

The employability of low-skilled workers in the knowledge economy

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1. Introduction

Across all industries, the complexity of jobs is increasing. This trend is driven by innovations in information technology (IT) and information and communication technologies (ICT). Especially in firms that make large investments in research and development, IT and ICT, or other technological and organizational developments, there is a growth in relative skill demand. Less skilled workers often do not possess adequate skills to operate the new technologies and processes. As a consequence of this, their wages are lowered or they lose their jobs (Machin, 2001).

Several authors argue that it is not only the introduction of information technology but also organizational change that induces 'skill-biased technological change'. Actually, they assume that it is the *combination* of related innovations in information technology, workplace reorganization, and the introduction of new products and services that is responsible for the importance of upgrading the skills of the labour force (Caroli & Van Reenen, 2001; Bresnahan, Brynjolfsson & Hitt, 2002). This also means that the extent to which the complexity of jobs increases is much larger than the upgrading of the skills related to technology as such.

The upgrading of skills demanded in the labour market is also broadly recognized in public policy. The 'White Paper' on *Growth, Competitiveness, and Employment* issued by the European Commission (1993) argued that a highly skilled labour force in the European Union is required to catch up in the technological race with other developed countries. At the Lisbon European Council meeting in March 2000, the European Council formulated as the European Union's "major strategic goal for the next decade: " to become "the most competitive and dynamic knowledge economy in the world" (European Commission, 2000).

Apart from the upgrading of the skill *level* demanded in the labour market, technological and occupational changes induce shifts in the *type* of skills required. Green et al. (2000) found that in particular problem-solving skills, communication and social skills as well as computing skills are becoming increasingly important in many jobs, whereas the market price of manual skills declines. Workers employed in sectors experiencing rapid technological and organizational changes may therefore face obsolescence of their human capital. This may particularly hold for workers who have breaks in their employment. Also older workers, who possess older vintages of human capital, may severely suffer from skill obsolescence.

The need for (continuous) upgrading of the skill level in most occupational fields threatens the labour market position of low-skilled workers who are crowded out of their

traditional occupational domains (Borghans & De Grip, 2000; Jacobebbinghaus & Zwick, 2002). This means that low-skilled workers are either locked up in poorly paid elementary jobs with flexible contracts that further weaken their labour market position or crowded out of employment entirely. A similar argument applies to female employees who have spent considerable periods outside the labour market to care for their children and to older employees who have outdated skills.

Many policy makers and experts argue that low-skilled workers can also benefit from the changes in the demand for skills if they receive additional training (Acemoglu & Pischke, 1999). From this perspective, the 2003 *Employment Guidelines* of the European Commission, derived from the so-called Lisbon agenda of the European Council, are targeted on a substantial increase in the adaptability of workers to the changing demands in the labour market (i.e. their *employability*) and improvements in access to training, in particular for low-skilled workers (European Commission, 2003a).

In this paper, we will go further into the question to what extent the employability of low-skilled workers is threatened by the changes in the demand for skills, because low-skilled workers may lack the skills necessary for more knowledge intensive jobs. Moreover, we will discuss whether low-skilled workers are able to improve their employability by further investment in their human capital. We will particularly focus on (1) the older low-skilled workers, who might face skill obsolescence due to the fact that they represent less recent vintages of human capital or because new technologies depreciate the value of their (previous) work experience, and (2) low-skilled female workers, who might face skill obsolescence due to career interruptions in which they were not able to keep their skills up to date.

To answer the question whether the employability of low-skilled workers is threatened by the changes in the demand for skills, we will discuss the relations between technological change, organizational change, and the level and type of skills demanded. Furthermore, we will discuss the effects of these interactive developments on the labour market position of low-skilled workers, older workers, and female workers who take career breaks to care for children. For a better understanding of the effects of the changes in the economy, we will present a more detailed analysis of the development in the tasks workers have to do in their jobs and the skills necessary for an optimal performance in these tasks. And finally, it will be studied how low-skilled workers could acquire these skills.

The structure of the paper is as follows. In section 2, we will briefly discuss the literature on skill-biased technological and organizational change. Section 3 describes the way in which shifts in the skills demanded in the labour market can induce skill obsolescence. In Section 4, we will analyse which types of skills are especially demanded nowadays. Section 5 shows the development of the employment shares and labour market participation of (older) low-skilled workers in various European countries, which indicates to what extent low-skilled workers are crowded out of employment. Section 6 deals with various aspects of the employability of low-skilled workers. In section 7, we will discuss on the one hand to what extent participation in training could contribute to an

improvement in the employability of low-skilled workers, and on the other hand the reasons for the low rates of training participation of (older) low-skilled workers. Section 8 concludes and points out some possible policy strategies that may prevent the exclusion of low-skilled workers from the labour market in the dawning knowledge economy.

2. Skill-biased technological and organizational change

Human resources play a central role in the knowledge-economy age, which is dawning in the Western world as human capital embedded in both high-tech capital goods and the working population is becoming an increasingly important determinant of the performance of individuals, organizations and whole economies. Human resources stimulate technological and organizational change, while on the other hand these changes stimulate the use of human resources. Acemoglu (2002) shows that the acceleration of skill-biased technological change in the US at the end of the 20th Century was a response to the rapid increase in the supply of high-skilled workers in the preceding decades. However, the upgrading of skills demanded in the labour market due to technological and organizational change is a major threat for the labour market position of low-skilled workers when they do not succeed in adjusting their skills according to the shifts in the skills demanded in their job or sector of industry.

Technological developments and in particular the diffusion of ICT are singled out as the main determinants of the expanding skill intensity in the economy (Autor, Katz & Krueger, 1998; Machin & Van Reenen, 1998; Maurin & Thesmar, 2003). Falk & Seim (2001) and Jacobebbinghaus & Zwick (2002) showed that in Germany firms with an intensive use of ICT employ fewer employees without a professional degree or a degree from the apprenticeship system. In these firms, the shares of highly qualified employees are relatively larger. Several authors argue that it is not merely the introduction of information technology that induces skill-biased technological change but the *combination* of three related innovations: (1) information technology, (2) complementary workplace reorganization, and (3) the development of new products and services (Caroli & Van Reenen, 2001; Bresnahan, Brynjolfsson & Hitt, 2002). It should be noted, however, that in Europe the diffusion of ICT lagged some years behind the US. As known from Bartel & Lichtenberg (1987) high skilled workers particularly have a comparative advantage in the first stage of the life cycle of new technologies. Sanders (2004) argued that the ICT life cycle dynamics magnified the induced skill bias in innovation in the US, but moderated the transmission of this skill bias to Europe.

Until recently, there has been a broad consensus in economic literature that technological and organizational change, instead of the globalization of the economy, is the major cause of the increasing demand for high-skilled workers. However, recent studies show that trade and technology arguments for skill-biased technological change are interrelated. Manasse, Stanca & Turrini (2004) found that in Italy exporting firms play a major role in both product-demand related and technology related shifts in labour demand: On the one hand, demand has been shifting towards exporting firms with a low-skilled workforce, on the other hand, in these firms the upgrading of the skills demanded is the largest.

