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Participation in Further Education over the Life Course: A Longitudinal Study of Three Birth Cohorts in the Federal Republic of Germany

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ABSTRACT In this paper we address the issue of who is most likely to participate in further training, for what reasons and at what stage of the life course. Special emphasis is given to the impact of labour-market policies to encourage further education and a person's individual or cohort possibilities to participate in further education. We apply a Cox proportional hazard model to data from the West German Life History Study, separately for women and men, within and outside the firm. Younger cohorts show not only higher proportions of participation in further education and training at early stages of the life course, they also continue to participate in higher numbers during later stages of the life course. General labour-force participation reduces and tenure with the same firm increases the propensity to participate in further education and training. Contrary to expectations, in Germany labour-market segmentation has been enhanced rather than reduced by further education and training policies, since in the firm-specific labour-market segment, i.e. skilled jobs in large firms, and in the public sector both women and men had a higher probability of participation. Particularly favourable conditions for participation in further education outside the firm prevailed during the first years of the labour promotion act (*Arbeitsförderungsgesetz*) between 1969 and 1974, but women did not benefit to the same extent as men. Training policies are, therefore, in need of continuous assessment based on a goal-achievement evaluation to avoid any unintended effects of such policies.

INTRODUCTION

Presently we observe a revived interest in topics related to further education and training not only in Germany but in many European countries and the United States (Groot *et al.*, 1990; Stern and Ritzen, 1991; Lynch, 1992*a*; Auer and Schmid, 1993). In the broadest sense further education includes both training within the firm usually defined as firm-specific training and more general training or education acquired outside the firm. This kind of general training might itself be provided either by privately organized institutes, or within the general education and training system, which, in most countries, is mainly state financed (Auer, 1992; Schmid and Schömann, 1994).

There are many actors involved in the training process, such as the individual concerned, the firm in need of updated skills, and trade unions and employers' organizations, and it also has an impact on the public interest at local, regional, national, and supranational levels (Commission of the European Communities, 1992). Due to the large number of potential actors a complex interplay of individual interests and institutional arrangements comes into action. In taking a longer term perspective when analysing this interplay we shall consider the outcome of this process in terms of factors favouring participation in

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further education and training. These factors range from individual incentives in terms of possible increases in earnings (Lynch, 1992*b*) to public financial resources devoted to further training efforts.

Whereas these factors have frequently been analysed with emphasis on one or other of the factors of this process, Schmid (1992) stresses the importance of the process of co-ordination of actors and activities in this field. Following this perspective only a flexible co-ordination of state provision of training facilities, or subsidies for training and individual interests and firms' needs will ensure the best use of resources and, at the same time, is most likely to include equality considerations. Further education might therefore be a good example in which enhancing efficiency in production could also further equality in terms of educational attainment or earnings among the labour force.

In this respect studying the system of further education and training cannot be discussed without considering the more general framework of the general education system (Kochan and Ostermann, 1991; Dobischat and Husemann, 1992). As much as further education and training success depend on successful completion of compulsory education and the initial training system, it has similarly been valued in some countries for its compensating capacity. Deficiencies in the initial training system, if they then become apparent, could be compensated for by increased efforts in the field of further education or state-financed retraining programmes (Osterman and Batt, 1992).

While there has been much discussion about whether state training programmes increase the earnings of programme participants (LaLonde, 1986; Barnow, 1987; Björklund, 1989), as well as research on more general socio-economic measures of programme effectiveness (Breen, 1992; Korpi, 1992), such as re-employment probabilities, job loss, or the employment stability of participants,[1] the issue of who is most likely to participate in further training, for what reasons and at what time during their occupational career, or over the entire life course, has received much less attention.

THEORIES OF THE LABOUR MARKET AND HYPOTHESES ABOUT PARTICIPATION IN FURTHER EDUCATION AND TRAINING

In this part we shall present basic labour-market theories, such as human-capital theory and the theory of segmented labour markets, in order to derive hypotheses for the empirical analysis of participation in further education and training during the life course. Particular emphasis will be placed on the timing of training in an individual's occupational career and the changing macro-societal determinants which create the institutional background for individual decisions to participate in training.

Human Capital Theory and Decisions about Further Training

The original formulation of human-capital theory by Becker (1975) pictures an individual as choosing a certain amount of schooling in order to maximize his expected discounted life-time income. This process of participation in education is considered as investment in human capital where benefits will accrue in later periods of an individual's working life and life-time. This investment decision is, as any other investment decision, subject to budget constraints, such as an individual's resources, family resources in the case of early schooling, and the probability of success in a particular educational or occupational area.

The Mincer (1974) version of the human-capital model needs to be adapted to allow statements to be derived concerning participation in further education and training. The traditional model assumes two persons of the same age or birth cohort where one has finished s years of schooling and the other one $s-d$ years of schooling. On leaving school with s years of schooling earnings will be E_s during the working life and E_{s-d}, respectively with $E_s > E_{s-d}$.

Defining a discount rate r we can write the following two discounted future earnings equations for the two persons with d years' difference of investment in schooling, where L stands for the discounted life-time earnings.

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$$L_s = E_s \int_s^n e^{-rt} dt = E_s \frac{(e^{-rs} - e^{-rn})}{r} \quad (1)$$

$$L_{s-d} = E_{s-d} \int_{s-d}^n e^{-rt} dt = E_{s-d} \frac{(e^{-r(s-d)} - e^{-rn})}{r} \quad (2)$$

As an extension of this basic model we can transform the initial investment decision into a sequential decision process, whereby the initial investment decision may be revised at a later point in time. This point in time could be envisaged as being determined by a kind of 'external shock' (an exogenous influence) such as technological innovations, far-reaching organizational changes and the integration of societies and economies like the Western European integration or the reunification of the two German states. Economic theory treats an across-the-board shift in individual preferences for education, as occurred in the late 1960s in many countries, as a kind of 'external shock' in preferences.

These kinds of 'external' effects are introduced into the standard human-capital model in order to relax the rigid assumption of full knowledge of a person's future earnings possibilities at the time of investment in initial education. The introduction of an external shock such as technological change therefore allows for some sort of unaccounted uncertainty in the individual's investment decision. At the time when such a shock occurs individual decisions may be revised to seek retraining due to the perceived risk of a lower than previously expected life-time earnings trajectory or occupational status.

This point in time is exogenous to the individual's perceived returns on earlier investment in education, but has an impact on everybody at the same point in time. In Figure 1 we identify this point in time as c. To keep the model simple we assume that the same kind of investment decision as in the earlier period applies to the revised investment decision where s' indicates the duration of further education and $E_{s'}$ and $E_{s-d'}$ the

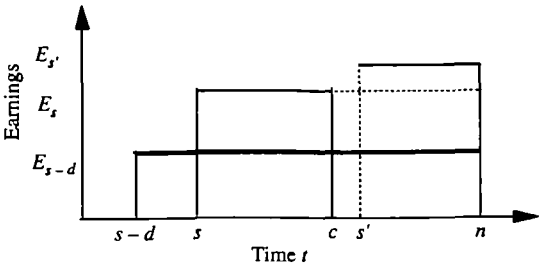

FIGURE 1 *Further education enhancing inequality*

expected life-time earnings from time c until n, the end of the working life. In Figure 1 the further education of the person who has already had s years of schooling will further increase the wage differential after the second training spell, although foregone earnings for this person are equally larger. Foregone earnings if training is pursued off-the-job might even offset the wage increase possibly realized after the second spell of training.[2]

The positive correlation of earnings and education makes an interruption of working life for training more expensive in terms of foregone earnings than on-the-job training. The loss in earnings for a later training period off-the-job is higher the higher the initial investment has been. This applies to the sequential investment model depicted in Figures 1 and 2, where the person who has not invested in human capital in the initial period will invest in the next period, after the external shock, at time c.

Figure 2 shows how further education can be interpreted as a second chance education. In this situation the wage differential between the person with s years of schooling and the

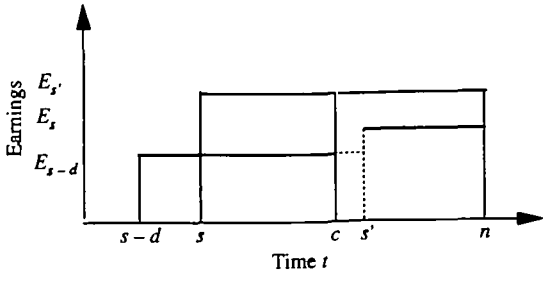

FIGURE 2 *Further education enhancing equality*

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one with $s-d$ years of schooling could be narrowed in the second period after time c. Further education would, under these assumptions, enhance wage equality between individuals who did not have the same initial investment in human capital. The concern about wage differentials is based on the assumption that the life-time earnings of individuals with earnings streams following equations 1 and 2 will be of equal value as perceived in the basic model by Mincer (1974).

