

DEVELOPING HIGHLY SKILLED WORKERS:
REVIEW OF SWEDEN



ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

Pursuant to Article 1 of the Convention signed in Paris on 14th December 1960, and which came into force on 30th September 1961, the Organisation for Economic Co-operation and Development (OECD) shall promote policies designed:

To achieve the highest sustainable economic growth and employment and a rising standard of living in member countries, while maintaining financial stability, and thus to contribute to the development of the world economy.

To contribute to sound economic expansion in member as well as non-member countries in the process of economic development; and

To contribute to the expansion of world trade on a multilateral, non-discriminatory basis in accordance with international obligations.

The original member countries of the OECD are Austria, Belgium, Canada, Denmark, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The following countries became members subsequently through accession at the dates indicated hereafter: Japan (28th April 1964), Finland (28th January 1969), Australia (7th June 1971), New Zealand (29th May 1973), Mexico (18th May 1994), the Czech Republic (21st December 1995), Hungary (7th May 1996), Poland (22nd November 1996), Korea (12th December 1996) and the Slovak Republic (14th December 2000). The Commission of the European Communities takes part in the work of the OECD (Article 13 of the OECD Convention).

www.oecd.org

© OECD 2004

Applications for permission to reproduce or translate all or part of this material should be made to:
OECD Publications, 2 rue André-Pascal, 75775 Paris Cedex 16, France.

DEVELOPING HIGHLY SKILLED WORKERS: REVIEW OF SWEDEN

FOREWORD

A major conclusion of the OECD Growth Study was that governments need more effective policies for developing human capital and realising its potential in order to increase productivity and growth. In the framework of the project on *Growth Follow-Up: Micro-Policies for Growth and Productivity*, the OECD is conducting peer reviews of member countries' policies for developing highly skilled workers. Peer reviews are also being carried out on policies for increasing access to venture capital, increasing the diffusion of information technology to business, and enhancing public/private partnerships for research and innovation.

This peer review of Sweden was carried out by the Committee on Industry and Business Environment (CIBE) in October 2004. The report presents recommendations for policy actions based on the strengths and weaknesses observed in the Swedish policy approach to developing highly skilled workers to fulfil future industry requirements. Once a critical mass of countries has been reviewed, a cross-country comparative synthesis report will be prepared with a view to identifying common good policy practices.

This report was prepared by Ricardo Tejada of the OECD Secretariat. It is published under the responsibility of the Secretary-General of the OECD

TABLE OF CONTENTS

ASSESSMENT AND RECOMMENDATIONS	5
TRENDS IN SUPPLY AND DEMAND OF HIGHLY SKILLED WORKERS	7
POLICIES FOR DEVELOPING HIGHLY SKILLED WORKERS	12
Overview	12
Monitoring supply and demand for highly skilled workers	12
Increasing enterprise and individual training	13
Enhancing national worker mobility	16
Adjusting to international worker mobility	17
Increasing workforce participation by highly skilled women	19
Developing human resources in science and technology	21
REFERENCES	24

ASSESSMENT AND RECOMMENDATIONS

Sweden has among the highest levels of educational attainment, worker training, and research and development (R&D) expenditures in the OECD. Large public investments in education and research and easy access to lifelong learning have resulted in a highly skilled workforce, which has contributed to Sweden's recently improved productivity performance. Sweden's productivity growth rate was on average 0.6% above the OECD average in the period 1990-2003. However, in the longer-term, a mismatch between job offers and available skills may be exacerbated by demographic changes, as the Swedish workforce ages at a pace similar to the rest of Europe. In addition, the technology-based small firm sector remains underdeveloped, and worker mobility across sectors could be enhanced.

In particular, more flexibility is needed in higher education and wage-setting to enhance the responsiveness of these institutions to changes in industry demand for skilled workers. Although co-operation with the social partners has created effective worker training provisions, collective bargaining and a sharply progressive income tax have dampened the role of wage signals in allocating human resources to jobs. There remains a gender-based wage gap which reduces full-time employment of skilled females. In addition, projections suggest that home-grown labour will not satisfy increasing demand for the highly skilled human capital needed to maintain current rates of economic growth. Policies must also focus on other sources of skilled workers such as immigrant residents with under-utilised skills, new immigrants and expatriate Swedes.

The government has recently initiated a new innovation strategy, Innovative Sweden (*Innovativa Sverige: En Strategi För Tillväxt Gennem Förnyelse*), focusing on some of these problems, particularly the need to develop a more innovative small firm sector through venture financing and links to research. A summary of progress and recommendations concerning policies for highly skilled workers in Sweden is given in **Table 1**.

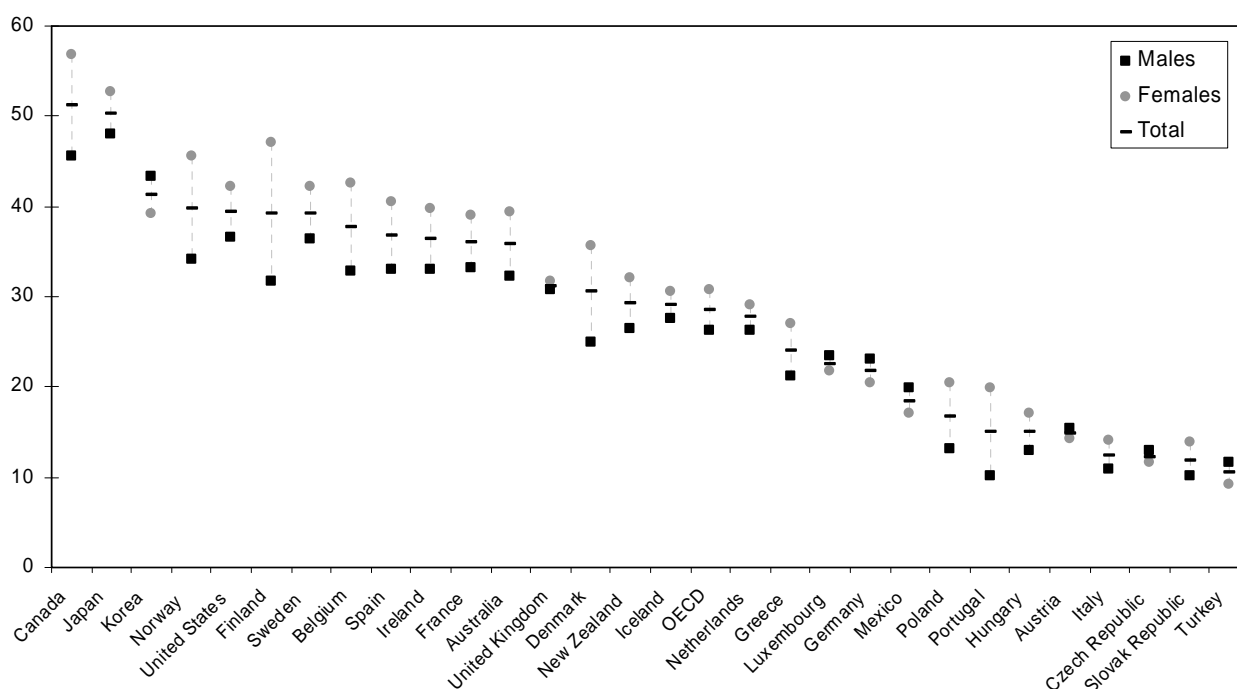
Table 1. Progress and recommendations

Area	Recent/planned action	Recommendations
Monitoring supply and demand of the highly skilled	Long and short-term forecasting of skill needs and employment trends by both governmental and non-governmental institutions.	Enhance integration of labour market forecasting by different actors to provide firmer basis for educational planning.
Measures to increase enterprise and individual training	Training tax deductions, study leave for workers, and AVE and other support schemes.	Develop a more comprehensive strategy to increase technical and managerial training in small and medium-sized enterprises.
Measures to increase national worker mobility	Attempts to disaggregate wage bargaining; <i>Validation Commission</i> to develop recommendations for accreditation of skills and competencies.	Modify wage bargaining system and other policies which limit mobility of skilled workers; accelerate development of more harmonised accreditation approach.
Measures to adjust to international worker mobility	Tax incentives and temporary visas available for highly skilled labour and to alleviate specific skill shortages.	Enhance longer-term labour market access for foreign skilled workers and students.
Measures to increase workforce participation by highly skilled women	Generous benefits include extended parental leave and childcare supports.	Adopt active policies to address gender-based wage gaps and sectoral employment segregation.
Measure to develop human resources in science and technology (HRST)	High public and private R&D spending; targets to increase number of researchers.	Promote R&D in small and medium-sized firms and increase number of women researchers.

TRENDS IN SUPPLY AND DEMAND OF HIGHLY SKILLED WORKERS

Sweden has one of the highest levels of educational attainment in the OECD when measured as the share of 25 to 34-year-olds with Type A and B tertiary education (**Figure 1**). Additionally, a long-standing emphasis on socio-economic and gender equality has reduced discrepancies in access to higher education, providing Sweden with a high share of female tertiary graduates. Measured as a share of gross domestic product (GDP), Sweden has one of the highest levels of public expenditure on higher education in the world. Education is free throughout the national system, and government financial support increases access to tertiary studies for the overall population. The public higher education sector in Sweden comprises 13 universities and 23 university colleges, which are part of the central government in terms of both organisation and function. In addition, there are 13 private institutions, of which ten are fairly small, funded by the state and with a right to award degrees.

