

DEVELOPING HIGHLY SKILLED WORKERS: REVIEW OF DENMARK



ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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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 Denmark 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 Danish 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 Yukiko Fukasaku and Karsten Olsen of the OECD Secretariat. It is published under the responsibility of the Secretary-General of the OECD.

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ASSESSMENT AND RECOMMENDATIONS

Although a high-income country with low unemployment, Denmark faces long-term economic challenges relating to the development of human capital. In view of a rapidly ageing population, increasing the labour supply in general, and that of the highly skilled in particular, is a central concern. Owing to a mismatch in labour force skills, Danish companies are facing increasing difficulties finding qualified workers in sufficient numbers. Yet Denmark has one of the highest levels of expenditures on education and worker training in the OECD. The Danish welfare state is under growing pressure, and reforms to the tertiary education system and generous training outlays could both lower costs and increase the supply of labour with relevant skills.

The 2002 *Danish Growth Strategy* was, in part, formulated to address these problems and improve the use of the labour force to achieve higher productivity. Proposed reforms to the tertiary education system are intended to shorten the length of university studies, encourage earlier completion of tertiary degrees, and increase private sector involvement. Measures are also being introduced to lengthen working hours, discourage early retirement and raise overall labour force participation. Improved co-ordination of adult education and training is being implemented to facilitate continuous upskilling.

But incentives to embark on higher education in Denmark continue to be impeded by a flat wage structure and high taxation, while the educational system leads to a dearth of technical and engineering personnel for industry needs. Generous government training supports tend to reduce both the cost-effectiveness and relevance of much continuing education. Foreign high-skilled labour remains poorly integrated, while the country confronts an increasing brain-drain. There is room for improving the gender balance in the employment of researchers and scientific and technical personnel in general. Also, mobility and interactions between the public and private sectors in research and other areas needs to be strengthened. A summary of progress and recommendations concerning policies for highly skilled workers in Denmark is given in **Table 1**.

Table 1. Progress and recommendations

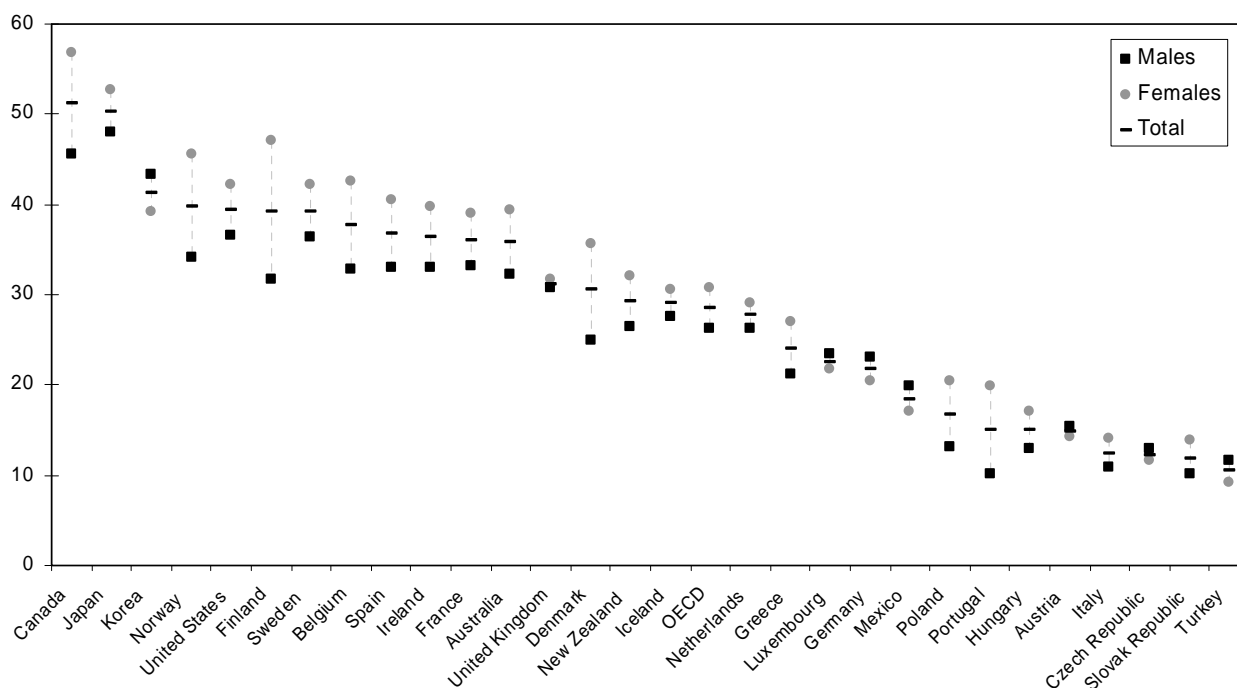
| Area | Recent/planned action | Recommendations |
|---|---|---|
| Monitoring supply and demand of the highly skilled | Centralised labour market survey and forecasting system. | Better target surveys to highlight skilled labour shortages and more broadly disseminate results. |
| Measures to increase enterprise and individual training | Generous government supports to enterprises for training costs and also to training providers. | Increase cost-effectiveness of public training supports through leveraging enterprise and individual contributions. |
| Measures to increase national worker mobility | Recent measures to increase mobility of researchers between public and private sectors. | Implement more flexible employment practices in the public sector to improve mobility from government to industry. |
| Measures to adjust to international worker mobility | Tax incentives and special green card provisions for highly skilled immigrants. | Strengthen and target schemes to recruit foreign high-skilled workers, and facilitate certification of foreign credentials. |
| Measures to increase workforce participation by highly skilled women | Family-friendly policies and initiatives to promote more gender equality and gender mainstreaming. | Accelerate measures to reduce gender segregation by sector and field. |
| Measures to develop human resources in science and technology | Steps to promote public/private research collaboration and to improve job structure and conditions for researchers. | Reform tertiary education system to produce more scientists and engineers. |

