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PERFORMANCE PAY, TRAINING AND LABOR MOBILITY

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Performance pay, training and labor mobility

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Abstract

Market imperfections may cause firms and workers to under-invest in specific training. This paper shows that profit sharing may be a suitable instrument to enhance specific training investments, either by enhancing wage flexibility or by increasing the returns to training. As a result, profit sharing not only increases productivity by means of an effort effect, but also by increased training investments. Furthermore, the results suggest that older workers' employability can be improved if a profit-related remuneration is paid.

JEL codes: M52, M53, J24, J62.

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1 Introduction

A high-quality employment relationship is of great importance for both workers and firms. Therefore, both have an incentive to invest in the productivity of the match. Investing in training is an important instrument for increasing workers' productivity and hence the quality of the match. Training can be defined as either general or specific, according to Becker (1964), where general training is productive in other matches as well (and hence the costs and returns are borne by the worker) while specific training is only productive with the current employer (and hence is paid for by the firm). In a perfectly competitive world without any frictions, the distinction between general and specific training is economically meaningful, and investment in both types of training is efficient. However, capital market imperfections, labor market imperfections and information problems may cause under-investment in training (see Leuven (2005) for an overview). This paper discusses two sources of market imperfections that may cause low investment levels in specific training.[1] One source is the presence of asymmetric information within the employment relationship. For example, when effort levels are difficult to monitor for the employer, worker shirking may result, where workers choose to exert less effort than is optimal from the employers' point of view and hence productivity is lower. This lower productivity, however, may signal a low rate of return to training for employers deciding on whether or not to invest in specific training. Since the potential rate of return is higher than the signalled rate, specific training investments may be lower than in the absence of imperfect information. Second, low levels of specific training may arise due to wage rigidities. When wages fail to adjust to the business cycle, worker separations are necessary as an adjustment mechanism, where firms may need to lay off more workers in an economic downturn, whereas workers may prefer to quit more often during an economic expansion. This mobility reduces expected tenure and hence the expected payoff period for specific training investments. As a result, low levels of specific training investments may arise. To the extent that trained skills

[1]The more recent training literature illustrates that in a situation of imperfect markets the distinction between general and specific training may not be that clear-cut (Stevens (1996, 1999)) and firms may actually find it profitable to invest in general training when they have oligopsonistic wage-setting power (e.g. Acemoglu and Pischke (1998, 1999a)). This paper focuses on training which has a firm-specific character as this is most likely to improve the quality of the current worker-firm match.

are (partly) transferable to other employers and imperfect competition in the labor market creates external benefits of training for other firms, the low training levels in the worker-firm match may aggravate under-investment in training at the economy-wide level (e.g. Acemoglu and Pischke (1998, 1999a), Stevens (1996, 1999)).

This paper investigates whether a profit-related pay scheme can be used to increase specific training investments. First, profit sharing may increase the returns to training. Paying a profit-related remuneration provides an effort incentive to the worker. When worker productivity increases, employers may find it more profitable to invest in training as the returns to training may be higher. Second, profit sharing may affect worker mobility by enhancing wage flexibility. When part of the remuneration is linked to the performance of the firm, labor costs adjust to economic circumstances and hence the number of separations may reduce. For example, in recessions the firms' labor costs are automatically reduced, thereby reducing the need to layoff workers. Similarly, wages rise automatically when the economic situation improves, thereby reducing the workers' quit propensity.[2] As a result, expected tenure may increase which extends the expected payoff period of training investments and thereby may eventually provide an incentive to invest (more) in specific training.[3] Consequently, profit sharing may augment specific training investments by increasing both the returns to training and the total payoff period. Because of this, paying a profit-related remuneration may boost labor productivity both via an effort effect and via a training effect.

Using data for the UK over the period 1998-2003, this study investigates the relationship between profit sharing and specific training and the effects on worker productivity, measured by workers' wages. Though there is a huge literature on the effects of profit sharing and training on wages, these issues are discussed more or less separately in previous literature.[4]

[2]Note that this argument is only partially valid as it implicitly assumes that the individual firm faces the same shocks as the market as a whole. In a situation where the individual firm faces a positive economic shock while the economy is in recession, the positive effects on quits may be even larger. In the situation where the firm faces a negative economic shock while the economy is booming, the net effect on mobility may be ambiguous due to less layoffs and more quits.

[3]Previously, firing and exit costs have been suggested as a means to reduce worker separations and to increase training efficiency (Adnett et al. (2004)). However, this came at a cost of less efficiency in separations. Introducing profit sharing is not likely to generate such a trade-off between training and separation efficiency.

[4]An important exception is Azfar and Danninger (2001), who argue that profit sharing positively affects wage flexibility, thereby reducing separations and increasing training investments.

First, this study investigates the effect of a profit-related payment on the specific training incidence. Then, in a second step, a wage equation is estimated to investigate the effects of specific training and profit sharing on worker productivity. The results indicate that profit sharing has a positive effect on training levels, thereby increasing workers' wages by means of greater worker effort and by increased training investments.[5] Furthermore, in a third step, the effect of profit sharing and training on workers' employability is investigated by looking at subsequent worker mobility. In addition, this paper pays attention to the effects for workers of different age groups, where a distinction is made between young, prime-age and older workers. The training incidence for older workers is far below that of middle-aged workers in almost all European countries (Arulampalam et al. (2004), OECD (2006)). This may be due to a high labor market exit probability of older workers compared to younger workers. When workers are expected to retire in the near future, the payoff period of training investments is relatively short and hence the incentives to invest in training are rather low. However, a lack of training events together with the depreciation of skills due to technological progress may create a gap between wages and productivity for older workers (Dostie (2006)). This causes older workers often to be characterized as 'expensive labor' which has a negative effect on their employability. As a result, a job separation for older workers is more likely to result in a labor market exit rather than in the take up of a new job. For young workers the situation is quite different. Even if they were to experience lower training investments due to being very mobile, their current skills are more up-to-date. As a result, young workers are more able to find new employment if job loss occurs. The situation of older workers may be improved if they are being paid on a profit-related basis. First, this may elicit a higher effort level, thereby increasing worker productivity. As a result, the wage-productivity gap may be reduced. Second, profit sharing may increase wage flexibility, thereby reducing the layoff risk. Higher productivity and a lower expected separation probability may increase the incentives to invest in training.[6] This paper therefore

[5] Azfar and Danninger (2001) only found indirect evidence for a relationship between profit sharing and wage growth through skill accumulation, possibly because their analyses did not control for unobserved heterogeneity and different types of training (e.g. training with current employer versus training with previous employers).