Technological and organizational changes induce shifts in the *type* of activity demanded in the labour market. These shifts might be related to the shift in the occupational structure of employment. Maurin & Thesmar (2003) showed that the diffusion of personal computers and computer-aided management technologies generally shifts labour demand from low-skilled to high-skilled. In addition, they establish that jobs linked to conception/development and sales/marketing are more and more substituted for those linked to production-related activities. Maurin & Thesmar conclude that new technologies produce high-skilled jobs related to non-routine, cognitive activities and low-skilled jobs related to non-manual activities. Goos & Manning (2003) also found that low-skilled activities do/will not become completely useless: they argue that technological change increases job polarization, which is characterized by a rapid growth of employment in high-skilled occupations accompanied by a growth of low-skilled service occupations (e.g. security jobs, cleaners, sales assistants), whereas employment in the ‘middling’ clerical jobs is decreasing. These “middling” jobs, which are open to both skilled and unskilled workers, are therefore replaced by high-quality jobs designed for the skilled and low-wage jobs targeted at the unskilled (Acemoglu, 1999). This frequently means, however, that unskilled jobs are dead-end jobs without any prospects to reach better paid activities and that ICT innovations increase the lines of demarcation between skilled and unskilled jobs.

3. Skill obsolescence

Both the upgrading of the skill level and the shifts in the type of activities may deteriorate the applicability of skills the workers acquired in the past. This refers to the notion of the *half-life* of a worker’s human capital. This half-life of a worker’s human capital can be described as “the time after completion of professional training when, because of new developments, practicing professionals have become roughly half as competent as they were upon graduation to meet the demands of their profession” (Dubin, 1972).

Following Rosen (1975), De Grip & Van Loo (2002) distinguish between two different kinds of obsolescence of human capital, analogously to economic theory on the depreciation of physical capital: technical and economic obsolescence of human capital. *Technical obsolescence of human capital* affects the skills of workers and refers to (1) the wear of skills due to the natural aging process, injuries or illness, or (2) the atrophy of skills due to career interruptions or as a result of specialisation. *Economic obsolescence of human capital* affects the value of the human capital of workers and is caused by changes in the job or work environment. These changes in job content are usually related to technological and organizational change and shifts in the sector structure of employment.

It is obvious that greying knowledge economies have to face both kinds of obsolescence of human capital. Low-skilled workers form the major group of workers who are at risk of losing their jobs due to technical or economic obsolescence of their human capital. Especially low-skilled workers suffer from technical skill obsolescence, because the physically demanding working conditions in the jobs where they are employed often

accelerate the wear of their skills. Due to, for instance, persistent back pains they may become unable to do their job properly. This usually makes their vocational skills worthless. On the other hand, in particular low-skilled workers might suffer from economic skill obsolescence due to the upgrading of skill requirements related to technological and organizational change and shifts in the sector structure of employment (De Grip, Van Smoorenburg & Borghans, 1997). Through this skill-biased technological change, low-skilled workers are crowded out of the jobs in which they were traditionally employed. This means that the 'skill package' the low-skilled workers can offer loses its value in the labour market.

Ramirez (2002) found that the human capital of blue-collar workers is indeed more affected by technological change than the human capital of white-collar workers. Moreover, workers who have only firm-specific skills may be more vulnerable for skill obsolescence as these skills are usually more technology-specific than the skills of workers who attended a broader vocational education. Krahn & Lowe (1997) analysed the atrophy of skills of employed persons. They studied the impact of spending an extended period of time in a job with limited literacy requirements on literacy loss over time. The results of their study support the idea that working in an environment with limited complexity leads to skill loss through atrophy. For low-skilled workers who suffer from literacy loss due to the limited literacy requirements in their jobs, it will therefore be difficult to participate in training courses that would be needed to keep up with the changes in the skills demanded in their jobs.

Especially the diffusion of ICT and the related organizational changes are a major cause of skill obsolescence (Neuman & Weiss, 1995). Bartel & Sicherman (1993) showed that particularly unexpected technology shocks induce skill obsolescence among older workers, whereas a more continuous flow of gradual changes in the skills demanded due to technological developments stimulates workers to invest more in additional training, which reduces the risk that their skills become obsolete. Weinberg (2002) found, however, that new technologies may complement the existing skills of the workers, which means that having experience of working with old vintages of technology may improve workers' ability to use a new technology. It is therefore a-priori unclear if the skills of older workers are outdated at a faster pace than those of younger workers by new vintages of ICT. Some studies show that older workers mainly work on the production of traditional products with traditional methods, whereas younger workers in the same firm are entrusted with product and organizational innovations (Boockmann and Zwick, 2004).

Moreover, workers who have career interruptions face large risks of skill obsolescence. This holds for both workers who suffer from long-term unemployment and, in particular, women who left the labour market for maternity. For a sample of high-skilled German women, Beblo and Wolf (2002a) estimated a depreciation of human capital due to non-work spells by 33% per year.

Discontinuities in a worker's career do not only imply interruptions in the accumulation of human capital. During an employment break different forces are at work that may

reduce workers' wages and employability. One can distinguish between (1) missing experience or the interruption in the accumulation of human capital, the atrophy of skills due to non-use, and (2) skill obsolescence induced by technical and organizational progress and innovations (Mincer & Ofek, 1982). Human capital deterioration therefore in particular threatens the employability of workers who have substantial breaks in their employment in sectors experiencing rapid technological and organizational changes, as both the upgrading of the skill level and the shift in the type of skills demanded deteriorate the skills workers acquired longer ago.

In an experimental study, Bailey (1989) analyses the effect of atrophy on the effects of an interruption of the learning process. From the relevant psychological literature, he introduces the distinction between "continuous control tasks" and "procedural tasks". Continuous control tasks involve repetitive movements without a clear beginning or end, for example visually inspecting parts on an assembly line. Procedural tasks consist of a series of discrete simple motor responses, such as pressing appropriate buttons to run a computer. Thus a procedural task consists more of learning what to do than of learning the motion itself. Bailey shows that forgetting of a continuous control task is negligible, whereas forgetting of a procedural task is a function of both the time of interruption and the amount of learning before the interruption.

The employability of the unemployed and workers with breaks in employment may also be negatively affected by a stigma imposed on them by the demand side of the labour market. Periods of non-employment may be interpreted as a "bad" signal. Therefore, stigma or signalling effects may cause further problems with employability or wage losses. In particular displaced (older) workers may be seen as less productive on average than other workers (Gibbons & Katz, 1991; Disney, 1996). A comparable argument can be made for voluntary non-employment due to parental leave, as extended periods of voluntary non-employment may be interpreted as lack of career orientation (Albrecht et al., 1999; Beblo & Wolf, 2002b).

Beblo and Wolf (2002b) found on the basis of German data that unemployment spells lead to significantly lower wages for male re-entrants for several years. A break for educational purposes increases the consecutive expected wage three years after the break, however. For women, longer periods away from the workplace decrease the expected wage stronger than mere missing experience, whereas unemployment does not seem to have an impact in addition to the missing experience effect. The effects of maternity leave or time out of the labour market do not level out even after more than ten years. Ondrich, Spiess and Yang (2001) also found large reductions in wage growth in Germany caused by maternity leave, which is increased if women stay home after the end of the formal leave period.

4. Which are the skills demanded?

Green et al. (2000) found that in the UK between 1992 and 1997 mainly problem-solving skills, communication and social skills, and especially computing skills increased in importance, whereas manual skills experienced a reduced demand. This phenomenon is

not only caused by younger workers who have more “topical skills” and replace older workers with “outdated skills”, these changes affect all age groups. Moreover, Green et al. could not find any difference between female and male employees. Spitz (2003) found that computer use decreases the demand for manual as well as cognitive repetitive skills, whereas it increases the demand for analytical, interactive and computing skills. The shifts in the skills demanded in many jobs can be related to the organizational changes that accompany the diffusion of ICT, because flat hierarchies, autonomous work groups or teamwork are transformations of work places usually introduced with higher ICT intensity (Bresnahan, Brynjolfsson & Hitt, 2002; Zwick, 2003). Therefore, Autor, Katz & Krueger (1998) suggested that there is a growing demand for workers with both cognitive and ‘people skills’. Lindbeck & Snower (2000) argued that, in addition, more flexible and ‘multi-skilled workers’ are required. Dickerson & Green (2002) found that especially high-level communication skills and computing skills carry positive wage premia. Moreover, advanced and complex usages of computers earn a higher premium than a more straightforward usage.

