CHANGES IN THE INCIDENCE AND DETERMINANTS OF EMPLOYER-FUNDED TRAINING IN BRITAIN, 1984-1994

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Abstract

Given the current political and economic importance attributed to private sector training for increasing the skills and productivity of the workforce, this thesis has examined, for the first time, how the determinants of employer-funded training changed for male and female full-time employees in Britain over the decade 1984 to 1994. A related objective, which investigates the importance of personal characteristics, is to determine whether or not an employer-funded training differential exists between white and non-white, male and female, full-time employees in the British labour market. In order to investigate these issues we use data from the Labour Force Survey and Quarterly Labour Force Survey, and it is important to note that these are the only sources of data in Britain which allow this to be undertaken.

Using logistic models and time-wise decomposition techniques we find that age, highest qualification, firm size and industry are consistently important factors determining training participation. Decomposition results suggest that the growth in employer-funded training between 1984 and 1989 was principally the result of increased demand for training and skilled labour by workers and firms, whilst the growth between 1989 and 1994 was due to the general improvement in the qualification base of workers rather than changes in the age or industry structures. These findings suggest that one key to increased training participation at the workplace is the continued reduction in the numbers of youngsters leaving school with low level or no qualifications. A separate analysis of the manufacturing sector confirmed these results.

We find that non-white employees in Britain are disadvantaged in access to employer-funded training compared to their white counterparts. As such, non-whites are estimated to receive only about one-half of the training received by whites. We have argued that this could lead to future labour market disadvantage in terms of reduced promotion opportunities and wages.

Outline of Contents

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Detailed Contents

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Chapter 1:
Introduction

Abstract

In this chapter the background and motivation for the empirical work undertaken in this thesis are discussed. The principal contributions made by this study are then highlighted. The final section of this chapter concludes by outlining the remaining chapters in this thesis.

1.1 Introduction

The last decade has seen a tremendous growth of interest by economists and governments in the relationships between work-related training and the economic performance of individuals, firms and nations.[1] A principal driving force behind this interest is the recognition by the advanced industrial countries that they cannot compete with the developing countries on the basis of labour costs, and that the survival of the industrial base, and hence the standard of living, depends crucially upon superior labour quality and hence the skills of current and future employees (Finegold, 1992). This has led governments to increasingly emphasise the need for changes in their country's education and training systems, and a central component of this has been to place greater importance on employer-led training in providing the skills necessary for improving productivity, adaptability and competitiveness (for example, see NEDO, 1984; OECD, 1995; and Stevens and MacKay, 1991).

Moreover, it is widely believed that Britain has, since the end of the Second World War, experienced a relative economic decline compared to other European countries which is has been reflected in inferior growth and productivity performance. This decline was particularly evident in the manufacturing sector, where in 1979, Britain's share of world manufacturing trade stood at 9.1% compared to 20.9% in 1937 (Crafts, 1993). Total factor productivity growth in manufacturing was also considerably lower in Britain compared to other advanced nations (Oulton and O'Mahony, 1994; Panic, 1976). One explanation recently put forward by many prominent economists (e.g. Bean and Crafts, 1995; Layard et al., 1992, 1994; Mayhew, 1991, Stevens and McKay, 1991; Prais, 1990) is that Britain's failure to create a well-educated and flexible workforce has prevented firms from improving productivity and successfully responding to changes in international competition and trade.

In recognition of these issues, consecutive British governments have introduced a host of initiatives since the early 1980s aimed at increasing the provision of training at the workplace. Perhaps the most important of these was the establishment of the Training and Enterprise Councils and the 'Investors in People' scheme in 1991. The key objective of these initiatives is to influence employers' attitudes and commitment, both financial and practical, to training, and to tailor training provision to meet the needs of local business to ensure that training is relevant to

[1] The increased interest by economists is demonstrated by the large number of academic articles and books which have been written about the economics of training in recent years (for books, for example, see Ashenfelter and

the economy (Marquand, 1994). Other major initiatives have been the setting up of the National Vocational Qualification system and the development of the National Training Targets. The former aims to provide a nationally compatible system of vocational qualifications, whilst the latter initiative aims to get all employees taking part in training or developmental activities as the norm by 1996.[2]

As a result of these policy initiatives there is much interest in determining the factors that affect the training decision-making process of individuals and firms, and consequently which workers receive training. At the individual level, this is also an important issue given the positive and significant relationship found between training and occupational attainment (Nichols, 1984, Greenhalgh and Stewart, 1986 and Pudney and Shields, 1997), wages (Blanchflower and Lynch, 1994, Blundell et al., 1996 and Booth, 1991) and labour market mobility (Elias, 1994, Dearden et al., 1997 and Greenhalgh and Mavrotas, 1996).

1.2 Main contribution

Given the current political and economic importance attributed to private sector training for increasing the skills and productivity of the workforce, this is the first study to empirically investigate how the determinants of employer-funded training have changed in Britain over the period 1984 to 1994. The analysis is undertaken for the labour force as a whole, and separately for the manufacturing sector, which is the largest employer of full-time workers in Britain. The period 1984-1994 was chosen because of the considerable changes that took place in official government training policy, the characteristics of the workforce and the industrial structure, and also because it represents the maximum length of time for which compatible training data was available from the Labour Force Survey. The use of repeat cross-sections of data in this thesis allows considerably more information to be gained about the training decision-making process of workers and firms, than is available from studies which have used a single cross-section of data. Furthermore, the application of the Oaxaca-type decomposition technique to investigate the origins of changes in the average probability of receiving employer-funded training also provides a new insight into the factors driving the increase in the training incidence which was witnessed over this 10-year period.

Lalonde, 1996; Ashton and Green, 1996; Booth and Snower, 1996; Chapman, 1993; Lynch, 1994; McNabb and Whitfield, 1994; Prais, 1995; Shackleton, 1992; Shackleton, 1995; Stern and Ritzen, 1991).

[2] For a more detailed history of training policy in Britain see Marquand (1994), Reid and Barrington (1994) and Sheldrake and Vickerstaff (1987).

This thesis additionally provides the first study to separately investigate the determinants of employer-funded training for white and non-white, male and female, full-time employees in the British labour market, and to make some conclusions about the extent, if any, of racial discimination in the access to training opportunities. We also point out, however, that these estimates of discrimination should be viewed with caution due to the fact that over 78% of non-white men and 57% of non-white women in our samples were born abroad. Differentials in training between whites and non-whites are an important economic and social issue due to the positive and significant relationships between training and employment, promotion and wages in Britain. Accordingly, poor access to training may help to explain the smaller returns to labour market experience found for non-whites in Britain (Shields and Wheatley Price, 1998).

For each of these studies we utilise data from the British Labour Force Survey and Quarterly Labour Force Survey (LFS/QLFS). The LFS/QLFS is the only data source in Britain which allows the determinants of employer-funded training to be examined over time, and provides a large enough sample of non-white male and female employees in order to reliably estimate separate determinants of training models for these groups.

1.3 Outline of chapters

Chapter 2 provides a review of the theoretical and empirical literature on the economic determinants of training. The chapter introduces the human capital approach to modelling the training decisions of workers and firms and discusses some recent theoretical advances, which predict that firms may be willing to contribute towards the cost of general training. A general critique of the human capital approach is also provided. The empirical section highlights the findings from the determinants of training literature focusing primarily on the results of British studies but also considering relevant international literature.

Using data from three cross-sections of the Labour Force Survey, Chapter 3 examines changes in the incidence and determinants of employer-funded training for male and female full-time employees in Britain between 1984 and 1994. We find that the incidence of employer-funded training increased significantly over the decade, with the greater growth occurring between 1984 and 1989. Logistic models indicate that age and qualifications are the key determinants of employer-funded training in each of the three years. We also find, for the first time, a clear and consistent relationship between industry and training with those employed in

public administration, health, education and finance receiving significantly more employer-funded training than those employed in other industrial sectors. Time-wise decompositions of the determinants of training estimates suggest that the majority of the training growth over the period 1984-1989 was attributable to changes in the demand for skilled labour by employers, rather than underlying changes in workforce characteristics. The opposite is found to be true for the period 1989 to 1994, with the (smaller) increase in training driven by changes in workforce characteristics. This chapter suggests that one key to increased training at the workplace lies in a continually improving education-system, which results in fewer youngsters leaving school with low-level qualifications or none. Given the findings for 1989-94 we also tentatively suggest that the government initiatives aimed at increasing training at the workplace (for example, the establishment of the Training and Enterprise Councils in 1991) may not have been particularly successful by 1994.

Chapter 4 investigates changes in the incidence and determinants of employer-funded training for manufacturing workers in Britain between 1984 and 1994. We focus on the manufacturing sector for two reasons. Firstly, it has experienced substantial structural change over the decade which is expected to affect the training decisions of workers and firms. Secondly, the manufacturing sector remains the largest employer of men, and the second largest employer of women, in Britain. We include, for the first time, sub-industry dummy variables in the determinants of training models, and we distinguish between on-the-job and off-the-job training, in order to gain a better understanding of the driving forces behind the observed growth in training investment. In addition, we compare the decomposition results for manufacturing with those for the publicly-orientated service sector. We observe that manufacturing employees receive considerably less employer-funded training than the national average or the publicly-orientated service sector. This analysis supports the finding that the high growth in the average probability of receiving employer-funded training between 1984 and 1989 was primarily due to increases in the demand for training and skilled labour by workers and firms, whilst the smaller growth observed between 1989 and 1994 was completely due to improvements in the work-related characteristics of the samples. Specifically, our results suggest it was the improvement in the educational base of manufacturing employees, rather than shifts in the age or industry structures, that was the key factor in increasing the incidence of employer-funded training.

In Chapter 5, ethnic differentials in the incidence and determinants of employer-funded training for full-time workers in Britain are investigated using data from the Quarterly Labour

Force Survey collected between December 1992 and November 1994. This is the only data source which provides a large enough sample of non-white male and female employees to allow for reliable estimation of the determinants of employer-funded training. Estimates of the determinants of all training, on-the-job training and off-the-job training, obtained using binomial and trinomial logistic regression models, show a marked consistency across white and non-white, male and female, employees. However, decomposition analysis indicates that non-whites receive only between 51%-73% of the mean predicted training probability obtained by whites. Furthermore, these ethnic differences cannot be explained by differences in observable characteristics. These findings suggest that 20 years of equal opportunities legislation in Britain has been unsuccessful in eliminating unequal access to employer-funded training for non-white workers. Moreover, low levels of training for non-whites might contribute to other forms of observed labour market disadvantage.

Finally, Chapter 6 summarises the work contained in the thesis. Our main findings are then reviewed and some suggestions for future research are made. A data appendix is also provided which gives further details of the derivation of the variables used in the econometric models.

Chapter 2:

The Determinants of Training in Britain: Theory and Evidence

Abstract

This chapter provides a review of the theoretical and empirical literature on the economic determinants of training. The empirical section focuses primarily on the results of British studies but also considers relevant international literature.

2.1 Introduction

This chapter provides a review of the determinants of training literature. In this thesis we are concerned with examining the real-world training experiences of individuals and firms. However, in order to better understand the issues that such an investigation brings to light, it is important to locate them in an appropriate theoretical context. Accordingly, in Section 2.2, we start by outlining the dominant theoretical approach in the economics of training. This is the theory of human capital that dates back to at least the time of Adam Smith. We then introduce some recent advances in the modelling of the training decision of individuals and firms, and also provide a general critique of the human capital theory. Section 2.3 discusses the results of empirical studies that have examined the determinants of training, focusing on studies that have used British data. Where informative, however, the results from international studies are also discussed.

2.2 Theory

2.2.1 The theory of human capital

The concept of human capital refers to the fact that human beings invest in themselves, by means of education and training, or other activities, which raises their lifetime earnings. The concept is an old one, dating back to at least the writings of Adam Smith in the 18th century.[1] It was not, however, until the 1950s and 1960s that the concept was further developed by the work of Mincer (1958, 1962), Schultz (1960, 1961) and Becker (1962, 1964). It was Becker, however, who provided the conceptual framework that fundamentally changed the way in which economists thought about skill acquisition. His framework provided a systematic method for seeking new results and implications of the theory, and practically every idea is his 1964 book[2] has been pursued at voluminous length in the last three decades (Rosen, 1989). Needless to say, the theory of human capital has dominated the economics of education and training and has had a powerful influence on the analysis of labour markets and wage determination.

The central argument put forward by Becker is that people can invest in themselves through education and training in order to secure future benefits in terms of increased wages. This is analogous to investment in physical capital. The model assumes a direct causality

[1] See Rosen (1987) and Shackleton (1995) for an extended discussion of the origins of the human capital theory. This includes the early writings of Adam Smith, John Stuart Mill and Alfred Marshall.

running from education and training to increased labour market productivity, and from increased productivity to increased wages. Becker's approach is based on a neo-classical framework of perfect competition, and is essentially one of a cost-benefit analysis where the benefits for undertaking education and training, suitably discounted, are compared with the costs. If the expected discounted benefits of training exceed the costs, then it makes rational sense to invest in training. A similar cost-benefit investment decision-making framework can be developed for firms who may increase their productivity, and therefore profits, by rationally investing in the training of their employees.

Perhaps the greatest contribution of Becker was to draw a distinction between general and firm-specific training. General training is that which produces skills that are valuable to more than one employer. These will include quite basic transferable skills such as reading and writing, interpersonal and other communications skills – but also higher abilities of a more specialised nature (e.g. economists, accountants). Individuals with these skills can expect to find a wide range of employers willing to pay them more than unskilled workers. In contrast, specific training 'has no effect on the productivity of trainees that would be useful in other firms' (Becker, 1964, p. 26). An example of specific training is induction training for new employees (e.g. a tour guide, training for a particular company's computing system or stock-control system). The key point to emerge from this distinction is that in a perfectly competitive labour market firms will be unwilling to pay for general training to their workers because they will not be able to recover the costs of training or reap any of the benefits. This is because individuals' gain the whole benefit from training, and firms cannot claw back the costs of training by paying workers below their marginal product due to perfect mobility of labour.[3] Employers do, however, have an incentive to provide specific training. As the workers' skills have no enhanced value outside of the firm, the employer does not need to pay higher wages to prevent 'poaching' by other employers i.e. there is no poaching externality problem. Workers, on the other hand, will not wish to invest in such training, because they cannot obtain the full benefits, as the skills acquired cannot be taken elsewhere. It is therefore possible that the marginal product of specifically trained labour can exceed the wage rate paid.

We can illustrate the training decision of individuals, in the human capital framework, by use of a simple model.[4] Our starting point is the assumption that individuals invest in

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[2] Second edition 1975.

[3] In Becker's words, 'Why ... would rational firms in competitive labour markets provide general training if it did not bring any returns? The answer is that firms would provide general training only if they did not have to pay any of the costs' (Becker, 1975, p. 20).

[4] The derivation and discussion of these illustrative models follows the exposition of Ashton and Green (1996). An extended discussion of the human capital approach to training can be found in Bosworth et al. (1994).

training (or education) in response to the prospect of economic return. For training to be undertaken, this return is required to be sufficiently large to at least compensate for the costs of the training. The individual's objective is to maximise a lifetime utility function of which a principal argument is lifetime wealth, which in turn depends on labour market skills acquired during the lifetime. We focus exclusively on this wealth and ignore the possible non-pecuniary costs and benefits of training. The individual's decision on whether to invest in training in each period derives then from maximising lifetime wealth, W_t, which is given by:

$$W_t = \sum_{t=a}^{R} \left(y_t(h_t) - mT_t\right)(1+\delta)^{a-t} \tag{1}$$

$$\text{subject to } y_t - mT_t \geq \psi \tag{2}$$

where $y_t(h_t)$ is income in period t (gained from wages and/or social security benefits), h_t is the stock of accumulated skills at the beginning of period t and T_t is the non-negative amount of training received in period t. The unit cost of training, m, include the opportunity costs of foregone wages net of any state subsidies. The individual's discount rate with regard to the training investment is δ, the individual's current age is represented by a and the age of retirement by R. Finally, ψ is the minimum income, given the presence of credit constraints, which the individual needs for spending on goods and services other than training (i.e. the greater that the individual is credit constrained, the greater is ψ). Equation (1) then expresses an individual's lifetime wealth as the sum of income net of training costs, for every year of working life, with future years' values being discounted to equivalent present values.

In the model the accumulated stock of skills held by the individual is the sum of past skills acquired. In line with Becker's perfectly competitive model we assume that these skills are general and transferable otherwise the individuals would not pay for training: they can be written as:

$$h_t = \sum_{j=1}^{t-A} T_{t-j}(1+d)^{(1-j)} + h_A(1+d)^{-(t-A)} \tag{3}$$

where A is the period since leaving full-time schooling, h_A is the skill level at that time and d is the rate of depreciation of skills. Equation (3) implies that current skills are gained from training undertaken last year and in previous years, but that the skill gained in previous years' training has been progressively depreciated over time.

The individual is assumed to have a good knowledge about the relationship $y(h)$ between

accumulated skills and income, which can be described by a set of parameters θ_h. The maximisation of (1) with respect to T_t and h_t, and subject to the credit constraint (2), gives the individual's demand for training. It is assumed in the literature that a general solution exists to this dynamic programming problem, and here it will take the form:

$$T_t = f_t\left(m, \delta, \theta_h, d, h_A, a, R, \psi\right) \tag{4}$$

Equation (4) simply states that the demand for training by individuals is a function of the various exogenous variables and the parameters of the model. The determinants of training literature discussed below then provide some plausible rationale (given the explanatory variables in the econometric model) to support the following comparative static predictions concerning the partial derivatives:

$$\frac{\partial T}{\partial m}<0, \quad \frac{\partial T}{\partial h_A}<0, \quad \frac{\partial T}{\partial \delta}<0, \quad \frac{\partial \mathrm{T}}{\partial \mathrm{a}}<0 \quad \text{and} \quad \frac{\partial \mathrm{T}}{\partial \mathrm{R}}>0$$

Therefore the model suggests that the individual's demand for training is greater (i) the lower the costs of training, (ii) the lower is the individual's initial skill level, (iii) the lower the individual's discount rate, (iv) the lower the current age and (v) the greater the age of retirement. The rationale for all these predictions is provided in the empirical review in the following Section.

The implications of this model can be further illustrated by use of a simplification. Assume that there are only two time periods until the individual retires from the labour market. These two periods can either be devoted to work or training (of course, in reality training and work can be undertaken simultaneously). We assume that the earnings function takes the form, $y = Bh^{\alpha}$, with $0 < \alpha < 1$. This trivially implies that the second period training is zero, and that, provided initial skills h_A are not so high as to preclude any positive demand for further training, the first period demand function for training is:

$$T = \left[\frac{\alpha B}{m(1+\delta)}\right]^{\frac{1}{1-\alpha}} - h_A \tag{5}$$

from which the first three of the above predictions flow directly.

In a similar manner to the individual we can illustrate the training decision of firms using a simple model. We start by making the standard assumption that the objective of the firm is to maximise a dynamic profit function, which can be written in the following way:

$$\pi_t = \sum_{t=0}^{\infty} (1-\tau)(P_t Q_t - w_{st} L_{st} - w_{ut} L_{ut} - c_t K_t - n\,\rho_t L_{ut})(1+r)^{-t} \qquad (6)$$

where Q_t is output and P_t its price; w_{st} and w_{ut} are the wage paths of skilled and unskilled labour, L_{st} and L_{ut}; c_t is the cost of capital, K_t; ρ_t is the proportion of unskilled workers being trained and n is the cost to the firm of such training (net of any subsidies); r is the rate at which firms discount future profits and τ is the tax rate. Equation (6) then expresses long-term profits as the sum of profits in each period, measured as revenue net of labour, capital and training costs, with future profits being discounted to present values.

It is assumed that the effect of the training is to turn unskilled into skilled workers ready for the next period. These may also be added to by recruiting skilled workers from the external labour market. It is also possible, however, that some skilled workers may leave the firm. Accordingly, we can write the amount of skilled labour used as:

$$L_{st} = \Lambda(w_{st}) + \frac{1}{1+D(w_{st})}\,(L_{st-1} + \rho_t L_{ut-1}) \qquad (7)$$

where $\Lambda(w_{st})$ is the contemporaneous supply of skilled workers from the external labour market, and D is the quit rate for skilled labour which is assumed to depend on their wage rate. Importantly, in the Becker framework, and in the absence of legal contracts binding the workers to the firm for a given length of time (e.g. the armed forces), we must assume that training is purely firm-specific in nature, since the existence of perfectly competitive labour markets would make general training unprofitable. Alternatively, however, a degree of labour market imperfection and/or asymmetry of information between the training firm and other firms can be assumed which would restrict labour mobility and therefore make it profitable for firms to provide general training. The recent theoretical models that introduce these factors into the training decision of firms are discussed below.

The model specification is completed with the production function:

$$Q_t = f\{L_{st}, (1-\rho_t)L_{ut}, K_t, TP_t\} \qquad (8)$$

where *TP* captures the rate of technical progress and where it is assumed that trainees do not contribute to production.

In a similar way to the individual's training decision, we can view firms as maximising (6) with respect to the range of choice variables, including ρ, subject to (7) and (8). Assuming a general solution to this problem exists, we then have the firm's unit demand for training in the form:

$$\rho_t = \rho\left(n, c_t, p_t, TP_t, \tau, r, \theta_f, \theta_\Lambda, \theta_D\right)$$

where θ_f represents the relevant parameters of the production function (8), θ_Λ those for the external supply of skilled labour $\Lambda(w_{st})$, and θ_D those for the quit function $D(w_s)$. As in the individual's case, a plausible rationale can be provided to suggest various hypotheses about firm's supply of training (or demand for skilled labour) used in the determinants of training literature. These can be illustrated more clearly by using a simplification of the model. As for the case of individuals, we assume there are only two time periods. We additionally assume that the firm's discount rate and the tax rate are set to zero. Moreover, assume that there is a unit endowment of first-period skilled labour, that there is a zero supply of second-period skilled labour (including those that have just been trained) and the quit rate is fixed at *D*. The firm then uses this skilled labour together with unskilled labour to produce a unit of output in each period, according to a Cobb-Douglas production function such that:

$$1 = \left[(1-\rho)L_{u_1}\right]^\beta = L_{s_2}^\alpha \, L_{u_2}^\beta \tag{9}$$

Given these assumptions the firm's rate of training in period 2 is, trivally, zero, and in period 1 can be derived as:

$$\rho = 1 - \frac{(w_u \alpha / \beta)^{-\beta/\alpha+\beta}}{(1+D)} \left[w_s + (1+D)(n+w_u)\right]^{\beta/\alpha+\beta} \tag{10}$$

From (10) it follows that $\partial\rho/\partial n < 0$, which implies that less training is undertaken the higher the cost to the firm of training. A second conclusion is that $\partial\rho/\partial w_s < 0$ which suggests that a higher-skilled wage results in less training being provided by the firm.

It is often argued, however, that actual training practice does not confirm to the general-specific distinction made by Becker. Employer-provided training often comprises both

general and specific elements, with some training being 'more general' and some 'more specific' than other training. The empirical evidence in Britain and the US also casts considerable doubt on the prediction that firms do not invest in employees' general training. Firms, it appears, realise an inordinate share of the returns to general training and are therefore willing to bear a substantial proportion of general training costs (see, for example, Rigg, 1989; Ryan, 1990; Bishop, 1991; Barron et al., 1989, 1993; Loewenstein and Spletzer, 1998). It has been found, for example, that the effect of an hour of training on productivity growth is about five times as large as the effect on wage growth (Barron et al., 1989, 1993, 1997; Bishop, 1991; Loewenstein and Spletzer, 1998). It also appears that workers bear little, if any, of the costs of training in the form of lower wages (Rigg, 1989; Barron et al., 1989, 1993; Lynch, 1992).

In recent years a number of theoretical contributions have attempted to identify situations where general training is profitable to employers. Several of these studies have developed models which predict that employers will be willing to fund some general training if there are information imperfections in the labour market which mean that other employers are not aware of the skills which generally trained workers have acquired (see Hashimoto, 1981; Katz and Ziderman, 1990; Chang and Wang, 1996; Acemoglu and Pischke, 1998). These models show that firms share the costs of general training because of informational asymmetries and their argument derives from the above empirical observation that workers pay few general training costs through lower wages during training. The rationale is that in the absence of perfect information recruiting firms would tend to place lower value on prospective workers' general skills than the firm that provided the training. This downgrading of general skills results in lower incentives for workers to share costs while it gives firms greater incentives to meet the costs of their own workers' general training. The key ingredient in this argument is that informational asymmetry restricts the 'portability' even of general skills.[5]

It has also been demonstrated that if labour markets are imperfect the training firm is able to reap some of the returns from general training. Stevens (1994, 1996) points out that the concepts of general and specific training are special and extreme cases of what she terms 'transferable training'. Most training, she argues, is useful to a limited number of firms, and usually not to an equal degree. The limited number of firms above must be imperfect competitors for labour. When firms are perfect competitors, workers' wages are equal to their

[5] Katz and Ziderman (1990) also point out that the UK government's policy to certificate and standardise skill levels within the NVQ framework may actually have the paradoxical results of discouraging employers from financing general training, for such initiatives will make workers' skills more visible to other firms.

marginal product; a worker who is offered less than his marginal wage simply leaves his current employers and works elsewhere. Under imperfect competition, however, firms have some market power, and consequently workers' wages turn out to be less than their marginal products. This allows employers to reap some of the benefits from providing general training.

Finally, Feuer et al. (1987) illustrate the viability of firm-financed general training, and show conditions under which investments by firms in general training are not vulnerable to risks of poaching by rival firms. They demonstrate that Becker's prediction does not necessarily hold if firm-specific training and general training are complementary and provided together. They argue that, to protect their investment in firm-specific training, firms may also share some of the costs (and benefits) of general training.

2.2.2. Limitations of the human capital approach

Whilst the human capital approach provides an attractive economic framework for examining the training decisions of individuals and firms, it misses a number of important elements of the real decision-making framework facing economic agents. These considerations imply that market failure will occur, since the free market is unlikely to supply the amount of training that is socially optimal (Stern and Ritzen, 1991).

Perhaps the greatest weakness of the human capital model is its heavy reliance on the assumption that firms and individuals have full information about all the relevant costs and benefits from training. However, uncertainty is the pertinent factor in real-life training decisions. For individuals this applies, in particular, to the relationship between skills and income, the probability of remaining with their current employer and also the value of their skills elsewhere. A similar uncertainty is faced by firms with regard to the expected job tenure of workers, future demand and prices for their goods and services, future technological developments and the true impact of training on productivity and profits. It is a well-established fact that markets are not efficient if there is risk for which no insurance can be bought, and if people are risk averse (Stern and Ritzen, 1991). Thus uncertainty in the training decision of workers and firms will lead to an under-investment in training. Finegold and Soskice (1988) have also pointed to the importance of individuals' and firms' expectations in the skill formation process. To the extent that individuals and firms take a pessimistic view of the future, an economy could settle into a 'low-skill equilibrium' rather than a 'high skill equilibrium' which could have resulted from acting on more optimistic expectations about the future. The simple model also assumes that capital markets are competitive. However, it is quite possible that workers faced with a training investment

decision may not possess the means to finance additional training out of income and could be unable to borrow from financial institutions. For an extended discussion of both the causes and the extent of market failure in the market for training see the collection of articles in Booth and Snower (1996) and Stern and Ritzen (1991).

A fundamental criticism of the human capital approach comes from the screening or signalling hypothesis (Arrow, 1973; Spence, 1974). This hypothesis argues against the productivity-enhancing role of education and training, and is based on the assumption of imperfect information between employers and workers. The hypothesis can be illustrated as follows. Suppose that individual 'A' could possess either a low natural ability level, associated with a low productivity of value $\Gamma 1$ to a future employer, or high ability and high productivity $\Gamma 2$ ($\Gamma 2 > \Gamma 1$). Further suppose that a risk neutral employer X (a good jobs firm) cannot, due to asymmetric information, determine the individual's ability and productivity before they are hired. From past experience and statistical findings, however, employer X knows that the probability that 'A' is type $\Gamma 1$ is Ω. Assuming X is hiring from a competitive labour market, if X knew A's type he would offer him a wage equal to his marginal productivity, $Y_i = \Gamma_i$. If employer 'X', however, does not know A's type the wage offered will be the pooled wage, $Y = \Gamma = \Omega\Gamma 1 + (1-\Omega)\Gamma 2$.

'A' has the option of undertaking training, which involves some cost to him. The cost of undertaking a given level of training is assumed to be smaller (i.e. a quicker propensity to learn) for the more able and productive individual, $\Gamma 2$, than for the less able and productive individual, $\Gamma 1$. As a result more training will be undertaken by $\Gamma 2$, which allows training to act as a signal to X of A's productive type. Implicit in this model is the non-productivity enhancing role of training, in that training is only useful as a filtering device helping to overcome the presence of uncertainty and asymmetric information which exists in the labour market. For recent empirical evidence on the human capital versus signalling/screening debate see Shah (1985), Mueser and Maloney (1991), Oosterbeek (1992), Groot and Oosterbeek (1994) and Weiss (1995).

A further criticism of the human capital approach comes from those who emphasise the importance of labour market institutions rather than individuals in determining training participation (for example, see Doeringer and Piore, 1971; Piore, 1983; Sobel, 1982). In particular, they emphasise the role played by trade unions and the government in training decisions. A further discussion of this and other theories of the working of the labour market, in particular the concepts of internal and segmented labour markets (Kerr, 1954; Siebert and Addison, 1991), can be found in Sapsford and Tzannatos (1993) and McNabb and Whitfield

(1994). Needless to say, the implications for the training decisions of workers and firms of these alternative views of the labour market complicates the simple and individualistic (assuming rationality) framework assumed by the human capital theory.

2.3 Empirical evidence

2.3.1. The empirical determinants of training in Britain

Interest in the empirical determinants of work-related training in Britain began with the seminal paper of Greenhalgh and Stewart (1987). Since then a number of studies have investigated the factors that are important in determining workers' and employers' training decisions and consequently who in the labour force receives training and who does not. The data used in these studies has either been from one-off surveys particularly focused on employment and training issues, or from one of the large continuing government surveys. The studies which have used government surveys have generally used only one cross-section of data, but a growing number are making use of either multiple cross-sections comparing findings over a number of years, or data from cohort surveys that interview the same respondents over a period of time. In general, the findings of these studies are explained in terms of changes in the costs and/or the expected benefits to the individual and firm of training, within the general human capital framework described above. It is implicitly assumed in this literature that most training has both a general and specific element, and firms contribute towards the cost of training their employees. Only a few studies have attempted to empirically distinguish between training provided at the workplace (assumed to be 'more' firm-specific) and training undertaken off-the-job (assumed to be 'more' general).

The econometric models used have typically included, as explanatory variables in the determinants of training models, a number of individual and employer variables that are expected to affect the costs and/or the benefits of training for the worker and the employer. It is usual to assume that training participation is the outcome of a joint optimising process by individuals and firms (although this is rarely made explicit in empirical studies). As such the determinants of training would be modelled best by two structural equations identifying the individual's demand for training and the firm's supply of training opportunities. However, due to a general lack of data by which to empirically distinguish these two equations, the vast majority of the literature estimates reduced-form equations.[6] Consequently, the empirical

[6] A recent exception is Oosterbeek (1998) who utilises data on workers' willingness to undertake training and bivariate probit analysis to distinguish between employees' demands for training and firms' supply of training

estimates have to be interpreted with some caution since each will be the outcome of individuals' and firms' decisions. In this section we will provide a detailed review of the findings from this literature. Our principal focus will be upon studies that have used British data, since these will be the most compatible with the empirical analysis of this thesis. However, we will also point to similarities and contrasts with the results from studies of the US and other European countries. The main British determinants of training studies as well as selected international studies are highlighted in Table 1. The definition of training adopted and the econometric techniques used for estimation by the main British studies are described in Table A1 in the appendix. The remarkable feature of these studies is their consistency across different definitions of training, different time-periods and different countries. This is particularly the case for the effects of age and education upon the probability of receiving training. The following section describes each of the main findings from this literature discussed separately the effects of individual and employer characteristics.

2.3.2. Individual characteristics[7]

It is generally agreed that men experience a significantly higher probability of receiving training than women[8] (see Arulampalam and Booth, 1997; Booth, 1990, 1991; Green, 1993a; Greenhalgh and Stewart, 1987), but that this differential diminished throughout the 1980s.[9] By the 1990s females in Britain were receiving higher training levels than males (Greenhalgh and Mavrotas, 1993,1996; Green and Zanchi, 1997). Similar trends have been found in Australia (Vandenheuvel and Wooden, 1997). In an often quoted study, Green (1993a) using data from the British General Household Survey of 1987, found (tentative) evidence of gender discrimination in access to training. Decomposing the gender training differential using the standard Oaxaca-type analysis, Green found that between 8% and 45% of the gender training differential was the results of gender discrimination at the workplace, with younger women being especially prone to discrimination. The fact that those younger women are more disadvantaged than older women is probably due to fears by employers that young females will quit for child-rearing. The study also provides some tentative evidence that

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opportunities.

[7] A review of the effect of ethnicity on the probability of receiving training is postponed to Chapter 5.

[8] Greenhalgh and Mavrotas (1994), however, using data from the Training in Britain Survey of 1987 found no significant gender differential in training once career aspiration variables (assumed to proxy motivation) were included in the determinants of training model. Note that the study examined training in the last three years i.e. 1984 to 1987.

[9] Greenhalgh and Stewart (1987) found that the probability of receiving training was 2.3 times higher for men than women using the 1975 NTS data. This differential was greater for highly paid (3 times) than for low-paid workers (1.6 times).

TABLE 1

The British and International Determinants of Training Literature

(Econometric-based studies)

Main British Studies	*Data set*	*Year(s)*
Greenhalgh and Stewart (1987)	National Training Survey	1975
Booth (1990)	Survey of Graduates and Diplomats	1987
Booth (1991)	British Social Attitudes Survey	1987
Green (1991)	Labour Force Survey	1984
Tan and Peterson (1992)	National Child Development Study	1981
Booth (1993)	British National Survey of 1980 Graduates	1986
Green (1993a)	General Household Survey	1987
Green (1993b)	Labour Force Survey	1989
Greenhalgh and Mavrotas (1993)	Labour Force Survey	1979,1984,1989
Greenhalgh and Mavrotas (1994)	Training in Britain Survey	1987
Green et al. (1995)*	Employers Manpower and Skills Practices Survey	1990-1
Green et al. (1996)*	Employers Manpower and Skills Practices Survey	1990-1
Arulampalam et al. (1996)	Quarterly Labour Force Survey	1993, 1994
Green and Felstead (1996)*	Work-Related Further Education Project	1990, 1992
Greenhalgh and Mavrotas (1996)	Labour Force Survey	1984, 1989
Blundell et al. (1996)	National Child Development Study	1981-91
Arulampalam and Booth (1997)	National Child Development Study	1981-91
Dearden et al. (1997)	National Child Development Study and LFS	1981-91, 1992-94
Green and Zanchi (1997)	Labour Force Survey	1985, 1995
Selected International Studies	*Data set*	*Year (s)*
Australia:		
Baker and Wooden (1992)	How Workers Get Their Training Survey	1989
Baker (1994)	How Workers Get Their Training Survey	1989
Miller (1994)	How Workers Get Their Training Survey	1989
Vandenheuvel and Wooden (1997)	Survey of Training and Education	1993
USA:		
Duncan and Hoffman (1979)	Panel Study of Income Dynamics	1975
Barron et al. (1987)	Employment Opportunity Pilot Project	1982
Altonji and Spletzer (1991)	National Longitudinal Survey of Youth	1986
Lillard and Tan (1992)	Current Population Survey	1988
Lynch (1992)	National Longitudinal Survey of Youth	1979-1985
Royalty (1996)	National Longitudinal Survey of Youth	1980-1986
Loewenstein and Spletzer (1997)	National Longitudinal Survey of Youth	1988-1991
Lynch and Black (1998)	Educational Quality of the Workforce Survey	1994
Netherlands		
Groot et al. (1994)	Brabant Survey	1983
Oosterbeek (1996)	OSA Labour Supply Survey	1992
Oosterbeek (1998)	International Adult Literacy Survey	1995
Germany		
Pischke (1996)	German Socio Economic Panel	1986-1989
Spain		
Aiba-Ramirez (1994)*	Collective Bargaining in Large Firms Survey	1989

Note:

'*' indicates that the study has used firm level rather than individual level data.

gender discrimination is greater for on-the-job than off-the-job training opportunities. The author does note, however, that part of the training differential could be the result of demand-side difference with women having a lower preference for training (due to prior social conditioning). Mallier and Rossier (1987) emphasise the importance of role models and the reinforcement of girls' and women's expectations in this process (this could itself be the result of discrimination or perceived discrimination). Failure to control for the possible problem of selectivity could bias the decomposition results if the average unobserved 'ability or motivation' of men and women differ due to differences in the employment process. A similar gender differential was found by Green (1991) using data from the 1984 Labour Force Survey. In a recent follow-up study, comparing the gender training differential using Labour Force Survey data for 1985 and 1995, Green and Zanchi (1997) find that in 1985 the unexplained (not the result of differences in work-related characteristics) gender differential was between 11-19% in favour of men in 1985. By 1995, however, the unexplained residual was around 19% in favour of women. This reversal in the gender training differential may partly account for the narrowing of the wage differential between males and females in Britain over this period (see Blackaby et al., 1997b).

The probability of training is universally found to be negatively related to age and positively related to qualifications. As already mentioned these findings are indifferent to the definition of training, the time-period and the country examined (Ashton and Green, 1996). Indeed, the fact that the young train more than the old, and the highly educated train to a greater extent than the poorly educated, is probably as near to a fundamental law as the science of economics permits. The generally accepted rationale for these 'laws' is that increased age reduces the expected benefits from training to the individual and firm because there are fewer potential years over which the returns can be reaped. Some emphasis, however, should also be given to the possibility of a 'vintage effect' in explaining this significant age-training relationship. This could occur if younger workers, having a greater willingness and motivation to train (i.e. due to changes in the social 'norm' and better information regarding the returns to training) than their older counterparts. In comparison, qualifications, which are often viewed as a proxy for the ability to learn, are associated with a reduced (psychological) cost of learning, and a higher likelihood of successfully completing a training spell and enhancing productivity from the application of acquired skills. As a consequence, there is a strong complementarity between education and training arising from a higher incidence of the expected benefits from training exceeding the costs of training for

the more educated.[10] As Booth (1991) points out, this complementarity has important policy implications, since an increasing reliance on employers to provide training will not necessarily lead to an improvement in the skill level of the general workforce. This, it is suggested, leads to a segmented labour market and an under-class of uneducated (and possibly unemployable) workers (Arulampalam and Booth, 1997).

Another common finding is that the age-training profile for men is steeper than for women (e.g. Booth, 1993; Green, 1993a; Greenhalgh and Stewart, 1987), which is consistent with the hypothesis that employers are more reluctant to train younger women, since they are more likely to quit for child-rearing (Green, 1993a). The correlation between training and qualifications is most pronounced for female employees (Booth, 1991; Green, 1993a), and for workers who have received employer-provided training early in their careers. In contrast, formal qualifications gained after school appears to have no significant effect on future training probabilities (Blundell et al., 1996).

Occupational status has also been found to play a significant role in the decision-making of individuals and firms (Greenhalgh and Stewart, 1987; Green, 1993a, 1993b). Higher level occupations (in the case of Greenhalgh and Stewart (1987) occupational status was defined in terms of hourly wages) are likely to reflect a higher level of current skills and are more likely to be subject to changes in the labour process. Greenhalgh and Stewart (1987) find that the probability of training is highest for men and single women in high level occupations, whilst for married women it is highest for those in lower level jobs. The study suggests, therefore, that training is an equalising factor in the labour market for married women, but a disequalising factor for men and single women. In contrast, Green (1993a) finds that the probability of training is significantly greater for men and women in high level occupations, but the differential between the unskilled and managerial-professional occupations is wider for females than males. It has also been suggested that the share of firm employment, which is of a particular occupational group, will have an effect on their probability of training. This is because there are likely to be economies of scale in establishing a training programme for each occupational group. Green et al. (1996) provide some evidence to support this hypothesis, with consecutively higher density occupations receiving significantly more training.

It is expected that time spent unemployed is likely to cause a depreciation in skills which may necessitate investment in training (to bring the worker's skills up-to-date). Booth (1991), however, found that increased months spent unemployed in the last five years significantly

[10] Oosterbeek (1998) also found that workers' whose parents undertook many years of education received a significantly higher probability of training. The author suggests that this findings can be interpreted in terms of

reduces the probability of training for male employees (with no significant effect found for females). She suggests that this might be due to employers' using spells of unemployment as a negative signal of workers' 'quality' and/or 'trainability'. In contrast, Arulampalam and Booth (1997) found no significant effect of past unemployment on the probability of training for men, but women who were unemployed in 1981 experienced significantly fewer spells of training between 1981 and 1991.

It is generally found that full-time employees receive significantly more training than those working part-time.[11] Part-time work has a similar effect to age in that it reduces the time over which the benefits from training can be reaped. In addition, the probability of training is found to be highest within the first six or twelve months of job tenure, which reflects initial investment in the skills necessary for the job (Arulampalam et al., 1996; Green, 1991; Green, 1993a; Greenhalgh and Mavrotas, 1994). The decline in training with job tenure is, however, more pronounced for females than males (Green, 1993a). This is because training is particularly important to females returning to jobs after a spell out of the labour market.[12] Elias (1994), however, found only a weak link between training and job tenure for women. Finally, trade union membership increases the likelihood of receiving training,[13] since trade unions provide a collective voice communicating and encouraging the training demands of workers (Booth, 1991; Greenhalgh and Mavrotas, 1994; Green et al., 1995, 1996b).[14] Green (1993b), however, find this to be true only in firms with less than 25 workers. Trade unions may also have an indirect effect on training if they are able to alter wages and other labour market conditions, thus altering the incentives for firms and individuals to invest in training (Green, 1993b). Trade union recognition at the workplace also tends to reduce employee turnover (see, for example, Elias, 1994), thus raising the potential period over which the training investment can pay dividends (Green et al., 1996). Of course, trade union presence can also reduce training investment by individuals if union

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having a lower discount rate and therefore attaching a greater weight to the future returns of training.

[11] Booth (1991) and Green (1993a), however, find this to be true only for female workers.

[12] The job tenure results should, however, be viewed with some caution due to the possibility of endogeneity (Booth, 1993; Green, 1993b; Blundell et al., 1996). The problem of endogeneity arises if there are unobservable characteristics of the worker or the firm (e.g. commitment if the training is firm specific in nature) that are correlated with both training participation and job tenure. As such job tenure will determine training participation and the coefficient for job tenure in the determinants of training models will not capture the effect of job tenure per se, but also the effect of the unobservable characteristics (see Section 3.5 for further discussion).

[13] In contrast, Arulampalam et al. (1996) finds trade union membership to be negatively correlated with training incidence, and therefore cast doubt upon the adequacy of the Quarterly Labour Force Survey's trade union membership question.

[14] In the US the evidence is more mixed. For example, Duncan and Stafford (1980), Mincer (1983), Lillard and Tan (1992) and Barron et al. (1987) find negative effects of union status on training. Barron et al. (1997), on the other hand, report insignificant union effects. In contrast, Lynch (1992) finds positive effects for formal training using data from the National Longitudinal Survey of Youth.

seniority rules apply, and promotion is fairly independent of training (Mincer, 1983).

There is no consensus concerning the impact of marital status on the probability of training. Greenhalgh and Stewart (1987) find that married and post-married men receive more training than single men, whereas Green (1991, 1993a) finds that marriage reduces the probability of training for women. Booth (1991) estimates no marital status impact for either sex. Several studies have found that the presence of children in the household is associated with a significantly lower probability of training (Green, 1991; Greenhalgh and Stewart, 1987; Booth, 1991 – for women only; Green, 1993a), with the disadvantage being considerably greater for married women than for married men. This is the case if employers believe that women with children are less committed to the firm, or if women themselves feel obliged to forfeit training opportunities owing to other commitments (Booth, 1991; Green, 1991; Green, 1993a). As Booth (1991) points out the former is tantamount to discrimination if a woman does not fit this stereotype.

2.3.3. Employer Characteristics

An important and generally consistent finding in the literature is that large firms invest in training to a greater extent than small firms. This is because large firms can reap both economies of scale (training provision may involve a large fixed cost) and be more certain of retaining the trainee (Green, 1991, 1993a; Greenhalgh and Mavrotas, 1994, 1996; Green et al., 1996b).[15] In the latter respect, the existence of internal labour markets in large firms supports the long-term relationship between workers and firms (which increases the expected benefits of training for the individual and firm). Large firms also tend to pay higher wages than small firms, which reduces labour turnover. It might also be the case that large firms need to provide initial training to their workers, which familiarises them with the structure, organisation and work ethic of the firm. Finally, large firms may regard training as a way to reduce monitoring costs (Barron et al., 1987). Despite these rationales, Booth (1991) finds that training is greater in large firms only for female employees. Alternatively, it has been suggested by Deloitte et al. (1989) that it is the enterprise rather than establishment size that is the important determinant.[16]

There appears to be less agreement concerning the effects of sector of employment, industry and region. Booth (1991) finds that training is higher for male employees in the

[15] Green (1993a) finds that this is significant for on-the-job training but not training provided outside of the workplace. Booth (1993) finds that the training differential between large and small firms is greater for males than females.

[16] As with job tenure, endogeneity may bias the estimated effect of firm size on training investment.

public sector than in the private sector. She suggests that this is firstly, because private sector firms are more constrained by the need to make profits and may be less willing to finance training, through fear of poaching, and secondly, private companies are more subject to the economic climate, making redundancies more probable and therefore more expensive. It might also be the case that public sector employers use training as a form of compensating non-pecuniary employee remuneration (Arulampalam et al., 1996). One implication of this finding is that the widespread privatisation that occurred since the mid-1980s would, ceteris paribus, have led to a reduction in training for males. Green (1993a) and Green at al. (1996), however, fail to find this correlation. Booth (1991) and Green (1993a) estimate that the industry in which the individual is employed has no impact for women, but men employed in 'agriculture, forestry or fishing' or 'other services' (Booth), and 'utilities' or 'other services' (Green), have a significantly higher training probability than other census-defined industries. From his findings Green (1993a) suggests that there is 'little support for the thesis that training is especially important in certain faster-growing industries.' In comparison, Green et al. (1996b), using an employer-based survey (rather than an individual-based survey), find substantial differences in training intensity between industrial sectors. In particular, workers in 'distribution' and 'utilities' have a significantly higher probability of training than the base group of 'other services', whilst employees in 'transport and communications' and 'metal goods, engineering and vehicles' are typically less likely to be trained. Greenhalgh and Mavrotas (1996) find that training is highest in 'non-tradable' industries (e.g. health, education and national and local government) and lowest in 'medium technology manufacturing' (e.g. foods, drinks, clothing, timber). Those employed in industries actively engaged in research and development were also found to have a higher probability of receiving training. Ooseterbeek (1998) finds similar results to Greenhalgh and Mavrotas (1996) for the Netherlands. He finds that, in 1995, the probability of training was lowest for workers employed in the agriculture, building and hotel sectors and highest in financial services and public services/government.

