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Job-Related Training
and Benefits for Individuals:
A Review of Evidence and
Explanations

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JOB-RELATED TRAINING AND BENEFITS FOR INDIVIDUALS: A REVIEW OF EVIDENCE AND EXPLANATIONS

OECD Education Working Paper No. 19

By Bo Hansson

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ABSTRACT

This paper reviews the literature on job-related training and the effects of these investments for different groups of individuals. The paper also elaborates on the theories, empirical explanations, and policy implications that can be drawn from these findings. Employer-provided training is by far the most important source of further education and training after an individual enters the labour market. A substantial portion of these human capital investments are financed by firms and it appears that the contribution by individuals are in most circumstances relatively modest. At the same time, substantial gains for individuals participating in training are documented in a large number of studies. The benefits are not only confined to wage returns as research has also shown that training leads to increased internal employability and job-security; and external labour market effects such as higher labour participation rates, lower unemployment, and shorter unemployment periods.

Training is not equally distributed among employees. Older, low skilled workers, and to some extent female workers typically receive less training than other groups of employees. However, we do not find any clear-cut evidence that returns to training varies with gender, educational or skills levels, which suggests that inequalities do not arise because of differences in returns to training, but are more a consequence of inequalities of the distribution of training investments.

The findings of this review further suggest that the returns to training are higher in the case that it is financed by the employer and that the returns to training are substantially higher for those leaving for a new employer. Employer-financed training appears, however, to lower the probability of an individual leaving for a new job elsewhere. The analysis of the distribution of returns to training reveals that although individuals benefit from these investments, the employer reaps most of the returns to training which suggests that the productivity effects are substantially larger than wage effects.

RESUME

1. INTRODUCTION

The importance of human capital in generating growth and prosperity among individuals, firms, and regions is one of the more significant research and policy issues in our time. In research, measures of human capital generally show a large impact in our evaluations, even though the measures to capture this important variable in many instances are a crude approximation of the real thing. The value creation that is generated by investments in human capital is documented in such diverse areas as labour economics, innovation and growth research, human resource literature, as well as in accounting and financial research. Initial schooling is naturally seen as the preferred public policy vehicle for improving the human capital base, but a substantial amount of investments are made after the individual enters the labour market. Approximately 2.3 percent of total labour costs are spent on training in EU15 and 40 percent of the workforce received some training in 1999 (Eurostat, CVTS2), which suggests that a considerable portion of the more formal educational efforts are conducted on-the-job. Estimates of informal training indicate that these contributions to improving skills are 4–7 times larger than formal training efforts, putting the overall investments in human capital conducted in firms at a level that is considerable even in comparison with what is achieved in our schooling systems.¹

Most of our efforts in measuring the contribution of human capital investments are geared towards formal training, as a consequence of the difficulties involved in measuring informal training (learning) in firms. In some research we are able to indirectly gauge the contribution of informal learning by analysing wages in connection with, for instance, mobility of the workforce or time devoted to learning for newly hired employees. Still, the vast amount of research is conducted in more formalised training efforts, and the crucial question is: what is the validity of measuring formal training when it is only a fraction of the overall learning in firms? As noted by Pischke (2005), few studies have had the opportunity to look at correlations between formal and informal training. A study by Loewenstein and Spletzer (1994) of the National Longitudinal Survey of Youth (NLSY) is an exception, and it indicates that workers receiving formal training are also more likely to receive informal training. This result suggests that formal training is a fractional, but fairly good approximation of the overall learning by individuals. That formal training effort reflects the intensity of learning, can to some extent be explained by the circumstance that formal training is often combined with informal training, such as applying the skills learned doing one's job. The exercise of only measuring a part of the investments in human capital is, thus to some extent, motivated by its role in signalling the overall learning accomplished by the individual.

Education and training is generally viewed as an investment decision of the individual. Although governments and other institutions encourage the enrolment in the educational system by providing subsidised or free schooling, and labour-market training for unemployed individuals, fewer attempts have been made to promote the scope of training conducted inside firms.² Theoretically, there is little incentive

¹ The estimates of informal training put forward in Pischke (2005) suggest that informal training is about 4–5 times larger than formal training. Studies examining training for newly hired employees suggest that informal training is at least 7 times larger than formal training (Barron *et al.*, 1989; Barron *et al.*, 1997, Barron *et al.*, 1999b).

² As noted in Ok and Tergeist (2003) and OECD (2004), there are some exceptions to this rule. Tax incentive schemes are, for instance, in place in Austria, Luxembourg, and the Netherlands, where the average corporate tax

for firms to invest in training. From a company perspective, investment in training differs from investment in other assets, because the employee has an option to leave the firm, engage in wage bargaining and, in other ways, influence the outcome of the investment decision. Based on this disposition, Becker (1962) advanced a theory on investment in human capital. The human capital theory explains the amount invested in training, while making a prediction about who should pay for the training and who will benefit from the completed training. Becker divided on-the-job training into general and specific training.

General training is not only useful to the firm providing the training, but to other firms as well. Because of this, employers, in theory are less inclined to invest in this type of training. In a competitive labour market, general training would lead to a wage increase for the employee and would offset the profit for the firm providing the training. In other words, general training increases the market value of the employee. For this reason, the theory predicts that the individual should pay for this type of training. The individual can either pay directly by picking up the cost of training or train outside working hours, or, indirectly by receiving a wage below his or her productivity during the training period. This is also a reason why unions and minimum wages have attracted attention in relation to company training, due to the restrictions on wage flexibility that these two factors typically enforce.

Specific, training, on the other hand, does not benefit other firms and, subsequently, the trainee's market value is not affected. Because specific training does not influence wages, the employee is not willing to pay for the training received. The firm thus pays for specific, on-the-job training, and the increased productivity is accrued by the firm providing the training. The employer may share some of the increased productivity with the employee in order to prevent the trainee from leaving the firm before the specific training investment is recouped. Theoretically, the introduction of staff turnover into the equation will result in joint investments in firm-specific human capital. This is because the higher wage for employees receiving specific training leads to an excess supply of workers willing to be trained. To bring supply more in line with demand, some of the costs for specific training are shifted onto the workers.

Thus, in a competitive labour market, the individual pays for general training, and firms largely pay for specific training investments. In this setting there is no need for additional policies to regulate the training market, as the decision to invest in human capital is strictly taken by the party that benefits from the investment (assuming that individuals can afford their investment in training). However, departures from theoretical models, based on a competitive labour market, often result in openings for policies that balance inefficiencies that are hampering investments in lifelong learning. Informational asymmetries and the functioning of the labour market play a crucial role in decisions to invest in human capital. The way in which wages are established, and the ability to signal human capital investments to the labour market, are, together with other well-known departures from a competitive market, not only determining who benefits from training, but also who is actually financing the training investment.

The analysis is thus complicated by the fact that labour markets are not perfectly competitive and that the value created by investments in human capital are distributed to both employers and employees depending on, for instance, their relative (collective) bargaining strength and institutional arrangements that influence the wage setting and the mobility of the work force. Basically, the human capital model has not fared well in empirical tests and the reality reflected in available evidence is not consistent with the predictions made on the financing and the distribution of returns to training. The implication of recent research is that to understand the demand for and financing of training one has to look at employers and employees together. Bargaining power has been given a prominent position in the recent literature explaining why firms invest

deduction rate is approximately 120% of training expenditures (20% subsidy). In France firms are required to invest at least 1.5 percent of wage bills in employee training or pay the difference in tax (Goux and Maurin, 2000). For an overview of training levies, subsidies, and interaction of social partners in Continuous Education and Training (CET) among different countries see Ok and Tergeist (2003).

in skills coveted by competing firms (see for instance Bassanini *et al.*, 2005). These alternative theories and the empirical findings in relation to who is actually financing the training will be outlined in more detail in the forthcoming sections.

2. FINANCING AND THE PARADOX OF UNDERINVESTMENT IN HUMAN CAPITAL

Employer-sponsored training is the single most important source of further education and training for the working age population (OECD, 2000). In all of the 17 countries studied in this report, employer-financed training was by far the main source for adult education for men. In about half of the countries this was also true for women. The gender difference in the financing of training is in part explained by lower labour market participation rates for women and the fact that they work part-time more often than men and there is less training for part-time workers. Self-financed training plays almost as an important role in further education and training for women as employer-financed training, indicating that the demand-side for training might be stronger for women than men. The OECD International Adult Literacy Survey (IALS) shows that in almost all countries, governments play a very modest role in financing further education and training.

Most of the training sponsored by firms is general in nature. Estimates suggest that general training makes up somewhere between 60 and 90 percent of all the training provided by firms. Estimates from Europe typically document that 80–90 percent of the training is general in nature, whereas U. S. based studies provide estimates of general training in the vicinity of 60–70 percent of all training spells (see, for instance, Barron *et al.*, 1997; Loewenstein and Spletzer, 1999; Booth and Bryan, 2002, Hansson *et al.*, 2004, or Evertsson, 2004). Some of these differences might be explained by methodological differences in the studies, but some researchers argue that the higher mobility of the workforce in the USA makes companies less willing to provide general training (Acemoglu and Pischke, 1998). There are also indications that the proportion of general training increases with more complex jobs, suggesting that most of the training associated with higher educated employees is useful to other companies (see for instance Loewenstein and Spletzer, 1999). That the major part of all company-based training has a value to other employers is an important observation in connection with the predictions of the human capital theory (Becker, 1962), as these figures imply that the individual should carry the major part of all training investments conducted at firms.

However, few studies have been able to document that employees pay for their training either by paying the direct costs or by adjusting their wages. On the other hand, a number of studies suggest the opposite, namely, that firms pay for all types of training, even though most of the training has a value to other employers. Studies on initial training of newly hired employees typically find that training does not lower the starting wages (or at least not in the magnitude to allow for the individual to pay for the received training), suggesting that either that most skills learned by newly hired employees are firm-specific, or that employers pay for general training (Barron *et al.*, 1989; Veum, 1995b; Barron *et al.*, 1999a). More recent research implies that the latter proposition is more consistent with the empirical evidence. For instance, the studies of Acemoglu and Pischke (1998; 1999) on apprenticeship programmes, the study by Autor (2001) on temporary help firms, and the Bassi and Ludwig (2000) study on different school-to-work programmes all suggest that firms finance general training investments.

More general evidence that employers finance general human capital can be found in studies examining the overall training in firms. Lengermann (1996) found that recipients of what appears to be general company training benefited from increased earnings during the training period. Veum (1995b) arrives at a similar conclusion having studied data from the National Longitudinal Survey of Youth (NLSY). Training increases wages in the training year is also documented in other studies (see for instance Ballot *et al.*, 2004). A study by Regnér (2002) indicates higher wage returns to general than specific training, but arrives at the conclusion that firms are willing to pay for general training investments. Other studies of wages and training take this reasoning a step further. The studies by Lowenstein and Spletzer (1999) and Barron *et al.* (1999a) conclude that employers pay for general training and maintain that firms are able to obtain some of the returns to general training investments. Similarly, the results from Booth and Bryan (2002) suggest that firms pay a substantial part of general training investments, and that the returns to general training are, to a large extent, captured by firms. The findings of Booth and Bryan (2002) also indicate that employees do not exchange training for lower wage growth before a training event, indicating once again that individuals do not contribute to the training investments by lowering their wages.

Additional evidence of the financing of general training comes from research examining the wage growth between those staying with the employer and those changing employer after the completed training. In these types of studies we generally see that training investments made by a previous employer generates significantly higher wages at the new employer, indicating that most of the received training is general and financed (in part or wholly) by the previous employer (see e.g., OECD 2004a). Studies focusing on training effects for firms are another source suggesting that a substantial portion of the investments in general skills are carried by firms, and that individuals are contributing to a lesser extent (see for instance Groot, 1999; Dearden *et al.*, 2000; Barrett and O'Connell, 2001). A potential reason for why firms finance such a large part of the education and training of the workforce is the increasing demand for more skilled workers (OECD, 2004a), which is likely to be forcing firms to take a greater responsibility in training their employees. In sum, most empirical research indicates that firms finance a large portion of the employee training investments despite most training being general in nature.