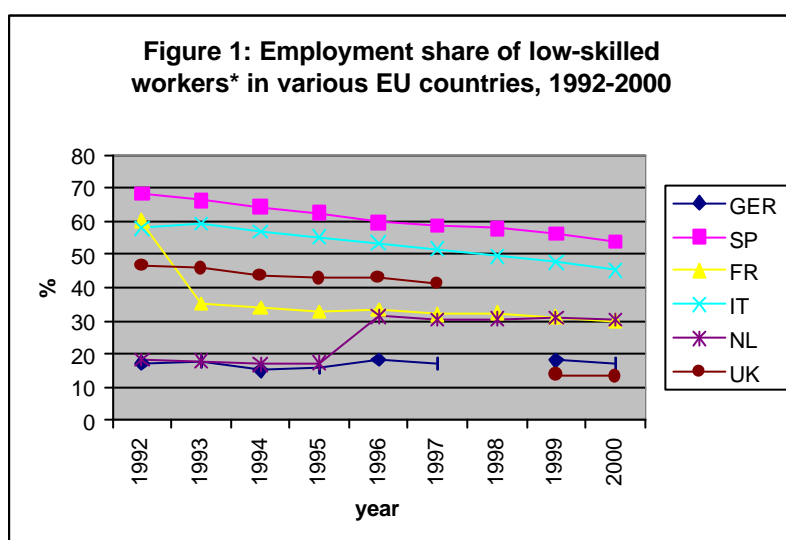
Gould (2000) showed that a worker’s IQ has become an increasingly crucial factor in explaining wage inequality. Murnane, Willett & Levy (1995) emphasised that the mastery of basic mathematics has become more important, and Borghans, Marey & Ter Weel (2003) found that the diffusion of ICT increases the value of analytical skills and decreases the value of teamwork and leadership. The latter conclude that ICT substitutes for tasks demanding co-operation and soft skills and complements tasks requiring hard analytical competencies. As analytical, problem-solving and computing skills frequently are positively correlated with someone’s level of education, lower qualified employees lack important skills that are more and more demanded in the labour market. Smits & Zwick (2004) showed that mainly skill gaps in ICT skills and foreign languages explain the lower employability of less educated employees (and the higher shares of higher educated employees) in ICT intensive sectors of the German economy.

However, Green et al. (2000) identified some groups of workers that are excluded from the “progress on any of the several fronts thought to be important in modern industry”, as they are employed in jobs in which there is no increasing demand for problem-solving skills or communication/social skills. This holds for 22% of the British workers who remained employed in a lower-level job in the period 1992-1997. Particularly part-timers and older employees over 50 years of age survived in their jobs without an increase in the demand for these skills. Although these workers kept their jobs, they experienced a reduction in earnings possibilities. This shows that there may be important differences in the labour market position of various groups of low-skilled workers. This is probably also related to skill differences between low-skilled workers. As shown by McIntosh & Vignoles (2001), even on the lower end of the skill spectrum, basic numeracy and literacy skills significantly increase wages and employment chances.

5. The crowding out of low-skilled workers

Due to skill-biased technological and organizational change and the more or less related skill obsolescence, the labour market position of low-skilled workers deteriorates. In the

first place, this is reflected in lower relative wages, i.e. the increasing skill-wage gap (see e.g. Machin & Van Reenen, 1998), but this can also induce a crowding-out of low-skilled workers from the previous occupational domains. In this section, we will show to what extent low-skilled workers are crowded out of employment in different European countries. Low-skilled workers are here defined as people with ISCED0-2 at most¹. Figure 1 gives an overview of the development of the employment shares of low-skilled workers in various EU countries. The figure shows that in most countries the employment share of low-skilled workers decreased considerably in the 1990's. In particular in Spain and France there has been a considerable decline of the employment share of low-skilled workers. Also in Italy, the Netherlands and the UK there has been a gradual decline of the employment share of low-skilled workers. However, the data for these countries suffer from a break in the data.



* ISCED levels 0-2

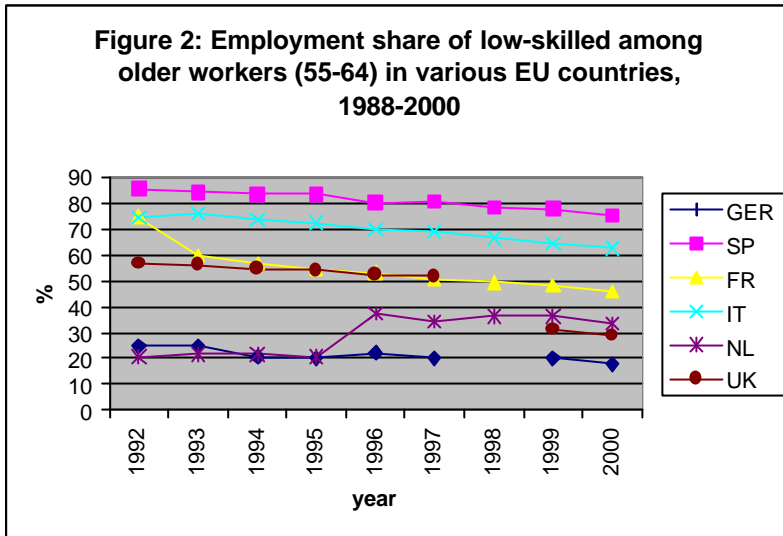
Source: European Labour Force Survey

Figure 2 shows that in most EU countries also among older workers (i.e. those who are 55-64 years old), employment shares of low-skilled workers declined in the 1990's. This particularly holds for France, the UK, Germany and Italy. In these countries older low-skilled workers face severe problems to remain active in the labour market. It should be noted that the employment share of the low-skilled among older workers are relatively high, because there are relatively many low-skilled people among the older population. However, in Germany, the UK and the Netherlands the employment shares of low-skilled workers are rather low at the end of the century. In Germany and the Netherlands the 'shake-out' of low-skilled older workers from employment occurred for a large extent in the 1980's.

The decreasing employment shares of low-skilled workers does not necessarily imply a process in which low-skilled workers are really crowded-out of employment by higher skilled workers, as also the supply of low-skilled workers has been steadily decreasing.

¹ Steedman and McIntosh (2001) show that ISCED 2 is the most adequate cut-off point for determining the group of low-skilled workers.