With regard to region of employment, Booth (1991), using 1987 data, found no significant effects for men, but women working in Scotland, the North or London were less likely to receive training than women in the South of England. Green (1991) found that workers in Wales, Scotland and Northern Ireland experienced significantly lower training levels than other regions in 1984. In contrast, Green et al. (1996b), found no consistency in the regional estimates, concluding 'that the region in which the establishment is located has very little influence on the training intensity of the workers' (p.14). Similarly, several studies (Arulampalam et al., 1996; Blundell et al., 1996; Green et al., 1996b) have found no

significant effect of local unemployment on the probability of training.[17] Theoretically, there are a number of reasons why training incidence will be related to the wider economic conditions (captured by the regional unemployment variables). It might be the case that firms curtail training activities in a recession because of constrained financial resources and/or altered labour recruitment patterns. Since the most common method by which firms vary their workforce is by varying the rate of recruitment (Elias and White, 1991), any fall in recruitment will tend to reduce training investment given that training participation is highest for new employees (Arulampalam et al., 1996). Similarly, the expected benefit to the firm (and the individual if the training is firm specific) from training may be reduced in times of recession if there is a possibility that the firm will have to lay-off staff. High unemployment areas might also be more likely to receive government-training grants in order to improve the skills available in the local economy. Conversely, employers might be more willing to provide general training for workers in times of high unemployment, given the reduced incentive for poaching and lower job mobility. An extended discussion of the theoretical and empirical evidence regarding the relationship between training and economic conditions can be found in Felstead and Green (1996).

Studies which have used employer-level data[18] have been able to shed additional light on the training decisions of firms. Three such examples are Dench (1993), Deloitte et al. (1989) and Green et al. (1996).[19] The first two studies are descriptive in nature, whilst the latter is based on econometric analysis. The data used in these studies is particularly valuable in that it provides direct information from questions asked to managers about why they provide training to their workforce. The results from the EMSPS suggest that firms provide training for a variety of reasons. The most important are to improve quality standards (85% indicating that this was very important), to meet health, safety and other legislative requirements (76%), to maintain and update existing skills (74%), to meet changing consumer requirements (66%), to implement new technology (57%), to implement organisational change (46%), to improve employee loyalty and reduce labour turnover (41%) and to attract good recruits. Similarly, factors which led firms to increase their training provision were the need to become more efficient and raise productivity (21% of firms), to enable the organisation to

[17] One exception is Arulampalam and Booth (1997) who found that male employees based in areas of high unemployment received significantly lower numbers of training spells between 1981 and 1991 (but not for women).

[18] These surveys generally contain greater detail about the characteristics of employers than is typically the case for worker-based surveys.

[19] Dench (1993) and Green et al. (1996) use data from the Employers Manpower and Skills Practices Survey (EMSPS), which is a nationally representative survey, collected between November 1990 and October 1991, of 2061 British firms with 25 or more employees. Deloitte et al. (1989) describe the data from the Training in Britain study.

become more flexible, adaptable and skilled (20%), to allow for the introduction of new technology and/or organisational change (18%), to meet the higher standards demanded by customers (13%) and to comply with quality initiatives and legal requirements (15%) (Dench, 1993).

Green et al. (1996) test a number of hypotheses about the effect of firm characteristics on the level of training provision. Firstly, given the finding of Alba-Ramirez (1994) for Spain and MacDuffie and Kochan (1995) for the US, it is proposed that foreign-owned firms in the UK might provide higher levels of employee training than native-owned firms. The rationale is that foreign-owned firms might have a more favourable attitude towards training, which stems from a longer time-horizon when considering training investment. Their econometric results, however, find no significant differences between foreign and UK-owned firms with the exception of those employed in personal and protective services and professional associate and technical positions. Secondly, it might be expected that firms that have experienced skill shortages in the last twelve months would be prepared to provide additional training in order to overcome the problem.[20] In all but management and administrative occupations, the experience of skill shortages had no significant impact on the probability of receiving training. Thirdly, given the findings of Dench (1993), firms who have experienced recent technological change (defined as experiencing either 'new product/service development' or 'new process development - new plant, machinery or equipment - in the past three years) might be required to provide extra training to their workforce. Using this measure of technological change, however, Green et al. (1996) found no significant evidence to support the hypothesis.[21] In contrast, employees based in firms which have undergone considerable organisation change (defined as implementing multi-skilling, job interchange, job re-design, 'just-in-time' scheduling, total quality initiatives or developing the 'corporate culture) were found to have a highly significant and positive training advantage. It appears then that firms are finding it necessary to increase their training provision in order to efficiently implement organisational changes. Finally, it is proposed that the degree of direct competition which firms experience might influence how much training they provide. We might expect that where there are a large number of competitors training intensity would be higher resulting in a competitive advantage. The results, from including a dummy variable

[20] Of course, it might also be the case that firms which provide good human resource development prospects for their employees are less likely to face skill shortages since good workers will be attracted to these firms (Jones and Gross, 1991).

[21] This contrasts to the finding of Alba-Ramirez for Spain. Using a dummy variable for technological change (i.e. taking the value one if the firm launched a new product or implemented a new production process) the study finds that firms which had implemented technological change provided significantly higher training levels.

indicating fewer than five competitors, however, were found to be insignificant for all occupational groups.

2.3.4. Summary

Table 2 summarises the results of the determinants of training literature, showing the expected effect of individual and employer characteristics of the probability of training and the level of consensus about the effect.

TABLE 2

The Main Findings from the British Literature on the Determinants of Training

Variable Type	Variable List	Effect on the probability of Training	Level of Agreement
Personal	Age	-	#
	Female	-	?
	Married	+	?
	Dependent Child(s)	-	?
Worker-related	Qualifications	+	#
	Occupational status	+	#
	New to job	+	#
	Trade union membership	+	#
	Part-time worker	-	#
	Past unemployment	?	?
Employer	Public sector	+	?
	High technology industry	+	?
	Small employer	-	#
	High regional unemployment	-	?

Notes:

1. A '#' in the final column indicates a relationship which has a general consensus, whilst a '?' refers to relationships for which conflicting findings are observed.
2. Table A1 in the appendix highlights the data sets used by the main studies.

Appendix

TABLE A1

The British Determinants of Training Literature: Definitions and Econometric Techniques

Main British Studies	*Definition of training*	*Econometric technique*
Greenhalgh and Stewart (1987)	Any 'vocational' training in last 10 years. Training defined as 'anything which may have helped an individual to learn to do his or her work.'	Reduced-form binary logistic
Booth (1991)	Formal job-related training. The survey question asks, 'In the last two years, have you been on any courses or had any other formal training, which was part of your work or helpful to your work?'	Reduced-form binary logistic
Green (1991)	Any work-related training received in the last four weeks. Also distinguishes employer-funded firm-specific training.	Reduced-form binary logistic
Booth (1993)	Any type of training received in the current job. The question asks, 'After you started this job did your employer arrange for you to have any formal training.' Separate binary logistic models estimated for all training, on-the-job and off-the-job training.	Reduced-form binary logistic
Green (1993a)	Any 'education, training or self-instruction that would help with (your job) or a job that you might do in the future.'	Reduced-form binary and trinomial logistic
Green (1993b)	Any work-related training received in the last four weeks. Divides training also into on-the-job and off-the-job components.	Reduced-form bivariate probit
Greenhalgh and Mavrotas (1993)	Various training measures from the LFS	Descriptive analysis only
Greenhalgh and Mavrotas (1994)	Divides between 'total training', 'employer arranged/paid for training' and 'individually arranged/financed training' (undertaken in the past 3 years).	Reduced-form Binary logitistic
Green et al. (1995)*	Continuing training, initial training, on-the-job and off-the-job training.	Reduced-form tobit
Green et al. (1996)*	Focuses on 'continuing training'. That is all training other than initial training in the last twelve months.	Reduced-form tobit
Arulampalam et al. (1996)	Any work-related training received in the last four weeks.	Reduced-form binary logistic
Green and Felstead (1996)	Overall volume of training e.g. increase, stayed the same, decreased over the recession	Reduced-form ordered probit
Greenhalgh and Mavrotas (1996)	Any work-related training received in the last four weeks.	Reduced-form binary logistic
Blundell et al. (1996)	Any training undertaken between 1981 and 1991 which helps develop skills that might be of use in a job. Focus on employer-provided training courses that lead to a qualification.	Reduced-form Binary and ordered probit models
Arulampalam and Booth (1997)	Number of training spells undertaken between 1981 and 1991 (broad definition of training, training spells defined as lasting at least 3 days).	Reduced-form Poisson and hurdle negative binomial poisson models
Dearden et al. (1997)	Use a number of training definitions derived from the NCDS and the QLFS.	A number of reduced-form models
Green and Zanchi (1997)	Any work-related training received in the last four weeks. Distinguishes on/off-the-job.	Reduced-form binary logistic

Chapter 3:

Changes in the Incidence and Determinants of Employer-Funded Training in Britain, 1984 – 1994 *

Abstract

Using data from three cross-sections of the Labour Force Survey, this chapter examines changes in the incidence and determinants of employer-funded training for male and female full-time employees in Britain between 1984 and 1994. We find that the incidence of employer-funded training increased significantly over the decade, with the greater growth occurring between 1984 and 1989. Logistic models indicate that age and qualifications are key determinants of employer-funded training in each of the three years. We also find, for the first time, a clear and consistent relationship between industry and training with those employed in public administration, health, education and finance receiving significantly more employer-funded training than those employed in other industrial sectors. Time-wise decompositions of the determinants of training estimates suggest that the majority of the training growth over the period 1984-1989 was attributable to changes in the demand for skilled labour by employers, rather than underlying changes in workforce characteristics. The opposite was found to be true for the period 1989 to 1994, with the (smaller) increase in training driven by changes in workforce characteristics. This chapter suggests that one key to increased training at the workplace lies in a continually improving education-system, which results in fewer youngsters leaving school with low-level qualifications or none.

* This chapter represents an extended version of Shields (1998).

3.1 Introduction

The last decade has seen growing interest in the links between the uptake of work-related training and the economic success of individuals, the productivity and profitability of firms and overall national performance. In Britain, much of this interest has focused on youth training and training in early adulthood and its effect upon the future wages and employment prospects of participants. A smaller number of studies (see Chapter 2) have examined the determinants of training throughout the life-cycle, even though this has strong implications for lifetime earnings. What literature exists, however, has been quite consistent in a number of its findings - namely, that the probability of an individual receiving training is positively related to their qualification level, the size of their employer's business and trade union membership, and negatively related to age, part-time working and length of job tenure. Determinants which remain more contentious are whether male employees receive more training than equivalent females, whether firms in technology-led industries fund more training, whether public sector employees receive more training than private sector workers, and whether the incidence of training moves pro-cyclically.

A re-examination of the determinants of employer-funded training, focusing on changes over the decade 1984 to 1994, is valuable for three reasons. Firstly, there has been a substantive shift in the characteristics of the British workforce (see Section 3.3). The ageing of the workforce would be expected to lead to a decrease in the observed incidence of training. Conversely, the fall in the proportion of the workforce possessing no formal qualifications, and the rise in the proportion with higher level qualifications, would suggest an increase. The size and direction of the observed change in training incidence over the last decade will partly depend upon the conflicting effects of these characteristics.

Secondly, there have been considerable changes in the economic environment. Growing international competitive pressures, coupled with notable advances in information and productive technology, have forced many firms to re-evaluate their organisational and productive strategies and consequently, their skill needs. Increased unemployment and greater job insecurity have encouraged individuals to consider their stock of labour market skills and hence their demand for education and training. The decade has observed significant industrial and labour market restructuring, with a reduction in the proportion of the workforce employed in the primary and manufacturing sectors, increased female participation in the labour force, increased part-time work and a shift towards the use of more skilled labour (Machin, 1996).

Thirdly, the Conservative government introduced many initiatives aimed at increasing the incidence of training at the workplace, such as the establishment of the Training and

Enterprise Councils and the introduction of 'Investors in People' in 1991. At the core of these policies lay a belief that individuals and firms should take greater responsibility for maintaining and up-grading the skills of the workforce.[1] Furthermore, other government policies such as the privatisation and contracting-out of public services, the weakening of the trade unions and the introduction of quality and safety regulations at the workplace may have affected individuals' and employers' demands for training.

This chapter has three aims:

- To highlight changes in the incidence of employer-funded training in Britain between 1984 and 1994 using the broadest definition of 'training' available in the LFS;
- To use multivariate analysis and cross-sectional econometric models to identify consistencies and changes in the determinants of employer-funded training for male and female full-time employees over the decade;
- To use Oaxaca-type decomposition analysis to examine the forces which drove any increase in employer-funded training over the decade.

The chapter is set out as follows. Section 3.2 describes the data source and the characteristics of the samples. Section 3.3 investigates changes in the incidence and characteristics of employer-funded training for full-time male and female employees in Britain between 1984 and 1994. Section 3.4 examines the determinants of employer-funded training using standard descriptive techniques. An econometric model of training incidence and the decomposition methodologies employed are introduced in Section 3.5. In Section 3.6 we discuss the econometric results and in Section 3.7 we describe the decomposition results. Finally, Section 3.8 presents some conclusions.

3.2 Data and sample characteristics

The data used in this and the following two chapters are drawn from the annual Labour Force Survey (LFS) and the Quarterly Labour Force Survey (QLFS) of the United Kingdom. The survey is conducted by the Office of National Statistics (ONS) on behalf of the Department of Education and Employment. The LFS was first conducted in 1973, and was introduced as a mandatory requirement of the UK's entry into the European Community under the terms of a

[1] See Booth and Snower (1996) for an up-to-date discussion of market failure in the training market and recent government initiatives.

regulation derived from the Treaty of Rome. The survey was carried out biennially up until 1983, then annually from 1984 to 1991 with around 64,000 randomly selected households (involving around 160,000 individuals) sampled in each survey. During 1991 the survey was expanded so that in the spring of 1992, for the first time, the data were collected quarterly, with a quarterly sample size approximately equivalent to that of the previous annual surveys. The QLFS is based on a panel structure that interviews respondents for five consecutive quarters. The data collection method used for the LFS/QLFS is face-to-face and telephone interviews with respondents in their home.

The principal aim of the surveys is to produce a set of national and regional employment and unemployment statistics for use by government departments and for comparison with other European Union countries based on internationally standardised definitions. In addition, the survey asks a wide range of personal questions to respondents relating to household composition, marital status, health and ethnicity, as well as work-related questions which included qualifications, training, occupation, job tenure, size of employer and industry of employment.

The main questions of interest for this thesis, which are used to construct the dependent variables for the econometric analyses, are those regarding individuals' experience of work-related training. The questions relating to training participation were introduced in the 1984 LFS, and have since been asked to working respondents in each of the consecutive surveys. The key question asked is:

1. 'Over the last 4 weeks, have you taken part in any education or training connected with your job, or a job that you might be able to do in the future?'

If the respondent answers 'yes' to the above question, then the following questions are asked:

2. 'Who paid the fees for this training?'

3. 'Where was the main place that you did this education or training (in the last 4 weeks)?'

4. 'What was / is the total length of the training course?'

In this thesis our focus will primarily be upon 'employer-funded' training. We make no distinction (if there is any to be made) between vocational education and training. An individual is identified as having received a spell of training that was funded by their current employer if the answer is 'yes' to question 1 and the employer is stated as paying for the training in question 2. We focus our attention exclusively on the incidence of employer-funded training rather than training which is funded by the individual, the government or

other funding source. This is because employers (see Table 1) fund the vast majority of training in Britain, and this allows a clearer interpretation of our empirical results.

There is, however, a problem with the definition of employer-funded training in the LFS/QLFS. This arises because we have no information about whether or not the employee has to forego wages or leisure time to undertake training. Thus we have no information about indirect costs of training to the employee. This is important because theory suggests that firms providing training may be able to recoup some of the costs of training by paying wages below the marginal productivity of labour (there may also be a loss in leisure time for the individual). This points to the need to model training participation as the outcome of joint optimising decisions of employers and employees (in a reduced-form framework), rather than that of the employer alone (as in, Veum, 1996, for example). A second problem highlighted by Felstead et al. (1997) is the LFS method of interviewing a substantial proportion of respondents using another member of the household; such a proxy may introduce a element of unreliability into the training responses (Felstead et al., 1997; Green and Zanchi, 1997). Given that proxies are used for men (because they are, on average, more likely to be working or outside of the home) more than women, this might affect estimates of any gender training differential.

There is also an issue of compatibility between the LFS and other surveys used to examine the incidence and determinants of training. This arises because there is no general agreement on what constitutes training (see Campanelli and Channell, 1994; Felstead et al., 1997; Shackleton, 1995). Surveys may differ in their estimates of training incidence and other training-related variables as the exact questions asked, and the degree of memory prompting and similar factors, vary.[2] Moreover, using surveys to examine changes over time is likely to exacerbate further this problem. An individual's reply to the training participation question is likely to be conditional on the year of interview. This might be particularly important in recent years given the recent political heightening of issues surrounding education and training. Nevertheless, the LFS remains the only large-scale data source capable of revealing trends in training incidence whilst permitting adequate sample sizes for important sub-groups of the working population.

A discussion of the particular data used in each of the empirical chapters will be introduced in their own data sections. The details of the variables used to identify the samples and derive the dependent variables and covariates in our models are provided in the data appendix at the end of the thesis.

For this chapter the data which we use are drawn from three of the Labour Force

Surveys: the annual surveys of 1984 and 1989, and the quarterly survey of the spring of 1994 (known as quarter 1). We use the first quarter of 1994 to allow seasonal compatibility with the two earlier surveys, both of which were collected in the spring months of March, April and May. By using these three surveys we have a consistent source of data with which to investigate changes in the incidence and determinants of training over a complete 10-year period.

From each of the three surveys we extracted two samples, that of male (MFT) and female full-time employees (FFT) aged between 16-65 for men and 16-60 for women. We define a full-time employee in the standard way as usually working 30 hours or more per week. We exclude from the analysis those still at school or in other full-time education, and immigrant and ethnic minority groups since these groups may have different training profiles to native-born whites. The incidence and determinants of training for ethnic minorities in Britain is examined in Chapter 5. After these exclusions we gain a final sample of approximately 28,000 male and 14,000 female employees of working age in each of the three years.

Table A1 in the appendix provides the means of the samples, for male and female full-time employees, in each of the three years. One major shift in the characteristics of the employee workforce in Britain between 1984 and 1994 has been the sharp fall in the percentage of workers under the age of 25. This decline was particularly evident for those under 20 and in the latter half of the decade, and is the result of the significant increase in the number of young people (particularly females) going into higher education and demographic changes. Accordingly, in 1984 18.3% of male and 32.5% female full-time employees in Britain were aged between 16 and 24. By 1989 and 1994 these figures had fallen to 17.8% and 28.7%, and 12.5% and 18.7% respectively. This ageing of the workforce would, ceteris paribus, suggest a fall in the reported incidence of training especially post-1989,[3] and is also reflected in the marital status and dependent children control variables (particularly for women).

The decade has seen a considerable increase in the proportion of the workforce possessing high level qualifications and a pronounced fall in the proportion having no formal qualifications. This is due to a cohort effect, where older and poorer educated generations of employees drop out of the labour market and young workers with a higher probability of having a qualification enter. As with age, this change in the qualification base of the workforce was particularly evident between 1989 and 1994. For example, in 1984, 42.4% of

[2] See Arulampalam et al. (1996) for a discussion of 'recall error', and how it applies to the LFS.

[3] It might also be the case that the most able youngsters enter into higher education, leading to a lower average ability level for those entering work. This would also lead to a decline in training incidence for those under 21 years.

males and 33.7% of females in our samples had no qualifications. By 1989 these percentages had fallen to 29.7% and 25.6%, respectively. The period 1989 to 1994 then witnessed a particularly pronounced improvement in the education level of employees, with only 13.9% of men and 15.5% of women claiming to possess no qualifications in 1994. At the other end of the qualification spectrum, the decade saw a considerable increase in proportion of employees having a degree or higher degree , and secondary or higher level vocational qualifications. Overall, then, we would expect that this improvement in the qualification base of British employees would have led to an increase in the incidence of training.

A third prominent shift in the characteristics of British full-time employees is the result of changes in the industrial structure. It is well known that the manufacturing sector in Britain has seen a relative decline in the post war period in both total factor productivity and the percentage of the workforce which it accounts for. Although there is some evidence to suggest that the decline in productivity rates had been reversed in the 1980s, the fall in the proportion of the workforce employed in manufacturing continued through the 1980s and into the 1990s (see Chapter 4 for further discussion). In our 1984 samples, the manufacturing sector was the largest employer of full-time workers in Britain, accounting for 34.6% of male and 24.1% of female employees. In 1989 these proportions had fallen to 33.9% and 21.2%, respectively, and by 1994 they stood at 30.9% and 17.0% respectively. For females, 1994 saw, for the first time, health and social work take over from the manufacturing sector as being the largest employer. As well as manufacturing, the 10-year period also saw a fall in the percentage of males and females employed in agriculture and fishing, mining and quarrying, construction (for males only) and the utilities (electricity, gas and water). The latter change being the outcome of efficiency drives following privatisation.

The converse of the decline in manufacturing was the increase in the numbers and proportion of full-time workers employed in the private service sector, in particular finance, real estate, and the accompanying rise in the percentage employed in 'publicly-orientated' services – public administration, education and health and social work. The expected effect upon the incidence of training from these industrial shifts, is unclear. From the empirical literature review in Chapter 2 we know that the reasons firms provide training to their workforce is multi-faceted. The infusion and adoption of new technologies, compliance with health, safety and quality regulations, the changing demands of customers and high employee turnover are all important factors determining a firm's training and skill needs (see Dench, 1993). We might expect that technological demands are higher in certain manufacturing industries and finance, than say education and construction. The degree of regulation will also differ considerably between industries. Booth (1993) has highlighted expected differences

between firms in the private and public sectors resulting from different competitive pressures and worker retention rates. The overall effect on the reported incidence of training of the industrial shifts that took place between 1984 and 1994 is an empirical question, which is addressed later in this chapter.

For male employees the decade has seen a small increase in the proportion of total employment accounted for by firms with less than 25 workers. The opposite, however, is found for female employees. Given the standard theoretical result and empirical finding that large firms invest in training to a greater level than their small firm counterparts, the effect upon training is expected to be positive for males and negative for females. Perhaps a more substantive shift has been in the proportion of new full-time recruits to British firms. As we might expect the proportion of employees with less than one year of job tenure was highest for females and in the more favourable economic climate of 1989 than in 1984 and 1994. However, there was a sharp decline in the percentage of new recruits after 1989, with 16.5% of men and 21.8% of women having less than one year of job tenure in 1989 falling to only 5.2% and 5.3% respectively in 1994. The differences between these years is difficult to explain, but is likely to have had a positive effect upon training incidence given that new recruits generally require some initial firm specific training in order to begin work. Conversely, of course, the asymmetry in information between the employee and employer concerning both the employee's ability and his or her commitment to the firm will be greatest for new recruits which implies a lower level of training investment by firms.

3.3 Changes in the incidence and characteristics of employer-funded training in Britain

We begin by highlighting how the incidence and characteristics of training have changed for males and females between 1984 and 1994. Table 1 provides the reported incidence of training, dividing total training into that which is employed-funded, self-funded and government-funded. The table shows a significant increase in the percentage of the workforce experiencing training between 1984 and 1994. The majority of this increase occurred in the first half of the decade, between 1984 and 1989, with males experiencing little training growth between 1989 and 1994. In comparison, female employees benefited from continual growth, experiencing both a higher cumulative growth rate (71% increase in training between 1984 and 1994, compared to 51% for men) and a higher incidence of training than males throughout the 10-year period.

TABLE 1: The Percentage of Employees Receiving Training in the Last Four Weeks by Funding Source

	MFT			FFT		
	1984	1989	1994	1984	1989	1994
All training	9.6	14.2	14.5	11.4	17.6	19.5
Employer-funded	7.8	12.1	12.6	8.4	14.4	16.0
	(81.3)	(85.2)	(86.9)	(73.7)	(80.4)	(82.1)
Self-funded	0.9	1.1	1.0	1.2	1.9	2.1
	(9.6)	(8.2)	(7.1)	(10.9)	(11.0)	(11.0)
Government-funded	0.6	0.2	0.3	0.9	0.6	0.6
	(6.3)	(1.6)	(2.3)	(8.1)	(3.5)	(3.1)

Notes:

1. All figures are significant at the 5% level.
2. The figures in brackets give the percentage of all training accounted for by each funding source.
3. Employer-funded includes training funded by the current employer or a potential employer; Self-funded includes training funded by the individual, their family and relatives; and Government-funded training includes training funded by local authorities, TECs and other government agencies.

As well as significant growth in the reported incidence of training the decade saw a notable shift in the method of financing training. Most importantly, we have seen an increase in the proportion of total training which is primarily funded by employers. By 1994, employer-funded training accounted for 86.9% and 82.1% of total training for full-time males and females respectively. These figures having increased from 81.3% and 73.7% in 1984. On the other hand, there was a decline in both the proportion and incidence of training funded by government sources, and for men, the period also saw a significant fall in the proportion of total training which was funded by the employee himself/herself.

With regard to the location of employer-funded training, the data indicates that there has been a considerable shift by British employers away from providing training at off-the-job establishments, and towards training their staff at the workplace (on-the-job). The most significant occurred for male employees with on-the-job training accounting for 55% of all their employer-funded training in 1989, but rising to 65% by 1994. In comparison the shift was smaller for female employees increasing from 65% to 68% of all employer-funded training, by 1994. By contrast, there was a decline in the proportion of training taking place off-the-job in colleges of further education, universities and other educational establishments (22% to 14.5% for males, and 18% to 14% for females). Two other important developments over the period have been the steady increase in the amount of employer-funded training taking place at another employer's premises, and an increased use of the Open University and

correspondence courses by British employers.

Finally, as discussed elsewhere (e.g. Felstead and Green, 1996; Greenhalgh and Mavrotas, 1993) the data reveal a trend towards shorter spells of training in Britain. For instance, there was a substantial increase in the proportion of training lasting less than one week (38% and 40% of male and female training in 1989, rising to 53% and 51% by 1994), and a corresponding decline of training lasting at least six months. As a result, the mean length of employer-funded training spells fell from between 1 and 2 months for both sexes in 1989, to between 3 and 4 weeks in 1994. This may indicate that as the proportion of employer-funded training provided at the workplace increased, there was some trade-off in length, and perhaps quality, of average training received.[4] In particular, there appears to be some evidence that qualifications are now often being awarded for short courses which have little depth (see Felstead and Green, 1996, for a full discussion). In terms of training expenditure, however, evidence from the CBI's Industrial Trends Quarterly Survey is more encouraging. This suggests that for each year since 1989 a far greater number of British firms have expected to authorise more, rather than less, expenditure on training in the next 12 months than in the previous 12 months.[5] This trend is also confirmed by a similar survey carried out by The Industrial Society.

The figures above provide us with useful information about trends in the incidence and characteristics of training in Britain. We now turn to a descriptive investigation of the determinants of employer-funded training using standard statistical techniques. In particular, we are interested in investigating whether the relationships between individual and firm characteristics and the receipt of training suggested by theory and supported by previous empirical work (see Chapter 2) hold true for our sample of male and female employees in 1984, 1989 and 1994.

3.4 A descriptive analysis of the determinants of employer-funded training

Economic theory and empirical evidence suggests that the age of the employee is the most important factor in the training decisions of individuals and employers. The rationale is that

[4] Unfortunately, the LFS is unable to identify whether total training time increased or decreased over the period. This is because of the discrete nature of the training length question and the inclusion, in 1989 and 1994, of a category for 'ongoing/no definite limit' training (representing around 16% of total employer-funded training), which provides no training length information. The author is unaware of any other data source which allows for the reliable calculation of total training time over the period.

[5] The survey asks whether employers 'expect to authorise more or less expenditure in the next twelve months than you authorised in the past twelve months on training and retraining?' A simple balance of opinion is constructed by subtracting the negative answers from the positive ones. The balance has remained positive since the training question was added to the survey in 1989.

increased age reduces the time available for individuals and firms to reap the returns to their training investment. This in turn reduces the occurrences where the expected benefits exceed the sum of the direct and indirect costs of undertaking/providing training.

The relationship between age and the mean level of employer-funded training for male employees is provided in Figure 1 and by age groups in Table A2. Figure 1 shows that the relationship between age and training for men has been negative throughout the decade, with the likelihood of receiving training being far higher for those male employees under 20 years of age, than any other age group. Interestingly, however, whereas the percentage receiving training in each age group over 20 years of age increased considerably after 1984, employees under 20 years appear to have seen little, if any, training growth. For example, whilst those aged 16-19 observed a slight growth in the percentage receiving employer-funded training (25.8% in 1984 to 26.2% in 1994) males aged between 50-54, for example, experienced a 178% increase (3.2% in 1984 to 8.9% in 1994).

For each of the three cross-sections, there appears to be only a gentle (linear looking) decline in the likelihood of receiving employer-funded training after the age of 20. Simple correlation tests (Pearson) confirm the significance of this relationship at the 1% level in each of the three years. There appears to have been a flattening of the age-training profile with the size of the test co-efficient declining from -.1849 in 1984, to -.1448 in 1989 and to -.1112 by 1994. This implies that the incidence of training for older male workers increased at a greater rate than for employees new to the labour force. Men aged over 55, for example, experienced a 220% increase in employer-funded training between 1984 and 1994, which compares to a 87% increase for men aged 30-34 and a 18% increase for men aged 20-24.

The corresponding information for female employees is given in Figure 2 and the final three columns of Table A2. It is clear that the relationship between age and training is considerably flatter for females than males. One reason for this is that female employees under the age of 20 receive far less training than equivalent males. This differential has, however, diminished since 1984. Female teenagers experienced only 52% of the training of their male counterparts in 1984, however, by 1989 this figure had risen to 56%, and to 70% by 1994. This suggests that employers have increasingly become willing to invest in their young female workforce.

The decline in the percentage of females receiving employer-funded training after the age of 20 is more gradual than for the male case. In 1994, women aged between 35-39 received 97% of the training for the 16-19 age group, this figure fell only to 61% for women aged 50-54. The equivalent percentages for men are 51% and 34%, respectively. The flatter age-training profile for women employees is confirmed by the correlation tests. The tests indicate

a weaker correlation between age and employer-funded training (only significant at the 5% level for 1989) for females, declining from -.1030 in 1984 to -.0443 by 1994. In contrast to males, this flattening of the profile appears not to have continued after 1989.

FIGURE 1: Mean Employer-Funded Training Levels by Age: Male Full-time Employees

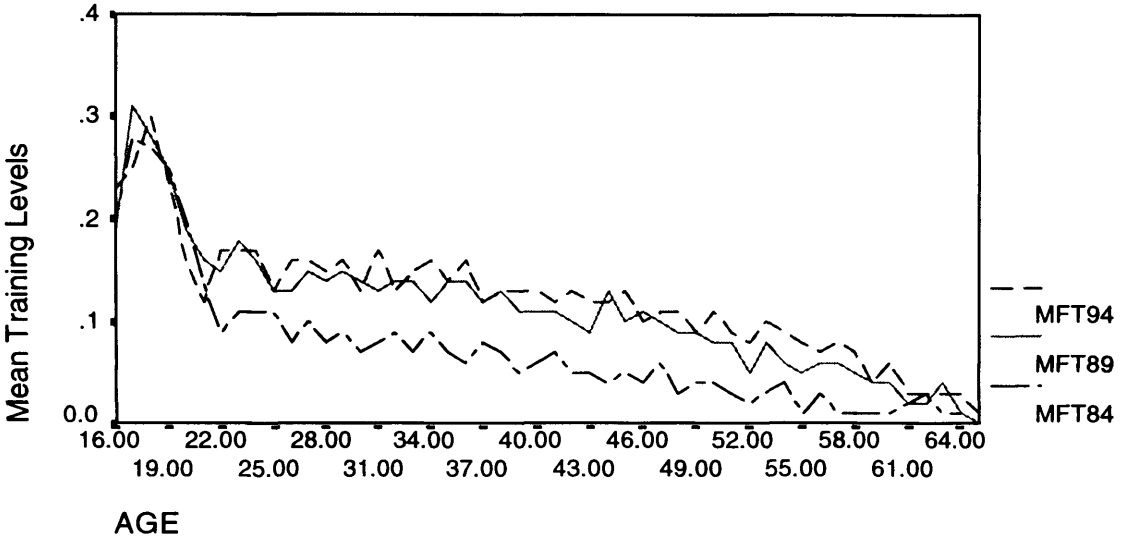
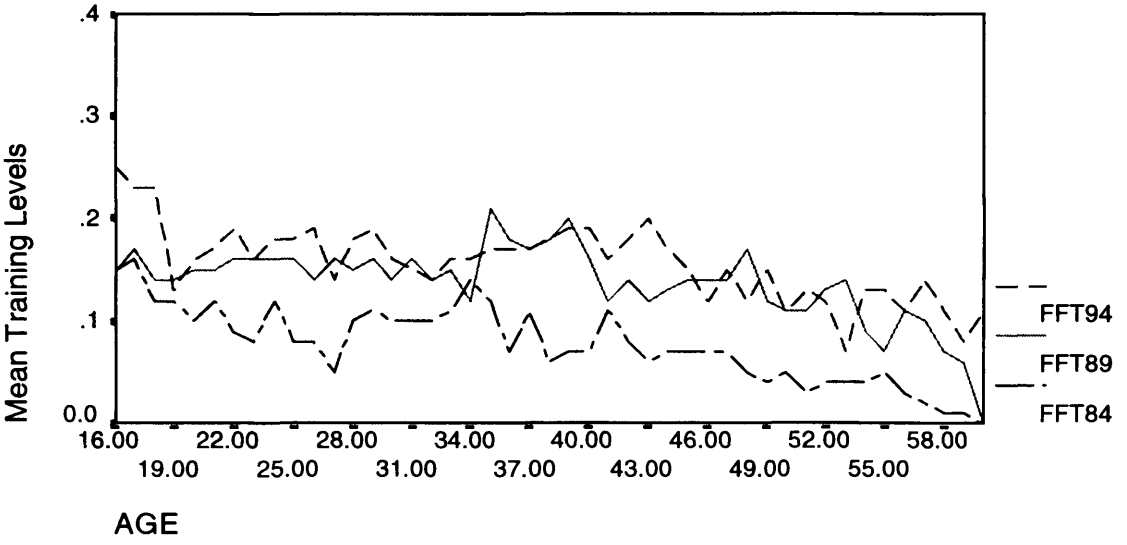


FIGURE 2: Mean Employer-Funded Training Levels by Age: Female Full-time Employees



The level of the highest qualification possessed by a worker appears to play a major role in whether or not he or she is likely to receive employer-funded training. Qualifications, which are often viewed as a proxy for ability, are associated with a reduced cost of learning and a higher likelihood of enhanced productivity from the application of acquired skills. Qualifications may act as a signal to employers regarding the workers learning ability, thereby reducing the risk to employers from investing in individuals who may fail to complete a course of training.

TABLE 2: Pearson Correlation Tests: The Relationship between Age and Employer-Funded Training Participation

Correlation tests	Pearson parametric
MFT 1984	-.1849 (p=.000)
MFT 1989	-.1448 (p=.000)
MFT 1994	-.1112 (p=.000)
FFT 1984	-.1030 (p=.000)
FFT 1989	-.0443 (p=.044)
FFT 1994	-.0496 (p=.000)

It can be clearly seen that individuals who hold high (e.g. first degree) and medium (e.g. 'O' levels or equivalent) level qualifications are likely to experience a considerably larger amount of employer-funded training than employees who possess no formal qualifications. Moreover, it appears that this relationship is even more pronounced for female employees than males. For example, whilst the difference in the percentage of male employees reporting training with a degree and with no qualifications was 13.3% in 1984, 19.7% in 1989, and 16.2% in 1994, the corresponding figures for female employees were 15.9%, 26.5% and 22.1% respectively. It is interesting that this gender difference does not derive from the fact that women with no qualifications receive less training than equivalent males, but from the fact that females with higher level qualifications receive substantially more training than men with equivalent qualifications. Table A2 also suggests that the differential between those with qualifications and those without increased significantly between 1984 and 1989, but declined somewhat by 1994. This movement implies that in times of relative economic prosperity employers turn to their qualified rather than unqualified workforce to satisfy their training needs.

Social class as defined by occupational status is positively associated with training. However, these figures should be viewed with caution, due to that fact that the relationship between occupational class and training is likely to reflect the qualification level of the employee and cannot be taken as an independent effect. Nevertheless, the cross-tabulations suggest that individuals employed at a professional level within the firm benefit from a higher likelihood of receiving employer-funded training than those employed at other levels. The training advantage for professional groups is small with regard to those employed in intermediary (associate professionals e.g. nurses, firemen) positions, and largest for those working in partly skilled and unskilled jobs. As was the case of qualifications, the differential in training between those higher up the occupational ladder and those at the bottom appears to

have widened. For male employees, the differential in the percentage reporting training increased from 9.9% in 1984, to 16.78% in 1989 and to 17.9% by 1994. The corresponding figures for females are 19%, 23.9% and 22.4% respectively. This increase is due to unskilled workers experiencing very little absolute training growth over the decade, in comparison to those employed in professional and skilled occupations. As with qualifications, the relationship between occupational status and training is more pronounced for female workers. A final point is that, non-manual skilled workers experienced an increasing training advantage over manual skilled workers over the period. This may reflect the growth in computer-intensive jobs for non-manual workers since the mid-1980s.

The region in which the firm is located appears to have some effect on its training intensity, but is found to be considerably weaker than the effects of age and qualifications. The regional variables are likely to capture differences in the local economic environment. This is important because employers' decision making regarding training investment may differ depending, for example, upon whether the labour market is 'tight' - with low levels of unemployment and the increased threat of high worker job mobility -, or 'loose' - with high unemployment and reduced possibilities of employment elsewhere. Regions also differ in both their age and industry compositions, which is likely to affect the reported level of training in each region. The cross-tabulations suggest that training levels throughout the 1980s have been generally higher (around 30% on average) in London and the South of England compared to the other regions of Britain. However, this differential with regard to regions in the North of England appears to have diminished by 1994.

Industry of employment is a key determinant of employer-funded training in Britain. Industries will have different training requirements due, for example, to differences in production technologies and levels of computerisation, the speed of technological adoption, the degree of imposed quality and safety regulations and the level of employee turnover. With these factors in mind, there appears to have been a remarkable consistency in the relationship between training and industry in Britain between 1984 and 1994, with a clear-cut training-industry hierarchy in existence. Those men and women employed in the 'publicly-orientated' industries - public administration, health and education - combined with those working in finance and the utilities gained the highest levels of employer-funded training throughout the ten-year period. Those employed in agriculture and fishing experienced the lowest levels of training.

Large employers are found to fund more training than smaller firms, with the differential rising considerably after 1984. This finding is consistent with the hypothesis that larger firms can spread the fixed costs of training and also benefit from a greater likelihood of retaining

trained workers. Those newly employed with the firm have a higher likelihood of training than established workers, which suggests initial investment in the skills necessary for the job. The relationship between temporary working and training, however, is not so clear-cut, with the figures, in part, capturing the effect of age (as most temporary staff are under 25 years). Similarly, with regard to marital status and family responsibilities, being single or having a young child are associated with higher training levels, which again is likely to reflect the higher training levels of the young.

We now turn to a more rigorous examination of the determinants of employer-funded training, identifying the independent effects of the individual and employer characteristics on the probability of an individual receiving employer-funded training in the four weeks prior to interview.

3.5 A model of training incidence and the decomposition methodology

Throughout this thesis we make the assumption that the receipt of training by an employee is the joint outcome of optimising behaviour on the part of workers and employers (see Chapter 2). Given the cross-sectional nature of the data and lack of variables by which to separately identify employees' and employers' demand and supply of training, it is not possible to model the structural framework of the training decision. Consequently, because of the dichotomous nature of the training outcome reduced form binary logistic models, estimated by maximum likelihood, are used to estimate the probability of an individual with certain characteristics, reporting to have received employer-funded training within the four weeks prior to interview (see Judge et al., 1985, pp. 753-4, for different motivations for the use of binary choice models in economic settings). Since there is no economic or theoretical grounds (see Amemiya, 1981), for deciding upon which type of binary response model to use (e.g. probit, Weibull, logistic), the logistic model was chosen because of its common use in the determinants of training literature, which allows comparisons to be drawn (see Table A1 in the appendix of Chapter 2). Whichever one of these models is chosen, however, will be superior to the linear probability model that suffers from heteroscedastic errors, leading to inefficiency, and estimated probabilities outside the acceptable range (0-1). We estimate separate logistic models for male and female full-time employees for 1984, 1989 and 1994. This approach allows the relationship between training and the independent variables in the model to vary by gender and year.

Let T^* be the unobserved net benefit to the individual and employer from providing training. Assuming an efficient bargain has been struck, a training spell will be recorded by

the individual at interview if $T^* > 0$. Therefore, the model can be denoted by:

$$T^{*M} = \alpha^M X^M + \mu^M \quad (1)$$

$$T^{*F} = \alpha^F X^F + \mu^F \quad (2)$$

$$T^p = 1 \quad \text{iff} \quad T^* > 0$$

$$T^p = 0 \quad \text{iff} \quad T^* \leq 0$$

where T^p is a dummy variable indicating receipt of training, X, represents a vector of individual and employer characteristics, μ denotes an error term and the superscripts M and F refer to male and female full-time employees respectively.

The resulting model calculates the probability of the *i*th individual receiving employer-funded training in the last four weeks, as follows:

$$\Pr(T_i = 1) = \frac{e^{(x_i'\beta)}}{[1 + e^{(x_i'\beta)}]} \quad (3)$$

The model is estimated by maximum likelihood, by assuming the observations are independent and treating each one as a single draw from a Bernoulli distribution. Following Greene (1993, pp. 643-4) the model with training success probability $\Lambda(x_i' \beta)$ leads to the following joint probability, or likelihood function (denoted L):

$$L = \prod_{T_i=0} [1 - \Lambda(x_i' \beta)] \prod_{T_i=1} \Lambda(x_i' \beta)$$

$$= \prod_i [\Lambda(x_i' \beta)]^{T_i} [1 - \Lambda(x_i' \beta)]^{1-T_i} \quad (4)$$

for a sample where 1 = 1, 2, ..., n. The log-likelihood function (LL) can then be written as :

$$LL = \sum_i [T_i \, In \, \Lambda(x_i' \beta) + (1 - T_i) \, In \, (1 - \Lambda(x_i' \beta))] \quad (5)$$

Differentiating the log-likelihood function leads us to the first-order conditions:

$$\frac{\partial LL}{\partial \beta'} = \sum_i (T_i - \Lambda_i) x_i = 0 \qquad (6)$$

with the second order conditions, necessary for a maximum, given by:

$$\frac{\partial^2 LL}{\partial \beta \partial \beta} = -\sum_i \Lambda (1 - \Lambda_i) x_i \, x_i \qquad (7)$$

The computation of maximum likelihood estimates for the logistic model, together with the asymptotic standard errors, is a standard feature of many statistical and econometric packages. In this study we use Limdep version 6.0 and SPSS version 7.0.

The explanatory variables used include a number of individual and firm characteristics which have been found to be important in earlier studies (e.g. Green, 1993a; Greenhalgh and Mavrotas 1996), and which are suggested by theory to affect the training decision of individuals and firms (see Chapter 2). These are age, highest qualification level, marital status, dependent children, job tenure and whether the job is permanent or temporary.[6] Employer characteristics - region, industry and size of firm - are additionally included. The regional dummies attempt to capture the effects of regional differences in economic conditions[7] and the continuous variables, of age and job tenure have been transformed into spline dummies to avoid the imposition of restrictive functional forms. The derivation and definitions of these variables can be found in the data appendix.

The coefficients and the associated marginal effects estimated from non-linear discrete models are difficult to interpret and is especially the case where dummy variables are used (Greene, 1993, p.641). For this reason, the predicted probabilities (PP) of each category variable have been simulated, whilst holding other category variables at their mean values.

The changing training prospects for each employee group are examined by decomposing the logit equations. The format followed is one which has been used in a number of recent papers in the UK aimed at explaining the differences in a binary outcome between two groups (e.g. Blackaby and Murphy, 1995; Green, 1993a; Green and Zanchi, 1997). However, instead of decomposing differences between groups, the aim here is to examine differences in one group over two time-periods. Following the methodology developed by Gomulka and Stern (1990), the following estimate is obtained:

[6] Unfortunately, a trade union membership dummy variable cannot be included in the model since the relevant question was not asked in the Spring QLFS of 1994.

[7] Regional dummies might additionally capture the differential success of TECs and other regional initiatives.

$$\hat{T}^{New} - \hat{T}^{Old} = [\ddot{P}(\hat{\alpha}^N, X^N) - \ddot{P}(\hat{\alpha}^O, X^N)] + [\ddot{P}(\hat{\alpha}^O, X^N) - \ddot{P}(\hat{\alpha}^O, X^O)] \quad (8)$$

where $\hat{\alpha}$ is the estimate of the coefficients from the logistic equation, $\hat{T}^N$ and $\hat{T}^O$ are the respective average of the predicted training probability for the newest year (e.g. 1994) and the more distant year (e.g. 1984), and $\ddot{P}(\hat{\alpha}^N, X^N)$ is the average predicted probability across the samples using the newest data coefficients and sample characteristics, say both 1994. The other terms have obvious meanings. The first bracketed term provides an estimate of the change in the mean training probability between two periods due to differences in the coefficients, and the second bracketed term gives the change attributable to differences in the underlying characteristics of the sample.

Having identified the percentage growth in the average training probability attributable to the changing characteristics of the samples, it would be valuable to be able to distinguish which groups of characteristics had the largest effects. This allows the driving forces behind the increase in training to be clearly identified and provides an indication of how the incidence of training may change in the future owing to continuing shifts in the age distribution of employees, the underlying qualification base and the industrial structure. To achieve this, the vector of mean characteristics are partitioned into K sets:

$$XA = (X_{age}, X_{rest}) \ , \ XI = (X_{industry}, X_{rest}) \ , \ XQ = (X_{qualifications}, X_{rest})$$

and the second term in brackets on the RHS of (8) is decomposed as follows:

$$\ddot{P}(\hat{\alpha}^O, X^N) - \ddot{P}(\hat{\alpha}^O, X^O) = [\ddot{P}(\hat{\alpha}^O, X^{K_N}) - \ddot{P}(\hat{\alpha}^O, X^O)] + [\ddot{P}(\hat{\alpha}^O, X^N) - \ddot{P}(\hat{\alpha}^O, X^{K_N})]$$

where X^{K_N} represents the vector of mean characteristics made up of the set K from the most recent year, N, and the remainder from year O. This provides an estimate of how much additional training, given the 1984 coefficient structure, would be observed in 1989 and 1994 solely due to each of these structural changes in turn.