TRENDS IN SUPPLY, DEMAND AND USE OF HIGHLY SKILLED WORKERS

Denmark has a lower level of educational attainment among its young adults than most other Nordic countries, particularly among males (**Figure 1**). Tertiary educational attainment in Denmark is also growing at a slower rate than in other Nordic and OECD countries. Incentives to advance to tertiary education are hampered by a flat wage structure accompanied by steep tax rates, with a substantial percentage of those in active employment falling into the top tax bracket. This suppresses wage signals which might encourage young people to further their education (DMEBA, 2002a). High marginal taxation also discourages longer working hours, including among the highly skilled. In all OECD countries, employment income is positively correlated with educational attainment, but Denmark is among those countries where the income differential is the smallest (OECD, 2004).

Figure 1. Educational attainment in OECD countries, 2002

(Percentage of the population of 25 to 34-year-olds with tertiary education)



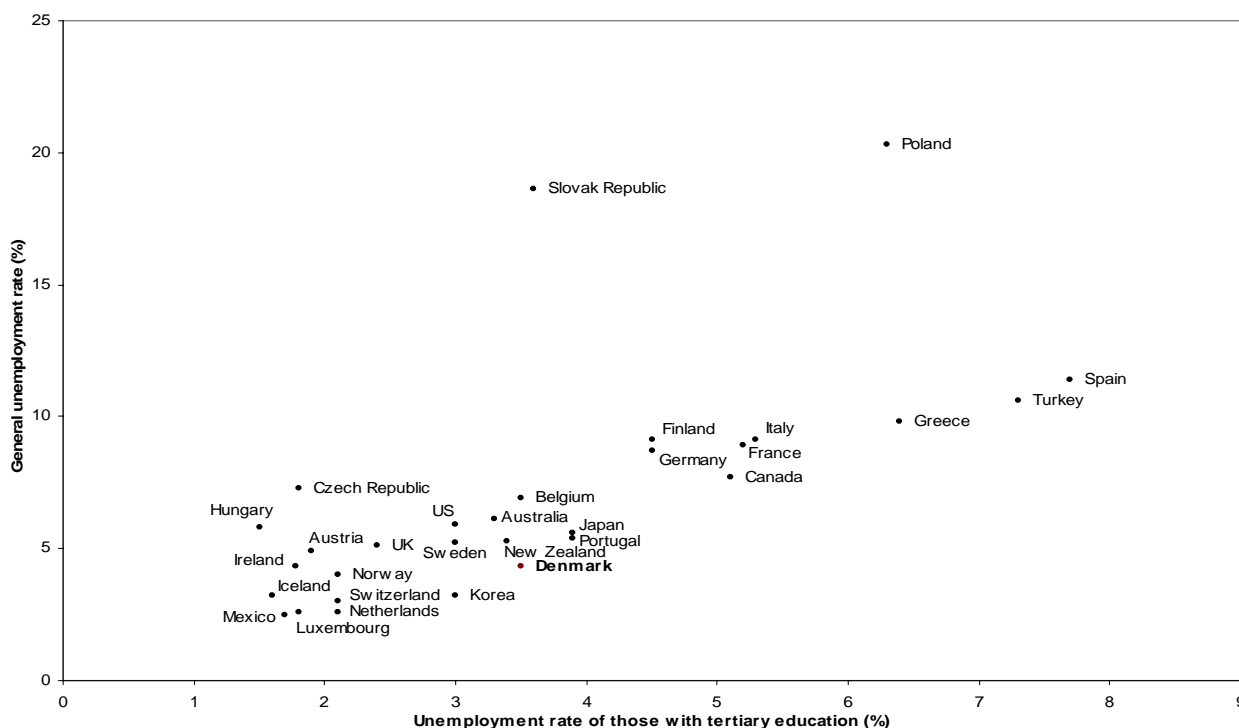
Notes: Includes tertiary type-A education, which corresponds to tertiary academic education (university), and tertiary type-B education, which corresponds to tertiary vocational education (practical/technical/occupationally-specific programmes).

