Chapter 3

TRAINING OF ADULT WORKERS IN OECD COUNTRIES: MEASUREMENT AND ANALYSIS

Summary

Recent economic experience underlies the importance of a highly skilled workforce. While a good initial education provides an essential foundation, learning continues through the working years and national skill development systems should be assessed in terms of how effectively they support the goal of life-long learning, recently endorsed by OECD Member governments. Policies encouraging wide participation of the adult workforce in continuing training may be able to play an important role in assuring strong economic growth and broadly-based prosperity. International comparisons of continuing training, including an analysis of the causes and consequences of cross-country differences, would be very useful for assessing the potential scope for and choices among such policies, but little systematic information has been available concerning these issues. This chapter assembles some of the available evidence and discusses its implications for policy-making and data collection.

The empirical analysis proceeds along two tracks. First, four "harmonised" surveys of training are used to assemble a set of "stylised" facts concerning international differences in the level and distribution of training for 24 OECD countries. The robustness of these comparisons across different surveys and training measures is assessed, as are their implications for understanding international differences in human capital investment and economic outcomes. Several of these issues are then examined in greater depth using independent – but broadly comparable – national surveys, which provide more detailed information on training. Multivariate statistical techniques are used to analyse both individual probabilities of training and the relationship between training and individual earnings.

Training patterns differ significantly across OECD countries. Although it is not possible to make precise comparisons, the evidence is robust that the level of formal continuing training is relatively low in southern European countries such as Greece, Italy, Portugal and Spain, and relatively high in the United Kingdom, France and most Nordic countries. Workers tend to receive more training in countries with higher educational attainment and achievement, as well as in countries devoting a larger share of GDP to research and development and achieving a strong trade performance in "high tech" industries. This suggests that educational reform and greater training are mutually reinforcing, due to the associated tendency for firms to specialise in economic activities requiring higher skills across a broad spectrum of the workforce. While improving initial education should increase training levels for future cohorts of workers, policies to improve the training received by the current workforce are also desirable. Since a key distinguishing feature of high-training economies is that participation in training is more evenly distributed, policies enhancing the incentives and resources for investing in the continuing training of workers typically receiving little training may be of particular importance. However, the analysis of the determinants and consequences of training is not yet sufficiently developed to provide policy makers with reliable estimates of the economic returns that would accrue to specific policy approaches. Further progress in the harmonisation of training statistics could make a useful contribution to filling that gap.

Chapter 3

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Introduction

The critical importance of a highly skilled workforce in an increasingly "globalised" and "computerised" economy has become a commonplace. At the individual level, a good education is increasingly decisive for employment prospects and earnings levels [Blau and Kahn (1996); OECD (1997*d*, *e*)]. Human capital formation also appears to be an important precondition for the economic success of firms and national economies, although these links are more difficult to verify [Griliches (1996); OECD (1998*d*)]. This evidence suggests that policies encouraging wide participation in education and training are an important component of an overall strategy to achieve broadly-based prosperity.

The skills and competences of the workforce are the product of a large variety of learning activities that take place in diverse institutional contexts. While good initial education provides an essential foundation, learning continues through the working years. This suggests that national skill development systems should be assessed in terms of how effectively they support the goal of life-long learning. Consistent with this perspective, researchers assessing the potential economic contribution of human capital investments have increasingly emphasised the importance of *continuing vocational training*, including informal on-the-job learning [Lynch (1994); Booth and Snower (1996)].

Very little is known concerning international differences in continuing training or their causes and consequences [OECD (1991, 1993)]. Such information would be useful for assessing policy choices related to training, such as whether to encourage an overall increase in training levels or to attempt to redirect training investments toward groups in the workforce currently receiving little training. Prior research suggests that differences across national labour markets, such as those documented for labour turnover rates and the degree of wage compression, could have important effects on the incentives of businesses and workers to invest in training [Acemoglu and Pischke (1999); Lynch (1994)]. If these or other factors result in significant differences in training patterns, there could be important consequences for workforce skills and labour market performance. This chapter conducts an exploratory analysis of these issues.

Section I surveys prior research on continuing training, while Sections II and III present new empirical results on comparative training patterns. Section II uses four "harmonised" surveys of training to assemble a set of "stylised" facts concerning differences in the level and distribution of training across 24 OECD countries. The robustness of these comparisons across different surveys and training measures is assessed, as are their implications for understanding international differences in human capital investment and economic outcomes. Section III examines several of these issues in greater depth using independent – but broadly comparable – national surveys, which provide more detailed information on training. Multivariate statistical techniques are used to analyse individual probabilities of training and the relationship between training and individual earnings. A concluding section considers implications for policy.

Several limitations of the analysis require emphasis. This chapter analyses only one type of job training, namely, continuing and more or less formal training received by *incumbent* workers. Most of the analysis is limited to workers between the ages of 25 and 54 years, since this restriction avoids complications related to international differences in initial education [OECD (1994, 1998*f*)] and retirement patterns [OECD (1998*e*)]. Because most continuing training of employees is sponsored – at least in part – by employers, employer-provided training is emphasised. However, worker-financed training and public training programmes receive some attention, as does training received by adults not currently employed. Finally, training is measured in terms of the resources invested, not in terms of the learning achieved.

Main findings

The main findings of the chapter are:

- The level of training differs significantly across OECD countries. Although it is not possible to make

precise comparisons, the evidence is quite robust that formal, continuing training is relatively low in southern European countries such as Greece, Italy, Portugal and Spain, and relatively high in the United Kingdom, France and most Nordic countries. There also appears to be some trade-off between the extensive and intensive margins of training, with the average duration of training being higher in countries with lower participation rates.

- Overall, men and women appear to participate in job-related training at fairly equal rates, although men may receive more financial support from their employers. When expected hours of training are calculated over the 40-year period between the ages of 25 and 64, women have significantly lower training expectancies than men, due to less continuous employment. Lower training rates for part-time and temporary workers may also lower relative training access for women.
- The extent to which training falls off with age varies strongly across countries, suggesting that progress in reaching the goal of life-long learning has been uneven. Workers aged 50-54 years receive almost as much training as those aged 25-29 in the United States and the Nordic countries (except Finland), while the older group receives much less training than the younger in France, Greece, Portugal and Spain.
- Training tends to reinforce skill differences resulting from unequal participation in schooling in all countries, although the strength of this relationship varies significantly between countries. Training appears to be most evenly distributed across educational levels in Ireland, Japan, New Zealand, the Netherlands and several Nordic countries, and least equally in Belgium, Hungary and southern Europe. The positive association between more schooling and training remains strong even after controlling for other characteristics affecting the probability of training.
- Workers tend to receive more training in countries with higher overall average levels of educational attainment and achievement, as well as in countries devoting a larger share of GDP to research and development and achieving a strong trade performance in "high tech" industries. A higher overall training rate is also associated with more equal age and educational distributions of training. These patterns suggest that education and greater training are mutually reinforcing due, at least in part, to an associated tendency for firms to specialise in economic activities requiring a highly skilled workforce.
- Workers reporting recent training are paid more than other workers, but the strength of this relationship varies across countries. The pay "premium" associated with training differs between educational and gender groups within all of the countries, with the most common pattern being higher training premiums for the least educated workers.
- The strong link between national levels of educational attainment and achievement, on the one hand, and the level of workforce training, on the other, suggests that an indirect strategy of strengthening schooling is a potent – if slow – means of encouraging continuing training. Since a key distinguishing feature of high-training economies is that participation in training is more evenly distributed, policies enhancing the incentives and resources for investing in the continuing training of workers typically receiving little training are of particular importance. However, the theoretical and empirical analysis of the determinants and consequences of continuing training are not yet sufficiently developed to provide policy makers with reliable estimates of the economic returns that would accrue to specific policy approaches. Further harmonisation of training statistics could make a useful contribution to filling that gap.

I. Review of litterature

The standard model of training as human capital investment and its main critiques are briefly reviewed in this Section. The focus here is on the most recent literature developments as this topic was already dealt with in the 1991 *Employment Outlook* to which the reader is referred for a more complete treatment.

According to the standard theoretical model of training as a human capital investment [Becker (1964)], firms train workers to increase productivity and output while workers undertake training to realise future earnings gains associated with these increases in productivity. This model predicts that the costs of training are borne partly by the worker and partly by the firm. Even when training is provided by the employer, workers may indirectly pay for their training by accepting lower wages for the duration of the training period. Because trained workers may quit the firm and the benefits of training be reaped by other firms, the model predicts that firms will mainly finance *firm-specific* training, that cannot be exported to other firms, as opposed to *general* training. This model also predicts that the provision of firm-specific training will be associated with longer tenure at the firm since workers will lose part or all of their expected future earnings gains if they move to other firms. Similarly, firms

will not have an incentive to train those workers who are more likely to quit.

The main policy issue highlighted by this model is that investments in *general* training may be inadequate. Employers may be unwilling to finance enough such training because trained workers may quit the firm later on. An economic externality arises because some of the returns to the general training provided by the initial employer accrues to other firms, who subsequently hire the trained worker. However, the higher wages that a trained worker can command with other employers creates a corresponding incentive for employees to pay for their own training. Thus, a serious market failure is only likely to arise if capital market imperfections prevent workers from borrowing the money required to finance their own training.

The empirical literature has focused on testing the predictions of the conventional model:

- The positive impact of training on future earnings.
- The positive impact of training on productivity.
- Lower earnings during the training period.
- The possibility to distinguish between general and firm-specific skills and the prediction that most training provided by firms is firm-specific.
- The positive relationship between training and job tenure.
- The negative relationship between training and turnover.
- The market allocates training optimally.

Some of the most recent studies on these issues are reviewed in Table 3.A.1 in Annex 3.A to this chapter. The main conclusions from this review are summarised here.

Earnings growth after training and the event of training may not be independent variables. Unobserved individual characteristics may determine both the probability that someone is trained and the fact that they earn higher-than-average wages after the training.

Generally, most empirical work has found a positive impact of training on earnings growth. In particular, some recent studies have concluded that the earnings gains from training are significantly larger for groups of workers less-likely to be trained: less-skilled workers in the United States [Bartel (1995)] mid-educated workers in the United Kingdom [Blundell *et al*. (1996)] and women in the United Kingdom [Booth (1991)] and in Germany [Pischke (1996)].

However, theories other than human capital may explain the fact that wages increase over an individual work's life [Veum (1995)]. For example, firms may increase wages over time to reduce supervision costs [Lazear (1981)], to reduce turnover costs [Salop and Salop (1976)], to encourage employees' work efforts and their morale [Akerlof (1984)] or simply as a consequence of good employer-employee matches [Jovanovic (1979)]. Overall, individual and firm unobservables have been found to be very important in explaining wage differences across firms and individuals [Abowd *et al.* (1994, 1998)].

The literature generally confirms a positive impact of training on productivity [Bartel (1995); Black and Lynch (1996); Boon (1998)]. However, most studies suffer from the fact that it is hard to disentangle the pure effect of training from other alternative explanations of any rise in productivity.

There is very scant evidence that earnings of trainees are lower than those of comparable workers, with the exception of apprentices.

Several recent studies have investigated whether firms provide general or firm-specific training. Generally, since it hard to measure the content of training, inferences are made using information on tenure, quits, turnover rates and on earnings growth of job movers. Inferences based on such evidence favour the view that most firm training is of a general nature and exportable to other firms [Blundell *et al*. (1996); Goux and Maurin (1997); Loewenstein and Spletzer (1998); Regner (1995, 1997); Vilhuber (1997, 1998)]. A possible explanation is that training that is firm-specific may often be complementary to general training so that some elements of both have to be provided by the firm. It is also unlikely that any training will be useful only to one specific firm or vice versa to all firms in the economy.

The empirical evidence on the relationship between tenure and training is blurred, as is the relationship between turnover and training. These new facts, especially the finding that much enterprise-based training appears to be general, yet trainees do not undergo periods of lower earnings, is an argument against the validity of Becker's model [Acemoglu and Pischke (1998, 1999)]. In sum, recent empirical work calls into question the standard explanation of the determinants of employer-financed training, as well as the associated analysis of training policy.

An important stream of literature has investigated whether market forces alone are likely to be efficient in allocating training optimally across workers as is implied by the standard model, in the absence of capital market imperfections [Lynch (1994); Booth and Snower (1996)]. If not, there is a market failure and some government intervention to subsidise on-the-job training may be needed.

Lynch (1994, p. 22) surveys studies of training in different OECD countries and concludes that "different" systems are more or less successful in overcoming market failure and that it is difficult for individual firms to move unilaterally from one training system to another. For example, Japanese firms appear to have a strong tradition of training their workers. According to Hashimoto (1994), the secret of successful firm training in Japan lies in the close link with the education system and in the fact that training is not only of a technical nature, but also involves teaching workers to co-operate with each other. In particular, it is a prize for senior workers to be able to pass on their knowledge to more junior workers.

Most studies find that employers tend to train their better educated workers more [OECD (1991); Lynch (1994); O'Connell (1998); Blundell *et al.* (1996); Shömann (1998)]. The empirical literature also indicates that larger firms, firms that pay above-average wages and more capital-intensive firms are more likely to train their workers. There is some evidence that workers on part-time jobs are less likely to be trained, as argued in Chapter 1, and the same applies to workers on temporary contracts [Arulampalam and Booth (1998*a*)].

Absent good rate of return data, it is difficult to judge whether the uneven distribution of training indicates a market failure in the allocation of training. Clearly, however, there are equity concerns. For example, training by firms appears to reinforce patterns of poorer labour market performance of the less-educated. The empirical evidence indicates that firm training and formal schooling complement each other. Not only do firms invest more in training their better educated workers, but they also may spend more resources in the screening and hiring of workers that they expect to train later on [De Grip and Hoevenberg (1996); Burdett and Cunningham (1998)].

In sum, the predictions of a positive impact of training on workers' earnings and productivity are generally confirmed by the empirical literature while other important predictions of the standard model do not find much empirical support.

Alternative theories have recently been formulated that may better explain the evidence [see, for example, articles in Booth and Snower (1996)]. Most recently, Acemoglu and Pischke (1998, 1999) have put forward a different model of firm-provided training. They argue that non-competitive labour markets often compress the structure of wages and this provides an incentive for firms to invest in general training. The authors argue that employers and employees will share the costs of training depending on how compressed the distribution of wages is. The more compressed the wage distribution, the higher is the incentive for employers to train workers in order to reap the benefit of productivity gains that are not passed on to these workers in the form of higher wages. A more compressed wage distribution may also lower workers' incentives to invest in training, but the net effect on training will be positive if employers play the dominant role in determining the level of training.

The authors illustrate possible sources of wage compression. The current employer has information about workers' abilities that other employers do not have access to; this is shown, under given circumstances, to lead to wage compression and incentives to train. Quits impose costs on the current employer who has to replace the worker in question and on workers who have to invest resources in finding a new job; these costs may create some job-match rent that is shared between the current employer and the worker through bargaining. Employers may have an incentive to pay workers more than their marginal productivity when they first hire them – to increase their work effort or to reduce their quit probability, as in efficiency-wage models – and to train them later on to increase their productivity up to the level of the wage or above. Minimum wages may result in more training of workers whose productivity is initially below the wage level. Trade unions may compress the structure of wages by making employers pay higher wages to less-skilled workers.[1]

This theory has not yet gone through much empirical testing [Acemoglu and Pischke (1998, 1999)]. However, it can better account for the key finding that firms pay for a substantial share of general training. The theory also suggest that international differences in labour market institutions and practices, such as wage setting and labour turnover patterns, may have an important influence on the extent to which the private market provides an optimal level and distribution of training.

II. Training across countries: lessons from "harmonised" surveys

A. Sources and definitions

Several recent initiatives have collected "harmonised" data on the continuing training of the adult workforce. The OECD has co-ordinated two of these efforts,

1. The literature does indeed generally find that, in the presence of trade unions, more training is provided [Green *et al.* (1999); Kennedy *et al.* (1994)].

while two others have been co-ordinated by EUROSTAT. In all four cases, national statistical offices collected the underlying survey data, which was then reported in a common format. Although the intent is to assemble internationally comparable data on training, the four initiatives differ in the extent to which the survey questionnaire and data collection process were harmonised among the participating countries. They also differ in terms of the precise definitions of training activity, the population sampled and the countries and years for which data were collected.

Table 3.1 describes some of the basic characteristics of these four sources of training statistics: the International Adult Literacy Survey (IALS); the European Labour Force Survey (ELFS); the OECD/INES (Indicators of Education Systems); and EUROSTAT's Continuing Vocational Training Survey (CVTS).[2] Two characteristics are especially salient for making international comparisons. The first is differences in the degree of cross-country harmonisation that has been achieved. The second is differences in the way in which training is defined and measured in the surveys.