Before we discuss the results it is important to note two potential problems - selection and endogeneity - both of which can lead to biases in our determinants of training estimates. The following discussion also applies to the econometric results in Chapters 4 and 5. In the training context, one source of selection bias is generated through the existence of unobservable determinants of training which are correlated with unobservable determinants of

current employment. It is possible, for example, that attitudes towards and aptitudes for training could affect individuals' decisions to seek employment, or the decision of firms to employ them (Green, 1993). This effect may change over time and be different for males and females, whites and non-whites. Therefore, by restricting the above analysis to employees, there may be an unobserved missing variable causing $E(\mu_{W,NW}) \neq 0$.

This implies that the determinants of training analysis may be improved by incorporating a sample selection correction procedure, which estimates the training probabilities conditional on individuals' employment. However, to investigate this would require modelling the employment decision in a sophisticated manner, taking into account all the various employment states, which include unemployment, full-time education, self-employment and other economically inactive states. Unfortunately, the QLFS does not contain enough information about individuals that would enable us to empirically distinguish between these outcomes. However, it is generally assumed in the literature (e.g. Jones and Makepeace, 1996) that selectivity bias is less severe for men than women.

The more important potential bias is due to the possible endogeneity of some of the explanatory variables. This is an inherent problem in many applied labour economics studies which make use of individual level survey data. In the context of training, endogeneity arises if there exists some common unobservable factors (e.g. ability, motivation, commitment) that influence training participation and one or more of the explanatory variables in the determinants of training model (Blundell *et al.*, 1996). The result is that the variable(s) are determined simultaneously with training participation, leading to biased coefficient estimates. The bias arises because the explanatory variables also captures the effect of the unobservable variable on training participation.

It might be the case, for example, that the individuals who are most motivated for training (or see the potential benefits from training) are more likely to change jobs in order to access employer-funded training opportunities. This would suggest that the coefficient on increased job tenure would be downwardly biased in our determinants of training model. Alternatively, it may be the case that employers are more likely to train the most motivated workers in order to retain their services. This, of course, would have a converse effect on the estimated job tenure parameters. The overall direction and size of these potential endogeneity biases is as yet, unclear. Other variables, in our model, that might be affected by similar endogeneity concerns are highest qualifications, industry of employment and firm size.

The Instrumental Variable technique (IV) is a commonly used method in which to tackle endogeneity in cross-sectional data. However, this approach would require us to be able to identify a number of variables that are significantly correlated with our possible endogenous

variables but not with training incidence. Such information is not available from the LFS/QLFS. The use of the instrumental variable technique is also not straightforward when the dependant variable is discrete.

A second more general approach for modelling endogeneity in cross-section data is undertaken in Pudney and Shields (1997). With regard to this paper, this would involve the construction of separate equations for each of our potentially endogenous variables, with the unobservable heterogeneity terms linking these variables to the training decision (the promotion process in Pudney and Shields) being accommodated using simulated maximum likelihood. This approach requires a formal model for each of the endogenous variables and the covariates to identify each equation. Thus we would need, for example, models of educational achievement and occupational choice together with detailed information on the background characteristics of the employees in our sample. Formal models of education and occupational choice are difficult to derive and the level of information necessary to model them is not available in the LFS/QLFS.

In the light of this discussion the empirical results in this thesis should be interpreted cautiously

3.6 Empirical results

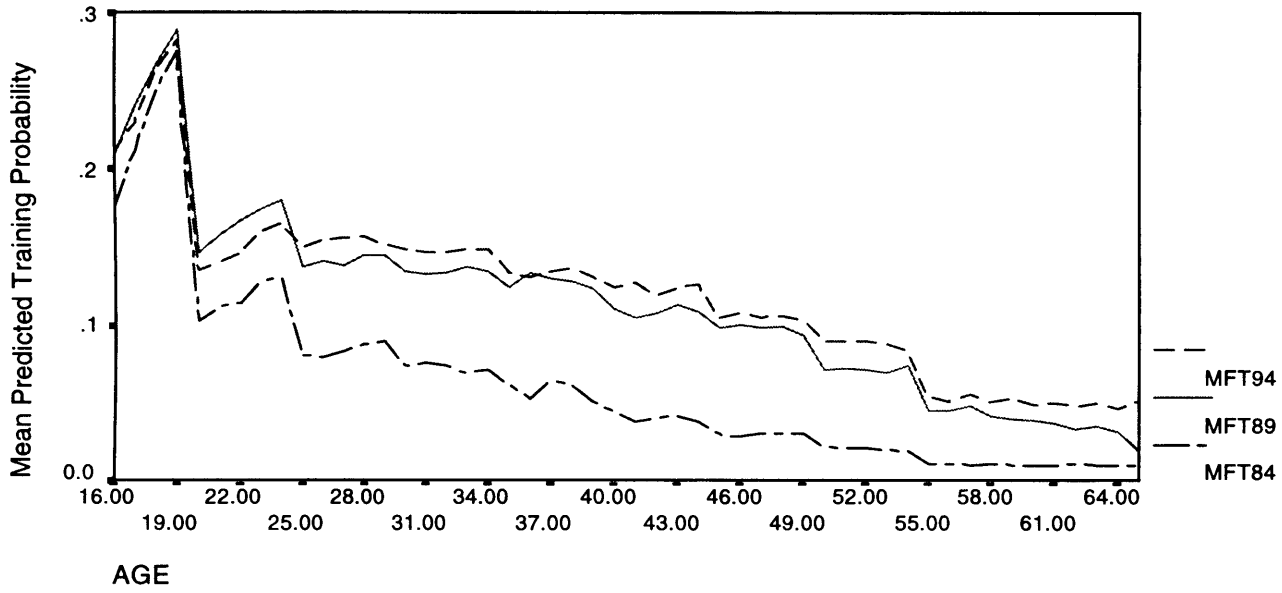
The estimates for the determinants of employer-funded training for male and female full-time employees are provided for each of the years in Table A3 and A4. For each of the six models the χ^2 statistic suggests that the coefficients are significantly different from zero at the 1% level. For men and women, the highest maximum likelihood is estimated for the 1989 model, followed by 1994 and 1984.

3.6.1 Male full-time employees

As expected from theory and the above analysis, age and qualifications play an important role in the training decision of individuals and employers. Figure 3 provides the mean predicted probabilities of receiving employer-funded training (PP) by age for male employees in each of the three years. It can be seen that the model produces a good fit of the actual data given in Figure 1. The probability of training is estimated to decline sharply for men after the age of 19, with employees aged 30-34, for example, receiving only 16% in 1984 and 31% in 1994, of the training probability for men under 20. This, however, represents an increase in the willingness of employers to invest in older workers and a significant flattening of the age-

training profile for male employees. This overall flattening is confirmed by correlation tests (all significant at the 1% level), with the negative Pearson co-efficient of correlation between age and the predicted probability of training declining in strength from -.6051 in 1984, to -.5128 in 1989 to -.4589 by 1994 (a much smaller flattening is found, however, when we include only employees aged over 21 in the correlation calculations).

FIGURE 3: The Predicted Age-Training Profile for Male Employees



The complementary relationship between qualifications and the probability of receiving training strengthened considerably between 1984 and 1989 for male workers, with the probability differential between employees with high and medium level (e.g. degree and 'A' level or equivalent) qualifications and those lacking qualifications widening substantially. The largest differentials were seen in the boom year of 1989, which suggests a relationship between the economic climate and the training returns from qualifications, with the differential between qualified and non-qualified workers increasing in times of economic upturn. Given that training in Britain is associated with increased promotional opportunities and high wages (see, for example, Blundell et. al., 1996; Booth, 1991; Greenhalgh and Stewart, 1987; and Nickell, 1982), this relationship could help to explain the widening of the pay distribution in Britain over the 1980s (see Machin, 1996).[8]

Marital status and family responsibilities have increased in importance as determinants of training. In contrast to 1984, married men in 1989 and 1994 were significantly more likely to receive employer-funded training than single males (married men having around a 20% greater probability of training than single men). Two possible explanations could be that

[8] See Constantine and Neumark (1996) for an investigation of the link between training and the growth of wage

increased job mobility (geographical also) and growing fears of poaching have led employers to use marital status as a signal to indicate a higher level of commitment to the firm, or that married men in 1989 and 1994 had a greater demand for training related to the higher likelihood of their spouse being employed.[9] The negative effect on training from having a young dependent child or children was found to be significant only in the favourable economic climate of 1989. In contrast to marriage, then, employers might have perceived a young dependent child as a constraint upon the flexibility (e.g. the inability to work unplanned overtime) of the worker in the more prosperous year of 1989.

Industry plays a key role in determining whether male workers receive employer-funded training. The decade saw a marked consistency in this relationship, with workers in the 'publicly-orientated service' - public administration, education and health and social work - and those in finance and the utilities, receiving significantly more training than manufacturing employees. Men employed in agriculture and fishing, and wholesale and retail experienced the lowest probability of receiving training throughout the decade.

The explanations for higher training in the public sector, given by Booth (1991), suggest that the privatisation of the utilities (electricity, gas, water) and the increased cost pressures on public administration would have reduced any positive training differential experienced by workers in these sectors by 1994. In fact, the training probability differential between public administration and manufacturing, for example, increased between 1984 and 1994 (.036 to .073). A similar increased differential over manufacturing was experienced by men working in the utilities sector (.021 to .060).

Scottish males consistently experienced a lower probability of receiving training than those in the South of England. A similar disadvantage was found for Welsh employees in 1984 and 1989. This could be due to relatively high levels of unemployment in these regions.[10] By 1994, men in the central West Midlands region were also found to have a significantly lower probability of receiving employer-funded training, which does not appear to be explained by higher unemployment in that region. In an earlier specification of the model, regional dummies were replaced with regional unemployment rates. As with previous studies, these were found to be insignificant for each group, in each of the three years. A tentative explanation for the regional findings could be that government initiatives such as the

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inequality in the USA over the 1980s.

[9] Married men with working wives may also have a greater psychological incentive to train and move up the occupational ladder.

[10] In times of high unemployment employers might provide less training because employees can make fewer training demands as there is a large pool of employees waiting to take up jobs (Green et al., 1996). Moreover, high unemployment may reduce the power of trade unions to bargain for training for their members. Finally, firms might fear that they may have to make redundancies, which reduces their willingness to train.

establishment of Training and Enterprise Councils and the take-up of 'Investors in People', have been less successful in this region.

Small employers funded significantly less training than their larger counterparts throughout the decade. The differential between large and small firms, however, increased after 1984. Given that the overall incidence of employer-funded training rose significantly after the mid-1980s, large firms, may be able to spread the fixed costs of training between many more employees, and benefit from increased economies of scale (Green et al., 1996b). Moreover, the recent introduction of strict quality and safety regulations requires additional investments in training, which are likely to apply to a greater extent to large than to small firms (Felstead and Green, 1996).[11]

In contrast to previous studies, no consistent relationship was found between job tenure and training probability for male employees. This suggests that any need for employers to provide initial job training to new recruits is counteracted by uncertainty regarding new employees commitment to the firm. Those employed in a temporary post are found to receive significantly less employer-funded training throughout the period.

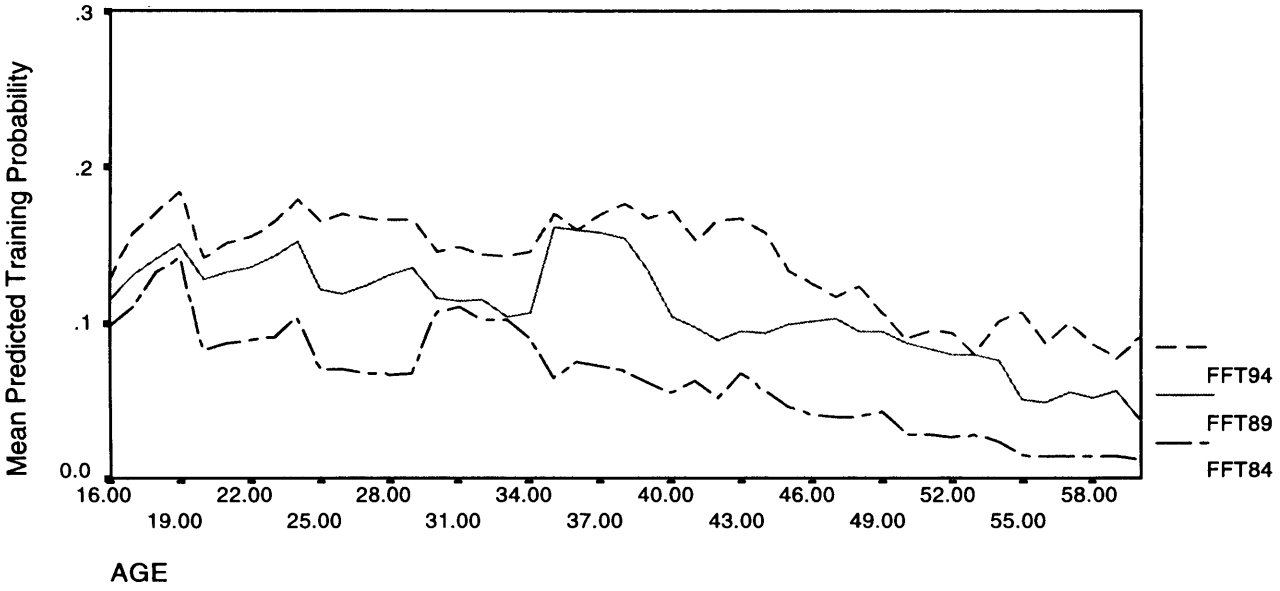
3.6.2. Female full-time employees

Figure 4 shows the age-training profile for female full-time employees in Britain. The predicted probability of receiving employer-funded training for young females under 20 is considerably lower than for young men. As with males there has been a flattening of the age-training profile, with older workers benefiting from an increased relative training probability. The shape of the age-training profile for females appears to exhibit a significantly negative slope until age 30, then an increased training probability between 30 and 40 years of age, and a significant decline thereafter. The low training probability between 20 and 30 is probably related to childbearing age: employers will be cautious about investing in training for females in the light of future childbirth (Green, 1993a). The increased likelihood of training observed in the 30-40 age range can be explained by higher initial training requirements for women returning to the labour market. The period 1984 to 1989 saw a subtle shift in the age-training profile, with the 'child-bearing kink' appearing at around the 30th year in 1984 and the 35th year in 1989 and 1994. This may reflect a movement towards (or the expectation of) later

[11] Other possible explanations include a widening of the pay distribution in favour of employees in large firms. Increased pay raises the likelihood of workers remaining with the firm, which increases the benefits to the firm from training (Green et al., 1996). Similarly, employees may have a greater demand for firm-specific training if their probability of remaining with the firm is high. Furthermore, any divergence in the length of time horizon between large and small firms, adopted when evaluating the benefits from training, could lead to a greater willingness to training on the part of large firms.

childbearing.

FIGURE 4: The Predicted Age-Training Profile for Female Employees



The complementary relationship between training and qualifications is more pronounced for females than for males in all three years. The average training probability differential between a degree and no qualifications, for example, was .144 (.106 for men) in 1984, increasing to .219 (.162 for men) in 1989, and declining to .192 (.129 for men) by 1994. As in the case for men, the increase in the differential between 1984 and 1989, and the decline between 1989 and 1994, suggests a relationship with the economic climate.

Marital status and family responsibilities are found to play no significant role in determining training for female full-time workers. The effect of having a young dependent child or children is likely to be a more important determinant of training for women working part-time. Any increased uncertainty employers might have concerning the labour market commitment of female returnees might be compensated by an above-average level of motivation (and willingness to train) for those women choosing to return to full-time working.

The relationship between the probability of receiving employer-funded training and industry of employment is similar for females and for males. Women employed in public administration, education and health, and finance and the utilities, have significantly higher training probabilities than those working in manufacturing. As in the case of men, the training probability differential between these industries increased substantially after 1984. The training differential between the high training industries and manufacturing is greater for females, and the gender gap increased significantly between 1984 and 1989. As with males, we find an increase in the probability differential between those employed in public

administration and the utilities, on the one hand, and other industrial sectors on the other.

Length of job tenure with the current firm is an important determinant of employer-funded training for female full-time employees. Females, if recently employed, have a higher probability of training. Training may be particularly important for women returning to jobs after spending time out of the labour force (Green, 1993a). Moreover, Scottish female employees experienced the lowest probability of training throughout the decade. By 1994, female employees, working throughout the Midlands region were receiving significantly less employer-funded training than those in other areas in England. Female employees in large firms experienced a significantly higher training probability than those employed in small firms in 1989 and 1994 but not in 1984.

3.7 Decomposition results

Tables 3 and 4 provide the decomposition results. For males and females, respectively, the average predicted probability of training is estimated to have increased by .056 and .077 between 1984 and 1994. The majority of this increase, around 75% and 73%, occurred between 1984 and 1989, and can be attributed to changes in the demand for training and skilled labour by individuals and employers (the coefficients). In contrast, the growth in training between 1989 and 1994 was, on the whole, driven by changes in the average work-related characteristics of the workforce.[12] The important change was a general improvement in the qualification base of the workforce rather than shifts in the age or industrial structures. Consequently, male and female employees would have received a .025 and .023 higher average probability of training, respectively, in 1994 than in 1989, solely on account of their improved qualification levels. As a result, had the educational levels of the workforce remained at their 1989 level, 1994 would have witnessed a fall in the recorded incidence of training rather than the increase actually observed.

[12] This contrast to the finding for part-time females, where the training growth was fully explained in both sub-periods by coefficient changes (see Shields, 1996).

TABLE 3: Decomposition of the Growth in Employer-Funded Training for Male Full-Time Employees

	1984 – 1989	1989 - 1994	1984 - 1994
Difference in mean probability			
$\hat{T}^N - \hat{T}^O$	.042	.014	.056
Difference in Coefficients			
$\{\ddot{P}(\hat{\alpha}^N, X^N) - \ddot{P}(\hat{\alpha}^O, X^N)\}$	.036 (85%)	-.008 (-57%)	.041 (74%)
Difference in characteristics			
$\{\ddot{P}(\hat{\alpha}^O, X^N) - \ddot{P}(\hat{\alpha}^O, X^O)\}$	.006 (15%)	.022 (157%)	.015 (26%)
Principal Components of Characteristic differences			
Age Structure	-.0001	-.0040	-.0030
Qualification Base	+.0060	+.0253	+.0184
Industrial Structure	+.0014	+.0014	+.0003

TABLE 4: Decomposition of the Growth in Employer-Funded Training for Female Full-Time Employees

	1984 – 1989	1989 - 1994	1984 - 1994
Difference in mean probability			
$\hat{T}^N - \hat{T}^O$	.056	.021	.077
Difference in Coefficients			
$\{\ddot{P}(\hat{\alpha}^N, X^N) - \ddot{P}(\hat{\alpha}^O, X^N)\}$	.046 (81%)	-.001 (-7%)	.058 (75%)
Difference in characteristics			
$\{\ddot{P}(\hat{\alpha}^O, X^N) - \ddot{P}(\hat{\alpha}^O, X^O)\}$	.010 (19%)	.023 (107%)	.019 (25%)
Principal Components of Characteristic differences			
Age Structure	.0000	-.0032	-.0035
Qualification Base	+.0073	+.0232	+.0225
Industrial Structure	+.0003	+.0059	+.0027

3.8 Conclusion

This chapter has examined, for the first time, the incidence and determinants of employer-funded training over the decade 1984 to 1994, using three comparable cross-sections from the British Labour Force Survey. The results confirm that age and prior qualifications are key determinants of employer-funded training for full-time employees, irrespective of the year in

focus. The estimates do, however, indicate other consistencies and also some notable changes in the determinants of training over the period; these are:

(i) The effect of industry on the probability of receiving employer-funded training was remarkably consistent throughout the decade and of the same magnitude as that of age and education. A consistent training-industry hierarchy was found with those employed in public administration, education, health and financial services received a higher probability of training than those employed in manufacturing and other industries.

(ii) The age-training profile flattened significantly over the period, with the growth in training probability being considerably greater for older workers than younger workers.

(ii) There was a significant training differential between large and small firms throughout the decade, but the size of this differential increased significantly after 1984.

(iii) The complementary nature of prior qualifications and the probability of training strengthened between 1984 and 1989, with the training differential between those with qualifications and those without, widening substantially.

Furthermore, decompositions of the growth in employer-funded training between 1984 and 1989 suggest that changes in individuals' and employers' demands for training and skilled labour, respectively, changed significantly, accounting for nearly all of the growth in training. This finding contrasts sharply with that for 1989 to 1994, where significant improvements in the qualification base of the workforce drove the increase in training incidence. The estimates suggest that had the educational levels of the workforce remained at their 1989 figures, the period 1989-1994 would have observed an actual decline in the average training incidence.

Taking into account Blundell et al.'s (1996) finding that formal qualifications gained after school appear to have no significant effect on the probability of receiving employer-provided training, this chapter finds that one key to increased training at the workplace lies in a continually improving education-system, resulting in fewer youngsters leaving school with low-level qualifications or none.

Appendix A – Empirical results

TABLE A1: Changes in the Work-Related Characteristics of Male and Female Full-Time Employees in Britain: 1984 –1994

Percentage	MFT			FFT		
	1984	1989	1994	1984	1989	1994
16-19	6.2	5.6	2.7	11.9	9.3	3.6
20-24	12.1	12.2	9.8	20.6	19.4	15.1
25-29	12.3	13.4	14.1	13.2	15.1	16.9
30-34	12.7	12.5	14.6	9.1	10.5	12.8
35-39	13.0	12.4	12.9	10.4	10.2	11.3
40-44	10.7	12.9	12.6	10.0	12.3	11.9
45-49	10.0	10.3	13.3	9.5	9.7	13.0
50-54	9.4	8.6	9.2	8.5	7.9	8.5
55 +	13.6	12.1	10.8	6.8	5.6	5.2
Single	24.9	25.0	21.7	36.8	32.8	25.7
Married	71.2	71.0	73.7	54.6	58.2	64.5
W/D/S	3.8	4.0	4.6	8.6	9.0	9.8
No child < 9 years	73.9	73.9	74.0	91.3	88.6	86.7
Child(s) under 9 years	26.1	26.1	26.0	8.7	11.4	13.3
Higher Degree	2.0	2.1	3.1	0.8	1.0	2.2
First Degree	5.7	6.9	9.8	5.0	6.8	10.4
Other Degree	2.6	2.4	2.9	0.8	0.9	1.2
Higher Vocational	3.9	4.5	15.6	0.8	1.3	8.3
Teaching qualification	0.9	0.8	0.6	4.2	3.5	3.2
Nursing qualification	0.3	0.3	0.5	5.0	5.1	5.6
'A' level or equivalent	5.2	5.6	6.4	6.8	8.3	8.2
Secondary Vocational	15.9	18.8	21.2	4.6	7.1	11.6
'O' level or equivalent	12.5	14.8	13.4	25.5	27.5	23.0
GCSE	4.7	4.9	4.5	7.5	5.7	4.9
Other	3.8	9.2	8.1	4.5	7.3	5.9
No Qualifications	42.4	29.7	13.9	33.7	25.6	15.5
North	5.7	5.9	5.3	5.4	5.6	5.4
Yorkshire/Humberside	9.5	9.0	9.3	8.7	8.1	8.6
East Midlands	7.6	7.8	7.8	7.4	6.9	7.3
East Anglia	3.9	3.9	4.0	3.3	3.7	3.7
London	9.5	10.1	8.9	11.5	12.0	11.2
Rest of South East	20.4	20.0	20.6	19.9	20.0	20.2
South West	7.9	8.6	8.5	7.3	8.7	8.3
West Midlands Central	4.3	4.8	4.1	4.6	4.6	4.1
Rest of West Midlands	4.8	5.0	5.6	4.7	4.3	4.9
Manchester + Merseyside	6.8	6.4	6.4	6.8	6.7	6.8
Rest of North West	4.3	4.1	4.9	4.4	4.1	4.7
Wales	4.6	4.2	4.7	4.7	4.1	4.6
Scotland	10.6	10.2	10.0	11.3	11.2	10.2

TABLE A1 (continued)

Agriculture and fishing	1.9	1.7	1.4	0.7	0.6	0.5
Mining and quarrying	2.9	2.0	1.0	0.5	0.3	0.2
Manufacturing	34.6	33.9	30.9	24.1	21.2	17.0
Electricity/gas/water	2.5	2.3	1.8	1.1	0.9	0.7
Construction	10.0	9.2	8.2	1.5	1.6	1.7
Wholesale and retail	10.9	11.9	13.0	14.8	14.9	12.6
Hotel and restaurants	1.4	1.5	1.7	4.0	3.7	3.2
Transport etc.	9.1	9.6	9.6	4.0	4.7	3.9
Finance	3.4	4.0	4.6	6.5	7.9	7.8
Real estate etc.	4.7	6.1	8.0	6.0	8.3	9.1
Public Administration	7.5	7.9	7.9	7.7	7.9	8.9
Education	4.9	4.0	4.7	9.8	9.8	11.4
Health and social work	2.8	2.6	3.5	15.2	14.3	18.3
Other	3.4	3.4	3.6	3.9	3.9	4.7
> 25 workers	74.2	73.7	73.0	67.8	68.7	70.1
< 25 workers	25.8	26.3	27.0	32.2	31.3	29.9
< 1 year with firm	13.9	16.5	5.2	19.0	21.8	5.3
1-2 years	7.4	9.9	11.2	9.9	13.5	13.3
2-5 years	18.0	18.2	20.1	24.5	22.8	25.5
>5 years	60.7	55.4	63.5	46.6	41.9	55.9
Permanent job	96.3	97.8	96.1	94.9	96.4	94.2
Not permanent	3.7	2.2	3.9	5.1	3.6	5.8
Sample size	28959	28584	24832	13524	15316	15014

Note:

1. All figures are significant at the 5% level.
2. W/D/S means widowed/divorced/separated.

TABLE A2: The Determinants of Employer-Funded Training: Percentage Receiving Training by Individual and Employer Characteristics

	MFT			FFT		
	1984	1989	1994	1984	1989	1994
All Sample	7.8	12.1	12.6	8.4	14.4	16.0
16-19	25.8	26.6	26.2	13.5	14.8	18.3
20-24	12.8	16.6	15.1	10.1	15.6	17.3
25-29	9.2	14.1	15.4	8.2	15.3	17.7
30-34	7.9	13.5	14.9	11.0	14.3	15.5
35-39	6.9	12.7	13.3	8.7	19.1	17.8
40-44	5.5	10.7	12.4	7.8	13.4	17.8
45-49	4.5	9.8	10.5	5.9	13.9	13.9
50-54	3.2	7.2	8.9	4.0	11.6	11.2
55 +	1.6	4.0	5.1	2.2	7.6	11.8
Single	13.8	16.3	14.9	10.5	15.1	16.8
Married	5.9	10.7	12.0	7.4	14.3	15.6
W/D/S	3.5	8.8	9.5	6.7	13.0	15.5
No child < 9 years	7.6	11.9	12.1	8.3	14.3	15.9
Child(s) under 9 years	8.3	12.8	14.4	9.9	16.0	16.8
Higher Degree	10.2	18.8	18.3	15.7	27.0	22.7
First Degree	16.0	23.8	20.3	19.0	31.7	26.9
Other Degree	9.6	18.1	18.4	14.0	28.4	27.8
Higher Vocational	9.4	19.9	17.4	16.6	24.4	19.9
Teaching qualification	13.4	34.1	26.2	13.5	38.2	27.3
Nursing qualification	8.4	20.5	29.0	13.3	25.6	25.3
'A' level or equivalent	12.4	18.3	16.9	13.4	20.8	18.9
Secondary Vocational	11.2	15.6	8.8	14.6	15.1	12.2
'O' level or equivalent	14.2	14.4	14.1	9.9	13.0	14.9
GCSE	9.4	9.7	10.4	6.1	8.0	9.6
Other	4.0	7.0	7.0	6.1	10.5	12.3
No Qualifications	2.7	4.1	4.1	3.1	5.2	4.8
Professional	11.7	19.9	21.0	19.9	25.6	25.0
Intermediate	10.0	17.1	15.7	14.4	25.3	22.9
Skilled Non-Manual	10.4	14.7	17.0	7.2	11.0	12.6
Skilled Manual	6.6	9.2	8.5	6.3	8.6	10.1
Partly Skilled	4.2	5.9	5.8	3.2	4.8	6.9
Unskilled	1.8	3.2	3.1	0.9	1.7	2.6
North	8.2	12.4	14.0	7.6	13.0	15.7
Yorkshire/Humberside	7.3	11.8	13.7	8.0	15.5	18.6
East Midlands	7.7	12.7	11.0	9.0	14.4	13.5
East Anglia	6.5	10.3	11.2	7.8	17.1	16.7
London	9.7	14.1	13.7	10.4	16.3	17.6
Rest of South East	8.7	14.0	13.5	9.5	16.2	16.9
South West	8.6	12.6	12.7	10.2	13.5	15.6
West Midlands Central	6.3	10.8	9.8	7.1	14.4	12.8
Rest of West Midlands	6.8	11.1	12.4	7.5	13.9	13.2
Manchester + Merseyside	7.1	9.8	11.1	6.6	12.6	14.5
Rest of North West	6.7	12.0	13.1	7.9	14.9	19.2
Wales	6.4	9.4	12.0	7.2	14.0	15.6
Scotland	7.3	10.2	11.5	6.8	10.3	14.1

TABLE A2 (continued)

Agriculture and fishing	3.3	5.4	3.6	6.9	6.8	7.4
Mining and quarrying	7.5	9.4	9.2	10.4	10.0	11.5
Manufacturing	6.8	10.5	10.9	4.6	8.3	9.4
Electricity/gas/water	9.3	12.1	18.9	12.2	20.6	23.0
Construction	6.5	9.8	10.3	6.8	11.6	11.2
Wholesale and retail	5.8	9.2	8.7	7.1	8.7	10.0
Hotel and restaurants	4.2	10.1	9.7	5.3	7.1	9.6
Transport etc.	6.8	9.9	8.4	8.6	12.2	11.4
Finance	13.6	20.2	20.5	10.8	16.9	18.7
Real estate etc.	10.1	14.6	14.2	8.5	13.2	13.7
Public Administration	12.5	18.9	21.0	9.6	16.7	21.0
Education	11.3	23.0	18.7	12.5	29.4	25.8
Health and social work	11.9	18.7	19.6	12.0	21.1	20.7
Other	5.7	9.9	11.8	9.6	11.8	13.1
> 25 workers	8.2	13.1	13.8	8.6	15.1	16.9
< 25 workers	6.7	9.3	9.1	8.1	12.9	13.8
< 1 year with firm	11.2	13.9	13.9	12.2	15.0	19.0
1-2 years	12.6	14.2	12.9	11.7	15.1	17.3
2-5 years	11.1	14.4	15.0	8.6	15.2	16.6
>5 years	5.5	10.5	11.6	6.2	13.6	15.0
Permanent job	7.6	12.1	12.6	8.2	14.4	15.8
Not permanent	11.3	10.9	12.2	11.7	14.1	17.7

Note:

1. All figures are significant at the 5% level.
2. W/D/S means widowed/divorced/separated.

TABLE A3: The Determinants of Employer-Funded Training for Male Employees: Binary Logistic Estimates

	1984			1989			1994		
Variable	α	S. E	PP	α	S. E	PP	α	S. E	PP
16-19	-	-	.315	-	-	.338	-	-	.355
20-24	-1.3688	.0847*	.105	-.9762	.0804*	.162	-1.0992	.1127*	.155
25-29	-1.9261	.1052*	.063	-1.4256	.0911*	.110	-1.2676	.1156*	.134
30-34	-2.1486	.1172*	.051	-1.5270	.0993*	.100	-1.3535	.1213*	.124
35-39	-2.1682	.1213*	.050	-1.6095	.1040*	.093	-1.5024	.1264*	.109
40-44	-2.3403	.1317*	.042	-1.7502	.1059*	.082	-1.5875	.1289*	.101
45-49	-2.4615	.1417*	.038	-1.8417	.1133*	.075	-1.7337	.1316*	.088
50-54	-2.7433	.1559*	.029	-2.0787	.1244*	.060	-1.8824	.1414*	.077
55 +	-3.2585	.1684*	.019	-2.5565	.1304*	.038	-2.3083	.1496*	.052
Single	-	-	.047	-	-	.081	-	-	.095
Married	.1161	.0774	.052	.1962	.0598*	.097	.1616	.0627*	.110
W/D/S	-.2522	.1795	.037	.1430	.1234	.092	.0641	.1182	.100
No child < 9 years	-	-	.050	-	-	.095	-	-	.107
Child(s) under 9 years	.0406	.0635	.052	-.1170	.0523#	.085	-.0453	.0519	.103
Higher Degree	.1810	.1569	.089	.5599	.1232*	.167	.4063	.1138*	.158
First Degree	.6353	.0949*	.133	.8168	.0763*	.206	.5215	.0768*	.174
Other Degree	.2608	.1406	.095	.6954	.1148*	.186	.5574	.1130*	.179
Higher Vocational	.0957	.1197	.082	.7040	.0871*	.188	.4373	.0687*	.162
Teaching qualification	.6397	.2175*	.133	1.3581	.1675*	.308	.9532	.2111*	.245
Nursing qualification	-.2661	.3916	.058	.2732	.2873	.131	.7644	.2291*	.211
'A' level or equivalent	.0425	.0992	.078	.3963	.0822*	.145	.2421	.0864*	.137
Secondary Vocational	.1704	.0742#	.088	.3228	.0614*	.136	-.2001	.0732*	.093
'O' level or equivalent	-	-	.075	-	-	.103	-	-	.111
GCSE	-.7948	.1108*	.035	-.6122	.1045*	.058	-.3769	.1135*	.079
Other	-.5037	.1678*	.047	-.2378	.0934#	.083	-.3500	.1046*	.081
No Qualifications	-1.0579	.0804*	.027	-.9102	.0746*	.044	-.9643	.1025*	.045
North	.0125	.1083	.053	-.0566	.0886	.100	.0667	.0934	.120
Yorkshire/Humberside	-.0865	.0923	.050	-.1573	.0761#	.091	.0750	.0761	.121
East Midlands	-.0435	.0977	.052	.0319	.0786	.108	-.1624	.0864	.098
East Anglia	-.2047	.1362	.045	-.3438	.1118*	.077	-.1155	.1117	.102
London	.0951	.0850	.059	-.0941	.0698	.097	-.0884	.0775	.105
Rest of South East	-	-	.054	-	-	.105	-	-	.113
South West	.0124	.0931	.055	-.1135	.0759	.095	-.0776	.0798	.106
West Midlands Central	-.1967	.1325	.045	-.1443	.1003	.093	-.2761	.1162#	.088
Rest of West Midlands	-.1635	.1226	.046	-.1389	.0971	.093	-.0261	.0946	.110
Manchester + Mersey	-.1648	.1054	.046	-.3900	.0915*	.074	-.1586	.0930	.098
Rest of North West	-.1997	.1284	.047	-.1775	.1031	.090	-.0126	.0980	.112
Wales	-.2790	.1279#	.042	-.3578	.1117*	.076	-.1030	.1021	.103
Scotland	-.2210	.0893#	.044	-.3682	.0762*	.075	-.2362	.0783*	.091

TABLE A3 (continued)

Agriculture and fishing	-.7230	.2551*	.023	-.4633	.2135#	.055	-.9644	.2906*	.041
Mining and quarrying	.3554	.1448*	.066	-.0589	.1548	.081	-.1802	.2320	.085
Manufacturing	-	-	.047	-	-	.085	-	-	.100
Electricity/gas/water	.3907	.1435*	.068	.1863	.1286	.101	.5369	.1315*	.160
Construction	-.1392	.0918	.041	-.0683	.0780	.080	-.0643	.0847	.095
Wholesale and retail	-.4311	.0936*	.031	-.1749	.0725#	.073	-.2173	.0759*	.082
Hotel and restaurants	-.7726	.2609*	.022	-.1673	.1720	.074	-.2314	.1721	.081
Transport etc.	.2582	.0924*	.060	.0973	.0758	.093	-.2110	.0847#	.083
Finance	.5672	.1120*	.075	.4330	.0889*	.126	.4962	.0877*	.155
Real estate etc.	.1961	.1067	.057	.1140	.0819	.095	.1138	.0785	.111
Public administration	.6096	.0826*	.083	.6015	.0681*	.145	.6261	.0698*	.173
Education	.4376	.1114*	.071	.5871	.0935*	.144	.3805	.0947*	.140
Health and social work	.6662	.1284*	.088	.7434	.1121*	.164	.5501	.1046*	.162
Other	-.0996	.1507	.043	.0331	.1197	.088	.1949	.1141	.119
> 25 workers	-	-	.053	-	-	.100	-	-	.114
< 25 workers	-.2438	.0595*	.042	-.3160	.0494*	.074	-.3260	.0518*	.085
< 1 year with firm	.0794	.0761	.051	-.0179	.0608	.090	.1333	.0940	.116
1-2 years	.1770	.0873#	.056	-.0081	.0686	.087	-.0549	.0696	.098
2-5 years	.2320	.0645*	.059	.0553	.0544	.103	.1281	.0516#	.116
> 5 years	-	-	.047	-	-	.092	-	-	.103
Permanent job	-	-	.050	-	-	.093	-	-	.107
Not permanent	-.1555	.0935	.043	-.4728	.1529*	.084	-.2864	.1102*	.082
Constant	-.4188*			-.5232*			-.5720*		
Sample size	28079			27881			24354		
-2LL	13432			18608			17245		
-2LL (slopes = 0)	15731			20801			18640		
Model χ^2 (52 d.f)	2298*			2193*			1394*		

Note:

1. * indicates significance at the 1% level; # indicates significance at the 5% level.
2. W/D/S means widowed/divorced/separated.

TABLE A4: The Determinants of Employer-Funded Training for Female Employees: Binary Logistic Estimates

	1984			1989			1994		
Variable	α	S. E	PP	α	S. E	PP	α	S. E	PP
16-19	-	-	.132	-	-	.165	-	-	.211
20-24	-.5806	.1105*	.079	-.2537	.0981*	.133	-.3172	.1315#	.163
25-29	-.9746	.1424*	.054	-.4352	.1126*	.113	-.4041	.1372*	.152
30-34	-.5923	.1534*	.078	-.5123	.1273*	.106	-.5699	.1461*	.131
35-39	-.6518	.1577*	.074	-.1211	.1279	.149	-.3837	.1477*	.154
40-44	-.7316	.1675*	.068	-.4389	.1302*	.113	-.3689	.1494#	.156
45-49	-.9476	.1800*	.056	-.3600	.1383*	.121	-.6363	.1528*	.124
50-54	-1.2812	.2073*	.041	-.5869	.1497*	.099	-.8258	.1662*	.105
55 +	-1.8400	.2550*	.024	-.8246	.1754*	.080	-.7255	.1780*	.114
Single	-	-	.061	-	-	.118	-	-	.133
Married	.0957	.0877	.067	.0443	.0654	.123	.0878	.0632	.144
W/D/S	.1699	.1471	.072	.0253	.1073	.120	.2012	.0979#	.158
No child < 9 years	-	-	.065	-	-	.121	-	-	.144
Child(s) under 9 years	.0056	.1145	.066	.0052	.0900	.121	-.1351	.0723	.128
Higher Degree	.7545	.2928*	.150	.8500	.2002*	.244	.4038	.1488*	.203
First Degree	.9617	.1329*	.179	1.0347	.0947*	.279	.6594	.0827*	.248
Other Degree	.7020	.2878#	.144	.8762	.2078*	.248	.7993	.1773*	.275
Higher Vocational	.8437	.2660*	.162	.8686	.1769*	.245	.3732	.0877*	.198
Teaching qualification	.7369	.1743*	.148	1.3750	.1300*	.353	.6949	.1311*	.255
Nursing qualification	.2821	.1492	.099	.5159	.1109*	.188	.4739	.1067*	.215
'A' level or equivalent	.4037	.1166*	.111	.5924	.0865*	.200	.2957	.0892*	.186
Secondary Vocational	.5581	.1328*	.127	.2616	.0993*	.152	-.1582	.0897	.127
'O' level or equivalent	-	-	.077	-	-	.121	-	-	.146
GCSE	-.6087	.1477*	.043	-.5444	.1359*	.074	-.4406	.1365*	.099
Other	-.1719	.1870	.065	.0978	.1149	.132	-.1216	.1182	.131
No Qualifications	-.8222	.1127*	.035	-.7753	.0929*	.060	-1.0469	.1127*	.056
North	-.1149	.1613	.064	-.2511	.1200#	.112	-.1296	.1222	.139
Yorkshire/Humberside	-.1290	.1311	.063	-.0968	.0993	.129	.1198	.0900	.172
East Midlands	.0906	.1339	.078	-.0277	.1068	.137	-.2439	.1047#	.126
East Anglia	-.2694	.1940	.055	.1141	.1300	.154	.0014	.1279	.156
London	.0861	.1105	.077	-.1469	.0856	.118	-.0497	.0845	.149
Rest of South East	-	-	.071	-	-	.140	-	-	.156
South West	.0385	.1286	.074	-.2462	.0998#	.113	-.1243	.0952	.140
West Midlands Central	-.1536	.1760	.062	-.0496	.1253	.134	-.2828	.1347#	.122
Rest of West Midlands	-.1244	.1701	.064	-.0829	.1309	.130	-.2413	.1235#	.126
Manchester + Mersey	-.2773	.1539	.055	-.2404	.1128#	.113	-.2034	.1056	.131
Rest of North West	-.0931	.1713	.065	-.1573	.1298	.122	.1076	.1118	.170
Wales	-.2674	.1526	.056	-.2155	.1331	.116	-.1644	.1203	.135
Scotland	-.3674	.1267*	.050	-.6479	.0991*	.078	-.3505	.0917*	.115

TABLE A4 (continued)

Agriculture and fishing	.3761	.4129	.065	.0135	.4385	.088	-.1418	.4400	.093
Mining and quarrying	.6085	.4231	.080	-.1518	.5422	.076	.0963	.6301	.115
Manufacturing	-	-	.045	-	-	.087	-	-	.106
Electricity/gas/water	.9275	.2702*	.107	.8952	.2315*	.189	.6962	.2489*	.192
Construction	.1468	.2957	.052	.3541	.2155	.120	-.0182	.2118	.104
Wholesale and retail	.3678	.1266*	.064	.1010	.1015	.095	.0173	.1055	.107
Hotel and restaurants	.0552	.2166	.048	-.1280	.1827	.077	-.0875	.1735	.098
Transport etc.	.4927	.1822*	.072	.3038	.1356#	.114	.0337	.1487	.109
Finance	.5548	.1466*	.076	.5327	.1062*	.140	.5260	.1060*	.167
Real estate etc.	.1924	.1589	.054	.2079	.1111	.105	.1246	.1087	.118
Public administration	.5217	.1410*	.074	.5578	.1062*	.143	.6661	.0996*	.187
Education	.5367	.1495*	.075	.8753	.1086*	.186	.7229	.1016*	.196
Health and social work	.8914	.1210*	.104	.9363	.0936*	.196	.7367	.0910*	.198
Other	.4177	.1801#	.067	.2492	.1497	.109	.1961	.1366	.126
> 25 workers	-	-	.067	-	-	.128	-	-	.148
< 25 workers	-.1112	.0734	.061	-.2028	.0569*	.107	-.1539	.0549*	.130
< 1 year with firm	.4380	.0999*	.086	.2064	.0766*	.135	.3444	.1070*	.180
1-2 years	.3743	.1134*	.081	.1325	.0834	.127	.1166	.0759	.149
2-5 years	.0935	.0902	.062	.0661	.0686	.120	.1141	.0582#	.149
> 5 years	-	-	.057	-	-	.113	-	-	.135
Permanent job	-	-	.066	-	-	.122	-	-	.143
Not permanent	-.4177	.1515*	.044	-.4723	.1432*	.080	-.1670	.1003	.124
Constant	-2.151*			-1.839*			-1.589*		
Sample size	12996			14649			14474		
-2LL	7019			11107			12072		
LL (slopes=0)	7734			12359			12986		
Model χ^2 (52d.f)	715*			1251*			914*		

Note:

1. * indicates significance at the 1% level; # indicates significance at the 5% level.
2. W/D/S means widowed/divorced/separated.

Chapter 4:

Changes in the Incidence and Determinants of Employer-Funded Training in the British Manufacturing Sector, 1984 - 1994

Abstract

This chapter investigates changes in the incidence and determinants of employer-funded training for manufacturing workers in Britain between 1984 and 1994. We focus on the manufacturing sector for two reasons. Firstly, it has experienced substantial structural change over the decade which is expected to affect the training decisions of workers and firms. Secondly, the manufacturing sector remains the largest employer of men, and the second largest employer of women, in Britain. We include, for the first time, sub-industry dummy variables in the determinants of training models, and we distinguish between on-the-job and off-the-job training, in order to gain a better understanding of the driving forces behind the observed growth in training investment. In addition, we compare the decomposition results for manufacturing with those for the publicly-orientated service sector. We observe that manufacturing employees receive considerably lower levels of employer-funded training than the national average or the publicly-orientated service sector. This analysis supports the finding that the high growth in the average probability of receiving employer-funded training between 1984 and 1989 was primarily due to increases in the demand for training and skilled labour by workers and firms, whilst the smaller growth observed between 1989 and 1994 was completely due to improvements in the work-related characteristics of the samples. In the latter respect, it was the improvement in the educational base of manufacturing employees, rather than shifts in the age or industry structures which was the key factor.

4.1 Introduction

In the post-war period it is true to say that Britain has experienced a relative economic decline compared to other European countries which is reflected in inferior growth and productivity performance. This decline was particularly pronounced in the 1950s to 1970s and was especially characteristic of the manufacturing sector (Ball, 1992; Crafts, 1996; Van Ark, 1993). In 1979, Britain's share of world manufacturing trade stood at 9.1% compared to 20.9% in 1937, and 1989 saw the balance of trade in manufacturing turn negative for the first time, reaching a deficit of 3.6% of GDP (Crafts, 1993). Total factor productivity (TFP) growth for British manufacturing fell from an average rate of 1.16% between 1958-73 to -1.25% for the period 1973-9 (Oulton and O'Mahony, 1994). Panic (1976) estimated a TFP growth rate of 1.5% for British manufacturing between 1954 and 1972, which compared with 2.6% for West Germany.