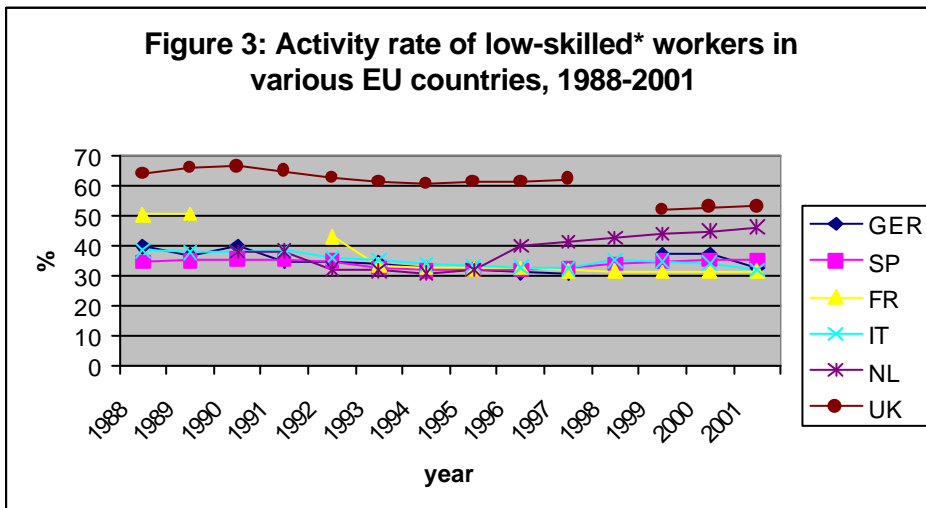
Such a crowding-out process should become manifest in a lower proportion of the low-skilled labour force that is not employed.



* ISCED levels 0-2

Source: European Labour Force Survey

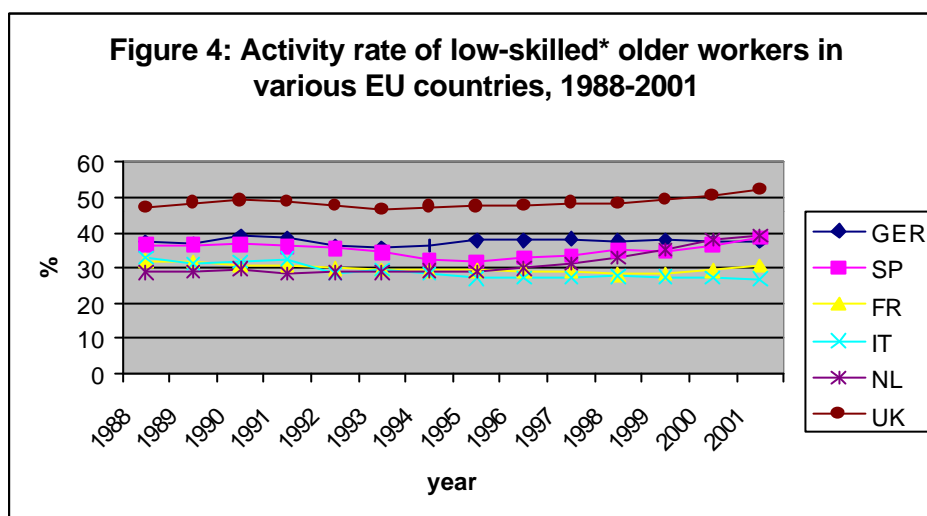
Figure 3 shows the development of the activity rates of the low-skilled workers in the same countries. The figure shows that in most countries the activity rate of the low-skilled workforce has been rather stable in the 1990's. This indicates that there is no evidence that in the European Union low-skilled workers have been crowded-out of employment by higher skilled workers in the recent past. In France, however, the activity rate of low-skilled workers shows a clear decline. Particularly in the UK and the Netherlands, the activity rate of low-skilled workers is relatively high. In the Netherlands the activity rate of the low-skilled workforce remarkably increased in the booming economy in the second half of the 1990's.



* ISCED levels 0-2

Source: European Labour Force Survey

Figure 4 shows that in most countries the activity rate of the older low-skilled workforce has also been rather stable in the 1990's. Particularly in the second half of the 1990's, in most countries the activity rates of older low-skilled workers increased. However, it should be noted that in most countries the activity rates of low-skilled workers are far below the targets of the Lisbon agenda of the European Union. At the Stockholm meeting of 2001 the European Council set the target that in 2010 50% of all persons in the age of 55-64 should be employed (European Commission, 2003b). With respect to the low-skilled workers, only in the UK the activity rate is above this policy target, whereas in particular in France and Italy the activity rates of the low-skilled older workers falls far behind this Stockholm target.



* ISCED levels 0-2

Source: European Labour Force Survey

6. The employability of low-skilled workers

The previous section has shown that it has become more difficult for low-skilled workers to keep their position in the labour market during their working life. In other words: the employability of low-skilled workers is rather poor. In this section we will go further into various aspects of the employability of low-skilled workers.

The concept of workers' employability has been developed since the 1950s². It refers to the attitudes, knowledge, and skills of workers that determine their labour market potential. Sanders & De Grip (2004) define a worker's employability as:

“The capacity as well as the willingness to be and to remain attractive in the labour market, by anticipating on changes in tasks and work environment and pro-acting on these changes.”

² A comprehensive overview of the literature on employability can be found in De Grip, Van Loo & Sanders (2004).

De Grip, Van Loo & Sanders (2004) provided a conceptualisation of the various aspects of workers' employability that takes account of both supply (i.e. workers) and demand (i.e. firm or industry) characteristics and also includes the Human Resource Management (HRM) facilities offered to employees to effectuate their employability. In particular, workers' capacity and willingness to (1) participate in training and (2) to be mobile across jobs or flexible in the tasks they do in their job determine their employability. Furthermore, the employability of the workers in a sector of industry also depends on the extent to which these workers need to be employable in order to cope with turbulence in which they operate. As discussed in section 2, this turbulence is in the first place highly related to technological and organizational change. Moreover, it is related to the dynamics of the product markets in which the firms in the sector sell their products or services³.

Table 1: Industry Employability Index for low-skilled workers in the Netherlands by sector of industry, 1998.

Sector of Industry	Worker Characteristics (supply)	Need to be Employable (demand)	HRM facilities	Industry Employability Index
Agriculture and fisheries	93	97	86	83
Food and beverage industry	91	99	97	90
Chemicals	96	105	105	96
Metal and electrical industry	98	104	101	95
Other industry	99	99	98	98
Energy	97	113	103	89
Construction and real estate	97	92	100	104
Commerce	98	94	100	105
Transport and communication	92	99	98	91
Financial services	93	98	107	101
Hotels/restaurants and business services	97	101	106	102
Non-commercial services	99	96	102	97
Civil service, police, defence, and education	90	103	97	94

(100 = average value of indexes for total workforce)

Table 1 indicates the employability of the low-skilled workforce in the various sectors of industry in the Netherlands⁴. The table shows that in most sectors the employability of the low-skilled workers is far behind the average employability of the Dutch workforce (index = 100). In particular the employability of the low-skilled workers who are employed in agriculture and fisheries is very low. Also the employability of the low-skilled workers who are employed in manufacturing and the public sector is falling

³ From the point of view of the firm, also the extent to which they have to cope with a greying workforce affects their demand for an employable workforce.

⁴ Cf. De Grip, Van Loo & Sanders (2004) for similar indexes for the total workforce in the various sectors of industry.

behind. On the other hand, the employability of the low-skilled workers employed in services seems to be at a less critical level. The table shows that the need to be employable differs between the various sectors of industry. Particularly in financial and business services, the chemical industry, the energy sector and the metal and electronics industry, the employability demands are rather high. Moreover, there are substantial differences in the HRM facilities offered to the low-skilled workers in the various sectors of industry. Particularly the firms in agriculture and fisheries, the food and beverage industry, and the transport and communication sector lack HRM policies that may contribute to the employability of the low-skilled workers.

With respect to workers' employability, it is important to distinguish between workers' internal and external employability (Groot & Maassen van den Brink, 2000). External employability refers to the ability and willingness to switch to a similar or another job in another firm and therefore reflects the value of workers' human capital in the external labour market. Internal employability refers to a worker's ability and willingness to remain employed with the current employer and reflects the value of a worker's human capital in the internal labour market. Sanders & De Grip (2004) distinguish between three forms of employability: *job-match employability*, which refers to workers who remain employed in their current job within their current firm; *firm-internal employability*, which refers to workers who switch to another job within their current firm; and *external employability*, which refers to workers who switch to a job in another firm.