The IALS comes the closest to the ideal of fully harmonised data collection. A common questionnaire and survey interview protocol were used in all countries, although there was some discretion concerning the use of certain supplementary questions. The two EUROSTAT surveys are intermediate in terms of harmonisation. Statistical authorities in EU member States make considerable efforts to comply with common guidelines for questionnaire content and data collection, yet considerable variation remains in both domains – particularly in the ELFS. Finally, the OECD/INES data appear to be the least harmonised overall. Under this programme, participating countries report data estimates from pre-existing national surveys that match, as closely as possible, a common set of definitions.

All four surveys provide measures of the level of continuing vocational training among the adult workforce. However, there are important differences in how the training questions are phrased.[3] Most mechanically, the ELFS asks about training over the prior 4 weeks, whereas the other three surveys use a 12-month reference period. A second difference is that the CVTS poses the training questions to employers and not workers. There are likely to be systematic differences in how these two groups report training activities. A third difference is that respondents in the ELFS and the CVTS are asked to distinguish between initial and continuing vocational training, so that the former can be explicitly omitted from the training estimates. This information is not available in the other two surveys and some initial vocational training undoubtedly contaminates these data, although the adoption of a minimum age threshold of 25 years reduces this problem.

More subtle differences occur in the precise phrases used to characterise training activities. For example, the surveys included in the OECD/INES typically ask about participation in training "courses" or "programmes," while the IALS question also refers to "on-the-job training." The latter formulation may result in greater reporting of less structured forms of training – such as coaching provided by more experienced colleagues – and, hence, result in higher estimates of training. The ELFS is probably intermediate between those in the IALS and OECD/INES in the amount of informal training reported, since the survey question asks about any "schooling and training received in the last four weeks". Employers in the CVTS, with its focus on structured training programmes, probably report little or no informal training. These effects could be quite large since prior research indicates that participation in informal training activities is at least as widespread as participation in formal training [Frazis *et al.* (1998); OECD (1991)]. There is some evidence, however, that formal and informal training are positively correlated [Loewenstein and Spletzer (1994)]. Such an association suggests that *relative* levels of training for different groups or countries might not be as greatly affected by cross-survey differences in the extent to which informal training is recorded, as are *absolute* levels. The cross-survey indices of training developed below combine exclusively relative measures from the underlying surveys.

These four sources also differ with respect to how much employer involvement is required for a training episode to be reported. Data from the IALS confirm that international comparisons of training participation can be affected by these noncomparabilities, although the effect may be relatively minor. For the 25-54 age group, most education and training activities reported by employed respondents are characterised by them as being career or job-related, and most of this job-related training received direct employer support (Chart 3.1). The comparison between all job-related training and employer-supported, job-related training is most critical for assessing the comparability of the four harmonised surveys, since the CVTS only records employer-supported training while the

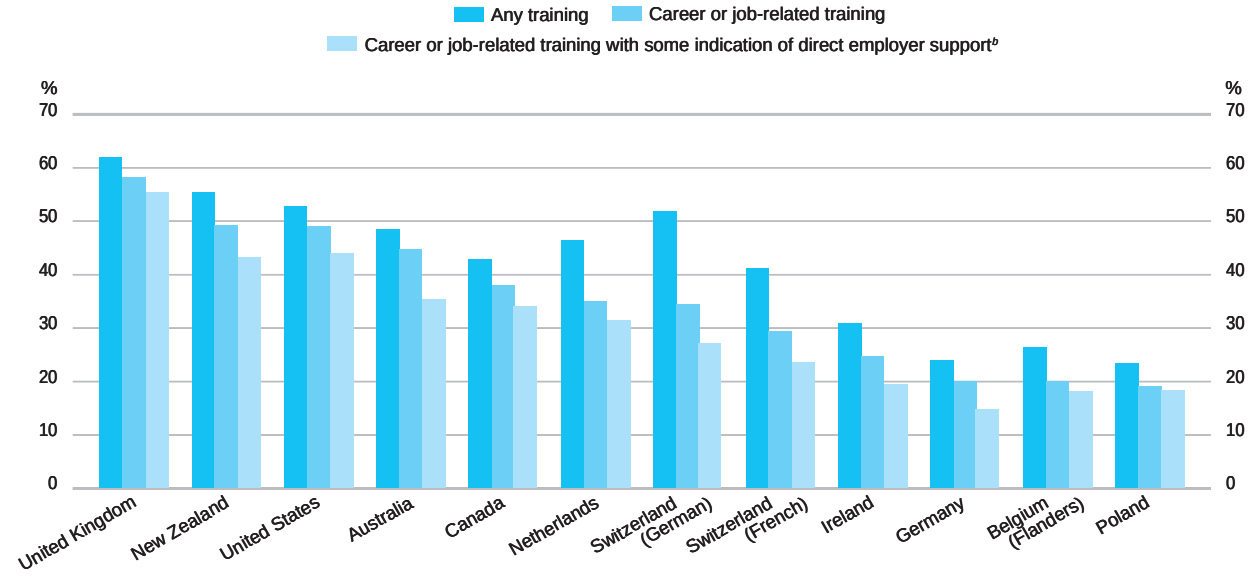
2. For detailed documentation of these four surveys see, respectively, OECD and Statistics Canada (1995), EUROSTAT (1996), OECD (1997*a*) and EUROSTAT (1997).
3. See Phelps and Stowe (1998) and OECD (1997*b*, 1998*a*) for fuller discussions of this issue.

Table 3.1. Overview of surveys providing harmonised training statistics

Title and year	Countries covered	Nature of survey, including degree of harmonisation and sample size	Definitions of training participation and volume used in this chapter	Reference period	Comments
The International Adult Literacy Survey (IALS), 1994-1995	Australia, Belgium (Flanders), Canada, Germany, Ireland, Netherlands, New Zealand, Poland, Sweden, Switzerland, United Kingdom, United States. [a]	Household survey using a common questionnaire. Relatively small sample sizes (*e.g.* 3 045 individuals for the United States).	*Participation:* Took one or more education and training courses for "career or job-related purposes". *Volume:* Total hours for the three most recent courses. [b]	12 months	Initial training question is very broad and may capture quite informal learning activities not captured by the other three harmonised surveys. The IALS also provides unique data on workers' literacy skills.
European Labour Force Survey data from EUROSTAT (ELFS), 1997	Austria, Belgium, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, United Kingdom.	Household survey (national labour force surveys that have been adapted to some extent to the EUROSTAT standard, but differ somewhat in the questions posed). Data are mapped into a common file structure and the sample sizes are large.	*Participation:* Received education and training for a reason other than secondary education or initial vocational training. *Volume:* Total hours.	4 weeks [c]	Annual data on training participation are available for the period 1988-1997 for twelve of the countries.
The OECD/INES [d] (Indicators of Education Systems) data on continuing training, 1991-96	Australia, Canada, Finland, France, Germany, Norway, Sweden, Switzerland, United States.	Household surveys, typically national labour force surveys or special surveys of adult education and training. [e] Data mapped into a common file structure. Large sample sizes.	*Participation:* Took one or more training courses that the interviewed person identified as job or career-related. *Volume:* Total hours.	12 months	OECD/INES training statistics are not available for the age group emphasised in this chapter (25 to 54 years). Training patterns are analysed, instead, for workers aged 25 to 64 years. Only very limited data are available for France and Norway.
The EUROSTAT's Continuing Vocational Training Survey (CVTS), 1994	Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, United Kingdom.	Employer survey of enterprises with 10 or more employees in the European Union. Survey is based on common specifications with large sample sizes (50 000 enterprises in total).	*Participation:* Percentage of workforce receiving employer-sponsored vocational training, including internal and external courses and structured on-the-job learning, but excluding initital vocational training. *Volume:* Hours and costs for courses.	12 months	The CVTS excludes enterprises with fewer than 10 employers or in NACE Rev 1 sectors A and B (agriculture, forestry, fishing), L, M and N (public administration, health and education), P (household domestic staff) and Q (extra-territorial).

a) IALS data have been collected for 12 additional countries, but are not yet available for analysis.
b) The IALS for Sweden provides no usable data for the hours of training nor for the question whether the main purpose of training was career and job-related. Training rates for Sweden are calculated, instead, in terms of participation in training that received at least some employer financial support.
c) The reference period for France in the ELFS is current (*i.e.* date of survey interview) training activities.
d) The OECD/INES data used here only include those countries reporting training activity over a 12-month period. This database also includes a number of countries reporting training over a 4-week period, but they are essentially the same labour force survey data reported under ELFS and, hence, are not included here.
e) The OECD/INES for France consists of administrative data (DARES – ministère de l'Emploi et de la Solidarité).

Chart 3.1. **Alternative definitions of the participation rate in training**[a]
Percentage of dependent employees aged 25 to 54 years



a) Countries are ranked in descending order of the percentage of training for career or job-related purposes.
b) Worker reports that main purpose of the training was career or job-related and that the employer either directly provided the training or provided one or more of the following: financial support, the training site (including on-the-job) or the suggestion to take the training (including provisions in collectively bargained agreements).
Source: International Adult Literacy Survey, 1994-1995.

household surveys should also record job-related training not supported by the employer. The IALS data suggest that the resulting difference in the range of training activities that are reported is fairly small in most countries. Although the magnitude of cross-country differences in training participation rates varies, depending on whether comparisons are made for all job-related training or only the subset supported by employers, the only significant change in country rankings is that Germany moves from approximate parity with Belgium and Poland to being somewhat lower – apparently because German employers provide financial support for an unusually low share of *continuing* formal vocational training, in marked contrast to their investment in *initial* training [OECD (1995)].

The population sampled also differs between some of the four surveys. Dependent and salaried employees between the ages of 25 and 54 years, which are the target population of most of the following analysis, can be exactly identified only in the IALS and the ELFS. The OECD/INES training statistics are for the age range 25 and 64 years, while the CVTS data cover employees of all ages in the surveyed enterprises. The CVTS sample also excludes workers in enterprises with fewer than ten employees and all workers in certain sectors (see Table 3.1). The exclusion of workers in the smallest enterprises biases upward the training participation rates calculated using CVTS data, since training rates rise with enterprise size over the observed range [EUROSTAT (1997)].

B. The level of training

Does a larger share of the workforce receive training in some countries than in others? Since the boundary between training and the learning that accompanies work experience is so difficult to draw in practice, it should not be expected that very precise statements can be made about how much higher training is in one country than another. Nonetheless, it should be possible to rank countries in terms of training intensities based on the evidence from the harmonised surveys. This section constructs such rankings.

Participation rates

Training participation rates are shown in Table 3.2. Looking first at the unweighted column means (calculated over all countries for which data are available), the average participation rates in the IALS and the OECD/INES (both 37 per cent) are much higher than that for the ELFS

Table 3.2. Participation rate in career or job-related training

Employees aged 25 to 54 years in the 1990s [a]

	IALS		ELFS		OECD/INES		CVTS		Cross-survey index of participation rate (average = 0) [b]	
	Participation rate (%) (1)	Rank (2)	Participation rate (%) (3)	Rank (4)	Participation rate (%) (5)	Rank (6)	Participation rate (%) (7)	Rank (8)	Mean (9)	Rank (10)
European Union										
Austria	..	..	7.9	8	..	..	..	..	–0.1	13
Belgium [c]	19.8	11	3.4	13	..	..	25	6	–0.7	17
Denmark	..	..	18.4	1	..	..	33	4	1.1	4
Finland	..	..	18.0	3	45.0	1	..	..	1.5	1
France [d]	..	..	*1.9*	n.a.	40.2	3	37	3	0.9	5
Germany	20.0	10	4.2	10	33.3	8	24	8	–0.7	16
Greece	..	..	0.7	17	..	..	13	11	–1.3	24
Ireland	24.6	9	6.6	9	..	..	43	1	0.1	11
Italy	..	..	3.8	12	..	..	15	10	–0.9	21
Luxembourg	..	..	2.5	16	..	..	25	6	–0.6	15
Netherlands	34.8	7	14.9	4	..	..	26	5	0.3	9
Portugal	..	..	3.2	14	..	..	13	11	–1.1	22
Spain	..	..	3.1	15	..	..	20	9	–0.7	19
Sweden	55.5	2	18.3	2	41.6	2	..	..	1.2	2
United Kingdom	58.0	1	14.2	5	..	..	39	2	1.2	3
North America										
Canada	37.7	6	..	..	28.4	9	..	..	–0.8	20
United States	48.8	4	..	..	33.5	7	..	..	0.1	12
Pacific area										
Australia	44.6	5	..	..	38.1	4	..	..	0.4	8
New Zealand	49.1	3	..	..	..	..	..	..	0.8	6
Other OECD countries										
Hungary	..	..	4.2	11	..	..	..	..	–0.7	18
Iceland	..	..	14.0	6	..	..	..	..	0.8	7
Norway	..	..	11.7	7	37.0	5	..	..	0.2	10
Poland	19.0	12	..	..	..	..	..	..	–1.3	23
Switzerland [e]	33.0	8	..	..	35.0	6	..	..	–0.3	14
Switzerland (French)	*29.2*	n.a.	..	..	..	..	..	..	*–0.6*	n.a.
Switzerland (German)	*34.2*	n.a.	..	..	..	..	..	..	*–0.2*	n.a.
Unweighted mean	**37.1**	**n.a.**	**8.8**	**n.a.**	**36.9**	**n.a.**	**26.1**	**n.a.**	**0.0**	**n.a.**
Standard deviation	**14.2**	**n.a.**	**6.3**	**n.a.**	**5.0**	**n.a.**	**10.1**	**n.a.**	**0.9**	**n.a.**

.. Data not available.
n.a.: Not applicable.
a) Figures in *italics* are not used in the calculations of the cross-country statistics in Columns 3 and 4 or the cross-survey index in Column 9.
b) The national estimates of training participation rates in Columns 1, 3, 5 and 7 were standardised to have a zero mean and unit variance. Column 9 reports the unweighted means of these standardised values which are calculated using all surveys for which estimates are available for that country.
c) The IALS data for Belgium only cover Flanders.
d) The ELFS data for France measure only current training activity and are not fully comparable to those reported for the other countries. Accordingly, the French value is not used in the calculations of the cross-country statistics in Columns 3 and 4 or the cross-survey index in Column 9.
e) IALS values for Switzerland are a weighted average of the values for the French and German-speaking populations.
Source: See Table 3.1.

(9 per cent). This is in line with expectations since the four-week reference period used by the latter will miss many of the episodes of training occurring during the previous twelve months. The average participation rate from the CVTS (26 per cent) is somewhat lower than the rates for the IALS and OECD/INES, consistent with employers not reporting some vocational training activities reported by workers, such as training undertaken on their own initiative outside of work or less formal activities at the work site. These data confirm that differences in survey design are likely to lead to significantly different estimates of the absolute level of training.

Each of the surveys indicates considerable cross-country differences. This variation suggests that training patterns differ significantly between countries, especially since it is quite pronounced for the two most harmonised

surveys, the IALS and the CVTS (standard deviations of 14 and 10 percentage points, respectively).

Simple inspection of Table 3.2 reveals that there is considerable consistency across the surveys concerning international differences in participation rates. Denmark, Finland, Sweden and the United Kingdom consistently show above-average training participation, while Greece, Italy, Portugal and Spain have below-average rates of participation. However, Ireland illustrates a more mixed pattern, with below-average participation in the IALS and ELFS, but the highest rate in the CVTS. Despite a few such anomalies, it appears that most of these countries can be characterised, with some confidence, as being low, near average or high in the OECD hierarchy of training rates. In this spirit, column 9 of Table 3.2 combines the information from the four surveys to calculate a summary index of relative participation.[4] The resulting cross-survey index suggests that training participation tends to be high in the Nordic countries and the United Kingdom and low in southern Europe. The cross-survey index also suggests that international differences in participation are quite large, since it ranges from 1.5 standard deviations above the mean to 1.3 standard deviations below.[5]

The volume of training

A simple "head count," such as a participation rate, provides an incomplete measure of the level of training. Training is a form of economic investment. This suggests that a continuous measure of the resources invested in training would be more informative than a simple, yes/no measure of whether any investment was made. While from a theoretical standpoint a measure of training volume is desirable, in practice it is difficult to gather accurate information of this type. Neither workers nor their employers routinely track the magnitudes of training investments and their attempts to estimate them in a survey interview are likely to be quite inaccurate [OECD (1997*b*)]. These considerations suggest that it is best to utilise both participation and volume measures to gauge the level of training, rather that relying solely on one or the other, since they have different strengths and weaknesses.