Figure 1. Educational attainment in OECD countries, 2002
(Percentage of the population of 25 to 34-year-olds with tertiary education)



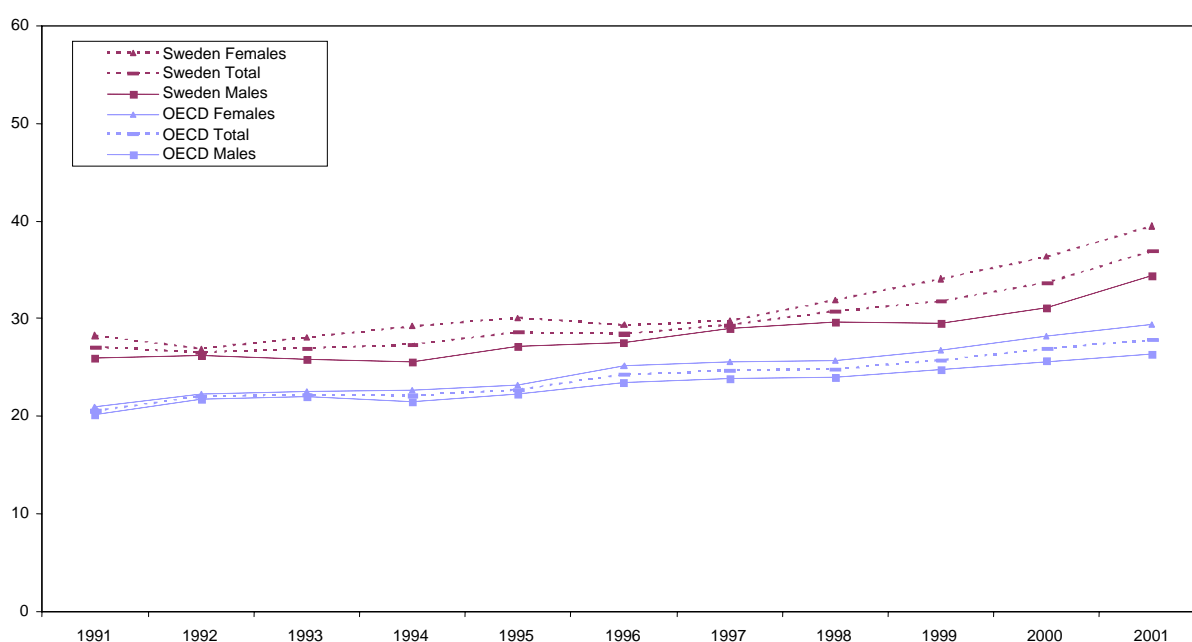
Notes: Includes tertiary type-A education, which corresponds to tertiary academic education (university), and tertiary type-B education, which corresponds to tertiary vocational education (practical/technical/occupationally-specific programmes).

Source: OECD (2004), *Education at a Glance*.

Subsequent to a period of low enrolment and graduation rates during the 1980s, higher education in Sweden grew substantially during the 1990s (**Figure 2**). This growth may in part be attributed to a leap in the number of displaced workers who sought further education as an alternative to unemployment. Capacity problems ensued and, by 1998, the share of applicants offered places in higher education dropped

to 40% from 50% at the beginning of the decade. Increased competition reduced an already low share of entrants coming directly from upper secondary school. This is largely because the higher education system allows mature candidates to apply work experience toward admission requirements, making it increasingly challenging for younger applicants to gain entry to tertiary education. In an effort to increase the share of younger candidates, the government has announced a target that 50% of those born in any given cohort shall have embarked on university-level studies by the age of 25. The Swedish government is also examining policies for easing entrance regulations into tertiary education (OECD, 2004).

Figure 2. Growth in tertiary education, 1991-2001
(Percentage of the population of 25 to 34-year-olds that has attained tertiary education)

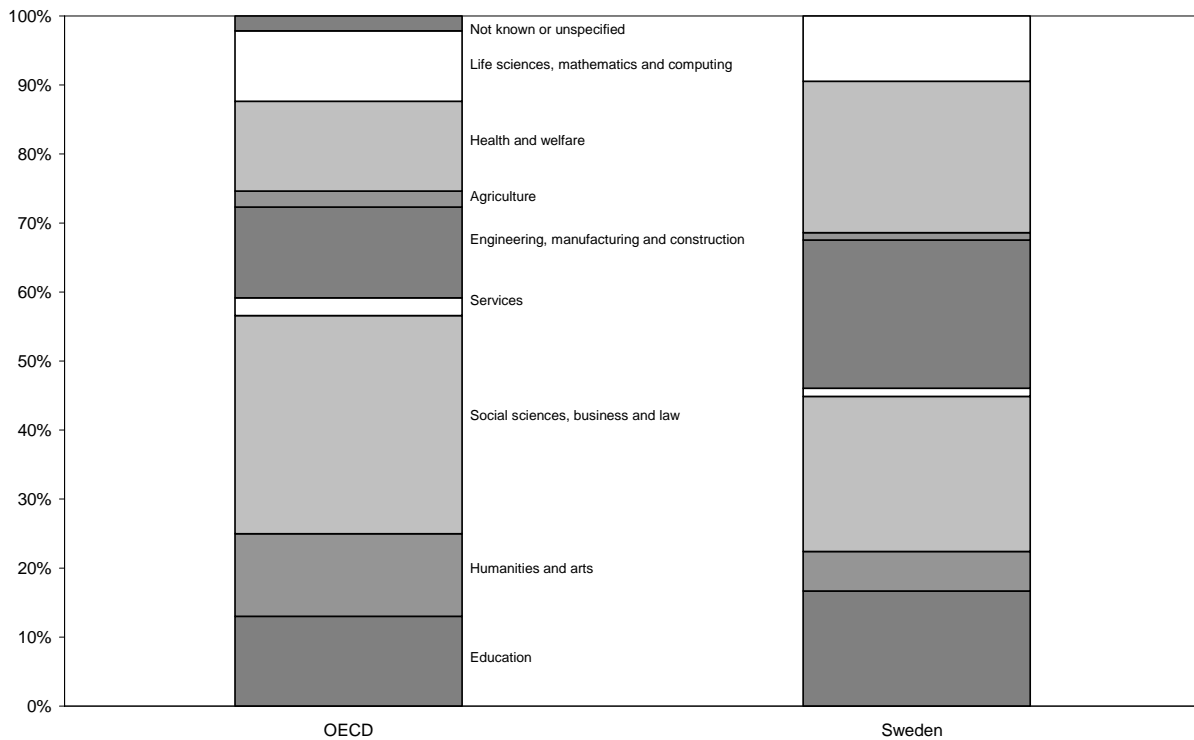


Notes: Includes tertiary type-A education, which corresponds to tertiary academic education (university), and tertiary type-B education, which corresponds to tertiary vocational education (practical/technical/occupationally-specific programmes).

Source: OECD (2003), *Education at a Glance*.

The composition of higher education courses and programmes offered in Sweden is the result of an intricate planning process which incorporates government objectives based on labour market needs and forecasts. Strong links between the university colleges and local industries are also reflected in the specialisations and courses offered at these institutions. The resulting mix of tertiary graduates by field of study is somewhat different than the OECD average in evidencing a higher share of technical graduates (**Figure 3**). For example, Sweden's outputs of graduates in engineering, manufacturing and construction are well above the OECD average. This is also the case in the fields of health and welfare, reflecting a high level of female enrolments and contributing to the substantial and growing share of public sector employment.

Figure 3. Higher education by field of study, 2001



Source: OECD (2003), *Education at a Glance*.

The centralised management and funding of the higher education system by the public sector has contributed to certain weaknesses. It has been noted that the lack of sufficient entrepreneurial education may contribute to the underdeveloped small and medium-enterprise sector (Salerno, 2002). Entrepreneurship in Sweden is lagging with most graduates seeking employment in the public sector or corporate conglomerates (OECD, 2003b). However, several universities and vocational institutes are now offering entrepreneurship courses, and the Swedish National Agency for Education has been asked to revise curricula for upper secondary education to include more entrepreneurship training.