A large number of explanations have been proposed for this relative decline. These include the presence of powerful trade unions raising costs and constraining productivity (Bean and Crafts, 1995), high marginal income tax rates reducing the incentive to work (Tanzi, 1969), low levels of investment in machinery and equipment (De Long and Summers, 1991), a higher prevalence of hostile take-overs causing large firms to forego investment opportunities in R+D and training (Mayer, 1992) and the continuity of institutions in the post-war period which failed to adapt to the changing international economy (Eichengreen, 1993).[1]

A further explanation recently put forward by many prominent economists (e.g. Bean and Crafts, 1995; Layard et al., 1992, 1994; Mayhew, 1991, Stevens and McKay, 1991; Prais, 1990) and historians (e.g. Wiener, 1981; Barnett, 1986; Collins and Robbins, 1990) is that Britain's failure to create a well-educated and flexible workforce has prevented firms from improving productivity levels and successfully responding to changes in international competition and demand. The importance of human capital and skills formation in the growth process is encapsulated in the theories of new endogenous growth (see Lucas, 1988; Romer, 1990). Recent econometric evidence also suggests the importance of human capital accumulation due to its positive externalities which physical capital investment do not have (Oulton and O'Mahony, 1994).

In this chapter we extend the analysis of Chapter 3 by focusing exclusively upon changes in the level of training (human capital) investment by British manufacturing firms between 1984 and 1994. This is a particularly interesting decade in which to investigate these issues as

[1]See the Controversy Section of the Economic Journal, January, 1996, for a comprehensive lists of possible explanations and a discussion of their relative importance.

there is some evidence suggesting that Britain's poor productivity performance in manufacturing might have been reversed during the 1980s (see Crafts, 1996, for a discussion). Furthermore, 1984 to 1994 saw a considerable reduction in the proportion of the British workforce employed in the manufacturing sector, as well as the significant shifts in the work-related characteristics of manufacturing employees. The manufacturing sector accounted for 34.6% of all full-time male employment in 1984, whilst in 1994 it accounted for only 30.9%. The decline was even greater for females, falling from 24.1% in 1984 to 17% in 1994.[2] Some of the catch-up in productivity for manufacturing in the 1980s is due to an increase in broad capital per worker for the remaining labour force (Crafts, 1996), but it has been found that about 50% of the improvement in labour productivity in Britain relative to Germany came through changes in TFP (O'Mahony and Wagner, 1994). By 1987 O'Mahony (1992) estimates that TFP in British manufacturing may actually have exceeded that in West Germany. An important factor which may have lead to the growth in TFP in the 1980s is increased human capital and skills formation through education and work-related training.

Specifically, we examine whether investment in human capital by manufacturing employers in Britain, in the form of training provision, increased between 1984 and 1994. The question of 'how much of the change in training incidence for manufacturing employees is the result of increases in the demand for training and skills by employees and firms, and how much is due to shifts in the work-related characteristics of the manufacturing workforce', is also addressed (see Section 4.2). The overall size and direction of the latter effect will be the outcome of many separate and conflicting effects. For example, the sharp fall in the proportion of manufacturing employees under the age of 25, the increase in the share employed in small firms, and the fall in the percentage of new recruits to manufacturing firms between 1984 and 1994, would be expected to lower the reported measure of training. In contrast, the substantial fall in the percentage of employees possessing no qualifications and the rise in the proportion of employees with higher level qualifications would be expected to increase training incidence.

In this study we disentangle the effects of the three main structural changes, namely the shifts in the age distribution, the qualification base and the sub-industry structures. To allow the separate effect of shifts in the industrial structure to be identified, we include, for the first time, sub-industry control variables in our determinants of training models.[3] We also make a formal distinction between employer-funded training undertaken at the workplace (on-the-job) and that provided elsewhere (off-the-job), since a number of studies have shown that

[2] Authors own calculations using the LFS/QLFS, see Table A1.
[3] The derivation of the sub-industry variables can be found in the data appendix at the end of the thesis.

estimating separate determinants of training models for these two training types is valuable in identifying which individual and firm characteristics are important in determining all training and which differ by training type (for the UK see Blundell et al., 1996; Green, 1993; Greenhalgh and Stewart, 1987; for the US see Lynch, 1992; Tan and Peterson, 1992). This information is also important due to the differing returns to on-the-job and off-the-job training (in terms of increased employment opportunities, occupational attainment and wages) found by several studies.

As well as the empirical motivation for analysing on-the-job and off-the-job training separately, we can distinguish a number of differences suggested by theory. It is helpful to start by forming a number of generalisations about the relative characteristics or attributes of on-the-job and off-the-job training which are likely to be important factors in determining individuals' and firms' calculations of the expected net benefit from undertaking and providing training.

Firstly, there is a direct cost which not only consists of the payment to the training provider, but may also include costly living, accommodation and travel expenses to employers from funding training outside of the workplace, which do not generally apply to training provided at the workplace. Since the majority of on-the-job training is taught by existing qualified staff within the firm, the direct costs of on-the-job training are likely to be, on average, considerably lower than for off-the-job training. Secondly, the opportunity cost of undertaking on-the-job training are likely to be lower than for off-the-job training, given that on-the-job training is generally in the form of 'learning-by-doing', where the worker produces some level of output whilst learning. Thirdly, off-the-job employer-funded training spells are considerably longer, on average, than on-the-job training episodes. This fact supports the premise that off-the-job has a higher direct provision cost, and further adds to the cost of lost output whilst the worker is away from the workplace. The LFS/QLFS provides some evidence to support this claim; for example, the mean length of off-the-job training for male manufacturing employees was between 2 and 3 months in 1994, compared to a mean length for on-the-job training of between 3 and 4 weeks. A similar, but slightly smaller differential is found for females, with the mean length of off-the-job training being between 2 and 3 months in 1994, compared to a mean value of between 1 and 2 months for on-the-job training. Similar differences were also found for the 1989 data. Fourthly, on-the-job training is by definition (see Lynch, 1992) more firm-specific in nature than training courses provided by a general supplier such, as a college of further education. Theory suggests that firms will be reluctant to invest in general training, whilst individuals will be less willing to undertake training which is specific to the firm.

We address the following five questions in this chapter:

- How did the incidence and characteristics of employer-funded training change in the manufacturing sector between 1984 and 1994?
- Are the determinants of on-the-job and off-the-job employer-funded training consistent over this period?
- Which factors drove the increase in training investment in the manufacturing sector between 1984 and 1994?
- What was the relative importance of each of the structural shifts in manufacturing upon training investment?
- How do the decomposition results for the manufacturing sector compare with those of other industrial sectors?

The chapter is set out as follows: Section 4.2 introduces the data and describes the changes in the sample characteristics. In Section 4.3 we highlight changes in the incidence and characteristics of employer-funded training for workers in the manufacturing sector in Britain between 1984 and 1994. The empirical estimates from our determinants of training models are discussed in Section 4.4, and the decomposition results are given in Section 4.5. Section 4.6 provides a point of comparison by contrasting the decomposition results from manufacturing with that of the 'publicly-orientated service' sector (defined broadly as public administration, health and education). Finally, section 4.7 presents some conclusions.

4.2 Data and sample characteristics

The data analysed in this chapter is a subset drawn from the LFS/QLFS data used in Chapter 3. From the sample of all employees in 1984, 1989 and 1994, we have extracted the samples of male and female full-time employees in the manufacturing sector. Manufacturing employees were identified using the industry variables (INDF1 for 1984, INDCODE for 1989 and INDS92M for 1994) as illustrated in Table 1 of the data appendix.

Table A1 provides the means of the samples, and illustrates the changes which have taken place in the work-related characteristics of our male and female manufacturing samples between 1984 and 1994.[4] Note that these changes have taken place over a period when the

[4] Standard errors for these mean values are not provided since each is significantly different from zero at the 5% level.

total (full-time) employment accounted for by the manufacturing sector in Britain declined considerably from 34.6% to 30.9% for men, and 24.1% and 17% for women (See Table A1 in Chapter 3). Perhaps the most notable change in the characteristics of manufacturing employees was the sharp fall in the proportion of employees under 20 years of age (and the smaller decline in the percentage aged 20 to 24). For males, the percentage of full-time manufacturing employees under 20 years declined from 6.5% to 2.9% over the 10 year period, with the greatest reduction occurring between 1989 and 1994. The decline was even greater for females falling from 12.6% of employees in 1984 to only 4.1% in 1994. Once again, this shift was larger between 1989 and 1994 than in the earlier period. The converse of this trend was a relative increase in the proportion of full-time workers aged between 25 and 49, which accounted for a small increase (about 1 year) in the average age of manufacturing employees in Britain. The shift in the age distribution of manufacturing employees is also reflected in the marital status variables which indicate that the proportion of workers who were married or post-married increased relative to single men and women. It is interesting to note, however, that there was an increase in the percentage who had a dependant child(s) under 9 years of age only for females.

The changes in the highest qualification levels held by manufacturing employees over the period reflect the changes observed for the employee population as a whole. The most striking change is the considerable reduction in the numbers of employees possessing no formal qualifications, and the significant increase in the numbers holding mid-level (i.e. secondary vocational or 'A' levels) and high-level (i.e. higher vocational, degree or higher) qualifications. The decline in the proportion of employees possessing no qualifications was greater for males than females over the 10 years, falling from 47.5% to 18.3% for males, and 53.5% to 32.1% for females, between 1984 and 1994. Similarly, a far higher proportion of male manufacturing employees held a higher-level qualification than females in each of the three years. Interestingly, this situation for manufacturing is the reverse of that found for all employees in the previous chapter, and reflects the lower position of manufacturing on the industrial hierarchy for women than men. Part of this general improvement in the qualification levels of manufacturing employees is the results of the 2 million net job losses in the manufacturing sector being entirely among the unskilled (O'Mahony and Wagner, 1994).

In addition to the decline in the proportion of British employees working in the manufacturing sector over this decade, there has been a considerable shift in the sub-industry structure of manufacturing. For males, the proportion of total manufacturing employees accounted for by the printing and rubbers/plastics/ceramics industries has continually increased, whilst the metals/machine tools and car/other transport industries have experienced

a continual decline. There was also an increase in the proportion of full-time female manufacturing employees in the printing, rubbers/plastics/ceramics, chemicals and metals/machine tools, and a relative decline in the textiles/leather/wood/paper sub-sector.

The decade 1984-1994 saw a substantial change in the distribution of job tenure amongst manufacturing employees. The most noticeable shift was the increase in the proportion of employees who were new (less than one year of job tenure) to the firm between 1984 and 1989, followed by the sharp decline in new recruits between 1989 and 1994. This will to some extent reflect the business cycle with firms taking-on many more new workers in times of economic upturn to meet their output requirements, and increased job mobility for workers in times of greater job opportunities and low unemployment. However, given that 1984 and 1994 were at similar stage in the manufacturing business cycle, the decline in new recruitment between those two years must have other explanations.

Finally, there has been a growth in the percentage of total full-time employment accounted for by small manufacturing companies. This increase was more pronounced for male than female employees, with the percentage of small firms increasing from 14.8% in 1984 to 17.1% in 1994 for men and 14.1% and 14.8% for women. In addition, the LFS/QLFS also indicates that the proportion of manufacturing workers employed on a temporary basis was similar for both sexes in 1984 and 1994, but somewhat lower in 1989.

In the light of the theoretical and empirical literature reviewed in Chapter 2, and the empirical results of Chapter 3, we would expect that many of these changes in the average characteristics of manufacturing employees would have affected the reported growth in the incidence of employer-funded training in that sector. In Section 4.5 we test this proposition with respect to changes in the age and qualifications distribution of manufacturing employees as well as changes in the sub-industry structure. We now turn to examination of the observed changes in the incidence and characteristics of employer-funded training in the manufacturing sector using the three cross-sections of LFS/QLFS data.

4.3 Changes in the incidence and characteristics of employer-funded training in the manufacturing sector in Britain, 1984 - 1994

The reported incidence of training for males and females employed full-time in the manufacturing sector in Britain is provided in Table 1. For comparison purposes, total training is divided into employer-funded, self-funded and government-funded components for each of the three years. We can see that both male and female manufacturing employees participate in training at considerably lower levels than the national average described in the

previous chapter (for men, 9.6% compared to 7.8% in 1984, 14.2% compared to 11.6% in 1989, 14.5% compared to 12.2% in 1994; for women, 11.4% compared to 5.7% in 1984, 17.6% compared to 9.9% in 1989, 19.5% compared to 11.2% in 1994). Interestingly, and in sharp contrast to the case for all industrial sectors, males employed in manufacturing experience a higher level of training than their female counterparts. The lower relative training levels for female manufacturing workers reflects the lower position of manufacturing in the training-industry (manufacturing compared to other industrial sectors) hierarchy for females than males. Importantly, however, the employer-funded training advantage experienced by men declined considerably over the 10 year period. For example, in 1984 women received only 67% of the employer-funded training gained by men. This figure had increased to 78% and 86% in 1989 and 1994, respectively.

TABLE 1: The Percentage of Employees in the Manufacturing Sector Receiving Training in the Last Four Weeks by Funding Source

	MFT			FFT		
	1984	1989	1994	1984	1989	1994
All training	7.8	11.6	12.2	5.7	9.9	11.2
Employer-funded	6.9	10.5	11.0	4.6	8.2	9.5
	(88.5)	(90.5)	(90.2)	(80.7)	(82.3)	(84.8)
Self-funded	0.4	0.8	0.7	0.6	1.1	1.4
	(5.1)	(6.9)	(5.7)	(10.5)	(11.1)	(12.5)
Government-funded	0.6	0.1	0.2	0.4	0.2	0.1
	(7.7)	(0.9)	(1.6)	(7.0)	(2.0)	(0.9)

Notes:
1. All figures are significant at the 5% level.
2. The figures in brackets give the percentage of all training accounted for by each funding source.
3. Employer-funded includes training funded by the current employer or a potential employer; Self-funded includes training funded by the individual, their family and relatives; and Government-funded training includes training funded by local authorities, TECs and other government agencies.

It appears that employers fund the vast majority of training received by manufacturing workers in Britain and the proportion increased from 88.5% in 1984 to 90.2% in 1994 for males, and from 80.7% to 84.8% for females. The higher figures for males reflect a lower propensity than females to invest in self-funded training spells. There was also a significant decline for males and females in the proportion of training that was government-funded. This fell from around 7% of all training in 1984 to between 1% and 2% by 1989.

The growth in the incidence of employer-funded training in the manufacturing sector was much faster between 1984 and 1989, then in the second half of the decade. Male and female

employees, respectively, experienced a growth of 49% and 74% in the reported incidence of training between 1984 and 1989. The comparable figures for the period 1989 to 1994, were 5% and 13%. As with other industrial sectors females gained a higher level of training growth than males through the decade.

With regard to the characteristics of employer-funded training received by manufacturing employees, the data shows (figures not provided in Table 1) that the proportion of training taking place on-the-job has increased sharply for male employees but has fallen for females. In 1984, 51.5% of male employer-funded training was received at the workplace, by 1989 this figure has risen to 54%, and had increased to 65% in 1994. For females, however, the comparable proportions are 64.5%, 59.4% and 58.5%, respectively. This increase for males reflects the trend in the national figures seen in Chapter 3; however, the trend for females is reversed. For males, there has been a corresponding decline in the amount of training received in other locations. In particular, the proportion of training taking place at private training centres, universities and other educational establishments fell from 42.5% in 1984, to 32.3% in 1989 and to 22% in 1994. For females there has been a small movement in the opposite direction.

With regard to the duration of employer-funded training spells in British manufacturing, the latter half of the decade[5] saw a notable increase in the proportion of total training that was of a short duration. In 1989, 34% of male training and 39% of female training lasted less than one week, by 1994, these figures had risen to 47% and 43%, respectively. Conversely, the proportion of training lasting more than 6 months in length (or classified as on going) fell from 48% for males in 1989 to 40% in 1994. Accordingly, the mean length of employer-funded training dropped from between 2 and 3 months in 1989, to between 1 and 2 months in 1994. The comparable figures show a similar decline for females.

Tables A2 and A3 in the chapter appendix, provide cross-tabulations which show the percentage of manufacturing employees receiving employer-funded training by individual and employer characteristics in 1984, 1989 and 1994. These calculations are shown separately for on-the-job and off-the-job training, with the sum of the two percentages equalling the total percentage receiving employer-funded training. These simple figures suggest both consistencies and marked differences in the determinants of on-the-job and off-the-job training. However, due to the similarity of these results with the empirical results in the following section, Tables A2 and A3 will not be discussed further here.

We now turn to the results from the econometric models, which control for the

[5] Reliable figures for length of training are not available in the LFS as the result of a large number of missing cases.

independent effects of individual and firm characteristics on the probability of receiving employer-funded training. The models and the decomposition technique used here are the same as used in Chapter 3 (see Section 4.4), except that as well as estimating binary logistic models (i.e. modelling the no training = 0, training = 1 choice) we also estimate trinomial extensions of the logistic model which take into account three possible training outcomes (i.e. no training = 0; on-the-job training = 1; off-the-job training = 2). To allow for easier interpretation of the results of these non-linear models we provide the mean predicted probabilities for both the binomial and the trinomial logistic models. The multinomial logistic model is a commonly used approach in the applied labour economics literature. A full description of the model can be found in Greene (1993, Chapter 21) and Davidson and MacKinnon (1993, Chapter 15).

4.4 Empirical results

The estimates from the binomial and trinomial logistic models of the determinants of employer-funded training for male and female employees in the manufacturing sector are provided in Tables A3 – A11 in chapter appendix. Each of the eight models is found to have a χ-squared value that is statistically significant at the 1% level.[6] We will begin by discussing the results from the binary models which estimate the probability of a manufacturing employee having received employer-funded training within the four weeks prior to being interviewed.

4.4.1 All employer-funded training

As we would expect from the results for the national employee workforce in Chapter 3, the age of the employee is a significant determinant of whether he or she receives training funded by his or her manufacturing sector employer. The dummy variable specification for age used in our models, indicates an age-training profile for males in which the probability of training is highest for those under 20 years, then drops sharply between the ages of 20 and 25 and declines only gradually thereafter until the age of retirement. Perhaps the most notable change over the 10 year period is that the average probability of training for young men under 20 years of age increased substantially between 1984 and 1994, from .229 to .423. In other words, by 1994 nearly half of all young male employees in the manufacturing sector in

[6] The $\chi 2$ statistic, with the null hypothesis that all coefficients are zero, is provided by:
Model $\chi 2$ = -2 [Restricted log-likelihood – Unrestricted log-likelihood]. The appropriate number of degrees of

Britain received some form of employer-funded training within the four weeks prior to interview, in comparison to less than a quarter in 1984. This situation contrasts sharply with the much smaller increase in the average training probability seen for young British workers as a whole. Moreover, the increased probability of training for manufacturing employees is repeated throughout each of the age brackets, with older workers enjoying a slightly higher percentage growth rate (but a smaller absolute growth) than their younger counterparts. For example, in 1984 those aged between 25-29 received an average training probability of .041 compared to .229 for workers under the age of 20 (18% of training received by under 20s). This fell to .082 and .358 in 1989 (22%), and .112 and .423 in 1994 (27%). This movement represents a slight flattening of the age-training profile for male manufacturing employees over the decade. Simple Pearson correlation tests between age and the predicted probability of receiving employer-funded training confirm this finding. In 1984 the correlation was -.586, in 1989 -.501 and in 1994 -.366 (all significant at the 1% level).

The age-training profile for female manufacturing employees is very different from that of their male counterparts. From Table A4 and A8 we can see that young female manufacturing employees under the age of 20 receive only about one-third of the average training probability of their male counterparts (.229 compared to .062 in 1984, .358 compared to .114 in 1989 and .423 compared to .137 in 1994). However, given even this low comparative training level for young females, those in the older age brackets are still found to receive significantly less training from their employers. The shape of the age-training profile for women, however, is clearly not linear in shape. After age 20 the probability of training falls for those in their early to late-twenties, then increases again for those aged 30 to 49. After 50 the probability of training declines once again to around a one-quarter of that of their under 20 counterparts. The shape of this profile is generally consistent with the findings for all female employees in Chapter 3, and indicates that the expected net benefits to individuals and employers is lower for women of prime childbearing age. This is likely to reflect the expectation by female workers and their employers of future childbearing, and the associated uncertainty about whether the individual would return to work after the maternity spell (or the same job, for the individual especially if the skills gained from training are likely to be firm specific, and for the employer if the training is general in nature). Unlike the case for males, the Pearson correlation tests suggest that there was no overall flattening of the age-training profile for female employees (-.329 in 1984, -.324 in 1989 and -.366 in 1994: all significant at the 1% level).

We find some evidence to suggest that marital status was a significant determinant of

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freedom are (k-1), where k is the number of explanatory variables.

training for women in 1994, and for men in 1989 and 1994. After controlling for the affect of age, married men and women in those years received a significantly higher probability of training than their single counterparts. This advantage stood at 35% for males in 1989 and 1994, and 52% for females in 1994. As suggested in Chapter 3, this finding might be due to employers using marital status as a signal for commitment to the firm, when faced with increased job mobility and growing fears of poaching in the late 1980s and 1990s. Alternatively, the married dummy variable included in the models might be acting as a proxy, capturing the effect of some unobservable characteristics of workers (e.g. a more stable work history) which is simultaneously determining both the probabilities of training and being married.

As expected from theory and our empirical findings in Chapter 3, the probability of receiving employer-funded training is positively and significantly correlated with the highest qualification held by the employee. For males, those possessing no formal qualifications experienced an average training probability of only .024 in 1984, compared to a probability of .101 for men with a degree or higher. The difference in the comparative probabilities then increased to .036 and .185, respectively, in the boom year of 1989, thereafter falling again to .042 and .138 in 1994. For females, the association between training and qualifications is even stronger with the average probabilities for those with no qualification and those with a degree being .013 and .133, respectively in 1984, .035 and .246 in 1989 and .027 and .159 in 1994. Therefore for females in the manufacturing sector we find no evidence so suggest that the training differentials between high and low qualified workers increases in times of economic upturn. Indeed, the qualifications differential diminished slightly over the whole 10 year period. These findings are on contrast to those for all female employees in Chapter 3.

The inclusion of sub-industry dummy variables into the econometric models highlights differences in the specific training needs of each sub-industry. This will be determined principally by differing technological requirements, safety and quality regulations and the level of labour turnover. The results for the effect of sub-industry are significant and reasonably consistent over the decade, with a clear hierarchy evident. Table 2 provides a ranking of manufacturing sub-industries ranging from the highest to the lowest training (holding all else at the sample mean) for male employees. Throughout the decade males employed in chemicals and car/other transport have experienced the highest probability of employer-funded training, whilst those employed in printing and textiles, leather, wood and paper have received the lowest. A higher comparative rate of technological change in chemical and car/other transport is likely to be the principal explanation. The training differential between the highest and lowest training industries changed little between 1984

and 1994 with textiles, leather, wood and paper workers gaining some 38% in 1984, 43% in 1989 and 42% in 1994, of the average training probability of male employees in the chemical industry. It is also interesting to note that the probability of training for workers in electrics and electronics industries consistently improved relative to other sub-industries throughout the 10 years, whilst those employed in rubber, plastics and ceramics received relatively less training over the decade.

TABLE 2: The Estimated Industrial Training Hierarchy for Male Manufacturing Employees

	1984	1989	1994
1.	Chemicals	Chemicals	Chemicals
2.	Car /other transport	Car /other transport	Electrics / Electronics
3.	Rubbers/plastics/ceramics	Electrics / Electronics	Car /other transport
4.	Electrics / Electronics	Rubbers/plastics/ceramics	Food production
5.	Food production	Metals / machine tools	Metals / machine tools
6.	Metals / machine tools	Food production	Rubbers/plastics/ceramics
7.	Printing	Printing	Printing
8.	Textiles/leather/wood/paper	Textiles/leather/wood/paper	Textiles/leather/wood/paper

The industrial training hierarchy for females provided in Table 3 shows a similar pattern as for males. Women employed in the chemicals and car/other transport industries received the highest probability of employer-funded training throughout the decade, whilst those working in textiles/leather/wood/paper received the least training (except for printing in 1984). In 1984, textiles/leather/wood/paper employees experienced less than one-third (28%) of the training probability of those employed in chemicals. Unlike males, this difference in the training probability between the highest and lowest training industries fell sharply to around one-half (50%) in 1989, but increased again to around one-third (34%) by 1994. This adds some support to the hypothesis that employers in low training industries turn to females to meet their training needs in times of economic upturn. Interestingly, in contrast to males, we find that employers in the electric and electronics industry consistently reduced their comparative training provision between 1984 and 1994.

TABLE 3: The Estimated Industrial Training Hierarchy for Female Manufacturing Employees

	1984	1989	1994
1.	Chemicals	Car /other transport	Chemicals
2.	Car /other transport	Chemicals	Car /other transport
3.	Rubbers/plastics/ceramics	Metals / machine tools	Metals / machine tools
4.	Electrics / Electronics	Printing	Food production
5.	Food production	Electrics / Electronics	Rubbers/plastics/ceramics
6.	Metals / machine tools	Food production	Electrics / Electronics
7.	Textiles/leather/wood/paper	Rubbers/plastics/ceramics	Printing
8.	Printing	Textiles/leather/wood/paper	Textiles/leather/wood/paper

After controlling for the independent effect of manufacturing sub-industry on the probability of training, we find no consistent evidence of regional inequalities in training provision over the period. Moreover, large manufacturing employers are found to provide significantly higher levels of training than their smaller counterparts throughout the decade. The differential between large and small firms is greater for females than males but declined after 1984. In 1984, males employed in a large manufacturing firm experienced a 72% higher average predicted probability of receiving employer-funded training than workers in small firms (a probability of .025 compared to .043). This figure fell to 52% in 1989 (.052 compared to .079) and 50% in 1994 (.050 compared to .10). The comparison figure for female employees was 225% in 1984 (.008 compared to .026), 86% in 1989 (.035 compared to .065) and 47% in 1994 (.043 compared to .063). This finding is the opposite of that found for all employees/sectors in the previous chapter.

We find no evidence that job tenure has a clear and consistent effect on training probabilities. For men, the probability of training was highest for those with job tenure between 2 and 5 years in 1984 and 1994, but not in 1989. In contrast, females with less than two years job tenure gained over double the average training probability of those with over 5 years tenure in 1984. This relationship, however, was not found for 1989 and 1994. It will become clear in the following section of this chapter that estimating the determinants of training at the aggregate level (i.e. all employer-funded training, without distinguishing between on-the-job and off-the-job training) can lead to incorrect inferences about the affect of job tenure on training.

Finally, the results suggest that manufacturing employers are less willing to invest in those workers employed on a temporary basis. Equally, employees on temporary contracts

may be less willing to demand training if it is firm-specific and non-transferable in nature. This relationship is only significant, however, for men in 1994, and for women in 1989.

4.4.2 On-the-job and off-the-job employer-funded training

We begin by examining the relationship between age and on-the-job and off-the-job employer-funded training. For both sexes, there is some evidence to suggest that the probability of training declines more quickly with age for off-the-job training than training provided at the workplace. This is a consistent finding over the 10 year period, and suggests that, relative to the costs of providing training, the expected benefits to the individual and the firm from undertaking/providing off-the-job training decline at a faster rate with age than for on-the-job training.

Marital status plays a greater role in determining the probability of receiving on-the-job than off-the-job training, with this importance increasing after 1984. For instance, married men in 1989 and 1994, and married women in 1994, experienced significantly higher probability of receiving on-the-job training than their single counterparts. The effect of marriage upon the probability of undertaking off-the-job training was only significantly positive for males in 1989 and 1994. As was proposed in the previous chapter, it might be the case that employers, are increasingly using marital status as a signal of reliability and commitment to the firm in their training calculations. A second possibility is that the married dummy variable is capturing the effect of an unobservable characteristics of the employee which is positively correlated with being married and receiving training. The estimates provide no evidence that having a young dependant child significantly effects the probability of either training type for men or women. The outlier case, is for females in 1989, where having a young child was found to lead to a significant reduction in the probability of receiving off-the-job training.

Qualifications are important determinants of both types of training for males and females. This effect, however, is more pronounced for off-the-job training spells and for females. For example, in 1984 males holding no qualifications received only 48% (.019 compared to .040) of the average on-the-job training probability of employees with a degree or higher. This qualification differential increased to 32% (.027 vs. .086) in the more prosperous year of 1989, then declined to 39% (.032 vs. .082) by 1994. In comparison, females with no qualification experienced relatively less on-the-job training than their highly educated counterparts. In 1984, this figures stood at 18% (.009 vs. .049) and then increased to 20% in 1989 (.025 vs. .123) and 31% (.026 vs. .085) in 1994. Overall, there appears to have

been a slight narrowing over the decade in the on-the-job training gap between those with qualifications and those without.

The qualification-training differential was even greater for off-the-job training resulting from the fact that low educated employees experienced a virtually zero probability of receiving off-the-job training throughout the decade. In 1984 those holding no qualifications received only 8% (.005 vs. .063) for male and 2% (.001 vs. .056) for female of the average off-the-job training probability of employees with a degree or higher. The comparable figures for 1989 and 1994 were 7% (.008 vs. .112) and 5% (.007 vs. .143), and 15% (.009 vs. .060) and 3% (.003 vs. .097). Therefore, only for males do we see a movement towards a narrowing of the qualifications differential in off-the-job training over the period.

We find some evidence that the region in which the firm is based has some effect on training probabilities for male manufacturing workers. The regional dummy variables in the models are attempting to capture differences in economic conditions between regions, in particular unemployment (and therefore labour turnover). Nevertheless, we find no little consistency in the findings for on-the-job or off-the-job training. In 1984 and 1989 men working in London received a significantly higher probability of receiving on-the-job training than workers based in the other areas. This effect, however, was not found for 1994. In contrast, male employees in the East Midlands, North West and Scotland experienced significantly lower levels of off-the-job training in 1984 and 1989, but this continued through to 1994 only in the East Midlands. We find no such regional differentials for females.

Importantly, the effect of sub-industry of employment is found to be consistent across training types and over the decade. This provides some additional support to our interpretation of these results in the previous section. For male employees, those working in the chemicals, electrics/electronics and car/other transport sectors enjoyed a significantly higher probability of receiving both on-the-job and off-the-job employer-funded training between 1984 and 1994, than workers employed in textiles/leather/wood/paper. In addition, those employed in rubber/plastic/ceramics gained significantly higher on-the-job training probabilities in 1984 and 1989, and for off-the-job training in 1984 and 1994. Employees based in food production, experienced high relative on-the-job training levels in 1984 and 1989, and for off-the-job training in 1994. Workers in metals/machine tools received a higher level of on-the-job training than our base group in 1994, and of off-the-job training in both 1984 and 1994.

We find a similar industrial hierarchy for female manufacturing employees. Female workers in chemicals and car/other experienced the highest on-the-job and off-the-job training probabilities in each of the three years. In addition, employers based in food production provided significantly larger amounts of off-the-job training in 1984 and 1994, than the base

sector textiles/leather/wood/paper. This is true also for rubbers/plastics/ceramics in 1994, metals in 1989 and 1994, and electrics/electronics in 1994.

Firm size is an important determinant of on-the-job and off-the-job employer-funded training over the decade. For both males and females, the probability of receiving on-the-job training is significantly higher for firms with over 25 workers than their smaller counterparts. The size of the differential between large and small firms, however, increased for males over the 10 year period but fell considerably for females. In 1984 and 1994, male employees in small firms received around 60% and 45%, respectively, of the average on-the-job training probability of those employed in large firm. The equivalent differential for female employees was 21% in 1984 and 70% in 1994. Large employers also tend to provide more training off-the-job than small firms, but we find this to be significantly so only for males. Moreover, the differential between large and small firm in off-the-job training has remained reasonably constant over the decade for both sexes.

Estimating the determinants of on-the-job and off-the-job training separately shows some interesting differences in the effects of job tenure on training probabilities. For both sexes, there is a clear tendency for the highest probability of receiving on-the-job training to be within the first year of job. This contrasts sharply with off-the-job training where the first year of job tenure is associated with a significantly lower probability. The reason for the differences in the relationship between tenure and the two training types may be the results of the more general nature of off-the-job training spells. Manufacturing employers are likely to require greater information concerning an employees commitment to the firm before offering an off-the-job training opportunity, which would develop skills valuable to other employers and be more costly. This is based upon the reasonable assumption that the asymmetry of information between an individual and employer declines over time (see Loewenstein and Spletzer, 1997). This consideration does not apply to on-the-job training, which is typically provided to new employees to enable them to undertake the tasks of the job.

We now turn to the results of the decomposition analysis which examines the driving force behind the growth in observed employer-funded training, as a whole and divided into on-the-job and off-the-job training. The analysis asks how much of the growth in training between 1984 and 1994 can be attributed to changes in the average characteristics of the manufacturing workforce and how much is the results of increases in the demand for training and skilled labour by individuals and firms, respectively.

4.5 Decomposition results

4.5.1 Male full-time manufacturing employees

Separate decomposition results of the growth in i) all employer-funded training, ii) on-the-job employer-funded training and iii) off-the-job employer-funded training for full-time male manufacturing employees are provided in Table 4. The predicted mean probability of receiving (any type of) employer-funded training within the four weeks prior to interview increased by 122%, from .0399 to .0888 between 1984 and 1994. As we found for all male employees in Chapter 3, the manufacturing sector experienced a far greater growth in its average training probability between 1984 and 1989 (around 70% of all growth) than between 1989 and 1994. Moreover, the results from decomposing the growth in training into parts attributable to differences in the coefficients (the demand for skilled labour) and differences in average employee characteristics, are remarkably similar to those for all British male employees. The growth in employer-funded training between 1984 and 1989 is estimated to be due to (explaining 93% of the training growth) changes in the demand for training and skilled labour by individuals and firms (the coefficient structure). This contrasts sharply to the period 1989 to 1994, where training growth was found to be the result of favourable shift in the average work-related characteristics of manufacturing workers. As with the findings of Chapter 3, the increase in the average training probability witnessed in the latter five year period can be totally attributed to improvements in the qualification level of male workers. Importantly, we again find that shifts in the age and industrial structures have had little or no effect on average training probabilities for this group of workers. One conclusion from these results is that if the qualification base of male manufacturing employees had remained at its 1989 level, then 1994 would have seen a small reduction in the average probability of receiving employer-funded training rather than the estimated .015 increase.

If we divide the growth in employer-funded training into that provided at the workplace and that provided off-the-job, we find both marked consistencies and differences in the decomposition results. The majority (around 74%) of the total training growth between 1984 and 1994 was in on-the-job rather than off-the-job training. Over this period, the average on-the-job training probability for a male manufacturing employee is estimated to have increased by 141% or .036, from .0257 to .0619, with the greater proportion of this growth (.021) occurring between 1984 and 1989. The total growth was, therefore, more evenly distributed throughout the ten year period than was the case for all employer-funded training (or for all male employees in Chapter 3). From the results of the decomposition analysis, it appears that

changes in either the age structure, the qualification base or the sub-industry composition of British manufacturing had little effect on the average on-the-job training probability for male employees between 1984 and 1989. Rather, we find that the training growth over this five year period can be was principally attributed to an increased demand for training (or human capital) and skilled labour by individuals and firms, respectively.

The picture is somewhat different when we consider the decomposition results for the growth in on-the-job training over the period 1989 to 1994. We find that of the .015 point increase in the average predicted probability, 54% (.008) can be attributed to changes in the coefficient structure or demand for training/skilled labour while the remaining 46% (.007) is due to the effect of changes in the average characteristics of the manufacturing workforce. These figures suggest that the demand for training/skilled labour grew for males in the manufacturing sector between 1989 and 1994 which was not found to be the case for all employer-funded training or for the employee workforce as a whole. We again find, however, that the dominating positive effect of an improved qualification base was the principal component of the increased training due to characteristics changes, with the increased average age of the male manufacturing workforce having only a slight expected negative or counter-effect on training probabilities in this period.

With regard to employer-funded training which was provided off-the-job, the decade 1984 to 1994 saw an increase in the average probability of 112% or .0136, an increase from .012 to .026. In 1984, therefore, only 1 in 82 male manufacturing employees reported to have received employer-funded off-the-job training in the four weeks prior to interview in 1984. By 1989 this figure had increased notably to 1 in 41. This significant rise in off-the-job training investment, however, did not continue after 1989, with the years up until 1994 seeing only a marginal betterment to 1 in 39. As such, a far higher proportion of total training growth over the decade occurred in the first five year sub-period (around 88%) than was the case for on-the-job training. Consequently, our model suggests that 1989 to 1994 saw virtually no growth in the percentage of the male manufacturing employees receiving off-the-job training funded by their employer. The results of the decomposition analysis for off-the-job training between 1984 to 1989 are consistent with those for on-the-job training, where the training growth in those years was attributable to demand (coefficient) changes. In sharp contrast, the results for 1989 to 1994 suggest that the demand for training and skills by individuals and firms in manufacturing fell. Had it not been for the improvement in the average qualification

TABLE 4: Decomposition of the Growth in Employer-Funded Training by Training Type for Male Full-Time Employees: The Manufacturing Sector

	1984 – 1989	1989 – 1994	1984 – 1994
	All Employer-Funded Training		
Mean predicted probability	1984 = .0399	1989 = .0739	1994 = .0888
Difference in mean probability $\hat{T}^N - \hat{T}^O$	.034	.015	.049
Difference in Coefficients $\{\ddot{P}(\hat{\alpha}^N, X^N) - \ddot{P}(\hat{\alpha}^O, X^N)\}$	.032 (93%)	-.003 (-20%)	.041 (85%)
Difference in characteristics $\{\ddot{P}(\hat{\alpha}^O, X^N) - \ddot{P}(\hat{\alpha}^O, X^O)\}$	.002 (7%)	+.018 (120%)	.008 (15%)
Principal Components of Characteristic differences			
Age Structure	.000	-.004	-.003
Qualification Base	+.003	+.023	+.013
Industry Structure	.000	.000	.000
	On-the-job Employer-Funded Training		
Mean predicted probability	1984 = .0257	1989 = .0467	1994 = .0619
Difference in mean probability $\hat{T}^N - \hat{T}^O$	.021	.015	.036
Difference in Coefficients $\{\ddot{P}(\hat{\alpha}^N, X^N) - \ddot{P}(\hat{\alpha}^O, X^N)\}$	.020 (94%)	.008 (54%)	.035 (97%)
Difference in characteristics $\{\ddot{P}(\hat{\alpha}^O, X^N) - \ddot{P}(\hat{\alpha}^O, X^O)\}$	.001 (6%)	.007 (46%)	.001 (3%)
Principal Components of Characteristic differences			
Age Structure	.000	-.001	-.001
Qualification Base	+.002	+.011	+.004
Industry Structure	-.001	.000	-.001
	Off-the-job Employer-Funded Training		
Mean predicted probability	1984 = .0122	1989 = .0245	1994 = .0259
Difference in mean probability $\hat{T}^N - \hat{T}^O$	.012	.001	.0136
Difference in Coefficients $\{\ddot{P}(\hat{\alpha}^N, X^N) - \ddot{P}(\hat{\alpha}^O, X^N)\}$	.011 (99%)	-.010	.007 (56%)
Difference in characteristics $\{\ddot{P}(\hat{\alpha}^O, X^N) - \ddot{P}(\hat{\alpha}^O, X^O)\}$	.000 (1%)	.011	.006 (44%)
Principal Components of Characteristic differences			
Age Structure	.000	-.002	-.001
Qualification Base	+.001	+.013	+.008
Industry Structure	.000	.000	.000

level of manufacturing males this reduced demand would have caused a .01 point fall in the average probability of receiving off-the-job training. If this had been the case only 1 in 63 (instead of the 1 in 39 actually predicted) male employees would have received off-the-job training in the four weeks prior to interview.

TABLE 5: Decomposition of the Growth in Employer-Funded Training by Training Type for Female Full-Time Employees: The Manufacturing Sector

	1984 - 1989	1989 – 1994	1984 – 1994
		All Employer-Funded Training	
Mean predicted probability	1984 = .0254	1989 = .0597	1994 = .0599
Difference in mean probability $\hat{T}^N - \hat{T}^O$	.034	.000	.034
Difference in Coefficients $\{\ddot{P}(\hat{\alpha}^N, X^N) - \ddot{P}(\hat{\alpha}^O, X^N)\}$	.025 (73%)	-.005	.023 (68%)
Difference in characteristics $\{\ddot{P}(\hat{\alpha}^O, X^N) - \ddot{P}(\hat{\alpha}^O, X^O)\}$	.009 (27%)	.005	.011 (32%)
Principal Components of Characteristic differences			
Age Structure	+.002	-.008	-.002
Qualification Base	+.005	+.015	+.017
Industry Structure	-.001	.000	.000
		On-the-job Employer-Funded Training	
Mean predicted probability	1984 = .0151	1989 = .0400	1994 = .0435
Difference in mean probability $\hat{T}^N - \hat{T}^O$	.025	.004	.028
Difference in Coefficients $\{\ddot{P}(\hat{\alpha}^N, X^N) - \ddot{P}(\hat{\alpha}^O, X^N)\}$	.019 (78%)	.002 (50%)	.025 (90%)
Difference in characteristics $\{\ddot{P}(\hat{\alpha}^O, X^N) - \ddot{P}(\hat{\alpha}^O, X^O)\}$	.006 (22%)	.002 (50%)	.003 (10%)
Principal Components of Characteristic differences			
Age Structure	+.001	-.002	-.001
Qualification Base	+.003	+.007	+.007
Industry Structure	.000	.000	.000
		Off-the-job Employer-Funded Training	
Mean predicted probability	1984 = .0027	1989 = .0143	1994 = .0172
Difference in mean probability $\hat{T}^N - \hat{T}^O$	.012	.003	.015
Difference in Coefficients $\{\ddot{P}(\hat{\alpha}^N, X^N) - \ddot{P}(\hat{\alpha}^O, X^N)\}$	.010 (87%)	-.002	.011 (74%)
Difference in characteristics $\{\ddot{P}(\hat{\alpha}^O, X^N) - \ddot{P}(\hat{\alpha}^O, X^O)\}$	.002 (13%)	.005	.004 (26%)
Principal Components of Characteristic differences			
Age Structure	.000	-.004	.000
Qualification Base	+.001	+.006	+.004
Industry Structure	.000	.000	-.002

4.5.2 Female full-time manufacturing employees

The comparable decomposition results for female full-time manufacturing employees are provided in Table 5. As we discussed in Section 4.3 female employees in manufacturing received considerably less employer-funded training than their male counterparts in each of the three years. This contrasts notably with the results for all employees, where it was found that women were more likely to receive employer-funded training than men. The decomposition results for the manufacturing sector suggest that female employees received only 63% of the average male training probability in 1984. The disadvantage faced by women, however, had declined by 1989 when women gained around 81% of the male training level, but increased again to 68% by 1994. This trend, however, is somewhat different for on-the-job and off-the-job employer-funded training. For on-the-job training, females gained 59% of the average training level of men in 1984, rising to 86% in 1989 and then again falling to 70% by 1994. Therefore, for all employer-funded training and off-the-job training the gender differential in manufacturing was smallest when manufacturing output was greatest in 1989 (see Kitson and Michie, 1996). The consequent increase in the gender differential between 1989 and 1994, however, was not large enough to shift it back to the 1984 level. Moreover, the gender differential is considerably greater for off-the-job than on-the-job training. There was, however, a considerable movement towards convergence in off-the-job training rates over the 10 year period. For example, in 1984 females in manufacturing received just 22% of the average off-the-job training probability of men. By 1989 this ratio had improved significantly to 58%, and in 1994 it stood at 66%.

The average predicted probability of receiving employer-funded training for female manufacturing workers increased by 136% between 1984 and 1994 from .0254 to .0599. In contrast to males, virtually all (99%) of the training growth for females was happened between 1984 and 1989. Consequently, female full-time manufacturing staff experienced no growth in their average training probability between 1989 and 1994. Of the growth between 1984 and 1989 the decomposition results suggest that 73% was due to changes in the demand for training/skilled labour (the coefficients) with the remainder due to improvements in the human capital characteristics of the sample. This implies that had there been no increase in demand for training/skilled labour by individuals and employers, the average probability of training would have increased by nearly one percentage point (from .0254 to .0353) between 1984 and 1989. In the main, this was attributable to improvements in the educational base of the female manufacturing workforce. By comparison, the period 1989 to 1994 saw a one-for-one trade-off between a reduction in the demand for training/skilled labour and improvements

in average workforce characteristics. Thus, we could have expected the average probability of receiving training for females to decline by .005 between 1989 and 1994. If it had not been for the increase of .005 due to characteristic changes. Interestingly, the latter effect consists of a predicted fall in the average training probability of .008 resulting from the changing age structure of the sample, but this is outweighed by the .015 positive effect on the average training probability emanating from the improved educational base of female manufacturing workers. Therefore, if we were to remove the effect of educational improvements (and keeping the effect of changes in the age structure) the average training probability for this group of employees would have fallen by .013 or 22% between 1989 and 1994.

Dividing total training into that provided on-the-job and that undertaken at off-the-job locations, we find that the average probability of on-the-job training for female manufacturing employees increased by .0284 from .0151 in 1984, to .040 in 1989 and to .0435 by 1994 – a total increase of 188%. In contrast, whilst the absolute growth in the average probability of receiving training was greater for on-the-job than off-the-job training, the percentage growth in the average probability of receiving off-the-job training was significantly greater. For example, the average probability of receiving off-the-job training increased by only .015 (around half of that for on-the-job training) from .0027 to .0172 between 1984 and 1994, which is equivalent to a 537% increase.

The results of decomposing the growth in training probability over the period 1984 to 1989 are found to be similar for both types of training. Between 78% and 87% of this growth can, as expected from the results of Chapter 3, be attributed to changes in the demand for training and skilled labour by individuals and firms. The remaining growth can be ascribed to changes in characteristics, in particular the improved qualification stock of female manufacturing employees. The results for 1989 to 1994 are somewhat different depending upon the training location. For on-the-job training, we find that the small increase in the average training probability is due equally to changes in the coefficient and characteristics structures. In contrast, the small growth in the probability of receiving off-the-job training is solely the result of having a better educated female workforce in manufacturing. As found elsewhere, had this educational improvement not have taken place, then it is possible that we would have seen a decline in the percentage of female manufacturing employees reporting to have undertaken off-the-job employer-funded training in this five year period.

4.6 A comparison with the Publicly-Orientated Service Sector

In order to provide a point of comparison with the manufacturing sector, Tables 6 and 7 give

decomposition results for the 'publicly-orientated service' sector (POSS). This broad sector is defined to consist of public administration, health and education, to provide the sharpest possible contrast with the characteristics of the manufacturing sector in Britain. The corresponding sample characteristics and logistics regression estimates for the POSS are presented in Tables B1-B11 in Appendix B, but are not discussed further here.