The primary measure of training *volume* examined here is hours of training averaged over all workers, whether they received any training or not. The four sources of harmonised training statistics yield quite different estimates of the average hours of training (Table 3.3). The major difference is the much lower level reported in the CVTS, which probably can be explained by the fact that the CVTS only reports hours spent in employer-provided "courses," which is narrower than the range of training activities covered by the other three surveys. Similarly, the use of a shorter reference period accounts for lower average hours in the ELFS than in the other two household surveys.[6] It is unclear, however, why training volume in the IALS is so much higher than in OECD/INES (42 versus 28 hours per worker). This difference may reflect a greater tendency of the IALS to capture relatively unstructured training.

All four surveys confirm that training volume differs between countries, but this variation ranges from quite modest in the CVTS to quite high in the IALS (standard deviations of 4 and 18 hours, respectively). As has been previously noted [OECD (1998*a*)], some of the cross-country differences in training hours measured in the ELFS appear to reflect either incompatible definitions or large measurement errors. In particular, the figure of 150 hours for the Netherlands is implausibly high.[7] Consistent with measurement error being greater for training volume than for participation rates, international comparisons of volume are less consistent across the four surveys. Greece provides the most extreme example of cross-survey inconsistency, being rated very low in the ELFS (15th out of 16 countries) but having the second

4. In order to average a country's ranking across all of the sources for which data are available, it is first necessary to convert the four sets of participation rates into comparable units. (Recall that differences in questionnaire design, such as different reference periods, mean that *absolute* levels are not comparable across the four sources.) For this purpose, each participation rate was "standardised" into a mean deviation in standard deviation units. For example, the training participation rate for Belgium from the IALS (19.8 per cent) is approximately 1.2 standard deviations below the cross-country mean value (37.1 per cent) and its standardised value is calculated as (19.8-37.1)/14.2 or –1.23. The cross-survey index is simply the unweighted mean of these standardised participation rates, where the average for each country is calculated across only the surveys in which it participated. The index has a mean value of zero by construction and is more reliable for the countries participating in a greater number of the surveys.
5. The ELFS provides some limited information concerning whether these training rates have changed over time. Between 1988 and 1997, training participation rose in seven of the twelve European countries for which data are available, while it fell in two and was approximately unchanged in the remaining three. While there is some overall support for a rising trend in training participation rates across EU countries, there is no evident trend toward a convergence of national rates.
6. The use of a 4-week – rather than 12-month – reference period in the ELFS underestimates training volume less strongly than participation for two reasons. First, the *full* length of any training courses that were on-going during the reference period is recorded. Second, a short reference period disproportionately "captures" long training episodes (a statistical phenomenon known as "length bias").
7. Two factors heightening the implausibility of these data are that *no* Dutch trainees are recorded as training for fewer than 20 hours per week and most of this training is attributable to a residual, "other purposes" category, rather than to "continuous vocational training" or "changing career". As a result, the ELFS data for the Netherlands are not used in any of the analysis of international differences in training volume.

Table 3.3. Volume of career or job-related training

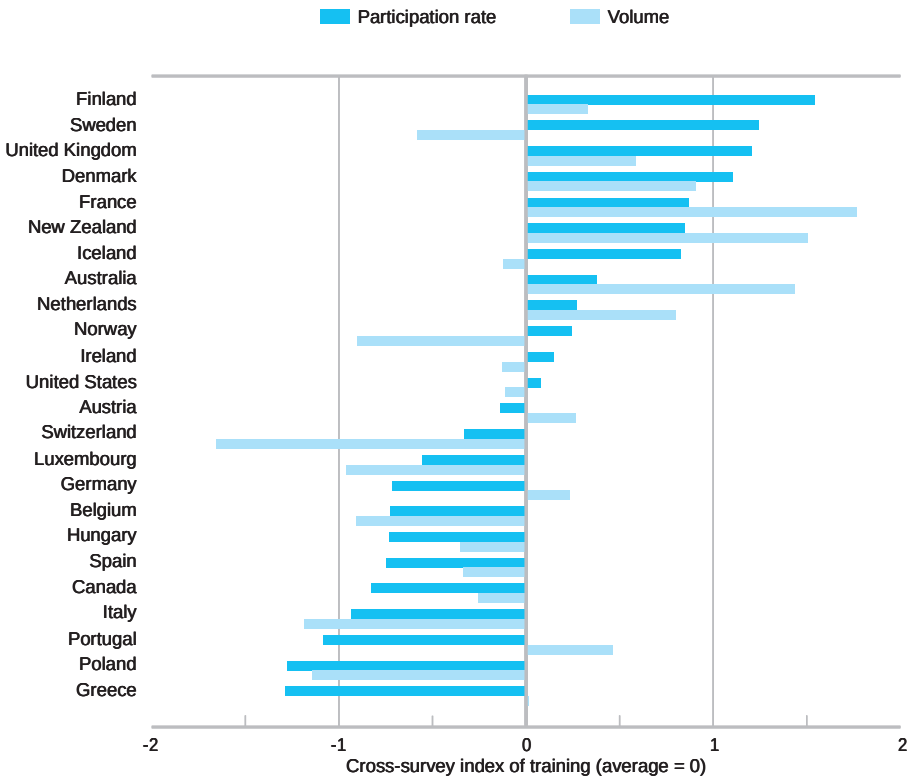
Average hours of training per employee aged 25 to 54 years in the 1990s [a]

	IALS		ELFS		OECD/INES		CVTS		Cross-survey index of volume (average = 0) [b]	
	Volume (1)	Rank (2)	Volume (3)	Rank (4)	Volume (5)	Rank (6)	Volume (7)	Rank (8)	Mean (9)	Rank (10)
European Union										
Austria	..	..	19.8	6	..	..	..	..	0.3	9
Belgium [c]	17.3	10	8.4	12	..	..	10.2	8	–0.9	20
Denmark	..	..	34.9	1	..	..	12.9	5	0.9	4
Finland	..	..	31.8	2	18.8	6	..	..	0.3	8
France [d]	..	..	*6.4*	n.a.	..	..	20.1	1	1.8	1
Germany	40.5	8	31.6	3	34.9	2	8.2	11	0.2	10
Greece	..	..	4.1	15	..	..	18.0	2	0.0	11
Ireland	45.6	6	14.8	9	..	..	10.9	7	–0.1	14
Italy	..	..	8.0	13	..	..	6.1	12	–1.2	23
Luxembourg	..	..	3.4	16	..	..	10.0	10	–1.0	21
Netherlands [e]	51.0	4	*151.6*	n.a.	..	..	17.2	3	0.8	5
Portugal	..	..	30.5	4	..	..	11.0	6	0.5	7
Spain	..	..	16.2	7	..	..	10.0	9	–0.3	16
Sweden	..	..	11.6	11	20.2	5	..	..	–0.6	18
United Kingdom	52.1	3	21.6	5	..	..	15.8	4	0.6	6
North America										
Canada	41.1	7	..	..	21.9	3	..	..	–0.3	15
United States	46.6	5	..	..	21.9	4	..	..	–0.1	12
Pacific area										
Australia	61.3	2	..	..	48.9	1	..	..	1.4	3
New Zealand	69.0	1	..	..	..	..	..	..	1.5	2
Other OECD countries										
Hungary	..	..	13.5	10	..	..	..	..	–0.4	17
Iceland	..	..	15.8	8	..	..	..	..	–0.1	13
Norway	..	..	7.8	14	..	..	..	..	–0.9	19
Poland	20.7	9	..	..	..	..	..	..	–1.1	22
Switzerland [f]	11.3	11	..	..	..	..	..	..	–1.7	24
Switzerland (French)	*8.2*	n.a.	..	..	..	..	..	..	*–1.8*	n.a.
Switzerland (German)	*12.4*	n.a.	..	..	..	..	..	..	*–1.6*	n.a.
Unweighted mean	**41.5**	**n.a.**	**17.1**	**n.a.**	**27.8**	**n.a.**	**12.5**	**n.a.**	**0.0**	**n.a.**
Standard deviation	**18.2**	**n.a.**	**10.3**	**n.a.**	**11.9**	**n.a.**	**4.3**	**n.a.**	**0.9**	**n.a.**

.. Data not available.
n.a.: Not applicable.
a) Figures in *italics* are not used in the calculations of the cross-country statistics in Columns 3 and 4 or the cross-survey index in Column 9.
b) The national estimates of training volume in Columns 1, 3, 5 and 7 were standardised to have a zero mean and unit variance. Column 9 reports the unweighted means of these standardised values which are calculated using all surveys for which estimates are available for that country.
c) The IALS data for Belgium only cover Flanders.
d) The ELFS data for France measure only current training activity and are not fully comparable to those reported for the other countries. Accordingly, the French value is not used in the calculations of the cross-country statistics in Columns 3 and 4 or the cross-survey index in Column 9.
e) The ELFS data for the Netherlands are not used in the calculations of the cross-country statistics in Columns 3 and 4 or the cross-survey index in Column 9, because they appear to be non-comparable (see text).
f) IALS values for Switzerland are a weighted average of the values for the French and German-speaking populations.
Source: See Table 3.1.

highest volume in the CVTS. Nonetheless, stable patterns also emerge: Australia and the Netherlands being consistently above average; Germany and Portugal consistently near the average value; and Belgium and Italy consistently below average. That relatively few countries have volume data for multiple surveys also makes it somewhat difficult to come to an overall assessment of the cross-survey robustness of international differences. Although its validity appears more open to doubt, column 9 of Table 3.3 presents a cross-survey index of training volume, analogous to that previously constructed for participation. Australia, France, the Netherlands and New Zealand have the highest values while Belgium, Italy, Poland and Switzerland have the lowest.

Chart 3.2. **Cross-survey indices of the relative level of training: participation rates versus volume**[a]



a) Column 9 of Tables 3.2 and 3.3 respectively.
Source: See Table 3.1.

Another question related to the consistency of international comparisons of training levels is whether the training participation and volume measures produce similar country rankings. Chart 3.2 juxtaposes the cross-survey indices of participation and volume. These two measures provide somewhat different assessments of which countries invest most in continuing training. The second highest rated country, in terms of participation, is below average on training volume (Sweden), while the lowest participation country has average training volume (Greece). However, there is some positive association between the two measures for the larger number of countries in the middle ranges of the two distributions, resulting in an overall correlation of 0.50.

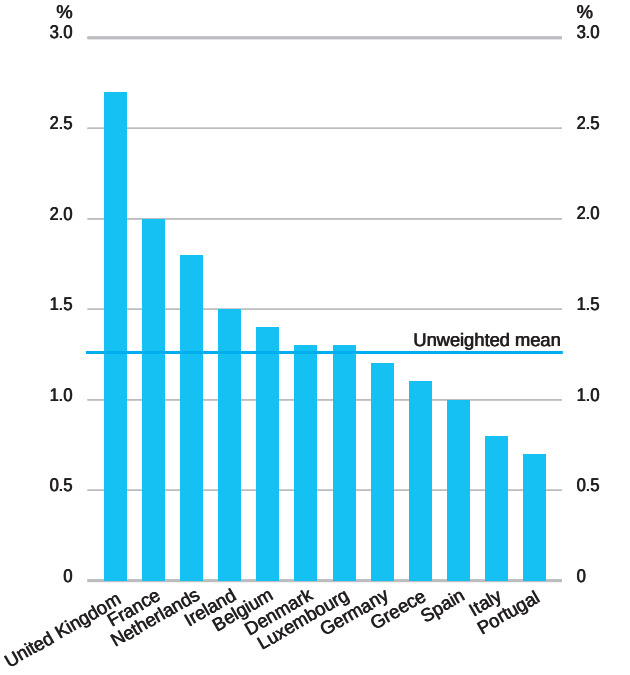
The absence of a closer association between a country's relative positions in training participation and volume could reflect a trade-off between the extensive and intensive margins of training investments. A country that provides a little training for many workers is emphasising the extensive margin and will tend to score higher on the participation index than on the volume index. These data suggest that this pattern may characterise the Nordic countries, Switzerland and the United Kingdom. By contrast, there is evidence that countries such as Australia, France, Germany, Greece, the Netherlands, New Zealand and Portugal emphasise the intensive margin, providing relatively intensive training to the average, or even below-average, share of workers who receive any training. It is striking that several of the countries that appear to emphasise the intensive margin also have (or recently had) a training levy: Australia, France and New Zealand.[8] This pattern may reflect the tendency of a training levy to encourage a mix of training that favours easily documented forms of spending, such as employer-sponsored courses, which are heavily weighted by the volume measures in these surveys.

8. The Australian data are for 1995, the year that the training levy was abolished.

The magnitude of this trade-off can be roughly estimated. If trainees received the same hours of training on average, independent of the participation rate, then the correlation between participation and volume should be 1.0 in the absence of measurement error. This correlation is 0.50 for the cross-survey indices, but the 0.66 value for the IALS data alone is a better indication of the extent to which training intensity tends to fall as participation rises, since it is less affected by measurement problems. The IALS correlation implies that a 10 per cent increase in the training participation rate is associated with approximately a 3 per cent fall in hours per trainee.

The CVTS provides an alternative measure of training volume, namely, employers' costs for training courses as a share of total labour costs (Chart 3.3). By this measure, Portuguese and Italian employers rank last, spending less than one per cent of total labour costs on training, while United Kingdom employers invest most, at 2.7 per cent. Overall, this measure of volume accords quite closely with the earlier analysis of participation rates, but less closely with the hours measures of training volume. In particular, the southern European countries with relatively low participation rates (*i.e.* Greece, Italy, Portugal and Spain) also have the lowest cost shares among the EU Member states, while the two countries with the highest participation rates (the United Kingdom and France) also rate highest in employer spending.

Chart 3.3. **Employers' training costs as a share of total labour costs, 1994**[a]



a) Employers' spending on formal training courses. Countries are ranked in descending order.
Source: EUROSTAT, CVTS, 1994.

Correlation analysis

Table 3.4 presents a more formal analysis of the robustness of cross-country differences in the level of training. Cross-country rank correlations were calculated between the various measures of training participation and volume. These correlations provide a quantification of the degree of consonance across three types of comparisons: between different measures of the level of training using the same survey (*e.g.* the 0.79 correlation between the IALS measures of training participation and hours); between different surveys using the same measure of training (*e.g.* the 0.83 correlation between the IALS and ELFS measures of participation); and using different measures and different surveys (*e.g.* the 0.30 correlation between the IALS participation and the ELFS hours measures). Note that the cross-survey correlations are often calculated for relatively small numbers of countries, since they can only be calculated over countries for which both estimates are available.

The participation and hours measures are positively correlated in the IALS, ELFS and CVTS. However, these correlations are substantially smaller that 1.0, suggesting either a cross-country trade-off between the number of workers being trained and the duration of training received or substantial measurement error in the hours measure. This correlation is actually negative in the OECD/INES, a pattern which suggests serious measurement error, since it is difficult to believe that increases in the share of workers being trained are associated with greater than proportional decreases in the average duration of training. For the CVTS, the correlations between training costs and both the participation and hours measures are strongly positive, at 0.89 and 0.51, indicating a high degree of agreement.

The cross-survey correlations for participation range from 0.60 to 0.83, indicating a quite high consistency in ranking countries by this dimension of training. This suggests that it is possible to make qualitatively valid comparisons of training participation rates and the cross-survey index of participation introduced earlier is used for this purpose latter in this section.

C. The distribution of training

Earnings levels and employment security are increasingly tied to a worker's skills [OECD (1997*c*)]. If

Table 3.4. **Spearman rank correlations of national measures of the level of career or job-related training across different data sources**

Employees aged 25-54 years in the 1990s

Measures compared [a]		Comparing the IALS with:				Comparing the ELFS with:			Comparing the OECD/INES with:		Comparing the CVTS with:
First survey	Second survey	IALS	ELFS	OECD/INES	CVTS	ELFS	OECD/INES	CVTS	OECD/INES	CVTS	CVTS
T%	T%	1.00**	0.83**	0.60	0.60	1.00**	0.80	0.72**	1.00**	..	1.00**
Hrs	Hrs	1.00**	0.40	0.20	0.80	1.00**	–0.50	0.18	1.00**	..	1.00**
T%	Hrs	0.79**	0.30	–0.70	0.80	0.51**	–0.50	0.21	–0.60	..	0.31
Hrs	T%	0.79**	0.90**	0.30	0.60	0.51**	0.40	0.20	–0.60	..	0.31
T%	C%	..	..	..	0.90**	..	..	0.58*	..	..	0.89**
Hrs	C%	..	..	..	0.90**	..	..	0.01	..	..	0.51*

.. Data not available.
* Significant at the 10% level
** Significant at the 5% level.
a) T% denotes the percentage of workers participating in training, Hrs the average hours of training per employee and C% training costs as a percentage of total labour costs.
Source: See Table 3.1.

certain groups receive little training, this could significantly restrict their labour market opportunities and result in greater economic inequality. An uneven distribution of training may also lower economic efficiency. There is some evidence (see Chapter 4) that recent trends in technology and work organisation have increased the importance of broad and continuing participation of a firm's workforce in training. Despite these equity and efficiency concerns, little is known about whether there are significant international differences in the distribution of training. This section uses the four sources of harmonised training data to assess international differences in training participation rates across workers grouped by gender, age and education.[9] Qualitatively similar results were obtained when this analysis was repeated for hours of training, but those results are not reported in detail, due to the lower quality of the underlying data.