In Figure 2 participation in further education enhances equality, since these individuals take part in further education as a chance to compensate for a lack in participation in initial education or training. The earnings achieved with basic education make it possible to review the initial investment decision based on a different level of resources.

So far we have discussed the more traditional human-capital theory rationale for investment in further education by individuals, including exogenous variables such as technological development. We now turn to a consideration of the participation decision, and in particular the timing of participation over the life course, as an endogenous process. Assuming an individual's utility-maximizing behaviour and extending the traditional model to allow for rational exceptions, individuals themselves will know about the empirical form of generalized earnings functions with its typical concave shape of lower returns to education at later stages of the life course.

These assumptions make it possible for people to anticipate the expected slower growth in wages and in their returns to initial investment in education, i.e. a levelling off of the earnings function after a certain number of years, by investing in further education. In this case individuals would participate in further education and training in order to realize the same wage growth as in earlier periods. In the form of a hypothesis for the empirical analysis we would therefore expect persons with higher wage growth in earlier jobs of their working life to be more likely to invest at later stages of the life course to avoid an anticipated levelling off of wage growth rates.[3]

This set of assumptions, added to the traditional assumptions of the human-capital theory, yields two further hypotheses concerning the timing of the decision to participate in further education. Those with low initial investment in human capital face a levelling off of their wage growth rates early on in their life course and, hence, would have a higher incentive to participate in further education and training soon after they had entered the labour market. Those with higher initial investment would participate at a much later stage of their working life since wage growth rates will level off much later.

The hypotheses derived above view the process of participation in further education and training from the perspective of the individual's demand for further education. On the supply side we find training courses provided in centres for further education, publicly financed adult education courses, extra-mural courses, and forms of distance teaching—all of which rely heavily on public funds and are based outside the firm. On the other hand, firms themselves provide further training opportunities, although to a lesser extent. Firm-based training courses follow a specific logic, since this kind of supply of training courses is more likely to be market induced.

Firm-based training courses are more likely to be tailored to the specific needs of the firm with an eye on the returns to this investment. Procedures of human resources accounting and controlling ensure that large parts of the benefits of such an investment will accrue to the firm. The firm will try to ensure a lasting employment relationship. From the firm's perspective human-capital investment is most beneficial in younger participants, since the time to recover the cost of the training course is potentially longer. However, a firm's decision to provide training internally depends on the kind of training it seeks, and its own capacity to provide such training internally. If the decision on the need for training is taken, then younger male or female workers might be considered first.

If employers believe that women in general are more likely to quit jobs than men they may

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discriminate against women when choosing among employees for participation in internal training courses. Such employer behaviour has become known as 'statistical discrimination' (Polachek, 1981) or 'dead end' employment, where women are recruited into career tracks with little prospect of wage growth (Schömann, 1992).

Labour-Market Segmentation and Participation in Training

Based on theories of the segmented labour market it is fairly straightforward to derive hypotheses concerning participation in further education and training. The dual labour-market theory (Doeringer and Piore, 1971) distinguishes a primary from a secondary segment. The former consisting of high productivity jobs, good working conditions, stable employment patterns, high wages, and well-established further education and training courses. Training courses are considered to be an integral part of this favoured segment where it is easy to implement new technologies through training courses due to good working relationships ensured by high wages, seniority rules, and structured promotion ladders. Firms in this segment are usually large, capital-intensive, and highly unionized. Some hold quasi-monopoly power in product markets due to either the legal status of the firm, technology innovations, or faster commercialization of new technologies. Further education and training ensure rapid adjustment to new developments and play an important role in keeping a strong market position. Primary segment male or female workers have a higher probability than secondary segment workers of participating in further training in general and particularly in further training courses held within the firm.

Secondary segment jobs, on the other hand, offer no stable employment, lower wages and no further education and training, either internally or externally. The tasks to be performed are usually acquired through brief initial training with task performance requiring only minimal skills. The abundance of such workers able to perform these frequently repetitive tasks in the labour market tends to keep wages low. The secondary labour market is also differentiated into one of large and one of small firms. Employment uncertainty, low wages, and virtually no promotion prospects make it unlikely that internal training would be organized by the firm.

Due to good in-company training in the primary segment, which is strictly limited to company employees only (Malcomson, 1984), promotion is usually restricted to internal workers. Further education and training therefore plays a crucial role in promoting occupational mobility in the labour market and in particular between labour-market segments. Mobility between segments can be promoted through courses providing more general training to secondary workers.

In further education outside firms we are more likely to find secondary segment workers who, probably induced by adverse selection in internal training courses, are obliged to seek training outside the firm. However, in spite of their further education efforts, upward job mobility due to training efforts is more likely if they change jobs after the education or training period. Secondary segment workers aspiring to work in the primary segment will try to achieve this mobility through participation in further education and training courses. Obviously the state can intervene in this process by providing additional training courses or through subsidies to secondary workers to encourage participation. Alternatively, the state can operate as a model employer facilitating mobility between segments through special career tracks to employees previously employed in the secondary labour market.

For the former West Germany, Lutz and Sengenberger (1974) developed an augmented version of the segmentation theory, distinguishing the primary segment further into a firm-specific labour market of large firms with high job qualification standards, a craft-specific labour market of small firms with high qualification standards, and a secondary segment demanding no or few skills either of small or large firms. While most research

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efforts have focused on the identification of this kind of segmentation (Blossfeld and Mayer, 1989; Becker, 1990; Schömann *et al.*, 1991), little research has been carried out to investigate individual efforts, firms' strategies, state initiatives, and the effectiveness of measures to overcome such segmentation, for example through further education and training.

Blossfeld and Mayer (1989) characterized internal markets as those found in investment-intensive industries such as iron and steel production or the chemicals industry. In these industries, they argue, firms hardly recruit any workers from the external labour market, since they require very firm-specific qualifications. 'Internal labor markets are formed in larger firms where specific qualifications cannot be acquired in general training but must instead be created by internal training processes' (Blossfeld and Mayer, 1989: 7). Firms in this segment are more likely to organize and carry out further education and training within the firm rather than by means of external and more general training.

The vocational training system in Germany also contributes to the segmentation of labour markets, since women or men who receive occupational training constitute a group of people selected by firms who will obtain qualifications that are specific for certain occupations. 'These technical qualifications are acquired in education outside individual firms and allow for change between companies without much friction' (Blossfeld and Mayer, 1989: 7). A labour-market segment organized in that way is most likely to continue to organize further education and training in the same manner, that is outside the individual firm and probably in close co-operation with the state and the chambers of trade, industry, and commerce, as is the case with the initial vocational training system.

THE GERMAN LIFE-HISTORY DATA, DEFINITION OF VARIABLES, AND THE STATISTICAL MODEL

The empirical analysis is based on the German Life History Study (GLHS) directed by Karl Ulrich Mayer (Mayer and Brückner, 1989). A representative sample of 2171 West German men and women were interviewed with respect to social and regional strata from the birth cohorts 1929–31, 1939–41, and 1949–51. The survey was conducted from October 1981 to May 1983. Standardized interviews were used to collect information on individual life histories and selected subject areas (social origin, education, employment, family, migration, and so on) with detailed time references to allow a dynamic longitudinal analysis of education, training, and job careers. The educational and occupational histories of the GLHS were recorded with a so-called event-oriented observation plan (Blossfeld, 1989). In addition to relevant information regarding content and level of education and further education, starting and ending dates were recorded on a monthly basis for each period of further education or work.

The data-set is retrospective. This means that the respondents were asked to reconstruct their life in various fields with exact reference to time. With such a method recall errors might be expected when the time interval between the interval and the occurrence of a specific event is long. This might also be true for further education. However, several reliability tests and comparisons of GLHS data with official statistics have shown a high degree of consistency (Blossfeld, 1989: 153–68). Schömann (1994: 158–74) has demonstrated that from a methodological point of view it is at least as important to arrive at a well-specified estimation of, for example, earnings equations (requiring considerable retrospective career information) as it is to use reliable data. Omissions of important variables in the estimation can lead to more serious bias than sources of error due to error margins associated with retrospective data.