The most striking difference between men and women employed in the POSS is that they receive considerably (about 2 to 3 times) more employer-funded training than their manufacturing counterparts. Despite this, however, there is a remarkable similarity between the results of the decomposition analysis for the two industrial sectors.

Between 1984 and 1994 the average probability of receiving employer-funded training for males in the POSS increased from .096 to .1823 – an increase of around 90%. The comparable growth for female employees was even more impressive increasing from .0912 to .2084 over the same period – a 129% increase. We have also found that whereas men in this sector experienced a slight training advantage over females in 1984, the differential had turned in favour of women by 1989 and further increased slightly by 1994. For example, male POSS employees experienced around a 5% (.096 for men, .0912 for women) higher average probability of receiving employer-funded training in 1984. By 1989, females gained the advantage, some 12% (.1799 for men, .2014 for women) over men, which rose to 14% in 1994 (.1823 for men, .2084 for women). The experience of women relative to men in the POSS, therefore, provides a interesting contrast to the case of manufacturing over this 10 year period.

Dividing total employer-funded training into on-the-job and off-the-job components allows a better insight into the nature of the growth in training for POSS employees. Of the two forms of training, on-the-job is found to be the dominant training medium for British employers representing around 70% of total training for both males and females. This figure remained reasonably constant for both sexes between 1984 and 1994, and compares closely with the figures for the manufacturing sector. There was, however, a small movement towards increasing the dominance of on-the-job training in the POSS, which was the result of a slight fall in the average probability of receiving off-the-job training for both sexes between 1989 and 1994 (whilst the average probability of on-the-job training increased marginally by around half of one percent).

Looking at the decomposition results in Tables 5 and 6, we observe a similar pattern to that found for the manufacturing sector. The vast majority (over 95%) of the estimated training growth occurred between 1984 and 1989, rather than in the latter period. Of the former growth, around 93-94% is estimated for males and females to be the result of changes

in the coefficient structure (interpreted as an increased demand for trained workers). Thus, we find that changes in the human capital characteristics of POSS employees, or shifts in the sub-industry structure, played only a small role in increasing the incidence of employer-funded training in this period. In contrast, the findings for the period 1989 to 1994 are very different. The estimates suggest that the demand for training and skilled labour by individuals and employers fell considerably after 1989. The result of this would have been a fall of around 12% for men and 7% for women in the average probability of training, had it not been for favourable changes in the average characteristics of the POSS workforce. Once again the increased probability of training arising from the improved work-related characteristics of the sample can principally be attributed to the improved qualification levels of workers rather than shifts in the age or industry structures.

The decomposition results for on-the-job and off-the-job training are consistent with each other, and the above finding, that the improved qualification base of POSS employees was the principal driving force behind the increased training incidence observed after 1989. The important point to note from these decompositions is that the fall in demand for training and skilled labour by individuals and employers between 1989 and 1994 was greater for off-the-job training than on-the-job training. Male POSS employees, for example, would have experienced a 26% fall in their average probability of receiving employer-funded training in this five year period, had it not been for the counteracting positive effect of their improved qualification levels. For females the comparative decline was slightly smaller at 16%. As with previous results, we find that the increasing average age of the POSS workforce since 1984 does have the expected negative effect on the receipt of training but that the size of this effect was small. Moreover, we find no evidence that changes in the sub-industry structure within the POSS had any consistent effect on average training investment.

4.7 Conclusions

In this chapter we have examined changes in the incidence and determinants of employer-funded training in the British manufacturing sector between 1984 and 1994. This is of interest given the significant structural changes which have occurred in the sector over this period. We have included, for the first time, sub-industry control variables in the determinants of training models, and divided total employer-funded training into on-the-job and off-the-job components. This has provided us with a better insight into the nature of, and driving forces

TABLE 6: Decomposition of the Growth in Employer-Funded Training by Training Type for Male Full-Time Employees: The Publicly-Orientated Service Sector

	1984 – 1989	1989 – 1994	1984 – 1994
	All Employer-Funded Training		
Mean predicted probability	1984 = .0960	1989 = .1799	1994 = .1823
Difference in mean probability $\hat{T}^N - \hat{T}^O$	.084	.002	.086
Difference in Coefficients $\{\ddot{P}(\hat{\alpha}^N, X^N) - \ddot{P}(\hat{\alpha}^O, X^N)\}$	.078 (93%)	-.021	.068 (79%)
Difference in characteristics $\{\ddot{P}(\hat{\alpha}^O, X^N) - \ddot{P}(\hat{\alpha}^O, X^O)\}$	.006 (7%)	.023	.018 (21%)
Principal Components of Characteristic differences			
Age Structure	-.001	-.003	-.002
Qualification Base	+.008	+.028	+.021
Industry Structure	.000	-.001	-.001
	On-the-job Employer-Funded Training		
Mean predicted probability	1984 = .0649	1989 = .1267	1994 = .1327
Difference in mean probability $\hat{T}^N - \hat{T}^O$	.062	.006	.068
Difference in Coefficients $\{\ddot{P}(\hat{\alpha}^N, X^N) - \ddot{P}(\hat{\alpha}^O, X^N)\}$	.058 (94%)	-.010	.058 (85%)
Difference in characteristics $\{\ddot{P}(\hat{\alpha}^O, X^N) - \ddot{P}(\hat{\alpha}^O, X^O)\}$	.004 (6%)	.016	.010 (15%)
Principal Components of Characteristic differences			
Age Structure	-.001	-.002	-.001
Qualification Base	+.005	+.019	+.012
Industry Structure	.000	-.001	.000
	Off-the-job Employer-Funded Training		
Mean predicted probability	.1984 = .0287	1989 = .0616	1994 = .0575
Difference in mean probability $\hat{T}^N - \hat{T}^O$	.033	-.004	.029
Difference in Coefficients $\{\ddot{P}(\hat{\alpha}^N, X^N) - \ddot{P}(\hat{\alpha}^O, X^N)\}$	.030 (92%)	-.016	.020 (70%)
Difference in characteristics $\{\ddot{P}(\hat{\alpha}^O, X^N) - \ddot{P}(\hat{\alpha}^O, X^O)\}$	.003 (8%)	.012	.009 (30%)
Principal Components of Characteristic differences			
Age Structure	-.001	-.001	-.001
Qualification Base	+.003	+.014	+.010
Industry Structure	.000	-.001	-.001

TABLE 7: Decomposition of the Growth in Employer-Funded Training by Training Type for Female Full-Time Employees: The Publicly-Orientated Service Sector

	1984 – 1989	1989 – 1994	1984 - 1994
		All Employer-Funded Training	
Mean predicted probability	1984 = .0912	1989 = .2014	1994 = .2084
Difference in mean probability $\hat{T}^N - \hat{T}^O$	.110	.007	.117
Difference in Coefficients $\{\ddot{P}(\hat{\alpha}^N, X^N) - \ddot{P}(\hat{\alpha}^O, X^N)\}$	.104 (94%)	-.013	.101 (86%)
Difference in characteristics $\{\ddot{P}(\hat{\alpha}^O, X^N) - \ddot{P}(\hat{\alpha}^O, X^O)\}$	.006 (6%)	.020	.016 (14%)
Principal Components of Characteristic differences			
Age Structure	-.001	-.001	-.003
Qualification Base	+.008	+.026	+.022
Industry Structure	-.001	-.001	.000
		On-the-job Employer-Funded Training	
Mean predicted probability	1984 = .0619	1989 = .1577	1994 = .1631
Difference in mean probability $\hat{T}^N - \hat{T}^O$	.096	.005	.101
Difference in Coefficients $\{\ddot{P}(\hat{\alpha}^N, X^N) - \ddot{P}(\hat{\alpha}^O, X^N)\}$	.094 (98%)	-.001	.096 (95%)
Difference in characteristics $\{\ddot{P}(\hat{\alpha}^O, X^N) - \ddot{P}(\hat{\alpha}^O, X^O)\}$	.002 (2%)	.006	.005 (5%)
Principal Components of Characteristic differences			
Age Structure	-.001	.000	-.003
Qualification Base	+.005	+.008	+.013
Industry Structure	-.002	-.002	-.002
		Off-the-job Employer-Funded Training	
Mean predicted probability	1984 = .0210	1989 = .0692	1994 = .0678
Difference in mean probability $\hat{T}^N - \hat{T}^O$	.048	-.001	.047
Difference in Coefficients $\{\ddot{P}(\hat{\alpha}^N, X^N) - \ddot{P}(\hat{\alpha}^O, X^N)\}$	.043 (90%)	-.011	.038 (80%)
Difference in characteristics $\{\ddot{P}(\hat{\alpha}^O, X^N) - \ddot{P}(\hat{\alpha}^O, X^O)\}$	.005 (10%)	.010	.009 (20%)
Principal Components of Characteristic differences			
Age Structure	.000	-.001	.000
Qualification Base	+.003	+.010	+.008
Industry Structure	+.001	+.001	+.001

behind, the observed growth in the reported incidence of employer-funded training in manufacturing between 1984 and 1994. We have also provided a point of comparison for manufacturing by contrasting the results of the decomposition analysis with those of the 'publicly-orientated service' sector.

With regard to the incidence and growth in employer-funded training for manufacturing employees the principal findings of the chapter are that:

(i) Manufacturing employees in Britain received lower levels of employer-funded training than the employee workforce as a whole. It appears that the manufacturing sector is lower down the training-industry hierarchy for females than males, with female manufacturing workers receiving only 55-61% (89-95% for males) of the national employer-funded training average between 1984 and 1994.

(ii) As such, and in sharp contrast to the national aggregate figures, female manufacturing workers received only 64% of the average employer-funded training probability experienced by their male equivalents in 1984. The gender differential fell considerably in 1989 (females gaining 81% of the male level), but increased again to 67% by 1994.

(iii) The average probability of receiving employer-funded training increased considerably for manufacturing workers over the 10 year period. This growth was greater for females (136%) than males (123%), and for manufacturing employees than the national figure (70% for men, 88% for women). Interestingly, whereas 70% of the training growth for males occurred between 1984 and 1989, nearly all (98%) of the training growth for females was seen in this five year period. Females, therefore, experienced no growth in their average training probability between 1989 and 1994.

(iv) Of the total growth in the average employer-funded training probability between 1984 and 1994, the majority (73% for men, 72% for women) was in on-the-job training. A much smaller growth was seen in off-the-job training probabilities.

(v) Those employed in the Publicly-Orientated Service Sector received a significantly higher average training probability than manufacturing workers throughout the decade. This differential was reasonably constant over the period with female manufacturing employees experiencing around 30% of the average training probability of equivalent POSS employees. This figure stood slightly higher for men at around 45%.

The main findings with respect to the determinants of employer-funded training are that:

(vi) Age and highest qualification are significant determinants of training for men and women in British manufacturing. The age-training profile appears to be considerably steeper for off-the-job than on-the-job training, with the probability of receiving off-the-job training declining sharply with age. The differential in the

average training probability of employees with no qualifications and those with high level qualifications is greater for females than males, and for off-the-job than on-the-job training.

(vii) There is a consistent training- sub-industry hierarchy for males and females, with those employed in the chemicals, electrical/electronics and car/other transport sectors experiencing the highest probability of employer-funded training between 1984 and 1994. Workers in textiles/leather/wood/paper and printing consistently received the lowest probability of training. These findings are confirmed for on-the-job and off-the-job employer-funded training.

(viii) Large manufacturing firms provide significantly more training than their smaller counterparts throughout the decade. The differential between large and small firms is greater for females than males, but the differential for both sexes declined considerably after 1984. The significant training advantage for employees in large firms is also found for on-the-job and off-the-job training for males, but only for on-the-job training for females.

(ix) The probability of receiving on-the-job training is significantly higher in the first year of job tenure in each of the three years. This finding contrasts sharply with that for off-the-job training where new recruits to the firm have a significantly lower probability of receiving training.

The results from the decomposition analysis for manufacturing employees tend to support the national findings in Chapter 3. The vast majority (93% for men, 73% for women) of the growth in the average probability of employer-funded training for British manufacturing employees between 1984 and 1989 can be attributed to increases in the demand for training and skilled labour (the coefficients) by workers and firms. In sharp contrast, virtually all of the (smaller) training growth seen between 1989 and 1994 was due to improvements in the work-related characteristics of the samples. The important component of these improvements was the increase in the average qualification level of manufacturing workers. In particular, it the qualification base had remained at it's 1989 level in 1994, we would have observed an actual decline of as much as 20% in the incidence of employers-funded training between 1989 and 1994 rather than the small increase actually observed. This decline would have been particular evident for training provided outside of the workplace.

Finally, it might be the case that the sharp increase in the incidence of employer-funded training between 1984 and 1989 may have contributed to the increased TFT growth witnessed in the British manufacturing sector in the 1980s.

Appendix A – Empirical results for the Manufacturing Sector

TABLE A1: The Changing Characteristics of Male and Female Full-Time Employees in the Manufacturing Sector

	Male			Female		
	1984	1989	1994	1984	1989	1994
Percentage						
16-19	6.5	5.6	2.9	12.6	11.1	4.1
20-24	11.1	11.7	9.0	20.1	18.3	14.7
25-29	11.2	12.9	13.9	11.6	14.0	16.8
30-39	24.8	22.9	26.0	18.2	20.2	22.8
40-49	21.3	23.8	25.7	19.5	22.3	25.5
50+	25.1	23.1	22.5	18.0	14.1	16.1
Single	22.5	23.8	20.8	36.1	32.0	24.4
Married	73.7	71.9	74.5	55.4	58.5	66.2
W/D/S	3.8	4.3	4.7	8.5	9.5	9.4
No child < 9 years	74.0	74.4	74.4	92.1	89.0	88.0
Child(s) under 9 years	26.0	25.6	25.6	7.9	11.0	12.0
Degree or higher	5.0	5.6	8.2	2.2	3.9	5.2
Higher Vocational	6.9	7.2	20.2	2.4	2.7	8.6
'A' level or equivalent	3.4	3.6	4.2	3.8	5.2	5.9
Secondary Vocational	18.8	21.7	25.7	3.1	6.2	12.2
'O' level or equivalent	10.5	12.5	10.9	20.5	23.6	22.6
GCSE and other	7.9	13.7	12.5	14.5	15.2	13.4
No Qualifications	47.5	35.7	18.3	53.5	43.2	32.1
North/York./Humber	15.8	16.2	15.9	15.3	14.4	15.7
East Midlands/ Anglia	12.4	12.8	14.1	13.2	13.2	14.2
London	6.1	6.2	4.1	7.4	7.2	5.6
Rest of South England	26.9	26.0	25.3	22.4	26.1	25.0
West Midlands	12.4	13.1	13.5	13.4	12.3	12.9
North West	13.2	12.2	13.5	13.6	12.2	12.8
Wales	4.4	4.6	5.2	3.6	3.9	4.2
Scotland	8.8	8.9	8.4	11.1	10.7	9.6
Food production	10.7	8.9	9.2	12.9	10.9	12.0
Textile/leather/wood/paper	13.0	14.3	13.2	29.0	27.9	24.2
Printing	5.1	6.2	7.1	6.2	8.1	9.4
Chemicals	8.4	7.4	8.4	7.8	8.3	9.3
Rubbers/plastics/ceramics	7.8	9.0	10.4	6.2	7.2	9.7
Metals/machine tools	26.3	25.6	25.5	13.8	14.1	14.6
Electrics / electronics	13.6	14.5	12.6	16.8	18.0	15.1
Car / other transport	15.1	14.1	13.6	7.3	5.5	5.7
> 25 workers	85.2	83.7	82.9	85.9	85.4	85.2
< 25 workers	14.8	16.3	17.1	14.1	14.6	14.8
< 1 year with firm	12.5	16.3	4.7	20.0	24.3	6.1
1-2 years	6.6	9.5	10.7	10.3	14.4	14.1
2-5 years	17.0	18.1	18.8	22.5	21.4	24.7
>5 years	63.9	56.1	65.8	47.2	39.9	55.1
Permanent job	97.6	98.4	97.2	96.4	97.5	96.4
Not permanent	2.4	1.6	2.8	3.6	2.5	3.6
Sample size	10033	9699	7680	3265	3249	2547

Note:

1. All figures are significant at the 5% level.
2. W/D/S means widowed/divorced/separated.

TABLE A2: The Percentage of Male Manufacturing Employees receiving Training by Individual and Employer Characteristics

Percentage	1984		1989		1994	
	ON	OFF	ON	OFF	ON	OFF
16-19	12.1	16.6	8.9	21.8	19.2	12.5
20-24	5.4	7.6	5.8	7.4	5.8	6.5
25-29	3.8	2.7	6.3	6.0	8.1	5.2
30-39	3.7	2.6	6.9	3.9	8.0	4.1
40-49	2.6	1.5	5.8	3.5	7.1	3.2
50+	1.1	0.6	2.7	1.3	4.6	1.3
Single	6.5	8.5	5.8	9.4	7.4	5.6
Married	2.8	1.9	5.7	3.5	7.2	3.4
W/D/S	0.8	1.5	2.2	2 . 7	4.7	3.6
No child < 9 years	3.5	3.5	5.2	5.1	6.8	3.7
Child(s) under 9 years	3.7	2.8	6.8	4.4	8.2	4.2
Degree or higher	5.2	8.4	10.5	12.3	10.0	7.5
Higher Vocational	3.7	4.6	9.3	8.9	10.4	6.3
'A' level or equivalent	6.8	5.3	8.6	6.9	9.4	6.9
Secondary Vocational	4.1	5.7	7.4	7.5	5.6	2.8
'O' level or equivalent	7.8	8.2	6.4	8.1	9.1	4.0
GCSE and other	3.9	2.5	4.9	2.5	6.5	2.6
No Qualifications	1.9	0.6	2.7	0.9	3.2	1.0
North/York./Humber	3.5	3.3	6.5	5.3	8.5	3.5
East Midlands/ Anglia	3.4	2.4	4.9	4.4	5.9	1.9
London	4.9	5.4	8.0	6.2	6.4	2.2
Rest of South England	3.6	4.5	5.9	5.8	7.6	4.4
West Midlands	2.3	2.5	5.2	4.1	6.1	4.1
North West	3.6	2.4	4.8	3.8	7.4	5.1
Wales	3.9	3.0	4.0	3.6	7.2	3.0
Scotland	4.3	2.6	4.8	4.5	6.9	4.7
Food production	4.1	2.1	4.4	3.0	6.2	3.4
Textile/leather/wood/paper	2.6	2.0	2.6	3.6	4.7	2.0
Printing	2.1	3.3	5.5	2.7	5.9	2.6
Chemicals	5.1	4.8	8.5	7.5	12.7	5.2
Rubbers/plastics/ceramics	3.4	3.0	6.6	3.4	5.6	3.6
Metals/machine tools	3.0	3.2	4.1	4.2	6.1	3.6
Electrics / electronics	4.2	4.5	8.5	7.5	9.9	5.8
Car / other transport	4.0	4.0	6.7	6.4	8.0	4.5
> 25 workers	3.7	3.5	5.8	5.1	7.8	4.1
< 25 workers	2.8	2.6	4.3	3.7	3.8	2.4
< 1 year with firm	7.8	3.9	7.9	5.2	9.3	1.4
1-2 years	5.4	6.8	5.3	7.4	7.9	3.0
2-5 years	4.4	7.6	5.6	8.1	8.0	6.4
>5 years	2.3	1.7	5.0	3.3	6.6	3.4
Permanent job	3.4	3.3	5.6	4.9	7.2	3.9
Not permanent	11.2	5.0	6.4	3.2	6.1	2.8
Sample size	10033		9699		7680	

Note:

1. All figures are significant at the 5% level.
2. W/D/S means widowed/divorced/separated.

TABLE A3: The Percentage of Female Manufacturing Employees receiving Training by Individual and Employer Characteristics

Percentage	1984		1989		1994	
	ON	OFF	ON	OFF	ON	OFF
16-19	7.3	2.9	5.3	6.7	6.7	7.6
20-24	2.9	3.2	4.0	4.7	8.3	5.9
25-29	2.6	1.6	8.6	4.6	7.3	4.0
30-39	2.7	1.7	5.6	3.2	4.3	5.0
40-49	2.0	0.9	4.0	1.7	5.5	2.6
50+	1.2	0.2	2.4	0.7	2.7	1.7
Single	4.0	2.6	5.1	5.0	4.3	5.9
Married	2.4	1.1	4.7	2.5	5.9	3.0
W/D/S	1.8	1.8	5.5	2.9	5.9	5.0
No child < 9 years	2.9	1.7	4.9	3.7	5.6	4.1
Child(s) under 9 years	3.5	1.9	5.0	0.8	5.2	3.0
Degree or higher	6.9	8.3	14.4	16.0	9.8	10.5
Higher Vocational	5.1	13.9	8.0	14.9	10.0	11.0
'A' level or equivalent	7.5	5.8	11.2	8.8	9.4	9.4
Secondary Vocational	9.0	9.0	8.0	8.0	4.5	3.5
'O' level or equivalent	4.5	2.9	5.7	3.5	6.8	4.5
GCSE and other	3.2	0.4	3.9	1.6	4.6	2.3
No Qualifications	1.3	0.1	2.6	0.7	2.8	0.4
North/York./Humber	2.2	1.4	4.3	3.6	6.5	4.5
East Midlands/ Anglia	3.5	0.9	3.3	2.8	4.4	4.7
London	3.3	4.2	8.5	5.5	4.9	5.6
Rest of South England	3.0	2.0	5.7	4.7	6.4	3.4
West Midlands	2.8	1.6	6.3	2.0	2.7	2.1
North West	2.0	1.6	3.0	3.5	5.2	3.7
Wales	1.7	0.8	5.5	2.4	4.6	6.5
Scotland	4.4	1.4	3.7	0.6	8.2	2.5
Food production	1.2	2.1	4.2	2.0	5.6	4.9
Textile/leather/wood/paper	2.4	0.3	2.8	1.4	4.1	1.3
Printing	1.0	1.5	8.4	5.7	5.8	3.8
Chemicals	7.8	6.3	7.0	6.7	10.5	8.8
Rubbers/plastics/ceramics	2.5	2.0	2.6	3.0	4.8	4.4
Metals/machine tools	2.2	1.3	4.6	4.2	5.1	4.0
Electrics / electronics	2.7	1.1	6.2	3.9	5.2	3.9
Car / other transport	5.9	3.0	8.5	4.0	6.2	4.1
> 25 workers	3.2	1.8	5.2	3.6	5.7	4.1
< 25 workers	0.9	1.1	3.0	2.1	4.5	2.7
< 1 year with firm	6.2	1.6	6.8	2.4	9.7	3.2
1-2 years	3.6	4.5	4.5	6.0	6.7	2.5
2-5 years	2.9	2.5	4.5	4.2	7.5	4.9
>5 years	1.4	0.8	4.1	2.5	3.9	3.9
Permanent job	2.7	1.7	5.0	3.4	5.5	4.0
Not permanent	7.7	0.9	2.5	0.0	7.7	1.1
Sample size			3249		2547	

Note:

1. All figures are significant at the 5% level.
2. W/D/S means widowed/divorced/separated.

TABLE A4: The Determinants of Employer-Funded Training for Male Employees in the Manufacturing Sector: Binary Logistic Estimates

	1984			1989			1994		
Variable	α	S. E	PP	α	S. E	PP	α	S. E	PP
16-19	-	-	.229	-	-	.358	-	-	.423
20-24	-1.1755	.1457*	.084	-1.4368	.1416*	.117	-1.6290	.2032*	.126
25-29	-1.9384	.1939*	.041	-1.8269	.1617*	.082	-1.7660	.2068*	.112
30-39	-1.8224	.1926*	.046	-1.9290	.1671*	.075	-1.9625	.2129*	.093
40-49	-2.1583	.2171*	.033	-2.0190	.1777*	.069	-2.0904	.2223*	.083
50+	-2.8208	.2494*	.017	-2.6723	.2027*	.037	-2.5731	.2384*	.053
Single	-	-	.043	-	-	.060	-	-	.070
Married	-.0419	.1415	.041	.3173	.1172*	.081	.3265	.1263*	.095
W/D/S	-1.1576	.4709#	.014	-.1726	.2580	.051	.2643	.2272	.089
No child < 9 years	-	-	.040	-	-	.076	-	-	.089
Child(s) under 9 years	-.0526	.1181	.039	-.0951	.0921	.069	-.0246	.0983	.087
Degree or higher	.4260	.1740*	.101	.7456	.1425*	.185	.4015	.1572*	.138
Higher Vocational	.0440	.1778	.071	.5901	.1377*	.163	.4667	.1319*	.146
'A' level or equivalent	.1759	.2034	.080	.3476	.1774#	.132	.4376	.1902#	.142
Secondary Vocational	-.0069	.1297	.068	.2572	.1093#	.122	-.1730	.1395	.083
'O' level or equivalent	-	-	.068	-	-	.097	-	-	.097
GCSE and other	-.9585	.1780*	.027	-.5072	.1388*	.061	-.2594	.1579	.076
No Qualifications	-1.0894	.1391*	.024	-1.0710	.1300*	.036	-.8928	.1748*	.042
North/York./Humber	-.0657	.1336	.042	.0879	.1077	.086	.0462	.1185	.100
East Midlands/ Anglia	-.2343	.1501	.035	-.0973	.1222	.072	-.3767	.1377*	.068
London	.5022	.1658*	.071	.2426	.1420	.099	-.3281	.2215	.071
Rest of South England	-	-	.044	-	-	.079	-	-	.096
West Midlands	-.3850	.1607#	.031	-.1171	.1221	.071	-.0880	.1299	.088
North West	-.2645	.1353#	.034	-.3065	.1276#	.059	.0929	.1229	.104
Wales	-.0211	.2172	.044	-.3284	.1966	.058	-.2501	.1857	.076
Scotland	-.1960	.1624	.037	-.2550	.1266#	.062	-.1392	.1477	.084
Food production	.4954	.1931*	.039	.2037	.1760	.061	.4399	.1854#	.088
Textile/leather/wood/paper	-	-	.024	-	-	.050	-	-	.059
Printing	.1915	.2504	.029	.0787	.1922	.054	.1820	.2070	.070
Chemicals	.9824	.1908*	.063	.9121	.1586*	.116	.9608	.1703*	.140
Rubbers/plastics/ceramics	.6526	.2110*	.046	.5434	.1637*	.083	.3925	.1813#	.085
Metals/machine tools	.4501	.1658*	.038	.2622	.1268#	.064	.4225	.1535*	.087
Electrics / electronics	.5816	.1771*	.043	.7149	.1396*	.097	.6952	.1629*	.111
Car / other transport	.7642	.1766*	.051	.7242	.1435*	.098	.5537	.1649*	.098
> 25 workers	-	-	.043	-	-	.079	-	-	.100
< 25 workers	-.5930	.1318*	.025	-.4456	.1074*	.052	-.7541	.1263*	.050
< 1 year with firm	.1286	.1387	.041	-.0385	.1099	.070	-.1057	.1979	.079
1-2 years	.2142	.1605	.044	.0173	.1255	.074	-.1802	.1384	.074
2-5 years	.4973	.1138*	.058	.1499	.0967	.083	.2227	.0976#	.107
>5 years	-	-	.036	-	-	.072	-	-	.087
Permanent job	-	-	.040	-	-	.074	-	-	.090
Not permanent	.2190	.2107	.049	-.3934	.2957	.051	-.5475	.2659#	.054
Constant	-.9909			-.7646			-.7003		
Sample size	10033			9699			7680		
LL	-2093			-2854			-2445		
LL (slopes = 0)	-2515			-3253			-2659		
Model χ^2 (32 d.f)	843.2*			796.9*			427.9*		

Note:

1. * indicates significance at the 1% level; # indicates significance at the 5% level.
2. W/D/S means widowed/divorced/separated.

TABLE A5: The Determinants of On and Off-the-Job Employer-Funded Training for Male Employees in the Manufacturing Sector, 1984: Trinomial Logistic Estimates

MFT 84	On-the-job Training			Off-the-job Training		
Variable	α	S. E	PP	α	S. E	PP
16-19	-	-	.094	-	-	.151
20-24	-.8908	.2031*	.041	-1.5234	.1919*	.037
25-29	-1.2386	.2535*	.029	-2.7473	.2814*	.011
30-39	-1.1478	.2531*	.032	-2.6043	.2772*	.013
40-49	-1.4379	.2817*	.024	-3.0304	.3324*	.009
50+	-2.1693	.3213*	.012	-3.5891	.3808*	.005
Single	-	-	.026	-	-	.014
Married	.0335	.1877	.027	-.1175	.2029	.012
W/D/S	-1.1482	.5859#	.008	-1.1301	.7371	.005
No child < 9 years	-	-	.026	-	-	.012
Child(s) under 9 years	-.0581	.1518	.025	-.0405	.1759	.012
Degree or higher	-.1049	.2494	.040	1.0071	.2317*	.063
Higher Vocational	-.3129	.2454	.033	.4581	.2241#	.037
'A' level or equivalent	.0521	.2593	.047	.3478	.2911	.034
Secondary Vocational	-.3193	.1769	.033	.3139	.1754	.018
'O' level or equivalent	-	-	.045	-	-	.024
GCSE and other	-.7476	.2234*	.022	-1.2484	.2670*	.007
No Qualifications	-.9002	.1716*	.019	-1.5512	.2328*	.005
North/York./Humber	.0349	.1786	.026	-.1560	.1866	.021
East Midlands/ Anglia	-.0038	.1936	.025	-.5102	.2223#	.015
London	.5731	.2232*	.046	.4219	.2249	.036
Rest of South England	-	-	.025	-	-	.024
West Midlands	-.3694	.2228	.018	-.4023	.2201	.016
North West	-.0092	.1868	.025	-.5710	.2152*	.014
Wales	.0961	.2783	.028	-.1298	.3178	.021
Scotland	.1305	.2034	.029	-.6403	.2485*	.013
Food production	.5521	.2382#	.029	.3843	.3054	.010
Textile/leather/wood/paper	-	-	.017	-	-	.007
Printing	-.1384	.3609	.015	.4849	.3408	.011
Chemicals	.9007	.2444*	.040	1.0632	.2802*	.020
Rubbers/plastics/ceramics	.5185	.2683#	.028	.8025	.3109*	.015
Metals/machine tools	.3271	.2144	.023	.5577	.2454#	.012
Electrics / electronics	.5096	.2294#	.028	.6495	.2592#	.013
Car / other transport	.7101	.2262*	.034	.7798	.2612*	.015
> 25 workers	-	-	.028	-	-	.013
< 25 workers	-.5464	.1743*	.016	-.6352	.1882*	.007
< 1 year with firm	.5913	.1686*	.039	-.5133	.2184#	.008
1-2 years	.3060	.2133	.030	.0716	.2253	.013
2-5 years	.3098	.1772	.030	.6035	.1597*	.023
>5 years	-	-	.022	-	-	.013
Permanent job	-	-	.025	-	-	.012
Not permanent	.4386	.2144	.039	-.2188	.3404	.010
Constant	-2.1741			-1.1665		
Sample size	10033					
LL	-2503					
LL (slopes = 0)	-2994					
Model χ^2 (66 d.f)	980.4*					

Note:

1. * indicates significance at the 1% level; # indicates significance at the 5% level.
2. W/D/S means widowed/divorced/separated.

TABLE A6: The Determinants of On and Off-the-Job Employer-Funded Training for Male Employees in the Manufacturing Sector, 1989: Trinomial Logistic Estimates

MFT89	On-the-job Training			Off-the-job Training		
Variable	α	S. E	PP	α	S. E	PP
16-19	-	-	.135	-	-	.278
20-24	-.9085	.2120*	.059	-1.8835	.1784*	.055
25-29	-1.1064	.2304*	.049	-2.4929	.2165*	.031
30-39	-1.0151	.2325*	.054	-2.8744	.2340*	.021
40-49	-1.1448	.2456*	.047	-2.9059	.2490*	.021
50+	-1.7556	.2726*	.026	-3.6538	.3005*	.010
Single	-	-	.036	-	-	.021
Married	.4166	.1561*	.053	.2088	.1639	.026
W/D/S	-.4472	.3686	.023	.1784	.3479	.025
No child < 9 years	-	-	.047	-	-	.025
Child(s) under 9 years	-.0473	.1160	.045	-.1422	.1371	.022
Degree or higher	.4869	.1938#	.086	1.0929	.1920*	.112
Higher Vocational	.4797	.1839*	.085	.7769	.1901*	.084
'A' level or equivalent	.3815	.2301	.078	.3487	.2519	.057
Secondary Vocational	.2314	.1487	.068	.3033	.1481#	.054
'O' level or equivalent	-	-	.055	-	-	.041
GCSE and other	-.2259	.1768	.044	-.9172	.2151*	.017
No Qualifications	-.7264	.1646*	.027	-1.6748	.2168*	.008
North/York./Humber	.2149	.1385	.058	-.0839	.1546	.026
East Midlands/ Anglia	-.0680	.1605	.044	-.1241	.1733	.025
London	.3663	.1794#	.067	.0726	.2052	.031
Rest of South England	-	-	.047	-	-	.028
West Midlands	-.0389	.1575	.045	-.2043	.1772	.023
North West	-.2058	.1644	.039	-.4426	.1863#	.018
Wales	-.2727	.2594	.036	-.3989	.2831	.019
Scotland	-.1584	.1833	.040	-.3990	.1976#	.019
Food production	.4577	.2252#	.041	-.0771	.2564	.019
Textile/leather/wood/paper	-	-	.026	-	-	.020
Printing	.5210	.2467#	.043	-.5347	.3033	.012
Chemicals	1.0890	.2169*	.074	.7232	.2179*	.041
Rubbers/plastics/ceramics	.9156	.2153*	.063	.0293	.2471	.021
Metals/machine tools	.3608	.1947	.037	.1586	.1848	.024
Electrics / electronics	.9737	.1947*	.067	.4217	.1904#	.031
Car / other transport	.9082	.2003*	.063	.5098	.1853*	.033
> 25 workers	-	-	.049	-	-	.027
< 25 workers	-.3544	.1388*	.035	-.5558	.1564*	.015
< 1 year with firm	.3164	.1321#	.060	-.5414	.1732*	.015
1-2 years	-.0494	.1702	.043	.0059	.1759	.026
2-5 years	.0101	.1304	.045	.2235	.1367	.032
>5 years	-	-	.045	-	-	.026
Permanent job	-	-	.049	-	-	.025
Not permanent	-.1258	.3434	.035	-.8915	.4936	.010
Constant	-2.5392			-.4265		
Sample size	9699					
LL	-3467					
LL (slopes = 0)	-3955					
Model χ^2 (66 d.f)	974.3*					

Note:

1. * indicates significance at the 1% level; # indicates significance at the 5% level.
2. W/D/S means widowed/divorced/separated.

TABLE A7: The Determinants of On and Off-the-Job Employer-Funded Training for Male Employees in the Manufacturing Sector, 1994: Trinomial Logistic Estimates

MFT94	On-the-job Training			Off-the-job Training		
Variable	α	S. E	PP	α	S. E	PP
16-19	-	-	.278	-	-	.259
20-24	-1.7500	.2544*	.063	-1.6194	.2904*	.065
25-29	-1.6021	.2477*	.072	-2.1104	.3097*	.041
30-39	-1.7000	.2545*	.066	-2.4870	.3232*	.028
40-49	-1.7830	.2657*	.061	-2.7005	.3401*	.023
50+	-2.1476	.2825*	.043	-3.5195	.3882*	.010
Single	-	-	.048	-	-	.021
Married	.3689	.1574#	.067	.2499	.1936	.027
W/D/S	.0697	.2910	.051	.6237	.3391	.039
No child < 9 years	-	-	.062	-	-	.026
Child(s) under 9 years	-.0154	.1172	.061	-.0346	.1611	.025
Degree or higher	.0960	.1903	.082	.9854	.2531*	.060
Higher Vocational	.2814	.1551	.097	.8452	.2205*	.052
'A' level or equivalent	.1842	.2330	.089	.9210	.2954*	.056
Secondary Vocational	-.3053	.1640	.056	.1122	.2382	.026
'O' level or equivalent	-	-	.075	-	-	.023
GCSE and other	-.2874	.1833	.057	-.1975	.2770	.019
No Qualifications	-.8909	.2006*	.032	-.9589	.3305*	.009
North/York./Humber	.1524	.1396	.073	-.1723	.1994	.026
East Midlands/ Anglia	-.2072	.1593	.054	-.7727	.2530*	.014
London	-.1705	.2540	.055	-.6899	.3391#	.016
Rest of South England	-	-	.065	-	-	.031
West Midlands	-.1330	.1610	.057	-.0147	.1996	.030
North West	.0116	.1516	.066	.2375	.1877	.038
Wales	-.1127	.2169	.058	-.5191	.3217	.018
Scotland	-.1927	.1828	.054	-.0622	.2254	.029
Food production	.3489	.2203	.059	.6352	.3153#	.028
Textile/leather/wood/paper	-	-	.043	-	-	.015
Printing	.1926	.2430	.051	.1752	.3628	.018
Chemicals	1.0240	.1986*	.110	.8335	.3001*	.034
Rubbers/plastics/ceramics	.2522	.2186	.054	.6623	.3033#	.029
Metals/machine tools	.3264	.1617#	.062	.6172	.2648#	.028
Electrics / electronics	.6761	.1925*	.081	.7514	.2774*	.032
Car / other transport	.5072	.1950*	.069	.6424	.2821#	.028
> 25 workers	-	-	.071	-	-	.029
< 25 workers	-.8268	.1574*	.032	-.6269	.1984*	.016
< 1 year with firm	.3613	.2133	.082	-1.4474	.4825*	.007
1-2 years	.0584	.1591	.062	-.6715	.2457*	.015
2-5 years	.1667	.1212	.069	.2825	.1393#	.037
>5 years	-	-	.059	-	-	.028
Permanent job	-	-	.077	-	-	.026
Not permanent	-.6689	.3131#	.032	-.3191	.4495	.019
Constant	-1.2618			-1.5582		
Sample size	7680					
LL	-2950					
LL (slopes = 0)	-3205					
Model χ^2 (66 d.f)	509.9*					

Note:

1. * indicates significance at the 1% level; # indicates significance at the 5% level.
2. W/D/S means widowed/divorced/separated.

TABLE A8: The Determinants of Employer-Funded Training for Female Employees in the Manufacturing Sector: Binary Logistic Estimates

	1984			1989			1994		
Variable	α	S. E	PP	α	S. E	PP	α	S. E	PP
16-19	-	-	.062	-	-	.114	-	-	.137
20-24	-.8164	.2780*	.028	-.7964	.2431*	.055	-.4353	.3421	.093
25-29	-1.3883	.4000*	.016	-.4707	.2726	.074	-.9611	.3745*	057
30-39	-.8706	.3715#	.027	-.7535	.2938*	.057	-1.0212	.3794*	.054
40-49	-.9692	.4130#	.024	-.9599	.3175*	.047	-.8601	.3900#	.063
50+	-1.3971	.5208*	.016	-1.4722	.4015*	.029	-1.4672	.4456*	.035
Single	-	-	.020	-	-	.052	-	-	.042
Married	.3431	.2533	.029	.1532	.1845	.061	.4412	.2006#	.064
W/D/S	.4000	.4190	.030	.5038	.2816	.084	.8001	.2972*	.090
No child < 9 years	-	-	.025	-	-	.063	-	-	.062
Child(s) under 9 years	.2243	.3216	.031	-.4612	.2297#	.040	-.3477	.2388	.045
Degree or higher	1.0883	.4150*	.133	1.4098	.2570*	.246	.7261	.2743*	.159
Higher Vocational	1.3105	.3619*	.161	1.2336	.3009*	.215	.7565	.2226*	.163
'A' level or equivalent	.9799	.3309*	.121	1.0058	.2401*	.179	.6192	.2573#	.145
Secondary Vocational	1.0341	.3265*	.127	.6694	.2378*	.135	-.3868	.2550	.058
'O' level or equivalent	-	-	.049	-	-	.074	-	-	.084
GCSE and other	-.5922	.2967#	.028	-.4649	.2336#	.048	-.5291	.2555#	.051
No Qualifications	-1.3478	.2734*	.013	-.7845	.2121*	.035	-1.1833	.2537*	.027
North/York./Humber	.1308	.3200	.025	.0397	.2209	.072	.3274	.2217	.078
East Midlands/ Anglia	.2126	.3135	.027	-.3687	.2451	.049	.1661	.2386	.067
London	.5573	.3315	.038	.1292	.2489	.078	.0122	.3213	.058
Rest of South England	-	-	.022	-	-	.069	-	-	.058
West Midlands	.2697	.3179	.029	.0506	.2337	.072	-.6205	.3022#	.032
North West	-.1646	.3275	.019	-.2155	.2483	.056	.1233	.2494	.065
Wales	-.6680	.6631	.011	-.1902	.3673	.058	.0718	.3541	.062
Scotland	.6319	.3137#	.041	-.8722	.3026*	.030	.2857	.2615	.075
Food production	.0024	.3478	.022	.2547	.2876	.052	.5997	.2684#	.077
Textile/leather/wood/paper	-	-	.021	-	-	.041	-	-	.044
Printing	-.6542	.5251	.011	.6293	.2684#	.074	.3893	.3057	.063
Chemicals	1.3167	.2939*	.076	.7517	.2633*	.083	1.1757	.2607*	.129
Rubbers/plastics/ceramics	.3825	.4156	.031	.0623	.3472	.044	.5851	.2938#	.076
Metals/machine tools	.0307	.3394	.022	.6229	.2458#	.074	.6327	.2663#	.079
Electrics / electronics	.0091	.3137	.022	.6077	.2312*	.073	.4578	.2246#	.068
Car / other transport	1.1229	.3334*	.063	.9684	.3037*	.101	.6744	.3442#	.083
> 25 workers	-	-	.026	-	-	.065	-	-	.063
< 25 workers	-1.1455	.3648*	.008	-.6564	.2319*	.035	-.4102	.2240	.043
< 1 year with firm	.7947	.2926*	.039	-.0229	.2027	.059	.4671	.2948	.084
1-2 years	.7901	.3142#	.039	.0781	.2181	.065	-.0943	.2342	.050
2-5 years	.4757	.2730	.029	-.0549	.1954	.057	.3402	.1718#	.075
>5 years	-	-	.018	-	-		-	-	.055
Permanent job	-	-	.025	-	-	.062	-	-	.061
Not permanent	.2984	.3897	.034	-1.642	.7436#	.013	-.5297	.4182	.037
Constant	-2.9436			-2.0093			-2.1979		
Sample size	3265			3249			2547		
-2LL	-492			-801			-710		
-2LL (slopes = 0)	-611			-925			-797		
Model χ^2 (52 d.f)	238.7*			247.4*			173.4*		

Note:

1. * indicates significance at the 1% level; # indicates significance at the 5% level.
2. W/D/S means widowed/divorced/separated.

TABLE A9: The Determinants of On and Off-the-Job Employer-Funded Training for Female Employees in the Manufacturing Sector, 1984: Trinomial Logistic Estimates

FFT84	On-the-job Training			Off-the-job Training		
Variable	α	S. E	PP	α	S. E	PP
16-19	-	-	.032	-	-	.011
20-24	-.9540	.3495*	.014	-.7752	.4481	.005
25-29	-1.0558	.4826#	.012	-2.0150	.6614*	.002
30-39	-.7407	.4548	.016	-1.3170	.6147#	.003
40-49	-.7708	.4980	.015	-1.5673	.7088#	.002
50+	-.9934	.5933	.012	-2.7740	1.192#	.001
Single	-	-	.012	-	-	.002
Married	.4162	.3251	.018	.2576	.3757	.003
W/D/S	.0914	.5597	.013	1.0052	.6155	.006
No child < 9 years	-	-	.015	-	-	.003
Child(s) under 9 years	.1320	.3882	.017	.4173	.5382	.004
Degree or higher	.7414	.5655	.049	1.5170	.5735*	.056
Higher Vocational	.4935	.5848	.039	2.0484	.4689*	.092
'A' level or equivalent	.8755	.4231#	.056	1.1907	.4873#	.041
Secondary Vocational	.9469	.4278#	.060	1.1263	.4514#	.039
'O' level or equivalent	-	-	.024	-	-	.013
GCSE and other	-.1792	.3334	.020	-1.8702	.7537#	.002
No Qualifications	-1.0066	.3133*	.009	-2.7716	.7611*	.001
North/York./Humber	.1697	.3986	.015	.1561	.5055	.003
East Midlands/ Anglia	.4923	.3631	.020	-.4599	.5978	.002
London	.4476	.4430	.019	.6372	.4708	.005
Rest of South England	-	-	.012	-	-	.003
West Midlands	.2392	.3911	.016	.3304	.5114	.004
North West	-.2426	.4171	.010	-.0534	.4980	.003
Wales	-.5200	.7939	.007	-.8675	1.1220	.001
Scotland	.9747	.3659*	.032	-.1096	.5676	.002
Food production	-.7689	.5071	.007	1.3949	.5904#	.006
Textile/leather/wood/paper	-	-	.015	-	-	.001
Printing	-.9848	.7656	.006	.1186	.7832	.002
Chemicals	1.2373	.3453*	.050	1.8150	.5636*	.008
Rubbers/plastics/ceramics	.1317	.5194	.017	1.1078	.7207	.004
Metals/machine tools	-.1102	.4006	.014	.7271	.6346	.003
Electrics / electronics	-.0226	.3553	.015	.3394	.6399	.002
Car / other transport	1.0975	.3836*	.044	1.4811	.6488#	.006
> 25 workers	-	-	.019	-	-	.003
< 25 workers	-1.5321	.5300*	.004	-.6631	.5024	.002
< 1 year with firm	1.2820	.3416*	.034	-.2593	.5177	.002
1-2 years	.7086	.4128	.020	.7667	.4726	.005
2-5 years	.5416	.3437	.017	.2742	.4287	.003
>5 years	-	-	.010	-	-	.003
Constant	-3.6250			-3.8229		
Sample size	3265					
LL	-560					
LL (slopes = 0)	-711					
Model χ^2 (64 d.f)	300.9*					

Note:

1. * indicates significance at the 1% level; # indicates significance at the 5% level.
2. W/D/S means widowed/divorced/separated.