[6] Obviously, profit sharing may also have these positive effects on training for young workers, especially if it can improve their job security in times of cyclical change. However, an increase in training is especially desirable among older workers given the low job-finding rates for this group and the associated negative consequences on older workers' labor market participation.

investigates whether profit sharing can be effective in improving older workers' employability and thereby labor market participation of older workers.

The structure of the paper is as follows. In section 2 a brief overview of the previous literature is given. Section 3 describes the data and presents some stylized facts. In section 4 the results of the empirical analysis are presented. Finally, section 5 provides a conclusion.

2 Previous literature

The quality of the employment relationship is of joint interest to both the worker and the firm, because the surplus of the match is shared between the worker and the firm (Gielen and van Ours (2006b)). Additionally, the costs associated with a separation provide an incentive for both the worker and the firm to invest in the productivity of the current match. Specific training is found to be a good instrument for increasing workers' productivity. Because productivity information is mostly not available in existing datasets, a natural way to gauge the effectiveness of training is through earned wages, as increased productivity should be compensated with higher earnings. Several studies have found positive effects of specific training on wages (e.g. Lynch (1992), Parent (1999), Frazis and Spletzer (2005)). The wage effect of one additional specific training event varies between 1 and 4 percent for training with the current employer and between 2 and 5 percent for previous employer training (Loewenstein and Spletzer (1998) using US data; Booth and Bryan (2005) using UK data). The duration of the training is taken into account by Loewenstein and Spletzer (1999) who find that wages increase by about 3.5 percent for the mean positive training of 2.2 weeks. Frazis and Loewenstein (2005) find that wages increase by about 5 percent for the median positive training of 60 hours.[7] Employers are only willing to pay for specific training if they can also reap (part of) the benefits of the training during a given period. As a result, training is more likely to be provided to workers

[7]The result of Frazis and Loewenstein (2005) imply an annualized return in the range of 150-180 percent. Note that the returns to training are relatively high compared to the returns to schooling, which are about 10 percent (Card (1999)). Frazis and Loewenstein (2005) investigate that these relatively high returns to training can be explained by promotions, direct costs of training, and heterogeneity in wage growth. In addition, heterogeneity in the returns to training can explain the high returns to training. Hence, the estimated rates of return should be regarded as the return of training to the trained, and therefore are likely to be greater than the returns that could have been realized by workers who did not receive training.

who are less likely to change jobs (Loewenstein and Spletzer (1997)). For workers with a high separation probability, firms may need an alternative instrument to boost productivity. One such instrument is profit sharing. Data for different countries have shown that if workers are being paid a profit-related pay productivity increases by 2-6 percent (Ewing (1996); Cahuc and Dormont (1997); Booth and Frank (1999); see Prendergast (1999) for an overview). Even though profit sharing can be applied to stimulate effort on the part of all workers, individual workers' productivity is less targeted than with individual training and free-riding is a potential risk. Hence, the choice for training versus profit sharing as a means of increasing productivity may depend on (unobserved) worker characteristics.

Most studies consider profit sharing and training as two distinct issues. However, there might be a direct relation between the two. Profit-related pay provides an effort incentive. If productivity increases, the returns to training – and hence training investments – increase. Furthermore, when part of the remuneration is linked to the performance of the firm, labor costs automatically adjust to economic circumstances and the number of separations may thereby be reduced. As a result, profit sharing increases expected tenure which may provide an incentive to increase specific training investments.[8] One important exception to the literature is Azfar and Danninger (2001) who investigate the direct effect of profit sharing on the training incidence and the number of weeks of training. Using NLSY data, they find strong evidence for profit sharing reducing layoffs and weak evidence for it reducing worker quits. Furthermore, profit sharing does not affect the training incidence, but is found to have a positive significant effect on the number of weeks of company training.[9] Parent (2004) also concludes that profit sharing increases the acquisition of skills. This paper pays more attention to the relationship between profit sharing and training.

Investments in specific training can improve the employability of the worker. Especially for older workers, specific training is important as they are often characterized as 'expensive' labor due to a gap between wages and productivity. Dostie (2006) shows that for Canadian men

[8]Initially, introducing profit sharing may increase worker separations, due to the self-selection of workers across different firms (Gielen et al. (2006)).

[9]However, as their analyses do not control for worker and match-specific fixed effects, the results may be driven by worker selection if workers who are likely to invest in training sort into jobs which pay a profit-related wage.

aged 55 and above productivity is lower than their wage. This causes older workers to be more subject to being laid off. Furthermore, as older workers come near to leaving the labor market because they are near to retirement, training investments may not pay off. Sanders and De Grip (2004) use Dutch data to show that firm-internal employability is improved within two years after participation in training. However, no effect is found on external employability (i.e. between-employer job changes). Evidence of a direct relationship between profit sharing and training may suggest that profit sharing may have a role in improving employability of workers as well. This study investigates this relationship in more detail.

3 Data and stylized facts

3.1 Data

The analysis in this paper is based on information from the British Household Panel Survey (BHPS) for the period 1998-2003.[10] The BHPS collects data annually from a representative sample of approximately 16000 individuals from 9000 households. The dataset contains extensive information on both the individual and the household level, such as individual and spousal actual working hours, labor market position and transitions, individual and household income, and other job-related characteristics. The analyses are restricted to male workers between the ages 16 and 64 in paid employment. Women are excluded from the sample as they are more likely to have career interruptions which reduce the gains from training.