Due to the inclusion of hourly earnings in our analysis we had to exclude family workers and farm-related employment, since data on earnings for such workers, especially in the immediate post-war period, included a large amount of payments in kind. Hourly earnings data require that respondents were able to remember both the amount of earnings and the

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corresponding hours worked at the beginning of each job in a person's occupational history. Due to these restrictions the total sample size was reduced to 4321 periods of employment.

Definition of Variables

There have been a number of propositions for substantive definitions of further education and training. We make use of a synthesis of attempts by Kemp (1976) and the National Commission on Further Education (cf. Becker, 1991: 355) whereby *further education* is defined to be any education or training course, under the condition that the person has already completed initial education or vocational training after first entry into the labour market.

This definition excludes training courses of very general interest, as well as courses about politics, household practices, or more leisure-oriented courses in *Volkshochshulen* (community colleges offering evening courses). Further education aimed at the improvement of occupational skills or at training for a different occupation are at the core of this definition. The definition incorporates any education process which, based on the original occupation, transmits knowledge, skills, communication, or behavioural practices.

The advantage of such an apparently narrow definition of courses and participation in further education and training lies in the fact that the relationship of initial education and training, earnings, age, and state supply of courses can be analysed in a more stringent way related to longer occupational trajectories or life-time earnings. Additionally, this substantive definition of further education and training comes close to the concept of further education and training used in standard theories of the labour market. In the empirical analysis we further differentiate between firm-based further training, and training organized outside the firm. Firm-based training takes place on the firm's premises and the employer is largely responsible for the content of courses and covers training costs.

As explanatory variables in the process of participation in further education and training we include *cohort membership* as two dummy variables for the birth cohorts 1939–41 and 1949–51 with the cohort 1929–31 being the cohort of reference. Levels of *education* and qualifications are recoded in terms of years of participation spent in full-time education. The level of education attained is coded according to the average number of years required to obtain particular degrees: a lower secondary school certificate without vocational training = 9 years; a lower secondary school certificate with vocational training = 11 years; an intermediate school certificate without vocational training = 10 years; an intermediate school certificate with vocational training = 12 years; an upper secondary school certificate = 13 years; a degree from college of engineering or professional college = 17 years; a university degree = 19 years. As demonstrated earlier in the theoretical section, *firm size* is an indicator for labour-market segments (measured as the logarithm of the number of employees in the firm), as is *employment in the public sector*, with the private sector being the reference category. *Earnings* are included as the logarithm of the starting hourly wage rate on a job. *Labour force experience* is calculated in months since time of first entry into the labour market.

Information contained in the GLHS data allows us to include demand-side indicators, such as job requirements, which we used to construct a set of dummy variables to test the relevance of segmentation theories to the participation decision. The operationalization follows Blossfeld and Mayer's (1989) work which identifies four *segments*: (1) internal labour market, i.e. skilled jobs in large firms requiring firm-specific training (2) craft jobs, i.e. skilled jobs in small firms with occupation-specific training (3) mass-production jobs, i.e. unskilled jobs in large firms, and (4) peripheral jobs, i.e. unskilled jobs in small firms. We implement this conceptualization with three dummy variables for size, skill, and an interaction of the two variables.

In addition to accumulated labour-force experience we include the *duration of employment with the same employer* or at the same work-place in the analysis. Another

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occupational history indicator is constructed making use of the longitudinal structure of the data. The episode preceding the current period of employment could have been unemployment due to having lost a previous job (*forced unemployment* = 1), or a more *voluntary type of unemployment* (= 1), after quitting a job or giving birth to a child or other family-related events causing temporary inactivity. The reference category against which these latter two variables have to be evaluated is one in which there is no interruption of the occupational career.

To measure period effects on the probability of participating in further education or training we introduced two dummy variables for the periods 1969–74, and 1975–83, with 1945–68 as the reference period. These *period dummies* are constructed to measure indirectly the effects of the introduction of the Labour Promotion Act (*Arbeitsförderungsgesetz*) in 1969. This law created incentives for participation in further education and training for the employed and the unemployed. The first major revision of this law occurred in 1975 as a consequence of financing difficulties due to the first oil crisis.

The Statistical Model

The causal analysis of participation in further education and training makes use of a hazard-rate model. The dependent variable is the probability of participating in further education during the time interval $(t, t+dt)$ provided that such an event has not occurred before the beginning of this time interval. The time interval in each spell of employment during which a person had censured spells are those that do not end in a period of further education or training.

$$r(t) = \lim_{\substack{dt \to 0 \\ dt > 0}} P(t \leqslant T < t + dt \mid T \geqslant t)/dt$$

For estimation of the transition into further education the Cox model with a partial likelihood ratio test is applied. In the Cox model, the unspecified duration dependency will be controlled as the baseline-hazard rate $r_0(t)$. The independent variables will be included in log-linear form $\exp(\mathbf{x}'\beta)$. Therefore, the baseline hazard rate will be multiplicatively connected with the log-linear covariable vector (Blossfeld *et al.*, 1986: 138):

$$r(t|x) = r_0(t)\exp(\mathbf{x}'\beta)$$

with $\mathbf{x}'$ being the vector of covariates, β representing the regression coefficients, and t showing the duration until the occurrence of an event.[4]

RESULTS

Our empirical analysis is organized into three sections. First, we present some descriptive statistics on cohort-specific participation rates in further education and discuss the remarkable increase in participation for later birth cohorts of women, and an even more pronounced rise for later cohorts of men. Second, we present estimates of hazard-rate models of participation in further education and training separately for women and men, irrespective of internal or external training provision. Third, we estimated hazard-rate models for participation in further education which is organized outside the firm. Finally, participation in firm-specific training organized within the firm is estimated using an appropriate subsample of the GLHS.

The Cohort-Specific Patterns of Participation

In Figure 3 we have drawn age-specific further education rates for the three birth cohorts of the GLHS.[5] These rates are calculated as the proportions of the labour force participating in further education at different points in time during the life course of individuals. As is the case for labour-force participation rates or fertility levels, the broad national figures do not reveal cohort-, age- and period-specific processes at work. Figure 3 demonstrates the remarkable increase in participation in further education for later birth cohorts. Younger cohorts show higher proportions of participation in further education from an early age and continue to do so at later stages of their life course.

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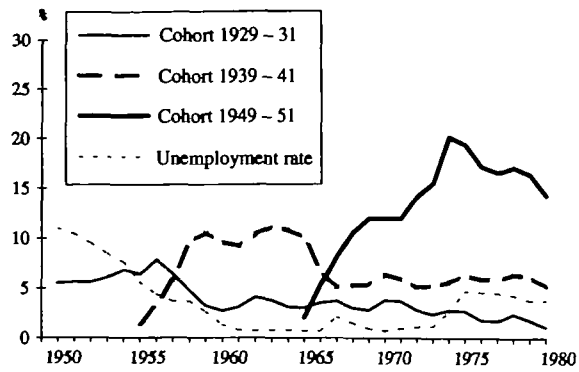

FIGURE 3 *Participation rates in further education and training of birth cohorts 1929–31, 1939–41, and 1949–51*

Across cohorts we find that the proportion of younger participants increases over cohorts, which means there is a cohort-differentiating process of accelerated transition into further education. For example, 5.5 per cent of the 20-year-olds in the cohort 1929–31 participated in further education, whereas participation rates were 9.6 per cent of the 20-year-olds in the cohort 1939–41, and 12 per cent in the youngest cohort. At age 25 participation in further education rises from 6.4 per cent in the 1929–31 cohort to 10.1 per cent in the 1939–41 cohort, and 19.4 per cent in the 1949–51 cohort. For all cohorts, the highest degree of participation in further education is reached between the ages of 22 and 27. In some respects, this corresponds with results of cross-sectional studies (Brinkmann *et al.*, 1972; Müller, 1979; Kuwan, 1989). After this age interval the proportion of participants decreases in all cohorts. In line with official statistics we find that older people participate in further education to a lesser extent than the young. However, there remain sizeable differences between cohorts in the level of participation of older people, as the comparison of levels of participation across cohorts in 1980 reveals.