2.1 Alternative models for firm-financed general human capital

Because few studies have been able to document that employees pay for their training, the response to why firms invest in and are able to profit from general training is abundant in the literature. Theoretically, there are some alternative models and explanations as to why firms might invest in general human capital. Based on differences in bargaining power, Glick and Feuer (1984) propose that general training is superior to straight money payments as an insurance against personnel turnover, and that firms should invest in general training to safeguard joint investments in specific training.

In the shared investment model of Loewenstein and Spletzer (1998), the employer shares the general training investments with the employee because of the employer's inability to credibly commit to future wages. The employer, instead, commits to a minimum guaranteed wage and shares the investment in general training, realising the returns of the training if the minimum wage guarantee is binding. The wage floor is only binding for less productive workers, whose productivity turns out to be unexpectedly low.

Autor (2001) proposes a model in which firms offer general training to induce self-selection and perform screening of workers' ability. In this model, general skills training and ability are complementary, where it is assumed that more able workers self-select to receive general training to a greater extent than low ability workers.

The skills-weights approach of Lazaer (2003) suggests that it is the firm-specific combination of general skills that makes companies able to invest in general training. The argument in this model is that the

individual will find it difficult to locate a company that requires the same idiosyncratic combination of general skills as the employer providing the training. The individual is thus likely only to use portions of the set of acquired general skills at a new employer, and the incentives for an individual to leave are therefore weakened.

In the model of Acemoglu and Pischke (1999) firm-financed general training is a result of compressed wage structure. Wage compression induces employers to invest in general training, because firms extract higher profits from workers with higher skill level and with more human capital. The basic reasoning is that individuals are not paid their marginal product due to labour market inefficiencies (peculiarities).

Another rationale that has attracted considerable attention is the information-based explanation of Katz and Ziderman (1990). Katz and Ziderman argue that the information asymmetry, existing between the training firm and a recruiting (raiding) firm in terms of the training, reduces the potential benefits that a worker with general training can obtain by moving to another firm. Informational asymmetries make general training specific in the sense that the investment is not observable (verifiable) to other firms.

Another response to the rent extraction from general human capital investments is what could be defined as mobility thresholds that reduce the ability of the individual to capitalise on these training investments. Explanations that provide against turnover (mobility) include, for instance:

- The loss of firm-specific investments for the individual when changing work (Glick and Feuer, 1984), or that a recruiting (raiding) firm needs to make additional investments in firm-specific knowledge;
- That firms use back-loaded compensation schemes that induce costs for individuals who change employer (Salop and Salop, 1976);
- That workers have incomplete information about the pay elsewhere (Bewley, 1998; Polachek and Robst, 1998); and
- That firms have superior information about the profitability (payoff) to training investments (Green and Kahn, 1983).

Other explanations for firm-financed general human capital investments are that “liquidity constrained” individuals or “risk averse” individuals force firms to carry these investments (Bishop, 1994). One could also speculate whether the possibility for firms to redistribute investment risk through capital markets might cause employers of larger firms to be relatively more willing to invest in general training. For a well-diversified investor, it does not matter if the individual moves to a competing firm, as long as there is a balance between pay and productivity.

An alternative argument is that because the employer-employee relationship is complex, it might be myopic to focus only on monetary gains. Part of the answer to the rent extraction from general training investments might be explained by the circumstance that these investments represent good working conditions. In this sense, training, no matter its level of generality, is a measure of employer commitment, which is likely to reduce the probability (threat) of changing employer. This reasoning is in line with findings in High Performance Work Systems (HPWS) literature, where training is typically associated with, and an integral part of, those human resource management systems aimed at retaining and motivating employees (See for instance Huselid, 1995; Delaney and Huselid, 1996; Barnard and Rodgers, 2000; Whitfield, 2000; Boselie *et al.* 2001).

In all there is a substantial amount of diverse models and explanations for shifting general training investments onto firms. Much of recent empirical research also suggests that this is the case, that firms to a large extent are the main contributors to training investments, even though these investments increase alternative employment options and the market value of the individual. Recent research within this area

stresses the functioning of the labour market and the market power of firms as the reasons for the rent extraction from general human capital investments. The competition for workers and the distribution of the bargaining power between employees and employers is thus likely to have an important impact on the decision to invest in human capital. These results also suggest that there might be room for improvements in the training market as a consequence of the investment decision, which should be made by the individual, is in part being made by the employer. This mismatch opens up inefficiencies that are likely to affect the amount invested in human capital after the individual leaves the schooling system. While firms capture some of the returns to training, there is a vast amount of literature documenting individual benefits of employer-sponsored training. The following sections try to shed some light on the benefits that employees accrue through participation in training.

3. VALUE CREATION OF HUMAN CAPITAL INVESTMENTS FOR INDIVIDUALS

As noted in the introduction, the overall acquirement of job-related skills is to a large extent achieved by participation in informal training and learning "on-the-job". Much of our understanding of the outcomes of training is, however, focused on the effects of formal training.³ This circumstance may not be too problematic, if formal and informal training can be seen as complementary. The findings of Loewenstein and Spletzer (1994) suggest that this is the case in their study of NLSY data. Their results indicate that there is a significant relationship between formal and informal training, conveying that individuals receiving formal training also are more likely to receive informal training. A study by Wholey (1990) of manufacturing establishments in the U.S. also indicates that there is an association between formal and informal training, though the correlations are in most cases relatively weak, ranging from 0.23 for female workers to 0.35 for male managers. Based on the importance of the complementary nature between formal and informal training, Erickson *et al.* (1998) argue that informal learning should be used as a complement to formal training, and shows that firms relying exclusively on informal on-the-job training are smaller, older and single-establishment firms that do not feel that there is a rising skills requirement for producing their services or products. Analogue to the complementarities between initial education and further job related training, formal and informal training are likely to be more strongly related than hitherto documented as formal training courses are typically combined with applying the skills at the job. Although more research is warranted in understanding the complementary nature between formal and informal training, the findings thus far hint that formal training might be an incomplete, but relatively good, indication of the overall learning by individuals.

If formal training is combined with informal training and learning by doing, we will, however, underestimate the true investments made in developing new skills, and consequently also overestimate the returns to training, as we are only measuring a portion of the investments in human capital. The results from Loewenstein and Spletzer (1994) indicate that this problem might not be too severe. When including an estimate of informal training in their analysis of wage growth, the impact of the formal training variable falls somewhat, but both training measures show a significant impact on the wage growth. The findings in this study suggest that wage growth from formal training falls by somewhere between 15–20% when

³ In the framework of the Adult Education Survey (AES), Classification of Learning Activities (CLA) both formal and parts of informal training would qualify as non-formal education and training as this category also includes guided on the job training whereas learning on the job would potentially be classified as informal learning.

including a control for informal training. With these caveats in mind, there is still much to say about research-based findings of benefits from training for individuals.

3.1 Employee earnings

A substantial volume of research, both in the US, EU, and in other countries and economies, has documented short and long-term wage growth from training spells in large longitudinal (panel data) studies.⁴ The large volume of research on training and wages has produced overwhelming evidence that training generates wage growth for individuals participating in company-based training. There are a few studies arguing that the wage returns are due to ability and not to training. But, on the whole, the research suggests that individuals receiving training have substantially higher wage growth, which also suggests long-term wage effects for individuals staying with a firm that invests in their employees. The findings of Lengermann (1999) indicate that we, for longer training periods (four weeks or longer), can detect effects on wages up to 9 years after the training event. The remainder of this section will take a closer look at some emerging differences in returns to training for certain categories of individuals and certain types of training. This effort in classify differences in outcomes must be viewed in the light that we, in all likelihood, have missed out on certain important papers.

Training and ability

There is some concern that more able individuals receive more training and that this in turn will affect the estimates of the returns to training. If individuals that are more capable are more likely to receive training, the return to past training will be upward biased. This is because one is in part measuring ability instead of human capital investments.⁵ The way around this problem is typically to either include some approximate measure of ability (aptitude tests, armed force qualification tests, etc.), or to handle this statistically in the models used in estimating returns to training. One common way is to use a first difference approach, where the effects of changes in training are matched with lagged effects of changes in wages. This technique typically cancels out all time invariant effects (such as ability which is looked upon as being relatively stable over time) from the estimated equation.

Most of the studies on wage growth presented in this section have, in one way or another, made an effort to handle the problem with ability in their statistical specifications. Nevertheless, there are some papers arguing that the wage effects from training to a large extent are dependent on ability or some other unobserved factor that is not accounted for in the statistical models. A paper by Goux and Maurin (2000) of employer-provided training in France, suggests that the wage differential between trained and untrained workers largely depends on the selectivity in which firms choose employees to participate in training programmes. When accounting for this selectivity, the returns to training falls to zero. The study utilises matched firm-worker data in estimating the wage effects to training, and the results suggest that more able workers are chosen for training, and that the wage returns to training reflect these differences in ability.

⁴ See for instance OECD (2004), Arulampalam *et al.* (2004), Battu *et al.* (2004), Evertsson (2004), Gerfin (2004a), Booth *et al.* (2003), Ok and Tergeist (2003), Booth and Bryan (2002), Görg *et al.* (2002), Brunello (2001), Dearden *et al.* (2000), Groot (1999), Barron *et al.* (1999a), Loewenstein and Spletzer (1999), Lengermann (1999), Loewenstein and Spletzer (1998), Green *et al.* (1996), Lengermann (1996), Veum (1995a, 1995b), Bartel (1995), Loewenstein and Spletzer (1994), Barron *et al.* (1989).

⁵ Some studies suggest that there is a relatively strong correlation between ability and training (see for instance Loewenstein and Spletzer, 1994) whereas other studies indicate the there is weak or no correlation between ability and training (Lengermann, 1999). In relation to schooling, Becker (1993) found that ability only explains a small portion of the return to education, indicating that only a fraction of return to schooling depends on sorting out less able individuals.

The authors conclude the paper by stating that the zero wage returns to training do not imply that firm-provided training does not improve productivity, but it only suggests that training mostly benefits employers.

An interesting approach in correcting this selectivity in the participation in training (incidence of training) is presented in Leuven and Osterbeek (2002), where a clever research design for eliminating differences between participants and non-participants is employed. The authors use a sample of workers who wanted to participate in training, but did not do so by some random event as a comparison group to workers participating in the training program. The results suggest that the wage effects are essentially zero, and that a large share of what is normally interpreted as returns to training, is actually returns to some unobservable characteristics of workers taking training. The authors also note that this result (zero return) is in line with other recent findings for the Netherlands, indicating that this result might, to some extent, not only depend on selectivity in training, but also on some country specific circumstances. It is also worth noting that France and the Netherlands were the only two countries among the 7 countries studied by the OECD (1999) that did not exhibit any significant wage differentials for workers who had undertaken training, supporting the notion that country-specific factors might play a role in these results.

Educational and skills background

A number of studies have documented that low educated and low skilled workers are the categories that typically receive less training than other groups of employees. The results regarding the returns to training for these two groups of employees are somewhat mixed. The results presented in Lengermann (1999) suggest that the returns to school-based training and longer company-based training for low skilled and low educated individuals are higher and demonstrate that these groups are less likely to receive training. Lynch (1992) also notes that returns to off-the-job training are significantly higher for low educated employees. The findings of Brunello (2001) on European data indicate that returns to training are higher for those individuals with secondary education, compared with college graduates and that this difference in return increases with labour market experience.

A somewhat contrary result is presented in Evertsson (2004) on Swedish data where the returns to training increase with job complexity and where unskilled workers have the lowest returns while professionals attain the highest returns. The study also exhibits that returns to training increase with educational attainment. Other European-based research also draws conclusions that returns to training is significantly higher for workers who have completed higher education (Bassinini *et al.*, 2005). A similar conclusion is obtained in the OECD study (2004a) where employee training has a clear impact on wage growth only in the case of young or highly-educated employees. A study by Finegold *et al.* (2005) on temporary employees and returns to training suggest that office workers experience significantly higher wage growth, while training had no effect on wages for blue-collar workers. That employer-provided training has significant impact on wages for low paid workers in the service sector is also documented in Battu *et al.* (2004). However, from a study by Arulampalam *et al.* (2004) of male workers in European Community Household Panel (ECHP) it appears that there is no distinct pattern in returns to training for high-wage earners and low-wage earners indicating that the returns to training do not seem to be conditioned by wages (productivity).