The dataset provides information on the incidence of profit sharing, since workers are asked whether or not they have received a profit sharing payment in the previous 12 months. Furthermore, detailed information on training is present in the data. Respondents are asked how many training schemes they started in the previous year. For the longest three training events (or all if the total number of training events did not exceed three) detailed information on the purpose of the training was collected (for more information see Appendix 5.A). Specific training is defined as having received training which served to increase or improve the skills in the current job. However, according to the recent training literature, a large share of all specific

[10]Unless otherwise indicated, the figures and tables in this paper are based on the BHPS data.

training is reported to be partly general as it also serves to develop general skills.[11] This study focuses on training with a specific character (which may be partly general as well) as the main aim is to investigate the direct effects on productivity and employability.

In the analysis, a distinction is made between young, prime-age and older workers to see how training investments differ across the separate age groups and how these affect workers' employability. Young workers are defined as being 29 years old or younger; prime-age workers are defined as being between 30 and 49 years old; all males aged between 50 and 64 are defined as older workers.

3.2 Stylized facts

Table 1 presents some descriptive statistics for the different age groups. As can be seen from the table, older workers invest much less in (specific) training than young and prime-age workers. However, once it is optimal for older workers to invest in specific training, the number of training events is not less than for the average worker in the workforce. With respect to the type of pay, it appears that young and older workers are less likely to receive a profit-related payment than prime-age workers. Hourly wages are also lower for these two groups. Finally, the table indicates that the different age groups are quite distinct in their mobility patterns. In general, young workers are highly mobile, and mobility decreases with age. This is especially due to mobility to other employment (such as a job change or a transition to self-employment). Separations to inactivity make up a relatively large share of older workers' mobility. Though this is to a large extent due to retirement transitions, together with the relatively low proportion of job-to-job transitions, it suggests that the employability of older workers is relatively poor compared to that of young and prime-age workers.

Table 2 provides information on the cross-relation between profit sharing and specific training. It appears that both profit sharing and training are associated with a higher wage. Profit sharing is not only associated with higher average wages, but also with a larger variance in the wage. This may suggest that profit sharing may enhance wage flexibility. Also training is

[11] About 67 percent of all training events is neither completely general nor completely specific. Of all specific training events, 88 percent also served general purposes.

associated with a higher variance in the wage (though to a lesser extent than profit sharing). This may be due to differences in rent extraction by firms after investing in training. Furthermore, the table illustrates that workers on profit sharing are more likely to receive training (28 percent) than workers who do not receive a profit-related payment (22 percent). This may be due to a positive effect of profit sharing on expected tenure or on the immediate returns to training. However, this evidence is only tentative as other worker characteristics are not controlled for here. Note also that a large proportion of the labor force receives neither profit sharing nor training.

Figure 1 illustrates how the incidence of profit sharing and specific training relate to worker mobility. Workers with profit sharing separate less often from their current employer than workers without. This holds true for both separations to other employment and for separations to inactivity. Training is also associated with lower rates of both types of separations, especially for young and older workers. So, the figure suggests that profit sharing and training may improve the quality, and hence stability, of the worker-firm match.[12]

4 Empirical analysis

This section investigates the relation between profit sharing, specific training and worker mobility. Section 4.1 determines the direct effect of profit sharing on the training incidence. In section 4.2 the effects on worker productivity are estimated. In the analysis, a distinction is made between two effects of profit sharing on wages: the effort and the training effect. Finally, section 4.3 investigates how profit sharing and training affect employability, by looking at worker separations. In each section, fixed effects are included to account for unobserved worker characteristics.[13]

[12]Of course, this result may also be due to reversed causality where low mobile workers sort into jobs that provide profit sharing or training, as the figure does not control for unobserved characteristics.

[13]All analyses in this study include all sectors. Excluding the public sector has no effect on the results. Furthermore, when the analyses are restricted to specific training which is (at least partly) paid for by the employer, the results remain more or less unchanged.

4.1 Training estimation

To investigate whether profit sharing has a positive effect on specific training investments, a logit model is estimated for whether or not some worker i with employer j has started a specific training course in the year preceding time t (which is reported at survey date t). The fixed effects specification allows for individual worker specific effects (α^T):

$$P(T_{ijt} = 1) = \Lambda(\beta^T X_{ijt} + \gamma^T PS_{ijt} + \alpha_i^T) \tag{1}$$

where P indicates the probability that someone acquired training (T), Λ is an indicator for the logistic cumulative distribution function, X is a vector of observable characteristics, and PS is a dummy for profit sharing. The parameters are estimated using Chamberlain's conditional likelihood method. The results can be found in Table 3, where the second column presents the results of the fixed effects specification.[14] From panel A it appears that education level is a main determinant of training. Higher educated workers have a 15 percentage points higher training probability than low-educated or non-educated workers.[15] Since the payoff of specific training investments increases with expected tenure and the number of hours worked, temporary workers are less likely to receive training, while full-time working males are more likely to invest in training.[16]

Furthermore, the results indicate that profit sharing positively affects the training incidence. Note however that a large share of the results can be explained by unobserved heterogeneity. After correcting for the fact that workers who are likely to invest in training may sort into firms that pay a profit-related remuneration (i.e. selectivity effects), the results suggest that profit sharing increases the probability of training by about 1 percentage point. When age-specific effects are introduced (panel B), it appears that especially young and older workers benefit

[14] Marginal effects are presented in square brackets and evaluated at the mean of each of the covariates. In order to be able to calculate marginal effects for the fixed effects logit, the fixed effects were assumed to equal zero.

[15] Note that the effect of education in the fixed effects specification can be identified due to changes in education level among mainly younger workers.

[16] Potential endogeneity of the temporary work dummy and the number of working hours is not taken into account. It seems more likely that people choose to work a certain number of hours in a permanent or temporary job and then investigate whether training would be possible. Therefore, the temporary job dummy and the number of working hours are not instrumented.

from receiving a profit-related payment.[17] This may be due to the effects of profit sharing on wage flexibility, since young and older workers often bear the burden of cyclical fluctuations in terms of excess separations (see for example Gielen and van Ours (2006a)). After controlling for unobserved characteristics, the positive effect on training for prime-age workers disappears. Apparently, selectivity effects are mostly present among prime-age workers. The probability of receiving training for older workers increases by 2.7 percentage points if they are paid a profit-related wage, which is significantly higher than for prime-age workers. This suggests that paying a profit-related wage can be effective in increasing training investments, and hence improving the labor market position, of older workers.

