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OECD Employment Outlook

Chapter 4

Improving Skills for More and Better Jobs: Does Training Make a Difference?

It is often claimed that upgrading workers' skills could help meet the challenges of technological and structural change, as well as population ageing. Policies to enhance skills could thus be an important part of the OECD Jobs Strategy. Still, little is known about the labour market impact of adult learning. Do policies that enhance workers' skills help improve the overall employment situation? To what extent do workers who receive training enjoy better job prospects to the detriment of their non-trained counterparts? Are the effects of training different across demographic groups and what do empirical findings suggest as regards lifelong learning strategies?

Introduction

The eighth policy guideline of *The OECD Jobs Strategy* focused on improving "labour force skills and competences through wide-ranging changes in education and training systems" (OECD, 1994a, p. 43). Three out of nine detailed policy recommendations concerning skills and competences dealt with options to overcome market failures and inequalities in order to "improve the incentives for enterprises and workers to invest in continued learning" (*op. cit.*, p. 48). Subsequent country-specific recommendations, however, have focused essentially on initial education rather than adult training – possibly reflecting a lack of consensus on the appropriate policies needed to upgrade workers' skills (OECD, 1997a).

Recently, some progress has been made in understanding which policies are more likely to be effective in increasing adult learning and for whom (see, for example, OECD, 2003a). However, there is relatively little empirical evidence on returns to training that can support the Jobs Strategy's emphasis on adult learning. The evidence on the impact on labour market performance of government-funded training programmes for the unemployed is mixed (see, for example, Martin and Grubb, 2001). Available evidence on employee training focuses on the *average* effect on wages and productivity[1] – thus leaving aside the issue of how training affects workers' employment prospects in general, as well as for specific groups. Few studies look at the relationship between employee training and employment security, and their results are somewhat inconclusive.[2] Furthermore, the fact that the number of hours of training received by each participant is much smaller than those received by full-time students enrolled in initial education might cast doubts on how much a marginal improvement in training provision can affect labour market performance. Finally, available studies ignore the risk that the gains enjoyed by individuals upgrading their skills might be offset by the losses experienced by those who do not participate in training – *i.e.* there might be significant so-called "displacement effects".

This chapter is an attempt to bridge this gap, by building on both cross-country comparative aggregate data on training and longitudinal surveys that were not available in the mid-1990s when the OECD Jobs Strategy was launched. It aims at evaluating as rigorously as possible aggregate and individual effects of adult education and training on labour market performance. After reviewing the mechanisms through which education and training might have an impact on aggregate employment, and discussing to what extent these mechanisms apply to adult learning, the chapter presents some empirical evidence on the relationship between adult training and aggregate labour market performance. The bulk of the chapter explores at the microeconomic level, the economic mechanisms suggested by the aggregate analysis, controlling as much as possible for selection bias and heterogeneity and examining their importance for specific groups. The final section exploits the policy analysis developed in the 2003 edition of the *Employment Outlook* to make a first attempt to assess how the policy recommendations underlying this plank of the Jobs Strategy match the findings of the paper.

Main findings

- *The importance of education and training for labour market performance is likely to have increased*. Education and training may enhance the potential benefits that individuals can reap from participating in the labour market. It can also raise productivity prospects for individual workers (as well as the wedge between productivity and wages), thereby stimulating labour demand. Global demand shifts associated with skill-biased technological and organisational change, as well as international competition, may have raised the risk of skill obsolescence while also adding upward pressure on the demand for skilled labour. More generally, the growth-enhancing role of human capital suggests a positive impact of education and training on aggregate employment.
- *Empirical analysis of the links between training and aggregate employment lends some support to these theoretical predictions*. There is a strong cross-country correlation between employment performance, on the one hand, and both initial education and adult training, on the other. This finding is essentially due to the robust correlation between human capital investments and labour force participation, which may reflect the fact that such investments make work more attractive, because either expected wages are higher or employment prospects better than in the absence of training. On the other hand, no significant cross-country correlation is found between training and unemployment rates.
- *At the individual level, there is a strong association between training histories and employment outcomes*. On average, a 10% increase in the time spent by an adult individual on education or training is estimated to be associated with: *a)* an increase in the probability of being active of almost 0.4 percentage points; and *b)* a fall in the probability of being unemployed of almost 0.2 percentage points. Importantly, these results hold even after attempting to control for selection bias, suggesting the existence of a causal link between training and individual labour market performance.
- Employee training has a clear impact on wage growth only in the case of young or highly educated employees. Conversely, *training appears to have a stronger impact on both subjective and objective measures of employment security* in the case of both older and low-educated workers. The latter finding suggests that, for older and low-educated workers, training allows attaining and maintaining the competences required to bring productivity in line with market wages, thereby sustaining employment prospects of these groups.
- Although *there is a substantial correspondence between results at the aggregate and individual levels for employment and labour force participation*, this is not the case as regards the impact of training on unemployment. One reason for the latter could be that individuals who receive education or training might partially *displace* (or *crowd-out*) those who do not. However, although it is not possible to estimate these crowding-out effects at the economy-wide level, there is evidence that, within each specific labour market group, crowding-out effects, if any, are not large.
- The fact that there is no evidence of large intra-group displacement effects of training lends strong support to the idea that *appropriate policies can improve the labour market position of specific targeted groups*. Such policies can be an important component of a general strategy geared at reducing non-employment traps.

1. Adult education and training and aggregate employment performance

The trend decline in the relative demand of low-skilled labour

It is a stylised fact in all OECD economies that employment rates of low-educated people are much lower than those of the high-educated (*cf.* Statistical Annex, Table D). In addition, the employment gap between high- and low-educated groups seems to be on the rise in practically all OECD countries. Between 1991 and 2001, the total employment rate increased by about 0.1 percentage points on an annual basis in the OECD area; during the same period, the employment rate of those with less than upper secondary education declined by about 0.3 percentage points each year (OECD, 2003a).

What can explain the low employment rates of those with little qualifications?

There are a number of possible explanations of why the employment rates of those with less than upper secondary education are so low in relative terms (see OECD, 1994b; and Nickell and Bell, 1995, amongst others). First, while low-educated workers tend to perform only jobs with relatively low levels of task complexity, high-educated workers have more generic skills and can, in principle, perform different types of jobs; they may therefore compete for low-skilled positions with their low-educated counterparts, in periods of depressed labour demand (Thurow, 1972, being the classic reference on job competition).

Second, higher levels of educational attainment may be associated with better labour market information and more effective job-search techniques, thereby reducing the likelihood, or the duration, of unemployment (see *e.g.* OECD, 1989).

Third, potential earnings from market activities are greater in the case of high-educated individuals, which is tantamount to a greater incentive for them to participate in the labour market (as opposed to staying on income-replacement benefits and/or engaging in home production; see *e.g.* Gronau, 1986; and OECD, 2003a).

Fourth, because of various imperfections in the labour market, the gap between marginal productivity and the wage (interpreted to include all variables costs associated with the worker) might be greater in the case of high-educated workers than in the case of the low-educated (see Box 4.1); therefore, employers might find it convenient to organise the production process in such a way as to employ more high-educated workers or, for the same reason, to hoard the high-educated in downturns while laying-off the low-educated.[3]

Although these explanations for the relative performance of high-educated workers are not mutually exclusive, they have different implications for policy. Indeed, to the extent that the success of the high-educated is only due to the fact that they can compete successfully with low-educated workers for low-skilled jobs, only relative shifts in the position of one individual in the distribution of educational attainments will matter for his/her employment performance and a population-wide increase in average educational attainment will have no effect on aggregate employment rates. Nevertheless, the evidence for this crowding-out mechanism is limited.[4] Conversely, according to the other explanations of the relative success of high-educated labour (namely, the fact that education may increase job-search efficiency, make work more attractive *vis-à-vis* inactivity, and boost the productivity-wage gap), better skills can lead to higher employment, even though the possibility that a population-wide increase in education has no effect on aggregate employment cannot be theoretically ruled out.[5]

Box 4.1. **Beyond institution-driven wage compression: factors shaping the relationship between education and the productivity-wage gap**

Policies and institutions – such as minimum wages and wage floors set by collective agreements (see Chapter 3) – are usually cited as one reason why the wedge between productivity and the wage might be smaller (and, potentially, even negative) at the bottom end of the skill market (see *e.g.* Siebert, 1997; and Freeman and Schettkat, 2001). Although the importance of institutions in shaping the wage distribution is undeniable, other reasons outside the control of policy might also explain why the gap between marginal productivity and the wage might be greater in the case of the high-educated. First, it might be less costly for employers to invest in firm-specific knowledge in the case of high-educated workers (Waldman, 1984; Stevens, 1994). Although these workers may reap some of the benefits from these investments, specialised skills do not transfer easily to many other well-paid jobs, and therefore it is unlikely that these workers can appropriate all the gains (see *e.g.* Parsons, 1986). Second, even when the skills accumulated on the job are general, these skills might not be easily recognised by other employers, due to asymmetric information (Greenwald, 1986; Acemoglu and Pischke, 1998). As a result, the search for suitable alternative jobs might be costly for high-educated workers, thereby leaving their employer with some degree of market power. Indeed, Booth and Zoega (2004) show that most of the compensation schemes that are normally considered in personnel economics – including piece rates – constitute departures from the competitive framework that imply a positive relationship between the degree of employers' market power and individual productivity.

Possible links between education and aggregate employment

There are in fact several related channels through which education might have an impact on aggregate employment rates:

- *Education is known to have a strong impact on productivity.* According to the most plausible estimates, increasing average education by one extra year would raise aggregate productivity by at least 5%, with possibly a stronger effect in the long-run through its enabling impact on innovation (de la Fuente and Ciccone, 2003). In turn, the productivity gains can be shared by workers (through greater wages) and firms (through a greater productivity-wage gap), thereby raising both the incentive to participate in the labour market and labour demand (to the extent that wage and productivity gains are not concentrated in population segments with already high participation and employment rates).
- *Education might accommodate rising demand for skills.* Unskilled workers have been experiencing an adverse demand shift in the past thirty years, compressing their labour market earnings (and therefore their incentive to participate) and/or worsening their unemployment prospects, to the extent that the wage structure cannot fully adapt. The causes of this adverse demand shift have been debated for more than a decade, with no final resolution of the controversy. The most common explanation holds that technological change is biased towards skilled workers (see Chennells and Van Reenen, 2002, for a survey). An alternative explanation points to the fact that trade flows and foreign direct investment (FDI) result in the relocation of unskilled labour-intensive production activities into less developed countries, and in industrialised countries specialising in sectors which are more intensive in terms of skilled labour (see OECD, 1997b). Irrespective of its causes, the demand shift against the low-skilled is estimated

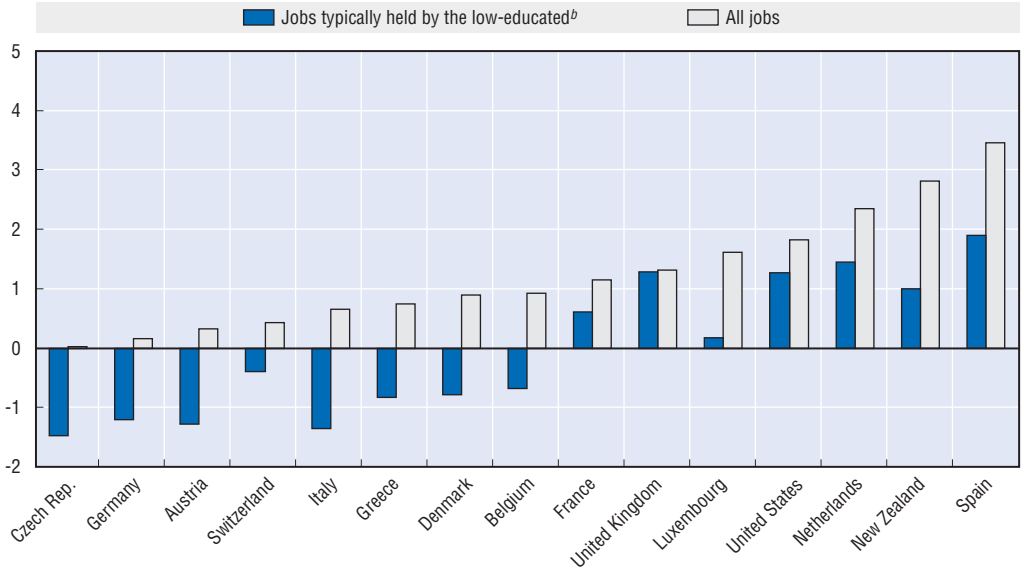
to be considerable. For instance, Nickell and Bell (1996), even in their most cautious estimates, attribute 10-30% of the increase between 1970 and 1990 in the unemployment rate of the G7 countries for which they report data to the skill-biased demand shift. The fact is that the nature of jobs is changing. Chart 4.1 shows that in half of the countries covered, the jobs typically held by the low-educated declined over the period 1993-2002; in the other countries employment growth in these jobs was positive but smaller than total employment growth. It seems, therefore, natural to conjecture that, by simply allowing the supply of human capital to accommodate demand shifts, education can have a positive impact on aggregate employment rates.

- *Education is crucial for competitiveness in high-tech sectors.* Job competition might also occur across national borders, thereby inducing a human capital race among countries. Recent studies (see *e.g.* Bartelsman *et al.*, 2004) point to the fact that, for OECD countries, the quality of human resources is crucial to maintain competitiveness in high-tech sectors and attract FDI. Indeed, Nicoletti *et al.* (2003) estimate that one additional year of average educational attainment in the population would increase total stock of inward FDI by 1.9%. In turn, inward FDI might result in strong employment growth, as the Irish experience suggests (Barry and Bradley, 1997; Walsh and Whelan, 2003).

In sum, whether human capital has an impact on aggregate employment remains an empirical issue. It is possible to shed some light on the aggregate education-employment relationship by extending the model of institutional and policy determinants of the

Chart 4.1. **The nature of jobs is changing**

Annual average growth in the number of jobs, 1993-2002[a]



a) Jobs typically held by the low-educated correspond to jobs with a high share of workers with less than upper secondary education. For each country, jobs (*i.e.* employment in industry/occupation cells) are ranked on the basis of the proportion of low-educated workers in 1993 and then placed into three groups of equal size in terms of employment shares. Aggregate employment growth and the employment growth of the group with the highest share of low-educated workers are reported in the chart.

b) 1994-2002 for Denmark; 1995-2002 for Austria, France and the United Kingdom; 1995-2001 for Germany; 1993-2001 for Luxembourg; 1996-2002 for the Netherlands; 1992-1998 for New Zealand, Switzerland and the United States and 1993-1998 for the Czech Republic; 1993-2002 for all other countries.