The increase in youth participation in further education over cohorts can be explained by two developments. First, it became easier to gain access to government grants not only to finance higher education at university level, but also further education and training. The education promotion act (*Bundesausbildungsförderungsgesetz Bafög* of 1971) facilitated the financing of education and training. It led to increased access to further education for the more recent birth cohorts. Second, the Labour Promotion Act (*Arbeitsförderungsgesetz* (AFG) of 1969) and the Vocational Training Act (*Berufsbildungsgesetz* of 1969) increased the engagement of firms and labour offices in further education. This led to the creation of many additional opportunities to participate in further education courses. After distinguishing the age-specific further education ratios of men and women in Figures 4 and 5, very pronounced gender-specific differences become evident. Although the age-specific further education rates increase for both women and men over consecutive cohorts, there remain differences in the level of participation in further education at several stages in the life course. For example, 1.1 per cent of the women at age 25 in the cohort 1929–31 participated in further education. For the 1939–41 cohort, the ratio was about 5.6 per cent, and for the 1949–51 cohort it was 12 per cent. For men of the same age in the 1929–31 cohort, there is a ratio of 11.7 per cent, and the ratio increases over the other cohorts from 14.4 to 26.8 per cent.

Across consecutive cohorts, there are remarkable gender-specific changes. For

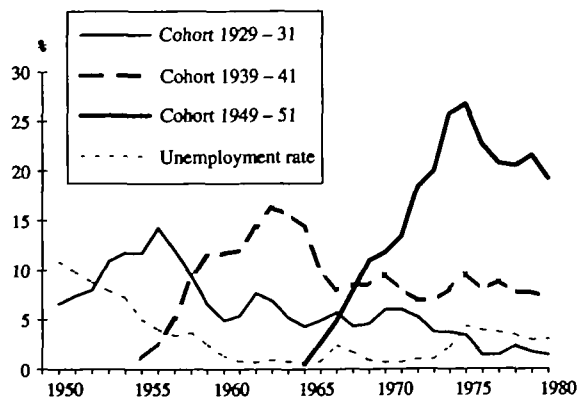

FIGURE 4 *Male participation rates in further education and training of birth cohorts 1929–31, 1939–41, and 1949–51*

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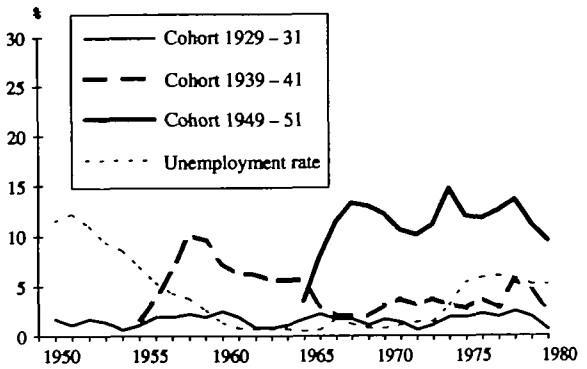

FIGURE 5 *Female participation rates in further education and training of birth cohorts 1929–31, 1939–41, and 1949–51*

example, 2.2 per cent of women in the 1929–31 cohort who were 18 years old participated in further education, while the ratio of the 18-year-old men in the same cohort who participated is much higher (6.6 per cent). However, for the following cohorts young women are more likely than young men to have participated in further education. For 18-year-old women in the 1939–41 cohort, the degree of participation was about 9.6 per cent in contrast to 9.3 per cent for men. The ratio has increased to 13.3 per cent for women in the 1949–51 cohort, and has decreased to 7.9 per cent for men in the same cohort. These differences can be explained by structural changes in the labour market (e.g. post-war conditions, technological change, or changes in female labour-force participation rates and patterns) as well as by different educational and occupational histories of women and men (Blossfeld, 1989). This might then result in gender-specific differences in subsequent occupational opportunities and earning trajectories (Schömann, 1994). In spite of the gain in participation in employment and further education, overall women still participate less in further education than men. Table 1 shows the distribution of all further training episodes (one person can participate in several courses) over several forms of further training. Despite increases in overall participation in further training over consecutive cohorts, the distribution across categories of further training has changed little. The increasing amount of money spent on further training by firms, however, does not show up in individual rates of participation.[6] The increased public provision and financing of courses for further training is reflected in the increase of participation rates across cohorts for training outside the firm. The narrowing of the gap in general education levels of women compared to men is also observable for participation in further training. Later birth cohorts of women have participation rates coming closer to the levels of participation of men.

Estimating Hazard Rate Models of Participation

For both theoretical and statistical reasons we estimate separate partial likelihood functions of the probability of participation in further education for women and men.[7] Table 2 shows the estimated coefficients and significance levels for men. Starting with model 1 in Table 2 we can confirm with a rudimentary multivariate model the expected cohort-specific acceleration of the transition into further education. Younger birth cohorts are more likely to participate in further education, as we expected, since the expansion of the education system as a whole during the 1960s offered more opportunities, more financial support, and easier access for younger cohorts.

With the increasing length of time spent in full-time education the probability of participating in further education increases.[8] This result supports the education accumulation hypothesis (Thurow, 1975), which stresses that the correlation between educational level and probability of further education participation strengthens the social and qualificational disadvantages arising in the first stage of education. However, assuming that higher educational levels run a higher risk of devaluation due to technological progress, higher participation in further education of the more educated might only keep their level of instruction up-to-date. A more rapid depreciation of the value of knowledge due to faster technological change will necessitate

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TABLE 1 *Distribution of participation in further education and training by cohorts*

Kind of training		Cohort 1929–31	Cohort 1939–41	Cohort 1949–51	Change column (1)–(3)
Training within the firm	T	2.8	1.4	2.3	−0.5
	M	3.9	2.0	3.2	−0.7
	F	0.7	0.6	1.3	+0.6
Training outside the firm	T	8.5	10.5	14.6	+6.1
	M	10.6	13.6	16.1	+5.6
	F	4.6	6.2	12.8	+8.2
No training	T	88.8	88.0	83.0	−5.0
	M	85.5	84.4	80.6	−4.9
	F	94.7	93.2	85.9	−8.8
TOTAL		100.0	100.0	100.0	
N		1236	1672	1413	
Participation rates		11.3	11.9	16.9	+5.6
N_M		802	978	774	
Participation rates$_M$		14.5	15.6	19.3	+4.8
N_F		434	694	639	
Participation rates$_F$		5.3	6.8	14.1	+8.8

T = Total, M = Male, F = Female.
Source: Data from German Life History Study (Max-Planck-Institut für Bildungsforschung, Berlin); own calculations.

re-training, or further training, earlier for the better educated.

Model 1 reports a negative and significant effect of the hourly wage rate at the beginning of the job episode for men when different levels of education and birth cohorts are controlled for. Higher earnings do not enhance participation in training. It is more plausible to conclude that men with low levels of earnings perceive these lower earnings to be due to a lack in general education and, therefore, seek to compensate for this lack of training through further education efforts. However, as models 2 to 4 in Table 2 show, once work experience and the duration of employment with the same employer is included in the model, the effect of hourly earnings is no longer significant. Similar results were obtained by Tuijnman (1989) with data from the Malmö study. As earnings are frequently linked to the duration of work experience (especially in the public sector and in big firms), the loss of significance for the earnings variable is not unexpected. It provides further evidence for the strength of the link in wage structures between labour-force experience in general and tenure with the same employer.[9]

The more general work experience or labour-force experience a person has acquired, the less likely he is to participate in further education. This is actually an alarming finding assuming the significance of this effect can be confirmed in subsequent models. It reveals the fact that the longer people are in the labour force the less likely they are to keep their knowledge up-to-date through further education. Due to the high correlation between age and duration of labour-force experience we can interpret a large part of this effect as increased immobility with age. This kind of under-investment in further education by people with substantial work experience could be one of the underlying factors of the early retirement schemes in many European countries.[10] This kind of market failure in further education (cf. Stern and Ritzen, 1991) may cause high social expenditure in the form of increased retirement payments in subsequent years.