Gender distribution of training

Equalising the labour market opportunities of women with men is an important policy goal and the upward trend in the labour market premium on skill [Blau and Kahn (1996)] suggests that equal access to education and training is of some importance in meeting this goal. Overall efficiency is also likely to suffer if a large segment of the labour force, such as women, have inadequate access to training.

Table 3.5 presents ratios of the training participation rate for women to that for men, for the four harmonised surveys. Averaging these gender ratios over all of the countries covered by a given survey always results in a mean ratio relatively close to 1.0 (the values range from 0.91 for the CVTS to 1.12 for the ELFS), suggesting that women and men participate in training to a roughly comparable extent. The moderately lower CVTS estimate suggests, however, that women participate somewhat less than men when attention is restricted to employer-provided training courses. Consistent with this interpretation, the IALS data indicate that women less often receive financial support from their employers for job-related training than do men [Loewenstein and Spletzer (1994); O'Connell (1998)]. It was argued earlier that the IALS training measures may tend to pick up more of the relatively unstructured forms of training than measures from the other two household surveys. The average relative training rate for women is lower in the IALS than in the ELFS, consistent with men having greater access to informal training.

There is significant cross-country variation in the gender ratios for each of the surveys. For example, the relative participation of women ranges from 0.75 (the Netherlands) to 1.32 (Ireland) in the IALS. By casual inspection, there appears to be moderate cross-survey consistency in the share of training received by women in a specific country and how it compares to the international average. For example, the gender ratio in Ireland is always greater than 1.0 and frequently among the higher values. Similarly, the Netherlands values are consistently below 1.0 for participation. However, there are also examples of rather striking inconsistencies. The IALS participation

9. CVTS data are used only for analysing gender differences in participation rates, because it lacks data on training rates by age and education.

Table 3.5. Differences in career or job-related training by gender

Ratios of the participation rates for women to those for men

	IALS		ELFS		OECD/INES		CVTS		Unweighted mean ratio [a]	Rank
	Ratio (1)	Rank (2)	Ratio (3)	Rank (4)	Ratio (5)	Rank (6)	Ratio (7)	Rank (8)	(9)	(10)
European Union										
Austria	..	..	0.97	14	..	..	..	..	0.97	17
Belgium [b]	0.83	11	0.93	16	..	..	1.12	1	0.96	18
Denmark	..	..	1.29	3	..	..	1.06	3	1.18	2
Finland	..	..	1.28	4	0.99	4	..	..	1.14	5
France	..	..	1.13	8	..	..	0.85	9	0.99	15
Germany	1.15	2	0.96	15	0.87	6	0.63	12	0.90	21
Greece	..	..	1.21	5	..	..	1.00	5	1.10	6
Ireland	1.32	1	1.12	9	..	..	1.05	4	1.16	3
Italy	..	..	1.46	2	..	..	0.69	11	1.07	9
Luxembourg	..	..	0.85	18	..	..	1.08	2	0.97	16
Netherlands	0.75	12	0.93	17	..	..	0.89	7	0.85	24
Portugal	..	..	1.03	11	..	..	0.73	10	0.88	22
Spain	..	..	1.58	1	..	..	0.86	8	1.22	1
Sweden	1.09	3	1.04	10	1.13	2	..	..	1.08	7
United Kingdom	1.00	6	1.16	6	..	..	0.93	6	1.03	12
North America										
Canada	0.94	7	..	..	1.11	3	..	..	1.02	13
United States	1.00	5	..	..	1.16	1	..	..	1.08	8
Pacific area										
Australia	0.91	10	..	..	0.98	5	..	..	0.95	19
New Zealand	1.05	4	..	..	..	..	..	..	1.05	10
Other OECD countries										
Hungary	..	..	1.15	7	..	..	..	..	1.15	4
Iceland	..	..	1.03	12	..	..	..	..	1.03	11
Norway	..	..	1.00	13	..	..	..	..	1.00	14
Poland	0.92	9	..	..	..	..	..	..	0.92	20
Switzerland [c]	0.93	8	..	..	0.81	7	..	..	0.87	23
Switzerland (French)	0.79	n.a.	..	..	..	..	..	..	0.79	n.a.
Switzerland (German)	0.98	n.a.	..	..	..	..	..	..	0.98	n.a.
Unweighted mean	**0.99**	**n.a.**	**1.12**	**n.a.**	**1.01**	**n.a.**	**0.91**	**n.a.**	**1.02**	**n.a.**
Standard deviation	**0.15**	**n.a.**	**0.19**	**n.a.**	**0.13**	**n.a.**	**0.16**	**n.a.**	**0.10**	**n.a.**

.. Data not available.
n.a.: Not applicable.
a) Mean calculated using all surveys for which estimates are available for that country.
b) The IALS data for Belgium only cover Flanders.
c) IALS values for Switzerland are a weighted average of the values for the French and German-speaking populations.
Source: See Table 3.1.

data for Germany indicate women participating at 1.15 times the rate of men (substantially above the average level for the 12 countries with these data), but at only 0.96, 0.87 and 0.63 times the rate of men in the other three surveys.

When the robustness of the international comparisons of these gender ratios is assessed using correlations between the various measures (Table 3.8, Panel A), the picture remains rather mixed. There is considerable consistency between the participation measures from the IALS, ELFS and OECD/INES. However, the estimates of gender differences in training based on the CVTS participation rates (or hours data from any of the surveys) provide a rather disparate picture of cross-country differences.

Age distribution of training

The logic of human capital theory, as well as simple observation of life courses, suggest that skill investments are likely to be concentrated in the early portions of an individual's life and career. While basic schooling and initial vocational training are everywhere concentrated in the pre- or early-career years, there may be considerable variation in the extent to which workers continue to receive training in the middle and later portions of their working lives. Too rapid a "tailing off" of training with age could lead to skill obsolescence and create severe employment difficulties for some older workers, while also reducing the adaptive capacity of the economy as the workforce ages in coming decades [OECD (1998*c*)].

Table 3.6 compares training participation for relatively young workers (*i.e.* ages 25-29 years) to that for older workers (*i.e.* ages 50-54 years). The greater the value of the age ratio, the more strongly continuing training is concentrated in the early stages of the prime working years. Since values in excess of 1.0 predominate, these four sources of harmonised training data confirm a tendency for training to be "front-loaded".

The cross-country averages of these age ratios vary considerably across the different surveys, from 1.10 for the OECD/INES to 2.76 for the ELFS. The lower values for the OECD/INES could be a simple artefact of having calculated the age ratio using broader age bands. Omitting this survey reduces the cross-survey difference in mean ratios, but large differences remain. This variation suggest that changes in survey design that affect the types of training captured are not age-neutral and can have a large effect on estimates of the age concentration of training.

There is considerable cross-country variation in the age concentration of training. For example, the age ratio calculated from IALS data on participation ranges from 0.93 for Sweden to 1.96 in Canada.[10] This variation suggests that countries differ significantly in the extent to which their training practices realise the goal of "life-long learning".

There appears to be considerable consistency across the three data sources and two measures in terms of which countries provide older workers with the greatest relative access to training. Most of the Nordic countries (with Finland as a notable exception) and the United States have consistently among the lowest age ratios, indicating no or only a weak tendency to concentrate training on younger workers. By contrast, the ratio tends to be well above average in France, Luxembourg and most southern European countries, indicating a steep fall off in training with age. Correlations between these measures of age differences in training (Table 3.8, Panel B) indicate a quite high degree of cross-survey consistency, especially for the participation measures of training. Overall, it appears that a number of reasonably robust comparisons can be made concerning international differences in the age distribution of training.

Education, literacy and the distribution of training

Extensive initial schooling might be complementary with subsequent participation in continuing training, if the knowledge base and learning skills acquired in school facilitate the later acquisition of more specific vocational skills through training. Alternatively, schooling and initial vocational preparation could be substitutes. Since the overall efficiency of the skill development system requires that continuing training mesh well with other forms of human capital investment, it would be valuable to know whether complementary or substitution links predominate and if there are important international differences in these relationships. International differences in the association of prior human capital investments and training could also have important implications for equity, since a strong complementarity between education and schooling would tend to reinforce the labour market disadvantages of the least educated workers.

In order to gauge the strength of the association between education and training, Table 3.7 presents the ratio of the training participation rate for workers with a university degree to that for workers who did not complete upper secondary schooling. These ratios are always

10. It is striking that the concentration of training on younger workers appears to be much stronger in Canada than in the United States (1.96 versus 0.97 for participation in the IALS).

Table 3.6. Differences in career or job-related training by age

Ratios of the participation rates for younger to those for older workers [a]

	IALS		ELFS		OECD/INES		Unweighted mean ratio [b]	Rank
	Ratio (1)	Rank (2)	Ratio (3)	Rank (4)	Ratio (5)	Rank (6)	(7)	(8)
European Union								
Austria	..	..	1.60	11	..	..	1.60	11
Belgium [c]	1.25	7	2.19	10	..	..	1.72	10
Denmark	..	..	0.98	16	..	..	0.98	21
Finland	..	..	1.50	13	0.96	5	1.23	17
France	..	..	5.38	2	..	..	5.38	2
Germany	1.79	2	3.32	7	1.25	2	2.12	8
Greece	..	..	4.55	4	..	..	4.55	4
Ireland	1.20	8	2.51	9	..	..	1.86	9
Italy	..	..	1.14	14	..	..	1.14	18
Luxembourg	..	..	4.54	5	..	..	4.54	5
Netherlands	1.44	5	2.93	8	..	..	2.19	7
Portugal	..	..	6.13	1	..	..	6.13	1
Spain	..	..	4.87	3	..	..	4.87	3
Sweden	0.93	12	0.88	18	0.90	7	0.90	23
United Kingdom	1.56	3	1.55	12	..	..	1.56	12
North America								
Canada	1.96	1	..	..	1.14	3	1.55	13
United States	0.97	11	..	..	0.94	6	0.96	22
Pacific area								
Australia	1.16	9	..	..	1.40	1	1.28	16
New Zealand	1.08	10	..	..	..	..	1.08	19
Other OECD countries								
Hungary	..	..	3.67	6	..	..	3.67	6
Iceland	..	..	1.01	15	..	..	1.01	20
Norway	..	..	0.89	17	..	..	0.89	24
Poland	1.42	6	..	..	..	..	1.42	14
Switzerland [d]	1.47	4	..	..	1.13	4	1.30	15
Switzerland (French)	1.70	n.a.	..	..	..	..	1.70	n.a.
Switzerland (German)	1.43	n.a.	..	..	..	..	1.43	n.a.
Unweighted mean	**1.35**	**n.a.**	**2.76**	**n.a.**	**1.10**	**n.a.**	**2.25**	**n.a.**
Standard deviation	**0.32**	**n.a.**	**1.73**	**n.a.**	**0.18**	**n.a.**	**1.63**	**n.a.**

.. Data not available.
n.a.: Not applicable.
a) Younger is defined as ages 25-29 in IALS and ELFS, and as 25-34 in OECD/INES; older is defined as ages 50-54 in IALS and ELFS, and as 45-64 in OECD/INES.
b) Mean calculated using all surveys for which estimates are available for that country.
c) The IALS data for Belgium only cover Flanders.
d) IALS values for Switzerland are a weighted average of the values for the French and German-speaking populations.
Source: See Table 3.1.

Table 3.7. **Differences in career or job-related training by education**

Ratios of the participation rates for workers with a university degree to those for workers not having finished upper secondary schooling

	IALS		ELFS		OECD/INES		Unweighted mean ratio [a]	Rank
	Ratio (1)	Rank (2)	Ratio (3)	Rank (4)	Ratio (5)	Rank (6)	(7)	(8)
European Union								
Austria	..	..	2.89	15	..	..	2.89	18
Belgium [b]	5.70	2	14.93	3	..	..	10.32	5
Denmark	..	..	3.34	11	..	..	3.34	14
Finland	..	..	3.30	12	2.11	7	2.70	19
France	..	..	5.08	9	..	..	5.08	8
Germany	1.96	8	5.19	8	6.91	1	4.69	9
Greece	..	..	22.83	2	..	..	22.83	2
Ireland	2.62	5	3.25	13	..	..	2.93	17
Italy	..	..	8.29	6	..	..	8.29	6
Luxembourg	..	..	4.58	10	..	..	4.58	10
Netherlands	1.88	9	1.93	18	..	..	1.90	23
Portugal	..	..	37.29	1	..	..	37.29	1
Spain	..	..	13.80	4	..	..	13.80	3
Sweden	1.58	12	2.11	17	2.25	5	1.98	22
United Kingdom	1.70	11	5.55	7	..	..	3.63	13
North America								
Canada	2.34	6	..	..	4.21	3	3.28	15
United States	4.09	3	..	..	4.30	2	4.19	11
Pacific area								
Australia	2.01	7	..	..	2.21	6	2.11	21
New Zealand	1.80	10	..	..	..	..	1.80	24
Other OECD countries								
Hungary	..	..	12.05	5	..	..	12.05	4
Iceland	..	..	2.26	16	..	..	2.26	20
Norway	..	..	3.02	14	..	..	3.02	16
Poland	3.72	4	..	..	..	..	3.72	12
Switzerland [c]	8.70	1	..	..	3.77	4	6.23	7
Switzerland (French)	4.80	n.a.	..	..	..	..	4.80	n.a.
Switzerland (German)	12.25	n.a.	..	..	..	..	12.25	n.a.
Unweighted mean	**3.18**	**n.a.**	**8.43**	**n.a.**	**3.68**	**n.a.**	**6.87**	**n.a.**
Standard deviation	**2.14**	**n.a.**	**9.17**	**n.a.**	**1.72**	**n.a.**	**8.12**	**n.a.**

.. Data not available.
n.a.: Not applicable.
a) Mean calculated using all surveys for which estimates are available for that country.
b) The IALS data for Belgium only cover Flanders.
c) IALS values for Switzerland are a weighted average of the values for the French and German-speaking populations.
Source: See Table 3.1.

Table 3.8. **Spearman rank correlations of national measures of the distribution of career or job-related training across different data sources and definitions**

Employees aged 25-54 years in the 1990s

Measures compared [a]		Comparing the IALS with:				Comparing the ELFS with:			Comparing the OECD/INES with:
First survey	Second survey	IALS	ELFS	OECD/INES	CVTS	ELFS	OECD/INES	CVTS	OECD/INES
Panel A. Correlations of ratios of the values for women to those for men									
T%	T%	1.00*	0.60	0.26	0.00	1.00*	0.50	–0.26	1.00*
Hrs	Hrs	1.00*	–0.10	–0.40	..	1.00*	–0.50	..	1.00*
T%	Hrs	0.23	0.09	–0.30	..	0.78*	0.50	..	0.54
Hrs	T%	0.23	–0.10	–0.90*	..	0.78*	–0.50	..	0.54
Panel B. Correlations of ratios of the values for younger to those for older workers [b]									
T%	T%	1.00*	0.60	0.60	..	1.00*	1.00*	..	1.00*
Hrs	Hrs	1.00*	0.10	–0.20	..	1.00*	–0.50	..	1.00*
T%	Hrs	0.44	0.54	0.50	..	0.61*	0.50	..	0.83*
Hrs	T%	0.44	0.90*	–0.10	..	0.61*	0.50	..	0.83*
Panel C. Correlations of ratios of the values for workers with a university degree to those for workers not having finished secondary schooling									
T%	T%	1.00*	0.49	0.14	..	1.00*	0.50	..	1.00*
Hrs	Hrs	1.00*	0.60	–0.50	..	1.00*	–1.00	..	1.00*
T%	Hrs	0.71*	0.03	0.60	..	0.85*	–1.00	..	0.80
Hrs	T%	0.71*	0.70	–0.50	..	0.85*	–0.50	..	0.80

.. Data not available.
* Significant at the 5% level.
a) T% denotes the percentage of workers participating in training and Hrs the average hours of training per employee.
b) Younger is defined as ages 25-29 in IALS and ELFS, and as 25-34 in OECD/INES; older is defined as ages 50-54 in IALS and ELFS, and as 45-64 in OECD/INES.
Source: See Table 3.1.