Table 2: Expected labour market position of lower educated workers five years from now, 1998

	Job match employable	Firm internally employable	Externally employable	Without a job	<i>Total</i>
	%	%	%	%	%
Male	73	16	9	1	66
Female	74	14	9	4	34
16-24 years	60	15	25		5
25-34 years	61	21	15	3	23
35-44 years	76	16	8	1	47
45-50 years	82	10	4	4	25
Manufacturing	80	10	9	1	21
Services	72	19	7	3	36
Other	70	16	12	2	52
Task-flexible	73	20	6	2	67
Not task-flexible	75	4	17	4	33
Satisfied	79	10	6	1	92
Unsatisfied	30	11	43	5	8
Training	73	16	8	2	71
No training	73	13	12	2	29
Part-time	80	11	7	2	27
Full-time	72	17	9	2	73
<i>Total</i>	73	15	9	2	100

Source: OSA

Table 2 shows the Dutch data on the labour market position the interviewed low-skilled workers expect to have five years later. The table shows that practically all low-skilled workers are rather optimistic about their employability. Only about 2% expect to be without a job in five years. The majority expects to be working in their current or a similar job within the current firm five years on. 15% of the workers expect to change jobs within the current firm, and about 10% expect to leave their current firm to start working elsewhere. This indicates that the great majority of the low-skilled workers relies on their firm-internal labour market.

Younger workers are more likely to expect to leave their current job within the next five years than older workers. This reflects the notion that older workers are less flexible than their younger colleagues, either because they have a higher rate of firm-specific human capital (Becker, 1964) or a stronger aversion to change among older workers (Salhouse, 1991), or because employers who recruit new workers would rather invest in a younger worker's human capital than in that of an older worker (Heckman, 1999). The table also shows that low-skilled workers who are employed in services more often expect to be firm-internally employable than low-skilled workers in manufacturing.

Low-skilled workers who are doing tasks that are not part of their job considerably more often expect to change their jobs within their current firm than workers who are not task-flexible. On the other hand, not task-flexible workers far more often expect to leave their current firm than task-flexible workers. This suggests that low-skilled workers signal their task flexibility in order to increase their firm-internal employability. What is more striking, however, is that whether or not low-skilled workers have participated in training has no effect on their expectations that they would stay in or leave their current job. Moreover, it shows that more than a fifth of the low-skilled workers did not have the idea that it is important for them to participate in training in order to reduce the risk of losing their job due to skill obsolescence (Cf. De Grip & Van Loo, 2002). This confirms the argument above that skill-biased technological change does not crowd out all unskilled or low-skilled jobs but frequently leave low-skilled employees without much of a career perspective.

7. Training participation

Participation in training may be of great relevance to increasing the labour market participation of low-skilled workers in general and of older low-skilled workers in particular. Many studies in the field of human capital theory find that investments in the skills of workers have a positive effect on their productivity. These skills can be acquired in several ways. Both initial education and post-initial training ('lifelong learning') contribute to a worker's human capital. There are various ways of post-initial learning: Workers may increase their human capital by participating in formal training courses, but also 'learning-on-the job' or experience appear to play a major role in acquiring the skills that are relevant for a worker's productivity (Mincer, 1974). Moreover, workers may acquire new skills by job rotation within the firm or by external job mobility. Heckman, Lochner and Taber (1998) argued that post-school learning is an important source of skill

formation that accounts for between one third and one half of all skill formation nowadays.

Heckman (1999) found that ability fosters further learning, i.e. more able people acquire more skills, while on the other hand more skilled people become more able. This explains low returns to investment from training low-skilled employees. Older persons have a shorter time to recoup their investment, and therefore also their returns are lower than those of the younger. Heckman concludes that private sector training typically excludes low-skilled and older persons. However, it should be noted that low-skilled workers have lower opportunity costs than skilled workers when they invest in training (instead of being productive in their jobs). Moreover, Heckman does not take account of the social costs of not training low-skilled workers, which (will) result when these workers are crowded out of employments because their skill loses its value in the labour market.

Zwick (2002) found that not all training types increase workers' productivity. While formal external training courses and to a lesser extent self-induced learning have a significantly positive impact on establishment productivity, training-on-the-job and participation in seminars and talks do not have any effect. For workers' employability it is therefore decisive who gets which kind of training and who finances it. Kuckulenz & Zwick (2003) found that only external training (e.g. participation in courses and seminars, trade fairs, lectures, and reading specialist literature) increases employees' wages, whereas internal training (e.g. participation in quality circles, special tasks, and on-the-job training) has no effect on earnings. Moreover, the wage returns to training are in Germany lower for less skilled employees than for highly skilled employees. Large groups of low-educated employees therefore experience no significant wage increase after training participation. One reason for this is that lower qualified employees more frequently participate in internal training instead of external training than higher qualified employees.

Sanders & De Grip (2004) found that the training participation of low-skilled workers merely contributes to their firm-internal employability. Although the participation in training does not increase their firm-internal employability expectations, it increases a worker's chances of moving to another job in the firm-internal labour market. They also found that workers who think they are firm-internal employable are more likely to participate in training courses. However, the participation of low-skilled workers in training does not contribute to their external employability. These results can probably be explained by the argument that low-skilled workers usually have more opportunities to improve their position in the firm-internal labour market than they (would) have in the external labour market (De Grip & Wolbers, 2002). This is also shown by the finding that the low-skilled workers who thought of themselves as being externally employable were more likely to move to another job in the internal labour market instead of realizing their external employability expectations.

The consequence of the low motivation of employers and employees for investing in training for low-skilled employees is that the training incidence increases with qualification (Acemoglu & Pischke, 1999; Blundell et al., 1999; Heckman, 1999;

Pischke, 2001; Kuckulenz & Zwick, 2003; Hughes, O'Connell & Williams, 2004). Firms with a higher qualified workforce and modern work organization train more (Lynch and Black, 1998; Bresnahan, Brynjolfsson & Hitt, 2002; Zwick, 2004; Hughes, O'Connell & Williams, 2004). The relative incidence of training of the less qualified in comparison with the highly qualified in the USA and the UK is lower than in Germany or other continental European countries. The argument put forward to account for this difference is the absolutely lower skill level of the lower skilled in these countries (Freeman & Schettkat, 1999). This skill gap induces the necessity for prior training in basic skills that enables the less qualified to participate effectively in more specific training. Otherwise less skilled persons may be confronted with a low wage or productivity return from training (Acemoglu & Pischke, 1999; Heckman, 1999; Muysken & Zwick, 2002)

Figure 5: Percentage of older and prime-age workers in training in the European Union by level of education, 2001.