We have not been able to find more elaborate evidence on differences in returns to training with references to educational attainment and skill levels and the impact from these two background factors on the returns to training provide a somewhat unclear picture. There are some indications that the returns to training for disadvantaged groups of employees to some extent can be lower, but this does not appear to be the case in all countries and for all low educated groups of employees. Some of the deviation in outcomes between

different studies might depend upon differences in the functioning of the labour market in Europe on one hand and U.S. on the other hand.

Gender

There has been an ongoing debate on gender differences in training. Among others, Leuven and Oosterbeek (1999) find that firms are less willing to invest in training for female workers and notes, “Whether employers have lower preferred training levels for women because of discrimination, higher turnover, or job characteristics remains an open question” (p. 324). The findings of Bassanini *et al.* (2005) in analysing the ECHP between 1995–2001, indicate that when holding job and industry characteristics constant, women receive about as much employer-sponsored training as men. However, the findings in this study also suggest that women are more often willing to pay for their own training than men, which is manifested in a higher overall incidence of self-sponsored training for women. There are also notable differences in participation rates for women in training among the European countries. The results in regard to returns to training for female workers are somewhat mixed. The findings from two studies based on Swedish data point towards lower wage returns to training for women (Evertsson, 2004; Regnér, 2002). Evertsson (2004) also notes that women are less likely to take part in general training and promotional training and that the returns to these training types are lower for women. The study by Brunello (2001) on the ECHP also indicates that the returns to training for female workers are less than for male workers, whereas there is no significant difference in the likelihood of receiving training between men and women. That the returns to training appear to be lower for women is also confirmed in the OECD (2004a) study of ECHP data between 1994 and 2000.

On the other hand, there are some studies indicating the opposite, namely that the benefits from training are greater for women than for men. The study by Melero (2004) of the British Household Panel Survey (BHPS) indicates that female workers receiving training significantly boost their chances of being promoted in the future whereas no significant effect was found for men. Veum (1995) also notes that on-site company training is particularly effective in increasing wages for females while off-site training has a significant impact for both men and women. Lynch (1991) concludes her article on gender and productivity by stating that young individuals in good jobs are more likely to receive training that results in higher wages and lower probability of leaving the firm, and that these effects are particularly strong for women. However on the whole, the research on gender and training effects are ambiguous at this stage and no conclusive evidence in either direction can be drawn from the papers included in this review. That the results are somewhat mixed in regard to wage returns to training for women is also apparent in Leuven’s (2004) review of the literature, where no particular conclusion can be drawn concerning training, gender, and wage effects.

Firm-financed and individual financed training

Most research points towards substantially larger returns to training financed by the employer. In fact few studies have been able to document any returns to individual financed (self-sponsored) training. This result is typically explained by the employer’s superior knowledge of what training is needed to perform one’s job better and improve productivity. For instance the study by Booth and Bryan (2002) on British data finds no effects on wages from individual financed training. Similarly, Loewenstein and Spletzer’s (1998) study of NLSY indicates that non-employer financed training does not yield a positive wage return. The results from a government co-financed training program in Taiwan also suggest that when firms only pay a small part of the training investment and when the decision to participate in the training program is largely taken by the individual him/herself, the outcome in terms of wage growth is less encouraging (Lee and Hsin, 2004). In this particular study, the employers initiated the training in only 15% of the cases and the

subsequent wage returns were negative. However, in the absence of controls for selectivity into the training program these results need to be interpreted with caution. For different types of employer-sponsored training, the findings suggest that training more closely related to one's work is yielding higher returns. The results of Veum (1995a) indicate that the incidence of company training and seminars outside work were positively associated with wage growth whereas other forms of training such as apprenticeship, correspondence courses, business school training, etc. had no effect on the wage growth. Blundell *et al.* (1999) also note that employer provided training has a positive impact on wages whereas training not provided by the employer has an insignificant effect on wages. However, there are some indications that vocational institute and business school training yield higher returns for the individual when changing employer (Loewenstein and Spletzer, 1998).

Certified training

The returns to training for individuals appear to be connected with the ability to signal the received training to an outside employer. This is for instance manifested in higher returns to outside seminars than for in-house training (Veum, 1995b; Loewenstein and Spletzer, 1998). To certify, training and skills thus, plays an important role in communicating the individual's competence to the labour market and to realise a wage in accordance with acquired skills level. Certification is, however, a two-edged sword as employers appear to finance general training investments and one can foresee that the incentives for firms to continue to do so will decrease with an increased ability of the individual to communicate the training to the labour market.

One of the more prominent reasons given for the existence of firm-financed general human capital investments is information asymmetry. As noted by Katz and Ziderman (1990) information asymmetries between the firm carrying out the training and other firms make firms more willing to invest in general training. This is because the lack of information about the training investment reduces the potential benefits that a worker with general training can obtain by moving to another firm. If Katz and Ziderman are right, providing more information about training investments to the labour market might have a negative effect on the provision of training. However, another information-based argument implies the opposite effect. Acemoglu and Pischke (1999b) argue that firms train their employees because they have sufficient monopsony power over their employees due to information asymmetries. While asymmetric information encourages firms to invest in training, it reduces the workers' incentive to invest in their skills, as most of the returns on training will be appropriated by the firm. This means, in contrast to Katz and Zidermann's argument, that asymmetric information in labour markets might undermine the existence of training by not giving enough incentives to workers. More information about the training investment in this case leads to more investment in training.

Little empirical work has been carried out on certification and the potential effects on the amount of firm-sponsored training. The study by Booth and Bryan (2002) reports that accredited (certified) training results in higher wage returns, and notes that accreditation increases the financing from the individual (from 3% to 17%). The major part (78%) of the certified training is still financed by employers, and the effects of certifying individual training on the amount of firm-provided training is still an open question. From an individual perspective, certification does not appear to significantly improve the willingness to participate in paying for education and training. Table 3.1 below shows the results of the lifelong learning questionnaire included in standard Eurobarometer (reproduced from table A8 in Descy and Tessaring, 2005).

Table 3.1. Willingness to pay for education and training, by purpose, population aged 15 and more, EU15

	Keep present job	Get a promotion	Get a recognised certificate	Get back into the labour market
Would pay all the cost	12.9%	11.7%	18.1%	14.8%
Would pay some of the cost	24.8%	27.0%	30.0%	24.9%
Would pay none of the cost	46.7%	48.7%	42.2%	45.5%
Do not know	2.7%	12.6%	9.7%	14.8%

Source: Lifelong learning questionnaire included in standard Eurobarometer, wave 59.0 (2003)

The majority of those responding to the survey would not pay any of the costs associated with education and training no matter the purpose of the training. Certification increases, to some extent, the willingness to contribute to the investment compared with the other education and training purposes. Still, the majority (42.2%) would not be willing to pay any of the costs and it is conceivable to foresee even higher figures if the questionnaire had focused on company-based training only. More encouraging numbers of the willingness of individuals to finance their own training is presented in Lee and Hsin (2004), where certification substantially increased the costs borne by the trainee. In their study, the individuals financed the training in 35% of the cases when the training led to a certification compared with, for instance, managerial training (8%), computer-related training (18.5%), and professional/technical training (11.4%).

There are some indications that certification does not affect job search intentions by individuals, but rather the way in which it is financed and the generality of the received training being the more important components for search intentions (Green *et al.*, 2000). From their study it appears that general training increases and firm-financed training decreases job search intentions, while certified training is not significantly associated with search intentions when controlling for these two factors. Among employees working in Small and Medium size Enterprises (SME) certification indeed appears to increase the probability of quitting one's job and moving to a better job after the training (Devins *et al.*, 2004). In their study of an EU-funded program aimed at training employees in SMEs, the findings indicated that those receiving a qualification were significantly more likely to have changed employer after the training than those not receiving a qualification.

In sum, there are some signs that individuals are more willing to participate in the financing of certified training, but it is difficult to foresee the magnitude of the potential negative influence that certification might have on the willingness of firms to provide and finance certified training. The impact on the overall investments in training, resulting from greater transparency of acquired skills, largely depends upon what will happen with the large share of training that is currently financed by employers. Higher wage returns to certified training and higher mobility for employees receiving certified training will of course result in less firm-financed training and the question is by how much?

Training at previous employer

Studies having access to information about training and wages at current and previous employers generally document higher returns to training when the individual changes employer. That training received at a previous employer generates higher wage returns at a new employer (compared with staying with the employer providing the training) has typically been interpreted as an indication of employers extracting some of the returns to general training investments. The magnitude of the differences in returns to training

that an employee can realise by moving to another employer is substantial.⁶ A study of education and training in 11 European countries (OECD, 2004a) suggests that the wage returns to training are more than twice as great if the training was taken with the previous employer (2.65%), compared with training taken with the current employer (1.22%). In the U.K., Booth and Bryan (2002) report that the wage effects from employer-financed training is about 3 times larger (7.5% compared with 2.4%) if it was received with a previous employer compared with the present employer. Results from Switzerland also indicate wage differentials between stayers and movers of a magnitude of 3 to 4 times (Gerfin, 2004b). From this study it is also clear that the wage returns from training between those who leave for a new job and those who are laid-off, are substantial. It is apparent that to gauge the effects from previous employer-sponsored training, it is important to distinguish between those two groups.

In the USA, Loewenstein and Spletzer (1998) also document significant differences in wage returns between training that occurred at a previous employer compared with training at the current employer. Among training spells of more general nature, Loewenstein and Spletzer report that business or vocational school training received with a previous employer yields a return of 14.2% compared with 2.8%, if it is received with the current employer (differential return 11.5%). Similar results are reported for outside seminars (14.8% compared with 4.5%, a differential return of 10.3%), which suggests a wage effect about 3–5 times larger if the individual moves to a new employer. The results of Lengermann (1999) for longer training spells suggest a doubling of the wage growth in the first year of receiving the training if the employee leaves for a new employer (8.3% compared with 4%), and that this difference increases over time. Similarly, Lynch (1992) reports that off-the-job training at a previous employer increased wages significantly, whereas no significant wage effect was found for training received at the current employer.

However, the results of Parent (1999) suggest modest differences between current and previous employer provided training and argues that the market pressure forces firms to pay employees their marginal product after the training. The findings in this study indicate somewhat larger differences for on-the-job training than off-the-job training. When accounting for starting-wage effects, on-the-job training received at the current employer yielded a 11.6% wage return whereas the wage returns with a new employer were 15.7%. For off-the-job training, the results were almost identical (12.9% for both current and previous employer training). But on the whole, the research in this area points towards substantial short-term individual gains from cashing in on firm-sponsored general training investments by moving to another employer. As noted earlier, this differential in returns between staying and changing employer after the completed training is generally taken as an indication that firms invest in and harvest returns to general training. That individuals receive higher returns to training when changing employer also suggests that the overwhelming part of the training comes to good use at the new employer.

3.2 Mobility

Mobility of the workforce is one important factor in determining the returns to employer provided training. Given that firms finance training investments, staff turnover is crucial to consider in relation to the capacity of firms to recoup their investments in human capital. Studies examining training at an aggregated level provide somewhat mixed findings in relation to staff turnover. The results presented in Hansson (2005) suggest that staff turnover (mobility) does not appear to be a decisive factor in explaining the provision of training on a national or company level. This result is somewhat contrary to the notion that mobility (staff turnover) reduces training in firms. However, this result is qualitatively similar to those presented by Goux and Maurin (2000) in France and by Green *et al.* (2000) in Britain. Both studies indicate that when training is measured on an aggregated level, it has little impact on mobility. Other studies find that training reduces

⁶ However, there are also some studies that find small or sometimes negative impact of previous employer training (see for instance Veum, 1995; Melero, 2004).

staff turnover as well as increases staff turnover. The studies by Loewenstein and Spletzer (1999) and Parent (1999) carried out on U.S. data suggests that training reduces the probability of changing work whereas the studies by Brunello and de Paola (2004) and OECD (2004a) on European data indicate that receiving employer-provided training increases the probability of a separation between employer and employee in the future. When treating training as a single measure (incidence or intensity) without considering the type of training or how the training was financed the results, are somewhat mixed. In some cases they are difficult to align with the theoretical reasoning that mobility reduces employer-provided training.⁷ As noted by Forrier and Sels (2003), a large portion of training appears to be concentrated on inflow and replacement problems, which might explain why we sometimes see a positive association between training and mobility.