TABLE A10: The Determinants of On and Off-the-Job Employer-Funded Training for Female Employees in the Manufacturing Sector, 1989: Trinomial Logistic Estimates

FFT89	On-the-job Training			Off-the-job Training		
Variable	α	S. E	PP	α	S. E	PP
16-19	-	-	.048	-	-	.066
20-24	-.5356	.3383	.028	-1.2067	.3373*	.021
25-29	.1995	.3499	.057	-1.5532	.4269*	.015
30-39	-.0966	.3779	.043	-1.8007	.4579*	.011
40-49	-.2429	.4036	.038	-2.1320	.5108*	.008
50+	-.6355	.4892	.026	-2.9679	.7367*	.004
Single	-	-	.035	-	-	.012
Married	.1762	.2343	.041	.1918	.2760	.015
W/D/S	.4344	.3431	.053	.6149	.4510	.022
No child < 9 years	-	-	.041	-	-	.017
Child(s) under 9 years	-.1274	.2752	.036	-1.4728	.6052#	.004
Degree or higher	.9399	.3288*	.123	2.1608	.3717*	.143
Higher Vocational	.4618	.4410	.080	2.0816	.4046*	.184
'A' level or equivalent	.7669	.3004#	.105	1.2757	.3555*	.065
Secondary Vocational	.4289	.3125	.077	.9578	.3446*	.048
'O' level or equivalent	-	-	.052	-	-	.019
GCSE and other	-.3916	2867	.036	-.6765	.4143	.010
No Qualifications	-.7561	.2500*	.025	-1.0366	.3966*	.007
North/York./Humber	.0153	.2854	.043	.0659	.3260	.023
East Midlands/ Anglia	-.3504	.3196	.030	-.4003	.3587	.014
London	.3000	.3047	.056	-.0684	.3773	.020
Rest of South England	-	-	.042	-	-	.021
West Midlands	.3991	.2732	.061	-.6305	.4280	.012
North West	-.3947	.3401	.029	-.0667	.3506	.020
Wales	.1027	.4283	.046	-.5933	.6431	.012
Scotland	-.2895	.3341	.032	-2.3458	.7458*	.002
Food production	.3211	.3414	.040	.0723	.4957	.010
Textile/leather/wood/paper	-	-	.030			.009
Printing	.6309	.3176#	.054	.6994	.4267	.018
Chemicals	.6251	.3109#	.054	.7890	.3976#	.020
Rubbers/plastics/ceramics	-.2875	.4729	.022	.5296	.5142	.015
Metals/machine tools	.3457	.3119	.041	.9954	.3885*	.024
Electrics / electronics	.5147	.2803	.049	.6561	.3824	.017
Car / other transport	.9709	.3588*	.075	.7982	.5175	.020
> 25 workers	-	-	.044	-	-	.015
< 25 workers	-.6730	.2948#	.023	-.5216	.3568	.009
< 1 year with firm	.3885	.2332	.054	-1.1707	.3604*	.006
1-2 years	-.0450	.2865	.036	-.0625	.3305	.019
2-5 years	-.0448	.2479	.036	-.1953	.2970	.016
>5 years	-	-	.037	-	-	.020
Constant	-3.1009			-2.0338		
Sample size	3249					
LL	-947					
LL (slopes = 0)	-1106					
Model χ^2 (64 d.f)	317.9*					

Note:

1. * indicates significance at the 1% level; # indicates significance at the 5% level.
2. W/D/S means widowed/divorced/separated.

TABLE A11: The Determinants of On and Off-the-Job Employer-Funded Training for Female Employees in the Manufacturing Sector, 1994: Trinomial Logistic Estimates

FFT94	On-the-job Training			Off-the-job Training		
Variable	α	S. E	PP	α	S. E	PP
16-19	-	-	.089	-	-	.058
20-24	-.1456	.4670	.078	-.9374	.4762#	.024
25-29	-.6363	.5011	.049	-1.5345	.5365*	.013
30-39	-1.1170	.5159#	.031	-1.0799	.5294#	.021
40-49	-.6465	.5013	.049	-1.3342	.5733#	.016
50+	-1.3623	.5829#	.024	-1.7112	.6569*	.011
Single	-	-	.021	-	-	.019
Married	.9849	.2713*	.054	-.2415	.2852	.015
W/D/S	1.1767	.3948*	.064	.4000	.4225	.029
No child < 9 years	-	-	.045	-	-	.018
Child(s) under 9 years	-.2996	.2927	.034	-.4477	.3831	.012
Degree or higher	.4537	.3640	.085	1.1023	.3827*	.097
Higher Vocational	.5238	.2932	.090	1.0596	.3156*	.093
'A' level or equivalent	.4108	.3403	.081	.9607	.3621*	.085
Secondary Vocational	-.4454	.3301	.036	-.2750	.3800	.026
'O' level or equivalent	-	-	.056	-	-	.034
GCSE and other	-.3660	.3132	.039	-.7811	.3819#	.016
No Qualifications	-.7831	.2897*	.026	-2.4117	.6258*	.003
North/York./Humber	.2888	.2746	.058	.3655	.3385	.022
East Midlands/ Anglia	-.1269	.3153	.039	.5367	.3452	.026
London	-.1865	.4364	.037	.1967	.4480	.019
Rest of South England	-	-	.044	-	-	.016
West Midlands	-.7083	.3593#	.022	-.4829	.4561	.010
North West	.0454	.3117	.046	.2537	3817	.020
Wales	-.2953	.5004	.034	.5048	.4755	.026
Scotland	.5627	.3030	.076	-.3504	.4812	.011
Food production	.2557	.3312	.043	1.1917	.4584*	.024
Textile/leather/wood/paper	-	-	.033	-	-	.008
Printing	.2463	.3693	.042	.7156	.5235	.015
Chemicals	.9301	.3128*	.080	1.5938	.4449*	.036
Rubbers/plastics/ceramics	.2111	.3710	.041	1.2345	.4849*	.025
Metals/machine tools	.4013	.3242	.049	1.0450	.4582#	.021
Electrics / electronics	.1571	.3217	.039	.9879	.4594#	.020
Car / other transport	.5092	.4193	.054	.9916	.5122#	.020
> 25 workers	-	-	.046	-	-	.018
< 25 workers	-.3654	.2778	.032	-.4762	.3556	.012
< 1 year with firm	.8602	.3243*	.077	-.6467	.5154	.011
1-2 years	.3978	.2749	.050	-1.1441	.4168*	.007
2-5 years	.5808	.2181*	.059	-.0307	.2597	.021
>5 years	-	-	.034	-	-	.021
Constant	-3.2360			-2.5648		
Sample size	2547					
LL	-843					
LL (slopes = 0)	-961					
Model χ^2 (64 d.f)	234.8*					

Note:

1. * indicates significance at the 1% level; # indicates significance at the 5% level.
2. W/D/S means widowed/divorced/separated.

Appendix B - Empirical results for the Publicly-Orientated Service Sector

TABLE B1: The Changing Characteristics of Male and Female Full-Time Employees in the Publicly-Orientated Service Sector

	Male			Female		
	1984	1989	1994	1984	1989	1994
Percentage						
16-19	3.1	1.4	0.8	6.3	3.2	1.8
20-24	8.8	7.1	5.7	15.1	14.0	10.7
25-29	12.4	12.6	11.8	12.9	13.5	14.0
30-39	29.6	29.2	28.8	22.3	23.1	24.1
40-49	22.0	28.1	32.3	23.8	27.7	30.8
50+	24.1	21.6	20.6	19.6	18.5	18.6
Single	19.6	17.1	15.8	29.3	24.5	21.0
Married	76.3	78.8	79.2	61.3	64.7	67.4
W/D/S	4.1	4.1	5.0	9.4	10.8	11.6
No child < 9 years	71.8	71.0	71.0	89.7	85.7	84.2
Child(s) under 9 years	28.2	29.0	29.0	10.3	14.3	15.8
Degree or higher	22.0	22.9	29.7	12.0	14.2	20.0
Higher Vocational	14.9	14.1	23.5	28.3	28.1	30.7
'A' level or equivalent	8.4	8.4	7.4	6.7	7.7	7.0
Secondary Vocational	11.2	14.4	12.8	3.3	5.7	8.4
'O' level or equivalent	13.6	15.7	13.3	21.4	20.1	16.7
GCSE and other	6.4	9.6	7.2	7.4	8.8	7.8
No Qualifications	23.5	14.9	6.1	20.9	15.4	9.4
North/York./Humber	14.4	14.8	14.3	15.4	16.3	15.2
East Midlands/ Anglia	10.7	10.2	10.8	10.4	10.0	10.4
London	10.5	11.0	10.1	11.0	10.8	10.0
Rest of South England	30.6	30.2	31.2	25.3	26.1	26.6
West Midlands	6.7	8.3	7.9	8.4	7.7	8.5
North West	9.7	10.4	9.4	11.2	11.0	12.6
Wales	5.2	4.3	5.4	5.8	4.8	5.5
Scotland	12.2	10.8	10.9	12.5	13.3	11.2
Central Government	15.5	14.0	9.9	10.8	10.6	7.3
Local Government	9.4	9.7	7.7	6.2	6.4	7.4
Other public services	28.0	30.9	31.6	7.9	7.5	8.4
Primary/ general education	17.0	15.9	17.3	23.6	24.6	23.6
Higher education	6.3	8.0	9.6	2.5	4.1	4.1
Other education	5.4	3.7	2.1	2.6	1.9	1.9
Hospital	11.0	9.9	12.1	27.2	24.1	24.9
Community	2.6	2.2	3.0	6.4	6.3	5.8
Other health/social work	4.8	5.7	6.7	12.8	14.5	16.6
> 25 workers	84.2	85.9	87.4	73.2	74.3	76.2
< 25 workers	15.8	14.1	12.6	26.8	25.7	23.8
< 1 year with firm	9.6	8.2	3.1	13.8	14.2	3.7
1-2 years	5.4	6.5	8.3	8.6	10.0	11.5
2-5 years	15.3	15.0	18.2	23.4	22.8	23.9
>5 years	69.7	70.3	70.4	54.2	53.0	60.9
Permanent job	94.6	97.3	94.5	93.9	95.3	93.2
Not permanent	5.4	2.7	5.5	6.1	4.7	6.8
Sample size	4408	4113	4004	4435	4898	5796

Note:

1. All figures are significant at the 5% level.
2. W/D/S means widowed/divorced/separated.

TABLE B2: The Percentage of Male Employees in Public Administration, Health and Education receiving Training by Individual and Employer Characteristics

Percentage	1984		1989		1994	
	ON	OFF	ON	OFF	ON	OFF
16-19	14.7	12.5	17.5	21.1	6.5	22.6
20-24	12.1	7.8	19.0	10.0	18.4	7.5
25-29	12.8	5.3	17.4	7.3	17.8	7.8
30-39	7.9	4.9	16.2	7.3	14.6	6.8
40-49	6.8	3.6	11.5	6.5	12.8	6.8
50+	3.3	1.2	7.3	3.9	10.0	3.4
Single	8.7	7.1	14.0	9.3	14.5	7.1
Married	7.5	3.6	13.3	6.2	13.4	6.4
W/D/S	7.8	2.8	10.1	6.5	13.6	3.5
No child < 9 years	6.8	3.9	12.6	6.2	13.0	5.9
Child(s) under 9 years	10.0	5.1	15.1	8.0	15.1	7.5
Degree or higher	8.9	6.4	16.7	8.1	14.4	8.0
Higher Vocational	6.7	5.6	17.6	11.6	15.2	9.5
'A' level or equivalent	8.6	5.7	16.0	8.1	13.8	6.1
Secondary Vocational	12.0	4.9	13.3	7.3	12.5	3.3
'O' level or equivalent	10.0	5.0	12.8	6.0	16.3	4.9
GCSE and other	8.9	1.8	10.6	3.0	11.0	3.1
No Qualifications	3.4	0.9	4.7	1.8	2.9	0.8
North/York./Humber	9.3	3.9	13.7	6.9	16.0	7.7
East Midlands/ Anglia	8.5	4.7	14.0	7.4	13.2	6.0
London	6.9	4.5	12.2	5.8	15.0	6.7
Rest of South England	7.7	4.6	13.7	5.9	15.0	6.7
West Midlands	7.8	4.1	12.9	8.8	12.3	5.7
North West	8.2	4.9	13.3	7.5	9.5	5.8
Wales	3.9	3.0	12.5	9.1	10.2	7.0
Scotland	7.3	3.4	12.9	5.6	11.7	4.8
Central Government	5.1	3.4	12.7	6.4	8.7	10.4
Local Government	5.0	8.4	9.3	10.6	11.3	9.4
Other public services	10.9	2.9	13.8	4.8	16.9	4.7
Primary/ general education	7.3	5.5	19.0	8.9	14.0	6.4
Higher education	3.6	2.2	8.5	6.7	10.7	5.7
Other education	10.5	4.2	11.1	7.8	8.2	7.1
Hospital	7.2	4.3	13.2	5.4	15.0	4.5
Community	7.0	5.2	11.2	4.5	15.6	9.0
Other health/social work	7.1	5.2	12.3	7.7	9.4	7.9
> 25 workers	7.8	4.3	13.1	6.6	14.0	6.1
< 25 workers	7.4	4.2	14.5	7.6	10.7	8.5
< 1 year with firm	11.1	5.4	17.9	5.7	15.3	7.3
1-2 years	11.0	7.2	14.7	8.3	15.6	6.9
2-5 years	8.1	8.1	13.5	9.4	12.8	9.2
>5 years	6.9	3.0	12.6	6.1	13.5	5.6
Permanent job	7.4	4.3	13.2	6.8	13.4	6.5
Not permanent	14.2	2.9	15.9	3.5	17.2	5.0
Sample size	4408		4113		4004	

Note:

1. All figures are significant at the 5% level.
2. W/D/S means widowed/divorced/separated.

TABLE B3: The Percentage of Female Employees in Public Administration, Health and Education receiving Training by Individual and Employer Characteristics

Percentage	1984		1989		1994	
	ON	OFF	ON	OFF	ON	OFF
16-19	13.8	3.3	9.6	7.7	19.2	6.7
20-24	13.9	3.7	17.9	7.3	16.2	7.1
25-29	7.3	4.4	15.9	7.3	18.1	6.5
30-39	8.9	5.0	15.2	10.2	15.6	8.3
40-49	6.2	3.8	15.1	7.3	15.5	6.9
50+	3.0	1.3	13.0	4.5	12.3	4.8
Single	11.0	4.1	15.5	8.4	16.7	6.3
Married	6.9	3.4	15.2	7.2	15.5	7.0
W/D/S	5.0	3.4	13.2	7.4	12.5	6.7
No child < 9 years	7.9	3.5	14.8	7.2	15.4	6.6
Child(s) under 9 years	8.1	4.1	16.5	8.8	15.6	8.1
Degree or higher	11.5	8.3	20.5	12.6	19.7	9.4
Higher Vocational	9.8	4.1	22.1	9.2	18.4	8.5
'A' level or equivalent	11.7	4.0	16.9	7.9	15.1	6.7
Secondary Vocational	10.2	8.8	10.4	10.4	14.5	4.1
'O' level or equivalent	8.5	2.9	11.0	5.4	13.3	6.0
GCSE and other	5.8	2.7	13.0	4.9	11.9	5.1
No Qualifications	2.5	0.5	4.4	2.5	4.6	1.5
North/York./Humber	6.8	2.8	14.6	8.0	17.0	7.2
East Midlands/ Anglia	9.3	3.7	16.4	8.4	16.3	5.3
London	10.2	4.3	17.0	7.4	18.8	9.3
Rest of South England	9.0	4.0	15.8	8.4	15.6	7.0
West Midlands	5.6	5.1	15.1	8.2	12.0	6.1
North West	7.1	3.6	16.2	7.6	15.6	6.7
Wales	6.2	3.5	16.7	4.7	12.9	8.2
Scotland	7.2	2.2	10.0	4.8	12.7	5.1
Central Government	7.1	2.4	14.7	5.0	16.9	5.7
Local Government	2.9	5.5	8.3	8.9	12.1	10.5
Other public services	9.9	0.6	8.7	3.3	14.8	3.3
Primary/ general education	7.4	5.0	22.2	9.6	19.6	7.3
Higher education	5.5	10.0	6.0	12.1	8.8	9.6
Other education	7.1	7.1	12.0	10.9	20.0	6.4
Hospital	11.6	1.5	18.3	4.6	16.8	5.8
Community	6.7	4.9	8.7	9.4	10.4	8.3
Other health/social work	4.4	5.1	9.9	9.5	11.4	7.2
> 25 workers	8.4	2.9	15.3	6.5	15.6	6.8
< 25 workers	6.6	5.6	14.4	10.2	14.7	7.0
< 1 year with firm	12.5	3.7	16.4	6.0	21.5	5.6
1-2 years	10.6	5.5	16.2	7.2	16.3	7.6
2-5 years	9.0	3.7	16.1	9.4	14.6	7.6
>5 years	5.9	3.2	14.0	7.1	15.2	6.4
Permanent job	7.8	3.7	14.8	7.7	15.0	6.8
Not permanent	10.0	1.9	21.4	2.6	20.6	6.9
Sample size	4435		4898		5796	

Note:

1. All figures are significant at the 5% level.
2. W/D/S means widowed/divorced/separated.

TABLE B4: The Determinants of Employer-Funded Training for Male Employees in Public Administration, Health and Education: Binary Logistic Estimates

	1984			1989			1994		
Variable	α	S. E	PP	α	S. E	PP	α	S. E	PP
16-19	-	-	.265	-	-	.454	-	-	.335
20-24	-.5831	.2588#	.168	-.6425	.3141#	.034	-.4610	.4397	.241
25-29	-.8044	.2744*	.139	-.9787	.3174*	.238	-.5498	.4328	.225
30-39	-1.2346	.2818*	.095	-1.1623	.3192*	.206	-.7876	.4338	.187
40-49	-1.2125	.2973*	.097	-1.4771	.3285*	.159	-.8315	.4280#	.180
50+	-1.8224	.3200*	.055	-1.8852	.3425*	.112	-1.1161	.4471#	.142
Single	-	-	.089	-	-	.158	-	-	.174
Married	.0918	.1583	.097	.1914	.1348	.185	.0663	.1307	.184
W/D/S	.3072	.2856	.117	.1593	.2480	.180	.0281	.2265	.178
No child < 9 years	-	-	.090	-	-	.179	-	-	.178
Child(s) under 9 years	.2578	.1238#	.113	.0127	.1018	.181	.1060	.1017	.194
Degree or higher	.4858	.1769*	.156	.4799	.1464*	.243	.2996	.1447#	.230
Higher Vocational	.1937	.1869	.121	.7073	.1501*	.287	.3599	.1368*	.241
'A' level or equivalent	.0911	.1945	.110	.3381	.1649#	.218	-.0339	.1825	.176
Secondary Vocational	.2930	.1937	.132	.1485	.1460	.187	-.2532	.1643	.147
'O' level or equivalent	-	-	.102	-	-	.166	-	-	.181
GCSE and other	-.2930	.2315	.078	-.2257	.1824	.137	-.3856	.1931#	.131
No Qualifications	-.9424	.2024*	.042	-.9222	.1987*	.073	-1.693	.3606*	.039
North/York./Humber	.1218	.1496	.109	.0261	.1275	.182	.1015	.1233	.218
East Midlands/ Anglia	.0714	.1647	.104	.0814	.1437	.191	-.1251	.1432	.181
London	-.0452	.1752	.094	-.1151	.1479	.162	-.0303	.1429	.196
Rest of South England	-	-	.098	-	-	.179	-	-	.201
West Midlands	-.0955	.2047	.090	.1692	.1552	.205	-.2422	.1662	.165
North West	.0926	.1731	.106	-.0018	.1445	.178	-.4165	.1622*	.142
Wales	-.6273	.2785#	.055	.0937	.2050	.193	-.2867	.1974	.159
Scotland	-.0758	.1698	.091	-.0714	.1466	.168	-.3999	.1492*	.144
Central Government	-	-	.071	-	-	.175	-	-	.173
Local Government	.5238	.2064#	.114	.0594	.1712	.184	.1258	.1943	.192
Other public services	.6062	.1723*	.123	.0040	.1375	.176	.2400	.1524	.210
Primary/ general educat.	.3479	.1953	.097	.3175	.1511#	.226	.0414	.1694	.180
Higher education	-.5255	.3065	.043	-.3053	.1982	.136	-.2213	.1979	.144
Other education	.4896	.2393#	.111	-.0044	.2422	.175	-.3874	.3346	.125
Hospital	.3368	.2077	.096	-.0160	.1754	.173	-.0681	.1791	.164
Community	.3778	.3307	.100	-.2580	.3232	.141	.3245	.2564	.225
Other health/social work	.2981	.2629	.093	.1065	.2068	.191	-.0435	.2172	.167
> 25 workers	-	-	.095	-	-	.176	-	-	.182
< 25 workers	.0635	.1386	.100	.2051	.1180	.207	.0250	.1300	.186
< 1 year with firm	.2352	.1841	.109	.0311	.1624	.183	.1013	.2411	.193
1-2 years	.3479	.2020	.121	.0316	.1685	.183	.1283	.1586	.197
2-5 years	.3349	.1365#	.119	.0365	.1200	.184	.1079	.1110	.194
>5 years	-	-	.088	-	-	.179	-	-	.177
Permanent job	-	-	.095	-	-	.181	-	-	.182
Not permanent	.1767	.2092	.112	-.1872	.2617	.155	.0075	.1878	.183
Constant	-1.5369			-.5225			-.7561		
Sample size	4408			4113			4004		
LL	-1492			-1939			-1928		
LL (slopes = 0)	-1617			-2058			-2003		
Model χ^2 (34 d.f)	250.1*			244.7*			150.7*		

TABLE B5: The Determinants of On and Off-the-job Employer-Funded Training for Male Employees in Public Administration, Health and Education, 1984: Trinomial Logistic Estimates

MFT84	On-the-job Training			Off-the-job Training		
Variable	α	S. E	PP	α	S. E	PP
16-19	-	-	.148	-	-	.136
20-24	-.2988	.3298	.114	-.9649	.3667*	.056
25-29	-.3999	.3450	.104	-1.4591	.4074*	.035
30-39	-.9821	.3545*	.061	-1.5847	.4173*	.031
40-49	-.9309	.3715#	.064	-1.6010	.4483*	.031
50+	-1.4358	.3949*	.040	-2.4188	.5087*	.014
Single	-	-	.055	-	-	.030
Married	.1986	.1960	.067	-.0627	.2468	.028
W/D/S	.4954	.3343	.088	-.0381	.5079	.029
No child < 9 years	-	-	.061	-	-	.027
Child(s) under 9 years	.2658	.1476	.078	.2334	.2036	.034
Degree or higher	.3848	.1952#	.099	.6680	.2840#	.060
Higher Vocational	.0448	.2329	.072	.4450	.2932	.063
'A' level or equivalent	.0202	.2370	.071	.2616	.3072	.041
Secondary Vocational	.3031	.2030	.092	.2553	.2982	.041
'O' level or equivalent	-	-	.069	-	-	.032
GCSE and other	-.0999	.2570	.063	-.8822	.4585#	.013
No Qualifications	-.8073	.2310*	.032	-1.3207	.4027*	.009
North/York./Humber	.2622	.1773	.080	-.1669	.2506	.028
East Midlands/ Anglia	.1167	.1995	.070	.0045	.2621	.033
London	-.0144	.2173	.062	-.1192	.2705	.029
Rest of South England	-	-	.063	-	-	.033
West Midlands	-.0004	.2470	.063	-.2522	.3313	.026
North West	.1720	.2116	.074	-.0421	.2706	.031
Wales	-.6757	.3606	.033	-.5618	.4153	.019
Scotland	.0640	.2019	.067	-.3542	.2839	.023
Central Government	-	-	.047	-	-	.023
Local Government	.0558	.2877	.050	.9881	.2934*	.060
Other public services	.8109	.2075*	.099	.1005	.2920	.025
Primary/ general education	.3478	.2445	.065	.3621	.2994	.033
Higher education	-.4868	.3815	.029	-.5747	.4878	.013
Other education	.6490	.2820#	.085	.1997	.4056	.028
Hospital	.3555	.2549	.065	.3276	.3265	.032
Community	.2464	.4188	.059	.5892	.4945	.041
Other health/social work	.2426	.3297	.059	.3637	.3986	.033
> 25 workers	-	-	.064	-	-	.028
< 25 workers	.0751	.1677	.069	.0784	.2226	.026
< 1 year with firm	.2283	.2202	.077	.3045	.2952	.033
1-2 years	.3061	.2446	.083	.4353	.3157	.037
2-5 years	.0326	.1756	.064	.7798	.2033*	.051
>5 years	-	-	.062	-	-	.024
Permanent job	-	-	.063	-	-	.030
Not permanent	.5411	.2316#	.104	-.7322	.4286	.015
Constant	-2.4032			-2.0065		
Sample size	4408					
LL	-1796					
LL (slopes = 0)	-1961					
Model χ^2 (68d.f)	330.1*					

Note:

1. * indicates significance at the 1% level; # indicates significance at the 5% level.
2. W/D/S means widowed/divorced/separated.

TABLE B6: The Determinants of On and Off-the-job Employer-Funded Training for Male Employees in Public Administration, Health and Education, 1989: Trinomial Logistic Estimates

MFT89	On-the-job Training			Off-the-job Training		
Variable	α	S. E	PP	α	S. E	PP
16-19	-	-	.272	-	-	.301
20-24	-.2255	.4032	.230	-1.2493	.4175*	.110
25-29	-.5402	.4063	.179	-1.6327	.4289*	.078
30-39	-.7171	.4086	.154	-1.8345	.4323*	.065
40-49	-1.1290	.4193*	.108	-1.9565	.4478*	.058
50+	-1.5457	.4346*	.074	-2.3275	.4766*	.040
Single	-	-	.098	-	-	.069
Married	.3657	.1599#	.135	-.1590	.2120	.059
W/D/S	.1749	.3023	.114	.1298	.3734	.078
No child < 9 years	-	-	.130	-	-	.057
Child(s) under 9 years	-.1065	.1187	.119	.2656	.1646	.074
Degree or higher	.4889	.1714*	.176	.4715	.2387#	.088
Higher Vocational	.6075	.1782*	.194	.8921	.2357*	.128
'A' level or equivalent	.3114	.1933	.152	.4111	.2657	.083
Secondary Vocational	.0901	.1724	.126	.2630	.2366	.073
'O' level or equivalent	-	-	.116	-	-	.057
GCSE and other	-.0982	.2065	.106	-.5855	.3453	.032
No Qualifications	-.8499	.2314*	.053	-1.0837	.3578*	.020
North/York./Humber	-.0071	.1490	.129	.0989	.2061	.063
East Midlands/ Anglia	.0249	.1682	.132	.2110	.2288	.070
London	-.1211	.1725	.117	-.1110	.2434	.052
Rest of South England	-	-	.130	-	-	.057
West Midlands	.0092	.1875	.131	.4623	.2343#	.088
North West	-.0484	.1708	.124	.0923	.2275	.062
Wales	-.0804	.2522	.121	.3928	.2998	.083
Scotland	-.0549	.1696	.124	-.0977	.2451	.052
Central Government	-	-	.124	-	-	.061
Local Government	-.2614	.2200	.098	.4754	.2363#	.095
Other public services	.1007	.1601	.136	-.2307	.2281	.049
Primary/ general education	.3631	.1763#	.169	.2282	.2411	.076
Higher education	-.5069	.2467#	.079	.0256	.2973	.063
Other education	-.1141	.2972	.112	.1713	.3620	.072
Hospital	.0590	.2031	.131	-.1893	.2914	.051
Community	-.1345	.3703	.110	-.5628	.5642	.036
Other health/social work	.0293	.2479	.127	.2590	.3167	.078
> 25 workers	-	-	.124	-	-	.060
< 25 workers	.1900	.1385	.146	.2440	.1850	.075
< 1 year with firm	.2164	.1816	.152	-.4267	.2927	.041
1-2 years	.0207	.1991	.128	.0532	.2621	.065
2-5 years	-.0909	.1449	.116	.1574	.1814	.072
>5 years	-	-	.126			.062
Permanent job	-	-	.127	-	-	.063
Not permanent	.0169	.2859	.129	-.7673	.5390	.030
Constant	-1.3812			-.9732		
Sample size	4113					
LL	-2432					
LL (slopes = 0)	-2583					
Model χ^2 (68d.f)	302.9*					

Note:

1. * indicates significance at the 1% level; # indicates significance at the 5% level.
2. W/D/S means widowed/divorced/separated.

TABLE B7: The Determinants of On and Off-the-job Employer-Funded Training for Male Employees in Public Administration, Health and Education, 1994: Trinomial Logistic Estimates

MFT94	On-the-job Training			Off-the-job Training		
Variable	α	S. E	PP	α	S. E	PP
16-19	-	-	.089	-	-	.332
20-24	.7980	.7713	.178	-1.6903	.5400*	.084
25-29	.7094	.7667	.165	-1.7923	.5237*	.077
30-39	.4713	.7677	.135	-2.0350	.5272*	.061
40-49	.4107	.7713	.128	-2.0449	.5358*	.060
50+	.2603	.7777	.112	-2.6435	.5639*	.034
Single	-	-	.135	-	-	.047
Married	-.0316	.1512	.132	.2724	.2195	.061
W/D/S	.0691	.2527	.143	-.1913	.4396	.039
No child < 9 years	-	-	.129	-	-	.056
Child(s) under 9 years	.1016	.1197	.141	.1115	.1638	.062
Degree or higher	.0914	.1671	.160	.7795	.2536*	.089
Higher Vocational	.1149	.1575	.163	.9174	.2415*	.101
'A' level or equivalent	-.1284	.2096	.132	.2524	.3228	.055
Secondary Vocational	-.2763	.1824	.116	-.2325	.3256	.035
'O' level or equivalent	-	-	.148	-	-	.043
GCSE and other	-.4013	.2066#	.104	-.4083	.4038	.029
No Qualifications	-1.7263	.4075*	.030	-1.6928	.7467#	.008
North/York./Humber	.1004	.1432	.161	.0804	.2016	.069
East Midlands/ Anglia	-.1416	.1669	.131	-.0769	.2381	.060
London	-.0168	.1655	.146	-.0743	.2378	.060
Rest of South England	-	-	.148	-	-	.064
West Midlands	-.1998	.1937	.124	-.3557	.2798	.046
North West	-.5154	.1968*	.094	-.2132	.2553	.053
Wales	-.3853	.2434	.105	-.1189	.3008	.058
Scotland	-.3374	.1704#	.110	-.5566	.2583#	.038
Central Government	-	-	.088	-	-	.092
Local Government	.3179	.2583	.117	-.0841	.2646	.085
Other public services	.7290	.2017*	.167	-.5793	.2251*	.054
Primary/ general education	.5116	.2217#	.139	-.6390	.2446*	.051
Higher education	.1419	.2551	.100	-.6678	.2909#	.049
Other education	-.1302	.4416	.078	-.7031	.4675	.048
Hospital	.5936	.2277*	.149	-.8146	.2852*	.043
Community	.7192	.3187#	.165	-.2250	.3799	.075
Other health/social work	.1944	.2872	.105	-.3354	.3021	.068
> 25 workers	-	-	.135	-	-	.055
< 25 workers	-.1646	.1625	.117	.3719	.1822#	.078
< 1 year with firm	.0062	.2824	.134	.3203	.3896	.071
1-2 years	.1140	.1839	.147	.1556	.2629	.060
2-5 years	-.0764	.1355	.125	.4356	.1691*	.078
>5 years	-	-	.133	-	-	.052
Permanent job	-	-	.131	-	-	.059
Not permanent	.2357	.2123	.160	-.5820	.3471	.034
Constant	-2.5358			-.7308		
Sample size	4004					
LL	-2385					
LL (slopes = 0)	-2505					
Model χ^2 (68d.f)	241.3*					

Note:

1. * indicates significance at the 1% level; # indicates significance at the 5% level.
2. W/D/S means widowed/divorced/separated.

TABLE B8: The Determinants of Employer-Funded Training for Female Employees in Public Administration, Health and Education: Binary Logistic Estimates

	1984			1989			1994		
Variable	α	S. E	PP	α	S. E	PP	α	S. E	PP
16-19	-	-	.156	-	-	.190	-	-	.297
20-24	-.1899	.2113	.133	.2521	.2386	.232	-.3777	.2517	.224
25-29	-.7807	.2377*	.078	-.0067	.2509	.1879	-.4211	.2551	.217
30-39	-.3550	.2397	.115	.1402	.2499	.212	-.4364	.2554	.214
40-49	-.5907	.2524#	.093	.0763	.2543	.202	-.4749	.2583	.208
50+	-1.3311	.2913*	.047	-.0777	.2669	.178	-.6504	.2680#	.180
Single	-	-	.091	-	-	.202	-	-	.194
Married	.0107	.1257	.092	-.0081	.0986	.201	.1342	.0924	.174
W/D/S	-.0301	.2177	.088	-.0419	.1465	.196	.0533	.1349	.202
No child < 9 years	-	-	.092	-	-	.203	-	-	.210
Child(s) under 9 years	-.1283	.1705	.082	-.0841	.1104	.190	-.0487	.0960	.202
Degree or higher	.9039	.1751*	.192	.7982	.1316*	.305	.5156	.1139*	.281
Higher Vocational	.4654	.1535*	.133	.7631	.1165*	.297	.4357	.1046*	.265
'A' level or equivalent	.4267	.1966#	.129	.5726	.1505*	.259	.2115	.1478	.224
Secondary Vocational	.6845	.2405*	.160	.2923	.1738	.209	-.0145	.1444	.187
'O' level or equivalent	-	-	.088	-	-	.165	-	-	.189
GCSE and other	-.2852	.2290	.068	.0761	.1569	.176	-.1520	.1524	.167
No Qualifications	-1.0965	.2297*	.031	-.9705	.1754*	.070	-1.2492	.2024*	.063
North/York./Humber	-.3764	.1626#	.075	-.1077	.1111	.205	.0817	.1017	.230
East Midlands/ Anglia	-.0262	.1693	.103	.0641	.1283	.235	-.0817	.1185	.202
London	.1289	.1627	.119	-.0760	.1269	.210	.2684	.1139#	.265
Rest of South England	-	-	.106	-	-	.223	-	-	.216
West Midlands	-.2151	.1952	.087	-.0510	.1436	.215	-.2719	.1344#	.173
North West	-.2374	.1755	.085	-.0419	.1255	.216	-.0470	.1102	.208
Wales	-.3156	.2365	.079	-.2077	.1782	.189	-.1249	.1531	.196
Scotland	-.4390	.1678*	.071	-.7022	.1332*	.125	-.3572	.1214*	.162
Central Government	-	-	.080	-	-	.204	-	-	.225
Local Government	-.1608	.2755	.069	-.2484	.1903	.167	-.0630	.1676	.214
Other public services	.1828	.2412	.095	-.6091	.1994*	.123	-.2664	.1686	.182
Primary/ general educat.	-.0173	.2071	.079	.2420	.1416	.246	-.0095	.1412	.223
Higher education	.3638	.3243	.111	-.2952	.2234	.160	-.4330	.2098#	.158
Other education	.1929	.3239	.095	-.0909	.2809	.190	.0480	.2525	.233
Hospital	.3944	.1912#	.114	.0182	.1397	.207	-.0646	.1386	.214
Community	.0155	.2594	.081	-.3142	.1944	.158	-.2925	.1904	.178
Other health/social work	.1560	.2265	.092	.0947	.1557	.220	-.0973	.1516	.208
> 25 workers	-	-	.087	-	-	.200	-	-	.208
< 25 workers	.2098	.1221	.105	.0458	.0887	.207	.0062	.0936	.209
< 1 year with firm	.2894	.1620	.110	.0625	.1213	.202	.1255	.1749	.230
1-2 years	.2928	.1756	.110	.0904	.1308	.207	.0006	.1130	.209
2-5 years	.0701	.1317	.090	.1815	.0947	.222	-.0243	.0826	.205
>5 years	-	-	.085	-	-	.192	-	-	.209
Permanent job	-	-	.093	-	-	.202	-	-	.207
Not permanent	-.2914	.2132	.071	-.0960	.1721	.187	.1058	.1282	.225
Constant	-1.8189			-1.5926			-.9399		
Sample size	4435			4898			5796		
LL	-1465			-2438			-2959		
LL (slopes = 0)	-1586			-2613			-3072		
Model χ^2 (34 d.f)	242.3*			350.8*			226.1*		

Note:

1. * indicates significance at the 1% level; # indicates significance at the 5% level.
2. W/D/S means widowed/divorced/separated.

TABLE B9: The Determinants of On and Off-the-job Employer-Funded Training for Female Employees in Public Administration, Health and Education, 1984: Trinomial Logistic Estimates

FFT84	On-the-job Training			Off-the-job Training		
Variable	α	S. E	PP	α	S. E	PP
16-19	-	-	.122	-	-	.026
20-24	-.2410	.2369	.098	-.0093	.4276	.026
25-29	-.9891	.2884*	.049	-.1862	.4617	.022
30-39	-.5143	.2761	.076	.1206	.4535	.029
40-49	-.7766	.2923*	.060	-.0755	.4724	.024
50+	- 1.4125	.3371*	.033	-1.0131	.5073#	.010
Single	-	-	.061	-	-	.021
Married	.0313	.1480	.063	-.0328	.2154	.021
W/D/S	-.0539	.2694	.058	.0024	.3436	.022
No child < 9 years	-	-	.063	-	-	.021
Child(s) under 9 years	-.1196	.2054	.056	-.1401	.2798	.019
Degree or higher	.7890	.2121*	.124	1.1051	.2912*	.059
Higher Vocational	.4243	.1787#	.090	.5629	.2783#	.035
'A' level or equivalent	.3974	.2258	.087	.4772	.3666	.032
Secondary Vocational	.3948	.3070	.087	1.1456	.3673*	.061
'O' level or equivalent	-	-	.060	-	-	.020
GCSE and other	-.3533	.2729	.043	-.1476	.4001	.018
No Qualifications	-.9661	.2573*	.024	-1.5146	.5055*	.005
North/York./Humber	-.3629	.1919	.052	-.4583	.2867	.016
East Midlands/ Anglia	-.0127	.1972	.073	-.0759	.2986	.023
London	.1626	.1903	.085	.0313	.2801	.025
Rest of South England	-	-	.073	-	-	.025
West Midlands	-.4931	.2442#	.046	.1989	.2905	.030
North West	-.2799	.2102	.057	-.1541	.2930	.021
Wales	-.4213	.2874	.050	-.0756	.3852	.023
Scotland	-.3738	.1938#	.052	-.6502	.3277#	.013
Central Government	-	-	.059	-	-	.020
Local Government	-.9190	.4059#	.024	.7808	.3931#	.043
Other public services	.4261	.2591	.088	-1.3622	.7562#	.005
Primary/ general educat.	-.1125	.2423	.053	.1815	.3721	.024
Higher education	-.3555	.4716	.042	1.2570	.4667*	.068
Other education	-.1406	.4198	.052	.7188	.4947	.041
Hospital	.5620	.2136*	.099	-.4077	.4030	.014
Community	-.1134	.3154	.053	.2832	.4363	.027
Other health/social work	-.2395	.2850	.047	.7585	.3802#	.042
> 25 workers	-	-	.062	-	-	.018
< 25 workers	-.0078	.1534	.062	.5766	.1907*	.032
< 1 year with firm	.3632	.1790#	.080	.1051	.2880	.022
1-2 years	.1933	.2123	.069	.5159	.2843	.032
2-5 years	.0824	.1565	.062	.0518	.2252	.021
>5 years	-	-	.057	-	-	.020
Permanent job	-	-	.062	-	-	.023
Not permanent	-.0073	.2334	.062	-1.334	.4852#	.006
Constant	-1.958			-3.6465		
Sample size	4435					
LL	-1721					
LL (slopes = 0)	-1904					
Model χ^2 (68d.f)	366.8*					

Note:

1. * indicates significance at the 1% level; # indicates significance at the 5% level.
2. W/D/S means widowed/divorced/separated.

TABLE B10: The Determinants of On and Off-the-Job Employer-Funded Training for Female Employees in Public Administration, Health and Education, 1989: Trinomial Logistic Estimates

FFT89	On-the-job Training			Off-the-job Training		
Variable	α	S. E	PP	α	S. E	PP
16-19	-	-	.124	-	-	.088
20-24	.4814	.3015	.186	-.1094	.3542	.080
25-29	.2111	.3155	.149	-.3251	.3732	.066
30-39	.2213	.3158	.150	.0261	.3671	.091
40-49	.3082	.3194	.161	-.2976	.3777	.067
50+	.2684	.3322	.156	-.7093	.4057	.046
Single	-	-	.153	-	-	.074
Married	.0531	.1166	.160	-.1145	.1527	.067
W/D/S	-.0466	.1744	.147	-.0192	.2252	.073
No child < 9 years	-	-	.159	-	-	.070
Child(s) under 9 years	-.0847	.1306	.148	-.0685	.1696	.065
Degree or higher	.6706	.1568*	.208	1.0415	.2054*	.129
Higher Vocational	.7186	.1366*	.216	8429	.1909*	.108
'A' level or equivalent	.5336	.1764*	.186	.6481	.2452*	.091
Secondary Vocational	-.0143	.2261	.117	.7393	.2486*	.098
'O' level or equivalent	-	-	.118	-	-	.050
GCSE and other	.1510	.1823	.135	-.0981	.2724	.045
No Qualifications	-.1213	.1315	.106	-.7381	.2847*	.024
North/York./Humber	-.1213	.1315	.156	-.0875	.1710	.076
East Midlands/ Anglia	.0752	.1508	.183	.0442	.1987	.086
London	-.0178	.1472	.170	-.2163	.2043	.067
Rest of South England	-	-	.172	-	-	.082
West Midlands	-.0610	.1703	.164	-.0455	.2205	.079
North West	.0117	.1465	.174	-.1383	.1988	.072
Wales	-.0308	.1991	.168	-.6452	.3222#	.045
Scotland	-.6536	.1575*	.098	-.7807	.2164*	.039
Central Government	-	-	.180	-	-	.057
Local Government	-.6890	.2440*	.099	.4749	.2894	.089
Other public services	-.6283	.2275*	.105	-.5526	.3617	.034
Primary/ general educat.	.2099	.1606	.213	.3532	.2457	.080
Higher education	-1.1252	.3313*	.067	.7301	.3111#	.112
Other education	-.4450	.3552	.124	.5538	.4064	.096
Hospital	.0641	.1561	.190	-.1652	.2580	.049
Community	-.7058	.2473*	.098	.3263	.2961	.078
Other health/social work	-.2619	.1872	.145	.7176	.2538*	.111
> 25 workers	-	-	.161	-	-	.064
< 25 workers	-.0961	.1065	.148	.2990	.1328#	.085
< 1 year with firm	.2077	.1402	.174	-.2308	.2017	.056
1-2 years	.1858	.1523	.171	-.0955	.2113	.064
2-5 years	.1802	.1126	.170	.1662	.1440	.081
>5 years	-	-	.146	-	-	.069
Permanent job	-	-	.156	-	-	.073
Not permanent	.2218	.1839	.188	-1.2708	.4307*	.022
Constant	-2.1146			-2.6284		
Sample size	4898					
LL	-3071					
LL (slopes = 0)	-3315					
Model χ^2 (68d.f)	487.0*					

Note:

1. * indicates significance at the 1% level; # indicates significance at the 5% level.
2. W/D/S means widowed/divorced/separated.

TABLE B11: The Determinants of On and Off-the-job Employer-Funded Training for Female Employees in Public Administration, Health and Education, 1994: Trinomial Logistic Estimates

FFT94	On-the-job Training			Off-the-job Training		
Variable	α	S. E	PP	α	S. E	PP
16-19	-	-	.243	-	-	.101
20-24	-.4340	.2842	.172	-.2421	.4381	.081
25-29	-.4082	.2873	.176	-.4580	.4467	.066
30-39	-.5102	.2889	.162	-.3770	.4431	.071
40-49	-.4999	.2921	.163	-.4128	.4481	.069
50+	-.6462	.3033#	.144	-.6684	.4649	.054
Single	-	-	.156	-	-	.057
Married	.0770	.1055	.167	.2737	.1568	.074
W/D/S	-.0554	.1577	.149	.2963	.2200	.075
No child < 9 years	-	-	.165	-	-	.068
Child(s) under 9 years	-.0787	.1124	.154	.0085	.1526	.068
Degree or higher	.4717	.1331*	.218	.6125	.1849*	.106
Higher Vocational	.3828	.1223*	.203	.5527	.1716*	.101
'A' level or equivalent	.1902	.1721	.173	.2612	.2464	.077
Secondary Vocational	.0989	.1633	.161	-.3365	.2703	.044
'O' level or equivalent	-	-	.148	-	-	.060
GCSE and other	-.1194	.1777	.133	-.2244	.2591	.049
No Qualifications	-1.1496	.2322*	.052	-1.5126	.3884*	.014
North/York./Humber	.1065	.1171	.183	.0236	.1676	.075
East Midlands/ Anglia	.0180	.1339	.170	-.3440	.2108	.053
London	.2401	.1222#	.204	.3315	.1703#	.099
Rest of South England	-	-	.168	-	-	.073
West Midlands	-.2936	.1486#	.130	-.2255	.2170	.059
North West	-.0198	.1271	.165	-.1117	.1826	.066
Wales	-.2343	.1853	.137	.0767	.2327	.079
Scotland	-.3049	.1399#	.129	-.4775	.2082#	.047
Central Government	-	-	.178	-	-	.064
Local Government	-.3886	.1916#	.128	.5331	.2687#	.105
Other public services	-.1802	.1858	.153	-.5871	.3342	.037
Primary/ general educat.	-.0076	.1588	.177	.0019	.2492	.064
Higher education	-.8691	.2701*	.083	.2732	.3145	.083
Other education	.0569	.2804	.186	.0191	.4549	.065
Hospital	-.0487	.1553	.171	-.0702	.2480	.060
Community	-.5771	.2307#	.108	.2527	.3027	.081
Other health/social work	-.3070	.1549#	.137	.3621	.2579	.090
> 25 workers	-	-	.163	-	-	.068
< 25 workers	.0114	.0972	.164	-.0072	.1359	.068
< 1 year with firm	.2295	.1935	.200	-.1967	.3266	.055
1-2 years	-.0280	.1315	.162	.0635	.1822	.070
2-5 years	-.0959	.0970	.153	.1241	.1321	.074
>5 years	-	-	.166	-	-	.066
Permanent job	-	-	.161	-	-	.068
Not permanent	.2019	.1442	.190	-.1353	.2228	.060
Constant	-1.1449			-2.5276		
Sample size	5796					
LL	-3719					
LL (slopes = 0)	-3868					
Model χ^2 (68d.f)	297.6					

Note:

1. * indicates significance at the 1% level; # indicates significance at the 5% level.
2. W/D/S means widowed/divorced/separated.