Source: Secretariat estimates based on the European Union Labour Force Survey for the EU countries; OECD database on services for the other countries.

employment rate used in Chapter 2 (see Table 4.A1.1 in Annex 4.A1).[6] The most reliable estimates suggest that, historically, the addition of one extra year of average education has been associated in OECD countries with an increase of 1.1-1.7 percentage points in both participation and employment rates, while no robust association is found between education and unemployment. However, any causal impact of education on aggregate employment and participation cannot be easily inferred from these estimates because of obvious endogeneity problems – due for instance to the fact that technical change has a simultaneous impact on returns to education (and therefore schooling; Bils and Klenow, 2000), on the one hand, and wages (and therefore labour force participation), on the other hand. Nevertheless, it is noteworthy that the association between education and both employment and participation remains significant even after controlling for GDP growth, institutions and a common (non-linear) trend.

Adult learning and aggregate employment

The OECD Jobs Study (OECD, 1994b) suggests at least four reasons why the mechanisms shaping the relationship between education and employment discussed above might also apply to skills acquired during adulthood. First, although learning begets learning, and the productivity of adult training is likely to increase with the quantity and quality of initial education, individuals who have entered their working life without qualifications might succeed in reducing this handicap through later investment in human capital (see Heckman, 2000; and Blundell, 2000, for an extensive discussion of this controversial issue).

Second, many empirical studies show that adult training has a positive impact on productivity at the firm level.[7] If displacement effects are small and productivity gains are not confined to workers with relatively good employment performance, these firm-level gains are likely to result in greater labour force participation and/or lower unemployment.

Third, the slow rate of labour force renewal through the entry of young qualified workers might not suffice to counteract the effects of skill-biased demand shifts and maintain a country's international competitiveness. Adult education and training can therefore be expected to have an impact on both containing international relocation of productive activities (see Box 4.2) and attracting inward FDI.

Fourth, due to human capital obsolescence, adult education and training might be required to maintain the employment prospects of workers far beyond school age. Studies of job inflows and separations show an unambiguously negative impact of technological change on the employment prospects of older workers. For instance, Bartel and Sicherman (1993) find that workers in US industries with a high average rate of technological change tend to retire later, but unexpected shocks to the rate of technological change force workers to anticipate their retirement. These findings suggest that, although workers self-select into industries according to their capacity to cope with the pace of technological change, technological innovations, when introduced, induce some skill obsolescence. Similarly, Givord and Maurin (2004) find that the risk of job loss for French high-seniority workers was higher in the 1990s in industries with above median computer- or Internet-intensity. Finally, Aubert *et al.* (2004) find that the adoption of new technologies has a negative impact on the employment of older workers at the firm level.

As in the case of initial education, the relevance of adult education and training for aggregate labour market performance remains an issue to be assessed empirically. The first thing that one can notice is that there is an extremely robust positive cross-country

Box 4.2. **Successfully coping with change: the survival strategy of the hosiery industry in North Carolina**

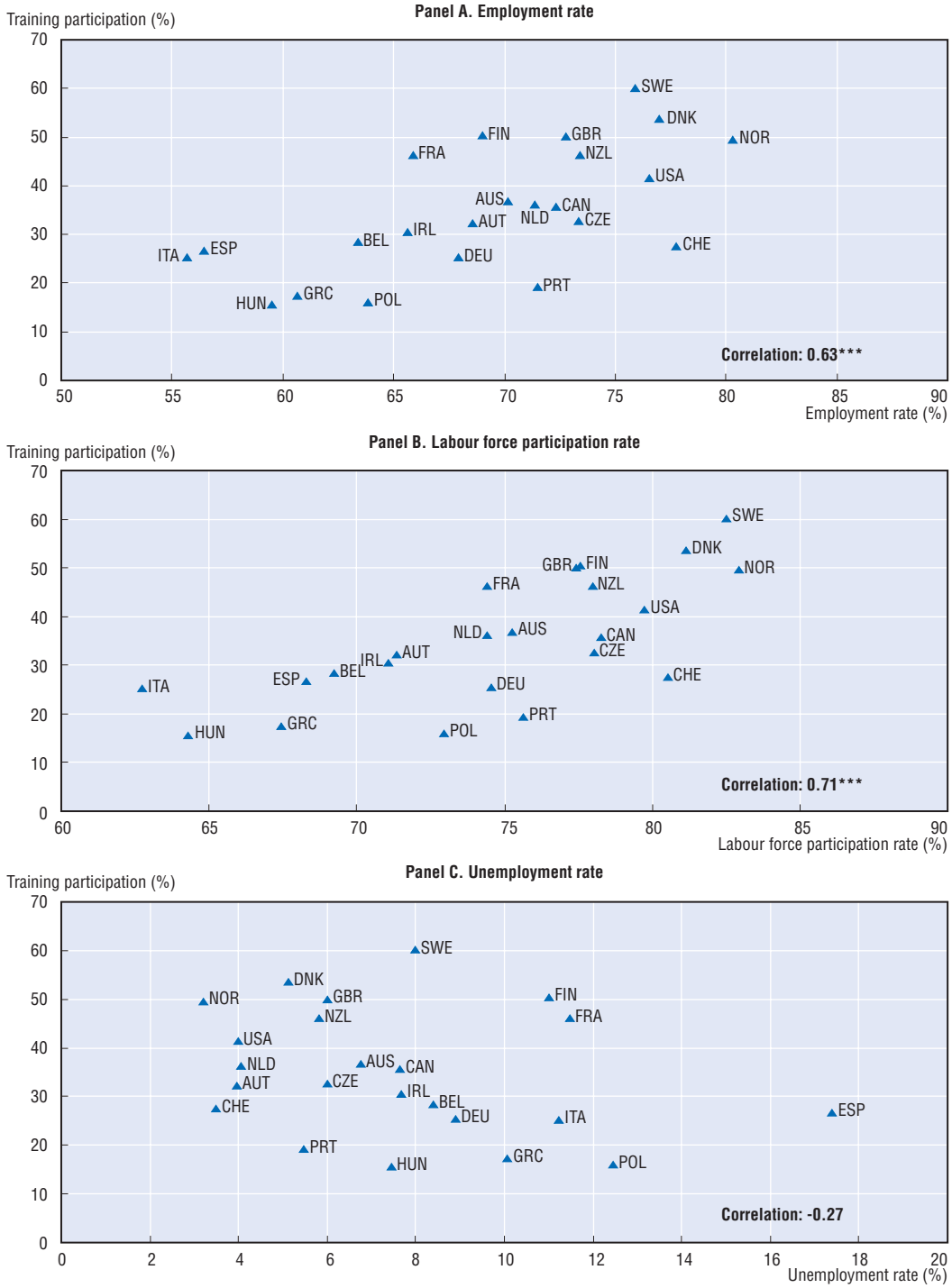
North Carolina has one of the greatest concentrations of hosiery manufacturing firms within the United States, mainly specialised in circular knitting for leg wear such as socks. Increasing competitive pressures from abroad have pushed the industry to modify its production process, namely by introducing computerised machinery and increasing the efficiency of tracking material throughout the production chain. Competitive pressures have also forced domestic producers to rethink their human resource management practices in order to increase worker retention and adapt to new technologies more quickly, by raising cognitive and problem-solving skills within a workforce which still has a low average level of educational attainment. Indeed, being a low-wage industry, despite the increase in skill requirements, the hosiery industry finds it difficult to attract more educated workers.

In 1990, in response to this situation, the Carolina Hosiery Association decided to initiate, develop, and support the Hosiery Technology Center (HTC) to transfer technological knowledge to new labour force entrants as well as experienced machine technicians and operators. There are several innovative features in this training program (Willis *et al*., 2003). First, the partnership among multiple stakeholders allowed pooling of resources and ideas, which consequently leads to efficient and quality training service delivery. Indeed, an ambitious co-operation programme was put in place between the HTC, the North Carolina community college system, individual firms within the industry, suppliers, the regional industry trade association, and the State government. Second, the HTC was strategically located within the North Carolina community college system to ensure proximity with clusters of hosiery manufacturers. The location choice is a fairly important component of this strategy since, due to the risk of disrupting the production process, training in this industry is best conducted outside the factory floor with the relevant equipment in place in HTC laboratories. It is therefore crucial to make it easy for workers in individual firms to have access to one of the community colleges linked to the HTC that can provide a flexible timing of classes (*e.g.* two or three hours at a time, two days a week for four weeks), which takes into account worker's schedules and allows for iteration between intensive training and on-the-job practice.

correlation between employee training and both employment and activity rates (Chart 4.2), while no significant correlation is found between training and unemployment rates (see Annex 4.A2 for data definition and sources, including the distinction between formal education and vocational training). Again, much care must be taken in interpreting these results since they may also reflect correlation between training and education (see *e.g.* OECD, 2003a), on the one hand, and education and labour market performance, on the other. However, even after controlling for the effects of education, GDP growth and institutions, there seems to be a significant relationship between employee training and aggregate employment – and this relationship appears to be essentially due to the correlation between adult training and labour force participation (see Table 4.A1.2 in Annex 4.A1).[8] Between 42% and 46% of the residual cross-country variance of labour force participation rates is statistically explained by the variance of training participation rates,[9] although the possible endogeneity bias – due for instance to the correlation of both training and labour force participation with the rate of technological change – must be taken into account while interpreting the figures.

Chart 4.2. **Training and employment rates are correlated**

Training participation[a] and aggregate labour market performance, second half of the 1990s



***, **, * statistically significant at 1% level, 5% level and 10% level, respectively.

a) Ratio of employees receiving training in one year to total employees.

Source: Secretariat estimates based on the International Adult Literacy Survey (IALS), the Second Continuing Vocational Training Survey (CVTS2) and data from Chapter 2 of this publication.

To sum up, this section shows a positive link between adult upgrading of skills and competences and aggregate labour force participation and employment. This evidence lends some empirical support to the hypothesis that investment in adult education and training, by increasing the income that individuals can expect from labour force participation, raises the relative value of market activities with respect to home production and, consequently, leads to higher employment rates.

2. Escaping non-employment traps: adult training and individual participation and unemployment

Individuals who participate in training have higher probability of being employed

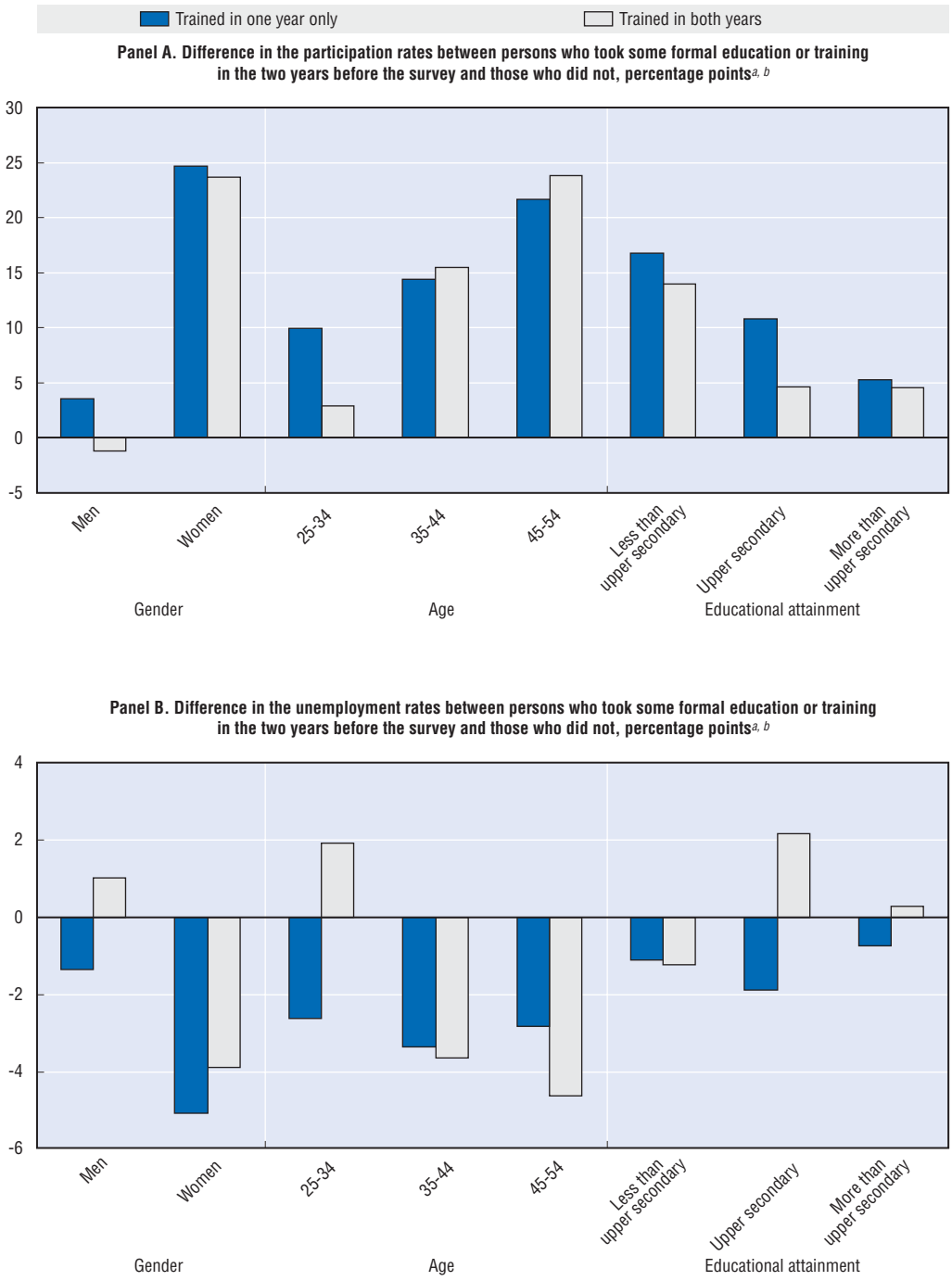
A first glance at individual data shows a pattern which is consistent with the aggregate analysis of the previous section. Chart 4.3 presents gaps in labour force participation and unemployment rates between individuals who received some training in the previous two years and those who did not (distinguishing between those who received training in both years from those who received it in one year only).[10] For all selected labour market groups, participation rates are greater for individuals who received some training in the last two years than for their counterparts who received no training in the same period.[11] Continuing education and training seems to matter particularly for women and older prime-age workers,[12] whose participation rate is more than 20 percentage points greater in the case of persons who received some training in the previous two years than in the case of those who did not. However, in contrast with the aggregate analysis of the previous section, individuals who received training in the previous two years seem to have on average lower unemployment rates than their counterparts who had no training in the same period.