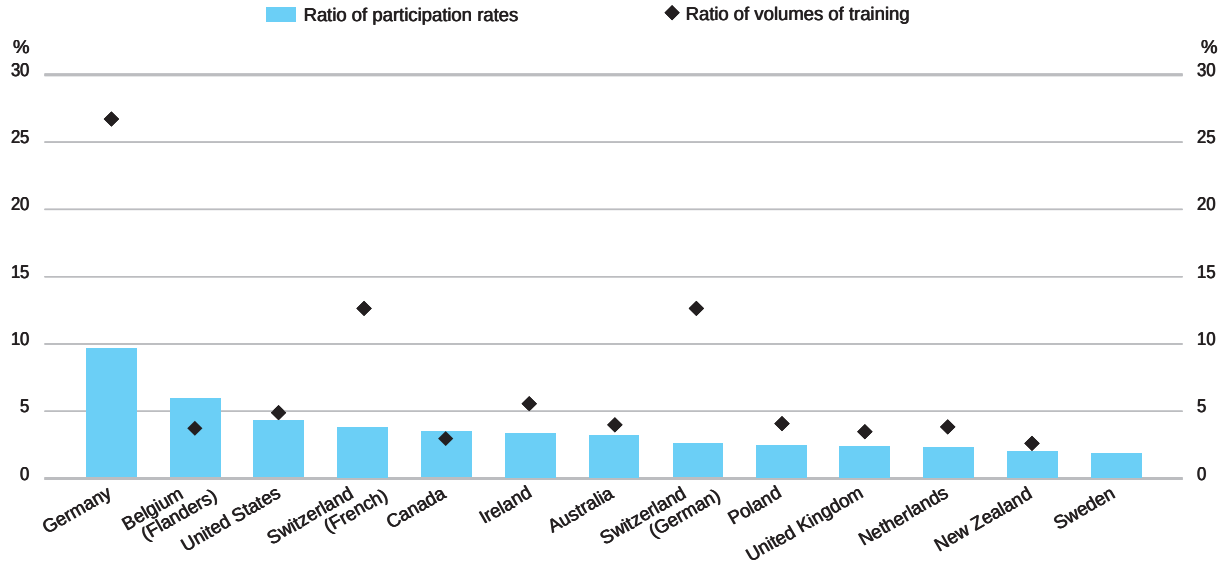
in excess of 1.0. Averaged across countries for a given survey, the mean values range from 3.2 (IALS) to 8.4 (ELFS), confirming that training reinforces the skill differences resulting from unequal initial schooling. These education ratios are consistently larger for the hours measure (not shown), suggesting that the concentration of training on the most educated workers, like that on younger workers, operates on both the extensive and the intensive margins.

The extent of concentration varies considerably across countries for any given survey. For example, the education ratio varies from 1.6 for Sweden to 8.7 for Switzerland, using IALS participation data. However, there is considerable consistency in the relative position of different countries. Training appears to be most evenly distributed across educational attainment levels in Australia, Austria, Ireland, New Zealand, the Netherlands and the Nordic countries. Training is most reinforcing of school-based differences in human capital in southern European countries, Belgium and Hungary. Correlation analysis confirms strong, cross-survey consistency in these comparisons, except that the results for the OECD/INES are more dissimilar (Table 3.8, Panel C).

Chart 3.4 uses IALS data on literacy scores to provide another perspective on the relationship between prior human capital investments and additional training. In all 11 countries, workers with high levels of literacy receive more training than workers with low literacy scores. This association illustrates an important complementarity between literacy and the ability to benefit from training programmes. Such a link could also account for some of the complementarity between greater initial schooling, which tends to enhance literacy, and subsequent training.[11] The strength of the association between training and literacy varies markedly across the 11 countries, in a pattern that roughly parallels international differences in the

11. There is a strong and positive correlation between literacy scores and educational attainment, but considerable variation in literacy scores is found at any given level of education [OECD and Statistics Canada (1995)]. Regression analysis of the determinants of training using IALS data indicates that literacy exercises an important, independent, effect on increasing the probability of training, controlling for the level of education.

Chart 3.4. **Differences in career or job-related training by literacy level**
Ratio of values for workers with prose literacy level 4-5 to those with literacy level 1[a]



a) Level 1 indicates a low level of literacy proficiency while levels 4-5 represent the highest proficiencies. See OECD and Statistics Canada (1995) for detailed definitions and analysis of the distribution of literacy scores.
Source: International Adult Literacy Survey, 1994-1995.

strength of the association between schooling and training. However, Germany is an important exception. The literacy-training association is especially strong for Germany, which only has an average level of association between education and training.

Is there a link between the level and distribution of training?

Chart 3.5 examines whether there is any systematic association between national differences in the level of training and differences in how strongly training is concentrated on younger and more educated workers. The result is clear-cut: training tends to be more evenly distributed in the countries with the highest participation rates, so that the cross-survey index of training participation is negatively correlated with the indices of the relative concentration of training on younger and better-educated workers (–0.41 and –0.55, respectively). With the exception of younger workers in France, all twelve countries with above-average participation have below-average concentrations of training on younger and the most educated workers. Similarly, training tends to be most concentrated in the countries with the lowest participation, although some exceptions occur at this end of the spectrum. Canada and Poland have both below-average participation in training and below-average concentration.

The association between higher training rates and more equal participation in training suggests that differences in national training systems that affect the overall level of training operate most strongly through their effects on the extent to which older and less-educated workers receive training. While it is not clear how to explain this relationship, it suggests that institutions or conditions affecting the incentives or resources available to train older and low-educated workers may be of particular importance. Relatively high and relatively equal training appears to characterise the Nordic countries, as well as Australia, New Zealand and the United Kingdom. At the other extreme, southern, central and eastern European countries tend to have low and concentrated training.[12]

12. While no Japanese data are available in the four harmonised surveys, data from the 1997 Survey of Vocational Training in Private Enterprises (Minkan Kunren Jittai Chosa) suggest that Japan should be classified among the countries with high and relatively equal training: 53 per cent of employees in private establishments with 30 or more regular employees had participated in formal, off-the-job training during the previous year, with the participation rate just 20 per cent higher for university graduates than for workers not finishing secondary schooling and workers aged 46-54 years actually training at a little higher rate than those aged 25-35.

Life-cycle perspective

New insights can be gained by adapting a life-cycle view of training that follows workers from age 25 until 64, taken to be the conventional retirement age. Since many individuals are not continuously employed throughout this forty-year period, realism requires that periods of unemployment and inactivity be incorporated into the analysis, even though training while employed is the focus of this chapter. The IALS data indicate that training occurs while individuals are not employed (Chart 3.6). In most countries, training participation is significantly higher for employees than for the unemployed, but the two rates are similar in the Netherlands and Switzerland and the unemployed actually report more training in Germany. The training rate for persons outside of the labour force is universally far lower than that for the employed.

Table 3.9 presents estimates of training expectancies, defined as the total hours of training received by a "typical" individual between the ages of 25 and 64 years. Using the IALS data, age, gender and education-specific rates were calculated for the three labour force states, as were mean annual training hours conditional on labour force status. These rates are then used to cumulate expected training time for individuals over this forty-year time span on the assumption that current conditions continue to prevail.[13]

Averaging over the 11 countries with the necessary data, these training expectancies imply that a typical individual devotes 1 288 hours, or the equivalent of over thirty weeks of full-time employment, to training after the period of initial vocational training has concluded. While this reflects a considerable investment of time, it is much smaller than that made to initial schooling.[14] Such a comparison probably greatly understates the relative importance of continuing training and on-the-job experience to the development of workforce skills and productivity, because a large share of informal training and experiential learning are not captured by this calculation.

When the life-cycle perspective is adopted, the volume of training received by women is significantly lower relative to that received by men than is indicated by single-year calculations: using the IALS data for employed individuals between the ages of 25 and 54 years, average annual training hours were 92 per cent as high for women as for men, but this falls to just 79 per cent for the forty-year training expectancies. This is due to the typical women being employed fewer years, than men, and when not employed being more likely to be out of the labour force. For the same reason, the concentration of training on the most educated individuals becomes more pronounced when the full working life is considered, a pattern that is very pronounced for women. It does not appear, however, that national comparisons of the level or distribution of training are much affected by the shift to a life-cycle perspective.

D. Bivariate analysis of the associates of training

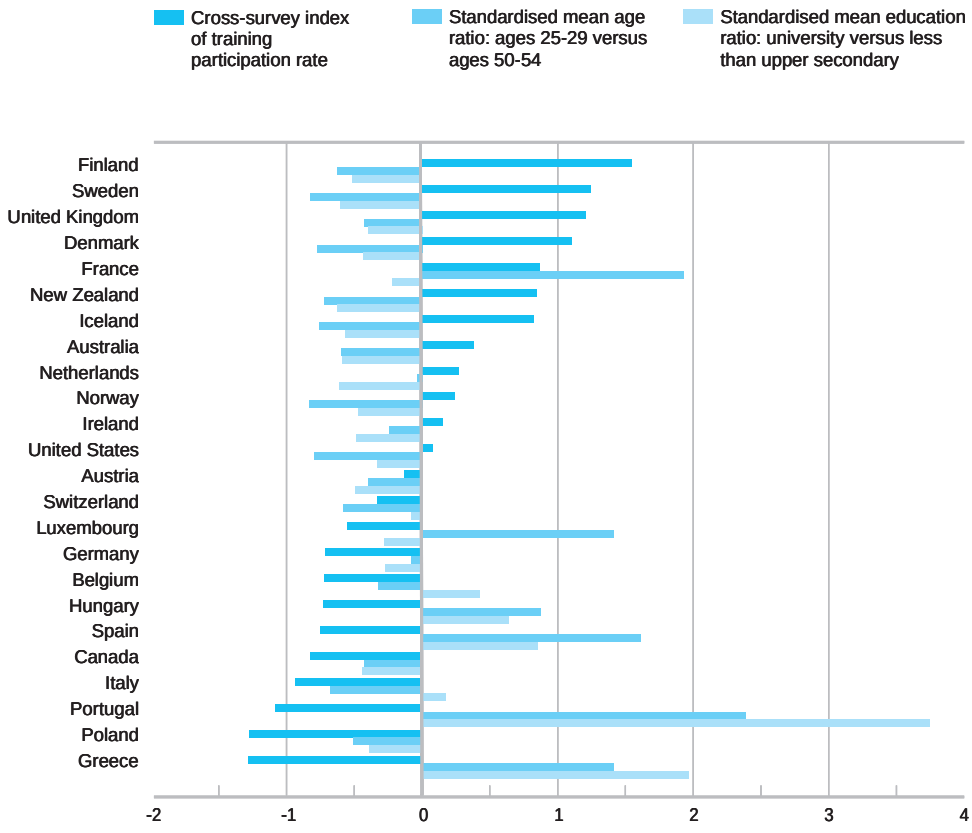
The following two subsections report cross-country correlations of the level and distribution of training with other variables. This exploratory analysis has the limited objective of clarifying the interpretation and economic salience of the international comparisons that can be made with the existing data on training. Correlations are reported with variables that economic theory suggests may be important determinants or effects of training. Nonetheless, these simple associations should not be interpreted as providing rigorous evidence of the causes and consequences of international differences in training, because they do not control for other causal factors. Instead, they are intended to provide an initial survey of factors that are associated with these differences, which can help to guide more sophisticated multivariate analysis of these empirical relationships.

Training and overall human capital formation

While the most educated workers receive a disproportionate share of training in all of the countries analysed, it need not follow that training and education are similarly reinforcing at the national level. Training rates might have to be higher in a country where initial schooling is less well developed, if the nation's business firms are to compete successfully.[15] Chart 3.7 shows that there is a tendency for higher national training rates to be associated with higher educational attainment. In other words, the complementary relationship between initial schooling and training appears to be stronger than the relationship of substitution. A con-

13. This method is analogous to that used to calculate life expectancy based on the age-specific mortality rates observed in the population in a given year. Note that the results should not be understood as providing forecasts of individual training histories, rather they provide an alternative optic for viewing contemporaneous training patterns.
14. These training expectancies are also moderately lower than 40 times the mean annual hours of training for all workers, which were examined in Table 3.3, due to training rates being lower for the years spent unemployed and out of the labour force. A second reason for this shortfall is that the cross-sectional averages for hours of training were calculated for the age span, 25 to 54 years, while these life-time calculations also include ages 55 through 64 years, during which training hours tend to be quite low.
15. A survey of multinational employers' assessments of international differences in the amount of training required suggests that such a relationship holds for the United Kingdom. Employers report needing to train workers more extensively to compensate for the poorer skills of new recruits [DfEE and Cabinet Office (1996)].

Chart 3.5. **National differences in the level and concentration of training participation**[a]



a) Countries are ranked in descending order of the cross-survey index of training participation rate.
Source: See Table 3.1.

siderable number of countries with average or below-average training participation, nonetheless, have above-average shares of the working-age population having finished upper secondary schooling. Notable examples include Canada, Germany, Poland and the United States.

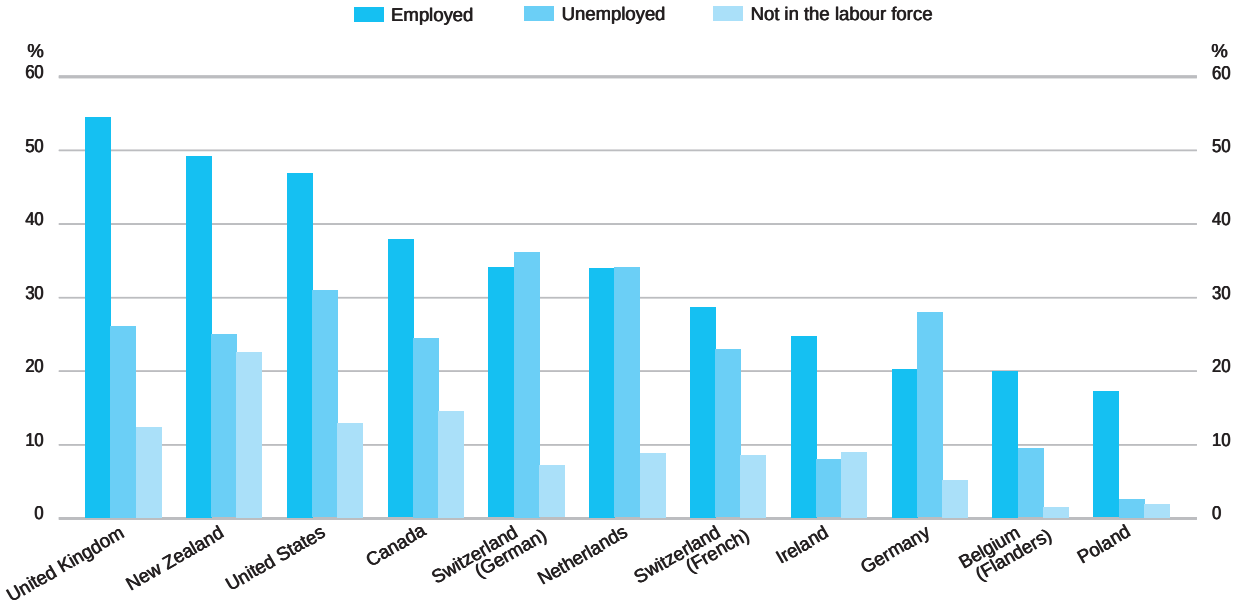
The associations between continuing training and other measures of human capital are examined in greater detail in Table 3.10. Panel A reports correlations between three measures of the level of training and six measures of educational attainment and spending on schools. The correlations for training participation confirm that the positive cross-country association of greater training with greater initial schooling is robust to different measures of educational attainment. The relationship is even stronger for measures of current schooling patterns (*i.e.* educational expectancies of five-year olds today) and school spending than for the educational attainment of the working-age population. It also appears that a high rate of upper secondary school completion is more closely associated with higher training than a high rate of university study.

Table 3.10, Panel A also reports correlations between educational attainment and three measures of the *distribution* of training. Training is less concentrated on younger and more educated workers in countries with higher educational attainment. While the presence of a better educated workforce appears to encourage employers to invest more in training, this increase affects less educated workers more strongly than more educated workers. This suggests that an increase in the supply of skilled workers due to conventional schooling may induce employers to adopt more skill-intensive production processes that imply a more-than-proportionate increase in skill demand, which is met – in part – through greater and more broadly distributed training [Acemoglu (1998)].