Chapter 5:
Ethnic Differentials in the Incidence and Determinants of Employer-Funded Training in Britain *

Abstract

This chapter investigates ethnic differentials in the incidence and determinants of employer-funded training for full-time workers in Britain, using data from the Quarterly Labour Force Survey collected between December 1992 and November 1994. This is the only data source which provides a large enough sample of non-white male and female employees to allow for reliable estimation of the determinants of employer-funded training. Estimates of the determinants of all training, on-the-job training and off-the-job training, obtained using binomial and trinomial logistic regression models, show a marked consistency across white and non-white, male and female, employees. However, decomposition analysis indicates that non-whites receive only between 51%-73% of the mean predicted training probability obtained by whites. Furthermore, these ethnic differences cannot be explained by differences in observable characteristics. These findings suggest that 20 years of equal opportunities legislation in Britain has been unsuccessful in eliminating unequal access to employer-funded training for non-white workers. Moreover, low levels of training for non-whites might contribute to other forms of observed labour market disadvantage.

* This chapter represents an extended version of Shields and Wheatley Price (1997).

5.1 Introduction

Over recent years there has been a considerable growth of research in Britain that has focused on ethnic differences in labour market performance, especially with regard to unemployment, occupation and wages. One consistent finding from this literature,[1] is that non-white workers receive lower returns to labour market experience in Britain than whites, and it has been proposed that differential access to work-related training may be a cause (see Chiswick, 1980; McNabb and Psacharopoulos, 1981; Blackaby, 1986; Blackaby et al., 1994; and Shields and Wheatley Price, 1998). A second possibility put forward is that ethnic minority workers receive lower returns from the work-related training they do receive (Duncan and Hoffman, 1979), due to restricted promotional opportunities (Arulampulam and Booth, 1997) or an increased likelihood of experiencing unemployment spells (Schmidt and Zimmerman, 1996).[2]

Nevertheless, there has been little empirical research into ethnic differences in the incidence and determinants of training, despite the fact that there are approximately 450,000 non-white males and 370,000 non-white females employed in Britain.[3] The only insight into this issue, in the literature, arises from the inclusion of simple dummy variables for 'non-white' or 'ethnic' in models of the determinants of training. This approach, however, does not allow for potentially important heterogeneity in the key determinants of training between whites and non-whites, which may arise if employers value non-white work-related characteristics (e.g. qualifications) differently in the provision of training opportunities. There is, however, some qualitative evidence suggesting that discrimination in the provision of training does take place (e.g. Beishon et al., 1995; Palmer, 1992).

The contribution of this chapter is to examine, for the first time in Britain, ethnic differences in the incidence and determinants of employer-funded training between white and non-white, male and female, employees. We estimate separate determinants of training models for these four groups of employees using a pooled sample of full-time employees, obtained from Quarterly Labour Force Surveys collected between December 1992 and November 1994. The QLFS is the only British data source which allows us to gain statistically reliable samples of non-whites and provides information on training incidence. As in Chapter 4 we make the important distinction between employer-funded training provided at the workplace (on-the-job) and that received elsewhere (off-the-job). This is important due to the differing wage returns found for these two training types in Britain (for example, see

[1] Note that these studies refer only to males. Comparable studies for British females have yet to be undertaken.
[2] The author is unaware of any British study that has investigated this aspect of the training experience of non-whites.
[3] Figures derived from population weighted estimates from the 1993/4 Quarterly Labour Force Surveys.

Blundell et al., 1996). The resulting estimates from our determinants of training models are then decomposed in order to identify the origins of any training differentials that are found.

The importance of this issue goes beyond discrimination in the access to training. This is because work-related training is associated with a reduced probability of unemployment, greater promotional opportunities, higher occupational attainment and increased wages (Blundell et al., 1996; Booth, 1991; Greenhalgh and Stewart, 1987; Harper and Haq, 1997; Nickell, 1982; and Pudney and Shields, 1997). Therefore, if ethnic minority groups are discriminated against in the provision of training opportunities, permanent labour market disadvantages may follow. Indeed, the observed discrimination against ethnic minorities in the British labour market, with regard to unemployment (Blackaby et al., 1997), promotion opportunities (Pudney and Shields, 1997), occupational attainment (Stewart, 1983) and wages (Blackaby et al., 1994, 1996) may partly be due to discrimination in the access to work-related training.

Discrimination in training opportunities, on the grounds of race, has been outlawed in Britain since the Race Relations Act of 1976. However, official government training policy, over the last decade, has had little to say about issues of equity for disadvantaged groups (Keep and Mayhew, 1996). The chapter is set out as follows. Section 5.2 reviews previous studies that have examined the importance of ethnicity in the determinants of training, and introduces the theoretical basis of this study. The data and sample characteristics are described in Section 5.3, and the comparative training experiences of whites and non-whites are highlighted in Section 5.4. Section 5.5 outlines the econometric and decomposition methodologies employed. The regression estimates are discussed in Section 5.6 and the decomposition results are described in Section 5.7. Finally, some conclusions are drawn in Section 5.8.

5.2 Training and ethnicity: the available evidence

In terms of the relationship between access to training and ethnicity, the only British studies which have examined this issue have relied upon the findings from simple dummy variables indicating 'non-white' in models of the determinants of training. The findings from these studies are, however, inconclusive. Greenhalgh and Stewart (1987), for example, using data from the National Training Survey of 1975, find that the probability of receiving full-time vocational training was lower for non-white males but higher for non-white females in comparison to the white base group. Booth (1991) found no ethnic differences in data from the British Social Attitudes Survey of 1987, while Booth (1993) using the British National

Survey of 1980 Graduates, found that non-white male graduates were more likely to be trained. Arulampalam and Booth (1997), using data from the National Child Development Study, found that ethnicity had no impact for women, but men of white ethnic origin had a significantly higher probability of experiencing training than non-whites. In contrast, Green et al. (1996) show that discrimination amongst ethnic groups does not appear to be evident in the access to training for any occupation, and, if anything, establishments with employees from ethnic minorities provide slightly more training. In summary, Green et al. (1996) note that there is little support for the hypothesis of discrimination against ethnic minority workers in employer-provided training.

Interestingly, a similar story of ambiguity emerges for the US literature with some studies finding that 'Blacks' receive less employer-provided (company) training than 'Whites' (Corcoran and Duncan, 1979; Duncan and Hoffman, 1979; Lynch, 1992; and Weiss, 1988), others finding no statistically significant differences (Lillard and Tan, 1992; and Veum, 1996) and at least one study finding that 'Blacks' receive more employer-provided training (Altonji and Spletzer, 1991).[4]

Differences between, otherwise observably equivalent, whites and non-whites are most frequently attributed to discrimination on the part of the employer (Becker, 1957). Discrimination, as defined by the United Kingdom's Race Relations Act of 1976, occurs when a person is treated less favourably than other persons on racial grounds (Palmer, 1992, p.86). In terms of training opportunities, discrimination may be defined as occurring when white and non-white workers, having the same personal and work-related characteristics, have an unequal chance of receiving employer-funded training.[5] This may be observed if employers undertake discriminatory practices (have a taste for discrimination) in the allocation of training opportunities, use ethnicity as a screening device for less productive workers, or, alternatively, are unwilling to employ ethnic minority workers in jobs that involve large amounts of training (Duncan and Hoffman, 1979).

Discrimination may also indirectly affect training outcomes. Non-whites may not put themselves forward for training if they anticipate lower returns to training (Duncan and Hoffman, 1979). A lower incidence of training would thus occur if non-whites believe they face discrimination in the access to higher grades and better paid jobs (Arulampalam and Booth, 1997) or are likely to experience more unemployment spells in their subsequent working life (Schmidt and Zimmermann, 1996).

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[4] Oosterbeek (1998) also finds that non-dutch-born workers receive significantly more training than their dutch-born counterparts in the Netherlands. In contrast, VandenHeuvel and Wooden (1997) find evidence of considerable training disadvantage for foreign-born workers in Australia.

[5] This is equivalent to Green's (1993) definition of gender discrimination.

Furthermore, there are a number of theoretical and practical reasons why a rational employer might treat such employees differently in the provision of training opportunities. Firstly, following the models of Lazear and Rosen (1990) and Barron et al. (1993), it may be rational for a profit-maximising firm to provide less training to non-whites, if they believe that this group of employees are more likely to leave the firm. This would be the case if non-whites are more likely to enter self-employment with the aim of avoiding discrimination and the resulting confinement to low status jobs (Aldrich et al., 1981; Jones et al., 1994; Metcalf et al., 1996).

Secondly, since the majority of non-whites in Britain were born abroad, many ethnic minority workers may not be fluent communicators in the English language, reducing their likelihood of successfully completing a training programme and diminishing their ability to apply learnt skills. Similarly, employers may be uncertain as to the quality of any education or experience received by immigrant employees in their native country (Duncan and Hoffman, 1979). Thirdly, the unobserved characteristics of foreign born employees may be systematically different from those of British born workers, due to self-selection processes associated with migration (Chiswick, 1978).

5.3 Data and sample characteristics

As with the two previous chapters our focus is on full-time male and female employees, of working age, who reported to have received employer-funded training within the four weeks prior to interview. The data used in this chapter, however, differs from that used in Chapters 3 and 4. In order to gain samples of non-white employees which are large enough to reliably examine ethnic differentials in the incidence and characteristics of employer-funded training, we have pooled together eight consecutive quarters of the Quarterly Labour Force Survey (QLFS) of the United Kingdom (1992 Quarter 4 - 1994 Quarter 3). The data, therefore, provide a snap-shot of the ethnic training differential rather than examining changes over time.[6] Further details of the data are provided in the data appendix. Due to the panel element of the QLFS we have used only waves 1 and 5 from 1992 quarter 4 to 1993 quarter 3, and only wave 1 from the next four surveys so that no double counting of individuals occurs. Those still in school, in other full-time education or working less than 30 hours per week were excluded from the samples. The pooling of the QLFS is the only method and data source that provides us with an adequate sample of non-white employees (2300 males and 2143 females)

[6] There are two reasons why we cannot examine changes in the ethnic training differential between 1984 and 1994. Firstly, the definition of ethnicity is not strictly compatible, and secondly, it is likely that the composition

to allow for separate determinants of training models to be estimated (i.e. the separate analysis of non-white males and females).[7]

Since white and non-white employees are likely to differ in their work-related and human capital characteristics, and this is likely to lead to differences in the incidence of training between whites and non-whites, it is important to begin by highlighting the main characteristic differences. Table A1 in the appendix provides the comparative sample characteristics for white and non-white, male and female, employees in Britain. We can see that non-whites are, on average, a year younger and are more likely to have a child under 9 years old, be foreign born, possess no or other qualifications and be employed in lower occupational categories (Clerical, Craft, Sales, Plant etc.) than whites. Interestingly, they are, however, more likely to possess a higher qualification, be employed in the health and education sectors and in larger firms than whites. Non-whites are more likely to be employed in the hotels/restaurants and transport sectors than whites, with a lower percentage working in the primary industries. Male non-white employees are more likely to be married, be employed in the professions and have shorter job tenure with their current employer than their white equivalents. Non-white females, however, are less likely to be married or to have been recently recruited, but are more concentrated in associate professional jobs and in the public sector, than white female counterparts. The overall importance of these differences in the work-related characteristics of white and non-white employees on the ethnic training differential is not obvious from the sample characteristics. In this chapter, we therefore attempt to isolate this effect using econometric models and decomposition analysis.

5.4 The incidence and characteristics of employer-funded training for white and non-white employees in Britain

Table 1 describes the incidence of training experienced by the white and non-white employees in the QLFS. The incidence of all training amongst non-white males is 85% of that of white males and, amongst females, non-whites receive only 82% of the training that whites do. For employer-funded training, non-white men are only 75% as likely to be trained as white men,

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of natives and immigrants has changed over the period.

[7] As with the previous chapters, in order to identify the recipients of employer-funded training we combine the responses to the questions, 'Over the last four weeks, have you taken part in any education or training connected with your job, or a job that you might be able to do in the future?' and 'Who paid the fees for this training?'. We use the measure of self-reported ethnicity to distinguish between the white and non-white samples. Unfortunately, no information concerning English language ability is available and questions on trade union membership are not asked in most of the quarters in our sample.

whereas non-white women receive 86% of that which whites women enjoy. Employer-funded training represents a much higher percentage of total training for white males (86%) than for non-white males (77%), who have a higher propensity to self-fund training, unlike non-white women.

TABLE 1: The Incidence of Training received by Employees according to Funding Source

	Males				Females			
	Whites		Non-Whites		Whites		Non-Whites	
	Incidence	%	Incidence	%	Incidence	%	Incidence	%
All Training	13.1	100	11.1	100	17.5	100	14.4	100
Employer-Funded	11.3	86.3	8.5	76.6	14.4	82.2	12.4	86.1
Self-Funded	1.0	7.6	1.8	16.2	1.8	10.3	1.5	10.4
Other / No Fees	0.8	6.1	0.8	7.2	1.3	7.4	0.5	3.5
Sample Size	58846		2300		34738		2143	

Notes:

1. The figures for all training and employer-funded training are significant at the 5% level.

Interestingly, Table 2 shows that whilst non-whites in Britain receive less employer-funded training than whites, the duration of the training they do undergo is more favourable. In terms of the length of training, the QLFS clearly shows that non-whites receive proportionately less training lasting less than one week and proportionately more training lasting 6 months or more. For example, white males (females) receive 49% (48%) of their employer-funded training which lasts less than one week, compared with 41% (41%) of non-white males (females). However, non-white employees experience a higher proportion of their employer-funded training at the workplace (70% for males, 76% for females) than whites (65% and 69%, respectively), but are less likely to receive training in other locations (e.g. private training centres, universities and other educational establishments).

The finding that non-white employees in Britain receive lower levels of employer-funded training than equivalent whites is also highlighted in Table A2 in the appendix. The table provides cross-tabulations showing the percentage of white and non-white employees reporting to have received employer-funded training by individual and employer characteristics.

The training differential between white and non-whites is not constant with age. In particular, young non-white male and female employees below 20 years of age receive considerably less training than their white counterparts. Interestingly, this differential virtually disappears for workers aged between 20 and 30. After the age of 30 the likelihood of

receiving training appears to significantly lower at each age bracket. As we might expect from

TABLE 2: The Distribution of Employer-Funded Training by Location and Length

	Males		Females	
	Whites	Non-Whites	Whites	Non-Whites
Percentage of training by location				
Employers premises	65.2	70.3	68.9	76.2
Another employers premises	3.7	3.6	3.8	2.3
Private training centre	6.6	6.2	5.4	5.7
At home (OU, correspondence)	2.8	2.1	2.2	3.0
Polytechnic, FE college, university	13.3	15.4	11.7	10.6
Other educational institution	1.3	0.5	1.6	0.8
Other	7.1	1.9	6.4	1.4
Percentage of training by length				
Less than 1 week	49.0	41.0	48.2	41.2
1 week less than 1 month	6.4	5.1	5.4	9.6
1 month less than 3 months	3.4	2.5	3.5	3.8
3 months less than 1 year	6.1	8.2	7.4	9.6
1 year less than 2 years	4.0	4.6	5.6	8.5
2 years less than 3 years	4.1	8.7	5.4	4.6
3 years or more	8.3	10.8	5.6	6.9
Ongoing / no definite time limit	18.2	17.9	18.8	15.8
Sample	6650	196	5003	266

our discussion in 5.2, foreign born non-whites experience notably lower levels of employer-funded training than do their native born equivalents. This differential between foreign and native born non-whites is more pronounced for men than women. It is interesting that no such training differential exists for white immigrants and native born. The high percentage of non-white native born men reporting to have received training in the main reflects the young average age of this group of workers.

The figures suggest that employers are rewarding highly educated non-whites to a similar degree as whites. This is in considerable contrast to the experience of non-white employees with no or low level qualification. Similarly, we find that non-white professional and skilled white-collar workers do as well, if not better, than their white equivalents in terms of training participation. The ethnic differential is more obvious for manual employees and those working in sales and personal services. In particular, non-white males and females employed

in plant and machinery received only about one-third of the training gained by whites.

Industry of employment appears to be an important determinant of the ethnic training gap. However, the industrial-training hierarchy found for whites in Chapter 3 appear to hold true for non-white employees in Britain. Interestingly, there are certain industries such as primary industries, finance and real estate and health and education, where non-white employees have comparable training levels to whites. This is not the case for manufacturing (non-whites report about 50% of the training of whites), wholesale and retail (70%), hotels and restaurants (30% for men, 72% for women), transport (75%), public administration (86% for men, 53% for women) and other industries (45% for men and 70% for women). It is noteworthy that these industrial-training differentials are consistent for both males and females.

We now turn to an investigation of how much of the variation in the observed incidence of training among these groups can be explained by differences in individual and employer characteristics.

5.5 A model of comparative training incidence

In this section we develop a model, in the same general framework as the models used in Chapters 3 and 4, to investigate the origins of the differential in employer-funded training observed between white and non-white employees in Britain. The format followed, in this respect, is similar to Green (1993) and Green and Zanchi (1997) who used decomposition techniques to examine the extent of gender discrimination in access to training in Britain. Once again, we make the assumption that the receipt of training by white and non-white employees is the joint outcome of optimising behaviour on the part of workers and employers.[8] As in the previous chapters our focus is exclusively on employer-funded training, since this represents over 75% of all training and allows for a clearer interpretation of our results. Given the cross-sectional nature of the QLFS, we are unable to model the structural framework of the training decision and separate employer and employee demands for training. Consequently, we estimate reduced form binomial and trinomial logistic regressions which model the probability of an individual, with certain characteristics, reporting (i) to have received employer-funded training within the four weeks prior to interview; (ii) to have received either on-the-job or off-the-job employer-funded training within the four weeks prior

[8] It is often assumed that the provision of employer-funded training reflects decisions made solely by the employer rather than human capital investment decisions made by workers (e.g. Veum, 1996). As such, employees will accept any training offer provided by the employer. We prefer to model the determinants of training as a joint optimising process because of the theoretical reasons why non-white workers may turn down

to interview. The latter model is a generalisation of the binomial logistic model, and allows us to identify whether the determinants of employer-funded training are consistent across training types. Given the findings of Chapter 4 it is expected that the determinants of on-the-job and off-the-job will differ in important ways.

Separate models are estimated for white (W) and non-white (NW), male and female, employees, using the method of maximum likelihood (see Greene, 1993, Ch. 21 for details). This approach permits the impact of independent variables on the probability of receiving employer-funded training to differ between white and non-white, and male and female, employees. Ideally, we would have liked to estimate separate determinants of training models for each ethnic group (i.e. Blacks, Asians etc.) but the sample sizes available prevented this. However, ethnic dummy variables included in preliminary estimations of the non-white model, were found to be insignificant.[9]

If we let T^* be the unobserved net benefit to the individual and employer from providing training, then if $T^* > 0$, a training spell will be recorded by the individual at interview. Hence, the model used is:

$$T^{*W} = \alpha^W X^W + \mu^W \quad (1)$$

$$T^{*NW} = \alpha^{NW} X^{NW} + \mu^{NW} \quad (2)$$

$$T^p = 1 \quad \text{iff} \quad T^* > 0$$

$$T^p = 0 \quad \text{iff} \quad T^* \leq 0$$

where T^p is a dummy variable indicating receipt of training, X is a vector of the determinants of training and μ is an error term.

As mentioned in Section 3.5 the results of our decomposition analysis of the ethnic training differential might be imprecise because of the possibility of sample selection. It is plausible, for example, that attitudes towards and aptitudes for training could affect individuals' decisions to seek employment, or of firms to employ them (Green, 1993). This effect may be different for whites and non-whites. Therefore, by restricting the above analysis to employees, there may be an unobserved missing variable causing $E(\mu_{W,NW}) \neq 0$. For example, it is plausible that non-white employees, as a result of (statistical) discrimination, would need, on average, a higher level of ability or motivation in order to be offered employment than equivalent whites. It could also be the case that only the most able or

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training offers discussed above.

[9] Obviously, this is not a rigorous test of whether the determinants of training are consistent across ethnic groups.

motivated non-whites decide to enter the labour market. The effect of these factors would be that our sample of non-white employees would have a higher average unobserved ability than the white sample, who, if they were treated the same as whites by employers would have experienced high levels of employer-funded training.[10] Consequently, our decomposition analysis is likely to underestimate the true extent of the unexplained component (discrimination) of the ethnic training differential. As discussed in the previous chapter the data limitations of the QLFS prevent the incorporation of a sample selection correction procedure, which estimates the training probabilities conditional on individuals' employment. As such, the possibility of selectivity should be taken into account when interpreting the decomposition results.

As with the previous two chapters we include, as explanatory variables in the models, a number of worker and firm characteristics which are suggested by theory to affect the training decision of individuals and employers and that have been found to be important in earlier studies (e.g. Green, 1993; Greenhalgh and Mavrotas, 1996). These are the employee's age, their marital status, whether they have a young dependant child, their highest qualification level, occupational status, length of job tenure and whether the job is considered permanent or temporary. Employer characteristics of industry and size of firm are also included, together with seven regions, one year and three seasonal dummy variables. Occupational status was included in these models, in addition to qualifications, to be comparable with studies which have examined gender differentials in training participation in Britain (Green, 1993; Green and Zanchi, 1997). Given the theoretical reasons why a rational employer might be less willing to fund training for immigrant workers, and in the absence of information on language ability, we include a dummy variable indicating those who are foreign born in our models in an attempt to capture the expected reduced probability of training for these workers.

As with previous chapters, one problem with non-linear discrete models is that the estimated coefficients and their associated marginal effects are difficult to interpret. This is especially so if dummy variables are used (Greene 1993, p.641). For this reason, the predicted probabilities (PP) of each category variable have been simulated, whilst holding the other variables at their respective sample mean values. These results, together with the estimated coefficients, are reported in Tables A3-A8.

We examine the hypothesis that whites and non-whites, possessing the same personal and work-related characteristics, have an unequal chance of receiving employer-funded training by decomposing the logit equations, using a familiar format (e.g. Green, 1993, 1997;

[10] Given the assumption that employers are more likely to train the more able, and the highly motivated are more likely to put themselves forward for training.

Jones and Makepeace, 1996). Following Gomulka and Stern (1990), the following estimate is obtained:

$$\hat{T}^{W} - \hat{T}^{NW} = [\ddot{P}(\hat{\alpha}^{W}, X^{W}) - \ddot{P}(\hat{\alpha}^{W}, X^{NW})] + [\ddot{P}(\hat{\alpha}^{W}, X^{NW}) - \ddot{P}(\hat{\alpha}^{NW}, X^{NW})] \quad (3)$$

where $\hat{\alpha}$ is the vector of coefficient estimates from the appropriate logistic regression and X is a vector of the mean characteristics of the sample. $\hat{T}^{W}$ and $\hat{T}^{NW}$ are the respective average of the predicted training probabilities for whites and non-whites. $\ddot{P}(\hat{\alpha}^{w}, X^{w})$ is the predicted probability of employer-funded training obtained using the coefficients estimated for white employees and their average sample characteristics. The other terms have similar meanings. The first bracketed term provides an estimate of the difference in the mean training probability, between whites and non-whites, due to differences in their average sample characteristics, and the second term in brackets indicates that part which is due to differences in their estimated coefficient structures.

Equation (3) assumes that the underlying association between the measured characteristics and employer-funded training, which would exist in the absence of any differential behaviour on the part of individuals and employers, is represented by the white coefficient structure. Although there are a number of ways to derive a pooled non-discriminatory coefficient structure, using both white and non-white coefficients, we believe that using the white coefficients as the non-discriminatory base is a reasonable assumption given that non-whites represent less than 4% of our combined sample (see also Blackaby et al., 1997).

5.6 Empirical results

5.6.1. All employer-funded training

The binomial logistic regression results for white and non-white male employees are presented in Table A3, and those for females can be found in Table A4.[11] The χ^2 statistics imply that the regression models are all significant at the 1% level. The estimates from these typical determinants of training models are in substantial agreement with previous chapters and show a considerable amount of consistency across the four groups. The predicted effect of

[11] For females a slightly different model specification is used due to their different occupational and industrial distribution.

age upon the probability of receiving employer-funded training is provided for males and females in Figures 1 and 2. These show very similar age-training profiles for white and non-white males, and white and non-white females. For males the key difference between whites and non-whites is the relatively low probability of receiving training for young non-white males. Non-white males in their mid-20s do as well as equivalent whites, but at all ages over 30 whites experience a higher training probability with the ethnic training differential appearing to remain fairly constant. The shape of the age-training profile for females is remarkably similar for whites and non-whites, but non-white females receive a lower probability of training at each age.

The results also show that, regardless of ethnicity or sex, an employee of working age in Britain in 1993/4, is more likely to report having undergone employer-funded training the better qualified they are, the higher is their occupational status, the greater is the number of workers in their firm and if they are employed in the finance and real estate or health and education sectors. We also find that marital status and the presence of children in the household[12] do not significantly affect the probability of receiving such training.

These results hold true for white and non-white, male and female, workers. However, white male employees have significantly lower probability of undergoing employer-funded training if they are employed in the wholesale and retail sector, whilst they are more likely to receive training if they are employed in the transport sector or have spent less than two years with the current employer. Non-white male immigrants receive significantly less training than their non-white native born equivalents, which is not the case for all white immigrants or non-white female immigrants. Lack of English language fluency and the possession of unfamiliar qualifications are the most likely explanations.

In fact, a non-white male, with average characteristics, is predicted to receive less training than a white male, with average white characteristics, in virtually every category of each variable. The differences in these predicted probabilities is particularly striking for those with degree or higher qualifications (white = .140, non-white = .076), O-levels or equivalent (white = .111, non-white = .066), most occupation categories (especially sales and personal services: white = .132, non-white = .062), all the industrial sectors (except health and education), in small firms (white = .091, non-white =.047) and in the job tenure categories.[13]

For females, non-whites are predicted to receive less training in every category except the four highest occupational groups and in primary industries, where they outperform white

[12] Except for white females, where our positive association is in contrast to the negative coefficients found in other studies (Greenhalgh and Stewart, 1987; Booth, 1991; Green, 1993).

[13] Note that the predicted probabilities for whites and non-whites are not strictly comparable due to the differing mean characteristics of the samples. They do, however, present the actual populations rather than assuming non-

female employees (by 3 - 6 predicted probability percentage points). The disadvantage is worst for those non-white female employees with degree or higher (white = .165, non-white = .116) and other (white =.113, non-white = .068) qualifications, those working in sales and personal service (white = .105, non-white = .065) occupations or in the transport (white = .119, non-white =.066) or public administration (white = .166, non-white = .070) sectors. The latter is particularly striking since equal opportunities policies are often most rigorously enforced in the public sector.

5.6.2 On-the-job and off-the-job employer-funded training

The trinomial logistic regression estimates for white and non-white males are reported in Tables A4 and A5, and for females in Tables A6 and A7. All the models have a χ^2 statistics that is significant at the 1% level. Overall, the results suggest that for whites and non-whites the determinants of on-the-job and off-the-job training are reasonably similar. However, there are some notable differences in the magnitude of the estimated coefficients of these two training types, and between whites and non-whites, which are not captured in the analysis of all employer-funded training.

As we would expect the age of the worker is a key determinant of training for all four groups, with the predicted probability of receiving both on-the-job and off-the-job training falling significantly for older workers. As age increases the differential between non-white and white receipt of off-the-job training widens considerably. Non-white male employees, aged 18, receive 68% (71% for women) of the average predicted off-the-job training probability of equivalent whites. This differential falls to 50% for men aged 35 (50% for women) and to 35% for those aged 60 (34% for women). A similar picture emerges for females and on-the-job training. A non-white female, aged 18, receives 87% of the on-the-job training probability of her white counterpart. At age 35 this figure has fallen to 71%, and at age 60 it is only 53%. However, for males the ethnic differential decreases slightly with age (51% at 18, 53% at 35 and 56% at 60 years of age).

Interestingly, among non-whites, being foreign born only significantly reduces the probability of receiving on-the-job training for males. It has no such effect with regard to off-the-job training. Since on-the-job training is generally more firm-specific in nature, this may reflect an uncertainty, on the part of foreign born non-white employees, as to their future employment and promotional prospects with the firm (Arulampulam and Booth, 1997).

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white employees have white mean characteristics.

FIGURE 1: The Predicted Age-Training Profile for White and Non-White Male Employees

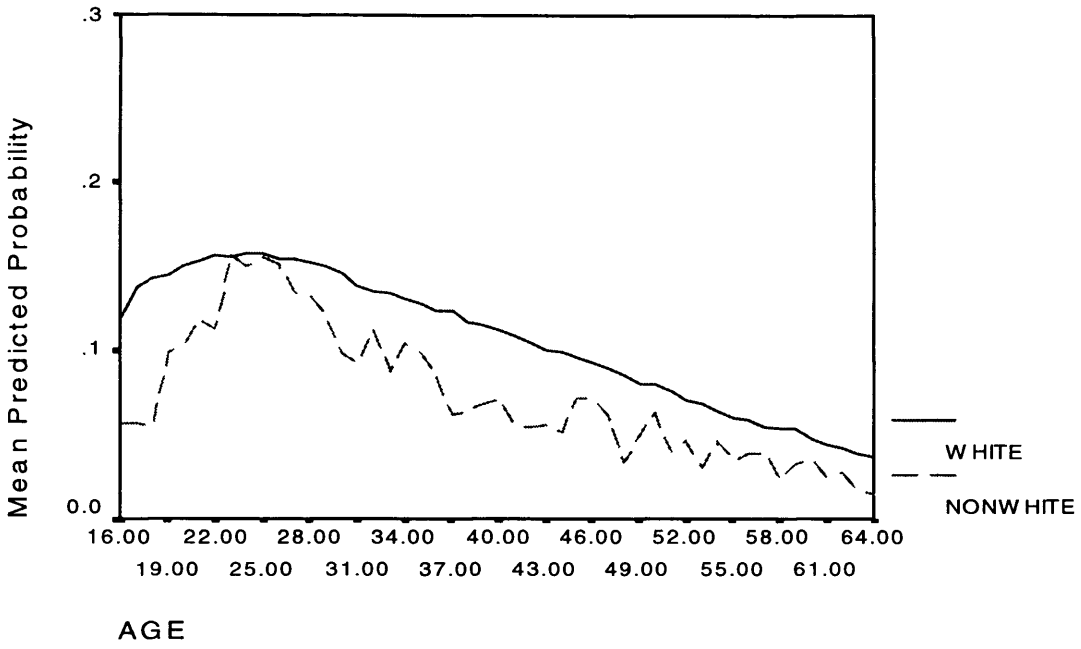
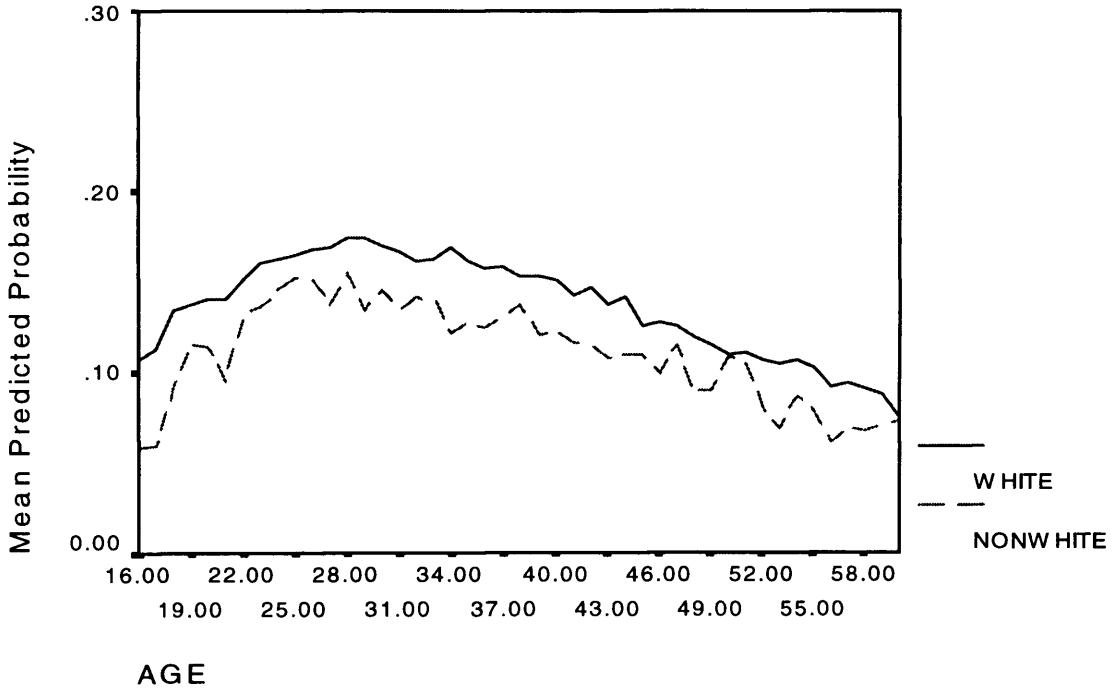


FIGURE 2: The Predicted Age-Training Profile for White and Non-White Female Employees



A consistent finding is that white and non-white employees, who possess formal qualifications, have a significantly higher probability of receiving both training types, than

their unqualified counterparts.[14] The percentage differential between those with high level qualifications (a degree or higher vocational qualification), compared to those with no qualifications is considerably greater for off-the-job than for on-the-job training.[15] This may be because off-the-job training is more costly to provide. Employers therefore require greater expected benefits from funding such activity, which are more likely the more educated is the individual undertaking training.

Occupation is found to have a consistent effect on the probability of receiving employer-funded training across training types. In particular, employees in professional, associate professional and managerial occupational positions are always found to have experienced more training than their respective base groups. However, female clerical workers, who have a significantly lower probability of gaining on-the-job training and a significantly higher probability of receiving off-the-job, than equivalent manufacturing workers, are a notable exception. In addition, whilst non-white males employed in clerical, craft and sales and personal service jobs are significantly more likely to undertake on-the-job training, than plant and machinery workers, they are no more likely to be trained off-the-job.

As with all employer-funded training, the industry in which the individual is employed is found to be a key determinant of on-the-job and off-the-job training. For whites, being employed in the finance and real estate, public administration and health and education increases the likelihood of being trained both on-the-job and off-the-job, compared with workers in the manufacturing sector. However, the effect of working in primary industries, wholesale and retail, hotels and restaurants, and transport sectors is not consistent across all groups and differs according to the location of training.

A general finding[16] is that large firms provide significantly more on-the-job and off-the-job employer-funded training than smaller firms. The differential between large and small firms is greatest in relation to on-the-job training,[17] which presumably reflects the fact that many small firms do not have the facilities or qualified trainers to provide training at the workplace.

Finally, white males are significantly more likely to receive on-the-job training in their first year of job tenure (and white females in their first two years), compared to those who have been with the employer for at least five years. Here an initial investment in firm-specific training allows new employees to gain the necessary skills to begin the job. However, for off-the-job training, it is the employees with 1-5 years of job tenure who receive significantly

[14] This relationship, however, is not significant for non-white females with regard to off-the-job training.
[15] Again, with the exception of non-white females.
[16] With the exception of non-white female employees.
[17] This is consistent with Green (1993) who finds that the effect of size of firm is important and significant only

more training. Since off-the-job training is more costly, and the benefits are reaped over a longer period, employers will only be willing to fund this activity for employees with proven ability and loyalty to the firm. The predicted probability profile is similar for non-whites, but none of the estimated coefficients are statistically significant from the base category

5.7 Decomposition Results

The results from the decomposition analysis, based on both the binomial and trinomial logistic regression estimates, are provided in Table 3. The difference between an average white and an average non-white employee's predicted probability of receiving employer-funded training is .044 for males and .034 for females. Thus non-white males are predicted to receive only 59% (73% for females) of that received by whites. This figure falls to 55% and 70%, for on-the-job training, and to 51% and 52%, for that undertaken off-the-job, with the respective probability differentials for between white and non-white males being .031 and .020, and for females .027 and .017.

TABLE 3: Decomposition of the Ethnic Training Differential

	Males			Females		
	Total	On-the-job	Off-the-job	Total	On-the-job	Off-the-job
Mean predicted training probability						
Whites	.108	.069	.041	.124	.092	.035
Non-Whites	.064	.038	.021	.090	.065	.018
Difference in mean probability $\hat{T}^{W} - \hat{T}^{NW}$	.044	.031	.020	.034	.027	.017
Difference due to coefficients $\{\ddot{P}(\hat{\alpha}^{W}, X^{NW}) - \ddot{P}(\hat{\alpha}^{NW}, X^{NW})\}$	.040 (91%)	.035 (112%)	.014 (67%)	.033 (97%)	.026 (96%)	.016 (94%)
Difference due to characteristics $\{\ddot{P}(\hat{\alpha}^{W}, X^{W}) - \ddot{P}(\hat{\alpha}^{W}, X^{NW})\}$	.004 (9%)	-.004 (-12%)	.006 (33%)	.001 (3%)	.001 (4%)	.001 (6%)

Decomposing these differences in mean predicted probability, we find that the component attributable to differences in work-related characteristics explains very little of the gap in the provision of employer-funded training (between 3% and 33% of the training differential). Differences due to coefficients account for over 90% of the disadvantage experienced by non-white employees in all employer-funded training, and the great majority (67% for males, 94% for females) of the difference in off-the-job training. In the case of on-the-job training, non-

for on-the-job training.

white males are found to have characteristics which suggest they should receive more of such training than whites.

To put these findings in a UK context, if there were no coefficient differences between white and non-whites, 18,000 more non-white male employees and over 12,000 non-white females would have reported receiving employer-funded training in the four weeks prior to interview in 1993/4. The corresponding figures for on-the-job training are 16,200 and 9,600, and those for off-the-job training are 6,300 and 5,900.[18]

These findings clearly suggest that white and non-white workers, who possess the same observable personal and work-related characteristics, do not have an equal chance of receiving employer-funded training. However, as we proposed in Section 2, part of the unexplained difference in mean training probability may arise if employers believe that non-whites are more likely to quit the firm or if non-whites are less likely to put themselves forward for training.

The 1976 Race Relations Act, introduced nearly two decades before the data we have used in this study was collected, and the Commission for Racial Equality Code of Practice in Employment (approved by Parliament in 1984) both outlaw discriminatory practices in the provision of training opportunities for ethnic minority workers in the United Kingdom. European Community law also states that the principle of equal treatment should apply to vocational training. In addition, by the end of 1991, all the 82 Training and Enterprise Councils in England and Wales and the 22 Local Enterprise Companies in Scotland had a contractual responsibility to ensure equality of opportunity in their training provision with regard to race and gender (Commission for Racial Equality, 1991). Indeed, there is a legal allowance for employers to take "positive action" in order to meet the training needs of any particular racial group, including the provision of English language instruction and communication skills, in the Race Relations Act of 1976 (Palmer, 1992).

On the basis of our findings, there does not appear to be equality of access to employer-funded training in Britain for ethnic minority employees. Evidently, the legal requirements outlined above are not being fulfilled. This may be because only 51% of large firms, and 13% of their subsidiaries, had regular ethnic monitoring in 1994 and only 45% and 13%, respectively, had implemented an action plan to realise their racial equality policies. Furthermore, only 12% of large companies, and 3% of their subsidiaries, provided training under the auspices of positive action (Commission for Racial Equality, 1995).

[18] Assuming a population of 450,000 male and 370,000 female non-white British employees, aged 16-64.

5.8 Conclusions

This is the first study to examine the incidence and determinants of employer-funded training for full-time white and non-white employees in Britain, using data from the Quarterly Labour Force of the United Kingdom. We have distinguished between training provided by the employer at the workplace (on-the-job) and training provided in private training centres and other educational establishments (off-the-job). The differences in mean training probability were decomposed into that attributable to differences in employee characteristics and that due to variations in the coefficient structure (usually ascribed to discrimination). Our main findings are that:-

(i) Non-white males receive about 75%, and non-white females approximately, 85%, of the employer-funded training that whites enjoy.
(ii) The determinants of employer-funded training are substantially the same for white and non-white, male and female, employees in Britain, though there are some interesting differences.
(iii) The average predicted probability of a non-white male receiving employer-funded training is only 50% to 60% of that for white males. Similar figures of 50% to 70% were found for females.
(iv) Less than 33% of the difference in the mean predicted probability of on-the-job and off-the-job employer-funded training, between white and non-white males, can be explained by characteristic differences. For females the picture is even more consistent, with less than 6% of the difference attributable to differences in measured characteristics.
(v) The vast majority of the mean predicted training differential (91% for males, 97% for females) is due to differences in the returns to characteristics. This can be taken as tentative evidence in support of the hypothesis that discrimination, on the basis of ethnicity, occurs in the provision of employer-funded training.

These findings suggest that equal opportunities policies in Britain have not been successful with regard to employer-funded training. Discrimination in training opportunities has not been as apparent, or received as much public attention, as the disadvantage experienced by Britain's ethnic minorities in their employment, promotion and wage outcomes. Indeed, most firms in Britain do not have written criteria by which training opportunities are allocated, in contrast to the case of employment. As a consequence, the equal opportunities monitoring of training outcomes has been difficult to undertake.

In order to reduce the disadvantage experienced by ethnic minority employees in Britain,

it is important to encourage firms to provide written details of the criteria by which training opportunities are allocated. They should also be encouraged to implement action plans to achieve equality of opportunity, undergo regular external monitoring of training outcomes and be encouraged to target training for ethnic minority groups, under the provisions for positive action in the 1976 Race Relations Act. Importantly, these programmes should include equal opportunities training for the key decision-makers within the firm who are involved in personnel matters (Commission for Racial Equality, 1987).

Any discrimination that occurs, in the access to training, may cause ethnic minority workers to be permanently disadvantaged in the British labour market. This is because there are established links between work-related training and reduced unemployment probabilities, improved promotional opportunities, more favourable occupational attainment and higher wages. Our results also provide some support for the view that the observed lower returns to labour market experience, experienced by non-white employees in Britain, may be due to a lower receipt of training. However, the link between wages and training has yet to be explicitly examined for non-whites in Britain.

Appendix A – Empirical results

TABLE A1: The Comparative Sample Characteristics of White and Non-White Full-Time Employees in Britain 1993/4

	Male		Female	
Variable	White	Non-White	White	Non-White
Age	38.7	37.6	36.2	35.5
Single	.266	.240	.355	.388
Married	.734	.760	.645	.612
No child < 9 years	.839	.748	.921	.830
Child(s) under 9 years	.161	.252	.079	.170
Native born	.964	.218	.953	.431
Foreign born	.036	.782	.047	.569
Degree or higher	.152	.194	.129	.143
Higher Vocational	.142	.103	.157	.175
'A' level or equivalent	.064	.043	.080	.062
Secondary Vocational	.230	.125	.114	.083
'O' level / GCSE	.171	.120	.285	.212
Other	.073	.170	.054	.113
No Qualifications	.168	.245	.181	.212
Managerial	.200	.148	.146	.098
Professional	.111	.130	.114	.104
Associate Professional	.084	.075	.119	.143
Clerical	.078	.094	.310	.282
Craft and Related	.195	.158	.038	.062
Sales and Personal	.110	.140	.174	.178
Plant and Machinery	.222	.255	.099	.133
North	.149	.076	.144	.044
East Midlands	.121	.091	.113	.065
London	.090	.428	.112	.414
Rest of South East	.204	.140	.208	.110
South West	.083	.022	.080	.014
West Midlands	.095	.139	.090	.098
North West	.112	.070	.118	.037
Wales and Scotland	.146	.034	.135	.013
Primary industries	.127	.043	.032	.015
Manufacturing	.323	.315	.178	.173
Wholesale and Retail	.125	.122	.127	.109
Hotels and Restaurants	.018	.082	.035	.048
Transport	.097	.121	.042	.054
Finance and Real Estate	.119	.120	.165	.141
Public Administration	.079	.052	.086	.116
Health and Education	.076	.116	.291	.303
Other	.036	.029	.045	.041
> 25 workers	.606	.641	.565	.623
< 25 workers	.394	.359	.435	.377
< 1 year with firm	.180	.210	.213	.204
1-2 years	.072	.079	.089	.108
2-5 years	.201	.271	.256	.265
> 5 years	.547	.440	.442	.423
Permanent job	.959	.943	.940	.930
Not permanent	.041	.057	.060	.070
Sample Size	58847	2300	34738	2143

Note:

1. All figures are significant at the 5% level.

TABLE A2: The Percentage of White and Non-White Employees receiving Employer-Funded Training by Individual and Employer Characteristics

Variable	Male		Female	
	White	Non-White	White	Non-White
16-19	24.5	10.6	17.2	8.7
20-24	14.4	14.6	15.0	14.7
25-29	12.9	16.3	15.8	14.4
30-34	13.1	6.4	15.0	10.6
35-39	11.7	6.1	16.0	15.6
40-44	11.5	6.8	16.0	13.0
45-49	9.5	8.4	13.4	5.5
50-54	8.4	3.0	10.3	11.9
55+	4.5	4.5	7.7	7.2
Single	13.1	13.2	14.5	14.0
Married	10.7	7.0	14.3	11.2
No child < 9 years	11.3	9.4	14.1	12.5
Child(s) under 9 years	12.4	5.9	17.8	11.0
Native born	11.2	14.2	14.4	13.1
Foreign born	12.3	7.0	13.7	11.6
Degree or higher	18.0	15.8	25.0	20.6
Higher Vocational	16.3	16.5	22.6	21.9
'A' level or equivalent	15.9	19.2	17.3	17.9
Secondary Vocational	8.9	5.2	10.8	11.9
'O' level / GCSE	11.8	6.5	12.7	9.5
Other	6.6	5.8	9.7	6.3
No Qualifications	4.3	2.0	4.9	3.3
Managerial	12.4	8.8	15.7	17.0
Professional	18.6	22.0	25.8	23.2
Associate Professional	17.2	15.1	24.8	15.6
Clerical	11.3	10.1	11.2	10.1
Craft and Related	9.5	6.6	4.2	2.3
Sales and Personal	13.7	4.9	11.4	7.3
Plant and Machinery	5.0	1.8	4.7	1.5
North	11.9	6.9	15.4	11.9
East Midlands	9.7	7.2	12.8	9.3
London	12.9	9.2	15.4	13.1
Rest of South East	12.4	8.7	15.7	14.5
South West	11.3	4.1	14.9	9.1
West Midlands	10.3	5.6	14.0	7.3
North West	10.3	9.4	13.3	17.5
Wales and Scotland	10.8	13.9	13.2	13.0
Primary industries	9.4	9.1	11.7	15.2
Manufacturing	9.4	3.9	8.4	4.0
Wholesale and Retail	8.4	5.4	9.0	6.4
Hotels and Restaurants	9.1	2.8	8.2	5.9
Transport	9.9	7.6	12.1	8.7
Finance and Real Estate	15.2	12.6	14.4	17.7
Public Administration	18.3	15.8	19.0	10.1
Health and Education	17.1	22.5	21.0	19.7
Other	9.8	4.5	10.0	6.9
> 25 workers	13.0	10.5	15.6	12.5
< 25 workers	8.8	5.0	12.7	11.9
< 1 year with firm	12.5	11.2	15.7	12.8
1-2 years	13.3	11.6	16.2	10.8
2-5 years	12.4	9.8	14.1	12.6
> 5 years	10.3	5.8	13.6	12.2
Permanent job	11.3	7.6	14.4	12.3
Not permanent	12.7	22.9	15.2	12.7
Sample Size	58847	2300	34738	2143

TABLE A3: The Determinants of Employer-Funded Training for White and Non-White Male Employees: Binary Logistic Estimates

Variable	White			Non-White		
	α	S. E	PP	α	S. E	PP
Age	-.0324	.0015*	-	-.0381	.010*	-
Single	-	-	.109	-	-	.069
Married	-.0170	.0325	.108	-.0962	.1823	.063
No child < 9 years	-	-	.110	-	-	.065
Child(s) under 9 years	-.0458	.0353	.105	-.0341	.1889	.063
Native born	-	-	.108	-	-	.077
Foreign born	.0240	.0677	.110	-.2916	.1415#	.059
Degree or higher	.9094	.0617*	.140	.9388	.3650*	.076
Higher Vocational	1.0016	.0584*	.151	1.5383	.3595*	.131
'A' level or equivalent	.8970	.0669*	.138	1.6019	.4138*	.138
Secondary Vocational	.5834	.0567*	.105	.9825	.3771*	.080
'O' level / GCSE	.6508	.0578*	.111	.7758	.3820#	.066
Other	.4626	.0767*	.094	.7513	.3772#	.064
No Qualifications	-	-	.061	-	-	.031
Managerial	.8075	.0519*	.131	1.1199	.3471*	.085
Professional	.9896	.0592*	.153	1.5072	.3603*	.120
Associate Professional	.8972	.0577*	.141	1.3266	.3618*	.103
Clerical	.5585	.0606*	.105	.9306	.3565*	.071
Craft and Related	.5780	.0508*	.107	1.0114	.3392*	.077
Sales and Personal	.8200	.0564*	.132	.7782	.3745#	.062
Plant and Machinery	-	-	.063	-	-	.029
Primary industries	.0680	.0453	.103	.5587	.3596	.082
Manufacturing	-	-	.097	-	-	.049
Wholesale and Retail	-.1675	.0494*	.083	-.0465	.3109	.046
Hotels and Restaurants	-.0498	.1022	.093	-.1112	.4555	.044
Transport	.2713	.0509*	.123	.4723	.2958	.076
Finance and Real Estate	.2586	.0433*	.122	.5131	.2589#	.079
Public Administration	.5066	.0483*	.151	.8494	.3206*	.107
Health and Education	.4619	.0492*	.146	1.2160	.2709*	.147
Other	.0914	.0748	.105	-.5199	.5709	.029
> 25 workers	-	-	.121	-	-	.076
< 25 workers	-.3140	.0284*	.091	-.5114	.1737*	.047
< 1 year with firm	.1191	.0379*	.116	.2084	.2253	.070
1-2 years	.1307	.0489*	.117	.2145	.2784	.070
2-5 years	.0314	.0343	.108	.2321	.1931	.071
> 5 years	-	-	.105	-	-	.057
Permanent job	-	-	.108	-	-	.063
Not permanent	.0209	.0621	.110	.2968	.2584	.083
Constant	-1.9677			-2.4213		
Sample size	58847			2300		
-2LL	-21138			-655		
-2LL (slopes = 0)	-22824			-803		
Model χ^2 (40 d.f)	3371			294		

Notes: *, 1% level of significance; #, 5% level of significance; -, shows the omitted category. Seven regional, three seasonal and one year dummies are also included in each model.