4.2 Wage estimation

This section investigates how profit sharing and specific training affect workers' productivity. Unfortunately, there is no information on worker productivity available in the dataset. Therefore, the effectiveness of training is measured through earned wages, as increased productivity should be compensated with higher earnings.[18] The following wage equation is estimated:[19]

$$w_{ijt} = \beta^w Z_{ijt} + \gamma^w PS_{ijt} + \delta_1^w T_{ijt}^c + \delta_2^w T_{ij}^p + \alpha_i^w + \nu_{ij}^w + \varepsilon_{ijt} \tag{2}$$

where w is the log hourly wage, Z is a vector of observable characteristics, and PS is a dummy for profit sharing. Furthermore, T^c is an indicator for specific training with the current employer

[17] Note that the inclusion of age-specific effects only marginally improves the model fit. Furthermore, one may argue that the use of age classes is not appropriate as some individuals may change from one class to an older age class during the sample period. However, in this sample only 8 percent of young workers (2.6 percent of the total sample) is defined as prime-age later in the sample period, and only 3 percent of prime-age workers (1.7 percent of the total sample) reaches the age of 50 during the sample period.

[18] Note that wages may be an imperfect measure of productivity, especially for old workers. Furthermore, Dearden et al. (2006) illustrate that the productivity gains from training in an analysis using wage information provide a lower bound on the actual training effect, since some share of the productivity gain may accrue to the employer rather than to the worker.

[19] Note that equations (1) and (2) can be considered a recursive system, as equation (2) includes the endogenous variable training on the right-hand side. However, the residuals of each equation are assumed to be independent due to the inclusion of a wide range of observable characteristics and the individual worker fixed effects. As a result, equation-by-equation estimation yields consistent estimates (Maddala and Lee (1976)). In particular, if the presence of time-varying unobserved characteristics were to violate the assumption of independent error terms, the model parameters are identified in equation-by-equation estimating due to the appearance of some exogenous variables in one equation but not in the other.

since the start of the employment relationship. In order to control for transferability of skills in the analysis, an indicator for training investments with previous employers (T^p) is also included (see also Booth and Bryan (2005)).[20] The inclusion of an individual worker-fixed effect (α^w) corrects for an ability bias in the returns to training which may arise if, for example, training costs are lower for high-ability workers and therefore training investments will be higher for more able workers. Additionally, one needs to correct for job-fixed effects (ν_{ij}^w), as potential estimation biases in the returns to training may remain due to non-random job mobility. Since workers who have invested a lot in training are willing to change jobs only if the wage gain is sufficiently large, previously accumulated training is correlated with the increase in job quality when a worker quits his or her job.[21] The job effect is approximated by a job-specific effect which is the same across individuals (ν_j^w). This job effect measures the average wage effect of a job change. It is modelled by introducing 5 dummy variables each indicating a new job; the reference group is the first job observed in the sample period.[22] That is, the first dummy has the value 1 throughout the duration of the second job; the second dummy equals 1 for the duration of the third job, etc. Hence, the wage gain of the first job change is assumed to be equal for all individuals, as is the gain of each of the following job changes. This approach follows Loewenstein and Spletzer (1998) and Booth and Bryan (2005, 2007).[23] Despite the inclusion of ν_j^w in the model, a bias may potentially still exist if workers who invest in training more than the average worker also receive higher-than-average returns to a job change. As a result, the returns to tenure should be interpreted with caution. Two separate specifications are estimated. The first specification uses dummy variables for the incidence of current and previous employer training; in the second specification, the accumulated number of training events is used for T^c and T^p.

[20] Since the training investments before 1998 cannot be identified, T^p represents all training with previous employers accumulated from the start of the sample. The omitted training history before the start of the sample is assumed to be captured by the individual worker fixed effect.

[21] For a more detailed discussion of the potential bias, see Loewenstein and Spletzer (1998) and Booth and Bryan (2007).

[22] Since the sample contains only 6 (annual) waves, a maximum of 5 new jobs can be observed.

[23] A test for the overall model fit suggests that this specification is preferred over a specification with individual job-fixed effects (ν_{ij}^w). Also note that the returns to training with previous employers could not be identified in a model with individual job-specific effects (ν_{ij}^w).

Panel A of Table 4 presents the estimation results of the baseline model. The results suggest that both profit sharing and training positively affect workers' wages. Along with the findings from Table 3, this suggests that profit sharing increases wages not only by eliciting larger worker effort, but also through skill accumulation. Note that training with the current employer is rewarded more than training with previous employers.[24] This may be due to the fact that specific training is only partially transferable across employers, which was also found previously for the US (Loewenstein and Spletzer (1998, 1999)) and Germany (Gathmann and Schönberg (2006)). Alternatively, it can be explained by an information asymmetry, where the training firm is better able to value the trained skills than other firms (Acemoglu and Pischke (1998)). Finally, the returns to training with previous employers may be rewarded less as these skills may have already started to become obsolete. The results in the second column indicate that each additional training with the current employer increases the wage by about 1.5 percent. Profit sharing has a slightly higher effect on wages. Workers who receive a profit-related payment earn 2.6 percent higher wages, *ceteris paribus*.[25]

Current training may not immediately increase wages as training participation reduces time spent on work. As a result, training may lead to a higher wage especially after the training is completed. Panel B of Table 4 presents some sensitivity results, where a distinction is made between current training (T) and previously accumulated training ($T^{c'}$) with the current employer.[26] The results illustrate that training indeed pays off in terms of higher wages especially after one year. There therefore seems to be a small lag in the returns to training.

The finding that both training and profit sharing have a positive effect on the wage, in addition to the positive effect of profit sharing on training investments (Table 3), may give rise to a bias in estimating the effort effect. That is, profit sharing may not only have a direct effect on wages via increased effort (i.e. effort effect), but also an indirect effect via increased

[24]Booth and Bryan (2005) find that for the period 1998-2000 the returns to training with previous employers in the UK exceed the returns to training with the current employer. However, this difference disappears when the sample period is extended to 1998-2003. In the first column the estimated coefficients for T^c and T^p are not significantly different; in the second column the returns to previous training with the current employer are significantly larger than the returns to training with previous employers.