Panel B of Table 3.10 reports correlations between the training measures and six measures of educational

Chart 3.6. **Participation rate in career or job-related training by labour force status**[a]

Percentages of persons aged 25 to 54 years



a) Countries are ranked in descending order of the percentage of training for employed persons.
Source: International Adult Literacy Survey, 1994-1995.

achievement and literacy proficiencies. There is a strong positive association between the level of training and both the mathematics achievement scores of current eight graders and the literacy scores of adults. There is also evidence that training levels are lower where the dispersion of literacy scores is higher, suggesting that training may be inhibited where the members of the workforce differ greatly in their "trainability" (*e.g.* their ability to use instructional materials). No such effect is evident for the dispersion of mathematics scores.[16] Training tends to be less strongly concentrated on younger and better educated workers in countries with higher education achievement. Greater dispersion in literacy scores increases the concentration of training on more educated workers, also suggestive of an inhibiting effect of low literacy proficiencies on trainability.

Schooling and formal training are only two of the ways in which economies invest in greater workforce skills and future productive capacity. Panel C of Table 3.10 presents correlations of the training measures with six measures of related investments. Training levels among the employed are positively correlated with national spending rates on active labour market policies (ALMPs). To some extent, this correlation reflects an overlapping of the two categories of training. However, the major part of ALMP expenditures are for nonemployed individuals, suggesting that countries providing more training to the unemployed also tend to have higher on-the-job training, which is less concentrated on younger and better educated workers.

Countries investing a higher share of GDP in research and development (R&D) or having a higher share of researchers in the workforce also tend to have higher training rates, less concentration of training on younger and better educated workers, and relatively less training for women. However, the pattern is very different for the association between training and investment in fixed capital, with more investment being correlated with lower and more concentrated training. This result provides an interesting extension of the well-established finding that physical capital and skilled workers are complements in production [Griliches (1969); Bergström and Panas (1992)]. While greater investments in physical capital appear to shift recruitment choices toward hiring more educated workers, these correlations suggest that there is a reduction in overall training which becomes more concentrated on university-educated workers.

16. This may be because mathematical ability is less strongly related to general trainability or it could simply reflect the positive correlation between the dispersion of test scores and the mean score [OECD (1998*b*)].

Table 3.9. **Training expectancy given current conditions**[a]

Cumulative hours of career or job-related training between the ages of 25 and 64 years

	Cumulative training hours	Ratio of training hours for:		
		Years employed relative to all years	Women relative to men	University educated relative to less than upper secondary
Australia	1 605	..	0.73	3.16
Belgium (Flanders)	478	0.88	0.68	10.75
Canada	2 109	0.48	1.03	3.83
Germany	1 833	0.44	1.23	1.13
Ireland	1 261	0.64	1.19	1.14
Netherlands	1 512	0.66	0.58	1.18
New Zealand	2 627	0.62	0.81	2.73
Poland	391	0.95	0.80	2.58
Switzerland (French)	217	0.92	0.39	2.47
Switzerland (German)	353	0.96	0.50	3.36
United Kingdom	1 666	0.73	0.75	1.72
United States	1 403	0.80	0.80	2.26
Unweighted mean	**1 288**	**0.73**	**0.79**	**3.03**
Standard deviation	**739**	**0.17**	**0.24**	**2.48**

.. Data not available.

a) Expected training hours are the *cumulation*, over five-year age intervals between the ages of 25 and 64, of age and gender-specific estimates of mean training hours. Mean training hours for a specific age and gender were calculated as weighted averages of the mean hours of training for each of three labour force states (employed, unemployed and out of the labour force), where population shares were used as weights.

Source: International Adult Literacy Survey, 1994-1995.

Overall, these patterns suggest that schooling and training are complements because a better educated workforce encourages firms to specialise in products and services that place a high premium on workforce skills and R&D, but are not especially physical capital-intensive. It also appears likely that policies to improve general educational and literacy levels can create a virtuous circle, in which greater skill supply induces greater skill demands and, hence, greater incentives for workers to obtain more schooling, as well as for employers and workers to invest in continuing training. However, a better understanding of these incentives and how they are shaped by policy and labour market conditions is needed. The determinants of the incentives for broadly targeted investments in training – for example, training for less educated and older workers – appear to be of particular importance.

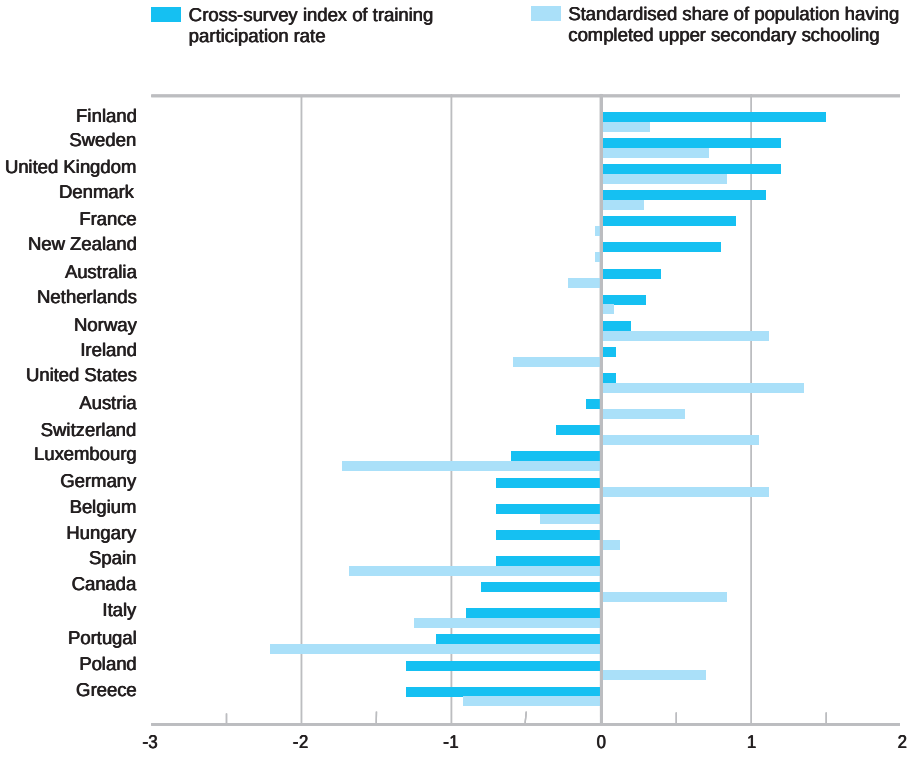
Training and the broader economy

Can these international differences in the level and distribution of training be explained in terms of the labour market institutions and conditions that economic theory identifies as potential determinants of training rates? This section uses bivariate associations to provide a first indication of which factors might plausibly play an important role in causing these differences. Similarly, summary indicators of national training investments are correlated with measures of economic outcomes that training might affect.

Among the labour market institutions that are examined in Table 3.11, Panel A, higher training participation is most strongly associated with greater adoption of flexible working practices.[17] In large part, this correlation reflects the relatively high use of flexible work practices in the Nordic countries which also tend to have the highest training rates, but it is consistent with the belief that increased training facilitates the successful implementation of these practices. Higher trade union density is also associated with higher training participation, consistent with earlier research [Green *et al.* (1999)]. However, collective bargaining coverage does not appear to be strongly associated with training levels. Finally, formal training rates are higher in countries with a higher share of the workforce changing jobs in the previous year, and lower in countries with stricter EPL and higher mean job tenure, two indicators of relatively low labour turnover [see Chapter 2]. Comparisons of training participation *within* individual countries (*e.g.* across workers, firms or industries) have often found that lower turnover is associated with higher training [OECD (1991, 1993)], a pattern that

17. The index of flexible working practices used here is the mean of adoption rates for fours sets of such practices, as measured in the EPOC survey for ten European countries: job rotation, team-based work organisation, involvement of lower-level employees and flattening of management structures [see Chapter 4 for details].

Chart 3.7. **National differences in training participation and educational attainment**[a]



a) Countries are ranked in descending order of the cross-survey index of training participation rate.
Sources: See Table 3.1 and OECD (1998*b*).

is consistent with greater job stability increasing the returns to employers of investing in their workers' skills. That the opposite should be true for international comparisons suggest that high priority be assigned to further study of the links between turnover and training.[18]

Correlations between training and seven measures of earnings dispersion suggest that greater wage inequality generally is associated with lower training participation (Table 3.11, Panel B). However, this effect tends to be modest and statistically insignificant, suggesting that larger wage differentials have largely off-setting effects on the incentives to invest in training: larger wage dispersion increasing the incentives of workers to invest in training, so as to qualify for better paying jobs, but also reducing the incentives of employers to train their workers [Acemoglou and Pischke (1998, 1999)]. The participation index of training suggests that greater wage dispersion, higher incidence of low pay and especially a steeper age-earnings profile are a net discouragement to training,[19] but that the two opposing effects appear to cancel each other out for increases in the educational premium.

Table 3.11, Panel C reports correlations between the summary indicators of training levels and six measures of economic performance. Employment rates are higher, and unemployment rates lower, in countries with higher training. Similarly, the levels of mean earnings and GDP per capita are positively correlated with training, as is trade performance in "high tech" industries. However, the growth in labour productivity and GDP per capita over the

18. Several recent studies using data for single countries have also called the link between lower turnover and higher training into question [Goux and Maurin (1997); Vilhuber (1997, 1998)].
19. The negative correlation between training and a larger age premium in earnings is another instance of these cross-country associations differing from cross-worker associations within a country. The latter tend to show that workers receiving training have steeper age-earnings profiles.

Table 3.10. Correlations of national measures of training with other measures of human capital and related investments

Panel A. Training measures correlated with educational attainment and school spending

Training measures [a]	Percentage of population aged 25-64 years completing upper secondary education	Percentage of population aged 25-64 years completing a university degree	Educational expectancy of five-year-olds under current conditions, expected years of full- and part-time schooling	Educational expectancy of five-year-olds under current conditions, expected years of full-time schooling	School spending as a percentage of GDP, public spending	School spending as a percentage of GDP, public and private spending
Level						
Participation rate	0.37*	0.20	0.48**	0.29	0.49**	0.54**
Mean hours	–0.02	0.14	0.31	0.02	0.01	0.19
Cost share	0.66**	0.35	0.18	–0.33	0.07	0.29
Distribution						
Gender ratio, participation	–0.14	0.08	–0.10	–0.04	0.13	0.17
Age ratio, participation	–0.70**	–0.28	–0.29	–0.04	–0.30	–0.33
Education ratio, participation	–0.64**	–0.31	–0.25	–0.25	–0.23	–0.43*

Panel B. Training measures correlated with educational achievements

Training measures [a]	Mathematics achievement of eight graders, mean score	Mathematics achievement of eight graders, 25th percentile score	Mathematics achievement of eight graders, range from 75th to 25th percentile scores	Prose literacy of population aged 25-54 years, mean score	Prose literacy of population aged 25-54 years, percentage scoring at level 3 or higher	Prose literacy of population aged 25-54 years, range from 75th and 25th percentile scores
Level						
Participation rate	0.13	0.10	0.14	0.56*	0.59**	–0.13
Mean hours	–0.09	–0.13	0.05	0.36	0.36	0.04
Cost share	0.53	0.46	0.47	–0.09	–0.00	0.36
Distribution						
Gender ratio, participation	–0.23	–0.28	0.03	0.22	0.21	0.50*
Age ratio, participation	–0.34	–0.23	–0.58**	–0.09	–0.13	–0.37
Education ratio, participation	–0.59**	–0.51**	–0.59**	–0.24	–0.21	0.06

Panel C. Training measures correlated with related investments

Training measures [a]	ALMP spending as a percentage of GDP	R&D spending as a percentage of GDP, total	R&D spending as a percentage of GDP, excluding higher education	Researchers per 10 000 labour force	Gross fixed capital formation as a percentage of GDP	Gross fixed capital formation, machinery and equipment, as a percentage of GDP
Level						
Participation rate	0.50**	0.61**	0.61**	0.64**	–0.46**	–0.22**
Mean hours	0.16	0.01	0.02	0.05	0.10	0.04
Cost share	0.02	0.67**	0.68**	0.58*	–0.60**	–0.24**
Distribution						
Gender ratio, participation	0.08	–0.13	–0.10	–0.00	–0.41**	–0.60**
Age ratio, participation	–0.22	–0.44**	–0.41**	–0.54**	0.45**	0.27**
Education ratio, participation	–0.18	–0.54**	–0.53**	–0.60**	0.48**	0.28**

ALMP = Active labour market policies.
* Significant at the 10% level.
** Significant at the 5% level.
a) Cross-country indices of training from Tables 3.2, 3.3, 3.5, 3.6 and 3.7, except that the cost share estimates are based solely on the CVTS.
Sources: For data on training, see Table 3.1. Other data from OECD, 1998*b;* OECD (1998), *National Accounts;* OECD Main Science and Technology Indicators Database.

past decade was actually lower in countries with higher training.[20]

Associations between the distribution of training and the measures of labour market institutions and economic outcomes in Table 3.11 are overall difficult to interpret, but several cases merit comment. The age and education concentration of training is significantly lower where flexible work practices are more widespread. Conversely, training is more strongly concentrated on younger and better educated workers in countries with lower job turnover (and stricter EPL) and greater collective bargaining coverage and centralisation/co-ordination. Women receive more training relative to men where flexible work practices are more widespread, earnings dispersion is greater and unemployment rates higher, but lower relative training where the employment to population ratio is higher. A higher wage premium for education is associated with a greater concentration of training on more educated workers, but a higher wage premium for older workers is associated with a greater concentration of training on younger workers.

Overall, these international comparisons suggest that many of the implications of theoretical models of training, like many of the findings of empirical studies for one or a few countries, do not easily generalise to a broad cross-section of OECD economies. Clearly, there is much room for further study of the determinants of the incidence of training and its relationship to earnings and other economic outcomes. The next section uses detailed micro-data for select countries to examine several of these issues in greater depth than is possible with the limited training data that are available in the surveys analysed here.

III. Analyses of training probabilities and earnings of trainees

This section seeks to answer the following questions:

- Which factors are most important in explaining the probability that a worker gets trained? Does training accrue mainly to the higher educated? Is there a gender bias in training? Do small firms train less than larger ones?
- What is the statistical association between wages and training? Does the relationship between wages and training differ by gender and education level? Do workers get trained more in the presence of compressed wage distributions?

A. Main features of the datasets

The micro-data used for the analysis are drawn from surveys for Australia, Canada, France, Germany, Great Britain, Italy and the Netherlands (see Annex 3.B for details). These surveys have the advantage that the samples drawn are large enough to enable one to make reasonable inferences about the population of origin and the questionnaires allow one to investigate the determinants of training. Another advantage is that information on individual (hourly) wages is available so that it is possible to investigate the correlation between wages and training. Some datasets also ask questions on the permanent or temporary nature of the work contract. Firm size and sector of industrial activity are also recorded in all surveys.

Other aspects of the datasets include:

- They relate to representative national samples of employed individuals.
- Questions about training all relate to formal, off-the-job, training. This is normally meant to cover courses or seminars taken either at the firm or outside it.
- Training is defined as only that paid for or provided by the employer for Canada, France, Italy and the Netherlands; but it includes "job-related training" courses that employees may have paid for themselves for Australia, Germany and Great Britain. However, given that the samples are composed of individuals in paid employment, the overlap between job-related training and employer-provided training is likely to be quite large (see Section II).
- The reference period over which training is recorded is the year preceding the date of the interview,[21] with the exception of the Netherlands, where the question relates to training courses being undertaken at the time the survey was carried out.

20. While these associations are consistent with training having important effects on economic performance, it must be emphasised that these correlations could be "spurious". For example, the true *causal* link might be between higher educational attainment and higher labour productivity, rather than from higher training to higher productivity. The interpretation of the negative correlation between training and growth rates in the recent past merits particular caution, since training investments may only be reflected in growth with a lag.
21. For France and Germany, the question asks whether any training courses were taken in the past, respectively, five years, for France, and three years, for Germany. However, in these surveys the date of the last training course/s is recorded. This additional information was used to construct a variable that records training having taken place in the past year. In Great Britain, the reference period is actually slightly more than a year since the relevant question asks about any training undertaken since 1 September 1995 and the survey is carried out some time (shortly) after 1 September 1996.