Contrary to the negative effect of the duration of general work experience on

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TABLE 2 *Men's participation in further education and training: partial likelihood estimations of effects of independent variables on further education participation*

	Model 1	Model 2	Model 3	Model 4
Cohort 1939–41	0.3728***	0.2328	0.2355	0.2071
	(0.1250)	(0.1310)	(0.1310)	(0.1331)
Cohort 1949–51	1.0357***	0.7783***	0.7723***	0.6321***
	(0.1314)	(0.1486)	(0.1496)	(0.1897)
Education	0.1265***	0.1156***	0.0983***	0.1012***
	(0.0188)	(0.0190)	(0.0201)	(0.0212)
Hourly net wage	−0.1717**	−0.0446	−0.0658	−0.0708
	(0.0729)	(0.0818)	(0.0839)	(0.0843)
Labour-force experience		−0.0036***	−0.0034***	−0.0034**
		(0.0009)	(0.0009)	(0.0010)
Tenure with the same firm		0.0036**	0.0033**	0.0032*
		(0.0014)	(0.0014)	(0.0014)
Public sector			0.5321**	0.4888**
			(0.1977)	(0.1983)
Secondary segment job in large firms			0.1174	0.0905
Primary segment job			(0.2465)	(0.2465)
occupation-specific			0.3538	0.3199
			(0.1971)	(0.1971)
Primary segment job firm-specific			0.4847**	0.4471*
			(0.1984)	(0.1983)
Unemployment				0.0740
				(0.2965)
Voluntary unemployment/inactivity				−0.8928*
				(0.4124)
Labour Promotion Act (AFG-time				0.7240***
period 1969–74)				(0.1886)
Time period after 1974				0.1095
				(0.1826)
Number of episodes	2554	2554	2554	2554
Number of events	419	419	419	419
Chi-square value	109.72	122.28	131.05	156.48
Degrees of freedom	4	6	10	14
Log-likelihood	−2890.1387	−2881.0818	−2875.6244	−2865.6424

Note: β-coefficients, in brackets: standard error of coefficients.
Source: Data from German Life History Study (Max-Planck-Institut für Bildungsforschung, Berlin); own calculations.

participation, we find that a longer duration of employment with the same employer increases the probability of participating in further education. This result corresponds to the findings by Groot *et al.* (1990: 8), where work experience prior to the current job had no effect on on-the-job training, but tenure within the firm showed a U-shaped pattern for the probability of participation in training. Similarly, our results suggest that firms are more likely to offer participation in further education courses to employees who stayed with the firm for a longer period. Employees with a proven record of 'attachment to the firm' are considered to be less likely to leave the firm for another employer once they have participated, hence reducing the risk of poaching of the firm's investment. The firm might also be offering successful participants of a training course faster internal career

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advancement or higher wage growth (Becker, 1991). Following the signalling theory, the selection of a loyal employee for a training course is to be understood as a signal from the employer that the successful participant is very likely to be considered when job openings demanding a higher qualificational level or a more productive workplace become available. Employees with longer durations of employment with the same employer are, at the same time, most likely to be employees working in primary segment jobs.

Variables measuring the impact of labour-market segmentation in more detail are shown in models 3 and 4 in Table 2. Individuals with jobs in internal labour markets (highly skilled jobs in large firms) show the expected positive and significant effect in terms of increased participation in further education and training. Skilled workers in large firms are more likely to receive some form of training provided either internally or externally. Within the firm-specific labour-market segment further training seems to play an important role to ensure both employees and employers of their long-term attachment to continue this work relationship. Participation in further education ensures high productivity levels by employees to the firm as well as career advancement for employees in highly regulated internal careers.

These results confirm the hypothesis that it is more likely that further education operates to confirm existing lines of labour-market segmentation rather than making borders between labour-market segments more transparent.

In model 4 in Table 2 we added variables which indicate whether a person has been unemployed for 12 months prior to the current period of employment. Recoding of reasons provided by individuals for this unemployment we can differentiate those who have been made redundant and those who quit their previous job for other reasons. Prior loss of job does not show a significant positive effect, but more voluntary kinds of unemployment have a negative and significant effect on participation. These transition periods are most likely to be from one job straight into another, and indicate that people with good job and career prospects do not invest in education out of work.

The late 1960s and early 1970s were a period of broad consensus on the benefits of a widespread increase in educational levels and an equalization of educational attainments in West Germany. The Labour Promotion Act of 1969 reflects this societal consensus and offered substantial state assistance to help realize the educational aspirations of employees. In order to test whether the period after the introduction of the Labour Promotion Act has been particularly favourable for further education efforts, we introduced a period dummy variable. We find, as expected, a strong positive effect of this time period 1969–74 in facilitating participation in further education relative to previous years. Financial cuts to these state-subsidized programmes in 1975, following the first oil shock and limits on public expenditure, brought the increases in training participation to a halt (see Sauter *et al.*, 1984: 15). The further education boom, started by the Labour Promotion Act of 1969, appears to have responded to widely perceived deficiencies in education and skills by both employees and employers. At the same time this societal consensus was assisted by devoting correspondingly high amounts of resources.

However, due to the oil crisis and the cuts in the budgets of the training programmes the early years of the Labour Promotion Act seem to remain a rather unique example of a successful and widespread increase in the skill level and education of the workforce. The severe economic recession in 1993 and cuts to the state training programmes in East Germany show similar features to those of the participation in further training in 1975 in West Germany.

Participation of Women in Further Education

Table 3 reports partial likelihood estimates for the same sequence of models as in Table 2 but for the participation of women. Comparing the size of the cohort-specific effects of participation in further education, we find

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that later birth cohorts of women show even higher probabilities of participating in training after full-time education than men. This confirms the widely reported effect of the expansion of the whole education sector, which has narrowed differences in participation in general education (Blossfeld, 1989) and, as we have shown here, in participation in further education. Younger cohorts of women benefit the most from this expansion when compared with older cohorts of women and their male counterparts of the same birth cohort.

The size of the coefficient of education on women's participation is almost double the size of that estimated for men. This indicates that the education accumulation hypothesis is even more pronounced among women. As has been shown by Schömann, Hannan, and Blossfeld (1991) and Schömann (1994), inequality in returns to education has been more pronounced for women than for men. In this paper we find evidence in addition to these prior findings that there is also higher inequality between women in subsequent participation in further education. Similar results are reported by Groot, Hartog, and Oosterbeck (1990) although they did not estimate separate models for women and men.

Drawing on earlier results on women's wage profiles, it is no longer surprising that individual-level effects of earnings, work experience, and duration of employment with the current employer show no statistically significant effects on participation for the three cohorts of women, but labour-market segments do. Women who hold jobs which can be classified as being in an internal labour-market have significantly higher participation in further education. Similarly, though to a lesser extent, women in the occupation-specific segment also have greater opportunities for further training than those in the labour-market segment open to everybody in small or large firms. In particular the public sector offered many opportunities for women to train, re-train, or improve their skills (Becker, 1991).

For women we find no significant effects of variables indicating periods of unemployment or inactivity on the probability of participation in training courses. Even more surprising is the lack of significance of the best years of the Labour Promotion Act. Despite a contemporaneous push by the women's movement for emancipation the Labour Promotion Act of 1969 did not increase the participation of women in training courses either within or outside the firm. The fact that in even its early and most favourable years the Labour Promotion Act largely bypassed women calls for a decisive revision of the guidelines for programme participation.

Further Education Organized Outside the Firm

The estimates based on the split sample of men's participation in further education external to the firm are reported in Table 4. As in Table 2 we find strong cohort-specific effects and cumulative effects for the duration of education. The negative effect of general work experience, which we discussed earlier, is reiterated in the sub-sample of West German men. Taken together with the set of effects measuring labour-market segmentation, the evidence shows strong support for the thesis that just being in the labour market for a number of years reduces the inclination to acquire additional skills by means of seeking further training outside the firm. But working a long period for the same employer increases the probability of receiving training. Training outside the firm appears to be a particular feature of the occupation-specific labour-market segment and only for those who stayed with the same employer for a large proportion of their total labour-force participation. The occupation-specific labour market probably rewards longer tenure with opportunities for participation in further education outside the firm, which could serve individuals in providing them with better chances in the external labour market through a kind of external certification of their firm- or occupation-specific skills.

This result suggests an *ex post* certification of skills that have been learned by simply working on the job and possibly with specific equipment. Interestingly, male employees in the public sector also have a higher chance of

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TABLE 3 *Women's participation in further education and training: partial likelihood estimations of effects of independent variables on further education participation*

	Model 1	Model 2	Model 3	Model 4
Cohort 1939–41	0.5586***	0.5204	0.4641	0.4791
	(0.2696)	(0.2806)	(0.2805)	(0.2833)
Cohort 1949–51	1.3320***	1.2573***	1.1624***	1.1690***
	(0.2572)	(0.2902)	(0.2911)	(0.3208)
Education	0.2373***	0.2344***	0.1988***	0.2005***
	(0.0267)	(0.0276)	(0.0305)	(0.0347)
Hourly net wage	0.0938	0.1079	0.0034	0.0109
	(0.1159)	(0.1213)	(0.1238)	(0.1295)
Labour-force experience		−0.0007	−0.0003	−0.0004
		(0.0013)	(0.0014)	(0.0016)
Tenure with the same firm		0.0008	0.0003	0.0006
		(0.0041)	(0.0040)	(0.0041)
Public sector			1.0514***	0.9960***
			(0.3048)	(0.3090)
Secondary segment job in large firms			0.1940	0.1213
			(0.4150)	(0.4177)
Primary segment job occupation-specific			0.8485**	0.8020**
			(0.3021)	(0.3047)
Primary segment job firm-specific			1.0530**	0.9932***
			(0.3351)	(0.3358)
Married				0.9113***
				(0.3385)
Part-time work				−0.1895
				(0.2214)
Unemployment				0.3349
				(0.5989)
Voluntary unemployment/inactivity				0.0461
				(0.2444)
Labour Promotion Act (AFG time-period 1969–74)				0.1504
				(0.2932)
Time-period after 1974				0.0187
				(0.2776)
Number of episodes	1767	1767	1767	1767
Number of events	160	160	160	160
Chi-square value	220.28	220.59	228.57	233.55
Degrees of freedom	4	6	10	16
Log-likelihood	−975.6022	−975.4737	−966.6794	−964.6030

Note: β-coefficients, in brackets: standard error of coefficients.
Source: Data from German Life History Study (Max-Planck-Institut für Bildungsforschung, Berlin); own calculations.

participating in external further training, an effect that has been masked in the merged sample estimates of Table 2.