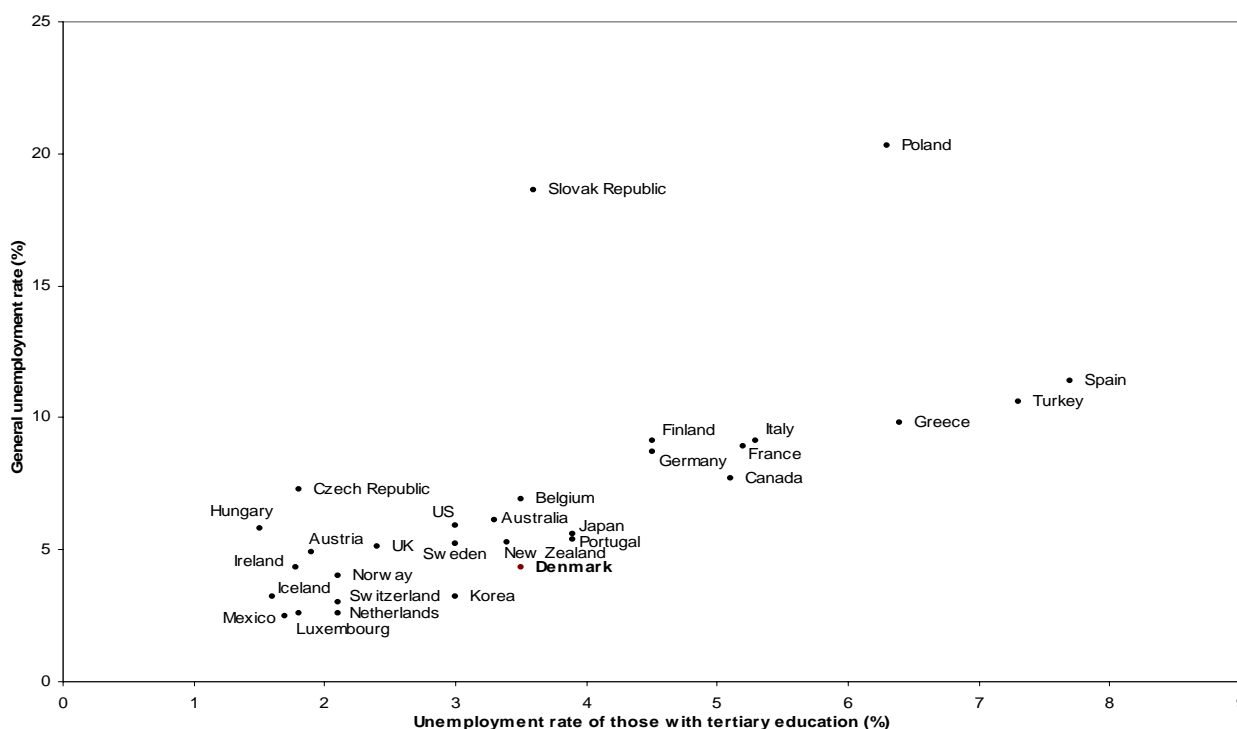
Speeding up the process by which younger people become qualified and enter the labour force is becoming an important policy concern. Prolonged and postponed studies have delayed entry by younger groups (20-34 year-olds) into the labour force, consequently lowering their participation rate by 10 percentage points in the period from 1980 to 2002. It is difficult to accurately determine completion rates of students because it is a common and accepted practice in Sweden for students to take extended breaks from studying and also because there is a great deal of flexibility with regard to changing study programmes midstream. Recent estimates suggest that only 60% of students complete a degree within 10 years (Salerno, 2002). The government has asked the National Agency for Higher Education to analyse conditions for enabling a more concentrated study period.

Compared to other OECD countries, Sweden has moderate returns to higher education due largely to long study periods and low earnings differentials once employed (Blondal *et.al.*, 2002). This is despite the low cost of higher education and generous student support from the government. It has been suggested that a compressed wage structure and high levels of upskilling coexist successfully in Sweden because the high value placed on education mitigates the need for incentives through large wage differentials (OECD, 2001). However, there are indications that the absence of prominent wage signals is hindering efficient allocation of labour resources in Sweden (OECD, 2004). Although the transition from a high inflation to a

low inflation regime in the mid-1990s reduced distortions in wage signals, there are still insufficient incentives to attract graduates to riskier and smaller ventures.

Generous public supports tend to depress active labour force participation rates, including of the higher-skilled. Skilled workers in Sweden are more likely to find employment than lower-skilled workers. Unemployment rates of tertiary graduates are somewhat below the median for OECD countries and just over half of the overall Swedish unemployment rate (**Figure 4**). However, the Swedish economy masks a considerable level of unemployment, for example, in the form of people on long-term sick leave. The OECD reports that, in 2002, a full-time equivalent of 270 000 persons received sickness compensation and a further 407 000 were on disability pension from the workforce. This figure is the equivalent of about 13% of the working age population (OECD, 2004). The government has recently announced measures to improve this situation by tightening controls on income support and promoting healthier work environments.

Figure 4. Comparative unemployment rates in OECD countries, 2002

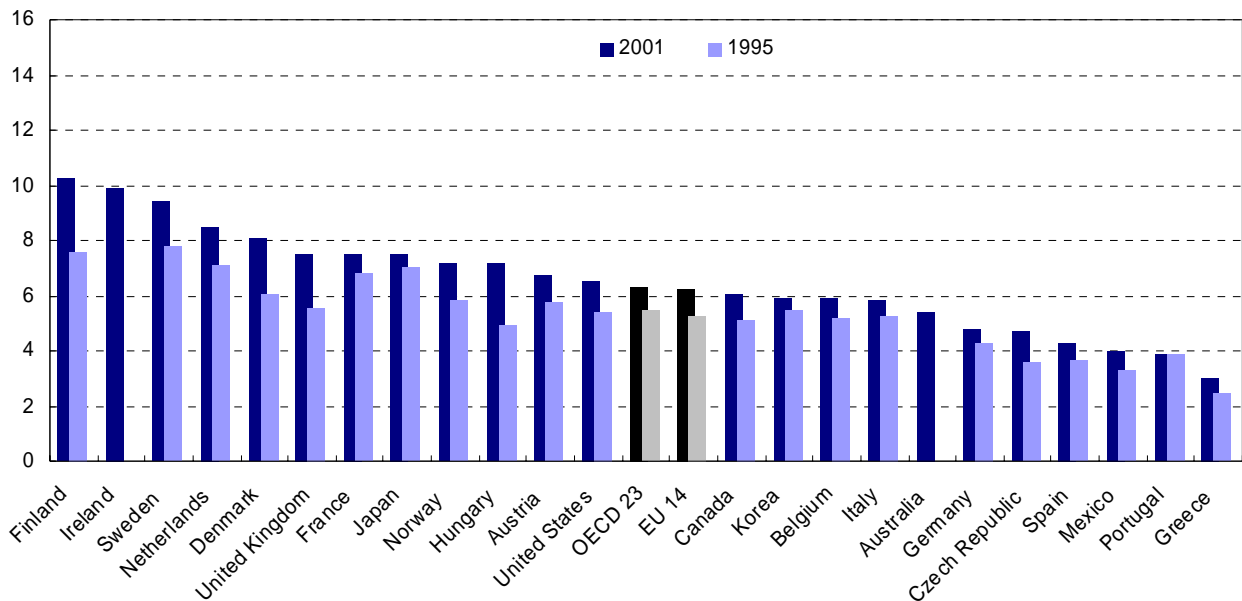


Notes: Unemployment rate of persons with tertiary education and total unemployment rate.

Source: OECD (2004), *Employment Outlook*.

In the longer term, Sweden needs to develop more research-intensive and technology-based small and medium-sized firms to maintain competitiveness and productivity performance. The modern Swedish economy is characterised by large manufacturing corporations with leading positions in their respective industries. Corporations such as Volvo, Ericsson, Electrolux and Asea Brown Boveri are the country's largest private sector employers and depend on highly skilled technical and scientific know-how for their competitive positions in the world market. High wage and tax rates, combined with the small size of the domestic and neighbouring markets, have forced Swedish firms to look to larger markets further afield. Consequently, small- and medium-sized enterprises which lack the critical mass to operate on a global scale are underrepresented in Sweden. Small firms are also rare in the information and communications technology (ICT) sector, a major source of employment in Sweden relative to other OECD countries (**Figure 5**).

Figure 5. Contribution of ICT sector to employment, 2001



Notes: Employment in information and communications technology (ICT) sector as share of total.
 Source: OECD (2004), *Information Technology Outlook*.

In the OECD area, industry employment has grown significantly in the past three decades as public sector employment has declined. But in Sweden, employment in the business sector has contracted in the past 40 years while public sector employment has grown. OECD estimates suggest that, given the overall rate of employment growth in Sweden since the early 1960s, had the public/private employment share not changed over the same time period, output per person would be nearly 50% higher than it is today (OECD, 2004). Although well served by its highly-educated workforce, Sweden faces challenges in enhancing overall productivity due to low youth labour force participation rates, a dearth of technology-based start-ups and the lack of an entrepreneurial small firm sector – all areas which the government is now attempting to address in its policies.

POLICIES FOR DEVELOPING HIGHLY SKILLED WORKERS

Overview

Sweden is very conscious of potential skills shortages or mismatches which may hinder growth potential in the long-term. The government has a number of programmes to stimulate upskilling and reskilling in enterprises and to augment the supply of researchers and technical workers. Initiatives aimed at achieving and preserving gender equality have been implemented, and targets have been set to increase the number of women in more technical fields and occupations where their participation is low. In June 2004, the government announced an *Innovative Sweden (Innovativa Sverige)* strategy intended to strengthen the international position of Swedish education and research, stimulate entrepreneurship and strengthen the ability of small and medium-sized enterprises to innovate. The proposals include increased venture financing for start-ups and measures to strengthen strategic co-operation between large and small enterprises.

There are still certain factors that may prevent Sweden from making fuller use of its human capital. Wage compression and job protection legislation hinder mobility across industrial sectors. Job tenure tends to be long, particularly for older workers. The problem of persistent gender-based wage gaps needs to be addressed. Such imbalances discourage portions of Sweden's highly skilled female labour force from seeking full-time employment, despite generous childcare benefits and family-friendly policies. Significant untapped highly skilled resources also exist in foreign-trained workers who experience integration difficulties and foreign students who encounter barriers to entering the workforce.