Adult learning has a durable impact on individual employment prospects

Skills accumulate over the lifetime and participation in training in the previous two years is not very representative of the *stock* of accumulated competences. Nevertheless, these results are confirmed by multivariate analyses that, by fully exploiting the longitudinal structure of available data, can estimate the relationship between the whole *stock* of previous training and employment performance (see Box 4.3 as well as OECD, 2004, for a full exposition of the empirical models used in this chapter and the discussion of the procedures used for identification and elimination of selection bias). In all countries except the Netherlands, adult education and training are estimated to have a significant association with the probability of participating to the labour force (Chart 4.4). On average, a 10% increase in the volume of previous education or training courses taken by an individual is associated with an increase in the probability of being active comprised between 0.3 and 0.4 percentage points.[13] The association is stronger for women and younger workers and in countries such as Austria, Italy and Spain. The opposite relationship is found between training and unemployment (Chart 4.5). Although with a relatively important cross-country variation, a 10% increase in the volume of previous education and training is associated with an average fall in the probability of being unemployed comprised between 0.15 and 0.2 percentage points, with again a stronger effect for younger workers and women.

In sum, the micro-econometric evidence presented here is fairly consistent with the findings of the literature on evaluations of training programmes for the unemployed (where positive outcomes are found more often in the case of training schemes included in job-first strategies – that is, strategies geared at finding a suitable job first and improving competences on the job later; see *e.g.* Martin and Grubb, 2001; Layard, 2003; and Betcherman *et al.*, 2004) and

Chart 4.3. **Trained workers participate more in the labour market and have lower unemployment than their non-trained counterparts**



a) Data refer to individuals aged 25-54 years.
b) Weighted average of the following countries: Austria, Belgium, Denmark, Finland, France, Germany (German Socio-Economic Panel, SOEP), Greece, Ireland, Italy, the Netherlands, Portugal and Spain.

Source: Secretariat calculations based on the European Community Household Panel, waves 1 to 7 (1994-2000).

Box 4.3. **Estimating the impact of training on individual labour market performance**

The simple associations shown in Chart 4.3 do not allow one to establish a causal link between training and better employment prospects. Skills accumulate over the lifetime and participation in training in the previous two years is not very representative of the stock of accumulated competences. Furthermore, selection bias might alter the results: individuals endowed with more productive characteristics are likely to receive more training (because of greater expected returns from training), while being more likely to be employed even in the absence of training. A multivariate analysis exploiting the longitudinal structure of the data is necessary to solve this problem.

As a first step, a panel multivariate analysis of the impact of training on individual employability can be conducted by controlling for individual fixed effects and other observable characteristics. Individual fixed effects control for all time-invariant unobservable characteristics, including training received before the sample window. Abstracting from human capital obsolescence – which is however unlikely to induce major measurement problems given that time-series are relatively short – this approach makes it possible to estimate the effect of the *stock* of previous training on employment prospects, while simultaneously eliminating selection bias due to time-invariant factors.

Controlling for fixed effects is not enough to correct for time-variant sources of selection bias and establish a causal link. For instance, a number of people are not employed because of prolonged study periods. These people might continue to be outside the labour force for a certain number of years in order to enter (or re-enter) it at a later date outside the sample window. Similarly, in the case of the employed, participation in training might reflect job-match-specific events – including a faster pace of adoption of new technologies in more dynamic firms – that are correlated both with the probability of training and the probability of keeping a job (thereby remaining employed), without implying a causal link between them.

When employability is measured by individual wages or employment security (see Sections 3 and 4), it is possible, however, to go one step further and split previous training into two components: training taken while working for the current employer, on the one hand, and training taken while working for previous employers, on the other hand. While the identification of the impact of the former is problematic (*e.g.* because it can capture match-specific effects that are correlated with training), the impact of training taken with previous employers can be shown to be essentially unaffected by selection bias (see OECD, 2004, for a fuller discussion).

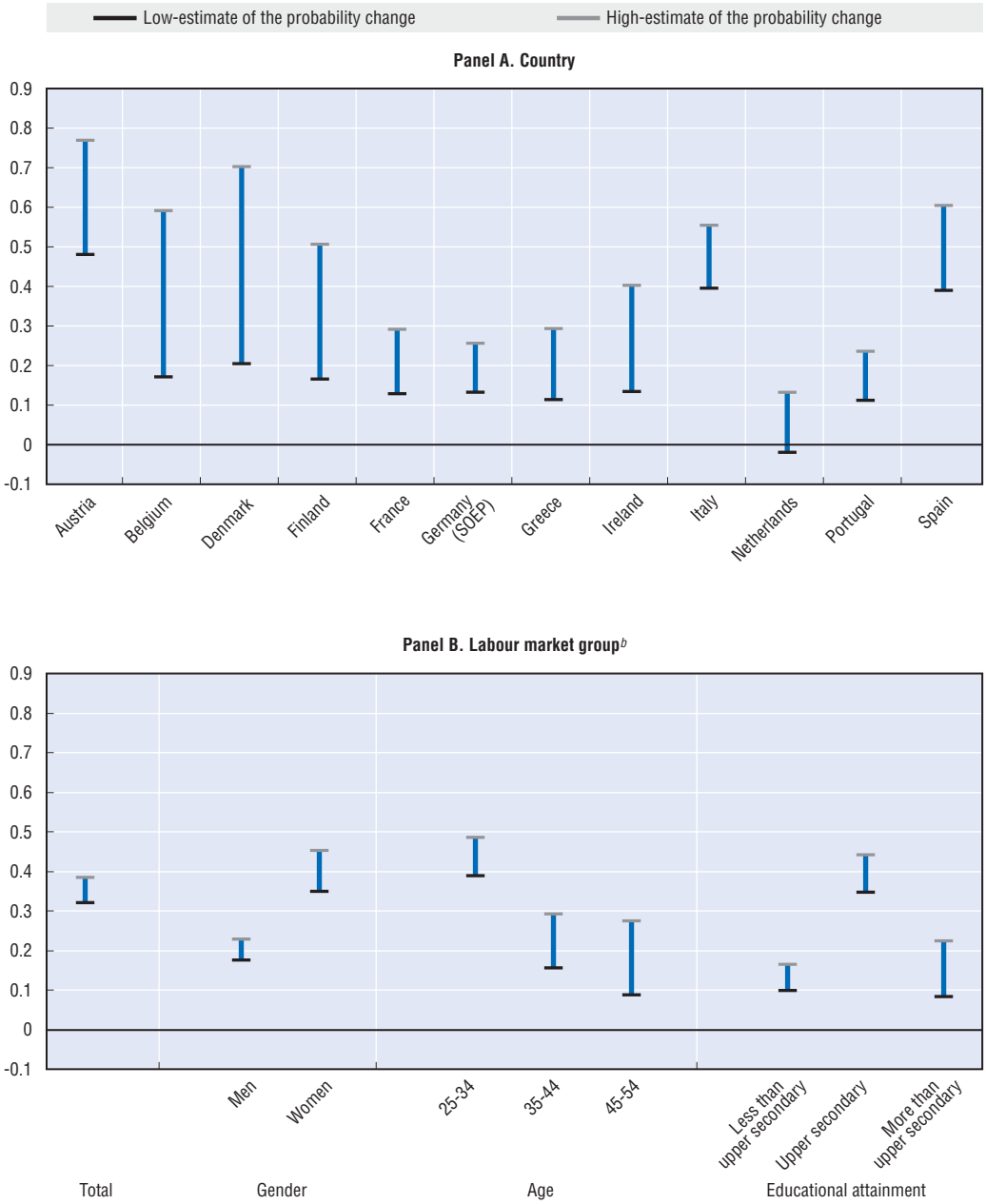
provides some support for the lifelong learning component of the Jobs Strategy. The incentive to participate in the labour market (as well as the probability of being employed) seems to be affected by the amount of education and training individuals receive throughout their working life. On the one hand, this implies that work seems to "pay" (and jobs seem to be easy to find) for individuals who continually received education and training. On the other hand, workers appear to reduce the risk of human capital obsolescence by resorting to continuing education and training.

Do workers who participate in training displace those who do not?

Can these results – based on the labour market performance of individual workers who participated in training *vis-à-vis* non-participants – be extended to the economy as a whole? This is not so simple: the micro-econometric estimates presented here do not take into

Chart 4.4. **Training increases the probability of being active**

Estimated change in the probability of participating in the labour market as a result of training, percentage points[a]



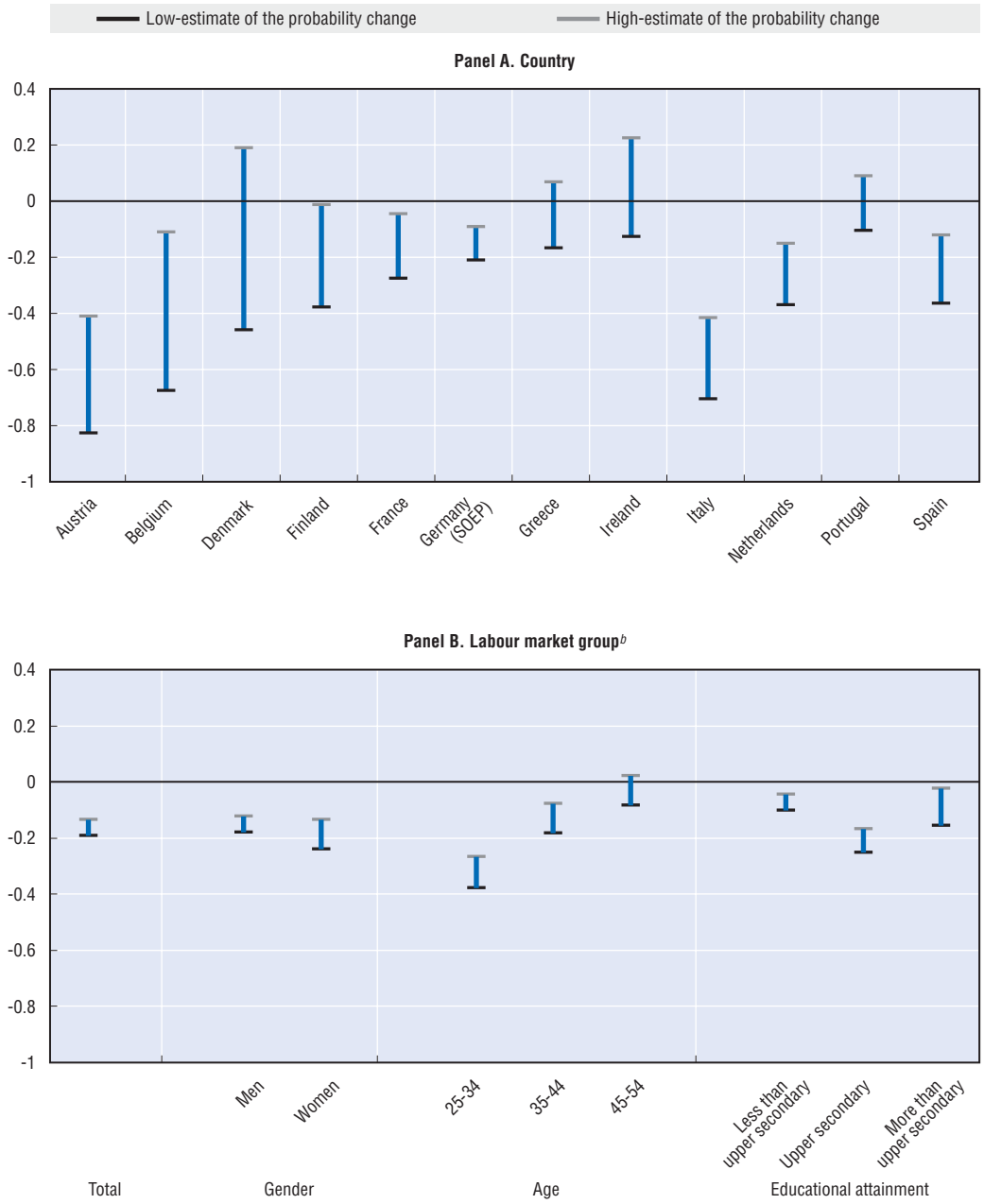
a) Ten per cent confidence interval of the impact of a 10% increase in the number of years in which an average individual receives some education or training. The estimates are obtained by maximising the conditional likelihood of a fixed-effect logit model. Beyond individual fixed effects, the specification includes country-year dummies, age and age squared, health status, family type, marital status, consensual union and presence of children. Family-related variables are interacted with gender. Data refer to individuals aged 25-54 years.

b) The sample includes the countries shown in Panel A.

Source: Secretariat calculations based on the European Community Household Panel, waves 1 to 7 (1994-2000).

Chart 4.5. **Training reduces the risk of unemployment**

Estimated change in the probability of being unemployed as a result of training, percentage points[a]



a) Ten per cent confidence interval of the impact of a 10% increase in the number of years in which an average individual receives some education or training. The estimates are obtained by maximising the conditional likelihood of a fixed-effect logit model. Beyond individual fixed effects, the specification includes country-year dummies, age and age squared, health status, family type, marital status, consensual union and presence of children. Family-related variables are interacted with gender. Data refer to individuals aged 25-54 years.

b) The sample includes the countries shown in Panel A.

Source: Secretariat calculations based on the European Community Household Panel, waves 1 to 7 (1994-2000).