[25]A similar result has been found for the US by Azfar and Danninger (2001), who show that profit sharing added 3 percent to annual wage growth, while training had a slightly smaller but insignificant effect.

[26]Note that the model fit is only significantly improved for the model using training incidence (F statistic = 12.3); not for the model using the amount of training (F-statistic = 1.3).

returns to training (i.e. training effect). When profit sharing increases training investments due to increased returns to training, the effort effect of profit sharing will be overestimated when the effect on training returns is not taken into account. As part of a sensitivity analysis panel C presents estimation results where the effect on the returns to training is controlled for by including an interaction term between profit sharing and training.[27] The results suggest that the effort effect of profit sharing is indeed lower than in the previous specifications. However, this is not due to an increase in returns to current training, but to larger returns to training with previous employers.[28] This may be due to the presence of asymmetric information with respect to the quality of previous training. Employers may find it difficult to value the quality of skills obtained in training with previous employers, therefore these skills may be less rewarded than recently acquired skills (as was shown in Panel A). However, this implies that there exist external benefits of training for other firms, which may cause the level of specific training investments to be sub-optimally low. Profit sharing enables workers to seize some of the returns to previous-employer training as their wage is linked to their productivity, which increases the returns to training for the worker and consequently reduces the external benefits for other firms. As a result, increasing the prevalence of performance-related wages may increase training investments and reduce inefficiency in training levels.

In panel D, age-specific effects in the returns to training and profit sharing are introduced.[29] The results indicate that the returns to training with the current employer especially increase wages for young and prime-age workers.[30] Furthermore, wages for young workers are positively affected by training with previous employers. The increase in wage for young workers is expected to reflect an increase in productivity. It is possible that, in the case of older workers, training serves as an instrument to reduce the wage-productivity gap (and hence to reduce the probability of involuntary separation) rather than to obtain a higher wage. On the other hand,

[27]For the model, using the amount of training including the interaction term improves the model fit only marginally. The F-statistic equals 3.2 and 2.7 for the model in the first and second column, respectively.

[28]Note that these findings may be affected by the lack of accurate productivity information. It is possible that the returns to training in the current match are increased by profit sharing as well, but this may not be reflected in the workers' wage if the gains accrue to the employer.

[29]In order to control for different average returns to training across the separate age groups, age-specific v_j are included in this specification. The model fit is significantly better compared to the baseline model (F-statistic is 14.0 and 16.4 for the estimation in the first and second columns, respectively).

[30]Though the result is only significantly different in the estimation using the amount of training.

for older workers, profit sharing is an effective alternative to increase wages.

4.3 Employability

This section investigates how profit sharing and investments in specific training affect the employability of the worker. Highly employable workers are more likely to be retained within the firm and are thus less likely to separate. Therefore, the employability of the worker is investigated by estimating the separation probability. However, if for some reason the worker separates from the firm, good employability will increase the probability of finding new employment. Low-employable workers are more likely to enter inactivity after a separation has occurred. Since employability not only affects the probability to separate from the current employer, but also the probability to find alternative employment, a distinction can be made between firm-internal employability and external employability. Separate models are estimated for the different types of separations:

$$P(S_{ij,t+1} = 1) = \Lambda(H_{ijt}\beta^S + \gamma^S PS_{ijt} + \delta_1^S T_{ijt}^c + \delta_2^S T_{ij}^p + \alpha_i^S), \quad S = (s, s_e, s_o) \tag{3}$$

where P is the next-period probability of a separation in general (s), a separation to other employment (s_e) or a separation to inactivity (s_o) (e.g. unemployment, retirement and disability), respectively.[31] Furthermore, H is a vector of time-varying observable characteristics, α^S controls for time-invariant worker characteristics, PS is a profit sharing dummy, and the incidence of training (in the current and in previous matches) is represented by T^c and T^p, respectively.[32] The estimation results are presented in Table 5.[33] Training with the current

[31] Note that a promotion is not considered as a separation as this study is mainly interested in between-employer job changes. Furthermore, s_e and s_o can also be estimated as a binary choice model with selection, i.e. conditional upon leaving the current employer. However, here the fixed effects are expected to pick up most of this selectivity.

[32] When the number of training events is included rather than the training incidence, the results are more or less unaffected. Though one important change is that the number of training events in the current match reduces job-to-job changes initially, but increases this probability as the number of training events becomes larger. This may be possibly due to the fact that some share of the specific training has a general character as well. As this training is also productive in other firms, competing firms may lure away trained workers (i.e. poaching externality; Pigou (1912), Stevens (1994)). However, an LR-test indicates that a model including the incidence of training performs significantly better. Therefore, only those results are presented where the training incidence is used in the set of regressors.

[33] Marginal effects evaluated at the mean of the covariates are presented in square brackets. When evaluating the marginal effects, the fixed effects are assumed to equal zero.

employer reduces the probability to separate from the employer. Along with the positive effects on worker productivity (as was found in the previous section), this result suggests that training improves the internal employability of the worker. Training with previous employers reduces all types of separations[34], which suggests that life-long learning improves the worker's employability in all aspects: not only does it improve the quality of the current employment relationship (internal employability), it also reduces the probability of becoming inactive later in life (external employability). Furthermore, profit sharing decreases the next-period separation probability, possibly due to increased wage flexibility or the higher effort level which improves match quality.[35]

Employability is especially a concern for older workers. Older workers are often denoted as being expensive labor due to a gap between wages and productivity (Dostie (2006)). Furthermore, if older workers separate from their employer, this separation is most likely to be a one-way exit out of employment (Gielen and Van Ours (2006a)). As part of a sensitivity analysis, in Panel B age-specific effects are introduced to see how the employability is affected for the separate age groups.[36] The results illustrate that training in the current match particularly improves employment stability for young and old. For young, the probability of separating to other employment and or to inactivity are reduced by specific training. Apparently, training investments improve the productivity of the match thereby improving the position of young workers both within the firm, thereby reducing the need to look for a job with alternative employers, and on the external labor market. For older workers, the probability to separate from the employer to other employment is reduced.[37] Though this may indicate a greater sta-

[34]The large marginal effect that is found for training with previous employers may result from the fact that about 80 percent of the workers have had some previous training. The estimation results including the number of training events (which are likely to exhibit more variation) indicate that each additional training event with previous employers reduces the separation probability by about 3 percentage points. On average, workers have had 2.3 training courses with previous employers.