Monitoring supply and demand for highly skilled workers

Sweden carries out several labour market forecasts analysing potential skill gaps across economic sectors in the short- and long-term. Two public sector entities are tasked by the Swedish government with creating and analysing labour market projections for use in policy-making - Statistics Sweden and the National Labour Market Administration. The results from these forecasts are used for policy-making and have led to changes to the structure of education and labour market policies.

Statistics Sweden (SCB) conducts three major forecasts of supply and demand of qualifications aimed at identifying possible mismatches in the labour market. The *Labour Market Tendency Survey*, published annually since 1959, is a short-term forecast based on a sample survey drawn from a population of establishments with over 10 employees (5 for some education categories). The SCB medium-term forecast, *Education and Demand for Labour*, is published every third year and looks at supply and demand flows for 50 education groups over a period of 8 years. This survey, introduced in 1999, was designed to complement the long-term forecast, *Trends and Forecasts*. This forecast, conducted and published every third year since 1972, gives information by gender and age group for about 50 education groups over a period of 20 years. According to the SCB *Trends and Forecasts*, imbalances in labour skills could be problematic in the private sector, particularly for technology workers and engineers.

The National Labour Market Administration (AMS) conducts two semi-annual short-term forecasts to identify bottlenecks or imminent skill shortages (Lindskog, 2002). The *County Labour Board Forecasts* are estimates based on local surveys of 10 000 private and public sector employers including municipalities, county councils and a selection of firms with more than 5 employees. Two national reports

are developed from this regional data: i) *Where Are the Jobs?* examines supply and demand trends, reports on shifts in employment by occupation and sector, and includes a *Shortage Index* based on a five-point scale; ii) *Labour Market Outlooks* gives the employment outlook over the following 12-month period.

The AMS also conducts long-term forecasts on an ad-hoc basis, often focusing on sectors where shortages are likely to occur. Recent reports have examined trends in health care, teaching and construction. Intended for longer-term policy-making, these forecasts examine exits from the labour market due to retirement together with existing data from population and labour force surveys, regional and national employment and education statistics and interviews with sector organisations and employers. These AMS forecasts envisage skill shortages in the education (teachers) and health care (nurses, physicians) sectors. In the longer-term, the public sector may face of shortage of 240 000 skilled workers.

A number of private banks and business organisations produce labour market forecasts for specific sectors of the economy. For example, the *Confederation of Swedish Enterprises* makes projections of future industry skill needs based on interviews with member companies. Employers report a short-term shortage of experienced staff for 75% of educational groups. Other sector-specific forecasts examine qualification needs in branches of the economy such as education, health care, social services and local government (Lindskog, 2003). Overall, the monitoring system to match labour demand and supply is very decentralised. *Regional Competence Councils* in the 21 counties also follow industry projections of labour needs and attempt to balance this with supply for all kinds of workers at regional level.

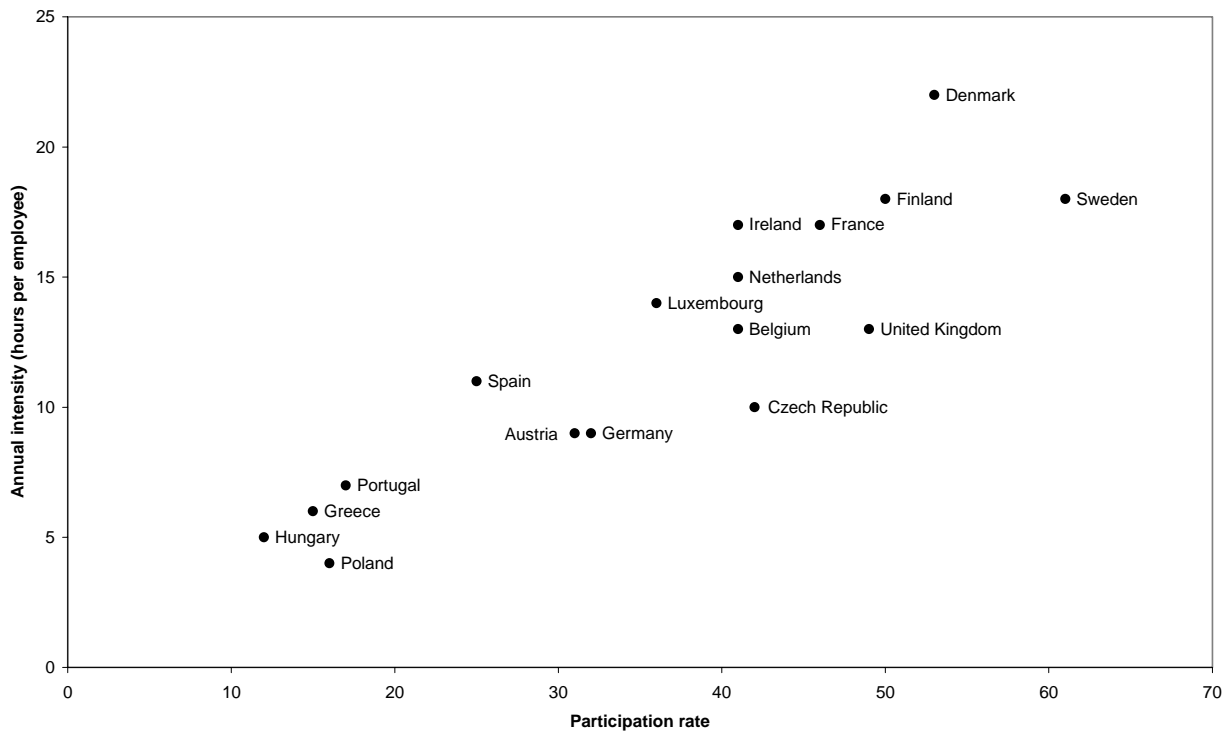
In Sweden, higher education institutions have the responsibility of meeting labour market demands according to annual monitoring instructions. The National Agency for Education (*Högskoleverket*) works with Statistics Sweden and other organisations to determine how the education system might respond to projected labour market changes. For example, a report was prepared in 2004 as a basis for governmental goals for the number of degrees and diplomas to be granted in certain vocationally-oriented studies. To better inform educational planning, Swedish policy-makers would benefit from greater integration of the diverse labour market outlooks to produce more consistent implications and guidelines.

Increasing enterprise and individual training

Sweden has among the highest levels of worker training in the OECD with 61% of workers participating in training in 1999 (**Figure 6**). Time spent on training as a proportion of total working hours underlines the priority that businesses place on upskilling their employees (Nestler and Kailis, 2003). Intensity of training, measured by hours per employee, is also higher than in many OECD countries, reflecting relative equity in access to training across workers. As in all Nordic countries, women are more likely to participate in training than men, though the difference in Sweden is less pronounced. Access to training also increases with educational attainment. The bulk of workplace training is given by private course providers, primarily in the fields of computer science (23%) and engineering (15%). Overall adult education and training in Sweden was significantly upgraded through the *Adult Education Initiative* (AEI) which ran from 1997-2002.

Most training is paid by employers. Over 90% of Swedish enterprises offer training to their employees, one of the highest shares in the OECD (Eurostat, 2002). Estimates derived from the Swedish Labour Force Survey suggest that employers spent SEK 62 billion on training in 1999, a sum equal to over 3% of GDP. In the same year, Swedish enterprise investments in training were estimated at 2.8% of total labour costs. As in most OECD countries, companies receive an immediate deduction of expenditures on worker training and associated costs from income tax. They also receive indirect support through the *Advanced Vocational Education* (AVE) programme which matches enterprises and course-providers in supplying practical workplace-based training.

Figure 6. Comparative rates and intensity of worker training, 1999



Notes: Participation rate and annual intensity of employee-sponsored continuous vocational training (CVT) in European countries.