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

Denmark's unemployment rate among those with tertiary education is at the OECD average (**Figure 2**), but has been rising in recent years. About 34% of new tertiary graduates were unemployed in 2002 and, in 2003, 48% were unemployed four months after graduation. Unemployment is not evenly distributed

according to age with the 25 to 29 year-old age group having a higher rate of unemployment (DMEBA, 2002a). The general economic slowdown could be a contributing factor, but this could also be due to generous unemployment benefits for new graduates. Although the overall low level of unemployment indicates that the Danish labour market is functioning efficiently, there is room for improving employment and use of the highly skilled, especially in the younger age group.

Figure 2. 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 first instance, Denmark needs to boost overall participation rates in tertiary education. In January 2003, the government introduced a comprehensive strategy for upgrading higher education in Denmark to improve employability (DME, 2003). However, problems persist in the higher education system regarding a lack of quality, relevance and choice of industry-oriented studies (OECD, 2003b). Enterprises in Denmark are requesting shorter courses of direct work relevance. New legislation seeks more flexibility for educational institutions to experiment with different study designs, although regulatory reforms need to be implemented to remove unnecessary controls over staffing, academic programmes, etc. to give universities more freedom to innovate.

The development of a coherent policy for higher education may be impeded by the diverse tracks of tertiary education, each under the jurisdiction of a different government Ministry. The academic track falls under the Ministry of Science, Technology and Innovation; the vocational track is under the jurisdiction of the Ministry of Education; and the arts-oriented track is under the Ministry of Culture.

Although technical courses are offered at other schools, Denmark has only one pure technical university (DTU), contributing to overall low levels of graduates with scientific, technical and engineering degrees. In addition, the education system at all levels has tended to stress humanities rather than more technical fields. There is now broad political support for removing the long-standing division between tracks on mathematics (*matematisk linie*) vs. linguistics/humanities (*sproglig linie*) in upper secondary school,

which should take effect from 2005/2006. Students will have more flexibility in choosing subjects and not be narrowly confined to particular tracts, which should positively affect participation rates in science and technology education at post-secondary level.

Generous government funding of tertiary education combined with long study periods leads to low social returns to education in Denmark (Blondal *et.al.*, 2002). The country has one of the highest levels of annual expenditure on educational institutions per student in the OECD. Danish students also tend to graduate at an older age due to later entry, simultaneous education and employment, frequent study breaks and prolonged study periods. In 1999, the median age of entry into tertiary education institutions was 23 in Denmark compared to an average 21 in the OECD and 18 in many English-speaking countries. Government grants combined with relatively high unemployment rates among tertiary graduates also contribute to the prolongation of studies.

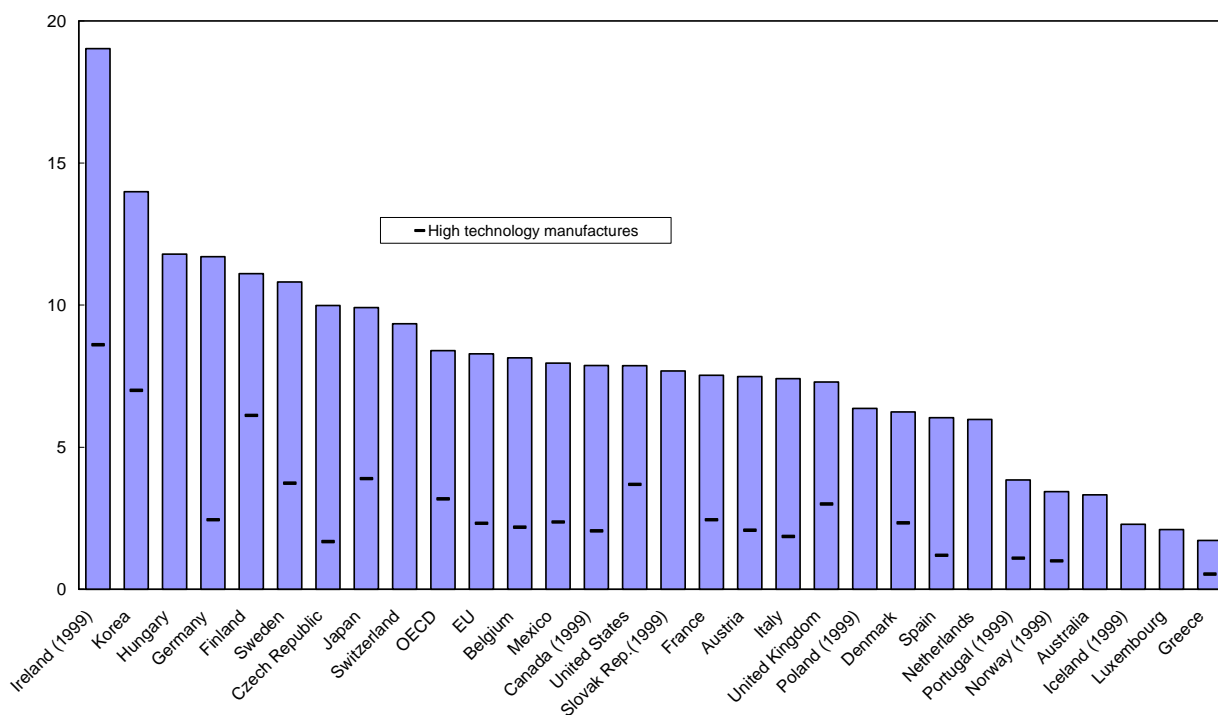
Steps are needed to promote earlier entry to higher education and to shorten study duration. For the university track, a bachelor's degree was introduced in the mid-1990s to enable the shortening of university education, but there has been little demand for this degree. This is largely due to negative perceptions on the part of both individuals and enterprises of the employment prospects associated with a BA. In addition to increasing the worth of the bachelor's degree, the government could shorten the length of time for financial support for students, offer loans rather than grants to students who lengthen their studies, generally tighten the rules on income support, and include a year of work experience in standard curricula (OECD, 2004).