When taking into consideration what type of training is provided and how it was financed, a somewhat more interesting picture emerges. There are some indications that general training increases the likelihood to change employer whereas specific training has an opposite effect (Green *et al.*, 2000; Loewenstein and Spletzer, 1999; Lynch, 1991). These results are more in line with expectations, as specific training has no or little value to an outside employer. The study by Melero (2004) indicates that general training increases the likelihood of changing employer (quitting for a better job) only for female workers and not male workers. There are also some indications that formal On the Job Training (likely to be more general) is associated with longer tenure and increased internal mobility whereas informal OJT (likely to be more specific) is not, demonstrating that the results are not as clear-cut as one could hope for (Wholey, 1990).

Although much of the research points towards the association between general training and job change, the financial aspects of training appear to be at least as important in determining the impact on mobility. Training that is financed by the employer seems to have a moderating effect on the probability on looking for a new job. Green *et al.* (2000) report that job search intentions are significantly lower if the training was financed by the firm and significantly higher if the employee financed the training him/herself. That employer-financed training reduces mobility is also reported in Dearden *et al.* (1996). Similar results are documented among young workers in the United States. Veum (1997) documents that self-paid training increases turnover, and for workers with one or more years of tenure, off-site company paid training significantly reduces the probability of leaving the employer. Considering that self-sponsored training yields no or very modest wages returns in comparison with employer-financed training, the conclusion that self-financed training is associated with higher mobility might not be too surprising.

As noted by Green *et al.* (2000), studies on training and mobility are limited and the systematic evidence is still based on a small sample that makes it difficult to draw any far reaching conclusions. It appears, however, that one needs to consider more detailed training information to be able to distinguish otherwise disguised effects in aggregated measures of training. There are indications that self-sponsored training, and training of a more general nature, are associated with higher mobility and that firm-financed training and firm-specific training reduce mobility. That firm-financed training reduces the risk of losing the employee, might to some extent explain why firms invest in their employees even though a major part of these investments are sought after by other firms.

3.3 Career development and internal employability

Employability and career development are closely linked concepts. As noted by Grip *et al.* (2004) the concept of employability has evolved over time and partly because of new ideas about career development

⁷ Green *et al.* (2000) reviewed the literature in this area and their conclusion is that the handful of studies examining mobility indicates (if anything) that training has a modest downward impact on mobility.

that put more emphasis on individual's action in developing the skills needed for staying employed and acquiring a better job. The modern concept of employability "is about employees who are willing and able to be as pro-active as possible – considering organisational and institutional constraints – to remain attractive for the labour market" p. 216, Grip *et al.* (2004). The modern notion of employability thus largely focuses on the individual's responsibility to remain attractive for the labour market (given the environmental constraints). From a firm-perspective, the role of promotion (career development) can to some extent be viewed from a somewhat different angle. Melero (2004) notes that the theories on promotion can be divided into two broad alternatives where human capital accumulation and learning by firms of workers' ability are one cause of promotion. The other alternative for promotion circles around the concept of promotions as a way of increasing the incentives for workers to exert effort in their work and in their human capital accumulation.

The findings of Melero (2004) on British data suggest that training and human capital accumulation play an important role for female's career progress whereas the career paths for men are more in line with theories proposing the role of promotion systems as an instrument to exert effort. A somewhat contrary result is presented in Wholey (1990) of manufacturing firms in the U.S., where formal training is positively related to internal mobility of male workers and is negatively related with mobility for female workers. The author explains this result by the situation in which women are trained for, and left in jobs, that are less complex and jobs having a short ladder. More general results are presented in Descy and Tessaring (2005) with reference to a German study by Pannenberg (1995). The findings of Pannenberg (1995) show that on-the-job training increases significantly the possibility of upward mobility, with a tendency of a more positive impact on in-company mobility from shorter training periods (two to seven days) and a more positive impact on external mobility from longer training spells (one week to one month).

The distribution of promotional training among different categories of employee is somewhat uneven. The results from Evertsson (2004) indicate that unskilled employees are less likely to receive training that increases promotion opportunities in comparison with professionals. However the group of employees that was most likely to receive promotional training were lower grade non-manual employees indicating that the distribution of promotional training is not as clear-cut as one might expect. In relation to low skilled workers, the results of Sanders and de Grip (2004) propose that training for low-skilled workers increases their firm-internal employability but does not contribute to their external employability. The results also indicate that training plays a more important role in internal employability than task flexibility (doing tasks that belong to other jobs). The reason given by Sanders and de Grip (2004) for the lack of impact from training on external employability is that low-skilled workers have more opportunities to improve their position in the firm-internal labour market than in the external labour market. Notable from this study is also that workers expecting to leave their employer are more likely to move to another job within the same firm instead of realising their external employability expectations, which can be interpreted along the lines that the current employer matches job expectations for individuals with higher market value (more general human capital).

The OECD (2004a) study of ECHP suggests that training has a positive impact on perceived employment security and there are several empirical studies supporting the idea that training improves job-security and the internal position of employees. For instance, Wholey (1990) notes that formal training improves job-security for male and female workers and that training is also associated with firm tenure for male workers. The results from Wholey (1990) also suggest that formal training plays a more important role in providing for internal employment security than informal training. The results of Parent (1999), however, suggest that both on-the-job and off-the-job training are associated with longer tenure and that training increases with the number of years of tenure. The findings of Finegold *et al.* (2005) suggest that white collar temporary employees receiving training were more likely to be with the staffing agency a year later, suggesting that training develops the internal standing of employees. For employees in small firms, Devins *et al.* (2004) note that training improves the confidence in one's job which also suggests that the internal

position is strengthened by participating in training. Similar results are documented in Euwals and Winkelmann's (2004) study of apprenticeship training in Germany and the findings here suggest that retention rates, first job duration and post-apprenticeship wages, are all an increasing function of training intensity during the apprenticeship. The greater internal job-security of trained workers is also manifested in a lower probability of being laid-off (OECD, 2004a).

In conclusion, studies on the effects of internal employment point towards the acquirement of substantial gains in terms of internal mobility and employability from training. Training thus plays an important role besides its effect on earnings that should not be underestimated. In times of decreasing job-security, a stable employment relationship and improved internal job-security are likely to be important to most individuals. Training appears to be one of the more critical factors in this equation. That training is associated with promotions and internal job-security is also in line with what is reported in for instance Blundell *et al.*'s (1999) review of the literature.

3.4 Employment security and external labour market effects

While training appears to be linked to internal promotion and employability, employment security and external effects constitute other important outcomes of employee training. Recent research on training has started to unravel the effects of training on employment security and external employability. The results from Ok and Tergeist (2003) on the ECHP indicate that participation in Continuous Vocational Training (CET) increases the probability of being employed and improves re-employment chances when a worker has been laid off. Similar results are presented in Bassanini (2004) where a strong relationship can be found between training histories and employment outcomes. In all countries investigated in this study (except the Netherlands) adult education and training had positive impact on the probability of participating in the work force as well as lowering the probability of being unemployed.⁸ These effects appear to be more pronounced for women and younger workers (see also OECD, 2004a). That a higher level of education and training reduces the probability of unemployment and increases labour force participation is also in line with the conclusions made in Descy and Tessaring (2005).

Grip *et al.* (2004) observed that the employability for older workers (age over 50) is generally lower in virtually every industry sector and note that training is one important source of staying attractive to the labour market. Training appears to have a strong effect on perceived job-security and more objective measures of employment security, particularly among more disadvantage groups of employees (Bassanini, 2004; OECD, 2004a). For older and low educated employees, training is positively related to perceived job-security, the ability to find a new job if laid-off, negatively related to dismissals and as also documented by Ok and Tergiest (2003), trained workers have generally shorter unemployment periods. On a more aggregated level, Bassanini *et al.* (2005) note that the participation by older workers in training is associated with the employment rate of older workers in European countries, reflecting either the impact of training on older workers' improved employability or the influences of differences in retirement schemes.

Detailed evidence of positive external labour market effects from training are presented in Bassanini (2004), OECD (2004a), Ok and Tergiest (2003). Considering that almost all employer-provided training

⁸ Bassanini (2004) uses the individual-based panels ECHP, BHPS, and the German Socio-economic Panel (SOEP) in estimating the impact of education and training on labour market outcomes. That training is associated with labour participation rates and employment rates are also documented in the analysis of cross country data (see for instance, OECD, 2004; Bassanini, 2004). It has generally been more difficult to establish a connection between training and unemployment rates on an aggregated country level where most results thus far are shown to be insignificant.

has a value to other employers (being general), these results might not be too surprising as one can foresee that these investments render the individual more attractive in the labour market. Besides positive wage effects and internal employment effects from training, employees participating in training also benefit from a stronger labour market position and this latter effect appears to be stronger for more disadvantaged groups such as less educated and older employees. Another important aspect brought forward in OECD (2004a) and Bassanini (2004) is that crowding out effects of training appears to be a relatively minor problem suggesting that the potential downside of training being of a lesser concern.

3.5 Trade offs between different outcomes

A question that arises when examining the literature on employee benefits from training is to what extent there might be some trade-offs between different outcomes for different groups of employees. As discussed in the OECD (2004a) study, downward wage rigidity and skill obsolescence can compress the wedge between productivity and wages and thereby also increase the risk of job loss for workers with a narrow wage-productivity gap. Training in these circumstances might not so much result in significant wage returns to training, but instead more secure employment prospects. This is largely documented in the OECD (2004a) study, where modest wage returns for older and low educated employees are exchanged for more stable employment prospects through lower risk of job losses and improved prospects of being re-employed when laid-off. The authors' conclude their section by stating "Once forgone income due to non-employment spells is taken into account, training premia for these groups [older and low educated employees] appear to be large" p. 207. Similar results can also be found in Melero (2004) where older workers had an increased probability of promotion but lower wage returns to training.

Another important point related to training is documented in Bassanini *et al.* (2005) where training is found to exhibit countercyclical patterns to general economic conditions. In their study of training in European countries (ECHP) and OECD data on output gap and unemployment rates, employer-sponsored training showed clear countercyclical behaviour of participation rates in training. A one percent change in the output gap and unemployment rate was associated with a 4-8% (output gap) and 6% (unemployment rate) change in training participation. In other words, companies appear to train their employees when the opportunity cost for training is low. These findings are also consistent with the notion that increased competition for workers lowers training investments by firms and the idea of labour hoarding in times of adverse economic conditions (see for instance Hanka, 1998). That firms invest in their employees when they have a slack in production suggests that training might work as a buffer to making employees redundant.⁹ The aggregated results presented in Bassanini *et al.* (2005) are also supported by industry (Dearden *et al.*, 2000) and firm-level (Bartel, 1994) analyses where it was found that training is more frequent when production is low (the pit stop theory).

3.6 Summary of main findings

Table 3.2 below provides a summary of the main findings in relation to benefits to training for individuals. Some of the findings are more robust than others and some caution is warranted in that some of the results are based on relatively few studies.

⁹ A main reason for equalising companies accounting rules for human capital investments with those of capital investments has been the argument that accounting for these investments in the balance sheet would facilitate for training investments in unfavourable economic conditions (as only portion of the investment is charged through the income statement). That firms invest more in bad times suggest that this is already the case. We do not know, however, whether accounting for human capital investments would reinforce this behavioural pattern.