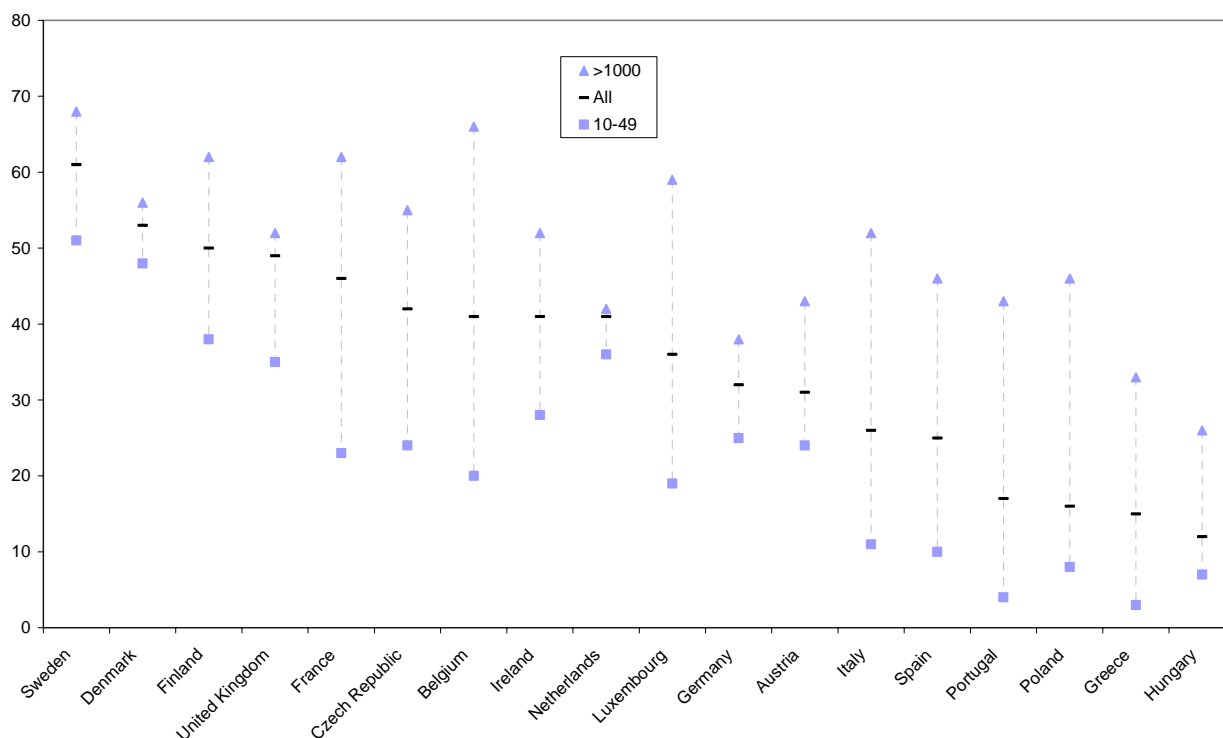
Source: OECD (2002), *Employment Outlook*.

In 1974, Sweden initiated a policy of training leave for both public and private sector employees. It is estimated that about 1% of the workforce is on such leave at any one time. Workers who have tenure of at least 6 consecutive months with their employer, or 12 months during the previous 2 years, may take unpaid leave to pursue vocational, general or popular education. The date of departure for studies is negotiated between workers and employers, who may postpone leave for a period not exceeding six months. This is an important statutory arrangement that grants the employer flexibility in planning for periods of study leave, particularly since there is no legal limit on the length of absence. Upon completion of the study leave, workers have the right to return to the same or similar work. The loss of wages foregone while away from regular work is covered in part by government grants and loans available to those undertaking study leave.

Employees of large firms are more likely to receive training than those in small or medium-sized firms, although the disparity is less in Sweden than in the majority of OECD countries (**Figure 7**). In firms employing 10 to 49 workers, 61% of employees participated in training compared to 67% for firms with over 250 employees. However, only 54% of employees in medium-sized firms employing between 50 and 249 workers received training. Nearly all large firms and 88% of small firms offer training compare to a far smaller share of medium-sized firms (Eurostat, 2002).

Figure 7. Worker training by firm size, 1999

(Participation rate of employee-sponsored continuous vocational training (CVT) by firm size in European countries)



Source: OECD (2002), *Employment Outlook*.

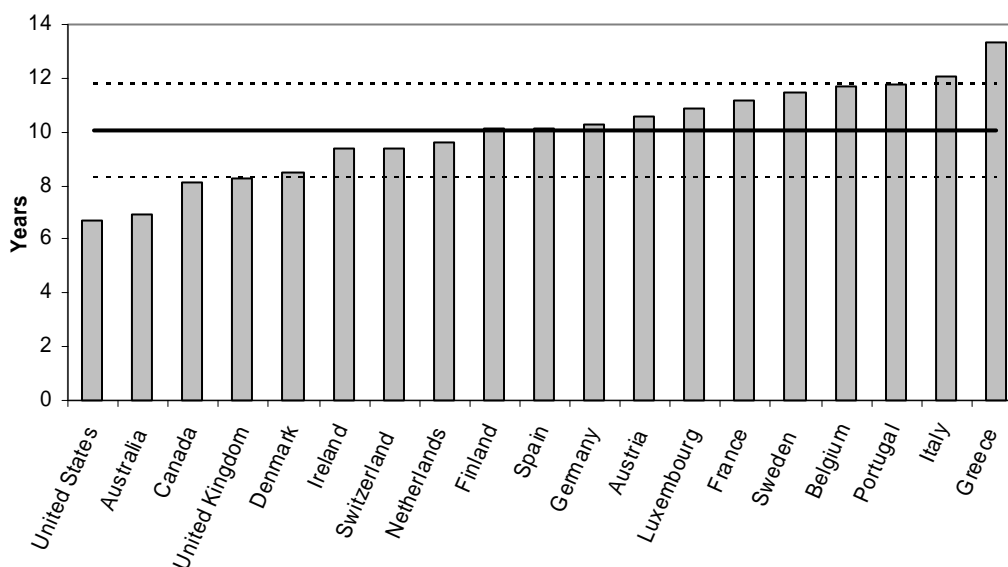
This was partly remedied by European Social Fund (ESF) programmes which provide financing to local projects in support of human capital development at the workplace level. In Sweden, skills development is based on an enterprise competence analysis conducted with the social partners, and the costs of vocational training are paid by enterprises, the ESF and the Swedish government. Funds were directed to unemployed persons in the period 1996-1999, while human capital development in enterprises was supported by the ESF Objective 4 programme, whose impacts on enterprise development were positively evaluated. These schemes were combined in 2000-2006 (*Växtkraft Mål 3*) when financing will be given to firms with less than 250 employees to enhance productivity through organisational and managerial changes as well as skills upgrading.

While the *Växtkraft Mål 3* programme is helping correct the training gap for medium-sized firms, it has limited funding. A previous initiative to subsidise training courses in SMEs with the condition that posts be temporarily filled by job-seekers was terminated. During 2001-2004, the Swedish Business Development Agency (NUTEK) maintained *IT.SME*, a government-financed programme aimed at developing information technology skills in enterprises with less than 10 employees. Over 12 000 companies participated in the programme and most retain basic information technology services in their firms. However, given overall weaknesses in Sweden's small and medium-sized enterprise sector, a more comprehensive strategy is needed to provide technical and managerial training for key personnel in SMEs and to help build contacts with universities, university colleges and research institutes.

Enhancing national worker mobility

National worker mobility in Sweden, as measured by change of employer, is one of the lowest rates in the OECD (**Figure 8**). The typical worker in Sweden spends almost 12 years in the same job. Although younger workers in Sweden (20-29 years) have a higher propensity to change jobs, this drops quickly with age and, by middle age, Swedish workers are reluctant to move (Mortensen and Sauto, 2003). Sweden's relatively high tenure rates are due in part to a rigid wage structure and extensive employee protections. Moreover, a Nordic study of trends in the late 1980s to the late 1990s showed that, in Sweden, the most qualified workers manifest lower mobility than those with medium qualifications, creating a bell-shape curve for mobility by level of education (SINTEF, 2003)

Figure 8. Average worker tenure, 1999
(Average length in years of continuous employment with same employer)



Notes: Full line indicates the OECD average; dashed line indicates the average +/- of the standard deviation.
Source: OECD (2001), *Employment Outlook*.

One of the main obstacles to worker mobility in Sweden is the high degree of wage compression which dampens financial incentives to change jobs. Net income wage compression through the tax system is part of the government strategy to create an equitable society. However, the absence of wage signals makes it difficult for workers to identify higher productivity positions with better longer-term earnings prospects. Recent attempts to decentralise wage bargaining have resulted in slightly higher wage differentials (OECD, 2004). But the government could do more to encourage more wage dispersion in order to enhance signals and incentives to change jobs.

Sweden has a portable pension system, developed through multi-employer schemes where collectively-bargained pension arrangements involve two or more unrelated employers. However, there are other policies which may negatively affect overall worker mobility. Swedish employment law provides job protections which favour older workers and those with longer job tenure. There are also indications that the unemployed or underemployed are more likely to wait out recessionary periods in a classroom or training programme, intended to help them change occupations, than to actively seek new employment (Björnberg and Dahlgren, 2003).

Worker mobility in Sweden would be enhanced by a system of accreditation for prior learning and formal recognition of worker skills. In 2000, the government created a *National Commission on Validation to*

develop, in close co-operation with the social partners, industrial sectors and academia, means for the identification and assessment of skills taking into account the prerequisites and needs of local and regional levels. For example, in Gothenburg, the municipality – together with the regional employment office and employee and worker organisations -- provides accreditation in specific professions where high demand for labour exists or is expected. The National Commission is to report in 2008 on procedures for maintaining legitimacy, quality and equivalence across the various regional and local accreditation systems and for generally increasing the transparency of worker skills.

As the population of Sweden ages, potential skill shortages will increase the need for a high level of occupational and geographical mobility in the labour market. Workers in declining occupations need to be moved quickly into sectors where demand is high to avoid skill gaps and structural unemployment. Policies that facilitate movement across jobs and occupations and avoid tenure or age biases while maintaining employment security need to be considered. The Swedish government should work with the social partners to negotiate wage agreements more tolerant of exceptions for particular sectors or groups. This would contribute to mobility and enhance labour market signals to more efficiently allocate skilled labour in the economy.