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account the risk of *displacement effects* – that is, the extent to which training an individual reduces the employment prospects of untrained individuals. The fact that, as shown in Section 1, training is not associated with lower aggregate unemployment – while being associated with a lower individual probability of being unemployed – suggests that some displacement might indeed be at work, thereby partially offsetting any aggregate employment gains from skill upgrading.

In the absence of valid instruments for the aggregate amount of training, it is difficult to measure the relevance of crowding-out effects for aggregate employment. Nevertheless, simple tests can be constructed to check whether trained workers are more or less likely to crowd out workers belonging to their same labour market group rather than workers in other groups (results from these tests are reported in Tables 4.A1.3 and 4.A1.4 in Annex 4.A1).[14] Since these tests find no evidence that intra-group crowding out effects are strong,[15] it can be argued that the empirical evidence does suggest that lifelong learning policies, if well-targeted on specific groups that are less successful in the labour market, can be effective in improving the relative labour market performance of these groups (in the worst possible scenario, at the expense of non-targeted groups) and therefore be part of a general strategy to reduce non-employment traps as well as to increase participation rates among mature and older workers. The cost of these policies for the public budget and the possible deadweight losses associated to them need, however, to be carefully evaluated and taken into account in their design (see OECD, 2003a).

Altogether, trained individuals participate more in the labour market than their non-trained counterparts. This is so because either the earnings individuals can expect to obtain from work (*conditional* on having a job) are greater once they have received some training or training increases the likelihood of securing stable income flows from participating in the labour market – in both cases raising the incentive to participate in the labour market. It is therefore useful to check whether training is associated with higher wages and/or greater employment security. This is the purpose of the remainder of this chapter.

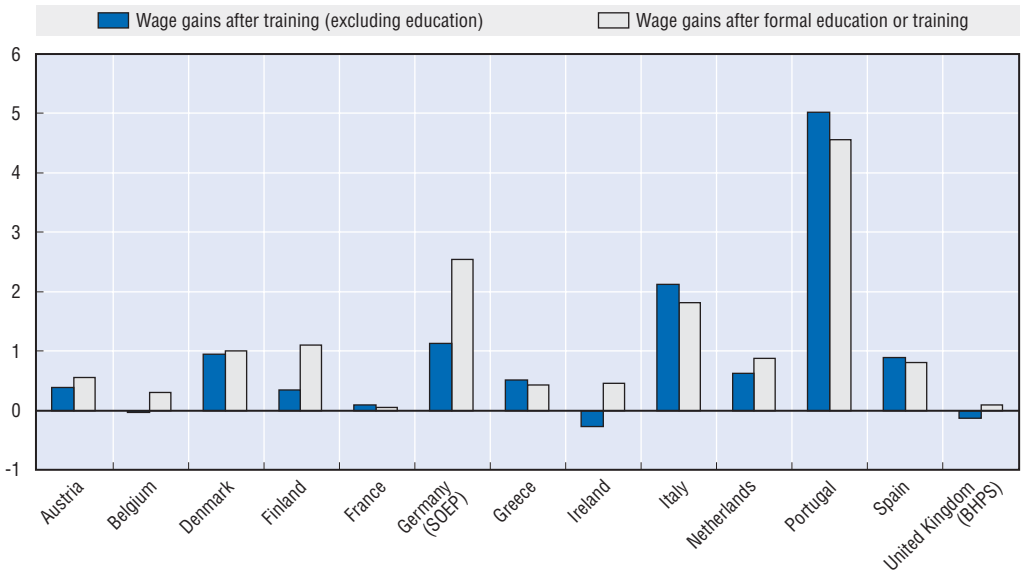
3. Better paid jobs: the effect of training on individual wages

If training boosts labour force participation by increasing the individual returns to undertaking market activities, it seems natural to expect that training will raise individual wages, particularly for those individuals for whom work does not always pay. There are various ways to compute a training wage premium.[16] The simplest method, when longitudinal data are available, is to compare wage growth rates between two interviews for workers receiving training between the same two interviews *vis-à-vis* those not receiving it. Chart 4.6 shows simple average measures of the wage premium computed along these lines. Training premia so computed range from practically zero in France and the United Kingdom to a peak of almost 5% in Portugal. Furthermore, they are lower in many countries when computed with respect to vocational training only (excluding education), but remain positive in all but three countries (Belgium, Ireland and the United Kingdom).

For policy purposes, it is important to know whether better skills gained through training are transferable across jobs and employers. This is particularly important in the context of a Jobs Strategy geared towards making the labour market more flexible and resource allocation more rapid and smoother. Furthermore, workers employed by high-performing establishments (for example, those belonging to more innovative firms) might receive more training and experience faster wage growth. For these reasons – as well as to eliminate

Chart 4.6. **Wages grow faster after training**

Wage growth difference between trained and untrained employees, percentage points[a]



BHPS: British Household Panel Survey.
SOEP: German Socio-Economic Panel.

a) Percentage-point difference in average annual wage growth rates between employees receiving training between two interviews and those not receiving it. Figures are adjusted to take into account that the time spell between two interviews can be different from one year. Data refer to wage and salary workers aged 25-54 years and working more than 15 hours per week.

Source: Secretariat calculations based on the European Community Household Panel, waves 1 to 7 (1994-2000).

selection bias – Table 4.1 decomposes raw training premia presented above into the premium to training taken with the current employer – estimated by correcting for match-specific heterogeneity (see OECD, 2004) – and the premium to training taken with previous employers, correcting also for changes in observable individual and firm characteristics.

In all countries for which data are available, continuous education and training taken with *previous* employers have, on average, a positive impact on wages, although this impact is not significant in Italy and Portugal. Participating in formal education and training in one year is estimated to increase earnings by up to 5.8% (in Austria). By contrast, workers usually reap a lower (and sometimes insignificant) wage premium if they do not change employer after having received training. These results are also broadly confirmed when wage premia to training and education are estimated separately, although estimates are less precise – and somewhat lower in the case of vocational training.[17] The fact that the wage premium to training taken with previous employers is smaller in the case of vocational training than in the case of formal education is not surprising because competences acquired through formal education are more easily signalled and recognised. Accreditation and recognition of competences acquired through short vocational training spells and informal training is indeed a crucial issue (and policy problem) for the transferability of training (OECD, 2003a). Overall, these findings are consistent with previous studies that typically find that the training wage premium increases in the aftermath of job change.[18]

Looking at results by labour market group is instructive in many respects. First, training wage premia seem to be lower for women than for men, possibly due to heterogeneity in the quality of training courses and/or occupational gender segregation (see Bardone *et al.*, 2004).

Table 4.1. **A durable effect of training only for certain groups**

Panel data estimates of training premia, percentage[a]

	Training taken with		Formal education taken with		Formal education or training taken with	
	Previous employers	Current employer	Previous employers	Current employer	Previous employers	Current employer
Panel A. Country						
Austria	. .	. .	. .	. .	5.81***	0.88**
Belgium	2.30*	1.84***	–1.20	–1.84	2.12*	1.57***
Denmark	1.60***	0.87***	4.39***	0.17	2.26***	0.78***
Finland	2.78***	0.66**	2.70*	1.22*	3.47***	0.83***
Germany (SOEP)	0.67	1.02	4.06***	2.11***	3.08***	1.82***
Ireland	3.31*	0.21	6.15***	0.67	4.46***	0.39
Italy	. .	. .	. .	. .	1.65	2.21***
Netherlands	0.48	0.44	6.12***	0.23	2.78**	0.58
Portugal	. .	. .	. .	. .	2.41	2.98***
Spain	3.83***	0.32	5.99***	0.20	5.05***	0.24
United Kingdom (BHPS)	. .	. .	. .	. .	5.09*	0.92
Panel B. Labour market group						
Total	**1.19*** **	**1.11*** **	**5.28*** **	**0.91*** **	**2.65*** **	**1.22*** **
Gender						
Men	1.65***	1.25***	5.51***	1.49***	3.12***	1.43***
Women	0.70	0.93***	4.97***	0.34	2.17***	0.97***
Age						
25-34	2.13***	1.55***	6.21***	1.41***	4.40***	1.65***
35-44	0.55	0.92***	2.70**	0.78*	0.83*	1.06***
45-54	0.56	0.71***	1.47	0.17	0.81	0.72***
Educational attainment						
Less than upper secondary	1.09	1.29***	2.58	0.64	1.39*	1.24***
Upper secondary	0.11	0.93***	6.87***	0.35	2.44***	0.96***
More than upper secondary	1.43***	0.95***	3.03***	0.95***	1.97***	1.10***

BHPS: British Household Panel Survey.
SOEP: German Socio-Economic Panel.
***, **, * statistically significant at 1% level, 5% level and 10% level, respectively.
. . Not enough observations with at least one job change after a training spell.
a) Estimates of the wage premium of participating in training in one additional year, obtained from the estimation of a wage equation controlling for individual fixed effects, age, age squared, tenure, tenure squared, firm size, public sector dummy, occupation, permanent contract dummy, log of hours worked, log of hours worked squared, the number of previous jobs, reason of last job change and interaction terms between country dummies, year dummies and date of interview. Training taken with the current employer has been demeaned by subtracting job-match-specific means. Wage premia to training and formal education are estimated through a specification that simultaneously includes both variables.

Source: Secretariat calculations based on the European Community Household Panel, waves 1 to 7 (1994-2000).

Second, the wage premium to participating in training while already working for the current employer is relatively homogeneous across age and educational attainment groups (being about 1% for all groups). Conversely, the impact of training on wages seems to be transferable across jobs only in the case of relatively young and/or high-educated workers, at least insofar as vocational training only (excluding education) is concerned.

Should one conclude that education and training does not have a *durable* impact on earnings for other groups, and particularly for those who have already lower earnings, greater employment insecurity as well as more imperfect access to training opportunities?

This conclusion would be unwarranted. In fact, these returns are computed only for workers that are employed. That is, these estimates do not take into account the impact of training on employment prospects and on containing the loss of income associated with unemployment spells. Indeed, due to the existence of downward wage rigidity, one can expect that those workers who are unable to maintain their productivity (due, for instance, to skill obsolescence) are more frequently laid-off – rather than experiencing a fall in wages and kept in employment – and thereby excluded from our sample. In particular, it can be conjectured that, in the case of older workers, training enables employers to *match* individual productivity with constant individual wages and therefore *retain* the worker. Conversely, workers not receiving training are more likely to enter non-employment because their productivity has fallen below their wage. This issue will be explored further in the next section.

4. More stable employment prospects: the effect of training on employment security

The term "employment insecurity" is generally used in the literature to denote the risk that a worker will experience a significant fall in earnings (and/or well-being) due to job loss or the threat of it (see *e.g.* Nickell *et al.*, 2002). Job loss is intended to refer to separations that are *involuntary* from the perspective of the worker. In practice, this means that employment security is composed of two elements (see also Chapter 2): the likelihood of maintaining the employment relationship with unmodified working conditions (including pay) and the expected cost of job loss, which, in turn, can be seen as the product of the probability of job loss and its cost conditional on losing the job. This (conditional) cost of job loss will tend to be higher when the expected duration of the non-employment spell following job loss is longer (see OECD, 1997b, 2002).

Does training decrease employment insecurity? By increasing individual productivity, training taken with the current employer can be expected to increase either potential wages (without increasing the probability of involuntary job separation) or the productivity-wage gap (thereby reducing the risk of job loss). To the extent that training is general and the productivity-wage gap is greater the greater the worker's competences, it can also be expected that training will increase the likelihood of finding a new job in the event of job loss.

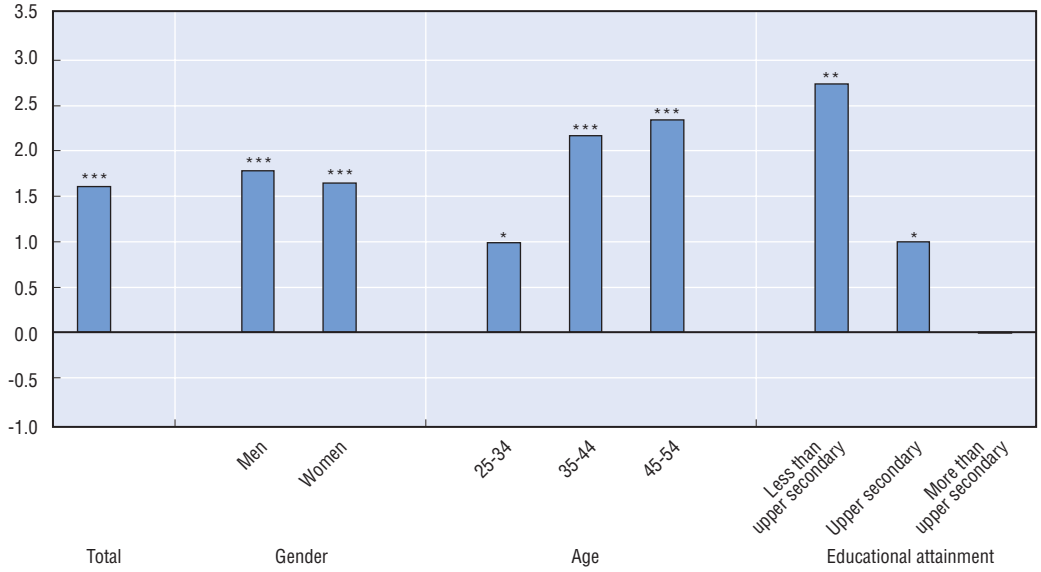
The remainder of this section tries to shed some light on the empirical relationship between training and employment security at the individual level. By focusing on several different indicators, it aims at disentangling the effect of training on the different aspects of employment security and at providing a relatively accurate picture in spite of the lack of satisfactory comprehensive objective measures of employment security.