Denmark's industrial structure partly explains demand trends for skilled workers. Compared to the OECD average, it has a smaller share of total value-added for high- and medium-high technology manufactures, which lowers overall demand for highly skilled workers (**Figure 3**). But the contribution of the fast-growing information and communications technology (ICT) sector to employment is slightly higher than the OECD average (**Figure 4**). Employment in this sector is stronger in ICT services than in ICT manufacturing. Generally, the uptake in ICT usage has been fairly high, with 35% of all firms progressing to advanced usage between 1999 and 2004 (DMSTI, 2004). In the ICT sector, higher demand is projected for specialised skills in ICT services (*e.g.*, software engineers) than for product manufacturing.

The National Labour Market Authority (AMS) predicts shortages of the highly skilled in the health care sector in terms of doctors and other medical staff and in the education sector in terms of teachers. Potential shortages are also predicted for university-educated personnel in the natural and technical sciences. University professors and researchers are forecast to be in deficit due to a wave of retirements in the next several years (OECD, 2003a). Whereas information technology workers have been among the labour force bottlenecks, only 2 out of 14 Labour Market Councils predict future shortages for this group (AMS, 2004). However, most current Ph.D. students are enrolled in non-technical fields, which could lead to future shortages of those with training in the hard science and information technology areas.

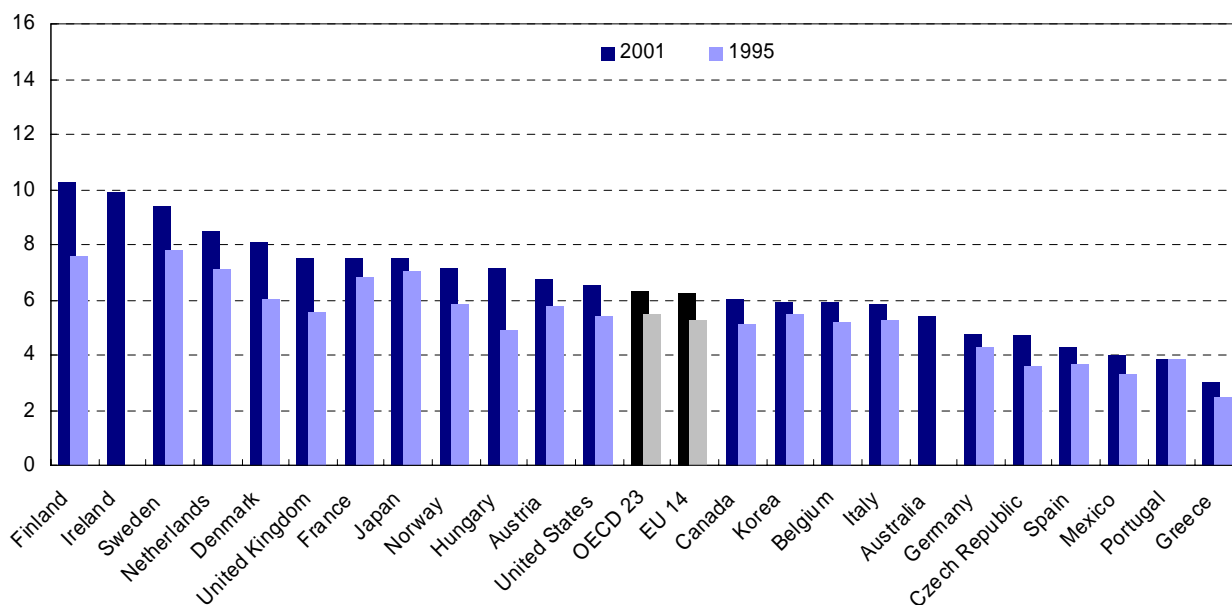
Denmark's rapidly ageing population will exert pressure on labour supply in general. By 2040, more than one in four adults will be over 65 years old. As the economy becomes more knowledge-based, demand for the highly skilled will increase. The Danish tertiary education system needs further reforms to hasten entry of graduates into the labour market and to produce highly qualified human resources adapted to the needs of the business sector. Employment opportunities for young tertiary graduates relative to other age groups should be enhanced. The supply of technical personnel and engineers, especially those trained in information technology, may become a bottleneck to growth. Globalisation of the economy will also increase the international mobility of skilled workers and aggravate potential shortages of the highly skilled in the domestic economy.

Figure 3. Share of total value-added for high- and medium-high technology manufactures, 2000



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

Figure 4. 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*.