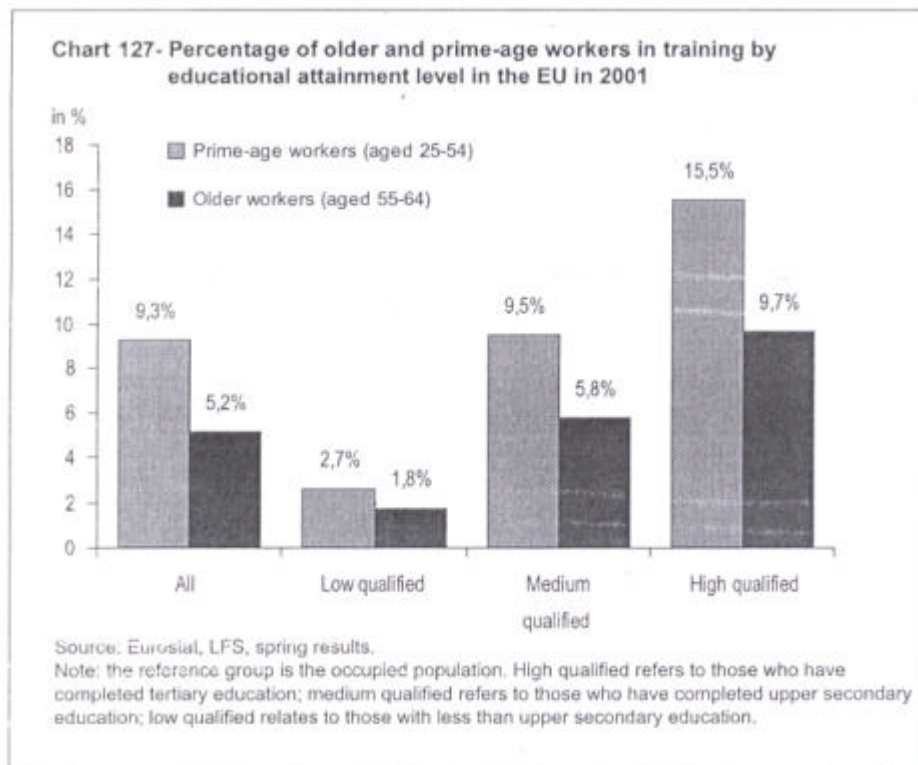
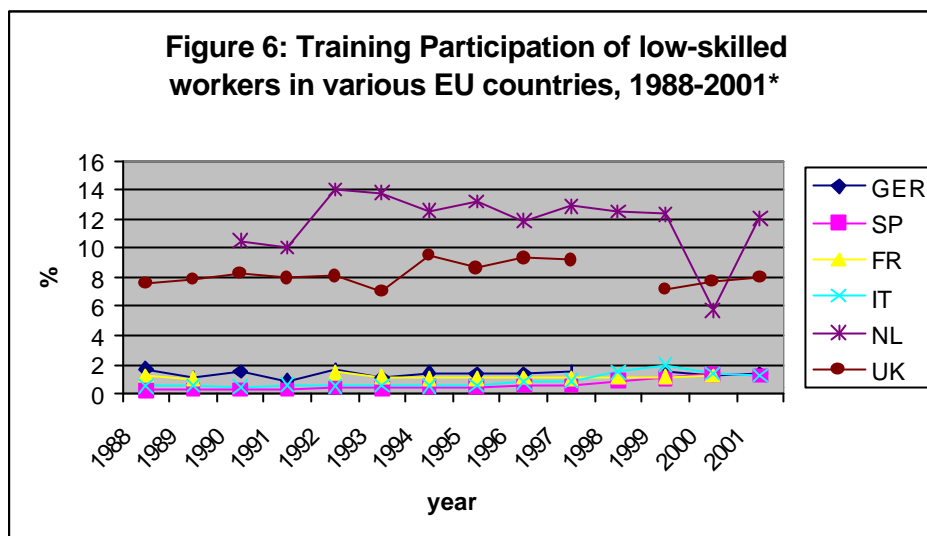


Figure 5 shows that training participation of the low-skilled workers in the European Union is indeed far below training participation of the workers with medium or high qualifications. While more than 15% of the prime-age high-skilled workers participate in training, only 2.7% of the low-skilled workers participate. Figure 6 shows, however, that there are substantial differences in the training participation of low-skilled workers between the EU Member States. In particular in the Netherlands, training participation of low-skilled workers is relatively high. The same holds, to a lesser degree, for the UK. On the other hand, the investments in training of the low-skilled workers in France, Spain, Germany, and Italy are relatively negligible.

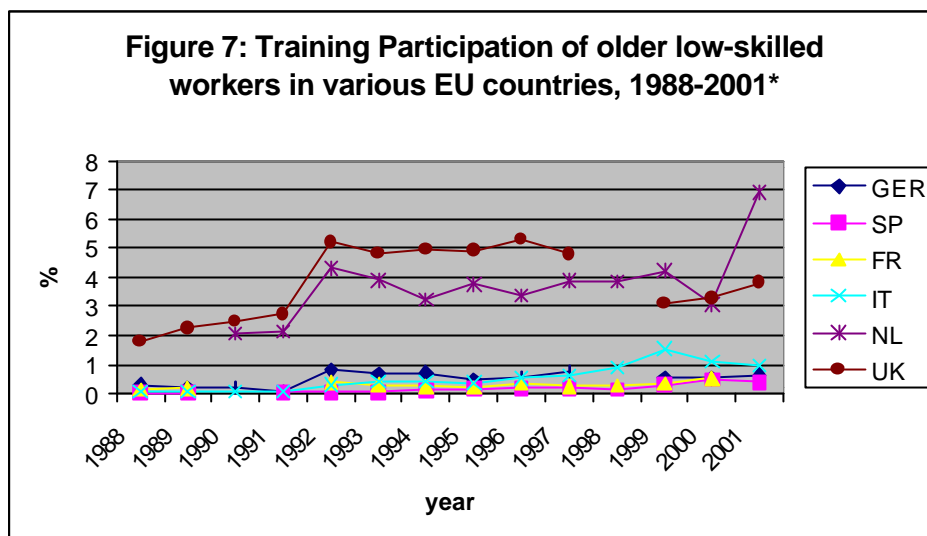


* ISCED levels 0-2

Older low-skilled workers

Heckman's (1999) notion that ability fosters further learning also explains why it is important that workers concentrate their human capital investments in the beginning of their lives. As we discussed above, often older workers need to invest in continuing training in order to cope with skill obsolescence if they want to avoid being crowded out of the labour market. However, one might expect that their incentives for further investment in their human capital will be restricted because of the shorter period that they can benefit from these investments. Besides, older workers often have a more attractive replacement rate, in terms of the income they can earn when they leave the labour market. Finally, the incentive of employers to provide training is also lower, because the largest disadvantage of older with respect to younger employees are seen by firms (apart from their physical stamina) in their relatively lower trainability and willingness to be trained (Boockmann & Zwick, 2004).

Older employees indeed receive less training than younger employees (OECD, 1999; Pischke, 2001). The OECD compared training participation of relatively young workers aged 25-29 years with those aged 50-54 years. For most countries (exceptions are the Nordic countries), this ratio is in excess of 1. France, Luxembourg and most southern European countries have a strong tendency to concentrate training on younger workers. As we could see from figure 5, the training participation of older workers is far behind the training participation of prime-age workers. Although this also holds for the more skilled workers, there are hardly any older low-skilled workers who participate in training. As shown by figure 7, there are also substantial differences in the training participation of older low-skilled workers between various EU countries. Actually, we see the same pattern as in figure 6, with relatively high participation rates in the Netherlands and the UK and a very low training participation of the older low-skilled workers in Italy, Germany, France, and Spain.



* ISCED levels 0-2

8. Policy strategies against exclusion of low-skilled workers from the labour market

As shown in this paper, there is ample evidence that the labour market position of low-skilled workers in the European Union is threatened by the upgrading of skills demanded in many jobs. Moreover, technological and organizational innovations require that low-skilled workers participate in training in order to combat skill obsolescence.

Complementarities between schooling and training increase the motivation of employers to provide continuing training. This requires that students leave initial education with literacy, knowledge, and learning skills which enables them to learn more effectively in the workplace (OECD, 1999; Hughes, O’Connell & Williams, 2004). For this reason, it is of major importance to reduce the number of youngsters that leave initial education without at least a lower-level vocational certificate. This reflects Heckman’s (1999) notion that “learning begets learning”.