The two period effects included in model 4 of Table 4 show for the first time the positive effects of a socio-political consensus for increased training efforts generally and not just for initial education. In particular the years immediately after the adoption of the Labour Promotion Act between 1969 and the first oil crisis were marked by a historically rather unique constellation of political consensus, availability of sufficient financial resources to support this political decision, and individuals' conviction of the necessity of participating in further education, at least

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to make up for insufficient initial education. The last case applies especially to those who did not have the chance to stay in full-time education as long as they intended due to the circumstances of the immediate post-war years.

The late 1970s and early 1980s could no longer sustain the high costs of the training efforts incurred on public expenditures once the economic recession had started. In 1975/6 a new budget structure was passed by parliament (*Haushaltsstrukturgesetz* 1975/6), which introduced into the Labour Promotion Act a separation of necessary education (for the unemployed, or persons under immediate threat of becoming employed) and only useful further education. At the same time income support for participants was cut from 80 per cent of the current wage while in training to only 58 per cent of net wages.

Comparing results for the Labour Promotion Act in Tables 2, 4, and 6 we can derive an even more precise conclusion concerning its impact on participation in further education. The longitudinal micro-evidence suggests that the Labour Promotion Act only had a strong impact on male participants taking part in training courses organized, and mainly financed, outside the firm by the responsible government institutions.

Results on external training for women are reported in Table 5. Model 4 in this table includes variables measuring labour-market segments and the period effects and confirms the existence of labour-market segmentation in participation in further education. Further education reinforces labour-market segmentation rather than working against segmentation at entry into the labour market (Schömann, 1994; Schömann *et al.*, 1991; Becker, 1991). Either by design or in its implementation, the Labour Promotion Act led to only small effects on women's participation in training courses organized during this particular time period.

Internal Firm-Specific Further Education and Training

In this part of the analysis we focus on firm-specific training which is provided on the premises of the firm. Table 6 shows the partial-likelihood estimates of four models with the same structure of independent variables as the previous sections. Due to insufficient participation by women in internal training, we can only present results for men of the three birth cohorts. The extent of gender-specific differences in participation in internal training courses (female participation is only about one-quarter of male participation) is responsible for the lack of sufficient data to estimate a separate model for women. Despite equalization in participation in higher education and initial professional training, firms' internal training processes appear to be still very much reserved to male participants.

Only two effects in models of participation in internal training courses show significance. The longer a person's general labour-force participation or work experience, the lower is the probability of participating in internal training. This supports the investment rationale of firms when choosing among employees for participation. Holders of jobs in the firm-specific labour-market segment are more likely to receive further training, supporting our earlier interpretation in Table 2 that further education in the internal labour-market appears to have an important role in ensuring both partners of their long-term perspective concerning the work relationship. However, in order to learn more precisely how the selection procedure for internal training courses functions, a detailed analysis of specific cases at the level of firms or even plants is indicated.

Our analysis reveals that further training provided within firms is largely restricted to the primary segment, and more specifically to large firms requiring a highly skilled labour force (cf. Table 6). This finding corresponds to the result presented by Bahnmüller, Bispink, and Schmidt (1993), who analysed questionnaires sent to work councils and personnel managers in the federal state of Baden-Württemberg. The introduction of new technologies was found to be the main reason for further education efforts within firms and, secondly, only big firms with more

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TABLE 4 *Men's participation in further education and training outside firms: partial likelihood estimations of effects of independent variables on further education participation*

	Model 1	Model 2	Model 3	Model 4
Cohort 1939–41	0.5499***	0.4243**	0.4233***	0.4064***
	(0.1410)	(0.1480)	(0.14804)	(0.1507)
Cohort 1949–51	1.1875***	0.9576***	0.9452***	0.8418***
	(0.1495)	(0.1691)	(0.1701)	(0.2047)
Education	0.1431***	0.1334***	0.1143***	0.1205***
	(0.0203)	(0.0206)	(0.0217)	(0.0231)
Hourly net wage	−0.1561	−0.0453	−0.0540	−0.0634
	(0.0821)	(0.0918)	(0.0938)	(0.0944)
Labour-force experience		−0.0032***	−0.0030***	−0.0029**
		(0.0010)	(0.0010)	(0.0011)
Tenure with the same firm		0.0035**	0.0031*	0.0031*
		(0.0016)	(0.0015)	(0.0015)
Public sector			0.5066**	0.4629*
			(0.22057)	(0.2212)
Secondary segment job in large firms			−0.0024	−0.0261
			(0.2834)	(0.2834)
Primary segment job occupation-specific			0.4600*	0.4236*
			(0.2169)	(0.2170)
Primary segment job firm-specific			0.3809	0.3397
			(0.2233)	(0.2235)
Unemployment				0.2019
				(0.3110)
Voluntary unemployment/inactivity				−1.0857*
				(0.5042)
Labour Promotion Act (AFG time-period				0.7329***
				(0.2066)
Time-period after 1974				0.0423
1969–74)				(0.2005)
Number of episodes	2554	2554	2554	2554
Number of events	343	343	343	343
Chi-square value	115.19	123.30	129.83	152.33
Degrees of freedom	4	6	10	14
Log-likelihood	−2349.1805	−2343.1821	−2338.4956	−2328.9091

Note: β-coefficients, in brackets: standard error of coefficients.
Source: Data from German Life History Study (Max-Planck-Institut für Bildungsforschung, Berlin); own calculations.

than 500 employees had a manager who was solely dealing with questions concerning personnel management and issues of further education within the firm. An analysis of specific wage agreements at firm level and personnel management strategies could probably reveal more about the processes at work within firms and at the level of single plants (Tondorf, 1993).

SUMMARY OF RESULTS

During most of the post-war period, participation in further education and training has tended to increase differences in educational attainment of employees rather than narrow the gap between the highly educated and those with no or few educational credentials. The much hoped for

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TABLE 5 *Women's participation in further education and training outside firms: partial likelihood estimations of effects of independent variables on further education participation*

	Model 1	Model 2	Model 3	Model 4
Cohort 1939–41	0.5609*	0.5464	0.4963	0.5137
	(0.2870)	(0.2988)	(0.2985)	(0.3023)
Cohort 1949–51	1.2987***	1.2772***	1.1855***	1.2001***
	(0.2737)	(0.3088)	(0.3093)	(0.3440)
Education	0.2456***	0.2448***	0.2071***	0.2191***
	(0.0277)	(0.0286)	(0.0316)	(0.0361)
Hourly net wage	0.1002	0.1010	0.0080	0.0138
	(0.1222)	(0.1275)	(0.1296)	(0.1360)
Labour-force experience		−0.0003	−0.0001	−0.0002
		(0.0014)	(0.0014)	(0.0017)
Tenure with the same firm		0.0018	0.0006	0.0018
		(0.0041)	(0.0041)	(0.0041)
Public sector			0.9949**	0.9391**
			(0.3164)	(0.3208)
Secondary segment job in large firms			−0.0147	−0.0809
			(0.4559)	(0.4591)
Primary segment job occupation-specific			0.8192*	0.7608*
			(0.3128)	(0.3156)
Primary segment job firm-specific			0.8869*	0.8178*
			(0.3561)	(0.3598)
Married				1.0130*
				(0.4780)
Part-time work				−0.2172
				(0.2302)
Unemployment				−0.0082
				(0.7263)
Voluntary unemployment/inactivity				0.1413
				(0.2490)
Labour Promotion Act AFG (time-period 1969–74)				0.2731
				(0.2971)
Time-period after 1974				0.0092
				(0.2913)
Number of episodes	1767	1767	1767	1767
Number of events	145	145	145	145
Chi-square value	271.5	218.1	224.3	229.9
Degrees of freedom	4	6	10	16
Log-likelihood	−887.1445	−887.0449	−879.6526	−876.8662

Note: β-coefficients, in brackets: standard error of coefficients.
Source: Data from German Life History Study (Max-Planck-Institut für Bildungsforschung, Berlin); own calculations.

equalizing effect of increased opportunities to participate in further education did not stop the further polarization of educational qualifications over the life course.