POLICIES FOR HIGHLY SKILLED WORKERS

Overview

The 2002 *Danish Growth Strategy* includes an action plan targeted for *More People in Employment* with the intention of creating 87 000 new jobs by 2010, although these are mostly intended for the low-skilled. More than 20 000 of these jobs are expected to be supplied through reductions in unemployment and the remaining 67 000 through increases in the labour force, an ambitious target in view of the ageing population. Also included is a government plan to outsource public employment services through tender, partly to address criticisms that the public service is overly large and inefficient (DMEBA, 2002b). However, more targeted measures may be needed to enhance the supply of the highly skilled, reduce their unemployment and promote better matches of skills and jobs.

In addition to shortening tertiary education and increasing its relevance to business, public funds could be shifted from student supports to improving employment services for graduates. In general, vocational training has been institutionalised and tends to lack industry relevance. Also, improving entry rates into tertiary education by making it an attractive option for prospective students and providing incentives for universities to provide industry-relevant studies, are issues that need to be addressed (Klyngje and Riis, 2004). Although worker mobility is relatively high, further measures are needed to increase movement across the public and private sectors and to improve interactions between public research and business. Despite favourable tax treatment to attract foreign knowledge workers, Denmark also faces challenges in better integrating highly skilled immigrants and slowing growth in the ongoing brain-drain of skilled workers.

Monitoring supply and demand for highly skilled workers

The National Labour Market Authority (*Arbejdsmarkedsstyrelsen*) (AMS) has general responsibility for implementing and following up labour market initiatives in the different regions of Denmark. The public employment system is divided into 14 regions, each covering a county. The AMS supports these regions by preparing statistics, contributing general guidance when needed, and preparing and providing surveys and studies of the labour market. The main part of labour market monitoring consists of a quarterly forecast which focuses on employment, unemployment and bottleneck issues. The forecast is prepared by the 14 regional labour market councils, which are also responsible for prioritising and organising labour market initiatives in the regions. Since all tasks are managed through the AMS, the labour market monitoring effort is co-ordinated and unified to a large extent.

Special surveys are also conducted to highlight problem areas in the labour market. The 2002 government report, *Conditions for Growth in Denmark*, examined the characteristics of the labour market in terms of working hours, participation rates, taxation levels, investment and participation rates in education, and employability (DMEBA, 2002a). The report provided the basis for the 2002 *Danish Growth Strategy*. There are also efforts to increase the dissemination of information about labour market trends and supply of workers. For example, *Pathfinder (Stifinder)* is a new initiative to improve the job market particularly for unemployed tertiary graduates. It includes programmes to increase the awareness of smaller firms of the competencies and availability of skilled workers.

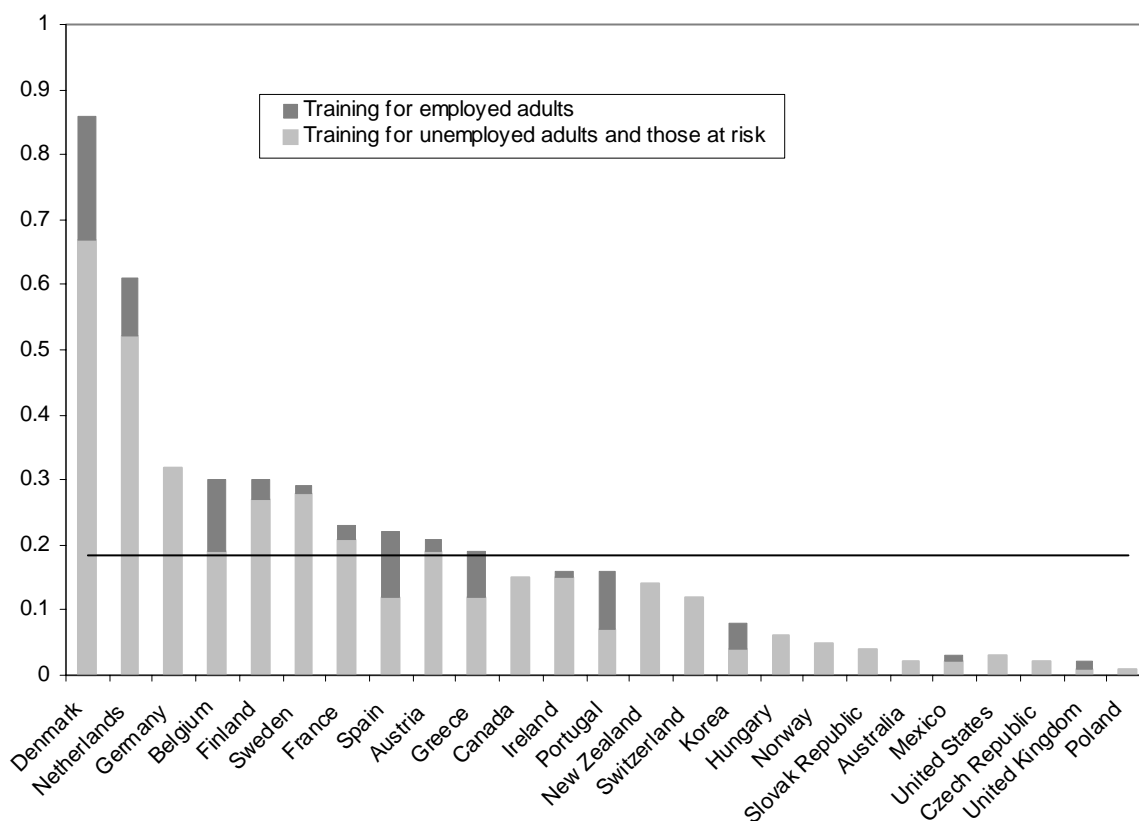
Trends in terms of skilled workers in Denmark are generally well monitored through the centralised AMS labour market surveys and forecasting system. However, in view of the relatively high unemployment rate of young tertiary graduates, surveys could be better targeted to identifying sectors in which skilled jobs may be created and what the specific skill requirements are. In order to better match supply and demand for highly skilled workers, information on projected vacancies, regional and sectoral job opportunities and