Moreover, the employability of low-skilled workers can be improved by a larger emphasis on skills that increase the trainability of low-skilled workers in the curricula of lower-level vocational education. An example could be the explicit introduction of key skills by the UK Government in 2000, such as communication skills, numeracy, information technology skills, problem-solving skills, or skills necessary to work with other people in school curricula (Dickerson and Green, 2002).

Other possible stimuli for improving the willingness of firms to invest in training of low-skilled workers are tax discounts or exemptions on training expenses, subsidised vocational training programmes, paid training leave, tax levies that oblige employers to spend a certain percentage of their total wage bill in training, or training funds from employees, employers, and public sources (OECD, 1999; Muysken & Zwick, 2002).

Another possibility is to increase the employability of older and less skilled employees within the firms. This could be achieved by including these employee groups in job training programmes and innovation processes with the goal to enable them to change to another task / perform other tasks if necessary and by this to lower the demarcation lines between jobs (Finegold & Mason, 1999). De Grip & Wolbers (2002) showed that low-skilled workers are indeed better off in countries where internal labour markets dominate and employees have more opportunities to change jobs within the firm.

As stated by the Dutch Social Economic Council (SER, 2002), the employability of low-skilled workers is a mutual responsibility for the firms where they are employed and the workers themselves. This means that firms should be encouraged to invest in HRM practices that may contribute to the employability of low-skilled workers and that workers should be stimulated to make use of the facilities available to them. Moreover, apart from the tax discounts for investments in low-skilled workers skill development, the government should make it easier for workers who left initial education without any diploma to obtain a certificate of a vocational course later in their life. The latter should be stimulated by creating an assessment system that enables low-skilled workers to demonstrate the skills they acquired by experience. Such a system of competence certificates enables workers to substitute some of the modules of a vocational education by the skills they learned on the job. This might encourage them to participate in training courses for the modules that complete their vocational certificate.

Finally, it is important to be aware of the spillover effects of R&D policy on the labour market position. As particularly in the first 'innovation' stage of the life cycle of a new technology the relative demand for high skilled workers will be the largest, Sanders (2004) argues that European governments might save on the tax money spent on programmes to stimulate the labour market position of the lower skilled workers, when R&D policies in Europe might be more targeted on the development of existing technologies, instead of the current focus on basic research.

References

- Acemoglu, D. (1999). Changes in Unemployment and Wage Inequality: An Alternative Theory and Some Evidence, *American Economic Review*, 89, 1259-1278.
- Acemoglu, D. (2002). Technical Change, Inequality, and the Labor Market, *Journal of Economic Literature*, 40, 7-72.
- Acemoglu, D. & J.-S. Pischke (1999). Beyond Becker: Training in Imperfect Labour Markets, *Economic Journal*, 109, 112-142.
- Albrecht, J.W., P.-A. Edin, M. Sundström & S.B. Vroman (1999). Career Interruptions and Subsequent Earnings: A Reexamination Using Swedish Data, *Journal of Human Resources*, 34, 294-311.
- Autor, D.H., L.F. Katz & A.B. Krueger (1998). Computing Inequality: Have Computers Changed the Labor Market?, *Quarterly Journal of Economics*, 113, 1055-1089.
- Bailey, C.D. (1989). Forgetting and the Learning Curve: A Laboratory Study, *Management Science*, 35, 340-352.

- Bartel, A.P. & F.R. Lichtenberg (1987). *The Comparative Advantage of Educated Workers in Implementing New Technology*, *Review of Economics and Statistics*, 69, 1-11.
- Bartel, A.P. & N. Sicherman (1993). Technological Change and Retirement Decisions of Older Workers, *Journal of Labor Economics*, 11, 162-183.
- Beblo, M. & E. Wolf (2002a). How Much Does a Year off Cost? Estimating the Wage Effects of Employment Breaks and Part-Time Periods, *Cahiers Économiques de Bruxelles*, 45, 191-217.
- Beblo, M. & E. Wolf (2002b). *Wage Penalties for Career Interruptions – An Empirical Analysis for West Germany*, ZEW Discussion Paper 02-45, Mannheim.
- Becker, G.S. (1964). *Human Capital. A Theoretical and Empirical Analysis, With Special Reference to Education*, New York: Columbia University Press.
- Blundell, R., L. Dearden, C. Meghir & B. Sianesi (1999). Human Capital Investment: The Returns from Education and Training to the Individual, the Firm and the Economy, *Fiscal Studies*, 20, 1-23.
- Boockmann, B. & T. Zwick (2004). Betriebliche Determinanten der Beschäftigung älterer Arbeitnehmer, mimeo.
- Borghans, L. & A. de Grip (2000). Skills and Low Pay: Upgrading or Overeducation?, in: Gregory, M., W. Salverda & S. Bazen (eds.), *Labour Market Inequalities*, Oxford: Oxford University Press, 198-223.
- Borghans, L., P.S. Marey & B. ter Weel (2003). Information Technology and the Value of Skills: A Systematically Varying Parameter Model Applied to 64 European Regions, mimeo, Maastricht University, Maastricht.
- Bresnahan, T.F., E. Brynjolfsson & L.M. Hitt (2002). Information Technology, Workplace Organization, and the Demand for Skilled Labor: Firm-Level Evidence, *Quarterly Journal of Economics*, 117, 339-376.
- Caroli, E. & J. van Reenen (2001). Skill Biased Organizational Change? Evidence from a Panel of British and French Establishments, *Quarterly Journal of Economics*, 116, 1449-1492.
- De Grip, A., M. van Snoorenburg & L. Borghans (1997), *The Dutch Observatory on Employment and Training*, ROA Working Paper 97002, Maastricht.
- De Grip, A. & J. van Loo (2002). The Economics of Skills Obsolescence: A Review, in: De Grip, A., J. van Loo and K. Mayhew (eds.), *The Economics of Skills Obsolescence*, Research in Labor Economics, vol 21, Amsterdam/Boston: JAI Press, 1-26.
- De Grip, A., J. van Loo & J. Sanders (2004). The Industry Employability Index: Taking Account of Supply and Demand Characteristics, *International Labour Review*, 143, (forthcoming).
- De Grip, A. & M. Wolbers (2002). *Are Low-Skilled Workers Better Off in Countries where International Labour Markets Dominate?*, Paper presented at the EALE Conference, La Sorbonne, Paris, 19-22 September 2002.
- Dickerson, A. & F. Green (2002). *The Growth and Valuation of Generic Skills*, University of Kent Discussion Paper, Canterbury.
- Disney, R. (1996). *Can We Afford to Grow Older? A Perspective on the Economics of Aging*, Cambridge (Mass.): MIT Press.
- Dubin, S. (1972). Obsolescence or Lifelong Education, *American Psychologist*, 27, 486-498.