Trained workers feel more secure

Chart 4.7 focuses on the two-year variation of subjective *perceptions* of job security (measured on a 1-6 Likert scale). As was done before, in order to control for selection bias, the analysis distinguishes between training with previous employers and training with the current employer. In this case, however, the effect of training with the current employer cannot be identified by controlling for match-specific effects.[19] For this reason, only the estimated impact of training taken with previous employers is reported in Chart 4.7.[20]

Chart 4.7. **Training has a positive impact on employment security**

Change in perceived employment security as a result of training, percentage[a, b, c]



***, **, * statistically significant at 1% level, 5% level and 10% level, respectively.

a) Estimates of the percentage impact on the average employee's perception of job security (measured on a 1-6 Likert scale) of participating in some formal education or training in one additional year. Each security category is assumed to identify an interval of length one, except the bottom and top categories that are assumed to be bottom- and top-coded. In the estimation model two-year changes in perceived job security are taken as dependent variables and estimates are obtained by maximum likelihood estimation of a Gaussian interval regression model. Controls are: two year differences of age, age squared, tenure, tenure squared, log wage, and log of hours worked, as well as dummies for public/private employment, the number of previous jobs, lagged level of perceived job security, voluntary or involuntary separations in the two-year reference period and country per year dummies.

b) Data refer to employees working more than 15 hours per week and aged 25-54 years.

c) The sample includes the following countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, the Netherlands, Portugal, Spain and the United Kingdom (British Household Panel Survey, BHPS).

Source: Secretariat calculations based on the European Community Household Panel, waves 1 to 7 (1994-2000).

Two clear facts seem to emerge from Chart 4.7. First, education and training taken with previous employers have a positive impact on the perception of job security of all categories of workers (with the exception of those with the highest educational attainment). Given that these measures are partially forward-looking (that is, take into account the perceived risk of job loss), these results yield some support to the conjecture that returns to training might be positive even for those groups of workers for which they do not show up in the wage level (conditional on being employed). Second, and more striking, training taken with previous employers has the greatest impact on perceived job security for those categories for which estimated wage premia are smaller. Conditional on changing job, for each year of previous training, employees without upper secondary qualifications are estimated to increase their perceived job security by 2.7%, and employees aged from 35 to 54 years, by more than 2%. Interestingly, as shown by Bassanini (2004), the effect of vocational training on employment security appears to be greater than that of formal education, in contrast with what occurs in the case of wages (see Section 3).

The relationship between training and mobility is complex…

Training can be expected to have ambiguous effects on job mobility. On the one hand, the probability of losing one's job can be expected to decrease in the aftermath of training,

particularly in the case of employer-paid training. On the other hand, training in transferable competencies might increase the probability that workers quit because of better job offers elsewhere. In fact, Parent (1999) – who looks at repeated job spells in the US National Longitudinal Survey of Youth without considering the reason of termination of the employment relationship – finds no correlation between the amount of training received during a job spell and its length.

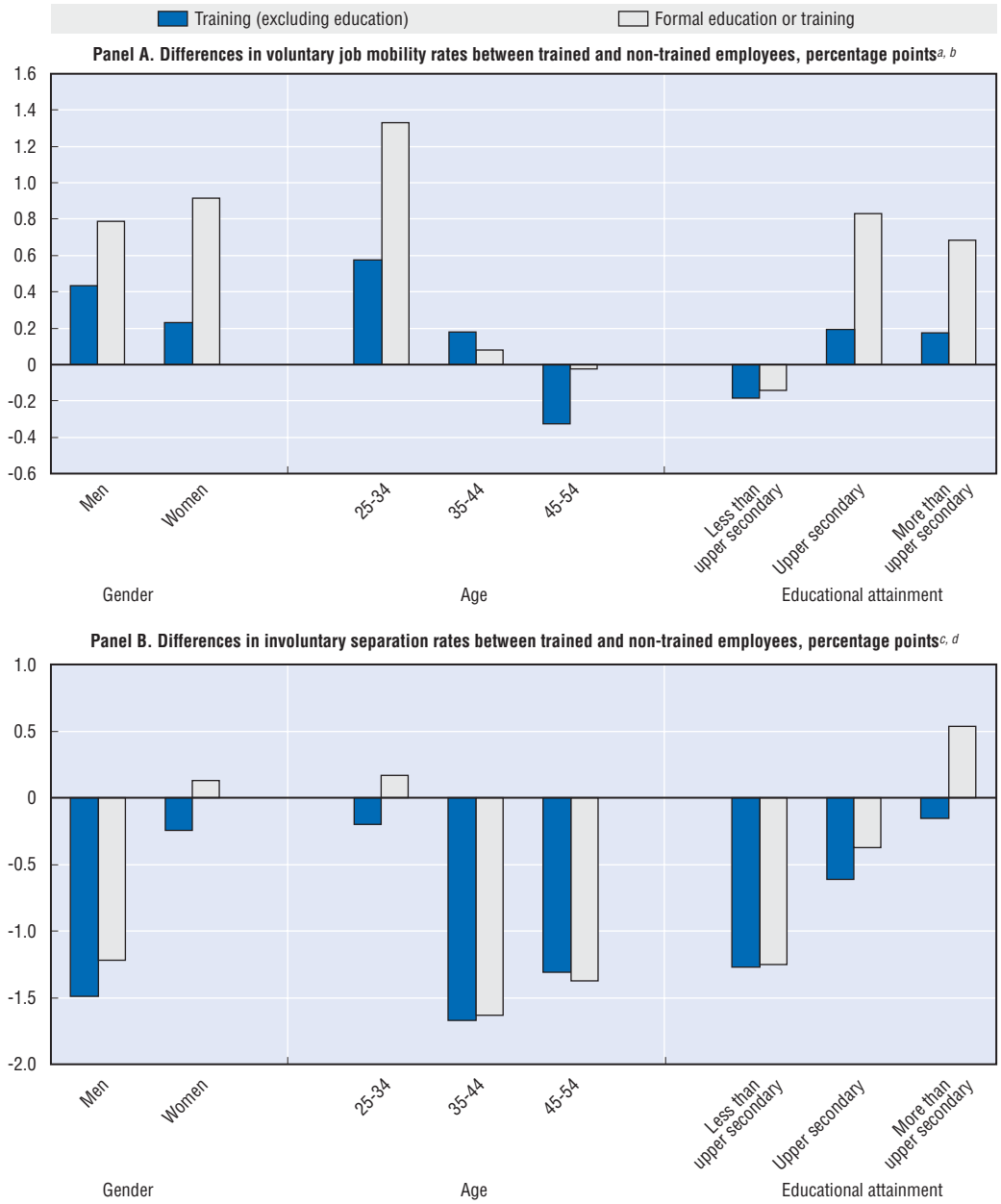
For all countries for which data are available, workers who previously received education or training tend to quit more often for better jobs and to separate less often against their will (Chart 4.8).[21] Nevertheless, important differences can be observed across labour market groups as well as type of training. The impact of training on voluntary job mobility is mostly confined to relatively young and educated workers – for example, the difference between trained and untrained individuals in terms of annualised voluntary job mobility rates is 1.7 percentage points, for workers aged 25-34 years, and about 0.7-0.8 percentage points, for workers with at least upper secondary education. Conversely, the negative correlation between training and involuntary separations is clearer in the case of older and less educated workers – the difference in involuntary separation rates being above 1.2 percentage points for workers aged 35 years or more or with less than upper secondary education. Furthermore, workers tend to be less mobile if they receive only vocational training rather than when they receive some formal education. This finding is not surprising: formal education is less frequently paid by the employer (OECD, 2003a) and imparts competences that are usually transferable and whose value is more easily signalled to the external labour market.

The probability of experiencing an involuntary separation is a natural objective measure for the risk of job loss – that is one of the components of employment insecurity discussed above. However, the figures presented here must be handled with special caution. Indeed, the fact that lay-offs seem to be less frequent in the presence of training does not prove that training reduces the probability of being laid-offs. Providing an employee with training might be the *consequence* (and not the *cause*) of the employer's decision of not laying him/her off, which in turn might be dependent on individual characteristics (including unobserved ability). The natural framework to deepen this analysis and address this issue would be a standard hazard model with controls for individual fixed effects. Unfortunately, there is no cross-country comparable dataset with sufficiently long individual time series where two complete job spells can be observed for a large portion of the sample. For this reason, a formal multivariate analysis of separation rates cannot be developed further in this chapter. Nevertheless, it is possible to go one step further by using the distinction between permanent and temporary contracts, which typically involve different job loss risk (OECD, 2002).

... but trained workers have greater chances to find (and keep) a permanent job

Chart 4.9 examines the impact of training with previous employers on the probability of being in a *permanent contract* using the same framework adopted for the analysis of subjective measures of job security.[22] The estimation results mirror the findings of the analysis of subjective perceptions of job security. First, for all labour market groups considered therein, training taken with previous employers has a positive impact on the probability of holding a permanent contract. On average, the probability of being in a permanent contract is estimated to increase by 0.6 percentage points for each year of work with previous employers in which the employee received some training. Second, training taken with previous employers has the greatest impact for those categories for which estimated training wage premia are smaller, although differences across groups are less

Chart 4.8. **Trained workers quit more often and are less frequently dismissed than non-trained workers**



a) Percentage-point difference in annualised rates of voluntary job changes between trained and non-trained employees. Voluntary job changes are defined as quits motivated by "better job opportunities" according to the interviewee. Voluntary mobility rates are defined as the share of employees at date *t* who voluntary quit their employer between date *t* and date *t* + 1. Trained employees are those who received some training between date *t* – 1 and date *t*. Data refer to persons aged 25-54 years.

b) Weighted average of the following countries: Austria, Belgium, Denmark, Finland, France, Greece, Ireland, Italy, the Netherlands, Portugal, Spain and the United Kingdom (British Household Panel Survey, BHPS).

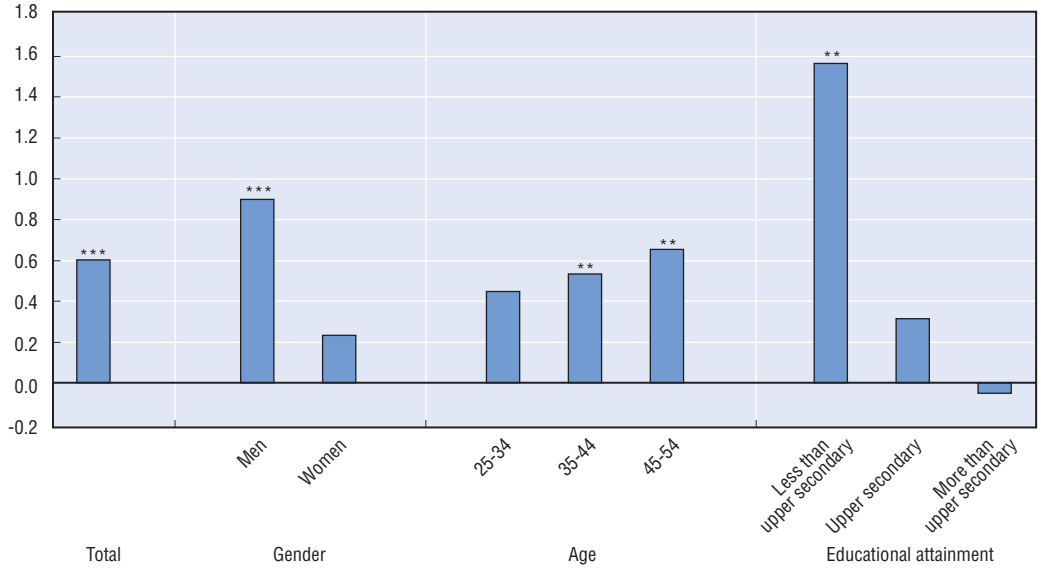
c) Percentage-point difference in annualised rates of involuntary separations between trained and non-trained employees. Involuntary separation rates are defined as the share of employees at date t who have lost their job against their will by date *t* + 1. Trained employees are defined as those who received some training between date *t* – 1 and *t*. Data refer to persons aged 25-54 years.

d) Weighted average of the following countries: Austria, Belgium, Denmark, Finland, France, Germany (German Socio-Economic Panel, SOEP), Greece, Ireland, Italy, the Netherlands, Portugal, Spain and the United Kingdom (BHPS).

Source: Secretariat calculations based on the European Community Household Panel, waves 1 to 7 (1994-2000).

Chart 4.9. **Training increases workers' chances of getting a permanent contract**

Change in the probability of being on a permanent contract as a result of training, percentage points[a, b]



***, **, * statistically significant at 1% level, 5% level and 10% level, respectively.

a) Estimates of the percentage-point impact on the probability of being on a permanent contract for an average employee who participates in some formal education or training in one additional year. Estimates are obtained by fitting a generalised ordered probit model of two-year changes in the contract status. Maximum likelihood estimation of this model takes into account the fact that left or right censoring of categories depends on the contract status of the employee at the beginning of the period. Controls are: two-year differences of age, age squares, tenure, tenure squared, log wage, log of hours worked, public/private employment and number of previous jobs, as well as dummies for lagged contract type, voluntary or involuntary separations in the two-year reference period and country per year dummies.

b) The sample includes the following countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, the Netherlands, Portugal, Spain and the United Kingdom (British Household Panel Survey, BHPS).

Source: Secretariat calculations based on the European Community Household Panel, waves 1 to 7 (1994-2000).

sharp in this case than in the case of subjective perceptions of job security. For instance, conditional on changing job, for each year in which they received previous training, employees aged from 45 to 54 years increase their probability of being in a permanent contract by almost 0.7 percentage points.

As conjectured in Section 3, the fact that training seems to have a stronger impact on job loss risk than on wages (conditional on being employed) in the case of older prime-age workers can be easily explained through the effect of skill obsolescence on the age profile of the productivity-wage gap: in the presence of downward wage rigidity, skill obsolescence compresses the wedge between productivity and the wage, thereby increasing the risk of job loss without affecting the wage level conditional on keeping the job. In this case training is required to maintain workers' competences so that their productivity will match their wage. If the wage structure is compressed, a similar argument can be generalised to all low-productivity workers (including, potentially, those with little or no qualifications). For instance, if the minimum wage is relatively high, a greater chance of being employed constitutes the main benefit from training for workers whose productivity would otherwise not match the minimum wage under all possible contingencies (Agell and Lommerud, 1997).

Training before job loss tends to reduce unemployment duration

As said above, to assess the impact of training on employment insecurity it is necessary to evaluate its effect on both the risk of job loss and the extent to which job displacement creates insecurity concerning the earnings capacity and living standards of workers and their dependants. Indeed, there seems to be a trade-off between the frequency of job loss and the resulting costs, for instance with markets with lower levels of employment protection characterised by relatively high rates of involuntary job loss, but also by relatively quick re-employment (see Chapter 2 above).