Adjusting to international worker mobility

Despite a strong economy with rich employment prospects for highly skilled labour, Sweden attracts relatively few skilled immigrants. Of the 30 000 to 45 000 immigrants who settle in Sweden annually, about half are asylum seekers. The other half is made up primarily of family members of earlier immigrants and economic migrants. About 16% to 19% of total immigrants are considered highly skilled in scientific or technical fields. These are largely asylum seekers who have come to Sweden from the former Yugoslavia and the Middle East (Gaillard, 2002).

Although net growth in the Swedish labour force is expected to come through immigration, the country has few policies aimed at attracting highly skilled immigrants. In 2001, Sweden passed a law designed to alleviate the tax burden on foreign experts that remain in the country for under five years. The law exempts 25% of income and certain benefits (moving expenses, home leave and children's education allowance) from taxes and social charges for a period of three years. However, the effectiveness of tax incentives in attracting foreign skilled workers has yet to be shown.

Swedish immigration law has granted automatic working permits to nationals of other Nordic countries since the 1940s and to immigrants from the European Union since 1995. However, nationals from countries outside of these areas must undergo a rigorous process to work legally in Sweden. Only 250 to 350 such work permits are awarded annually (319 in 2003). Instead, the Swedish government uses more targeted permits aimed at highly skilled workers or immigrants of exceptional talent. Targeted permits, which are valid for a renewable period of up to 48 months, are granted once a job offer has been made and require a minimum income and guaranteed housing. This latter condition poses a significant barrier in Sweden where housing shortages in large cities are particularly acute. Over 15 000 "international exchange" permits are granted annually (Gaillard, 2002). A second, even less-flexible category of work visa, the *Temporary Labour Shortage Permit*, is issued on an as needed basis to ease skill shortages. This visa is dependent on market conditions and is valid for 18 months.

Many of these immigrants from outside the European Union are not being utilised optimally. A 2001 study by the AMS showed that many skilled immigrants were unemployed or employed in jobs that did not make use of their qualifications. For example, only 44% of foreign professionals with a degree in technology or natural sciences had a qualified job in 2000, with the remainder either in an unqualified job, unemployed, taking part in labour market measures or studying (Berggren and Omarsson, 2001). Sweden needs to increase efforts to integrate foreign skilled workers already residing in the country into society and the

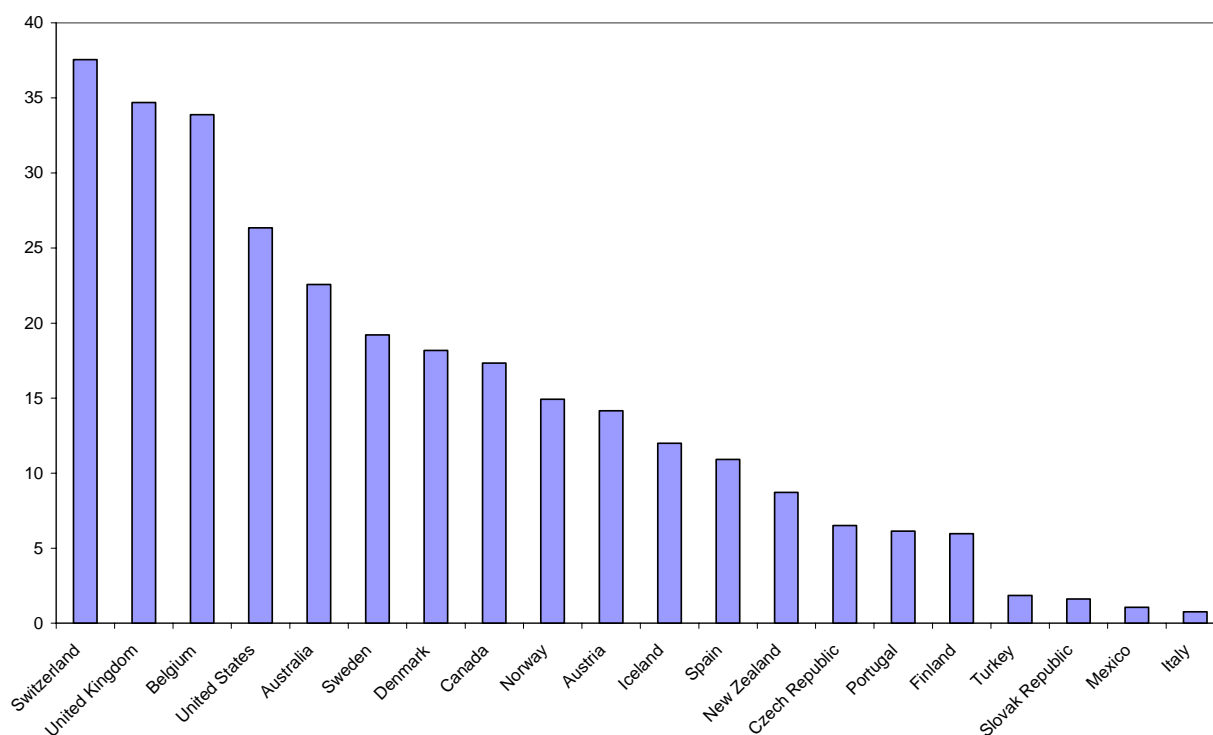
labour market. Existing programmes to improve immigrants' Swedish language skills should be intensified and coupled with measures to develop means of identifying and recognising foreign-earned qualifications and skills. The government is currently reforming the approach to immigrant education so as to include more Swedish language training relating to work, studies and other activities.

The number of Swedish professionals that leave the country has increased sharply in recent years, but this has been accompanied by a parallel increase in the number of returnees. While highly skilled workers often leave Sweden for professional reasons, particularly in the initial phases of their careers when mobility is relatively high, the majority of Swedish émigrés return home after relatively short periods abroad. Data from Statistics Sweden suggests that the propensity to emigrate increases with skill level. About 30% of new doctoral degree holders emigrated in 1995-96, most to pursue post-doctoral studies or research; half of these had already returned to Sweden the following year and two-thirds within 24 months (Gaillard, 2002). Although the majority of returning Swedes state quality of life and working conditions as reasons for their return, high rates of public investment in research and development and the availability of jobs play an important role in facilitating return of such workers.

Foreign students are attracted to Swedish institutions of higher learning which currently accommodate about 13 000 students from outside the country, a higher figure, in proportion to its population, than in the United States. Foreign PhD students make up nearly 20% of enrolments (**Figure 9**). The Swedish higher education system is free of charge to Nordic nationals and of high quality by international standards. In several universities, graduate and PhD programmes are conducted in English, thus enhancing their appeal to foreign students. The Swedish *National Agency for Higher Education* provides a service to evaluate foreign qualifications and issue credits corresponding to the Swedish equivalent. This accreditation system provides incentives to the overall circulation of students by attracting foreign students and encouraging those at home to study abroad.

Foreign students who have completed their studies in Sweden are an important source of skilled labour. It is estimated that two-thirds of PhDs stay because they become absorbed into local research teams in the public or private sector (Gaillard, 2002). However, Swedish immigration law makes it difficult for graduates to make the transition from university to the workplace, and it is unlikely that the country is optimising potential benefits from Swedish-educated foreign students. Sweden could further benefit from students trained in its universities by granting its foreign graduates greater access to the labour market upon completion of studies in a Swedish institution.

Figure 9. Foreign PhD students as % of total PhD enrolment, 2001

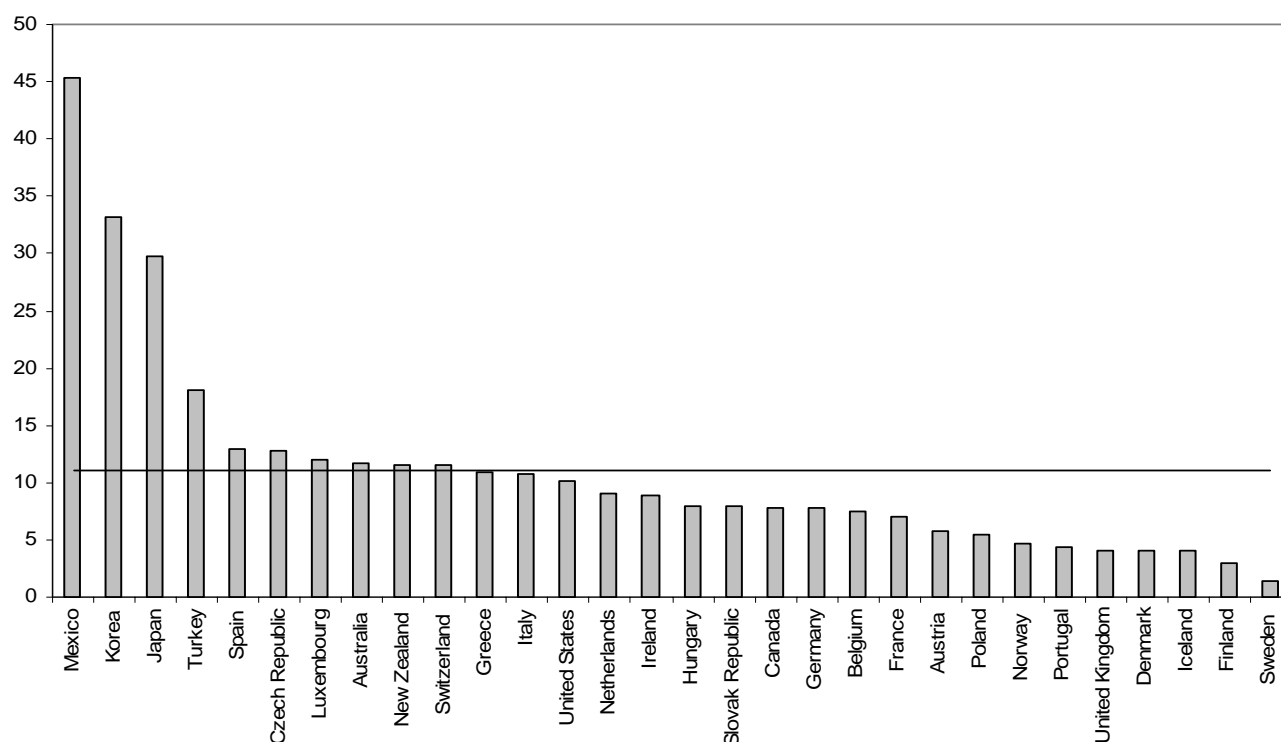


Source: OECD (2003), *Science, Technology and Industry Scoreboard*.