While the duration of general work experience has a negative effect on participation, we find that a longer duration of employment with the same employer increases the probability of men's participation in further education. This result corresponds to the findings by Groot and colleagues (1990: 8), where work experience prior to the current job had no effect on the within-firm on-the-job training, but tenure

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TABLE 6 *Men's participation in further education and training within firms: partial likelihood estimations of effects of independent variables on further education participation*

Model-Nr. Variables	Model 1	Model 2	Model 3	Model 4
Cohort 1939–41	−0.3693	−0.5473	−0.5354	−0.5964
	(0.2904)	(0.3015)	(0.3014)	(0.3042)
Cohort 1949–51	0.4872	0.1311	0.1419	−0.1165
	(0.2845)	(0.3195)	(0.3234)	(0.3970)
Education	0.0365	0.0206	0.0119	0.0032
	(0.0511)	(0.0520)	(0.0543)	(0.0562)
Hourly net wage	−0.2189	−0.0277	−0.1135	−0.1072
	(0.1593)	(0.1815)	(0.1902)	(0.1894)
Labour-force experience		−0.0051**	−0.0052***	−0.0056**
		(0.0021)	(0.0021)	(0.0022)
Tenure with the same firm		0.0043	0.0041	0.0039
		(0.0032)	(0.0032)	(0.0032)
Public sector			0.6667	0.6222
			(0.4473)	(0.4483)
Secondary segment job in large firms			0.4879	0.4736
			(0.5102)	(0.5103)
Primary segment job occupation-specific			−0.4055	−0.4298
			(0.5122)	(0.5124)
Primary segment job firm-specific			0.9037*	0.8757*
			(0.4367)	(0.4366)
Unemployment				−0.7944
				(1.0116)
Voluntary unemployment/inactivity				−0.3866
				(0.7195)
Labour Promotion Act (AFG time-period 1969–74)				0.7039
				(0.4637)
Time-period after 1974				0.3729
				(0.4461)
Number of episodes	2554	2554	2554	2554
Number of events	76	76	76	76
Chi-square value	9.36	14.51	29.65	34.06
Degrees of freedom	4	6	10	14
Log-likelihood	−553.5512	−530.2682	−522.2178	−520.5520

Note: β-coefficients, in brackets: standard error of coefficients.
Source: Data from German Life History Study (Manx-Planck-Institut für Bildungsforschung, Berlin); own calculations.

within the firm showed a U-shaped pattern for the probability of participating in training. Similarly our results suggest that firms are more likely to offer participation in further education courses to male employees who stayed with the firm for a longer period. However, selection for training within the firm (see Table 6) is independent of tenure within the firm. Firm's decisions on participation in internal training remain quite unexplained by standard approaches to this phenomenon.

Following the interpretation of the effects of general education on the probability of participating in further education by Lynch (1992*a*) and Groot and colleagues (1990) our evidence supports the view that in West Germany schooling and off-the-job training can be considered to complement each other rather than being substitutes for one another,

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as was the case for the Netherlands (Groot *et al.*, 1990: 7). This finding is likely to be due to a different organization of the general education system, in which Germany incorporates a lot of firm-based training into its general education system at an early stage (the dual training system).

Participation in further education, and subsequent occupational careers and earnings trajectories, are determined to a large extent by cohort-specific effects, period effects, and labour-force experience or tenure within the firm. Whereas young and better qualified birth cohorts had easier access to further education, older employees seem to be either unwilling to participate, or no longer chosen by employers or programme administrators for training courses. Our analysis highlights once more the necessity of disentangling cohort, period, and age effects in analyses of components of occupational careers (Blossfeld, 1989). Accumulation of education and a gender-specific pattern of participation in further education allows us to conclude that Figure 1, showing further education actually enhancing inequality, is the most appropriate explanation of the role played by further education in West Germany between 1950 and 1983. Emphasis should also be placed on the participation of women in training programmes in order to avoid the discriminatory practice which has dominated further education and training in West Germany.

Evidence on men's participation in further education and training (Table 2) makes a strong case for a multi-level analysis of participation in further education, since not only individual-level variables need to be considered, but also other labour-market institutions as they have been shaped by the segmentation of the labour market. Additionally, the introduction of the Labour Promotion Act in 1969, and the generous financial incentives promoting participation in training activities, significantly increased participation by individuals. The process of participation in further education is best characterized by the multitude of actors involved and the difficulty of achieving a smooth interplay of sometimes divergent interests. Historically, the early years of the Labour Promotion Act (the time-period from 1969 until 1974) brought about the most favourable conditions for the participation of all the actors involved. A broad societal consensus about the need for further training prevented a stigmatization of participants as free-riders using public funds.

NOTES

1. A more explicit review of the literature from the perspective of an evaluation of labour-market policies can be found in Schmid and Schömann, 1993. This paper also addresses the issue of the macro-economic effects of government spending on labour-market policies. For a summary of evaluation studies for West Germany see Bellmann, 1990, and a critical assessment of evaluation efforts in Germany during the 1980s is provided by Kasparek and Koop (1991).
2. The time $s'–c$ is the period where a person might have no earnings from a job while in training or on a government programme.
3. The longitudinal analysis of patterns of wage growth (Schömann, 1992) has shown that even the highest initial investment in education would not ensure against slower wage growth at later stages of the life course. These empirical estimates included job episodes of a maximum duration of thirty years.
4. In tables of hazard-rate models *, **, and *** reflect the 10, 5, and 1% level of significance of β-coefficients.
5. These age-specific further education ratios cannot be compared directly with the age distributions of the official statistics or of the longitudinal data of the IAB (Brinkmann *et al.*, 1972). The age categories for further education are distorted in the studies because the respondents are asked about their participation in further education during the last two to five years. Therefore, the age distributions are computed only for the time of the interview and the exact point of time of further education participation is omitted (see Müller, 1979: 191–2). In such cross-sectional studies, both the number and the duration of participation in further education at a particular time interval is neglected. Such cross-sectional computations result in under-estimation of further educational ratios. Only by the separation of several time dimensions (cohort membership, labour-force experience) and the consideration of the duration of participation in further education, is it possible to compute exact age-specific further education ratios. In contrast to cross-sectional studies, the exact computation of these ratios with retrospective longitudinal data is more appropriate.
6. Alternatively, this could be interpreted as evidence that firms do not in fact train substantially more than they used to in West Germany, except that they seek and

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receive much more public attention for their training efforts. Extensive further training for employees in a firm could enhance the general image of a firm in the eyes of the public. Media coverage of such events saves costs and has a signalling effect.

7. Both graphical inspection and statistical tests suggested that the assumption of proportionality necessary for the partial-likelihood Cox model did not hold for the hazard rates of men and women. The relationship between the hazard rates of both sexes was not constant for the total duration until entry into further education.
8. For men, the β-coefficient is 0.1265. The exponential value of this coefficient is 1.1348. Subtracting the coefficient from one and multiplying the result by 100 yields the percentage value for which the rate of transition into further education increases if the variable 'education' increases for one year. For men, the hazard rate increases by 13% for each additional year spent in full-time education.
9. Similarly, these results do not lend support to the view that participation in further education could be considered as a kind of non-monetary fringe benefit offered by employers instead of higher wage growth. But a more precise measurement of this mechanism has to be deferred to the analysis of the impact of further education and training on wage growth.
10. For example, a person of the birth cohort of 1930 would be 50 years of age in 1980. Due to the low probability of participation in further education after more than 25 years of work experience early retirement in the 1990s becomes all the more likely when the person has passed 60 years of age.

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REFERENCES

Auer P. (1992): 'Further Education and Training for the Employed (FETE): European Diversity', Discussion Paper FS I 92–3, Wissenschaftszentrum Berlin für Sozialforschung.

—, Schmid G. (1993): 'Challenges and Possible Responses- Further Education and Training for the Employed in Europe', Discussion Paper FS I 93- 201, Wissenschaftzentrum Berlin für Sozialforschung.