Insofar as training imparts transferable competences, it can be expected to increase re-employment probabilities in the event of dismissals, and therefore reduce the cost of job loss by reducing the length of the possible unemployment spell. Chart 4.10 shows that workers who received training or education in the year before losing their job are more frequently re-employed two years later than their untrained peers. However, cross-country variation is marked: in countries such as Austria, Belgium, Finland or Ireland, the share of trained workers who are re-employed two years after the separation is 20 percentage points greater than the share of untrained workers, while in Denmark, France, Greece, the Netherlands and Portugal, the difference between the two groups is negligible.

Chart 4.10. **In some countries, trained workers experience relatively short unemployment spells after dismissal**

Percentage[a] of people re-employed two years after dismissal

SOEP: German Socio-Economic Panel.

a) Data refer to the employment status at date *t* of persons aged 25-54 years, who were employed in *t* – 3 and experienced an involuntary separation between *t* – 3 and *t* – 2. Trained individuals are those who received some formal education or training between *t* – 4 and *t* – 3. Countries are ranked by increasing order of re-employment rate for trained people.

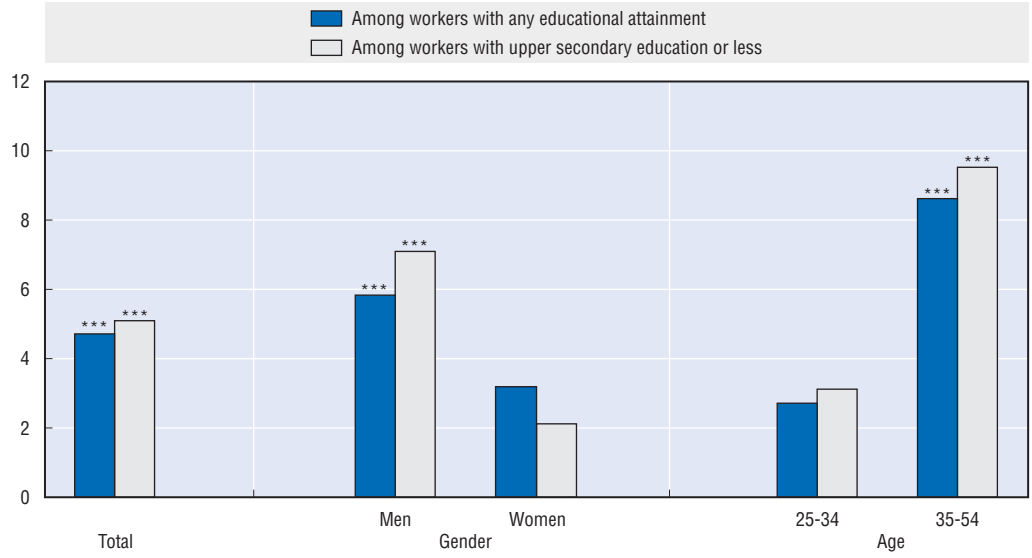
Source: Secretariat calculations based on the European Community Household Panel, waves 1 to 7 (1994-2000).

Again, no policy-relevant conclusion can be derived from this chart. Individuals receiving training might be endowed with more productive characteristics, and the apparent positive correlation between training and re-employment probabilities might not reflect a causal link. Unfortunately, due to the lack of cross-country comparative datasets where many spells of unemployment are observed for a large portion of the sample, this problem cannot be studied within a fixed-effects framework (see OECD, 2004). The analysis is therefore developed in two

steps. First, Chart 4.11 reports estimates of the effect of training and education received before job loss, obtained on the basis of a simple econometric specification wherein controls for the characteristics of the lost job as well as changes in personal and household characteristics are included. Second, this simple model is re-estimated by using matching methods to control the robustness of results to selection on observables (results from this sensitivity analysis being presented in Table 4.A1.5 in Annex 4.A1).[23]

Chart 4.11. **Training increases the probability of re-employment after job loss**

Changes in the probability of re-employment as a result of training, percentage points[a, b]



***, **, * statistically significant at 1% level, 5% level and 10% level, respectively.

a) Probit estimates of the percentage point increase in the probability of re-employment two years after an involuntary separation for an average employee due to participating in some education or training in one year while working for the employer who he/she separated from. Controls are two-year changes in health status, family type, marital status, presence of children, age, age squared, consensual union, as well as variables characterizing the job held before the separation: tenure, tenure squared, firm size, 1-digit occupation dummies, part-time status, unemployment experience before the job, log wage. Family-related variables are interacted with gender. Due to the small sample size, jointly insignificant groups of variables are dropped in the final specification, in order to have a parsimonious model.

b) The sample includes the following countries: Austria, Belgium, Denmark, Finland, Germany (German Socio-Economic Panel, SOEP), Italy, Ireland, the Netherlands, Portugal and Spain.

Source: Secretariat calculations based on the European Community Household Panel, waves 1 to 7 (1994-2000).

For persons aged from 35 to 54 years, each year in the previous (lost) job in which they received some training is estimated to increase their probability of being re-employed two years after the job loss by about 8 percentage points, on average. This effect is slightly greater (9 percentage points) if these persons have qualifications below or equal to upper secondary education and still holds if vocational training only (excluding education) is taken into account. This finding also appears to be robust to all checks undertaken in the sensitivity analysis. Conversely, results are less clear-cut for other groups, and it can be argued that certain patterns that emerge from the estimation of the baseline model (such as the apparent gender gap) might be the result of age-composition effects.

Overall, this section has shown that those workers, who do not seem to benefit from training through greater wages, can benefit from training by securing more stable employment prospects through lower job loss risk and greater chances to be re-employed quickly in the event of job loss. This is particularly the case for those categories (such as low-educated older workers) for whom their productivity-wage gap is more likely to be

increasingly compressed – as they age – by companies' personnel policies and/or institutional arrangements (such as minimum wages). Once foregone income due to non-employment spells is taken into account, training premia for these groups appear to be large.

Conclusions

The 2000 Nobel Prize winner in economics James Heckman argued that "in evaluating a human capital investment strategy, it is crucial to consider the entire policy portfolio of interventions together (training programmes, school-based policies, school reform, and early interventions) rather than focusing on one type of policy in isolation from the others. […] We cannot afford to postpone investing in children until they become adults, nor can we wait until they reach school age – a time when it may be too late to intervene. Learning is a dynamic process and is most effective when it begins at a young age and continues through to adulthood" (Heckman, 2000, p. 50). This observation is key for policy guidance. Nevertheless, as noted by Blundell (2000), Heckman's remarks do not imply that later interventions have no pay-off, and indeed the OECD Jobs Study enumerates several reasons why "the prevailing approach to human resource development based on systematic provision of 'front-end' formal education and training preceding entry to the labour market is increasingly insufficient" (OECD, 1994b, p. 154). It is therefore desirable to complement early interventions with policies for adult learning.

This chapter has provided evidence that training has indeed a positive impact on individual labour market performance. Furthermore, the chapter shows that potential benefits from training are not limited to those individuals who have already adequate skills, high wages and good employment prospects. In particular, in the case of more mature and less educated workers, training plays an important role in enhancing employment security. Altogether, this suggests that well-designed policies to foster lifelong learning can complement making-work-pay schemes and effective active labour market programmes, with the aim of "minimising the number of people who do not attain and maintain the skills required to command earnings that bring them above the poverty threshold" (OECD, 1999a, p. 12).

Three detailed recommendations of the OECD Jobs Strategy focused on improving "the incentives for enterprises and workers to invest in continued learning" (OECD, 1994a, p. 48):

a) Enable workers to alternate between work and extended periods of off-the-job training over their working life (*e.g.* through reductions in working time that are compensated by increases in training time).

b) Implement a training levy/grant scheme to stimulate enterprises to undertake more skill development or a system of "training credits" for adult workers which permits them to acquire new skills at certified training establishments or firms; pay specific attention to design and enforcement mechanisms so as to minimise deadweight and substitution effects.

c) Make the value of skills relative to other factor inputs more transparent (*e.g.* by encouraging changes in financial accounting and reporting practices and related institutional arrangements), so that workers and firms can treat them as long-term assets.

Based on the results of this chapter as well as Chapter 5 of the 2003 *Employment Outlook*, several comments are in order with respect to these policy recommendations. First, co-financing schemes – under which employers, employees and governments jointly finance training – must be geared at reducing *marginal* (direct and opportunity) costs, in order to minimise deadweight losses. What counts for individual or employer's decisions to invest in

training is the difference between marginal expected benefits and marginal training costs. For firms that would have spent up to the legal minimum anyway, "train or pay" levy/grant schemes do not increase incentives to invest in training. Conversely, by covering total costs up to a pre-determined ceiling, "train or pay" levy/grant schemes "overpay" the increase in training investment they induce on the part of firms that would have spent less than the legal minimum in the absence of the scheme.[24] What is more, individuals and organisations are more likely to be effective in monitoring service quality when the subsidy is a *matched* contribution and they have some own resources at stake.

Second, as a general rule, it seems preferable to favour financing schemes with large leverage potential, which have greater scope to minimise deadweight as well as the *costs* for the public budget. These schemes include regulatory and institutional arrangements that allow mobilising substantial private resources from both employers and employees, with limited public co-financing (for example, pay-back clauses, apprenticeship contracts, time accounts, company-based individual learning accounts, etc.; see OECD, 2003a), as well as policy measures that favour the establishment of training consortia pooling together resources from different enterprises. The typical example of the latter is the German co-management of the apprenticeship system by business associations (see *e.g.* Soskice, 1994). Nevertheless, various types of training consortia are gaining momentum also in many other countries, both with and without public financial support (see Box 4.4 for Korea, as well as Box 4.2 above for one example concerning the United States).

Box 4.4. **Pooling resources together: training consortia in Korea**

To address skill shortages and to facilitate training provision, training institutions of large enterprises (including multinational enterprises – MNEs) in Korea have pooled resources to create joint training centres to cater for partners (*i.e.* suppliers, distributors, and subcontractors), most of which are small or medium-sized enterprises. The benefit of this collaboration is to increase efficiency and quality of training delivery by sharing resources and know-how of pre-existing training institutions, to enlarge the pool of training recipients to employees of all partner enterprises, as well as to streamline curricula while providing flexible and demand-driven programmes. The government provides support by subsidising the consortium itself as well as partner enterprises and their employees, as established by the Promotion of Vocational Training of Workers Act of 2001.

Two training consortia recently established by Samsung Heavy Industries (SHI) and Volvo are good examples of this initiative. Facing severe skilled labour shortages and inadequate quality of intermediate products supplied by partner enterprises, SHI created a joint training facility for partner enterprises. The pilot project started in 2001 by developing and delivering training programmes and materials that reflect the skill needs of partner enterprises. The preliminary assessment of this pilot indicates a positive improvement in both access to and completion of training: in 2002, 92% of partner enterprises participated in the training programme with a 98% completion rate for trainees (KRIVET, 2004). The Volvo training consortium is an example of a MNE-driven strategy to pool training resources to improve the skill level of suppliers and subcontractors. This scheme benefited not only Volvo – by raising the quality of inputs from its suppliers – but also partner companies – by raising the efficiency and quality of their production process. In the light of this success in mobilising enterprise-driven consortia, the Korean government is currently considering the possibility of supporting the establishment of industry-wide and region-wide training consortia.

Third, policy action can also increase individual *benefits* from training. By fostering the *portability* of skills and *transparency* in the signalling of learning outcomes, trained workers can better price themselves into higher-pay jobs. Many countries have introduced standardised competence-based qualification systems, according to which acquisition of qualifications is not conditioned to course attendance in vocational training or educational institutions. Under these systems, workers are allowed to take individual skill tests independently of the way skills are acquired. Yet, much remains to be done to ensure the correct functioning of these mechanisms (Bjørnåvold, 2002; OECD, 2003b). But the need to proceed faster down this route is key in the context of labour market reforms. In fact, the whole set of policy recommendations of the OECD Jobs Strategy is "designed to improve the abilities of economies and of societies both to cope with, and benefit from, change, by: *i)* enhancing the ability to adjust and adapt; and *ii)* increasing the capacity to innovate and be creative" (OECD, 1994a, p. 43). In practice, this implies making the reallocation of resources within the economy more rapid and smoother, thereby requiring workers to be able to move efficiently from one job to another many times during their working life.

Fourth, while simultaneously increasing the share of training benefits potentially reaped by workers, enhancing the portability of skills – as well as fostering efficient labour reallocation and wage flexibility through labour market reforms – is likely to decrease the share of these benefits that is appropriated by employers. In the presence of capital or training market imperfections, however, employees might not find themselves to be able to afford and/or accept to increase their share of training financing.[25] For instance, credit constraints may create a barrier to training of low-educated (low-income/low-wealth) workers or these workers may find it difficult to negotiate with their employers about the content and quality of training programmes. In such a situation, in order to raise incentives for firms to invest in training, corporate tax deductions – possibly financed through a specific corporate levy and in any case covering less than total training costs[26] – might be required to sustain training outcomes.

Notes

1. Four exceptions to be noted are Bassanini and Brunello (2003), Kuckulenz and Zwick (2003), Leuven and Oosterbeek (2004) and Arulampalam *et al.* (2004).
2. These studies tend to be plagued by selection bias. See Bishop (1997) and Ok and Tergeist (2003) among others.
3. The latter phenomenon can occur in two cases. First, if wages are compressed with respect to productivity, a negative shock will more frequently push individual productivity (in nominal terms) below the wage in the case of low-productivity (low-educated) workers. Second, if firms invest more in job-specific capital for the high-educated – or if vacancies for jobs usually held by the high-educated are more costly to fill – firms will hoard high-educated workers even if the productivity-wage gap becomes temporarily negative, since job-specific capital would be lost upon lay-off (Oi, 1962; and Hamermesh, 1993, are classic references on this issue).
4. For example, Gautier *et al.* (2002) use a unique dataset for the Netherlands – where they can control for workers, jobs and firm characteristics – and find that in cyclical downturns firms do not increase the average educational attainment of inflows in any particular job, although they decrease the average educational attainment of outflows, at any level of job complexity. The existence of job competition would have required an increase in the average educational attainment of inflows, at least for low-complexity jobs (see *e.g.* Okun, 1981).
5. For instance, all these mechanisms may reflect the possibility that education acts as a sorting-screening device to select high-ability individuals, so that increasing the educational attainment of all workers would not result, other things equal, in higher productivity (see *e.g.* Weiss, 1995).