Table 3.2. Summary of value creation at an individual level

Financing of Training	Employer-sponsored training is the single most important source of further education and training for the working-age population. Much of the research also suggests that employers finance training no matter if it is specific or general in nature and that individuals only contribute to these investments to a minor extent.
Wage returns to training	<p data-bbox="582 539 1374 622">A vast empirical literature from different countries suggests that training generates significant wage returns for individuals participating in employer-sponsored training.</p> <p data-bbox="582 651 1374 757">Ability – individual ability could possibly explain some of the returns to training in certain circumstances, but most studies suggest that wage effects from training are in excess of those ascribed to the ability of individuals participating in training.</p> <p data-bbox="582 786 1374 920">Education and skills background – the research incorporated in this review does not provide a clear picture of how returns to training depend on background factors such as skills and educational levels. There is, however, a tendency of European research reporting lower returns to training for more disadvantaged groups of employees.</p> <p data-bbox="582 949 1374 1084">Gender effects – female workers appear to be more rationed in their training (wanting more training than they receive) and there are also indications that women finance their own training to a greater extent than men. However, there is no straight forward evidence that women experience lower returns to training than men.</p> <p data-bbox="582 1113 1374 1225">Employer-financed training – most studies suggest that employer-financed training generates larger wage returns than self-financed training. There are also some indications that training initiated by firms and training more closely related to one’s job yield higher wage returns.</p> <p data-bbox="582 1254 1374 1471">Certified training – certification of training appears to improve the willingness of individuals to take part in the financing of training to some extent but the greater part is still financed by employers. Thus the impact on the overall investments in training from greater transparency of acquired skills largely depends upon what will happen with the large share of training that is currently financed by employers. The concern is that higher wage returns to certified training and that a higher mobility of employees receiving certified training will result in less firm-financed training.</p> <p data-bbox="582 1500 1374 1666">Previous employer training – most research suggests that training received at a previous employer generates substantially higher wage returns than training at the current employer. That individuals have higher returns to training when changing employer, indicates that firms extract rents from general human capital investments and that a large portion of the training goes to good use with the new employer.</p>
Mobility and training	The connection between training and mobility is not clear when examining it at an aggregated level. Research based on more detailed information suggests that self-sponsored training, as well as training of a more general nature are associated with higher mobility and that firm-financed training and firm-specific training reduces mobility.
Career development and internal employability	Much of the research on this topic suggests that training improves the internal position of employees. A number of studies have documented improved career prospects, and increased internal mobility and job-security from participating in training.

Employment security and external labour market effects

Detailed evidence of positive external labour market effects from training has been documented in a number of recent studies based on European data. The findings here suggest that employees participating in training benefit from a stronger labour market position and that this effect appears to be stronger for more disadvantaged groups such as low educated and older employees.

Trade offs between different outcomes

There are some indications that individuals with poor employment prospects (older and low educated employees) have relatively modest wage returns to training but in exchange for more stable employment prospects through a lower risk of job losses and improved prospects of being re-employed when laid-off. There are also some indications that investments in training exhibit counter cyclical patterns, indicating that companies train their employees when the opportunity cost for training is low. These findings are consistent with the notion that increased competition for workers lowers training investments by firms and the idea of labour hoarding in times of adverse economic conditions.

4. EXTERNAL FACTORS AFFECTING VALUE CREATION FROM HUMAN CAPITAL INVESTMENTS

In terms of investments in human capital it is important to be able to understand under what conditions training takes place and how different conditions influence the value creation process and the distribution of the returns to training. Some of the more prominent theories and explanations are examined in the forthcoming sections.

4.1 Wage structure and labour market

Since Acemoglu and Pischke (1998; 1999) developed their model on wage compression, a substantial volume of empirical research has been conducted that tests the predictions of the model. As noted by Bassanini *et al.* (2005) labour market imperfections (wage compression) not only arise from collective bargaining and unions, but remark that growing literature argues that employers have market power in setting wages (oligopsony). Market power can arise through product differentiation, asymmetric information, search frictions, mobility costs, and various other factors, which can give the employer an upper hand in the wage setting process. One might expect that wage compression is predominantly restricted to a European type of labour market system; however, the wage compression argument can also be found in, for instance, studies of firms in the US (Bewley, 1998). The findings of Bewley (1998) suggest that the internal equity (fairness and moral) in firms' pay structure restrains managers from paying the employees the full value of their contribution.¹⁰

A compressed wage structure encourages employers to invest in general training, because firms extract higher profits from workers with higher skill level and workers with more human capital. In empirical tests, this model has fared reasonably well and several studies support the notion that wage compression indeed generates more company-based training. Among others, the results of Brunello (2002) appear to confirm the hypothesis that a compressed wage structure induces more company training. Brunello (2002) investigated wage dispersion and training in 11 European countries finding evidence that training was more frequent when wage compression was higher. Bassanini and Brunello (2003) also found that training incidence is higher in clusters with a lower training wage premium, which suggests that firms are more willing to finance general training in locations with a compressed wage structure. Similar results are presented on British data by Almedia-Santos and Mumford (2004) where higher levels of wage compression are positively related to training. Their results also indicate that the wage compression in the upper regions of the pay-scale matters most considering how much training is provided. However, we also see studies examining the effects of wage floor (minimum wages) on firm-provided training and the results of Dustman and Schönberg (2004) and Gerfin (2004b) suggest that wage floors increases training.

In summary, much of the empirical research on wage compression and training suggests that the Acemoglu and Pischke model does describe the real world phenomena quite well. The basic reasoning is that individuals are not paid their marginal product due to labour market imperfections and that this in turn

¹⁰ Bewley interviewed over 270 executives and managers of US-based firms about wages and layoffs.

shifts the financing of general training onto firms. That wage compression increases the willingness to invest in general training is in line with the reported studies in the earlier sections of this paper showing higher returns to training for those changing employer (indication that firms invest in general training).

4.2 Combined wage and productivity effects from training

Given that firms are rational in their investment decisions, the finding that firms finance general training is an important piece of information, as it suggests that firms benefit from training their employees even in skills coveted by other firms. There are a few studies that have had the possibility to examine the effects of training on both wages and productivity. The main conclusion from these studies is that employees receiving training only capture a portion of the returns to training, and this result appears largely to be independent of whether the received training is general or specific in nature. The study by Barron *et al.* (1989) indicates that the benefits from training newly hired employees are split 50–50 between the employer and the employee. In a more recent study by Barron *et al.* (1999a) of newly hired employees, the estimated impact of training on productivity growth are several times larger than the impact on wage growth. These results are statistically significant in both of the surveys used in this study (Employment Opportunity Pilot Program and the Small Business Administration survey). Additional U.S. based evidence comes from Bishop's (1994) review of the literature where he notes that time spent on training produces productivity effects that are many multiples larger than wage effects and states, "One explanation that doesn't fit is that the training is specific to the employer and the employer is financing all of its costs. There is direct evidence that most of the training is general." (p. 44).

Similarly, the study by Groot (1999) of company training in the Netherlands indicates that the productivity effects are about 4–5 times larger than the wage effects, suggesting that the wage growth is less than a quarter of the average productivity growth. The results from Groot (1999) also suggest that there is a rather weak connection between who contributes to training investment and who benefits from it. In about 43% of all cases, the workers either contributed through the use of their leisure time and did not receive any benefits, or did not contribute to the training but reaped some of the benefits. Notable is also that the average duration of the training was about 6 months, indicating that these results are largely based upon longer training spells.

A study by Dearden *et al.* (2000) on U.K. based data suggests that the overall effect of training on productivity is around twice as large as the effect on wages. The average length of training in this study was found to be about 2 weeks. The statistical analysis was carried out on industry-level data, suggesting that some of the returns to training documented in their study might have captured externalities that are normally omitted in studies based on individual or company level data. A substantially similar approach to estimate the effects of training on productivity and wages is taken by Conti (2005) on Italian training data. The results from this study point towards productivity effects being 3–4 times larger than the wage effects. Notable is that the positive training effects on wages are, in most of the regressions not significant, whereas the effects on productivity remain positive and strongly significant in all statistical specifications. The results reported in Ballot *et al.* (2004) for France and Sweden are about the same magnitude, where workers capture about 30% of the returns to training in France and about 35% of the returns in Sweden. Notable results from this study also include the wage differentials between small and large firms disappear after controlling for investments in R&D and the stock of investments in human capital and that there exists important complementarities between R&D and training expenditures. The former finding that wages are equal between large and small firms when accounting for R&D and human capital investments is an important finding as it suggests that firms might have a market power in the wage setting even though we typically find that larger firms pay higher wages (that larger firms pay higher wages has generally been interpreted as absence of monopsony power).

Having access to both wage and productivity data in estimating the benefits from training investments is crucial for our understanding of the financial mechanisms behind company-based training. Data on training, wages and productivity are in most instances not readily available, and it requires a substantial amount of ingenuity to come up with practical solutions to combined different sources of information, or a substantial amount of time devoted to survey companies for this type of information. If one is to draw any conclusions from the above cited wage-productivity studies, the findings here indicate that individuals receiving training capture somewhere between 20% and 50% of the returns to training. These results are fairly consistent with those documented in studies of training and mobility. Table 4.1 provides the results from different studies estimating the effects on wages from those staying with the training firm and those leaving for a new employer (panel A) and studies examining differences between wages and productivity from employee training (panel B). Note that the large dispersion in wage returns to training between different studies is largely a consequence of different studies using different measures of training (length, intensity, incidence, etc.) and that the main point of the table is the wage differentials between stayers and movers.

Table 4.1. Effects of training on wages and productivity

Panel A – Current and previous employer wage effects				
Study	Country	Current Employer	Previous Employer	Differential Effect
Gerfin (2004a)	Switzerland	1.1%	4.9%	4 times
OECD (2004a)	11 Countries (EU)	1.2%	2.6%	2 times
Booth and Bryan (2002)	UK	2.4%	7.5%	3 times
Parent (1999)	USA	11.6%	15.7%	-
		12.9%	12.9%	-
Lengermann (1999)	USA	4.0%	8.3%	2 times
Loewenstein and Spletzer (1998)	USA	2.8%	14.2%	5 times
		4.5%	11.8%	3 times

Panel B – Wage and productivity differentials		
Barron <i>et al.</i> (1989)	USA	2 times
Groot (1999)	Netherlands	4-5 times
Dearden <i>et al.</i> (2000)	UK	2 times
Conti (2005)	Italy	3-4 times
Ballot <i>et al.</i> (2004)	France	3.5 times
Ballot <i>et al.</i> (2004)	Sweden	3 times

Notes: Estimates from different studies of employer provided training. Panel A shows current-previous employer wage differentials and Panel B wage-productivity differentials. See also section 3.1 for more information on previous and current employer training and wage returns.

The figures of the distribution of the returns to training between the employee and the employer are largely consistent with what is documented when trained employees leave for a new employer. The wage returns for employees staying at the firm providing the training are somewhere between 20% and 50% of the returns to training for those leaving for a new employer. That wage-productivity differentials and current-previous employer training wage differentials are fairly consistent is comforting as we still depend upon a

handful of studies in gauging the effects of training on productivity.¹¹ These numbers also suggest substantial productivity effects from training that are not realised by individuals staying with the training firm and that firms extract considerable rents from their human capital investments.¹² Basically, the consistency in estimates between returns for firms and the returns for individuals leaving for a new employer also suggest that information asymmetry might not play as an important role as previously thought since movers appears to capture (get paid) most of the returns to training when changing employer. It thus appears that individuals are able to communicate previous human capital accumulation in a credible way to a new employer.

The wedge between wages and productivity thus support the notion that firms invest in and harvest most of the returns to training. As noted in OECD (2004a) the increased wedge between wages and productivity for trained workers suggest not only that companies profit from training, but also and maybe more importantly, that the increased productivity might, in a wider perspective, stimulate the overall demand for labour as the increased wedge between wages and productivity will likely result in a higher job growth for companies investing in their employees. In relation to the findings that displacement effects of training appear to be of a minor importance, it is conceivable that training generates effects on the demand-side for labour (OECD, 2004a; Bassanini, 2004).

The ability to extract rents from general human capital investments is, however, in all likelihood also dependent on the relative strength of the different parties in collective bargaining as well as legal and institutional arrangements influencing the mobility of the workforce. The bargaining power of firms appears to have increased considerably in the last three decades. As noted in OECD (2004b), the wage share in the business sector has steadily declined from being around 71% in the 1970s to 65% in 2000-03. Firms have captured most of the productivity gains in this period. The table below is reproduced from the OECD Economic Outlook database and shows the wage share in the business sector over the period 1960 to 2003.