Table 3.11. Correlations of national measures of training with measures of labour market institutions and economic outcomes

Panel A. Training measures correlated with labour market institutions

Training measures [a]	Index of the introduction of flexible work practices	Collective bargaining coverage rate	Trade union density	Strictness of EPL	Percentage of workforce with less than 1 year of tenure	Mean job tenure in years	Tax wedge
Level							
Participation rate	0.83**	0.02	0.44*	–0.42*	0.31	–0.39*	–0.07
Mean hours	–0.02	0.03	–0.21	–0.15	0.37	–0.43*	–0.12
Cost share	0.76**	–0.38	–0.17	–0.69**	0.08	–0.51*	–0.24
Distribution							
Gender ratio, participation	0.36	–0.10	0.36	–0.05	0.49**	–0.22	0.20
Age ratio, participation	–0.52	0.25	–0.48**	0.62**	0.00	0.11	–0.01
Education ratio, participation	–0.65**	0.06	–0.20	0.62**	–0.09	0.16	0.07

Panel B. Training measures correlated with earnings dispersion

Training measures [a]	Full-time weekly earnings					Mean annual earnings	
	Ratio of 90th to 10th percentiles	Ratio of 90th to 50th percentiles	Ratio of 50th to 10th percentiles	Low-pay as a percentage of full-time employment	Ratio women to men	Ratio 45-54 years old to 25-29 years old	Ratio university degree to less than upper secondary
Level							
Participation rate	–0.19	–0.14	–0.11	–0.38	0.02	–0.45*	0.05
Mean hours	0.02	0.03	–0.00	0.03	–0.09	–0.21	0.10
Cost share	0.01	–0.06	0.09	0.85*	–0.15	–0.62*	0.21
Distribution							
Gender ratio, participation	0.30	0.27	0.31	–0.05	–0.11	0.35	0.12
Age ratio, participation	0.20	0.24	0.05	–0.04	–0.06	0.41*	0.28
Education ratio, participation	0.10	0.18	–0.08	0.11	0.21	0.31	0.28

Panel C. Training measures correlated with economic outcomes

Training measures [a]	Mean employment to population ratio for the working age population, 1988-97	Mean unemployment rate for the total labour force, 1988-97	Mean earnings in PPP	GDP per capita in PPPs, 1997	Growth in labour productivity, annual rate for 1988-97	Growth in GDP per capita, annual rate for 1988-97	Trade coverage ratio (exports/ imports) for "high tech" industries
Level							
Participation rate	0.56**	–0.18	0.28	0.33	–0.12	–0.19	0.37
Mean hours	0.06	–0.02	0.30	–0.07	–0.25	–0.15	–0.18
Cost share	0.49	–0.15	0.08	0.23	–0.17	–0.01	0.64**
Distribution							
Gender ratio, participation	–0.25	0.54**	–0.17	–0.16	0.17	0.09	–0.05
Age ratio, participation	–0.58**	0.29	–0.29	–0.31	0.07	0.24	–0.09
Education ratio, participation	–0.44**	0.04	–0.38	–0.44**	0.06	0.08	–0.34

EPL = Employment protection legislation.
PPP = Purchasing power parities.
* Significant at the 10% level.
** Significant at the 5% level.
a) Cross-country indices of training from Tables 3.2, 3.3, 3.5, 3.6 and 3.7, except that the cost share estimates are based solely on the CVTS.
Sources: For data on training, see Table 3.1. Other data from the OECD Earnings Database; OECD (1998), *National Accounts;* OECD *Labour Force Statistics 1987-1997,* Part III; and Chapters 2 and 4 of this volume.

B. Results of estimation of models of the probability of being trained

The probability of being trained is specified as a dichotomous variable, taking the value of one if workers are trained and zero otherwise. A probit model is estimated by maximum likelihood techniques. The impact of individual and firm characteristics on the training probability is modelled by means of the following explanatory variables: age; education level; gender; type of contract, either permanent or temporary; tenure with the current employer; hours of work; firm size; public or private sector; and industrial sector (more details are given in Table 3.B.2 in Annex 3.B). A quadratic in tenure with the current employer is specified to allow for non-linearities in the relationship between job-related training and tenure. According to the standard theory, employers are more likely to train workers that will stay longer at the firm. However, the training probability is bound to be higher for a given worker in the first years of employment tenure. Issues of the potential endogeneity of tenure, and also of hours of work and type of contract, are not taken up in this analysis.

Results of estimation of models of the probability of being trained are shown in Table 3.12. The main findings are:

- Less-educated workers are significantly less likely to be trained in all countries considered except the Netherlands. This is important as most policies fail to affect the distribution of training across different categories of workers. Moreover, the labour market situation of less-skilled workers has deteriorated in many OECD countries [OECD (1997*d*)].
- Large establishments are significantly more likely to train workers.
- Workers on temporary contracts and in part-time jobs are significantly less likely to be trained. This is an especially important finding given the trend towards the increasing number of these types of contracts in most OECD countries [Chapter 1].
- Public sector employees are significantly more likely to be trained.
- Workers in finance, insurance and business or community, social and personal services are more likely to be trained compared with other industries.
- Training probabilities decrease significantly with age in Germany and the Netherlands; but less so in other countries.
- The training probability decreases significantly with tenure at an increasing rate in Australia, while it increases with tenure in Italy and Great Britain.

Notwithstanding large cross-countries differences in the amount of training provided, there are common patterns in the allocation of training that emerge from this analysis. In particular, the finding that less-educated workers get less on-the-job training confirms the conclusions of Section II and raises some policy concerns. Also important for policy is the conclusion that small firms provide less (formal) training of workers.

C. Results on the relation between training and wages

The relationship between wages and training has been the focus of a number of empirical and theoretical studies that have stressed the importance of the wage effect as a measure of training gains. Recent work, as reviewed in Section I and in Table 3.A.1, has brought up the following issues:

- The earnings gains from training are higher for some categories of workers that are, on the other hand, less likely to be trained: the mid-educated workers in the United Kingdom [Blundell *et al.* (1996)] workers that receive "remedial" training in the United States [Bartel (1995)]; and women in (west) Germany [Pischke (1996)].
- Employers have more incentives to train if the wage distribution is more compressed because the gains from training are not passed entirely on to wages [Acemoglou and Pischke (1998, 1999)].

The first group of studies have carefully dealt with the potential endogeneity of training variables entered in earnings regressions, (see Section I). The hypothesis about the impact of wage compression may require one to use information on institutions such as collective bargaining or minimum wages legislation to control for possible sources of wage compression. This is outside the scope of the analysis carried out here that draws on individual-level data. Rather, here the analysis investigates the statistical association of wages and training. Gross hourly wages, observed at the time of the surveys (*i.e.* at the end of the period over which training is recorded) are used for this purpose. For the Netherlands, these are contemporaneous wages as training is recorded at the time of the survey.

In Table 3.13, the mean wages of workers trained are compared with the mean wages of workers not trained. The earnings "gains" for workers trained are computed as the proportional difference between the two.

Workers trained have higher mean wages than those not trained. However, the proportional earnings differences vary considerably in size from country to country. The proportional earnings "gains" for all workers are the largest in Italy. As shown in the preceding section, Italy is

one of the countries that rank lowest in terms of the quantity of job-related training provided. In addition, university graduates reap the least "benefits" from training in most countries considered. Finally, women get the highest wage gains from training compared with men in Australia, France and Great Britain. In France, it is workers with less than lower secondary schooling that benefit most from training.

However, these earnings differences may be explained by factors other than training. More light on this issue may be shed by econometric analysis of wages and training. Results of the estimation of wage regressions using ordinary least squares are shown in Table 3.14. The natural logarithm of gross hourly wages is regressed on the following explanatory variables: age; gender; job tenure; hours of work; nature of the contract; firm size; public sector employee; and industrial sector. Interaction variables of training and gender, and training and education levels have been included in the model to capture the impact of training on wages.

The estimation results indicate that there is a significantly positive relationship between training and wages, except for the Netherlands, France and Italy. The result for the Netherlands may be due to the absence of a time lag between the times at which training and wages are observed. Previous studies for the Netherlands find a significantly positive impact of training on future wages [Groot (1994)]. The results for France and Italy are, instead, in line with previous findings in the literature, using the same datasets [Goux and Maurin (1997); Brunello and Miniaci (1999)].

For France, Italy, the Netherlands and Great Britain, there is a significant positive relationship between wages and training of less-educated workers. This finding provides some support for the argument that the lower educated, *when trained*, realise larger wage gains. On the other hand, it may also be a spurious result, driven by the correlation of unobservables that determine both the wage rate and the probability of being trained.

The interaction between women and training is insignificant in all countries except for Germany, where it is significantly positive. This confirms previous findings for Germany that women who get training realise more significant earnings gains than men [Pischke (1996)].

The possible endogeneity of training is controlled for by applying Heckman's two-stage procedure. This consists of including among the explanatory variables a term summarising information obtained from separate estimation of a probit of training. The additional term is significantly negative, which indicates the presence of some selection bias.[22]

On the basis of these findings, it may be concluded that, as argued in recent literature, the earnings gains from training are higher for some categories of workers who are, on the other hand, less likely to be trained. The evidence gathered also cannot reject the hypothesis that employers have more incentives to train workers in countries where the wage distribution is more compressed. However, given the limitations of the analysis carried out here, more work is needed to draw robust conclusions on these issues.

IV. What policies are in place for improving access to training for employees?

From the empirical analysis carried out in Sections II and III some policy concerns arise. The findings that less-educated workers; workers on part-time or temporary contracts and employees of small firms tend to receive relatively little training raise not only equity but also efficiency concerns. Lower training participation may worsen the labour market position of already disadvantaged categories of workers. This may lead to considerable costs in terms of loss of potential output, skill deterioration and future unemployment. Furthermore, it has emerged that training of workers takes place in some countries at a much lower rate than in others. This may signal some market failure in the allocation of training that may lead to lower productivity, worse economic performance and lower economic growth. This is especially important as recent theories stress the importance of human capital accumulation for economic growth. In particular, it has been argued that lower training rates may contribute to creating "low-skill-bad-job" traps such that firms have little incentives to upgrade their workers' skills and to invest in more productive activities [Booth and Snower (1996)].

Generally, it is very hard to establish whether the observed rates of training are "optimal" from the perspective of the individual, the firm and society. This is the more so as the costs and benefits of training to these different actors are very difficult to evaluate. Even if it were possible to conclude that observed training rates are "sub-optimal", this may not imply that government intervention

22. A general problem with any procedure to control for endogeneity of training is that of finding suitable instruments that affect training but not earnings. Here, the marital status presence, young children and their interaction with gender were used for this purpose. Functional form differences may also act as to identify training.

Table 3.12. Results of estimation of probits of the probability of being trained [a]

	Australia	Canada [b]	France	Germany	Italy	Netherlands	Great Britain
Intercept	0.49**	–0.27	–1.50**	–0.68**	–1.47**	–1.27**	0.35**
Woman	0.05*	–0.26	0.01	0.11	–0.11*	–0.12	0.15**
Age group 35-44	–0.03	–0.06	–0.14**	–0.12*	–0.04	–0.21**	0.00
Age group 45-54	–0.02	–0.18	–0.19**	–0.45**	–0.10	–0.39**	0.04
Tenure	–0.03**	0.11**	0.03**	–0.00	0.02	–0.01	–0.00**
Tenure squared	0.00**	–0.00**	–0.00**	0.00*	–0.00	–0.00	0.00
Less than upper secondary	–0.26**	–1.54**	–0.45**	–1.02**	–0.63**	0.01	–0.54**
Upper secondary	–0.18**	–0.43**	–0.12**	–0.37**	–0.08	0.13	–0.33**
Large firm size	0.08**	0.46**	0.48**	0.23**	..	0.24**	0.26**
Part-time work	–0.08**	–0.97**	–0.31**	–0.34**	0.12	–0.22*	–0.39**
Temporary job	–0.33**	–0.42	–0.34**	–0.25	..	..	–0.24**
Public sector	0.11**	..	0.02	0.38**	..	0.07	0.34**
Married	..	–0.21	0.15**	0.24**	0.14**	0.08	0.15**
Child less than 6	–0.05	..	–0.05	..	–0.04	0.10	0.03
Woman × child less than 6	–0.05	..	–0.20**	..	–0.01	–0.08	–0.27*
Married woman	..	0.16	..	–0.24**	..	..	..
Agriculture	..	..	–0.17	–5.49*	–0.51*	0.08	–0.09
Electricity, gas and water	0.38**	..	–0.25*	0.38*	..	–0.07	0.44**
Construction	–0.20**	..	–0.22**	–0.24	–0.52**	–0.18*	0.05
Wholesale and retail trade, restaurants	0.08*	..	–0.06	0.02	0.02	–0.26	0.14*
Transport and communication	0.07	..	0.01	0.15**	–0.03	–0.20	0.09
Finance, insurance and business services	0.28**	..	0.06	0.52**	0.57**	0.18	0.37**
Community, social and personal services	0.13**	..	0.03	0.28**	0.20**	0.15	0.23**
Number of observations	12 821	1 556	8 286	3 442	5 229	2 544	3 117

.. Data not available.
* Significant at the 10% level.
** Significant at the 5% level.
a) Figures have been rounded to the second decimal point.
b) Due to the pilot nature of the data, the specification for Canada is different.
Source: See Annex 3.B.

Table 3.13. Proportional mean wage differences for workers trained [a]

Percentages

	Australia	Canada	France	Germany	Italy	Netherlands	Great Britain
All	9.6	26.4	11.1	18.5	25.0	3.1	19.3
Men	9.6	32.0	17.2	17.6	29.1	0.0	15.1
Women	11.2	12.2	20.7	16.5	20.0	–2.3	25.0
Less than upper secondary	6.9	..	30.2	16.0	15.7	17.6	20.2
Upper secondary	8.6	..	16.1	9.5	23.8	0.7	4.3
Non-university tertiary	4.2	..	2.3	–7.6	..	–0.3	19.8
University	1.8	..	–1.3	17.9	6.8	–15.9	3.0

.. Data not available.
a) Mean earnings of workers trained minus mean earnings of workers not trained, divided by mean earnings of workers not trained.
Source: See Annex 3.B.

Table 3.14. **Results of estimation of OLS wage regressions with selection** [a, b]

Dependent variable: log of gross hourly wage

	Australia	Canada [c]	France	Germany	Italy	Netherlands	Great Britain
Intercept	2.42**	1.89	11.57**	3.85**	2.48**	4.31**	1.64**
Woman	–0.13**	–0.20**	–0.21**	–0.23**	–0.14**	–0.09**	–0.26**
Age group 35-44	0.04**	..	0.11**	0.12**	0.07**	0.17**	0.05**
Age group 45-54	0.07**	..	0.15**	0.25**	0.09**	0.31**	0.02
Tenure	–0.00	0.02**	0.01**	0.00**	0.01**	0.02**	0.00**
Tenure squared	0.00*	0.00*	–0.00**	–0.00**	–0.00**	–0.00**	–0.00**
Less than upper secondary	–0.48**	–0.27**	–0.60**	0.10	–0.37**	–0.37**	–0.13**
Upper secondary	–0.33**	–0.11**	–0.40**	–0.07**	–0.24**	–0.28**	–0.04
Large firm size	0.06**	0.20**	0.16**	0.01	..	–0.03	0.06*
Part-time work	0.19**	–0.27**	–0.16**	0.12**	0.26**	0.12**	–0.09*
Temporary job	–0.36**	0.01	–0.09**	0.06	..	..	–0.02
Public sector	0.09**	..	–0.04**	–0.16**	..	–0.09**	0.08
Agriculture	..	..	–0.28**	2.58**	–0.13**	–0.17**	–0.29**
Electricity, gas and water	0.14**	..	–0.07**	–0.08	..	0.15**	0.07
Construction	–0.16**	..	–0.04*	0.10**	–0.04**	0.06	–0.04
Wholesale and retail trade, restaurants	–0.08**	..	0.04**	–0.11**	–0.02	0.06	–0.26**
Transport and communication	0.04**	..	0.04*	–0.18**	0.06**	0.10**	–0.02
Finance, insurance and business services	0.21**	..	0.09**	–0.16**	0.07**	–0.01	0.17**
Community, social and personal services	0.01	..	–0.06**	–0.11**	0.06**	–0.05*	–0.10**
Had training	0.05**	0.14**	0.00	0.08**	0.38**	–0.04	0.74**
Training × woman	–0.00	–0.02	0.03	0.09**	–0.00	–0.02	0.04
Training × less than upper secondary	0.02	0.02	0.16**	–0.01	0.26**	0.17**	0.09**
Training × upper secondary	–0.01	–0.04	0.07**	–0.04	0.22**	0.04	0.03
Selection	0.94**	..	0.07	–0.55**	–0.23**	–0.58**	–0.44**
Adjusted R-squared	0.23	0.27	0.37	0.34	0.38	0.32	0.30
Number of observations	12 609	1 556	8 179	3 093	5 212	2 457	3 117

.. Data not available.
* Significant at the 10% level.
** Significant at the 5% level.
a) A correction for possible endogeneity of training is made using Heckman's two steps method; the selection used is the probit in Table 3.12.
b) Figures have been rounded to the second decimal point.
c) Due to the pilot nature of the data, the specification for Canada is different; regressors include a polynomial in age, a marital status dummy and the log of worked hours.
Source: See Annex 3.B.

in this area is desirable, because of the possible further distortions introduced by it in the market that may outweigh the benefits. In particular, it may be difficult to intervene effectively in an area which is typically the domain of the private sector. Indeed, while all OECD countries provide public education; very few provide public training of workers (an exception here being Denmark).