Arrow K J. (1973): 'Higher Education as a Filter', *Journal of Public Economics*, 2: 193–216.

Bahnmüller R, Bispinck R, Schmidt W. (1993): 'Betriebliche Weiterbildung in der Metallindustrie: Zum Einfluß kollektiv—rechtlicher Arrangements', forthcoming in Semlinger K. *Betriebliche Modernisierung: Strukturwandel zwischen Personalentwicklung, Personalaustausch u. betrieblicher Fluktuation.*

Barnow B S. (1987): 'The Impact of CETA Programmes on Earnings: A Review of the Literature', *Journal of Human Resources*, 22: 157–93.

Bartel A. (1992): 'Productivity Gains from the Implementation of Employee Training Programs', NBER Working Paper No. 3893.

Becker G S. (Baethge 1975): *Human Capital*, New York and London: Columbia University Press.

Becker R. (1990): 'Arbeitsmärkte im öffentlichen Dienst und in der Privatwirtschaft', *Zeitschrift für Soziologie*, 19: 360–75.

— (1991): 'Berufliche Weiterbildung und Berufsverlauf. Eine Längsschnitt untersuchung von drei Geburtskohorten', *Mitteilungen aus der Arbeitsmarkt- und Berufsforschung*, 24: 351–64.

Bellmann L. (1990): 'Labour Market Policies in Germany: An Evaluation of ABM and Training Measures', in *Labour Market Policies in the UK and the FRG: An Evaluation*, Report commissioned by the Anglo-German Foundation.

Blossfeld H-P. (1989): *Kohortendifferenzierung und Karriereprozeß*, Frankfurt am Main: Campus.

— and Mayer K U. (1989): 'Labour Market Segmentation in the Federal Republic of Germany: An Empirical Study of Segmentation Theories from a Life-Course Perspective', *European Sociological Review*, 4: 123–40.

—, Hamerle A, Mayer K U. (1986): *Ereignisanalyse*, Frankfurt am Main: Campus.

Björklund A. (1989): 'Evaluations of Training Programmes: Experiences and Proposals for Future Research', Discussion Papers FS 189-13, Wissenschaftszentrum Berlin für Sozialforschung.

Breen R. (1992): 'Job Changing and Job Loss in the Irish Youth Labour Market: A Test of a General Model', *European Sociological Review*, 8: 113–25.

Brinkmann C, Gottwald K, Schuster L. (1972): 'Die berufliche Fortbildung männlicher Erwerbspersonen, Teil I', *Mitteilungen aus der Arbeitsmarkt- und Berufsforschung*, 5: 1–30.

Brown J N. (1989): 'Why do Wages Increase with Tenure? On-the-job Training and Life-Cycle Wage Growth Observed Within Firms', *American Economic Review*, 79: 971–91.

Commission of the European Communities DG V (1992): 'Employment in Europe', Office for Official Publications of the European Communities, Luxembourg.

Dadzio W. (1980): 'Berufliche Eingliederung nach der Umschulung', *Mitteilungen aus der Arbeitsmarkt- und Berufsforschung*, 4: 2–6.

Dobischat R, Husemann R. (1992): 'Berufliche Weiterbildung im Spannungsfeld betrieblicher und außerbetrieblicher Strukturen in den neuen Ländern: Beschleunigte Segmentationstendenzen in den Beschäftigungschancen?', *WSI-Mitteilungen*, 24: 348–55.

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Doeringer P B, Piore M J. (1971): *Internal Labor Markets and Manpower Analysis*, Lexington.

Groot W, Hartog J, Oosterbeck H. (1990): 'Training Choice and Earnings', Research Memorandum 9027, Amsterdam University.

Hannan M T, Schömann K, Blossfeld H P. (1990): 'Sex and Sector Differences in the Dynamics of Wage Growth in the FRG', *American Sociological Review*, 55: 694–713.

Kasparek P, Koop P. (1991): 'Zur Wirksamkeit von Fortbildungs- und Umschulungsmaßnahmen', *Mitteilungen aus der Arbeitsmarkt- und Berufsforschung*, 24: 317–32.

Kemp T. (1976): 'Was ist Weiterbildung?', *Berufsbildung in Wissenschaft und Praxis*, 1: 2–4.

Kern E. (1976): 'Fort- und Weiterbildung', in Bierfelder W. (ed.), *Handwörterbuch des öffentlichen Dienstes*, Berlin: Erich Schmidt Verlag: 703–11.

Kochan T, Osterman P. (1991): *Human Resource Development and Training: Is There Too Little in the U.S.?* forthcoming from Harvard Business School Press.

Korpi T. (1992): 'Employment Stability following Unemployment: Manpower Programmes, Turnover and Recurrent Unemployment', paper presented at the Conference of the European Association of Labour Economists, Coventry.

Kuwan H. (1989): *Berichtssystem Weiterbildungsverhalten 1988*, Bonn: BMBW.

Lalonde R J. (1986): 'Evaluating the Econometric Evaluations of Training Programmes with Experimental Data', *American Economic Review*, 76: 606–20.

Lutz B, Sengenberger W. (1974): Arbeitsmarktstrukturen und öffentliche Arbeitspolitik, Göttingen: Schwartz.

Lynch L M. (1992*a*): 'Private-Sector Training and the Earnings of Young Workers', *American Economic Review*, 82: 299–312.

— (1992*b*): 'Differential Effects of Post-School Training on Early Career Mobility', NBER Working Paper No. 4034.

Malcomson J. (1984): 'Work Incentives, Hierarchy and Internal Labor Markets', *Journal of Political Economy*, 92: 486–507.

Mayer K U, Brückner E. (1989): 'Lebensverläufe und Wohlfahrtsentwicklung. Materialien aus der Bildungsforschung', Nr. 35, Max-Planck-Institut für Bildungsforschung, Berlin.

Mincer J. (1974): *Schooling, Experience, and Earnings*, New York: Columbia University Press.

Müller W. (1979): 'Schulbildung und Weiterbildung als soziologische Hintergrundsvariablen', in Pappi F U (ed.), *Sozialstrukturanalyse mit Umfragedaten*, Königstein/Ts.: Athenäum: 169–206.

Osterman P, Batt R. (1992): 'Employer Centered Training for International Competitiveness: Lessons From State Programs', forthcoming in: *Journal of Policy Analysis and Management*.

Polachek S. (1981): 'Occupational Self-Selection: A Human Capital Approach to Sex Differences in Occupational Structure', *Review of Economics and Statistics*, 63: 60–9.

Sauter E, *et al.* (1984): 'Berufliche Weiterbildung und Arbeitslosigkeit', Bundesinstitut für Berufsbildung, Materialien und statistische Analysen zur beruflichen Bildung Nr. 47.

Schmid G. (1992): 'Flexible Koordination: Instrumentarium erfolgreicher Beschäftigungspolitik aus internationaler Perspektive', *Mitteilungen aus der Arbeitsmarkt- und Berufsforschung*, 3: 232–51.

—, Schömann K. (1994) 'Institutional Choice and Flexible Coordination: A Socio-Economic Evaluation of Labour Market Policy in Europe', in Schmid G, *Labor Market Institutions in Europe*, New York: Sharpe: 9–58.

Schömann K. (1994): The Dynamics of Labor Earnings over the Life Course—A Comparative and Longitudinal Analysis of Germany and Poland, Max-Planck-Institut für Bildungsforschung (ed.) Berlin: edition sigma.

—, Hannan M T, Blossfeld H P. (1991): 'Die Bedeutung von Bildung und Arbeitsmarktsegmenten für die Arbeitseinkommen von Frauen und Männern', in: Mayer, Allmendinger, Huinink, *Vom Regen in die Traufe: Frauen zwischen Beruf und Familie*, Frankfurt/New York: Campus: 163–84.

Stern D, Ritzen J M M. (1991) (eds.): *Market Failure in Training?* New Economic Analysis and Evidence on Training of Adult Employees, New York/Berlin/Heidelberg: Springer Verlag.

Thurow L. (1975): *Generating Inequality*, New York: Academic Press.

Tondorf K. (1993): 'Interne Flexibilisierung und neue Entlohnungsmuster', in Semlinger K. *Betriebliche Modernisieuring- Strukturwandel zwischen Personalentwicklung, Personalaustausch u. betrieblicher Fluktuation.*

Tuijnman A. (1989): *Recurrent Education, Earnings, and Well-being. A Fifty-Year Longitudinal Study of a Cohort of Swedish Men*, Stockholm: Almqvist and Wiksell.

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