relative wages need to be more widely disseminated among firms, students and the unemployed. Programmes such as *Pathfinder* could be extended and strengthened to increase the transparency of labour markets.

Increasing enterprise and individual training

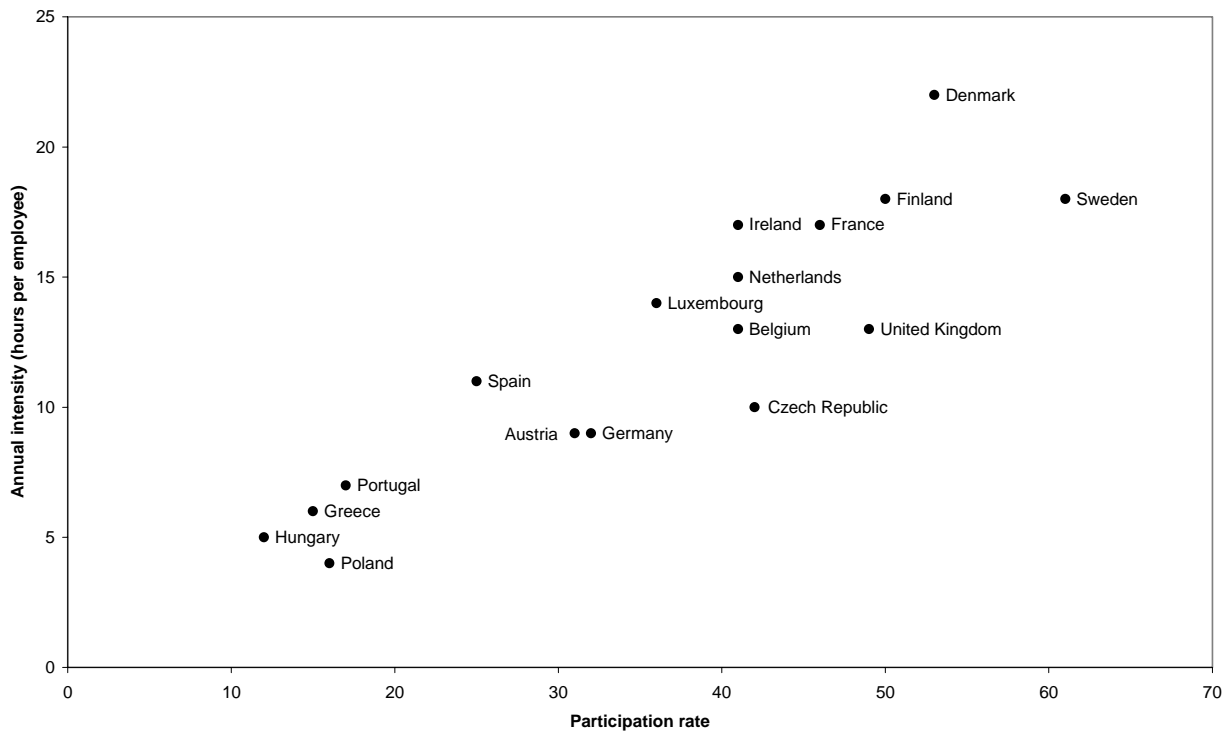
Participation in formal education at universities and vocational institutions is increasing in Denmark, albeit at a decreasing rate and slower than in other OECD countries (SD, 2002). According to a recent study by the Danish Economic Council, 74% of individuals surveyed with university degrees have taken part in continuous vocational training (CVT) in the past year, consisting of a wide range of education and training activities including on-the-job training, workshops and correspondence courses (DEC, 2003). Denmark has the highest level of government expenditures on training (as a share of GDP), including for skilled workers, in the OECD (**Figure 5**). In addition, the intensity of worker training as measured in terms of hours per employee is the highest among OECD countries for which data are available (**Figure 6**). Worker training programmes in Denmark are developed through tripartite co-operation with the government and social partners.