Despite these uncertainties, there is broad political support for public support of training and most OECD countries have policies that affect, either directly or indirectly, the training of workers. These range from tax-deductibility of training expenses to training levies that legislate compulsory spending on training of workers and to other policies that may indirectly affect training, such as equality of opportunity laws. It is outside the scope of this study to review and evaluate such policies especially given the limited information available on this topic to date. Nonetheless, a brief overview is provided of the policies in place.

One strategy is to focus on creating the right environment for firms to train their workers, rather than legislating compulsory spending on training. Governments may act so as to raise the incentives to train for employers and employees by, for example, improving access to relevant information, improving the recognition of skills acquired through training, and improving flexibility with respect to the capacity to exploit and make use of the acquired skills and competencies [Wurzburg (1998)]. More targeted policies may be needed, however, especially to equalise the distribution of training across workers and firms of different size.

Most countries allow for the immediate and full tax deductibility of training expenses incurred by firms. The tax rules allowing training costs to be "expenses" rather than treated as an investment that is amortised over a period of years, lowers the cost of training relative to investments in physical capital. However, the associated accounting convention may discourage investment in training since firms' financial statements provide little or

no indication of the competitive asset that a better trained workforce represents [O'Connor (1998)]. Some countries allow individuals to deduct some share of training expenses from taxable income, but few, if any, allow all expenses to be deducted.

Targeted, fiscal incentives are used to encourage the training of specific categories of workers. The Netherlands have legislated in the 1997 budget larger tax discounts on training expenses of small-and-medium-sized enterprises and on any training directed at older workers, above forty. No evaluation of such programme is available yet.

Some countries, among them France, Belgium and Denmark, grant workers a right to paid training leave [Gasskov (1998)]. This option is interesting especially since it is directed at the individual worker who can choose to take-up the scheme. On the other hand, it may present the disadvantage that the training initiative is taken by the worker rather than by the employer and may not correspond to the firm's needs. Moreover, in France beneficiaries of the programme must have an indefinite work contract, which implies that temporary workers are excluded; in Belgium the scheme is restricted to full-time workers. In Denmark, since the introduction of the programme in the mid-1990s, participation rates have been quite high. However, the programme was designed mainly for the long-term unemployed, that constituted a serious problem for the country since the late eighties, rather than as a means to encourage more training of workers. Generally, it is likely to be the more educated workers that will make use of their right to paid training leave.

Other countries have tax levies that oblige employers to spend a certain percentage of their total wage bill on training. If firms fail to comply, they have to pay the corresponding amount to the government. France was one of the first OECD countries to introduce a tax levy policy, back in 1971. The percentage of the wage bill to be spent on training has been increased several times and it is currently set at 1.5 per cent. The threshold wage bill that regulates participation into the programme is currently set at a level that corresponds roughly to a firm size of above ten employees. Korea implemented a training levy in the mid-1970s that was abolished in 1998, after having earlier restricted the programme to firms with more than a thousand employees. Australia introduced a training levy on employers in 1990 to abolish it few years later in 1994. Quebec introduced a training levy in the mid-1990s.

The levies have generally resulted in an increase in the overall quantity of training and have provided clear incentives for participating firms to formulate a training plan [Fraser (1996)]. However, the empirical evidence suggests that existing levies are not very effective with respect to small and medium-sized enterprises that have often opted to pay the levy rather than provide training [Fraser (1996); Brochier *et al.* (1997); Gasskov (1998); Ministry of Labor, Republic of Korea (1996)].[23] They also do not affect the distribution of training across different categories of workers as most of the training goes to higher-educated and more skilled workers, just as it does in countries that do not operate a levy scheme.

Denmark and the Netherlands have training funds that are run by collective agreements between employers and unions and that are also supplemented by government funds. In Denmark, the programme is more centralised and training is provided by public training institutions (AMU) to both the employed and the unemployed. These programmes appear to be quite responsive to the different training needs of specific industrial sectors and local labour markets.

In the EU, training of workers has also been promoted by programmes set-up under the activities of the European Social Fund to facilitate the adaptation of workers to industrial change and to changes in production systems. Another such programme is ADAPT, which has focused on the problems, needs and potential of small firms. However, most of the burden of setting up training programmes and funding them has remained with member countries. From the scant evidence available, it seems that such programmes were perhaps more successful in raising training rates in countries where EU funding contribution was more substantial such as Ireland, Portugal and Greece. However, not much evaluation of these programmes has so far been available.

Policies not explicitly targeted at training may also affect training efforts indirectly. For example, in the United States, there is some evidence that Affirmative Action policies have positively affected the training of women and minorities [Holzer and Neumark (1998)]. The authors conclude that firms that make use of Affirmative Action tend to screen more extensively; they hire more women and minority workers and provide more training to their employees. In these establishments, the job performance of women and minority workers is as high as that of other comparable workers.

23. The direct and indirect costs of formal training courses may be relatively higher for small and medium sized firms that may find it difficult to replace workers that undertake a course. Small firms may also require different skills from their workers than those provided by available training courses.

Conclusions

Should public policy attempt to expand or redirect the training received by incumbent workers after the period of initial vocational training? While there is no consensus on this question, Member country governments pursue a number of policies directed toward these ends. That the level and distribution of training differs significantly among OECD countries is supportive of the belief that appropriate policies can create an environment that encourages employers and workers to invest in continuing training. That the typical worker devotes more than 1 000 hours to formal training, between the ages of 25 and 64, is also supportive of the importance of continuing training for achieving the goal of life-long learning. Unfortunately, the analysis of the determinants and consequences of training is not yet sufficiently developed to provide policy makers with reliable estimates of the economic returns that accrue to any specific policy approaches. Further harmonisation of training statistics could make an important contribution to filling that gap. Nonetheless, it is possible to draw several tentative conclusions with the limited data currently available.

The strong link between national levels of educational attainment and achievement, on the one hand, and the level of workforce training, on the other, suggests that an indirect strategy of strengthening schooling is a potent – if slow – means of encouraging continuing training. These links also confirm that education and training policies should be assessed as an integrated system affecting learning over the life course [OECD (1996*a*)]. It is particularly striking that training rates are relatively low in countries where the literacy scores of the adult population are lower and more unequal. A key step in encouraging worker training is to ensure that all individuals enter the world of work with the basic knowledge and learning skills needed to insure their subsequent trainability.

Another finding of potential importance for policy making is that a key distinguishing feature of high-training economies is that participation in training is more evenly distributed across age and educational groups. Policies enhancing the incentives and resources for investing in the continuing training of those workers who typically receive little training may, thus, be of particular importance. Programmes to minimise school failure and early school drop-outs have received increased attention recently, as a part of efforts to protect at-risk youths from a future of economic marginality and social exclusion [OECD (1995)]. Success in bringing all individuals up to a minimum threshold of general education and literacy might also make an important contribution toward a broadening and deepening of enterprise-centred training and higher overall prosperity. However, such an approach will only gradually raise the skill level of the workforce and policies to expand the training received by the current adult workforce may also be desirable.

Internationally comparative research on worker training is not yet sufficiently advanced to assess the desirability of policies designed to affect training patterns more directly. Options here include minimally interventionist measures, which are intended to create a more supportive environment for employers and employees to invest in continuing training. For example, the limited evidence available suggests that policies encouraging the diffusion of flexible working practices [Chapter 4] or providing certification services that facilitate the recognition of skills acquired through training [OECD (1997*e*)], may indirectly encourage greater training. More interventionist measures, such as mandatory training levies and direct provision of training have also been tried in a number of Member countries. The now extensive evaluation literature on active labour market policies suggests that the effectiveness of any such measures will be dependent on good programme design and administration [OECD (1996*b*)]. Evaluations of a similar rigour would be highly desirable for the broader range of policies that have been used – or proposed – to enhance the training received by the employed workforce.

Annex 3.A

Overview of Findings from Recent Studies of Job-Related Training

Table 3.A.1. An overview of main findings from recent studies of job-related training

Authors	Country and data sources	Main findings
Arulampalam and Booth (1998*b*)	United Kingdom, British National Child Development Study of men only.	Training incidence has a significant large positive impact on wage growth, after controlling for its endogeneity. The number of training courses undertaken has no significant impact on wage growth. There is a strong positive correlation between the number of training courses and educational qualifications.
Bartel (1995)	Personnel records from a large American company.	A large and significant impact of formal training on employee's wage growth is found after controlling for selection bias. The effect is larger for "remedial" training, targeted at individuals that have low relative status in the job. Significant positive effects of training on job performance.
Black and Lynch (1996)	US establishment data.	The duration of off-the-job training has a positive impact on productivity.
Blundell *et al.* (1996)	United Kingdom, British National Child Development Study.	Formal off-the-job training especially increases the wages of individuals with intermediate schooling, who are, on the other hand, less likely to obtain training. More-educated people are more likely to be trained; and men are more likely to be trained than women. The duration of training courses has a significant positive impact on wages. Training provided by a previous employer has a positive impact on wages, as well as training with the current employer.
Boon (1998)	Netherlands, linked firm-level data, Central Bureau of Statistics, 1991 and 1993.	Investment in training has a positive effect on firm's value added.
Booth (1991)	United Kingdom, British Social Attitudes Survey, 1987.	There are significant positive effects of formal job-related training on wages. Men receive more training, but the positive wage effects are larger for women. Training is treated as exogenous.
Goux and Maurin (1997)	France, matched firm-worker data; Enquête sur la Formation et la Qualification Professionnelle, 1993, and Bénéfices Industriels et Commerciaux.	Training efforts are concentrated in occupations in the middle of the work hierarchy, *i.e.* technicians, foremen. Firms with higher mean wages train their workers more. While a positive impact of formal firm-training on wages is found, it disappears when firm and individual selection effects are controlled for. A three simultaneous equations model is estimated that contains a wage equation, a probability of training equation and an equation for the probability that the worker quits the firm. The impact of training on the probability of quitting the firm is small and insignificant.
Loewenstein and Spletzer (1997)	United States, National Longitudinal Survey of Youth, 1988 to 1991.	Formal training, beyond the first year of tenure, has a significant positive impact on wages, after controlling for the endogeneity of training and measurement error. Individuals who received previous training in the current job are more likely to be trained again in the current year.
Loewenstein and Spletzer (1998)	United States, National Longitudinal Survey of Youth, 1988 to 1991.	Employers seem to pay for most general training, like courses and seminars provided outside of the firm premises. Completed spells of training with previous employers have a larger positive effect on wages than completed spells of training with the current employer. This indicates that training is general and employers share the costs of it.
Pischke (1996)	Germany, Socio-economic Panel, 1989, that asked special questions on continuous training.	Returns to training are significantly positive for women, but insignificant for men. Training is mostly provided by employers. Individuals do not undertake much training at their expense. Training appears to be more general than firm-specific. Training is distributed very unequally: the more-skilled receive a disproportionate share of the training.
Regner (1995 and 1997)	Sweden, the Swedish Level of Living Survey, 1981, 1991.	Training is split into general or specific according to respondents' subjective answers. Most training is considered general. The returns to training are large and significant. There is no empirical evidence of a relationship between training and tenure at the firm.
Veum (1995)	United States, National Longitudinal Survey of Youth, 1986 to 1990.	Company training and seminars outside work have a positive impact on wages. Other forms of training do not impact on wages. The duration of the training does not affect wages.
Vilhuber (1997, 1998)	United States, National Longitudinal Survey of Youth, 1979 to 1993. Germany, Socio-economic Panel, 1989, 1993.	Workers mobility patterns indicate that employer-provided training is sector-specific or general rather than firm-specific.

Annex 3.B

Data Sources, Definitions and Methods for the Analysis in Section III

The data used in Section III are drawn from household surveys for France, Germany, Great Britain, Italy, the Netherlands, and from the employees' files from matched employer-employee surveys for Australia and Canada. The Canadian data are drawn from a pilot survey. The datasets used and the training questions asked are described in Table 3.B.1.

The sample selected for analysis consists of employees, excluding the self-employed and apprentices, aged between 25 and 54 years. Only workplaces with more than 20 employees were surveyed for Australia.

The analysis has been carried out partly by the OECD Secretariat and partly by the following individuals: Wiji Arulampalam Narendranathan, Department of Economics, Warwick University, United Kingdom; Jean-David Fermanian and Marc-Antoine Estrade at *Division Emploi*, INSEE, Paris, France; Bill Harley, Department of Management, University of Melbourne, Australia; Raffaele Miniaci, Department of Economics, University of Padova, Italy; Garnett Picot, Marie Drolet and Robert Kopersievich at Statistics Canada, Canada.

The descriptive tabulations and econometric analysis were carried out both with and without population weights. For Italy, weights were only available on a household rather than on an individual basis, and the unweighted statistics are presented. Unweighted statistics are also presented for Great Britain, France, Italy and the Netherlands. However, weighted statistics are presented for Germany, and for countries for which the sample dataset is drawn from the population of workplaces, rather than from the population of individuals, *i.e.* for Australia and Canada.

The variables used in the econometrics analysis are defined in Table 3.B.2.

Table 3.B.1. **Data sources for the analysis in Section III**

Country	Dataset, year	Question on training
Australia	Australian Workplace Industrial Relations Survey, 1995.	Has your employer provided you with any of the following training over the last 12 months? Include any training which is provided or paid by your employer and training to help you do your job.
Canada	Workplace and Employee Survey, 1995.	In the past twelve months have you participated in any formal training programmes related to your job?
France	Enquête sur la Formation et la Qualification Professionnelle, 1993.	Have you followed any training course organised and paid for, at least partially, by your employer, after completing your schooling? Which is the starting and ending date of the most recent course followed?
Germany	Socio-economic Panel, 1993; special section on employer-provided training.	Have you taken courses for occupational advancement in the last three years? Please, give the year when the most recent training course started and ended.
Great Britain	British Household Panel, 1996.	Since 1 September 1995, have you taken part in any education or training schemes or courses, as part of your present employment?
Italy	Bank of Italy survey, 1991; special supplement on employer-provided training.	Have you been on a training course organised and paid for by your employer in 1991?
Netherlands	Socio-economic Panel, 1994.	Are you currently following any training or education course that is paid for by your employer?

Table 3.B.2. Definitions of variables for the econometric analysis in Section III

Variable name	Definition	Countries' specificities
Training dummy	Equal to 1 if trained, 0 otherwise.	
Wage	Gross hourly wage.	Netherlands: only individuals who worked 12 months in the previous years are selected here, since usual hours of work in the reference week are asked in the current year survey and wages and months of work in the following tax year survey. France: the hourly wage is derived from INSEE computations of equivalent yearly earnings, since hours of work are not available.
Age		Dummies take the value of 1 when individuals belonging to that age group are entered. The excluded group is age 25-35.
Woman	Dummy that takes value 1 for women; 0 otherwise.	
Married	Dummy that takes value 1 if individual is married; 0, otherwise.	Australia: marital status is not available.
Child less than 6	Dummy equal to 1 if children younger than 6 are present and 0 otherwise.	
Tenure	Tenure with current employer.	
Part-time work	Dummy equal to 1 if hours less or equal to 30; 0, otherwise.	
ISCED 2	Dummy equal to 1, if education level is less than upper secondary education. Base is higher education (ISCED = 5, 6, 7).	
ISCED 3	Dummy equal to 1, if education level is upper secondary education. Base is higher education (ISCED = 5, 6, 7).	
Large firm	Dummy equal to 1 if firm size is larger than 100 employees.	Germany: the threshold firm size is 200 employees.
Temporary work	Dummy equal to 1 if contract is temporary; 0, otherwise.	Definitions vary across countries.
Public sector	Dummy equal to 1 if employed in the public sector.	Germany and the Netherlands: civil servants rather than broad public sector workers are covered here.
Industry dummies	One-digit SIC industrial sector dummies. The reference group includes mining and manufacturing.	Germany: an additional dummy for other sectors is included; results not shown in Tables 3.12 and 3.14.

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