[35]Differentiating between voluntary and involuntary job separations (involuntary separations comprise separations for reasons of redundancy, dismissal or temporary job termination; voluntary job separations include all other reasons for leaving the job (including retirement)) shows that profit sharing reduces both types of separations. However, these results are not presented (though available upon request) because this distinction is not as clear-cut as the distinction made in Table 5, since some separations (such as retirement or changing employers) may result after a layoff notification and hence may not have such a voluntary character after all.

[36]Note, that an LR-test suggests that this specification is preferred over the baseline model. However, adding age-specific effects for profit sharing does not improve the model fit.

[37]The coefficients for young and old are not significantly different. Furthermore, an LR-test between this

bility of the current employment relationship, it does not necessarily imply an improvement of the employability on the external labor market in terms of better job-finding rates. However, accumulated training over the working life does improve the external employability as it reduces the probability to leave the labor market for older workers. Consequently, paying a profit-related wage to older workers directly affects their internal employability by increasing worker productivity, and it has an indirect effect on the external employability in the long run by increasing training investments.

5 Conclusions

Training is an important instrument for improving the productivity of a worker-firm match. However, training investments may be rather low due to market imperfections. Using data for the UK, this study has shown that profit-related pay schemes can be effective in increasing training investments, especially for young and older workers.

Profit sharing may increase training investments due to a reduction in the separation probability or to increased returns to training. From the separation results it appears that profit sharing reduces the probability to separate from the current employer, possibly because it enhances wage flexibility, thereby providing an incentive to invest (more) in training. The wage results indicate that both training and profit sharing positively affect workers' wages. Hence, profit sharing increases workers' productivity not only by eliciting greater worker effort, but also through skills accumulation. The age-specific results suggest that training improves the employability of young workers both within the firm and in the external labor market. Furthermore, paying a profit-related wage to older workers directly affects their internal employability by increasing worker productivity, and it has an indirect effect on the external employability in the long run by increasing training investments.

In addition, profit sharing may increase training investments by raising the returns to training. In fact, the wage results suggest that profit sharing only increases the returns to training with previous employers. Such training may normally be less rewarded than recent training due

model and a model where current training for young and old is grouped in one variable suggests that the negative effect of current training is equal (and significant) for young and old.

to asymmetric information on the value of the skills acquired with previous employers. Because of the external benefits for other firms, under-investment in specific training may arise. The results suggest that profit sharing can reduce these external benefits by aligning wages more to productivity. Thus, if profit sharing becomes more widely used, training investments may increase.

All in all, the results in the previous section illustrate that paying a profit-related wage benefits both workers and firms in terms of higher productive employment relationships, due to both increased effort and higher levels of training. Higher training levels arise because profit sharing reduces the number of separations resulting from wage rigidities, and because profit sharing also reduces the gap between wages and productivity. This may reduce under-investment in training levels. In addition, increasing the incidence of profit sharing may have positive effects on the employability of young and older workers. In as much as this translates into a higher labor productivity and increased labor market participation of older workers, society as a whole may benefit as well. However, despite these advantages, the incidence of profit sharing appears to be rather limited, possibly because firms are reluctant to switch to profit sharing wage schemes as this may create conflict between the workers and the owners of the firm. More competitive firms whose profit levels are already quite low are not able to share the profit with workers while still satisfying the owners of the firm. Furthermore, changing from fixed wages to profit-related wages increases risk exposure for workers by making them residual claimants. However, unlike other residual claimants (such as shareholders) this risk is not compensated with an ownership stake that would enable workers to be involved in decision making. Employers may therefore be reluctant to switch to profit sharing as they fear that employees may demand more influence in the managerial decision making process. The presence of external benefits of training provide an economic rationale for government intervention aimed at increasing the use of profit-related pay schemes in order to increase training levels.

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Table 1: Age-specific sample means

	Young 16-29	**Prime-age** 30-49	**Old** 50-64	**Total**
N	5264	8510	3195	16969
Training (%)	31.1	30.1	24.1	29.1
Specific training (%)[a]	24.3	25.8	19.4	24.0
Number of specific training courses per year	0.4	0.5	0.3	0.4
- Given that training is undertaken	1.6	1.8	1.7	1.7
Profit sharing (%)	36.0	44.7	35.0	40.0
Gross hourly wage (£)[b]	6.7	11.3	10.0	9.7
Annual separation rate (%)	39.8	20.2	17.2	24.9
- To other employment (%)	32.7	17.9	10.6	20.3
- To inactivity (%)	7.1	2.3	6.7	4.6

[a] Note that about 83 percent of all training has a specific character. This is due to the fact that most training reported appears to have both a general and a specific character.
[b] Denoted in UK pounds (index year = 2000).

Table 2: Incidence of profit sharing and training, and the relation with wages

		Profit sharing		
		No	**Yes**	**All**
Specific training				
	No	$\overline{W}_{ijt} = 8.4$ $V(W_{ijt}) = 31.6$ N = 8234 48.5%	$\overline{W}_{ijt} = 10.7$ $V(W_{ijt}) = 53.4$ N = 4672 27.5%	$\overline{W}_{ijt} = 9.3$ $V(W_{ijt}) = 41.1$ N = 12906 76.0%
	Yes	$\overline{W}_{ijt} = 10.1$ $V(W_{ijt}) = 43.8$ N = 2277 13.4%	$\overline{W}_{ijt} = 12.1$ $V(W_{ijt}) = 60.0$ N = 17867 10.6%	$\overline{W}_{ijt} = 11.0$ $V(W_{ijt}) = 52.3$ N = 4063 23.9%
	All	$\overline{W}_{ijt} = 8.8$ $V(W_{ijt}) = 34.7$ N = 10511 61.9%	$\overline{W}_{ijt} = 11.1$ $V(W_{ijt}) = 55.6$ N = 6458 38.1%	$\overline{W}_{ijt} = 9.7$ $V(W_{ijt}) = 44.4$ N = 169696 100.0%

Note: $\overline{W}_{ijt}$ denotes the average gross hourly wage; $V(\cdot)$ is the variance.