¹¹ Besides studies having access to wage and productivity data, several other studies have documented substantial gains for employers from employee training (see for instance, Barrett and O'Connell, 1999; Bassi *et al.*, 2004; Bassi *et al.*, 2002; d'Arcimoles, 1997).

¹² The short-term gains that an individual can realise by moving to another employer need, however, to be balanced against the long-term wage growth that an individual can receive by staying with an employer committed to continuously upgrade the human capital stock.

Table 3.A2.4. Wage share in the business sector, 1960-2003

	Average in percentage for the indicated period ^a								
	1960-64	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995-99	2000-2003 ^b
Australia	..	62.4	64.8	67.9	64.4	60.9	60.2	60.9	59.8
Austria	..	80.1	78.6	83.0	81.0	79.0	76.4	72.0	68.7
Belgium	..	..	65.3	71.2	71.0	67.6	69.0	67.7	68.0
Canada	..	67.5	64.6	66.3	65.2	65.4	69.7	67.6	65.7
Czech Republic	..	..	..	..	..	..	54.0	58.3	57.7
Denmark	..	..	66.4	68.3	65.8	67.6	67.0	64.8	64.5
Finland	70.3	70.5	67.5	71.9	69.3	69.6	68.1	59.4	59.2
France	73.1	71.2	67.0	71.8	74.7	68.4	63.8	61.7	61.3
Germany ^c	68.3	67.4	69.2	69.4	69.6	66.0	66.6	64.7	65.0
Greece	70.6	69.0	62.6	64.3	68.3	66.0	60.7	60.1	58.0
Hungary	..	..	..	..	..	..	63.0	59.8	54.3
Iceland	..	..	79.6	72.6	66.2	75.2	72.9	76.0	82.5
Ireland	..	..	80.5	79.5	79.0	71.3	67.1	57.1	47.8
Italy	75.7	73.7	75.4	76.6	72.7	68.7	68.3	63.3	62.2
Japan	..	73.0	74.3	81.8	79.6	74.8	70.8	70.4	69.4
Korea	..	..	..	89.8	93.9	83.8	83.7	83.7	85.2
Luxembourg	..	..	..	..	..	..	62.4	59.0	59.6
Mexico	..	..	..	..	43.7	42.5	45.3	43.1	40.1
Netherlands	..	66.4	69.8	72.2	68.1	64.0	63.0	62.0	62.7
New Zealand	..	..	64.3	68.9	67.0	61.9	59.0	56.4	53.6
Norway	..	..	..	75.1	75.9	74.3	69.5	67.7	66.1
Portugal	..	..	..	..	..	68.4	71.9	72.5	73.3
Slovak Republic	..	..	..	..	..	..	48.6	47.5	46.3
Spain	65.4	63.9	65.2	65.8	68.2	63.2	65.6	63.6	62.9
Sweden	65.2	66.1	66.3	68.6	65.0	62.4	63.9	63.1	69.6
Switzerland	..	..	..	57.9	60.7	62.7	67.5	70.6	73.9
United Kingdom	69.2	70.0	70.8	70.6	70.4	69.7	72.1	69.7	72.6
United States	71.1	68.4	69.2	67.1	67.3	66.0	65.8	64.2	64.6
OECD averages ^d	71.0	69.9	70.2	72.5	71.2	67.0	66.4	64.4	64.1
			(70.2)	(71.8)	(71.2)	(68.2)	(67.3)	(65.5)	(65.4)

.. Data not available.

a) 1961-64 for Greece; 1963-64 for Sweden and the United Kingdom; 1964 for France and Spain; 1966-69 for Australia and Canada; 1969 for the Netherlands and Portugal; 1971-74 for Denmark and Ireland; 1976-79 for Switzerland; 1978-79 for Norway; 1983-84 for Mexico, 1991-94 for Germany and 1994 for the Czech Republic and Hungary.

b) 2000-2003 values based in part on projected values for certain countries.

c) Data for years up to 1990 refer to the former West Germany, while subsequent values correspond to post-unification Germany.

d) Employment-weighted averages for the expanding sample of countries for which data are reported for each period. Figures in parenthesis correspond to averages calculated for the unchanging samples of countries for which data are available in 1970-74.

Source: OECD Economic Outlook database.

It is apparent that the wage share has declined from the mid 1970s and onward and that a substantial change occurred in the later part of the 1980s. These findings suggest that the relative bargaining strength of firms has increased during the above period and that this in turn might explain some of the results linked to the distribution of returns to training, particularly in studies using data from later years. The labour income has decreased steadily since the 1970s is also apparent in the study by Santos and Veronesi (2000). In their study of stock market performance and labour income in the USA, they show that there has been a steady decline in the labour income-to-consumption ratio since the beginning of the 1970s, indicating that the importance of financial wealth in consumption has increased and labour income has decreased. Furthermore, it has also been shown that this ratio is negatively related to future stock returns. This finding indicates that relatively lower labour rents, measured as part of consumption, produce higher stock returns.¹³ Considering that wages are important determinants of stock returns is also demonstrated in

¹³ Based on the assumption that investors have two sources of income (labour income and dividends), Santos and Veronesi (2000) argue that the negative relationship between labour income and future stock returns is a consequence of investors requiring higher returns on their financial portfolios as their income from human capital declines. The basic argument is that when investors' consumption is mainly financed by wages, the relationship between stock returns and consumption growth weakens, thereby generating a lower required risk premium for holding stocks. One

Hansson (2004), where the performance (market value) of firms influences the relative bargaining power of employees, which in turn has an impact on wages and stock returns (higher rents to human capital generates lower stock returns). From OECD (2004b) it is also apparent that unemployment rates have increased while inflation rates have decreased substantially since the mid 1970s. Given such circumstances, one might foresee that firms in general have a rather strong position to finance and harvest their investments in human capital. The question is to what extent an increased competition for workers influences investments in and returns to human capital? Some answers to these questions can be found in the literature gauging the effects of densely populated areas and industrial concentration.

4.3 The role of human capital in a regional context

A substantial amount of research has focused on the effects of industry or urban density on productivity and wages (for an overview see for example Rosenthal and Strange, 2004). Empirical research suggests that agglomeration effects produce large productivity gains by the closeness of industries and people. The basic argument is that proximity of firms and individuals in denser industrial or economic areas increases interaction and promotes technological progress, which in turn drives productivity. The benefits from increased interaction between agents in more populated areas or in industry clusters are significant, with labour market pooling (matching), input sharing, and knowledge spill-overs possibly being the more prominent forces in generating increasing returns (Strange, 2005).¹⁴ Alternative explanations for agglomeration economies include, for instance, endowment of natural advantages, home market effects, consumption opportunities, and rent-seeking. Empirical research proposes that a doubling of city size increases the productivity by an amount that ranges from two to eight percent (Strange, 2005). Similarly, Ciccone and Hall (1996) found that the doubling of employment density increases average labour productivity by around six percent, suggesting substantial productivity effects from agglomeration economies.

Human capital, approximated by labour market pooling and knowledge spill-overs, plays an important role in explaining the higher productivity documented in this line of research. Several papers argue that labour market pooling is a main force behind the higher productivity and that the better matching between employees and employers through higher labour turnover increases productivity and wages. Rosenthal and Strange (2001) argue that the labour market pooling is the only agglomeration factor that is significant at different spatial levels (local and more aggregated levels), and that the urban wage premium, to a large extent, is explained by better matching and better interaction between agents, which in turn fosters human capital accumulation and more rapid updating of the human capital stock.

Carlino *et al.* (2005) have a similar argument that the productivity depends on the quality of workers' match. In denser economic areas the opportunity costs to find a matching employer is lower and the better matching results in higher productivity. Carlino *et al.* (2005) also document that human capital plays a crucial role in agglomeration research as the share of the adult population with at least a college degree

could also speculate whether demographic factors or technological innovations might assist in explaining why the relative importance of labour rents varies over time.

¹⁴ Agglomeration is typically distinguished into three dimensions where industrial and the geographic density as well as the temporal scope (impact of interaction over time) is seen as components driving economic growth (Rosenthal and Strange, 2004). Rosenthal and Strange note that there has been an ongoing debate on whether it is the industrial scope (localisation economies) or urbanisation economies (concentration of overall economic activity) that generate productivity effects and the empirical results thus far lean towards industry concentration being the more powerful force.

showed to be the most prominent factor in explaining innovations (patents per capita). Similarly, their measure of employment density (jobs per square mile) proved to be important in explaining the innovations in urban areas. The structure of the local labour market, in terms of proximity to the workforce and the availability of educated workers, thus seems to be important for the innovative capacity of firms.

There also appears to be a trend of cities having a highly educated workforce attracting even more highly educated individuals. Moretti (2003) shows that there has been a steady inflow of educated individuals to cities with a higher educational level, and that the dispersion of the average educational level between different cities has increased steadily since the 1980s. Another paper by Costa and Kahn (2001) examining “power couples” (married couples who both have a higher education), suggests that the increase of power couples in big cities to a large extent can be explained by better opportunities to be matched with a suitable employer. It thus appears that companies, as well as individuals, are organising themselves to take advantage of the opportunities to capitalise on human capital by improving the prospect of finding (matching) with a suitable employer/employee.

In sum, denser economic areas have higher productivity, more innovation, and higher wages, which to some extent are driven by higher workforce mobility and better matching between employees and employers. Almost all of the research in this area suggests that education plays an important role in producing these outcomes. There is little research on the effects of agglomeration on the willingness of firms to invest in their employees. The general notion of the effects of agglomeration on company-provided training is that agglomeration increases the poaching risk, and thus reduces the incentives for firms to invest in training. This is also what is documented in Brunello and Gambarotto (2004) in their study of agglomeration and training. Among other things, they document that there are less unfilled (skilled) job vacancies in denser areas and more critically that voluntary turnover after receiving training is higher in denser areas. The main results of the study suggest that there is a negative association between employer-provided training on the one hand and employment density and industrial specialisation on the other. In connection with these results, it is also important to note that most of the training is considered to be general in nature.

That training is lower when the competition for workers increases, suggesting once again that most general training investments are financed by firms. In the case where individuals pay for their own training, one would anticipate that more training taking place, as it is likely that the returns to training are higher in denser areas. However, these findings suggest that Becker’s (1962) prediction about the distribution of returns to general training in a competitive labour market is just about correct. When a larger portion of the returns to training are captured by the individual, the incentives for firms to take part in the financing of the training are weakened. However, the improved incentives for individuals to finance their own training do not seem to translate into a greater propensity to carry their own human capital investments.¹⁵

The higher wages in denser areas also suggest that individuals and firms share the productivity effects from pooling externalities and that other sources of human capital accumulation than training are important. Employees learn in many ways and one has to recognise that from a company perspective (formal), training might not always be the best way to learn skills, especially if the poaching risk is high. The question is to what extent productivity and wages would be higher if more training could be provided in these areas. In relation to the higher productivity in denser areas these results suggest that the positive pooling effects (mobility and matching) dominate the negative poaching effect that lowers training investments. For example, as noted by Rosenthal and Strange (2004), increased competition in an industry cluster may produce two opposite forces that influence productivity. Increased local competition encourages innovation, thereby enhancing productivity, whereas an increased local competition can lead to

¹⁵ An alternative explanation for the lower training in denser areas could of course be that the opportunity cost for training is too high and therefore restricts the amount invested in training.

a decreased productivity, because of incomplete property rights. This reasoning has a bearing on employee training as investments made by firms in human capital are in most cases by default incomplete.

There are some efforts to protect property rights and investments in human capital by for instance reducing opportunities for employees to capitalise on their acquired knowledge by restricting the transfer to a competing firm. A large portion of the strategies to capitalise on human capital investments by firms is geared towards reducing mobility or internalising these investments in one way or another. Although many of these strategies can be profitable for individual firms it is important to bear in mind the productivity trade-offs between pooling externalities (mobility and matching) and strategies aimed at increasing human capital investments by reducing the mobility of the workforce.