TABLE A4: The Determinants of Employer-Funded Training for White and Non-White Female Employees: Binary Logistic Estimates

	White			Non-White		
Variable	α	S. E	PP	α	S. E	PP
Age	-.0132	.0018*	-	-.0266	.0099*	-
Single	-	-	.121	-	-	.096
Married	.0496	.0355	.126	-.1187	.1503	.086
No child < 9 years	-	-	.123	-	-	.091
Child(s) under 9 years	.1333	.0556#	.138	-.1036	.1952	.083
Native born	-	-	.125	-	-	.079
Foreign born	-.0925	.0779	.115	.2434	.1748	.099
Degree or higher	1.0331	.0826*	.165	.9533	.3607*	.116
Higher Vocational	1.0556	.0773*	.168	1.1073	.3439*	.133
'A' level or equivalent	.9600	.0852*	.155	1.1559	.3965*	.139
Secondary Vocational	.7389	.0821*	.128	1.0026	.3878*	.122
'O' level / GCSE	.7413	.0723*	.129	.6468	.3264#	.088
Other	.5906	.1017*	.113	.3676	.4054	.068
No Qualifications	-	-	.066	-	-	.048
Managerial	.3856	.0592*	.147	.9083	.2871*	.226
Professional	.7010	.0672*	.191	.9325	.2977*	.230
Associate Professional	.6397	.0607*	.182	.9325	.2772*	.230
Clerical	-.0140	.0537	.104	.2256	.2631	.128
Craft and Related	-.5330	.1473*	.064	-.4604	.6464	.042
Sales and Personal	-	-	.105	-	-	.065
Primary industries	.2045	.1072	.115	1.0223	.5015#	.143
Manufacturing	-	-	.096	-	-	.057
Wholesale/Retail/Hotels etc	.0145	.0688	.097	.1562	.3715	.065
Transport	.2418	.0950*	.119	.1624	.4507	.066
Finance and Real Estate	.3051	.0640*	.126	.8784	.3411*	.126
Public Administration	.6264	.0691*	.166	.2208	.3693	.070
Health and Education	.5339	.0594*	.153	.9197	.3237*	.131
> 25 workers	-	-	.135	-	-	.090
< 25 workers	-.2178	.0346*	.111	-.0222	.1525	.089
< 1 year with firm	.1735	.0474*	.137	-.2197	.2208	.082
1-2 years	.1632	.0595*	.136	-.4106	.2653	.069
2-5 years	.0332	.0420	.121	-.1231	.1846	.090
> 5 years	-	-	.118	-	-	.100
Permanent job	-	-	.125	-	-	.090
Not permanent	-.0767	.0699	.117	-.0609	.2879	.085
Constant	-2.5048			-2.8422		
Sample size	33177			2049		
-2LL	-12839			-683		
-2LL (slopes = 0)	-13816			-775		
Model χ^2 (36 d.f)	1955*			183*		

Notes: *, 1% level of significance; #, 5% level of significance; -, shows the omitted category. Seven regional, three seasonal and one year dummies are also included in each model.

TABLE A5: The Determinants of Employer-Funded On and Off-the-job Training for White Male Employees: Multinomial Logistic Estimates

Variable	On-the-job training			Off-the-job training		
	α	S. E	PP	α	S. E	PP
Age	-.0260	.0018*	-	-.0426	.0023*	-
Single	-	-	.067	-	-	.044
Married	.0521	.0411	.070	-.1026	.0474#	.040
No child < 9 years	-	-	.070	-	-	.041
Child(s) under 9 years	-.0519	.0439	.066	-.0271	.0534	.040
Native born	-	-	.069	-	-	.041
Foreign born	.0988	.0813	.076	-.0983	.1070	.038
Degree or higher	.7345	.0761*	.082	1.1988	.0997*	.064
Higher Vocational	.8445	.0719*	.091	1.2589	.0953*	.067
'A' level or equivalent	.8157	.0181*	.088	1.0600	.1077*	.056
Secondary Vocational	.5535	.0687*	.070	.6540	.0954*	.038
'O' level / GCSE	.6243	.0701*	.074	.7232	.0964*	.041
Other	.4220	.0913*	.061	.5230	.1333*	.033
No Qualifications	-	-	.041	-	-	.020
Managerial	.6282	.0634*	.079	1.1213	.0850*	.057
Professional	.8444	.0729*	.096	1.2520	.0634*	.065
Associate Professional	.7083	.0715*	.085	1.2107	.0909*	.062
Clerical	.4211	.0744*	.065	.8159	.0972*	.043
Craft and Related	.3880	.0631*	.063	.8891	.0825*	.046
Sales and Personal	.8811	.0665*	.110	.6646	.0978*	.037
Plant and Machinery	-	-	.044	-	-	.019
Primary industries	-.0673	.0605	.058	.2208	.0637*	.046
Manufacturing	-	-	.062	-	-	.037
Wholesale and Retail	-.1434	.0626#	.054	-.1935	.0739*	.031
Hotels and Restaurants	-.1129	.1301	.056	.0796	.1504	.040
Transport	.3727	.0608*	.087	.0732	.0840	.040
Finance and Real Estate	.2519	.0545*	.078	.2554	.0630*	.047
Public Administration	.5852	.0580*	.106	.3377	.0764*	.051
Health and Education	.4956	.0610*	.098	.4152	.0726*	.055
Other	-.0042	.0976	.061	.2226	.1068	.046
> 25 workers	-	-	.081	-	-	.043
< 25 workers	-.4393	.0363*	.054	-.1384	.0414*	.038
< 1 year with firm	.1410	.0470*	.078	.0908	.0570	.042
1-2 years	-.0051	.0639	.068	.2967	.0683*	.051
2-5 years	-.0489	.0437	.065	.1372	.0502*	.044
> 5 years	-	-	.068	-	-	.039
Permanent job	-	-	.069	-	-	.041
Not permanent	.1135	.0754	.077	-.1099	.0946	.037
constant	-2.5232			-2.9084		
Sample size			58847			
-2LL			-26099			
-2LL (slopes = 0)			-28025			
Model χ^2 (80 d.f)			3853			

Notes: *, 1% level of significance; #, 5% level of significance; -, shows the omitted category. Seven regional, three seasonal and one year dummies are also included in each model.

TABLE A6: The Determinants of Employer-Funded On and Off-the-job Training for Non-White Male Employees: Multinomial Logistic Estimates

Variable	On-the-job training			Off-the-job training		
	α	S. E	PP	α	S. E	PP
Age	-.0232	.0116#	-	-.0593	.0157*	-
Single	-	-	.043	-	-	.020
Married	-.1722	.2324	.036	.0321	.2591	.021
No child < 9 years	-	-	.039	-	-	.021
Child(s) under 9 years	-.0897	.2453	.035	.0657	.2697	.022
Native born	-	-	.052	-	-	.022
Foreign born	-.4265	.2077#	.035	-.0692	.2679	.021
Degree or higher	.3818	.4276	.036	2.1095	.7726*	.036
Higher Vocational	1.0803	.4168*	.070	2.6011	.7674*	.058
'A' level or equivalent	1.6640	.4923#	.116	2.6596	.8159*	.061
Secondary Vocational	.5232	.4474	.041	2.0530	.7854*	.034
'O' level / GCSE	.4246	.4501	.037	1.6811	.7968#	.024
Other	.3641	.4421	.035	1.7205	.7923#	.025
No Qualifications	-	-	.025	-	-	.005
Managerial	1.4375	.4531*	.054	.6527	.5120	.025
Professional	1.9369	.4714*	.087	.9294	.4808#	.033
Associate Professional	1.6688	.4742*	.068	.8660	.4214#	.031
Clerical	.9208	.4718#	.033	.8080	.5157	.029
Craft and Related	1.4813	.4346*	.057	.2822	.5240	.018
Sales and Personal	1.0263	.4873#	.037	.4072	.5516	.020
Plant and Machinery	-	-	.014	-	-	.013
Primary industries	-.8948	.7674	.012	1.3490	.4365*	.063
Manufacturing	-	-	.028	-	-	.017
Wholesale and Retail	.0555	.4040	.029	-.1465	.4531	.015
Hotels and Restaurants	.1046	.5756	.031	-.3555	.7038	.012
Transport	.9524	.3523*	.069	-.4579	.5439	.011
Finance and Real Estate	.4999	.3552	.045	.5245	.3782	.029
Public Administration	1.0063	.3997*	.072	.6849	.4755	.034
Health and Education	1.1400	.3519*	.082	1.3192	.3824*	.062
Other	-.5759	.7823	.016	-.4169	.8004	.012
> 25 workers	-	-	.048	-	-	.023
< 25 workers	-.7205	.2328*	.024	-.2589	.2417	.018
< 1 year with firm	.3356	.2831	.047	.0424	.3323	.019
1-2 years	-.1392	.3897	.030	.5042	.3689	.030
2-5 years	.1848	.2477	.041	.3070	.2770	.025
> 5 years	-	-	.038	-	-	.018
Permanent job	-	-	.036	-	-	.021
Not permanent	.6889	.3001#	.070	-.4489	.4340	.014
Constant	-3.3096			-3.2597		
Sample size			2300			
-2LL			-804			
-2LL (slopes = 0)			-978			
Model χ^2 (80 d.f)			348			

Notes: *, 1% level of significance; #, 5% level of significance; -, shows the omitted category. Seven regional, three seasonal and one year dummies are also included in each model.

TABLE A7: The Determinants of Employer-Funded On and Off-the-job Training for White Female Employees: Multinomial Logistic Estimates

Variable	On-the-job training			Off-the-job training		
	α	S. E	PP	α	S. E	PP
Age	-.0115	.0021*	-	-.0173	.0031*	-
Single	-	-	.088	-	-	.035
Married	.0631	.0415	.093	.0180	.0591	.036
No child < 9 years	-	-	.091	-	-	.035
Child(s) under 9 years	.1554	.0636#	.104	.0826	.0951	.038
Native born	-	-	.092	-	-	.035
Foreign born	-.1287	.0918	.082	-.0119	.1274	.035
Degree or higher	.8012	.0946*	.109	1.6163	.1649*	.064
Higher Vocational	.9290	.0872*	.122	1.4471	.1605*	.054
'A' level or equivalent	.8585	.0969*	.115	1.2992	.1714*	.047
Secondary Vocational	.6314	.0929*	.094	1.1016	.1698*	.039
'O' level / GCSE	.6637	.0809*	.096	1.0345	.1554*	.037
Other	.5475	.1137*	.087	.7690	.2127*	.028
No Qualifications	-	-	.052	-	-	.013
Managerial	.1693	.0691#	.097	.9505	.1094*	.056
Professional	.6403	.0770*	.147	.9720	.1223*	.057
Associate Professional	.4776	.0699*	.128	1.1065	.1116*	.065
Clerical	-.1172	.0603#	.075	.3342	.1048*	.031
Craft and Related	-.4566	.1643*	.055	-.6690	.3189#	.012
Sales and Personal	-	-	.083	-	-	.023
Primary industries	.0495	.1390	.067	.4033	.1568*	.049
Manufacturing	-	-	.064	-	-	.033
Wholesale/Retail/Hotels etc	.2378	.0798*	.080	-.5652	.1296*	.019
Transport	.2347	.1165#	.080	.2408	.1498	.042
Finance and Real Estate	.3516	.0778*	.089	.1911	.0978#	.040
Public Administration	.7905	.0816*	.131	.2699	.1156#	.043
Health and Education	.6661	.0710*	.118	.2591	.0982*	.042
> 25 workers	-	-	.064	-	-	.020
< 25 workers	-.2600	.0404*	.050	-.1240	.0580#	.018
< 1 year with firm	.1903	.0547*	.104	.1295	.0811	.037
1-2 years	.1354	.0685#	.099	.2239	.0985#	.040
2-5 years	-.0244	.0500	.086	.1499	.0692#	.038
> 5 years	-	-	.088	-	-	.033
Permanent job	-	-	.091	-	-	.036
Not permanent	.0874	.0765	.099	-.5749	.1421*	.021
constant	-2.8504			-3.9721		
Sample size			33177			
-2LL			-15723			
-2LL (slopes = 0)			-16822			
Model χ^2 (72 d.f)			2199*			

Notes: *, 1% level of significance; #, 5% level of significance; -, shows the omitted category. Seven regional, three seasonal and one year dummies are also included in each model.

TABLE A8: The Determinants of Employer-Funded On and Off-the-job Training for Non-White Female Employees: Multinomial Logistic Estimates

Variable	On-the-job training			Off-the-job training		
	α	S. E	PP	α	S. E	PP
Age	-.0239	.0110#	-	-.0372	.0187#	-
Single	-	-	.069	-	-	.020
Married	-.1077	.1688	.062	-.1639	.2858	.017
No child < 9 years	-	-	.067	-	-	.018
Child(s) under 9 years	-.1737	.2226	.057	.1079	.3593	.020
Native born	-	-	.057	-	-	.015
Foreign born	.2439	.1961	.071	.3159	.3359	.021
Degree or higher	1.0266	.4148#	.083	.6970	.6849	.026
Higher Vocational	1.2794	.3946*	.104	.4864	.6677	.021
'A' level or equivalent	1.1936	.4593*	.097	.9771	.7331	.034
Secondary Vocational	.9890	.4548#	.080	.9991	.7079	.035
'O' level / GCSE	.8611	.3980#	.071	-.1185	.6819	.012
Other	.4433	.4734	.048	.1312	.7561	.015
No Qualifications	-	-	.031	-	-	.013
Managerial	.8584	.3139*	.116	1.2031	.6182#	.027
Professional	.8263	.3278#	.113	1.3647	.6467#	.032
Associate Professional	.7979	.3065*	.110	1.5387	.6021*	.038
Clerical	.0499	.2947	.055	.9055	.5729	.020
Craft and Related	-1.2345	1.050	.016	.6182	.9290	.015
Sales and Personal	-	-	.053	-	-	.008
Primary industries	.9870	.7216	.090	1.1732	.8963	.047
Manufacturing	-	-	.036	-	-	.015
Wholesale/Retail/Hotels etc	.3716	.4364	.051	-.4938	.7629	.009
Transport	.1255	.5615	.040	.2567	.7267	.019
Finance and Real Estate	1.0404	.4019*	.095	.5068	.5849	.025
Public Administration	.4469	.4383	.055	-.3533	.6841	.011
Health and Education	1.0676	.3921*	.097	.6531	.5599	.028
> 25 workers	-	-	.101	-	-	.037
< 25 workers	.0539	.1697	.106	-.2706	.3054	.029
< 1 year with firm	-.1992	.2459	.061	-.3054	.4343	.014
1-2 years	-.4147	.2991	.050	-.3774	.5110	.013
2-5 years	-.1984	.2100	.061	.0713	.3427	.021
> 5 years	-	-	.074	-	-	.020
Permanent job	-	-	.064	-	-	.019
Not permanent	.1678	.3052	.075	-1.0642	.7726	.007
Constant	-3.4091			-3.6553		
Sample size			2049			
-2LL			-804			
-2LL (slopes = 0)			-917			
Model χ^2 (72 d.f)			226*			

Notes: *, 1% level of significance; #, 5% level of significance; -, shows the omitted category. Seven regional, three seasonal and one year dummies are also included in each model.

Chapter 6:
Conclusions and Future Research

Summary

This chapter begins by summarising the work contained in this thesis. Our main findings are then reviewed and some suggestions for future research are made.

6.1 Summary of thesis

This thesis has investigated the determinants of employer-funded training for full-time employees in Britain using data from the Labour Force Survey and Quarterly Labour Force Survey. Our empirical work has focused on two main issues. These are (i) how have the determinants of employer-funded training changed for full-time employees in Britain over the period 1984 to 1994, and (ii) are there differences in the determinants of employer-funded training between white and non-white employees in Britain. These two issues have not been investigated in detail in the training literature previous and therefore this thesis is able to provide two new contributions.

The theoretical framework underlying the determinants of training literature is discussed in Chapter 2, and some recent theoretical developments, which incorporate asymmetric information between employers and employees into the human capital model, are outlined. These models are important because they provide a rationale for the observation that (profit-maximising) firms invest in employee training which has a general and transferable element. The chapter then continues by reviewing the empirical findings from the British determinants of training literature. A brief comparison is also provided with the results from studies that have used data from other countries.

Chapter 3 investigates, for the first time, the incidence and determinants of employer-funded training in Britain over the decade 1984 to 1994 using three comparable cross-sections from the British Labour Force Survey. Separate logistic models are estimated for males and females in 1984, 1989 and 1994, and the growth in the average probability of receiving employer-funded training over this period is decomposed into components attributable to changes in the coefficient structure and changes in the work-related characteristics of the samples. We then further decompose the growth in training due to changes in characteristics into that attributable to the changing age distribution of employees, the improvement in the qualification base and shifts in the industrial structure.

A similar study, focusing solely on the British manufacturing sector, is undertaken in Chapter 4. This study, however, extends the analysis of Chapter 3 in three directions. Firstly, following previous research which has found that different types of training have different labour market returns (in terms of occupational attainment and wages), we distinguish between employer-funded training which is provided at the workplace (on-the-job) and that which is provided

elsewhere (off-the-job). To allow for three possible outcomes in our determinants of training models (i.e. no training, on-the-job training and off-the-job training), trinomial logistic models are estimated. Secondly, we include, for the first time, control variables for a number of sub-industries in the manufacturing sector. The inclusion of these variables in the econometric models enables a better understanding of the factors that determine firms training investments. Thirdly, we compare the decomposition results for the manufacturing sector with those for the Publicly-Orientated Service Sector (defined as including health, education and public administration) in order to establish whether or not our results are consistent across different industries.

Given the finding of many studies that ethnic minorities in Britain are disadvantaged in terms of employment, promotion and wages, Chapter 5 examines, for the first time, whether an ethnic training differential also exists in the British labour market. Using the same dependent variables as Chapters 3 and 4, we estimate separate binomial and trinomial logistic determinants of employer-funded training models for males and females, white and non-white, using pooled data from eight consecutive Quarterly Labour Force Surveys collected between December 1992 and November 1994. It is important to note that the QLFS is the only British data source that allows us to gain statistically reliable samples of non-whites and provides information on training participation. The results from the logistic models are then decomposed using the standard Oaxaca-type technique in order to identify the origins of any training disadvantaged faced by Britain's ethnic minority employees. Specifically, we address the question of whether the ethnic training differential is solely due to differences in the work-related characteristics (in particular age and education) of white and non-white employees.

6.2 Main results and conclusions

6.2.1. Chapter 3

The data from the LFS and QLFS show that between 1984 and 1994 the percentage of British full-time employees receiving employer-funded training in the last four weeks increased considerably (by 70% and 88% for males and females, respectively). The majority of this growth (over 80%), however, occurred in the first half of the decade. Interestingly, throughout the decade a higher percentage of female than male employees received employer-funded training (compare

8.3% for females in 1984 with 7.3% for males; 14.1% compared to 11.8% in 1989; 15.6% compared to 12.4% in 1994).

The results from the logistic determinants of employer-funded training models confirm the findings from previous studies that age and prior qualifications are key determinants of employer-funded training for full-time employees, irrespective of the year in focus. The age-training profile, however, was found to have flattened significantly over the period, with the growth in training probability being considerably greater for older workers than younger workers. Furthermore, the complementary nature of prior qualifications and the probability of training strengthened between 1984 and 1989, with the training differential between those with qualifications and those without, widening substantially. Given this finding we have suggested that this widening training differential could help to explain the widening of the pay distribution in Britain over the 1980s.

We have also found a number of other consistencies and also some notable changes in the determinants of training over the period. Firstly, marital status appears to have increased in importance as a determinant of training for male employees. In contrast to 1984, married men in 1989 and 1994 were significantly more likely to receive employer-funded training than single males. No such relationship was found for females. In contrast to a number of previous studies, we find that having a young child has no consistent and significant effect on the probability of training. Secondly, the effect of industry on the probability of receiving employer-funded training was remarkably consistent throughout the decade and of the same magnitude as that of age and education. A consistent training-industry hierarchy was found with those employed in public administration, education, health and financial services receiving a higher probability of training than those employed in manufacturing and other industries. Thirdly, there was a significant training differential between large and small firms throughout the decade, but the size of this differential increased significantly after 1984. Fourthly, we find some evidence of regional differences in training probabilities. Employees in Scotland received the lowest probability of training throughout the decade. A similar training disadvantage was found for men in Wales in 1984 and 1989 and for men and women in the West Midlands in 1994. Fifthly, we find that job tenure is not a significant determinant of training for men. In contrast, females in their first year of job tenure experience a significantly higher probability of receiving training than other workers throughout the decade. This suggests that training may be particularly important for women returning to jobs after spending time out of the labour force.

Furthermore, decompositions of the growth in employer-funded training between 1984 and 1989 suggest that changes in individuals' and employers' demands for training and skilled labour, respectively, changed significantly, accounting for nearly all of the growth in training. This finding contrasts sharply with that for 1989 to 1994, where significant improvements in the qualification base of the workforce drove the increase in training incidence. The estimates indicate that had the educational levels of the workforce remained at their 1989 figures, the period 1989-1994 would have observed an actual decline in the average training incidence. This finding tentatively suggests that government initiatives introduce in the late 1980s to increase training participation at the workplace, have been unsuccessful.

If we accept the finding of Blundell et al. (1996) that formal qualifications gained after school have no significant effect on the probability of receiving employer-provided training, the main policy implication from this chapter is that the key to increased training at the workplace lies in a continually improving education-system, resulting in fewer youngsters leaving school with low-level qualifications or none.

6.2.2. Chapter 4

In this chapter we find that manufacturing employees received considerably less employer-funded training than the employee workforce as a whole. Moreover, it appears that manufacturing is lower down the training-industry hierarchy for females than males, with female manufacturing workers receiving only 55-61% (89-95% for males) of the national employer-funded training average between 1984 and 1994. As such, and in sharp contrast to the national aggregate figures, female employees in the manufacturing sector experienced only 64% of the average employer-funded training probability experienced by their male equivalents in 1984. The gender differential fell considerably in 1989 (females gaining 81% of the male level), but increased again to 67% by 1994.

Nevertheless, whilst the probability of training was lower for manufacturing employees than the national average, the growth in the average probability of receiving employer-funded training was far greater for manufacturing workers over the 10-year period (compare 136% for females and 123% for males with the national growth figures of 70% and 89%). Interestingly, whereas 70% of the training growth for males occurred between 1984 and 1989, nearly all (98%) of the

training growth for females was seen in the first half of the decade. Female employees, therefore, experienced no growth in their average training probability between 1989 and 1994.

Dividing total employer-funded training into on-the-job and off-the-job components we find that the growth in training for manufacturing workers was primarily due to an increased probability of receiving on-the-job employer-funded training. This trend was consistent for both males and females, with 73% and 72% of the training growth between 1984-1994 being in on-the-job training, respectively. Importantly, we find that there was virtually no increase in the probability of receiving off-the-job training between 1989 and 1994.

We find that employees in the POSS have a significantly higher probability of receiving employer-funded training than workers in the manufacturing sector throughout the decade. The training differential between these two industrial sectors remained reasonably constant in each of the three years, with female manufacturing employees experiencing around 30%, and males around 45%, of the average training probability of equivalent POSS employees. As with the manufacturing sector we find that most of the training growth for POSS employees occurred between 1984 and 1989 and the majority of this growth was in on-the-job rather than off-the-job training.

With regard to the determinants of employer-funded training for manufacturing employees we find much evidence to support our findings in Chapter 3. Once again, age and highest qualification are significant determinants of training for men and women in British manufacturing. Moreover, the trinomial logistic models indicate that the age-training profile appears to be considerably steeper for off-the-job than on-the-job training, with the probability of receiving off-the-job training declining most sharply with age. The differential in the average training probability of employees with no qualifications and those with high level qualifications is considerably greater for females than males, and for off-the-job than on-the-job training. Within the manufacturing sector we find consistent evidence of training- sub-industry hierarchy for both sexes, with those employed in the chemicals, electrical/electronics and car/other transport sectors experiencing the highest probability of employer-funded training between 1984 and 1994. In contrast, workers in textiles/leather/wood/paper and printing consistently received the lowest probability of training. These findings are confirmed for both on-the-job and off-the-job employer-funded training.

Large manufacturing firms provide significantly more training than their smaller counterparts in each year. The differential between large and small firms is greater for females than males, but

the differential for both sexes declined considerably after 1984. The significant training advantage experienced by employees in large firms is also found for on-the-job and off-the-job training for males, but only for on-the-job training for females. The use of all employer-funded training as the dependent variable in our econometric models appears to conceal the true relationship between training and job tenure. Given the existence of greater asymmetry of information between employees and employers in the first year of job tenure, we find that the probability of receiving off-the-job employer-funded training in the first year with the firm is significantly lower than for longer lengths of job tenure. This contrasts with the case for on-the-job training where workers new to the firm have a significantly higher probability of receiving on-the-job training (this presumably captures the need for initial job training). These findings are consistent throughout the decade.

The results from the decomposition analysis of the growth in the average probability of receiving employer-funded training for manufacturing employees tend to support the national findings in Chapter 3. The vast majority (93% for men, 73% for women) of the growth in the average probability of employer-funded training for British manufacturing employees between 1984 and 1989 can be attributed to increases in the demand for training and skilled labour (the coefficients) by workers and firms. In sharp contrast, virtually all of the (smaller) training growth seen between 1989 and 1994 was due to improvements in the work-related characteristics of the samples. The important component of these improvements was the increase in the average qualification level of manufacturing workers. In particular, if the qualification base had remained at its 1989 level in 1994, we would have observed an actual decline of as much as 20% in the incidence of employers-funded training between 1989 and 1994 rather than the small increase actually observed. This decline would have been particular evident for training provided outside of the workplace. These findings are also found to be consistent with those for the POSS, and therefore appear to be general rather than industry specific. The results in this chapter also support the key policy implication of Chapter 3, which is the key to increased training at the workplace lies in a continually improving education-system, resulting in fewer youngsters leaving school with low-level qualifications or none.

6.2.3. Chapter 5

The raw data from the QLFS suggest that non-whites in 1993/4 faced considerable disadvantage in terms of accessing employer-funded training in Britain compared to whites. Non-white males received only about 75% (compare 11.3% and 8.5%), and non-white females approximately, 85% (compare 14.4% and 12.4%), of the employer-funded training that whites enjoyed. Despite the fact that non-white employees are predicted to receive less training than equivalent whites in virtually every category of the explanatory variables, the logistic determinants of training models do however suggest that the determinants of employer-funded training are considerably similar for white and non-white, male and female, employees. This is particularly true with regard to the expected effects of age, qualifications, occupational status and industry. A notable policy concern, however, is that the differential in the probability of receiving employer-funded training between white and non-white males is greatest for the young. This is likely to have important implications for the comparative future occupational progression and wages of young non-white workers in Britain. Another interesting difference between whites and non-whites is the impact of being an immigrant on the probability of training. Non-white foreign-born men receive significantly less employer-funded training than their native-born counterparts after controlling for other observable characteristics. We do not find any such effect for whites born abroad. We have suggested that lack of language fluency and the possession of unfamiliar qualifications for non-white immigrants are the most likely explanations. We also find that non-whites employed in the public administration sector receive considerably less employer-funded training than whites. This is an important finding since equal opportunities policies are often more rigorously enforced in the public sector.

From the decomposition analysis of the ethnic training differentials we find that the average predicted probability of a non-white male receiving employer-funded training is only 50% to 60% of that for white males. Similar figures of 50% to 70% were found for females. Importantly, less than 33% of the difference in the mean predicted probability of on-the-job and off-the-job employer-funded training, can be explained by different work-related characteristics. For females the picture is even more consistent, with less than 6% of the difference attributable to differences in measured characteristics.

The vast majority of the mean predicted training differential (91% for males, 97% for females) is therefore due to differences in the returns to characteristics. This can be taken as

tentative evidence in support of the hypothesis that discrimination, on the basis of ethnicity, occurs in the provision of employer-funded training. These findings suggest that equal opportunities policies in Britain have not been successful with regard to employer-funded training. Discrimination in training opportunities has not been as apparent, or received as much public attention, as the disadvantage experienced by Britain's ethnic minorities in their employment, promotion and wage outcomes. Indeed, most firms in Britain do not have written criteria by which training opportunities are allocated, in contrast to the case of employment. As a consequence, the equal opportunities monitoring of training outcomes has been difficult to undertake.

The implications from the results in this chapter are that in order to reduce the disadvantage experienced by ethnic minority employees in Britain, it is important to encourage firms to provide written details of the criteria by which training opportunities are allocated. They should also be encouraged to implement action plans to achieve equality of opportunity, undergo regular external monitoring of training outcomes and be encouraged to target training for ethnic minority groups, under the provisions for positive action in the 1976 Race Relations Act. Importantly, these programmes should include equal opportunities training for the key decision-makers within the firm who are involved in personnel matters (Commission for Racial Equality, 1987).

A final point is that any discrimination or disadvantage that occurs, in the access to training, may cause ethnic minority workers to be permanently disadvantaged in the British labour market. This is because there are established links between work-related training and a reduced probability of unemployment, improved promotional opportunities, more favourable occupational attainment and higher wages. Our results also provide some support for the view that the observed lower returns to labour market experience, experienced by non-white employees in Britain, may be due to a lower receipt of training. However, the link between wages and training has yet to be explicitly examined for non-whites in Britain.

6.3 Suggestions for future research

This study raises as many questions as it seeks to answer. However, it presents the most comprehensive attempt yet made to investigate both changes in the determinants of employer-funded training, and the ethnic training differential, in Britain.

Perhaps the biggest weakness of the econometric analyses in this thesis, and in all other determinants of training studies in Britain, is the modelling of the determinants of training as a reduced-form equation. This has meant that the demand for training by employees and the supply of training by firms (or the demand for training labour by firms) cannot be separated. The principal reasons for using reduced-form equations is that the LFS/QLFS (and other data sources using by previous studies) does not contain enough information by which to empirical distinguish between demand and supply. This means that each of the results from the training models has had to be discussed in terms of two possible effects. In terms of policy implications the reduced-form framework is also weak. For example, it is not possible to identify whether the significant increase in the average probability of receiving employer-funded training experienced between 1984 and 1989 was the result of an increased demand for training by workers (e.g. given increased job mobility and employment uncertainty) and/or an increased supply of training by firms (e.g. due to increased technological requirements, regulation or labour turnover).[1] Similarly, the interpretation of the lack of any real training growth between 1989 and 1994 is problematic. It is important to note that potential policy responses, aimed at increasing training participation at the workplace, will differ considerably depending upon whether or not it is demand or supply which is the key driving force behind training growth.

A further weakness of the determinants of training literature has been that it has been unable to control for the potential bias that can result from selectivity and/or the endogeneity of explanatory variables. Selectivity could bias the coefficient and decomposition results if, for example, the unobservable work-related characteristics of female full-time employees in 1994 were different from those in 1984, or that the unobservable work-related characteristics of non-whites differed from those of whites. Similarly, endogeneity would lead to bias if there are unobservable individual characteristics (such as ability or motivation) which are correlated with training and at least one of the explanatory variables in the training models (e.g. qualification, job tenure). Further research attempting to control for these potential problems is necessary in order to establish whether or not the results presented in this thesis are robust.

Finally, estimating separate determinants of employer-funded training models for the different ethnic minority groups (e.g. blacks, Asians as well as the white immigrant groups) in Britain would be informative about their human capital accumulation and differential access to

[1] Oosterbeck (1998) is able to distinguish between demand and supply using detailed training information from the Dutch International Adult Literacy Survey of 1995. His analysis shows that there are important differences in the determinants of training between individuals and employers.

employer-funded training. This will become possible as more QLFS's become available. International comparisons of the training experiences of ethnic minority workers would also add to our knowledge.

The author is currently collaborating in research at Leicester which is attempting to address several of the above problems by combining macro data on growth, skill shortages, regulation and labour turnover with individual level data, and by using more sophisticated econometric modelling techniques.

Data Appendix

A. Accessing the Labour Force Survey and Quarterly Labour Force Survey (LFS/QLFS)

Permission to use the various LFS/QLFS used in this thesis was gained from the Data Archive at the University of Essex. The data were then downloaded from the on-line MIDAS system at the University of Manchester. The questions asked to respondents in the LFS/QLFS, and the consequent variable names, were identified using the relevant codebooks purchased from the Data Archive at the University of Essex.

B. Derived data used in Chapters 3

The data required for our study of the changes in the determinants of employer-funded training between 1984 and 1994 were extracted from the LFS of 1984 and 1994, and the QLFS of Spring 1994. The compatible variables downloaded in SPSS format from each of these surveys are illustrated in Table 1. The variables can be classified into four types: these are those used to define (i) the employee samples, (ii) the dependent variables used in the econometric models, (iii) the individual characteristics used as covariates in the econometric models, and (iv) the employer characteristics used as covariates in the econometric models.

The samples were selected in the following way. Firstly, all individuals outside of the typical working age (i.e. aged over 64 for men and 59 for women) were excluded from each of the three surveys (AGE < 60/65). Secondly, employees were selected using the variable EMPLOYEE for 1984 and 1989, and INECACA for 1994. The LFS/QLFS contains no training information for the self-employed, the unemployed or labour market non-participants. Thirdly, those still in full-time education were excluded from the samples using the variable PUPIL for 1984, ATSCHOOL for 1989 and SCHOOL for 1994. Fourthly, ethnic minority employees were excluded using the variable ETHNIC for each of the surveys. Fifthly, full-time employees were defined as usually working greater or equal to 30 hours per week (i.e. USUALHRS >= 30 for 1984, USUHR >= 30 for 1989 and TTUSHR >= 30 for 1994). Finally, the samples were split by gender using the variable SEX for each survey. This selection process provided six samples of employees, one for males and one for females, for each year of the three years.

The dependent variables used in the econometric models (i.e. whether the employees has received a spell of employer-funded training within the four weeks prior to interview) was

derived from the variables EDLASTWK and FEESA for 1984, EDLASTWK and TRNFEEM1 for 1989 and ED4WK and TRNFEE0 for 1994.

Each of the variables used to create the dummy variables used as covariates in the determinants of training models are directly compatible across the three surveys, with the exception of industry of employment and highest qualification. The problem with industry of employment is the result of a change from using the 1980 SIC industry classification in the 1984 and 1989 LFSs to the 1992 SIC definition used in the QLFS of 1994. A direct mapping of the industry responses from the 1980 to the 1992 industry definition, however, was available.[1] The latter comparability problem arises from the introduction of many new vocational qualifications in the late 1980s and 1990s, which were not available options for respondents of the 1984 survey. It was therefore necessary to map these new qualifications into pre-existing categories. Since no direct mapping was available, informed value judgements had to be made concerning the relative value or level of these new qualifications. Tables 2, 3 and 4, show the possible highest qualification for respondents of the 1984, 1989 and 1994 surveys, respectively. Table 5 then provides the mapping of these qualification types used in the construction of the qualification dummy variables included as regressors in our econometric analysis.

B. Derived data used in Chapter 4

The data used in examine changes in the determinants of employer-funded training for manufacturing sector employees in Chapter 4 were extracted from the aggregate samples used in Chapter 3 and defined above. The trivariate dependent variable (indicating the receipt of no training, on-the-job training and off-the-job training) used in trinomial logistic models in Chapter 4 was identified using the variables EDPLACE for 1984, TRAINPLC for 1989 and TRSITE for 1994 (see Table 1). The covariates included in the training models are the same as those used in Chapter 3 with the exception of the sub-industry manufacturing sector control variables. Table 6 provides the mapping used to create compatible sub-industry variables. As with highest qualification, no direct mapping was available for the sub-industry variables therefore some level of value judgement has had to be made. The sub-industry groups were chosen to present fairly homogenous sub-industries, in terms of technological requirements and the degree of regulation.

[1] See p.163 of the Quarterly Labour Force Survey, March 1993 to November 1994, User Guide, vol. 3.

C. Derived data used in Chapter 5

The investigation of ethnic training differentials in Chapter 5 uses data drawn from eight consecutive Quarterly Labour Force Surveys between 1992 quarter 4 and 1994 quarter 3. The eight quarters of data were pooled together in order to gain large enough samples of non-white male and female employees to allow for reliable estimation of the determinants of training models. Due to the panel element of the QLFS, which surveys individuals for five consecutive quarters, we have used only waves 1 and 5 from 1992 quarter 4 to 1993 quarter 3, and only wave 1 from the next four surveys so that no double counting of individuals occurs. The variables used to define the sample and construct the dependent variables and the covariates are the same as for 1994Q1 in Chapter 3 (see Table 1 above). The waves of the surveys were identified using the variable THISWVN, and non-white and immigrant employees were identified using the variables ETHNIC and CRY. The occupational status of the employee was identified by the variable SOCMAJM.

TABLE 1: Labour Force Survey Comparable Variables 1984, 1989 and 1994: Information used to define samples and variables used in Chapters 3 and 4.

Variable	1984 LFS	1989 LFS	1994 QLFS Q1
Information used to define sample			
Select employees only	EMPLOYEE	EMPLOYEE	INECACA
Select those left full-time education	PUPIL	ATSCHOOL	SCHOOL
Select white employees only	ETHNIC	ETHNIC	ETHNIC
Select full-time employees only	USUALHRS	USUHR	TTUSHR
Select ages 16 to 60/65	FAGE	AGE	AGE
Gender	SEX	SEX	SEX
Training information			
Undertaken training in last 4 weeks?	EDLASTWK	EDLASTWK	ED4WK
Who paid for the training spell?	FEESA	TRNFEEM 1	TRNFEE0
Where did the training take place?	EDPLACE	TRAINPLC	TRSITE
What was the length of the training?	TOTTRAIN	EDCONT	TRNLEN
Individual characteristics			
Marital status	MARSTAT	MARSTAT	MARCON
Dependent child(s) under 9 years	DEPCHFBF	DPCH9A	FDPCH9
Highest qualification held	QUALA	QUALSM1	HIQUAP
Job tenure	EMPLEN	EMPLEN	CONMPY
Temporary or permanent job	PERTEMP	JOBTEMP	JOBTYP
Employer characteristics			
Region	URESCOMF	URSMCA	URESMC
Size of firm	EMPLOYNO	EMPLOYNO	NMPNO
Industry	INDF1	INDCODE	INDS92M
Sub-industry	INDF	INDF	INDG92M

TABLE 2: Definition of Variable QUALA for 1984 LFS

QUALA Coding	Definition of Highest Qualifications used in LFS 1984
1.	Higher degree
2.	First degree
3.	Other degree – corporate or graduate member of professional organisation
4.	HNC/ HND/ BEC(Higher)/ TEC(Higher)
5.	Teaching qualification – secondary
6.	Teaching qualification – primary
7.	Nursing qualification
8.	ONC/ OND/ BEC(National/General)/ TEC(National/General)
9.	City and Guilds
10.	'A' level or equivalent
11.	'O' level or equivalent (including Grade 1 CSE)
12.	CSE (other grades)
13.	Any other professional / vocational qualification
14.	No qualification
15.	Don't know

TABLE 3: Definition of Variable QUALSM1 for 1989 LFS

QUALSM1 Coding	Definition of Highest Qualifications used in LFS 1989
1.	Higher degree
2.	First degree
3.	Other degree – corporate or graduate member of professional organisation
4.	BTEC or SCOTBTEC/ BEC or SCOTBEC(Higher) / TEC or SCOTEC(Higher) /HNC/ HND
5.	Teaching qualification – further education
6.	Teaching qualification – secondary
7.	Teaching qualification – primary
8.	Nursing qualification
9.	BTEC or SCTBEC / BEC or SCOTBEC / TEC or SCOTEC / SCOTEV / ONC / OND
10.	City and Guilds
11.	'A' level or equivalent (and Scottish equivalent, SLC(Higher), SCE(Higher), SUPE(Higher), A/S level)
12.	'O' level or equivalent (including Grade 1 CSE) (and Scottish equivalent, SLC(Lower), SCE(Ordinary), SUPE(Lower or ordinary), GCSE)
13.	CSE (other grades)
14.	YTS Certificate
15.	Any other professional / vocational qualification
16.	No qualification
17.	Don't know

TABLE 4: Definition of Variable HIQUAP for 1994 QLFS

HIQUAP Coding	Definition of Highest Qualifications used in LFS 1994
1.	Higher degree
2.	First degree
3.	Other degree
4.	Diploma in higher education
5.	HNC, HND, Higher BTEC, SCOTVEC
6.	Teaching: further education
7.	Teaching: secondary
8.	Teaching: primary
9.	Teaching : level not stated
10.	Nursing etc.
11.	Other higher qualification below degree level
12.	RSA higher diploma, etc.
13.	'A' level or equivalent
14.	RSA advanced diploma
15.	ONC, OND, BTEC national
16.	City and Guilds advanced craft
17.	Scottish CSYS or equivalent
18.	SCE higher or equivalent
19.	A/S level or equivalent
20.	Trade apprenticeship
21.	RSA diploma
22.	City and Guilds craft
23.	BTEC, SCOTVEC first diploma
24.	'O' level or equivalent
25.	CSE below grade 1
26.	BTEC general certificate
27.	YT, YTP certificate
28.	SCOTVEC national certificate
29.	RSA other qualification
30.	City and Guilds other
31.	Other qualification
32.	No qualification
33.	Don't know

TABLE 5: Mapping used to make comparable the Highest Qualification Dummy Variables for 1984, 1989 and 1994

Highest Qualifications	1984 QUALA	1989 QUALSM1	1994 HIQUAP
Higher Degree	1	1	1
First Degree	2	2	2
Other Degree	3	3	3
Higher Vocational	4	4	4, 5, 11, 12, 14, 15, 16
Teaching qualification	5, 6	5, 6, 7	6, 7, 8, 9
Nursing qualification	7	8	10
'A' level or equivalent	10	11	13, 18
Secondary Vocational	8, 9	9, 10, 14	17, 20-23, 26-30
'O' level or equivalent	11	12	19, 24
GCSE	12	13	25
Other	13	15	31
No Qualifications	14, 15	16, 17	32,33

TABLE 6: Mapping used to create Sub-Industry Manufacturing Dummy Variables

Sub-industry	1984 and 1989 (SIC 1980) Recode INDF	1994 (SIC 1992) Recode INDG92M
Food production	Indf > 134 and < 159	Indg92m > 20 and < 31
Textiles/leather/wood/paper	Indf > 158 and < 206	Indg92m > 30 and < 51
	Indf = 220/222/223	Indg92m = 116/118
Printing	Indf > 205 and < 210	Indg92m > 50 and < 54
Chemicals	Indf > 38 and < 60	Indg92m > 53 and < 64
	Indf = 9/10/11/221	
Rubbers/plastics/ceramics	Indf > 209 and < 219	Indg92m = 117/119/120/121
	Indf > 26 and < 39	Indg92m > 63 and < 74
Metals/machine tools	Indf > 16 and < 24	Indg92m > 73 and < 93
	Indf > 59 and < 100	Indg92m = 122/123
	Indf = 224/225/229	
Electrics/electronics	Indf > 99 and < 116	Indg92m > 92 and < 108
	Indf > 128 and < 135	
	Indf = 117	
Car/other transport	Indf > 117 and < 129	Indg92m > 107 and < 116

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