Table 3: Parameter estimates training equation

	Logit	**FE Logit**
A. Baseline model		
PS	0.316 (0.046)**	0.184 (0.067)**
	[0.054]	[0.011]
Tenure	−0.064 (0.010)**	−0.060 (0.016)**
	[-0.011]	[-0.004]
Tenure^2 (*0.1)	0.019 (0.004)**	0.014 (0.007)**
	[0.003]	[0.001]
Age	−0.016 (0.002)**	−0.136 (0.024)**
	[-0.003]	[-0.008]
Temporary job	−0.753 (0.103)**	−0.558 (0.159)**
	[-0.103]	[-0.026]
Number of working hours	0.013 (0.003)**	0.016 (0.005)**
	[0.002]	[0.001]
Education level		
Low qualification	0.145 (0.144)	0.859 (0.496)*
	[0.025]	[0.071]
Medium qualification	0.748 (0.112)**	1.661 (0.401)**
	[0.134]	[0.136]
High qualification	1.275 (0.109)**	2.553 (0.403)**
	[0.218]	[0.145]
Log $\mathcal{L}$	-8614.61	-2968.36
B. Age-specific effects		
PS: Young	0.299 (0.070)**	0.247 (0.106)**
	[0.053]	[0.014]
Prime-age	0.278 (0.057)**	0.077 (0.086)
	[0.049]	[0.004]
Old	0.503 (0.106)**	0.427 (0.159)**
	[0.095]	[0.027]
Log $\mathcal{L}$	-8611.69	-2965.85

Note: Logit estimation results are based on 16969 observations; fixed effects estimation on 8601 observations. Training refers to specific training. All estimations include information on profit sharing (PS) tenure, tenure squared, age, local unemployment rate, education level (reference category is no education), firm size, occupation, industry, temporary work, union coverage, number of working hours and spousal working hours. Standard errors are in parentheses, a **/* indicates that the coefficient is different from zero at a 5%/10% level of significance. Marginal effects evaluated at the mean of the covariates are presented in square brackets.

Table 4: Parameter estimates wage equation

	Training incidence	Amount of training
A. Baseline model		
T^c	0.035 (0.011)**	0.015 (0.003)**
T^p	0.031 (0.018)*	0.006 (0.005)
PS	0.026 (0.009)**	0.026 (0.009)**
Adjusted R^2	0.822	0.823
B. Sensitivity 1: Current vs. previous training		
T	0.015 (0.009)	0.011 (0.005)**
T'^c	0.051 (0.011)**	0.016 (0.003)**
T^p	0.030 (0.018)*	0.006 (0.005)
PS	0.025 (0.009)**	0.026 (0.009)**
Adjusted R^2	0.823	0.823
C. Sensitivity 2: Effort vs. training		
T^c	0.032 (0.013)**	0.014 (0.004)**
T^p	0.010 (0.020)	0.001 (0.005)
PS	0.015 (0.011)	0.018 (0.010)*
$PS * T^c$	0.006 (0.015)	0.002 (0.004)
$PS * T^p$	0.053 (0.022)**	0.015 (0.007)**
Adjusted R^2	0.822	0.823
D. Sensitivity 3: Age-specific effects		
T^c: Young	0.045 (0.017)**	0.039 (0.007)**
Prime-age	0.034 (0.014)**	0.015 (0.004)**
Old	0.023 (0.024)	0.002 (0.005)
T^p: Young	0.082 (0.028)**	0.027 (0.009)**
Prime-age	0.020 (0.024)	0.009 (0.006)
Old	−0.014 (0.043)	0.001 (0.010)
PS: Young	0.029 (0.015)*	0.026 (0.015)*
Prime-age	0.015 (0.012)	0.016 (0.012)
Old	0.040 (0.018)**	0.041 (0.018)**
Adjusted R^2	0.824	0.825
N observations	8261	
N worker fixed effects	2140	

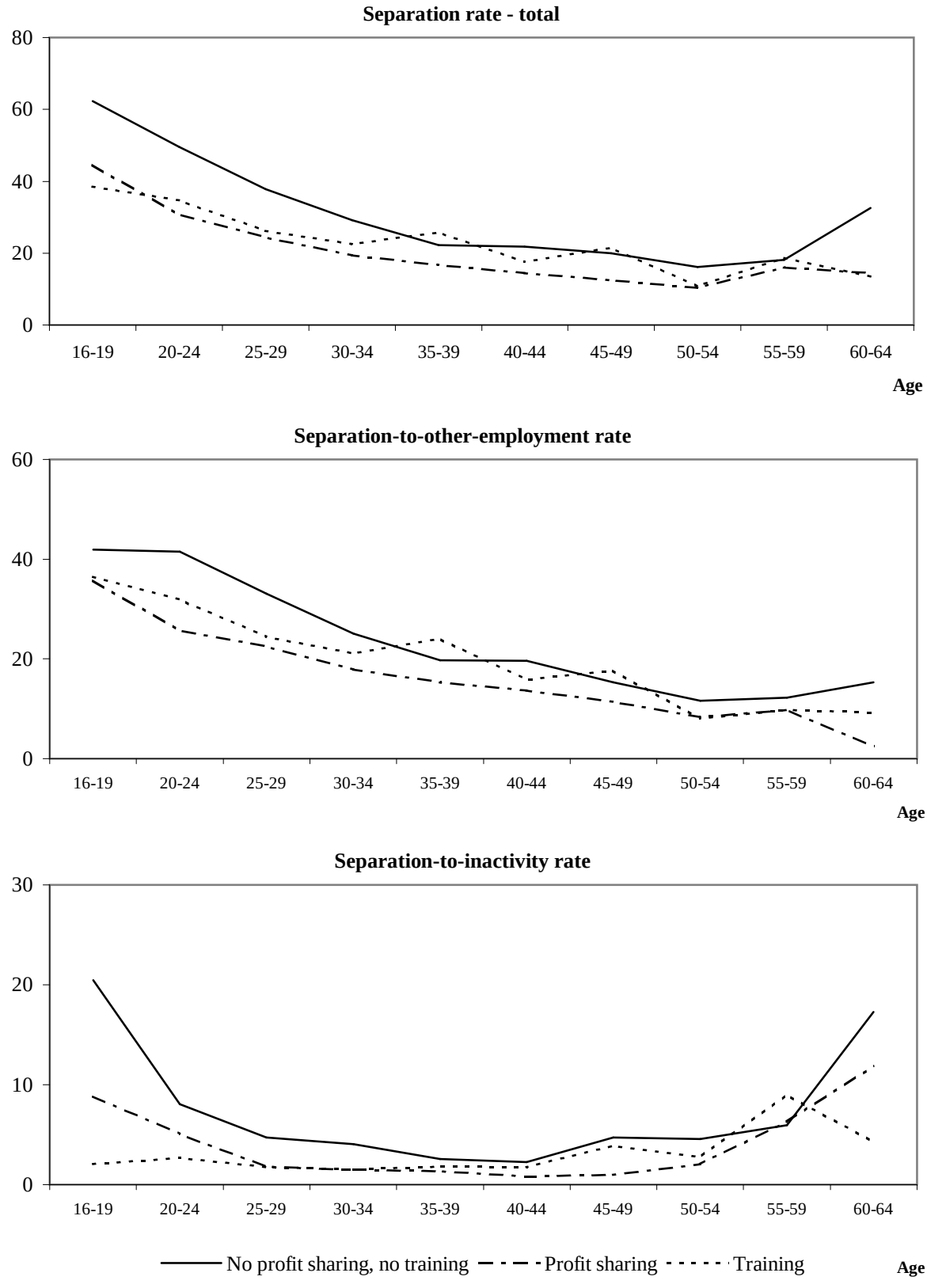
Note: Dependent variable is the log of gross hourly wage (in British pounds indexed at year 2000 values). All estimations also include information on region, marital status, tenure, tenure squared, experience, experience squared, local unemployment rate, union coverage, education level, firm size, occupation, industry, temporary work, job quality, and individual worker fixed effects. Standard errors are in parentheses, a **/* indicates that the coefficient is different from zero at a 5%/10% level of significance.