Increasing workforce participation by highly skilled women

Changes to tax policy and social reforms caused female participation in the Swedish workforce to swell during the 1970s, a demographic change which took place earlier in Sweden than in many other OECD countries. Sweden's pursuit of gender equality is manifest in the country's labour policy and has helped make the male/female employment gap the lowest in the OECD (**Figure 10**). After the prolonged recession of the 1990s during which the gap widened, differences in male/female employment rates have once again closed, and the gap is now negative for women with no children. The female labour force participation rate, at 77%, is second only to Iceland among OECD countries, though below the 1990 level of 81%. This figure climbs to over 88% for women with tertiary education (OECD, 2003a).

Figure 10. Gender employment gap for highly-educated women, 2002
(Percentage point difference between the employment rates for men and women with tertiary education)



Source: OECD (2004), *Employment Outlook*.

As in other Nordic countries, employment rates are little affected by the incidence of childbirth (Korpi and Stern, 2003). Generous parental leave makes it possible for mothers and fathers to take a combined total of 480 days away from work, with a condition that each parent takes a minimum of 60 days. During this period, the parent is paid 80% of normal salary subject to a maximum of €70 per day. Although the large gap between mothers and fathers staying home to care for children is slowly closing, male/female wage differentials and long-lasting attitudes toward child rearing may continue to disadvantage women. The increasing use of flexi-time among Swedish parents has increased the incentive for mothers to remain in employment by reducing childcare time. The number of mothers using flexi-time at work increased from 31% in 1981 to 55% in 2000. Greater dependence on income means that mothers living without a partner take advantage of flexi-time far less than those in a two-parent household (46% versus 62%).

Swedish labour policy allows for flexible working hours, and this has been applied most rigorously in the service sector which is dominated by female employment. In Sweden, around 23% of employed women work part-time, just below the OECD average. Swedish law grants parents with children under eight the right to work part-time, although only 3% of fathers take advantage of this rule. But not all women working part-time do so voluntarily, with about 17% of women working part-time stating that they would like to work longer hours (OECD, 2003a).

Despite the small gender employment gap, the Swedish labour market remains segregated with regard to employment by sector. Women are much more likely to be employed by the public sector than are men, particularly in the areas of health care and education. Privatisation of state-owned firms and downsizing of the public sector have increased the number of women working in the private sector, but a concurrent increase in male private sector employment has meant that the gap remains. Women in the private sector are also much less likely to hold managerial or supervisory positions than are men who hold about 81% of such positions (Björnberg and Dahlgren, 2003).

The gender-based sectoral segregation of jobs results in wage inequality. In Sweden, as in most OECD countries, female incomes are still inferior to those of men in the same sectors and positions, and the closing of the gender wage gap has made little progress over the years. Depending on the methodology, the average monthly wage for women was between 82% and 92% of the average male wage in 2001. Wages in the public sector, where half of the female labour force is employed, are considerably lower than those in the private sector. Furthermore, relative wages in the public sector, particularly in female-dominated health care, education and service occupations, experienced large decreases during the 1990s (Björnberg and Dahlgren, 2003). Sweden, together with Denmark and Austria, has gained financial support through the European Union for reviewing the wage bargaining process and making it more gender neutral.

This gender wage gap increases with educational attainment. While women benefit from education in the form of wage premiums, they do not benefit as much as men. In fact, wage differentials are greatest in management and other occupations that generally require a higher level of skills training. The wage differential is highest among workers with two years of tertiary education where the average woman earned a monthly wage of SEK 22 500 compared to an average male wage of SEK 29 700. Only 7% of women, compared to 26% of men, work in occupations that pay an average wage of over SEK 25 000 (Björnberg and Dahlgren, 2003). The Swedish government needs to take more active steps in encouraging the social partners to address these gender biases in order to more fully integrate women into the workforce.

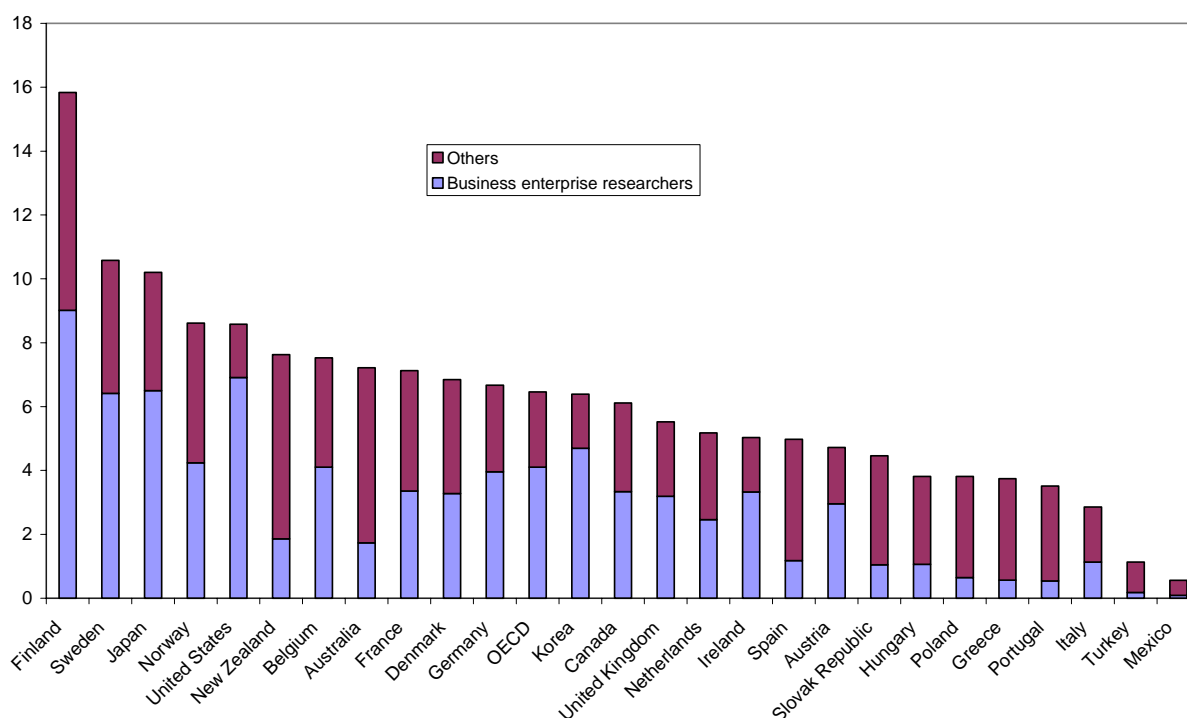
Developing human resources in science and technology

A combination of large investments in higher education and expenditures on research and development (R&D) has endowed Sweden with a high level of human resources in science and technology (HRST). Investment in knowledge (roughly defined as public and private spending in higher education, expenditures on R&D and investment in software) totalled 9.2% of GDP in 2000, the highest level in the OECD. Sweden also has the highest share of HRST occupations as a percent of total employment, half of which are filled by women (OECD, 2003). Still, Sweden may be facing future constraints in terms of research personnel in the public and private sectors.

Sweden leads the OECD in terms of R&D spending as a percentage of GDP at over 4% in 2001. Business enterprises accounted for nearly 72% of this expenditure, although this was concentrated in a few large firms (OECD, 2003). Sweden also has high levels of patent applications relative to its population, due in part to a very high share of researchers in total employment (**Figure 11**). However, demographic changes mean that researchers in certain fields will soon be retiring at a pace faster than the labour market can replace them. In an effort to counteract this trend, the Swedish government plans to increase the number of students currently receiving doctoral and research degrees through funding and other incentives.

The Swedish education system produces a substantial number of graduates with science and engineering degrees, mostly the latter (**Figure 12**). Engineering, at both undergraduate and Masters levels, is among the fields that have experienced the greatest growth in terms of graduates over the past ten years. Demand for mathematics and natural science degrees, on the other hand, has contracted, and the government has been forced to reduce the size of these programmes in order to expand capacity for increasingly popular subjects such as social sciences, law and the arts (Lindskog, 2003). This is another factor contributing to projections of researcher shortages in certain sectors.