5. STRATEGIES TO CAPITALISE ON HUMAN CAPITAL INVESTMENTS

5.1 Non-compete contract effects

A way to mitigate the negative effects of weak contractual arrangements is to improve property rights and minimise rent seeking behaviour. Non-compete contracts are one way to protect investments in human capital and company secrets. These agreements are essentially contracts that prevent employees from taking a job with a direct competitor or starting a competing business for a certain time after leaving the company. The advantages of protecting human capital investments by these agreements need to be, however, balanced against the negative effects that arise from locking people into certain jobs when they might be more productive in another job or as an entrepreneur. An interesting paper examining the effects of non-compete agreements indicates that the benefits in form of lower staff turnover are at most modest. Fallick *et al.* (2005) utilise the circumstance that non-compete agreements are not enforceable in California whereas these agreements with some exception are legally binding in other states around USA. The study finds a higher mobility of the workforce in the Californian computer industry and in Silicon Valley in particular. Outside the computer industry there are no significant differences between California and other states.

These results indicate that non-compete contracts might have some moderating effects on staff turnover in the computer industry but little or no effect in other industries. It is worth noting that the reported statistics in this study show no differences in impact (California and other states) between industry mobility and mobility in general (an employee moving from the computer industry to another industry). This result suggests that these contracts restrict mobility in general and not as intended preventing employees from taking a job with a direct competitor or starting a competing business in the same industry. While the work by Fallick *et al.* (2005) indicates that non-compete agreements might have some effect on turnover in certain industries (computer industry), little is known about the overall negative effects that these agreements might have on productivity and wages.

5.2 Firm strategies to increase value creation from human capital investment

The impact of Human Resource Management (HRM) practices on company performance has attracted considerable attention in the literature. The argument put forward in this line of research is that advanced HRM practices produce a higher level of productivity. The findings in this area suggest that there is a connection between HRM practices or what is often referred to as High Performance Work Systems (HPWS), and company performance indicators such as staff turnover, sales, market values, market-to-book values, profitability and productivity. These human resource management practices are sometimes also referred to as human capital enhancing systems, or high commitment policies (systems).

Generally, this research area has good access to company-based performance measures. The disadvantage is often that the statistical methods are based on level (cross-sectional) data, which makes it difficult to establish causality. That most of the research is based on level data is largely a consequence of the fact that firms seldom make any large changes to their HRM policies. Measuring changes in HRM practices, therefore, requires extensive measurement periods (longitudinal data). Much of the inference about the impact on firm performance is thus confined to cross-sectional data. However, many papers use a research design that accounts for the heterogeneity among firms, which makes the statistical models more robust.

In HPWS literature, education and training is part of a larger package of the activities of a human resource function. The areas that are typically covered in these studies are screening and employee selection, compensation systems, employee communication, teamwork practices, task flexibility and autonomy. Many cases studies also examine how aligned or integrated these practices are with the objectives or strategy of the company. Much of the current debate centres on whether bundles of human resource practices are the source of value creation in firms or whether certain practices contribute more than others. There is also the question of whether there is a specific HRM practice that is generally effective for most enterprises or whether HRM practices are firm-specific or country-specific.

The basic findings suggest that HRM practices have a substantial impact on the profitability of firms as well as their innovative capacity.¹⁶ In relation to human capital investments and the possibility to enhance the employment of the human capital in generating innovation and productivity effects, the HPWS literature stresses the importance of having a combined human resource strategy that is aligned with corporate objectives. Training by itself is not enough but needs to be combined with other HRM practices to be efficient. More efficient use of the labour force and the better utilisation of the investments in human capital are typically seen as the main driver behind higher productivity and more innovations. Training plays a crucial role in most of these studies. Employers adopting these systems are typically also providing more training to their employees (see for instance Cosh *et al.*, 2000, Whitfield, 2000; Barnard and Rodgers, 2000; Lynch and Black, 1998). We can also see that a part of the increased productivity from adopting HPWS translates into higher wages for employees (Bauer, 2003), suggesting that employees and employers shares the returns to HPWS.

Advanced human resource management practices are typically positively related to employee retention, which is, from an investment point of view, an important observation (see for instance Becker and Huselid, 1997; Huselid, 1995). That HPWS are associated with more satisfied employees is for instance reported in Bauer (2004), where job satisfaction is foremost driven by higher involvement of workers through flexible

¹⁶ See for instance Becker and Huselid (1997), D'Arcimoles (1997), Becker and Gerhart (1996), Delaney and Huselid (1996), Ichniowski *et al.* (1995), Huselid (1995) for studies connecting HPWS with profitability or Laursen and Foss (2000), Michie and Sheehan (1999), Baldwin and Johnson (1996) for studies linking HPWS with innovations.

work systems that generates increased communication between co-workers and increased autonomy to perform one's job. That autonomy (task flexibility) plays an important role in keeping employees is also documented in Sanders and Grip (2004).

There are a number of research papers examining links between training and HRM practices. For instance, Green *et al.* (2000) document that training aimed at increasing the identification of employees with corporate objectives decreases the likelihood of job search, which follows the line of argument in the HPWS literature. Employees working in small and medium enterprises (SME) subscribing to IiP (Investors in People) and adopting "best practice" in human resource management appears to be more favourable towards effects of training programmes than those not working in IiP certified SMEs (Devins *et al.* 2004). Employees in IiP companies also reported to a larger extent that they felt more confident at the workplace after the training and showed increased interest in further education and training. The findings of Cosh *et al.* (2000) also suggest that the effects of training in connection with more sophisticated HRM practices generate higher employment growth among smaller firms. The results of Axtell *et al.* (1997) on employee learning support the arguments seen in the HPWS literature in the sense that autonomy and motivation are main determinants of the transfer of training to the work setting. This paper thus provides the individual-level link between good HRM policies and the efficiency of training and suggests that firms' internal policies are important in increasing the returns to their investments in human capital.

The higher productivity and innovative capacity of firms employing HPWS indicates that training and other human capital investments generate larger effects in connection with other well developed HRM practices that focus on motivating and retaining employees. A study by Hiltrop (1999) suggests that training and development are some of the more important factors to consider in attracting and retaining talented workers. Firms categorised as being superior in their ability to attract and retain talented people were shown to perform substantially better on factors such as training, autonomy, and teamwork offered to employees, whereas no differences were found for factors such as job-security, internal promotion, and access to benefits for employees. This result in connection with the previously conveyed results that firm-financed training lowers mobility, suggests that training is an important factor to consider in keeping employees.

In conclusion, much of the research in the HPWS literature suggests that more advanced human resource management practices are of strategic importance for firms in protecting and enhancing their investments in human capital. The research suggests that there are substantial productivity effects from retaining talented employees, increasing autonomy, job satisfaction, and motivation that results in a better use of the labour force. It thus appears that training in these circumstances not only generates higher productivity but also provides an increased incentive for employees to utilise their acquired knowledge for the firm making the investment.

5.3 Other strategies to capitalise on human capital investments

There are numerous other strategies that firms can pursue in protecting and increasing their returns to investments in human capital and we will only briefly discuss some of these strategies in this concluding section. The aim for these strategic options is largely geared towards retaining employees or in making firms less vulnerable to mobility (less dependent on their human resources).

Training clauses/payback schemes are essentially agreements which encourage firms to invest in employee training by imposing a penalty on workers who quit before a certain period after receiving the training. As noted by Brunello and de Paola (2004) these schemes help to solve the problem with financially constrained workers as employers step in and pay for the training due to the restrictions placed on mobility. Pay-back clauses are generally not established by law but are to some extent permitted within certain

individual contracts or established by collective bargaining agreements (OECD, 2003). These contracts are possibly more suited towards formal education and training programmes leading to some kind of certification. With some exceptions, notably Germany, these agreements are fairly uncommon owing to difficulties of contracting training content and probably also due to the possibility for the individual to choose the level of effort after the training (shirking).

Back-loaded compensation (Salop and Salop, 1976) is another way of inducing costs for employees changing employer. Back-loaded or deferred compensation is generally seen as a mechanism in reducing costly staff turnover and thereby also increasing investments in human capital. Deferred compensation schemes have typically also provided a competing theory to human capital accumulation for an upward sloping wage curve. As with recent theories on wage compression, back-loaded compensation rests upon a disengagement of wages from productivity and as noted by Salop and Salop (1976), in competitive markets these schemes would cease to exist. For firms with large investments in their employees, an annual increase of the wage tied to the number of years of service could provide an effective way of inhibiting mobility and help them capitalise on their human capital investments.

Employee stock options and other financial incentives introduced by firms constitute another compensation scheme that aims to retain employees, improving commitment, and increasing efforts of employees in their work. As noted by Creelman (2004), the use of long-term compensation to create “golden handcuffs” are quite common in practice. For many smaller companies in fast growing industries who need to attract high-skilled labour, employee stock-options appear to be a particularly important means of attracting talented employees for those employers who are unable to pay full market wages. In the financial sector, favourable pension schemes for those staying with the company are frequently used to retain employees. Both stock-options and pension schemes have much in common with deferred compensation in that they are geared towards establishing a long-term relationship with employees. In the case of stock-options one can also look upon these contracts as way of shifting investment risks onto workers by lowering wages and increasing their financial stakes in the company.

Human capital to structural capital refers to the idea of incorporating employee knowledge into internal structures of the company and to protect "know-how" from leaving the company. In line with the reasoning in Creelman (2004) the efforts to minimise risk exposure and protect knowledge are just one of several different ways to deal with the same issue, where legal protection such as patents, trademarks, copyrights, confidentiality agreements, and non-compete contracts are seen as a first line of defence. Apart from these legal protections, secrecy, retaining talent, knowledge management, and creating hard to copy capabilities are important to consider in relation to internalising human capital and knowledge. With each of these approaches, there are of course limitations and trade-offs and Creelman (2004) notes that firms will not become great by preventing know-how from leaking to competitors, rather firms become great by developing know-how, keeping talented people and creating unique capabilities.

Branding to attract talent is another way of attracting the right people to a company. A research note by Baum *et al.* (2000) suggests that the ability to attract talented employees is the second most important component, after innovations, in creating value for businesses. Hieronimus *et al.* (2005) notes that demographic trends make it increasingly difficult for companies to replace valued employees when they retire and argue that firms should think of recruits as customers, use sophisticated market analysis to identify its key rivals, determine which corporate attributes matter most to recruits and understand how to best reach them. In this sense, companies need to understand their strengths and weaknesses and address these in an efficient way to be able to position themselves to recruit talented employees. The wage compression argument (Acemoglu and Pischke, 1998; 1999) suggests that a strategy of attracting talented employees might well pay-off in terms of higher profits as firms appears to extract rents from employees with higher productivity.

5.4 Summary of main findings

Table 5.1 below summarises the main findings of sections 4 (external conditions) and 5 (internal conditions and strategies). Some of these external labour market conditions and internal strategies in regard to human capital investments are well documented, whereas others are based on less empirical research. Nevertheless, we believe it is fair to conclude that there are a number of important factors to consider in increasing our understanding of the mechanisms at play behind the returns to human capital investments.