Table 5: Probability of separation - parameter estimates logit

		Separations at $t+1$	
	total	**to other employment**	**to inactivity**
A. Baseline model			
T^c	−0.196 (0.086)∗∗	−0.141 (0.087)	−0.245 (0.245)
	[-0.046]	[-0.025]	[-0.003]
T^p	−1.432 (0.120)∗∗	−1.312 (0.121)∗∗	−0.777 (0.349)∗∗
	[-0.343]	[-0.272]	[-0.012]
PS	−0.349 (0.069)∗∗	−0.353 (0.071)∗∗	−0.172 (0.193)
	[-0.082]	[-0.064]	[-0.002]
log $\mathcal{L}$	-2687.8	-2505.6	-405.5
B. Sensitivity: Age-specific effects			
T^c: Young	−0.499 (0.129)∗∗	−0.407 (0.129)∗∗	−0.741 (0.387)∗
	[-0.124]	[-0.085]	[-0.037]
Prime-age	−0.038 (0.108)	0.055 (0.110)	−0.294 (0.344)
	[-0.009]	[0.011]	[-0.012]
Old	−0.026 (0.208)	−0.146 (0.226)	0.711 (0.601)
	[-0.007]	[-0.029]	[0.020]
T^p: Young	−1.179 (0.179)∗∗	−1.153 (0.177)∗∗	−0.347 (0.511)
	[-0.280]	[-0.263]	[-0.015]
Prime-age	−1.561 (0.143)∗∗	−1.455 (0.146)∗∗	−0.394 (0.470)
	[-0.359]	[-0.332]	[-0.017]
Old	−1.625 (0.295)∗∗	−1.183 (0.312)∗∗	−2.936 (0.777)∗∗
	[-0.360]	[-0.274]	[-0.375]
PS	−0.343 (0.069)∗∗	−0.345 (0.071)∗∗	−0.163 (0.196)
	[-0.085]	[-0.068]	[-0.006]
log $\mathcal{L}$	-2679.6	-2499.1	-394.6

Note: Estimation results include worker fixed effects and are based on 7647, 7048 and 1519 observations, respectively. All estimations also include information on tenure, tenure squared, age, age squared, occupation, union coverage, education level, part-time work dummy, firm size, industry. Standard errors are in parentheses, a **/* indicates that the coefficient is different from zero at a 5%/10% level of significance. Marginal effects are in square brackets.

Figure 1: Separation rate at $t+1$



Note that Figures refer to separations in year $t+1$ when reporting having received profit sharing or training in year t.

Appendix: Variables description

Profit sharing:

This dummy variable indicates whether or not someone has received a profit sharing payment in the last 12 months. The exact question for waves 8 to 13 is: "In the last 12 months have you received any bonuses such as a Christmas or quarterly bonus, profit-related pay or profit sharing bonus, or an occasional commission?". However, until 1996 the question was phrased in terms of profit-related incentive payments only ("Does your pay ever include incentive bonuses or profit related pay?"). As the responses in terms of percentage of sample which reported "Yes" in waves 1-5 do not differ on average from the responses in waves 6-13, it is assumed that people only reported payments related to profit sharing (or another collective performance pay scheme). Furthermore, as of 1998 (wave 8) an additional question on individual performance pay was added to the questionnaire. This confirms the assumption that people will only report the receipt of some (collective) profit-related payment scheme in the question described above.

Training:

As of wave 8 detailed information is obtained for up to three training events received by workers since September 1 of the previous year. Training includes any part-time education received while being employed. The exact question is: "Was this course or training: (1) To help you get started in your current job; (2) To increase your skills in your current job; (3) To improve your skills in the current job; (4) To prepare you for a job or jobs you might do in the future; (5) To develop your skills generally?". Note that people can report more than one of the five categories. My measure of specific training includes training which served to increase (Ad. 2) or improve (Ad. 3) skills in the current job, regardless of whether this was employer-provided or not. About 75 percent of all training events was defined as specific. There is a great overlap between general and specific training. Only 16 percent of all training events were reported as general training only. This chapter focuses on any training which has a specific character (regardless of whether it also served general purposes) since the main interest is in the direct effects on productivity and employability.