6. The baseline specification considered in Chapter 2 as been augmented by average years of educational attainment in the population, time dummies and real GDP. The latter variable controls for country-specific trends (due to *e.g.* technical change) and is "demeaned" by subtracting its country-specific sample mean in order to eliminate size effects. Two different variants of this augmented model are estimated using both fixed and random effects. Beyond the base model, a reduced model, excluding the institutional variables with less time variation, is estimated. The latter model is motivated by the fact that the effect of institutions that do not change much over time might be poorly estimated once fixed effects, time dummies and two variables with a strong time trend (GDP and education) are included in the specification. On the other hand, time dummies and GDP growth must be included because otherwise the coefficient of education will just capture the upward historical trend in participation rates.

7. See Barron *et al.* (1999), Dearden *et al.* (2000) and Ballot *et al.* (2001) for recent evidence for the United States, the United Kingdom as well as France and Sweden, respectively; see also Bartel (2000) for a survey of previous studies.

8. Unfortunately, unlike the case of the aggregate education-employment relationship, the cross-sectional nature of cross-country comparative data on training does not allow a pooled cross-country/time-series model. Nevertheless, the partial correlation between training and labour market performance (once education and institutions have been controlled for) can be estimated by looking at the bivariate correlation between employee training and the fixed effects obtained from estimating the models used for Table 4.A1.1.

9. This figure surges up to more than 70% upon elimination of two outliers (Portugal and Switzerland).

10. The entire micro-analysis is based on the European Community Household Panel (ECHP), the British Household Panel Survey (BHPS) and the German Socio-Economic Panel (SOEP). The choice of the datasets is due to the need of preserving cross-country comparability of training measures (see Annex 4.A2).

11. The fact that participation rates are smaller in the case of training received in both years is not surprising, since individuals in full-time education cannot be excluded from the sample. Indeed, when formal education is excluded, participation rates are higher in the case of individuals who received some training in both years. In order to limit the bias induced by individuals still participating in initial education, persons aged 24 years or less are not considered in the analysis.

12. In this chapter, workers aged 45 to 54 years are termed "older prime-age workers" to distinguish them from "younger prime-age workers" (aged 25 to 34 years) and "mature prime-age workers" (aged 35 to 44 years). Due to sample size problems, workers aged 55 years or more could not be included in the analysis.

13. More precisely, Charts 4.4 and 4.5 show the effect of a 10% increase in the number of years in which an individual endowed with average characteristics has received some training (see also Box 4.3). In fact, available data allow establishing only whether an individual participated in training in a specific year, but it is not possible to identify either the number of training spells taken or the hours of training he/she received. As a consequence, all training measures used in the remainder of this chapter can at most be based on the number of years in which an individual received some training (see Annex 4.A2).

14. To perform these tests, contemporaneous or lagged group-specific and aggregate training and/or employment rates are included into the econometric specifications used for Charts 4.4 and 4.5 (substituting year dummies for country-year dummies). Since the individual effect of training is controlled for in the regression, one might expect that, if within-group crowding out is important, the estimated effect of the group-specific training rate on participation (unemployment) will be negative (positive). However, this argument is not correct because of the possible endogeneity of group-specific training and participation (unemployment) rates with, say, the rate of technological change. Nevertheless, a first possible test can be based on the *simultaneous* inclusion in the specification of *lagged* group-specific employment and training rates. In fact, since the positive (negative) relationship between technological change and participation (unemployment) is controlled for by the lagged employment rate – and the individual effect of training is controlled for by the individual training stock – it can be expected that, if within-group crowding out is important, the estimated coefficient of the lagged group-specific training rate on participation (unemployment) will be negative (positive). A second alternative consists in including in the specification both *group-specific* and *economy-wide* training rates (either contemporaneous or lagged). Although both the estimated coefficients of these measures are likely to be biased upwards (downwards), it can be argued that if group-specific crowding-out effects are more important than economy-wide ones, the difference between the estimated coefficients of group-specific and economy-wide training rates should be negative (positive).

Appealing though it might be, this second alternative has the drawback of making the implicit unwarranted assumption that the upward (downward) bias on the estimated coefficient of the group-specific training rate is no greater than that on the coefficient of the aggregate training rate. These tests are performed for nine groups of age by educational attainment levels and test statistics are reported in Tables 4.A1.3 and 4.A1.4.

15. To be more precise, the results are less clear-cut for unemployment than for participation (compare Table 4.A1.3 and Table 4.A1.4), although this should come as no surprise once the findings from the aggregate analysis are taken into account. The only exceptions are perhaps younger low-educated workers for whom test statistics are not robust.

16. The economic literature is crowded with empirical results on the issue. See Bishop (1997), OECD (1999b), Leuven (2003) and Ok and Tergeist (2003) for recent surveys.

17. Still, they are significant at the 10% level in almost all countries for which separate premia could be estimated (to limit the risk of unreliability, country-specific estimates are not computed when there are less than 100 individuals who received some training before a job change within the sample window and/or when these individuals represent less than 2% of the sample of individuals).

18. See Loewenstein and Spletzer (1998, 1999) and Parent (1999), for the United States, Fougère *et al.* (2001), for France, Blundell *et al.* (1999) and Booth and Bryan (2002), for the United Kingdom, and Gerfin (2003), for Switzerland. These papers interpret the fact that the training wage premium increases in the aftermath of job change as evidence of employers' market power. However, there are at least two other possible explanations. First, the training firm does not always have a high-pay position to offer to the trained worker. In this case – if competences acquired through training are transferable – trained workers may have better job options outside the firm. Second, workers might accept to be paid less than their marginal product in the current job if they are sensitive to reciprocity. In particular, workers might interpret the firm's investment in general training as a kind action which deserves reward in the form of wage moderation after the training (Leuven *et al.*, 2004).

19. This is due to the fact that the quality of the job-match might not be known by workers at the moment of hiring and training provision by the employers might be one of the channels through which information on job-match quality is disclosed: receiving employer-sponsored training, employees realise that their employers do not intend to lay them off or, in the case of temporary workers, that their contract will be renewed or transformed, thereby improving their perception of job security, with no causal effect of training.

20. For this chapter, three types of models (linear, Gaussian interval regression and generalised ordered probit models; see OECD, 2004) have been estimated with qualitatively identical results. The models use the two-year difference in perceived job security as dependent variable and, given that the use of long differences reduces sample size, no separate estimation by country is attempted. Results from the Gaussian interval regression model are presented in Chart 4.7.

21. In this chapter, voluntary quits correspond to separations due to better job opportunities, according to the respondent. Involuntary separations refer to individuals who reported they were "obliged to stop by employer", "end of contract" or "sale/closure of own or family business" as well as those who experienced an unemployment spell after separating from the last job.

22. In contrast to Chart 4.7, Chart 4.9 presents the results obtained from the generalised ordered probit model of changes in the contract status over a two-year period. In fact, as contract status is a dichotomous variable, it is easy to express the estimates from the generalised ordered probit model in terms of percentage-point impact on probabilities.

23. The absence of appropriate instruments for training makes it impossible to control for selection on unobservables. In order to correct for selection on observables, matching methods based on the propensity score are used (Nearest Neighbour matching and Gaussian Kernel matching based, in both cases, on a common support; see OECD, 2004). Note also that the labour market groups used in this analysis are more aggregate than in the other analyses of this chapter. This is done to preserve sample size, which can become easily a problem when a common support is used to implement propensity score matching methods. For instance, in the case of workers aged from 35 to 54 years with upper secondary education or less, there are only 1 631 observations in the sample; of these, 1 268 are effectively used in the Kernel matching estimation and only 210 in the Nearest Neighbour matching estimation.

24. Train-or-pay schemes confront employers with a financially neutral choice between training (and not paying the tax), or not training (and paying the tax). Funds collected this way are then distributed to firms in the form of additional grants. Strictly speaking, firms receive no automatic subsidy, since grants are not necessarily awarded. "Train-or-pay" levies, however, are equivalent to schemes where

there is a tax of a given percentage of payroll independent of training expenditures, a 100% automatic subsidy of training expenditures up to that percentage of payroll, and an additional grant awarded through case-by-case analysis of training projects (see OECD, 2003a).

25. See OECD (2003a) for a discussion of the effect on training provision of the interaction among different market failures.

26. In countries where corporate tax deductions are used (*e.g.* Austria, Italy, Luxembourg and the Netherlands) the average deduction rate is approximately 120% of training expenditures, which implies a 20% subsidy to firms (see OECD, 2003a for a discussion of different types of financial incentives for firms). Note also that in most other countries the costs associated with training are treated by tax regulations as a cost of doing business and deducted from taxable income of employers. As such, however, the treatment is similar to that of investment in fixed assets (where depreciation is deducted from taxable income), and certain forms of investment in intangible capital (such as R&D costs that are deducted from taxable income), but is not tax incentive.

ANNEX 4.A1

Supplementary Evidence

Table 4.A1.1. **Education and employment go hand in hand**

Fixed and random-effect estimates of the association between education and labour market performance

	Fixed effects base model[a]	Random effects base model[a]	Fixed effects reduced model[b]	Random effects reduced model[b]
		Panel A. Employment rate		
Percentage-point change associated with education[c]	**1.06**	**1.32****	**1.55*****	**1.85*****
Number of observations	219	219	251	251
Number of countries	19	19	21	21
Hausman test (P-value)	–	1.00	–	0.00***
		Panel B. Activity rate		
Percentage-point change associated with education[c]	**1.15****	**1.24****	**1.59*****	**1.72*****
Number of observations	219	219	251	251
Number of countries	19	19	21	21
Hausman test (P–value)	–	1.00	–	0.84
		Panel C. Unemployment rate		
Percentage-point change associated with education[c]	**–0.17**	**–0.65****	**–0.30**	**–0.55***
Number of observations	219	219	251	251
Number of countries	19	19	21	21
Hausman test (P-value)	–	0.81	–	0.11

Dependent variable indicated in the title of each panel.

***, **, * statistically significant at 1% level, 5% level and 10% level, respectively.

a) Base model: additional controls are tax wedge, expenditures on active labour market policies (ALMP), replacement ratio, index of employment protection legislation (EPL), centralisation/corporatism index, collective bargaining coverage, logarithm of demeaned GDP (in volume), output gap and year dummies.

b) Reduced model: same controls as for the base model, except for EPL and wage-bargaining variables.

c) Percentage-point change in the dependent variable associated with one extra year of average educational attainment in the population.

Source: Secretariat estimates based on the International Adult Literacy Survey (IALS), the Second Continuing Vocational Training Survey (CVTS2), data from Bassanini and Scarpetta (2002), and Chapters 2 and 3 of this publication.

Table 4.A1.2. **The correlation between training and employment is not only due to institutions and education**

Two-step estimates of the partial correlation between employee training and labour market performance

	Employment rate, base model[a]	Employment rate, reduced mode[b]	Activity rate, base model[a]	Activity rate, reduced model[b]	Unemployment rate, base model[a]	Unemployment rate, reduced model[b]
Training participation[c]	0.58**	0.59***	0.65***	0.68***	–0.08	–0.04
Training hours[d]	0.52**	0.48**	0.61***	0.63***	0.06	0.18

The table shows the correlation coefficient between training variables and the country fixed effects obtained from aggregate regressions presented in Table 4.A1.1.

***, **, * statistically significant at 1% level, 5% level and 10% level, respectively.

a) Base model: additional controls are tax wedge, expenditures on active labour market policies (ALMP), replacement ratio, index of employment protection legislation (EPL), centralisation/corporatism index, collective bargaining coverage, logarithm of demeaned GDP (in volume), output gap and year dummies.

b) Reduced model: same controls as for the base model, except for EPL and wage-bargaining variables.

c) Ratio of employees receiving training in one year to total employees.

d) Annual training hours per employee.

Source: Secretariat estimates based on the International Adult Literacy Survey (IALS), the Second Continuing Vocational Training Survey (CVTS2), data from Bassanini and Scarpetta (2002), and Chapters 2 and 3 of this publication.

Table 4.A1.3. **Tests of within-group crowding-out effects (activity)**

Z-statistics[a]

	Model i[b]	Model ii[c]	Model iii[d]
More than upper secondary education			
Aged 25-34	–0.46	–1.34	0.89
Aged 35-44	–1.84*	1.23	1.37
Aged 45-54	–1.52	0.88	–0.54
Upper secondary education			
Aged 25-34	–0.54	0.87	0.50
Aged 35-44	2.12**	2.82***	1.19
Aged 45-54	0.73	0.91	0.58
Less than upper secondary education			
Aged 25-34	–2.12**	2.06**	–1.96*
Aged 35-44	1.46	2.37**	1.97**
Aged 45-54	–0.87	0.59	–1.08

***, **, * statistically significant at 1% level, 5% level and 10% level, respectively.

a) A fixed effect logit specification with the same controls as for Chart 4.4 is used, except that aggregate variables and year dummies are included in substitution of country per year dummies.

b) Included aggregate variables are lagged group-specific training participation and employment rates. The reported statistics refer to testing that the coefficient of training participation is significantly different from zero. A significantly negative value suggests the presence of within-group crowding-out effects.

c) Included aggregate variables are group-specific and economy-wide training participation rates. The reported statistics refer to testing that the difference between the coefficients of group-specific and economy-wide training participation is different from zero. A significantly negative value suggests that group-specific effects are stronger than economy-wide ones.

d) Included aggregate variables are lagged group-specific and economy-wide training participation rates. The reported statistics refer to testing that the difference between the coefficients of group-specific and economy-wide training participation is different from zero. A significantly negative value suggests that group-specific effects are stronger than economy-wide ones.

Source: Secretariat calculations based on the European Community Household Panel, waves 1 to 7 (1994-2000).