Figure 5. Labour market training in terms of public expenditure in % of GDP, 2002 or latest year



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

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 1999, Danish enterprises spent the most on training per employee (measured in terms of both direct costs and the labour costs of participants) among European countries (Nestler and Kailis, 2002a). However, Danish enterprises both contribute to and receive funding from a public training fund - the *Labour Market Institution for Financing of Education and Training*. The ratio of this funding to direct training costs is low in most European countries, but in the case of Denmark, enterprise contributions to the public training fund (3.5% of wage costs) are largely cancelled out by the receipts from the fund (3.4% of wage costs). Enterprises in Denmark receive public grants towards operational expenditures for training as well as supports to cover foregone earnings for adults during participation in training, which is available for both the high- and low-skilled. As in other OECD countries, employers may also deduct all investments in education and training of employees from their taxes. In 2002, a modest user fee was introduced to increase the “need-driven” nature of vocational training.

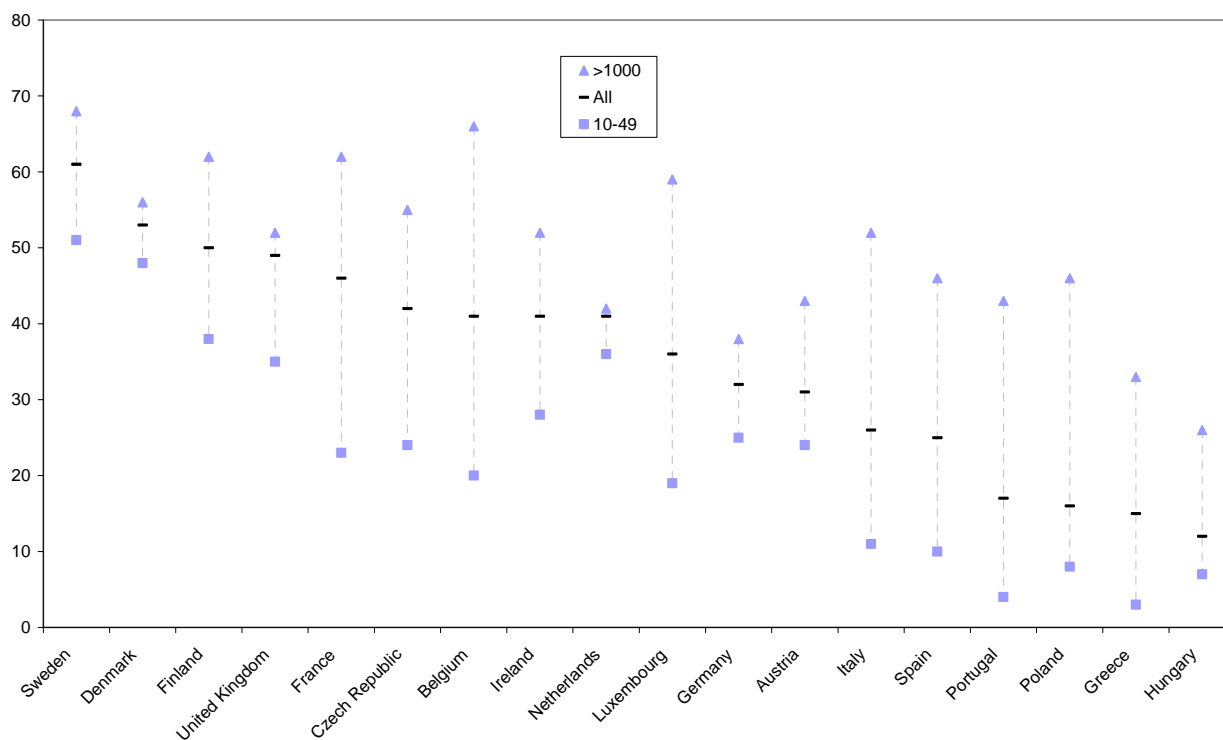
In Denmark, specialised training institutions are the largest provider of vocational training followed by private providers, industrial organisations and universities. This is in contrast to most other European countries where private providers play the largest role. Danish training providers (including private ones) are paid on a per capita basis by the state in the so-called “taxi meter” system. Since the “consumers” of training services choose the providers, and the providers are paid a fixed sum according to the number of students enrolled, this system stimulates competition between training providers in terms of pursuing cost efficiency. A recent evaluation found the training system to be demand-driven and cost-effective, although expensive for the government (DME, 2003).

As with other countries, larger companies invest more in training and education than small firms in Denmark. However, the difference in participation rates in training between employees of large and small

firms is far less than elsewhere (**Figure 7**). Owing to generous public supports, almost 50% of employees of small firms (less than 50 employees) participated in some form of training in 1999. Over 90% of larger enterprises conduct assessments of worker training as well as 71% of smaller enterprises (Sørensen, 2001). There is also a recent government initiative to strengthen the use of the Internet and e-learning in relation to continuing education and training for small and medium-sized enterprises.

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*.