- European Commission (1993). *Growth, Competitiveness, Employment. The Challenges and Ways Forward into the 21st Century*, Bulletin of the European Communities, Supplement 6/1993, Office for Official Publications of the European Communities, Luxembourg.
- European Commission (2000). Presidency Conclusions, Lisbon European Council 23 and 24 March 2000.
- European Commission (2003a). Council Decision of 22 July 2003 on Guidelines for the Employment Policies of the Member States, Official Journal of the European Union, L 197/13-20.
- European Commission (2003b). *Employment in Europe 2003*, Brussels.
- Falk, M. & K. Seim (2001). The Impact of Information Technology on High-Skilled Labour in Services: Evidence from Firm Level Panel Data, *Economics of Innovation and New Technology*, 10, 289-323.
- Finegold, D., G. Mason (1999). National Training Systems and Industrial Performance. US-European Matched-Plant Comparisons, *Research in Labor Economics*, 18, 331-358.
- Freeman, R.B. & R. Schettkat (1999). The Role of Wage and Skill Differences in US-German Employment Differences, *Jahrbücher für Nationalökonomie und Statistik*, 219, 49-66.
- Gibbons, R.S. & L.F. Katz (1991). Layoffs and Lemons. *Journal of Labor Economics*, 9, 351-380.
- Goos, M. & A. Manning (2003). *Good Jobs and Bad Jobs: Changes in UK Employment 1975-2000*, CEP/LSE, London.
- Gould, E. (2000). Inequality and Ability, mimeo, Hebrew University, Tel Aviv.
- Green, F., D. Ashton, B. Burchell, B. Davies & A. Felstead (2000). Are British Workers Becoming More Skilled?, in: Borghans, L. & A. de Grip (eds.), *The Overeducated Worker? The Economics of Skill Utilization*, Cheltenham: Edward Elgar, 77-106.
- Green, F., A. Felstead & D. Gallie (2004). Computers and Changing Skill Intensities of Jobs, *Applied Economics*, forthcoming.
- Groot, W. & H. Maassen van den Brink (2000). Education, Training and Employability, *Applied Economics*, 32, 573-581.
- Heckman, J. (1999). *Policies to Foster Human Capital*, NBER Working Paper 7288, Cambridge (Mass.).
- Heckman, J., L. Lochner & C. Taber (1998). Explaining Rising Wage Inequality: Explorations with a Dynamic General Equilibrium Model of Earnings with Heterogeneous Agents, *Review of Economic Dynamics*, 1, 1-58.
- Hughes, G., P. O'Connell & J. Williams (2004). Company Training and Low-Skill Consumer-Service Jobs in Ireland, *International Journal of Manpower*, 25, forthcoming.
- Jacobebbinghaus, P. & T. Zwick (2002). New Technologies and the Demand for Medium Qualified Labour in Germany, *Schmollers Jahrbuch*, 122, 179-206.
- Krahn, H., & G.S. Lowe (1997). *Literacy Utilization in Canadian Workplaces*, Ottawa: Statistics Canada.
- Kuckulenz, A. & T. Zwick (2003). *The Impact of Training on Earnings – Differences between Participant Groups and Training Forms*, ZEW Discussion Paper 03-52, Mannheim.

- Lindbeck, A. & D. Snower (2000). Multi-Task Learning and the Reorganization of Work. From Tayloristic to Holistic Organization, *Journal of Labor Economics*, 18, 353-376.
- Lynch, L. & S. Black (1998). Beyond the Incidence of Employer-Provided Training, *Industrial and Labor Relations Review*, 52, 64-81.
- Machin, S. (2001). The Changing Nature of Labour Demand in the New Economy and Skill-Biased Technology Change, *Oxford Bulletin of Economics and Statistics*, 63, 753-776.
- Machin, S. & J. van Reenen (1998). Technology and Changes in Skill Structure. Evidence from Seven OECD Countries, *Quarterly Journal of Economics*, 113, 1215-1244.
- Maurin, E. & D. Thesmar (2003). *Changes in the Functional Structure of Firms and the Demand for Skill*, CEPR Discussion Paper 3831, London.
- McIntosh, S. & A. Vignoles (2001). Measuring and Assessing the Impact of Basic Skills on Labour Market Outcomes, *Oxford Economic Papers*, 53, 453-481.
- Mincer, J. (1974). *Schooling, Experience and Earnings*. New York: Columbia University Press.
- Mincer, J., & H. Ofek (1982). Interrupted Work Careers: Depreciation and Restoration of Human Capital, *Journal of Human Resources*, 17, 3-24.
- Manasse, L., L. Stanca & A. Turrini (2004). Wage Premia and Skill Upgrading in Italy: Why didn't the Hound Bark?, *Labour Economics*, 11, 599-83.
- Murnane, R.J., J.B. Willett & F. Levy (1995). The Growing Importance of Cognitive Skills in Wage Determination, *Review of Economics and Statistics*, 77, 251-266.
- Muysken, J. & T. Zwick (2002). *Wage Divergence and Unemployment: The Impact of Insider Power and Training Costs*, ZEW Discussion Paper 00-37, Mannheim.
- Neuman, S. & A. Weiss (1995). On the Effects of Schooling Vintage on Experience-Earnings Profiles: Theory and Evidence, *European Economic Review*, 39, 943-955.
- OECD (1999). *Employment Outlook*, Paris.
- Ondrich, J., C.K. Spiess & Q. Yang (2001): *The Effect of Maternity Leave on Women's Pay in Germany 1984-1994*, DIW Discussion Paper 289, Berlin.
- Pischke, J.-S. (2001). Continuous Training in Germany, *Journal of Population Economics*, 14, 523-548.
- Ramirez, J.V. (2002). Age and Schooling Vintage Effects on Earnings Profiles in Switzerland, in: De Grip, A., J. van Loo and K. Mayhew (eds.), *The Economics of Skills Obsolescence*, Research in Labor Economics, vol 21, Amsterdam/Boston: JAI Press, 83-99.
- Rosen, S. (1975). Measuring the Obsolescence of Knowledge, in: Juster, F.T. (ed.), *Education, Income and Human Behavior*, New York: McGraw-Hill, 199-232.
- Salthouse, T.A. (1991). *Theoretical Perspectives on Cognitive Ageing*, Hillsdale (NJ): Erlbaum.
- Sanders, J. & A. De Grip (2004). Training, Task Flexibility and Low-Skilled Workers' Employability, *International Journal of Manpower*, 25, forthcoming.
- Sanders, M. (2004). *Skill Biased Technical Change. Its Origins, the Interaction with the Labour Market and Policy Implications*, Ph.D. Thesis, Maastricht: Maastricht University
- SER (2002), *Het nieuwe leren. Advies over een leven lang leren in de kenniseconomie*, SER 02/10, The Hague.

- Smits, W. & T. Zwick (2004). Why Do Business Service Firms Employ Fewer Apprentices? A Comparison between Germany and the Netherlands, *International Journal of Manpower*, 25, forthcoming.
- Spitz, A. (2003). *IT Capital, Job Content and Educational attainment*, ZEW Discussion Paper 03-04, Mannheim.
- Steedman, H., S. McIntosh (2001). Measuring low skills in Europe: how useful is the ISCED framework?, *Oxford Economic Papers*, 3, 564-581.
- Weinberg, B.A. (2002). New Technologies, Skills Obsolescence, and Skill Complementarity, in: De Grip, A., J. van Loo and K. Mayhew (eds.), *The Economics of Skills Obsolescence*, Research in Labor Economics, vol 21, Amsterdam/Boston: JAI Press, 101-118.
- Zwick, T. (2002). *Continuous Training and Firm Productivity in Germany*, ZEW Discussion Paper 02-50, Mannheim.
- Zwick, T. (2003). The Impact of ICT Investment on Establishment Productivity, *National Institute Economic Review*, 184, 99-110.
- Zwick, T. (2004). Training – A Strategic Enterprise Decision?, in: Fandel, G., U. Backes-Gellner, M. Schlüter & J. Staufienbiel (eds.), *Modern Concepts of the Theory of the Firm – Managing Enterprises of the New Economy*, Heidelberg: Springer-Verlag, 355-366.