Table 4.A1.4. **Tests of within-group crowding-out effects (unemployment)**

Z-statistics[a]

	Model i[b]	Model ii[c]	Model iii[d]
More than upper secondary education			
Aged 25-34	0.80	1.20	–0.90
Aged 35-44	0.48	2.56**	0.18
Aged 45-54	0.10	–2.23**	–1.59
Upper secondary education			
Aged 25-34	–0.29	–1.35	–1.36
Aged 35-44	–0.19	1.98**	1.20
Aged 45-54	–0.69	1.85*	–0.44
Less than upper secondary education			
Aged 25-34	–0.04	0.35	3.20***
Aged 35-44	–1.08	–0.54	0.04
Aged 45-54	–1.03	0.79	0.35

***, **, * statistically significant at 1% level, 5% level and 10% level, respectively.

a) A fixed effect logit specification with the same controls as for Chart 4.5 is used, except that aggregate variables and year dummies are included in substitution of country per year dummies.

b) Included aggregate variables are lagged group-specific training participation and employment rates. The reported statistics refer to testing that the coefficient of training participation is significantly different from zero. A significantly positive value suggests the presence of within-group crowding-out effects.

c) Included aggregate variables are group-specific and economy-wide training participation rates. The reported statistics refer to testing that the difference between the coefficients of group-specific and economy-wide training participation is different from zero. A significantly positive value suggests that group-specific effects are stronger than economy-wide ones.

d) Included aggregate variables are lagged group-specific and economy-wide training participation rates. The reported statistics refer to testing that the difference between the coefficients of group-specific and economy-wide training participation is different from zero. A significantly positive value suggests that group-specific effects are stronger than economy-wide ones.

Source: Secretariat calculations based on the European Community Household Panel, waves 1 to 7 (1994-2000).

Table 4.A1.5. **Sensitivity analysis for the estimated effect of training on the probability of re-employment by labour market group**

Percentage points[a, b]

	Base[c]	Last year[d, e]	NNM[e, f]	Kernel[e, g]
	Panel A. Formal education or training			
Total				
Any educational attainment	4.7***	2.8	6.1**	3.3*
Upper secondary education or less	5.1***	4.4	5.5	5.6**
Gender				
Men				
Any educational attainment	5.8***	5.5*	4.3	5.3**
Upper secondary education or less	7.1***	7.0*	6.0	6.4*
Women				
Any educational attainment	3.2	–1.4	–6.3	1.3
Upper secondary education or less	2.1	–1.6	–3.5	1.6
Age				
25-34				
Any educational attainment	2.7	–0.8	–1.0	0.1
Upper secondary education or less	3.1	–0.6	–2.8	–0.1
35-54				
Any educational attainment	8.6***	8.8**	–0.3	6.7**
Upper secondary education or less	9.5***	11.8**	10.6*	11.2**
	Panel B. Training			
Total				
Any educational attainment	1.8	2.7	3.6	3.2
Upper secondary education or less	2.5	4.1	6.5*	5.1*
Gender				
Men				
Any educational attainment	6.4***	5.5*	5.1	5.4**
Upper secondary education or less	8.2**	6.8*	0.9	6.0**
Women				
Any educational attainment	–2.2	–1.4	–1.5	1.7
Upper secondary education or less	–4.8	–2.1	1.4	1.3
Age				
25-34				
Any educational attainment	–1.1	–1.0	–2.0	0.1
Upper secondary education or less	–0.9	–1.1	–0.7	–1.1
35-54				
Any educational attainment	7.7**	8.1**	5.6	6.8**
Upper secondary education or less	9.3**	11.8**	17.8***	11.3**

Table 4.A1.5. **Sensitivity analysis for the estimated effect of training on the probability of re-employment by labour market group** *(cont.)*

Percentage points[a, b]

	Base[c]	Last year[d, e]	NNM[e, f]	Kernel[e, g]
	Panel C. Formal education			
Total				
Any educational attainment	8.9***	6.8**	5.2	7.0**
Upper secondary education or less	11.5***	8.3**	3.5	7.4**
Gender				
Men				
Any educational attainment	3.3	0.6	1.9	0.7
Upper secondary education or less	5.0	4.0	–7.8	–1.1
Women				
Any educational attainment	13.9***	11.8**	18.4***	11.2**
Upper secondary education or less	18.9***	13.6**	15.8*	13.9**
Age				
25-34				
Any educational attainment	8.1**	6.2**	14.5***	7.1**
Upper secondary education or less	12.0***	8.6*	5.3	8.0
35-54				
Any educational attainment	8.6	8.4	5.3	5.1
Upper secondary education or less	8.3	3.7	3.3	2.1

***, **, * statistically significant at 1% level, 5% level and 10% level, respectively.

a) Estimates of the percentage point increase in the probability of re-employment two years after an involuntary separation for an average employee due to participating in some training while working for the employer who he/she separated from. Controls are two-year changes in health status, family type, marital status, presence of children, age, age squared, consensual union, as well as variables characterizing the job held before the separation: tenure, tenure squared, firm size, 1-digit occupation dummies, part-time status, unemployment experience before the job, log wage. Family-related variables are interacted with gender. Due to the small sample size, jointly insignificant groups of variables are dropped in the final specification, in order to have a parsimonious model. Separate estimates for training and formal education are obtained by including both variables in the same specification.

b) The sample includes the following countries: Austria, Belgium, Denmark, Finland, Germany (German Socio-Economic Panel, SOEP), Italy, Ireland, the Netherlands, Portugal and Spain.

c) Probit estimates. Training is codified as the number of years in which, during the previous job, the individual participated in some training.

d) Probit estimates.

e) Training is codified as a dummy variable, taking value 1 if the individual participated in some training in the year before the separation.

f) Estimates by Nearest-Neighbour Matching (NNM) on a common support, with a logit specification for the propensity score.

g) Estimates by Gaussian Kernel Matching on a common support, with a logit specification for the propensity score; standard errors are obtained by bootstrapping with 100 replications.

Source: Secretariat calculations based on the European Community Household Panel, waves 1 to 7 (1994-2000).

ANNEX 4.A2

Data Description

Aggregate data

Data used for Chart 4.1 come from the European Union Labour Force Surveys for EU countries and from the OECD-DELSA database on services for the other countries. Jobs are defined as industry/occupation cells. For each country, 96 jobs (industry/occupation cells) are ranked on the basis of proportion of low-educated workers in 1993 and then placed into three groups of equal size in terms of their share of total employment.

All other aggregate data used in this chapter come from Chapters 2 and 3, except for average years of education that come from Bassanini and Scarpetta (2002) and data on employee training that have been reconstructed on the basis of the following two sources (see OECD, 2003a, for more details):

- The *International Adult Literacy Survey* (IALS), which is an individual survey that was carried out by the OECD and Statistics Canada in the 1990s. The survey asks whether the workers have received any training or education during the 12 months prior to the survey, but it includes details only about the three most recent courses (purpose, financing, training institution, duration, etc.). Data refer to 1994 for Canada, Ireland, the Netherlands, Poland, Switzerland (German and French-speaking regions), and the United States, to 1996 for Australia, Belgium (Flanders only), New Zealand and the United Kingdom and to 1998 for the Czech Republic, Denmark, Finland, Hungary, Italy, Norway and the Italian-speaking regions of Switzerland.
- The second *Continuing Vocational Training Survey* (CVTS2), which is an enterprise survey covering establishments with at least ten employees and was carried out by Eurostat in 2000 in EU member states, Norway and nine countries that were candidates to EU membership at that date. It provides information on employer-sponsored training, which is taken during the year prior to the survey, for employed persons, excluding apprentices and trainees. The survey provides a large set of characteristics for the enterprises, but only gender, training participation and total training hours for the employee.

The definition of employee training in different surveys varies. Therefore, the coverage of the different forms of training is not the same across surveys. In the CVTS2, employee training is defined as courses which take place away from the place of work, *i.e.* in a classroom or training centre, at which a group of people receive instruction from teachers/tutors/lecturers for a period of time specified in advance by those organising the course. Post-graduate education is included in this definition while initial training – *i.e.* training received by a person when hired in order to make his/her competencies suited to his/her job assignment – is

excluded. In the IALS, there is a distinction between job- or career-related training and training for other purposes. Furthermore, education and training courses are divided into seven mutually exclusive categories: *i)* leading to a university degree/diploma/certificate; *ii)* leading to a college diploma/certificate; *iii)* leading to a trade-vocational diploma/certificate; *iv)* leading to an apprenticeship certificate; *v)* leading to an elementary or secondary school diploma; *vi)* leading to professional or career upgrading; and *vii)* other. For the purpose of this chapter, only job or career-related training has been considered in the analysis.

CVTS2 and IALS samples are relatively small (the number may vary depending on the training measure but it is in any case no greater than 18 countries per dataset). To increase the size and variety of the sample, for the sake of the analysis of this chapter, CVTS2 and IALS data on both training participation rates and the log of training hours per employee have been merged by using the technique suggested in OECD (1999b). First, the cross-country distributions of both surveys were standardised to have zero mean and unit variance. Second, a cross-survey training index was constructed by taking, for each country, the cross-distribution unweighted average of the available standardised values (taking the single standardised value for countries that are not present in both datasets). The problem of the cross-survey index is that its values (by having approximately zero cross-country average) are difficult to relate to actual participation rates and hours. For this reason, as a third step, cross-survey final measures were reconstructed by multiplying the cross-survey index by the average of the standard errors of the original distributions and adding the average of their means.

In the case of the IALS, several measures could be used. In the measure that was retained, only courses that were not job-related were discarded but both job-related education and vocational training courses were retained. Cross-country correlation rates of the cross-survey measures with the original CVTS2 and IALS measures are very high (greater than 0.95 in all cases). As an additional quality test, cross-survey final measures were regressed on the original measures (separately on IALS and CVTS2) without including a constant. If no systematic data modification of the levels is introduced by this data-harmonisation process, we expect that the coefficient of the original measure will not be statistically different from one. In the case of participation rates, this hypothesis cannot be rejected at the 5% level, while it is rejected in the case of training hours. The possibility of experimenting with the IALS breakdown of course types was explored to check whether a different definition of training could improve the quality of the cross-survey measure for training hours. However, all other alternatives yielded worse results (in terms of quality tests) as regards to training participation without improving cross-country comparability of training hours data.

Due to data availability, the samples used in Tables 4.A1.1 and 4.A1.2 cover only the following countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan (only Table 4.A1.1), the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom and the United States. The samples span from 1985 to 1998, although they are unbalanced, due to missing data on institutional variables for certain countries in certain years (see Chapters 2 and 3).

Individual data

The microeconomic analysis of this chapter is based on individual data from the 2003 release of the *European Community Household Panel* (ECHP). This survey provides a wealth of

information on individual income and socio-economic characteristics for all EU countries and aims to be representative, both in cross-sections and longitudinally. Due to the common questionnaire, the information contained in the ECHP is, in principle, comparable across countries, which is its main strength. Moreover, releases of the ECHP contain additional longitudinal data from other sources for certain countries – such as the German Socio-Economic Panel (SOEP) and the British Household Panel Survey (BHPS), whose questions are made comparable with those of the ECHP questionnaire.

The main question on vocational training in the ECHP is as follows "Have you at any time since January (year before the survey year) been in any vocational education or training, including part-time and short-courses?". From this question, a dichotomous variable "participation in vocational training", which takes the value 1 if the individual responded "yes" and 0 if he/she responded "no", is constructed. Similarly, the main question on formal education in the ECHP is as follows "Have you at any time since January (year before the survey year) been in any formal education course?". From this question, a dichotomous variable "participation in formal education", which takes the value 1 if the individual responded "yes" and 0 if he/she responded "no", is constructed. The distinction between formal education and vocational training is based on the corresponding categories of national Labour Force Surveys.

In the year of the interview, the stock of vocational training and formal education is increased by 1 if the individual reported to have participated in one of them in the period covered by that interview. Each training stock is further decomposed in three aggregates: training taken with the current employer, with previous employers and while not in employment. Due to the scattered nature of the information on course duration (with many missing values for many countries), start and end dates are not used for the analysis of this chapter. This has two consequences. First, training reported in one interview is attributed to belong to the period between that interview and the previous one, although it might have been taken before the latter. This is equivalent to increasing the risk of false reporting, which, as shown by Frazis and Loewenstein (1999), is likely to bias returns towards zero. Second, training reported in one interview is either considered to have been taken with the current employer at the time of the interview or, if the individual is not in employment at that time, to have been taken while not in employment. If, at a given interview, the individual says he/she has separated from the employer he/she was working for at the time of the previous interview, the training reported in previous interviews as training with the current employer is added to the stock of training taken with previous employers and the stock of training with the current employer is re-set to either 0 or 1 (depending on whether training is reported in the current interview).

The microeconomic analysis of this chapter is limited to individuals aged from 25 to 54 years. Due to data availability a person is defined as employed if he/she works at least 15 hours per week. Moreover, employee's gross hourly wages are computed from gross monthly earnings in the main job at the date of the interview, by dividing them by 52/12 and by usual weekly hours of work. Overtime pay and hours are included.

The ECHP release used in this chapter contains data from 1994 to 2000. Although, in principle, the ECHP covers 15 European Union countries, the country sample in the different analyses is chosen on the basis of data availability. Luxembourg and Sweden never appear in the analysis – due to the small sample size for the former and the absence of longitudinal data for the latter. SOEP and BHPS sources are preferred for Germany and

the United Kingdom, respectively, since data from ECHP sources on these two countries are not available after 1996. Nevertheless, due to a change in the BHPS questionnaire, starting in 1998, only the waves 1998-2000 are used for the United Kingdom; and due to the lack of information on subjective perceptions of job security in the SOEP, ECHP data are used for Germany in the analysis of Section 4. Furthermore, data for Austria are not available in 1994 and data for Finland are not available in 1994 and 1995. In addition, observations for certain countries and certain years are excluded from the sample in the case of specifications including wages as dependent variable or co-variate, due to lack of time-series comparability of wage data – notably, 1995 for Austria, 1994 and 1997-2000 for France, 1994-1996 for Greece, 2000 for Ireland, and 1994 for Spain. Finally, the United Kingdom is excluded from the analysis of the probability of being active or unemployed, since the unemployed cannot be distinguished from the inactive in BHPS data, while Ireland is excluded from the analysis of subjective perceptions of job security due to a large number of missing values.

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