Figure 11. Employment of researchers, 2001

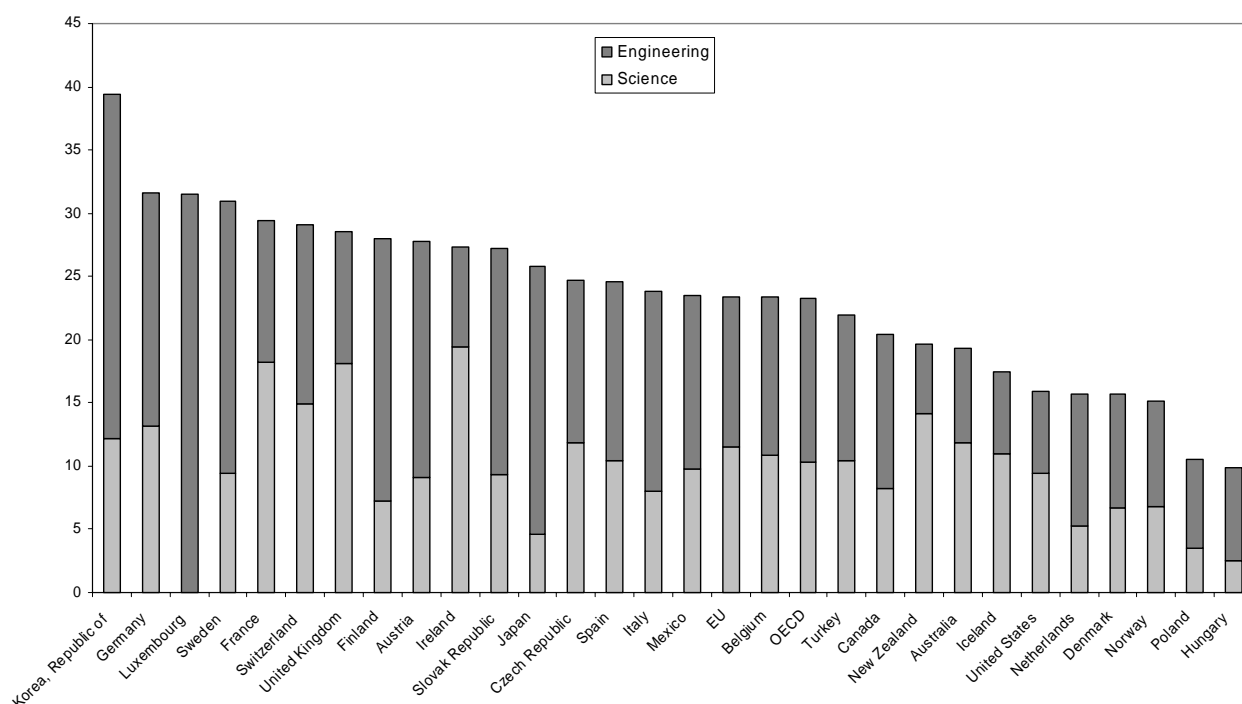


Note: Employment of researchers per thousand of total employment.
 Source: OECD (2003), *Science, Technology and Industry Scoreboard*.

In 2001, the Swedish government’s research bill “*Research and Renewal*” 2000/2001:3, established 16 graduate research schools hosted by universities, which received SEK 214 million to launch enhanced research activities (EC, 2003). The government set a target for these schools of 400 doctorates by 2007, a small proportion of the overall postgraduate population as a whole. Critics maintain that the boost in university-based R&D has come at the cost of teaching programmes, particularly in university colleges where public funding for research is limited. The government has also set up 28 “competence” centres, housed in 8 universities, to attract researchers from industry and academia to work together on technology projects for the benefit of both parties. A third of programme costs are funded by private industry and the remainder by the universities and the *Swedish Agency for Innovation Systems* (VINNOVA).

Sweden has the highest rate of researcher mobility between the public and private sectors among Nordic countries. Rates of mobility to manufacturing and business services are particularly marked relative to its Nordic neighbours (Graversen, 2001). The level of mobility of Swedish researchers is due in part to a government policy that stresses the need for co-operation between sectors and which provides stimulation through investments in centres designed to co-operate with private industry (EC, 2003). Temporary mobility is also supported by Swedish legislation (1997:1293), which gives employees, including researchers, employed for a specified amount of time the right to leaves of absence of up to 6 months for carrying out business activities.

Figure 12. Science and engineering degrees as % of new degrees, 2001



Source: OECD (2003), *Science, Technology and Industry Scoreboard*.

As in most OECD countries, women are underrepresented in technical fields, particularly in the natural science and information technology sectors. While females made up 44% of postgraduate degrees in 2002, they accounted for only 24% of PhDs awarded for engineering sciences. Only 38% of researchers in the higher education and 28% in the government sector were women. During the 1990s, the government took measures to correct this gender inequality and promote women in higher education and research. Two separate bills, Equality between Men and Women (*Jämställdhet mellan kvinnor och män* 1994/95:164) and Science and Society (*Forskning och samhälle* 1996/97:5) were passed in an effort to increase female appointments at Swedish universities (EC, 2003a). Government has increased higher-education funding for women in areas where they are underrepresented and funded post-doctoral fellowships for female candidates. The government has also set a target of increasing the share of female university professors to 25% by 2008, up from 12% today.

The Swedish economy has performed well with regard to the development of human resources for science and technology. However, to address approaching demographic changes which may threaten the country's position as a leader in R&D, it should find efficient ways to attract an increased number of women researchers in technical fields. Similarly, policies which can tap into foreign-educated science and technology workers resident in Sweden, should be explored. The new *Innovative Sweden* strategy includes proposals to increase the innovative capacity of smaller firms largely through increasing their links with universities and public research. Steps are needed to promote R&D in a larger share of Swedish firms, particularly small and medium-sized companies in manufacturing sectors, to more firmly entrench the country's strong technology base.

REFERENCES

- Berggren, J. and Omarsson, S. (2001), "Rätt man på fel plats - en studie av arbetsmarknaden för utlandsfödda akademiker som invandrat under 1900-talet", *AMS Utredningsenhet*, Ura 2001:5, Stockholm.
- Björnberg, U., and Dahlgren, L. (2003), "Labour Supply: The Case of Sweden", National Working Paper, Social Policy Research Unit, University of York, United Kingdom.
- Blondal, S., Field, S. and Girouard, N. (2002), "Investment in Human Capital through Post-Compulsory Education and Training: Selected Efficiency and Equity Aspects", *OECD Economics Department Working Papers*, No. 333.
- European Commission (EC) (2003), "European Trend Chart on Innovation, Country Report: Sweden", Brussels.
- European Commission (EC) (2003a), *Women and Science: Review of the Situation in Sweden*.
- EUROSTAT (2002), "Continuing Vocational Training in Enterprises in the European Union and Norway (CVTS2)", *Population and Social Conditions*, Luxembourg.
- Gaillard, A. M. (2002), "The Mobility of Human Resources in Science and Technology in Sweden", in *International Mobility of the Highly Skilled*, OECD, Paris.
- Government Of Sweden (2004), "Innovative Sweden", (*Innovativa Sverige: En strategi För Tillväxt Gennem Förnyelse*), Regeringskansliet, Näringsdepartementet, Utbildningsdepartementet.
- Graversen, E.K. (2001), "Human Capital Mobility Into and Out of Research Sectors in the Nordic Countries", in OECD (2001), *Innovative People: Mobility of Skilled Personnel in National Innovation Systems*, Paris.
- Korpi, T. and Stern, C. (2003), "Women's Employment in Sweden, Globalization, Deindustrialization, and the Labor Market Experiences of Swedish Women 1950 – 2000", Swedish Institute for Social Research, Stockholm.
- Lindskog, M., (2003), "Forecasting and Responding to Qualification Needs in Sweden.", Wissenschaftszentrum Berlin für Sozialforschung (WZB), Berlin.
- Ministry Of Industry, Employment And Communications (MIEC) (2002), *Memorandum - Individual Learning Accounts*.
- Mortensen, J. and Sauto, R. (2003), "Cross-border Portability of Pension Rights: An Important Condition for an Integrated Market for Pension Provision", Centre for European Policy Studies.
- Nestler, K. and Kailis, E. (2003), "Working Time Spent on Continuing Vocational Training in Enterprises in Europe", Eurostat.

OECD (1999), *Thematic Review of the Transition from Initial Education to Working Life: Sweden*.

OECD (2001), *Thematic Review on Adult Learning: Sweden*.

OECD (2003), *Science, Technology, and Industry Scoreboard*.

OECD (2003a), "Women at Work: Who are They and How are They Faring?" *OECD Employment Outlook 2002*.

OECD (2003b), *Venture Capital Policy Review: Sweden*, DSTI/DOC(2003)11.

OECD (2004), *OECD Economic Surveys: Sweden*.

Salerno, C. (2002), "Higher Education in Sweden, CHEPS Higher Education Monitor Country Report", Center for Higher Education Policy Studies, University of Twente, Enschede.

SINTEF (2003), "Mobility of Human Capital – the Nordic Countries, 1988-1998, Project Report 2".