Table 5.1. Summary of external and internal conditions influencing training and returns

Wage compression	Much of the empirical research on wage compression and training suggests that a compressed wage structure increases the amount of training. The basic reasoning is that firms have market power in setting wages and that in turn shifts the financing of general training onto firms.
Combined wage and productivity effects from training	<p>With relatively few training studies having access to both wage and productivity data, the findings nevertheless indicate that the productivity effects are about 2 to 5 times larger than the wage effects suggesting that individuals capture somewhere between 20-50% of the returns to training. These results are largely consistent with the findings on current-previous employer training wage differentials. The results in this section suggest that:</p> <ul style="list-style-type: none"> - Information asymmetry might play a less important role in promoting firm-financed general training (than previously thought); - Firms bargaining power is an important component for firm-financed general training investments; and - Training might increase the overall demand for labour.
Human capital and agglomeration economies	<p>The research on agglomeration suggest that denser economic areas have substantially higher productivity, more innovation, and higher wages, which to a large extent is driven by higher workforce mobility and better matching between employees and employers. The research in this area also suggests that human capital plays an important role in producing these outcomes, but there are also indications that employer-provided training is lower when employment density or industrial specialisation increases. That training is lower when the competition for workers increases suggests once again that most general training investments are finance by firms. The results in agglomeration research suggest that:</p> <ul style="list-style-type: none"> - In more competitive environments firms are less willing to finance training (in line with Becker, 1962); - Improved incentives for individuals to finance their own training does materialise in more training (but less); - The better matching between employees and employers and the mobility of the work force are important components in producing innovations and productivity effects; and - Productivity effects due to externalities/interactions overshadow “missed” productivity effects due to lower (formal) training investments in denser areas.
Strategies to capitalise on HC investments	<p>Non-compete contract – From a U.S. based study these contracts appear to have at most a modest impact on labour mobility.</p> <p>Human Resource Management (HRM) policies – much of the research in this area suggest that there are substantial productivity effects from more advanced HRM practices geared towards retaining productive employees, increase autonomy, job satisfaction, motivation, and a better utilisation of human capital investments. Training in these circumstances not only generates higher productivity but also provides an incentive for employees to utilise their acquired knowledge for the firm making the investment.</p> <p>Other strategies to capitalize on HC investments – there are numerous strategic decisions for firms to take in relation to human capital investments. Some of these strategies are:</p>

- *Training clauses/payback schemes* which essentially are agreements that encourage firms to invest in employee training by imposing a penalty of workers who quite before a certain period after receiving the training;

- *Back-loaded compensation* is another way of inducing costs for employees changing employer. Back-loaded or deferred compensation is generally seen a mechanism to reduce costly staff turnover and thereby also increase investments in human capital;

- *Employee stock options* and other financial incentives introduced by firms constitute another compensation scheme that aims at retaining employees; improve commitment and efforts of employees in their work;

- *Human capital to Structural capital* refers to the idea of incorporating employee knowledge into internal structures of the company and to protect know-how from leaving the company; and

- *Branding to attract talent* is a way of attracting the right people to the company. A research note by Baum *et al.* (2000) suggests that the ability to attract talented employees is the second most important component, after innovation, in creating value for businesses.

6. SUMMARY AND CONCLUSIONS

Employer-provided training is by far the most important source of further education and training after the individual enters the labour market. A substantial portion of these human capital investments are financed by firms and it appears that the contribution by individuals are in most circumstances relatively modest. At the same time, substantial gains for individuals participating in training are documented in a large number of studies. The benefits are not only confined to wage returns but research has also shown that training leads to increased internal employability and job-security; and external labour market effects such as higher labour participation rates, lower unemployment, and shorter unemployment periods.

Other results of this review suggest that the returns to training are higher in the case that it is financed by the employer and that the returns to training are substantially higher for those leaving for a new employer, but we can also note that employer-financed training appears to lower the probability of an individual leaving for a new job elsewhere. The analysis of the distribution of returns to training reveals that although individuals benefit from these investments, the employer reaps most of the returns to training. The estimates here suggest that individuals capture somewhere between 20-50% of the returns to training whereas the rest of the productivity effects are accrued by the employer providing the training. These estimates are fairly consistent with what is typically reported in studies gauging the wage differentials between those staying with the training firm and those leaving for a new employer. The findings that employers reap most of the benefits to training, even though nearly all training is general in nature, suggest that firms have substantial market power in setting wages, which in turn explains why firms carry such a large portion of the financing of these training investments.

We find some indications in the literature that firms could make better use of their investments in human capital. The more prominent indication of under-utilisation comes from the human resource management

area, where much of the research points out that firms adapting high performance work systems have substantially higher productivity and profitability than firms that have given less attention to these issues. Apart from “best practise” firms, HRM research basically suggests that a number of firms should engage in aligning their HR systems with their business strategies and employ more practices that increase autonomy, motivation, commitment, and job satisfaction in order to enhance their returns to human capital investments. Another indication that firms might not use their investments in an efficient way is demonstrated in the differences in returns to training by those staying with the firm and those leaving for a new employer. The higher returns to training for leavers has generally been interpreted as a indication that the training firm offers a wage lower than the market wages after training in order to recoup the training investment, but this difference in returns to training could also be interpreted along the lines that the acquired skills are put to better use with a new employer.

Training is not equally distributed among employees, older, low skilled workers, and to some extent female workers typically receive less training than other groups of employees. However, we do not find any clear-cut evidence that returns to training varies with gender, educational or skills levels, which suggests that inequalities do not arise because of differences in returns to training, but are more a consequence of inequalities of the distribution of training investments. If one takes a closer look at the demand-side of training some interesting patterns emerge (OECD, 2003). About 25% of all workers in the International Adult Literacy Survey (IALS) wanted to take further training but did not for some reason. Among the reasons given for not participating, a lack of time and being too busy at work were the most common responses for not taking further training. About 4-7 % claimed that it would be too expensive as a reason for not participating. There are some indications that low skilled workers are more financially constrained than others but on the whole, credit restrictions on behalf of workers only account for a small portion of the restrictions on overall training (25% times 4-7%). The marginal importance of financial constraints is likely to be a consequence of employers financing most of the training already and that workers are accustomed to receiving training without paying much of the costs.

Overall, a somewhat surprising finding is that highly educated workers feel more constrained (showing an interesting in taking more training but could not) than lower educated workers, and that the lower training levels for low educated and older employees can be attributed to workers’ own preferences (Leuven and Oosterbeek, 1999). In this study, it is also apparent that lower training for female workers can attributed to the preferences of firms (female workers being denied training). That the demand-side for training among disadvantaged groups is quite weak, with the exception of female workers, complicating matters through shifting the responsibility for training onto these groups would possibly result in larger inequalities in training participation than is currently the case. An explanation that still needs further research is to what extent employers have stronger market power in setting wages for less educated employees and to what degree this in turn explains why these groups of employees do not demand more training. There are some indications that returns to training are lower for less educated employees (OECD, 2004a and Bassanini *et al.*, 2005) which could provide an explanation for and justify the weak demand-side of training for disadvantaged groups of employees.

Since employers finance general training investments, the under-provision of training has been on the research agenda for some time. Market failures in training have been discussed frequently in the literature and more recently in for instance Brunello and de Paola (2004), Bassanini *et al.* (2005), OECD (2003). The sources of a market failure are different depending on how efficient labour markets are perceived. In a competitive labour market, market failures can arise because of credit constrained workers or the presence of minimum wages that inhibit workers from paying for their (general) human capital investments. If labour markets are less efficient, other sources of under-provision of training emerge. In the current literature review, two of the most apparent market failures in training arise because of employer-financed general training investments and because of employers bargaining strength. The former influences the supply-side of training whereas the latter can affect the demand-side of training (both lead to an under-

provision of training). The fact that employers finance general training is likely to result in too little training being provided because of workforce mobility (externalities). Staff turnover reduces the incentives to provide training and the positive productivity effects of training for other firms are not entering the equation when the employer decides upon training. In the case where employers take the decision to invest in training, too little training is provided compared with what is optimal from a societal point of view. If firms have market power in setting wages, the demand-side of training is affected as the incentives for individuals to invest in training are weakened. Individuals are discouraged to invest in training because the returns to training are uncertain and because some of the returns can be appropriated by the employer.

Both of these market failures appear to be important in our review of the literature and it is notable that some market power in the wage setting is a prerequisite for firm-financed general training investments. The remedy for improving these inefficiencies is a delicate balancing act between increasing the incentives to train or to be trained without reducing the motives for either decision. Another important aspect to consider in relation to training comes from the agglomeration literature where it is quite clear that externalities created by mobility and better matching are major forces in boosting productivity and wages. Although there are substantial productivity effects from training, it appears that productivity effects due to these externalities are more important in determining productivity than investments in (formal) training. Any attempt to restrict mobility in order to increase investments in human capital might thus lead to unwanted effects on overall productivity. Remedies geared towards restricting mobility will likely also lead to further erosion of employee bargaining power. Thus as a general guide, it is important to have in mind potential effects on mobility when considering improving the incentives for more training.

Information. One solution in improving the demand-side of training is to provide more information about human capital investments. The options in providing more information on training might include individual-based certification of training (skills) and the possibility to provide company-based information about training investments. The potential impact of certifying training on the overall investment in training is still largely unknown. There are some indications in the literature that certified training lowers the returns to training for employers by increasing the mobility and returns to training for the individual. However, certification seems to have a modest impact on the individuals' willingness to step in and finance their own training. The concern here is that the decreased incentives for employers to finance training will lead to lower overall investments in training, considering that employers currently are the main sponsors of training investments.

An alternative to certification is to provide more information about training on a company level. While this subject has received less attention in the current review, there are some potentially interesting advantages in disclosing human capital investments at a company level. First, more information about training will lead to a more efficient labour market by increasing the match between employer and employee; and by linking individuals who want to receive training to firms that provide training. The potential negative effects on the incentives to train employees will likely to be relatively minor as a raiding firm has little information about who is actually receiving the training investment. Second, more company-based information would likely also alleviate the information asymmetries existing in the capital market. The current non-disclosure practise is making it difficult for investors to evaluate companies on their human capital investments and as shown by Bassi *et al.* (2004), firms investing heavily in training are undervalued by the market (exhibits excess returns). More information would therefore likely lead to better allocation of resources to firms investing in their employees.¹⁷ Until more is known about the potential negative effects

¹⁷ More company-based information need not necessary imply that these investments are accounted for in the balance sheet, but more information could be provided on this item in the income statement. In connection with disclosing information about human capital investments, it is worth noting that training and R&D investments have a common problem in that both of these investments generate externalities. Ballot *et al.* (2004) note the following "A firm is likely to get only a part of the benefits of innovations it generates because other firms and consumers will also benefit

of certification on overall training investments, this type of information could be released at a company level.

Tax policies. As noted by Brunello and de Paola (2004) the existing empirical evidence on companies' investments in general skills, suggests that policy focus should be on employers rather than employees in order to increase either the marginal benefits or the decrease the marginal costs of training. The externalities of labour mobility further suggests that incentives to reduce the marginal costs of training for firms are preferred over incentives to increase the marginal benefits of training as these typically involve restrictions on labour movements. In decreasing training costs for firms, tax incentives play an important role. Tax incentive schemes like those in place in for instance Austria, Luxembourg, and the Netherlands (where the average corporate tax deduction rate is approximately 120% of training expenditures - 20% subsidy) will of course increase the incentives for firms to invest in training and align the global costs of investments in training with the economy wide benefits. To increase the equity in training, certain tax incentives could be geared towards specific categories of employees such as those in place in the Netherlands for older employees. The costs of these tax incentive schemes are likely to be lower than the direct subsidies, since trained workers earn more and because of the higher productivity in firms providing training. Some of the costs of tax incentives schemes are thus offset by increases in corporate and income taxes. Another way of decreasing the costs of training for firms is to employ some kind of co-financing agreement where the firm and the employee share the costs of training. (See e.g. OECD, 2004c). However, great care needs to be taken when introducing these types of contractual arrangements so as not to inhibit workers general mobility. A way forward might be to introduce co-financing, together with individual learning accounts which the individual retains even if he/she changes employer.

Payback schemes and non-compete agreements are mainly focused on increasing the marginal benefits of training for employers by reducing staff turnover. Considering that mobility produces significant productivity effects, restricting labour movements will, in all likelihood, result in a less efficient use of the labour force as some individuals would be better-off as entrepreneurs or more productive with another employer. In increasing the benefits of training for employers, less restrictive practices aimed towards lowering staff turnover on a voluntary basis or internalising human capital investments are probably better ways of increasing the pay-off to training for employers. Financial incentives, strategies to attract and retain productive employees, or strategies aimed at decreasing the dependence on human capital by incorporating employee knowledge into internal structures of companies have been proposed in increasing the returns to human capital investments. As shown in the HPWS literature, more sophisticated human resource management practices not only decreases staff turnover but also generate significant productivity effects by utilising the labour force in a more efficient way. In conclusion, there are a number of ways of improving returns to training for employers without forcing restrictions on labour mobility in general.

through knowledge spill-overs and various forms of externalities. Thus, the private rate for return will be lower than the social rate of return and this lead to under-investments in R&D activities” p.2. A similar argument as proposed for under-investments in human capital.

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