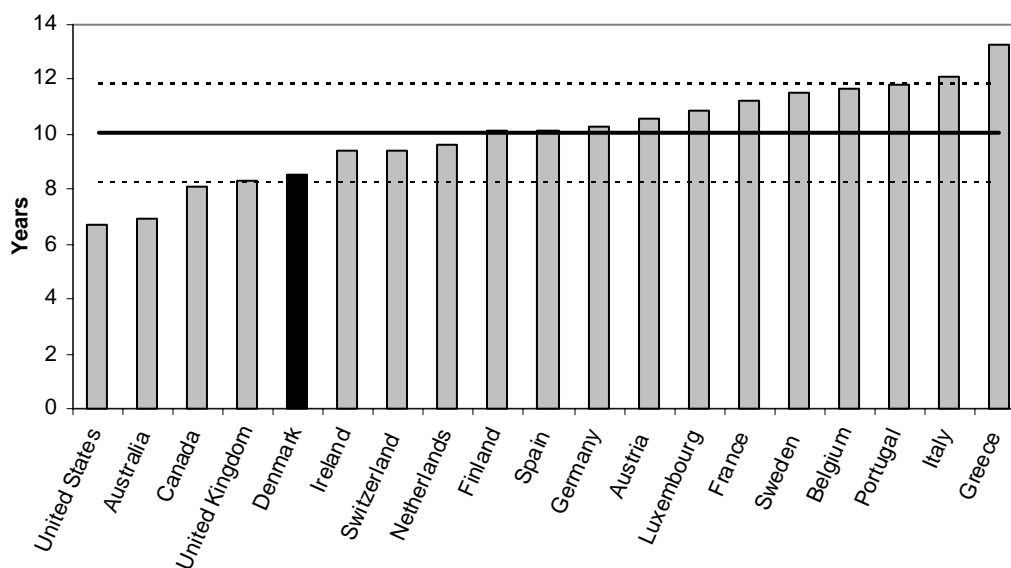
Incentives for individuals to pursue training are considerable, with most direct and indirect costs paid by the government. The *Danish Leave Scheme* provides income support to individuals while in training. Employees must have 3 years of employment in the previous 5 years and can take up to one year of training leave over a 5-year period. The *Adult Education Reform* of 2002 provided a framework for recognising skills and competencies acquired informally or on-the-job, although a formal system for recognition of prior learning has not yet been put in place.

Denmark's high enterprise training rates come at great expense to the government. In 2004, the government established a Committee with the social partners to evaluate the training system, particularly its overall cost-effectiveness. While the approach for distributing funds to training providers stimulates competition and good quality, the taxi meter system may need to be recalibrated. There is little attention to the issue of how to mobilise private funding for training activities either from enterprises or individuals. Policies to make training more demand-led by leveraging co-financing would also help ensure that training is relevant to industry needs. Approaches such as *Individual Learning Accounts* (ILAs), higher user fees and/or increased enterprise contributions would increase incentives to pursue relevant training at lower cost to the government.

Enhancing national worker mobility

Worker mobility is relatively high in Denmark compared to other OECD countries, including for the highly skilled. Denmark has a lower than average rate of employee tenure, measured as years of continuous employment with the same employer (**Figure 8**). Compared to the anglophone OECD countries, the employee tenure rate is higher, but significantly so only in comparison to the United States and Australia. Denmark's relatively low tenure rates are partially due to flexible employment practices, including liberal laws as regards hiring and firing and a generous unemployment benefit system. Worker mobility is further enhanced by an industry structure which consists largely of smaller enterprises.

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*.

Several studies attest to Denmark's flexible labour market. In the late 1990s, approximately 30% of the employed were newly hired, while 30% of workers left the workplace; there were no important differences by educational level (AMS, 2003). The job mobility rate, measured as the change of employer as a percentage of employment, was on average found to be 20% per year in the private sector between 1980 and 1995 (Frederiksen and Westergaard-Nielsen, 2002). Similarly, for the manufacturing sector, an annual job mobility rate of 24% was found between 1980 and 2000. Data on inter-industry mobility rates are lacking, but for manufacturing industries the intra-industry mobility rate is 8%, whereas the inter-industry mobility rate including the public sector is around 13% per year (Olsen *et al.*, 2004). In general, mobility across the public sector is lower than in the private sector (Madsen, 1999).

While overall movement among the university-educated is high, the mobility rates are far lower between the public and private sectors. This trend is evident especially for researchers. Intra-sectoral job mobility of researchers may be high, but between the public and private sectors, their mobility is very modest. This is partly attributed to the difficulties publicly-employed researchers have in matching their research fields with the demands of private firms and to the difficulties companies face in getting their R&D efforts acknowledged by the public research system (Graversen, 2002). One recent policy for enhancing national worker mobility has focused on stimulating interactions between business and public research institutions to encourage the cross-over of researchers (DMSTI, 2003a)

Although Denmark still has a relatively flat wage structure in more highly skilled professions, wage formation practices have become more flexible in both the public and private sectors in recent years. In the private sector, wage bargaining and negotiations relative to working conditions are left to the trade unions and employers' federations with little or no intervention from the government. While there is no minimum wage legislation, there is a minimum wage agreement between the social partners. Wage-setting has thus become increasingly decentralised and is largely at firm level, with only non-wage issues such as pensions and working hours dealt with at the central level. In the public sector, however, it is still the norm that wages are set through central biannual wage bargaining procedures. In order to promote more performance-based pay for public servants, the number of steps on the wage ladder has been recently reduced.

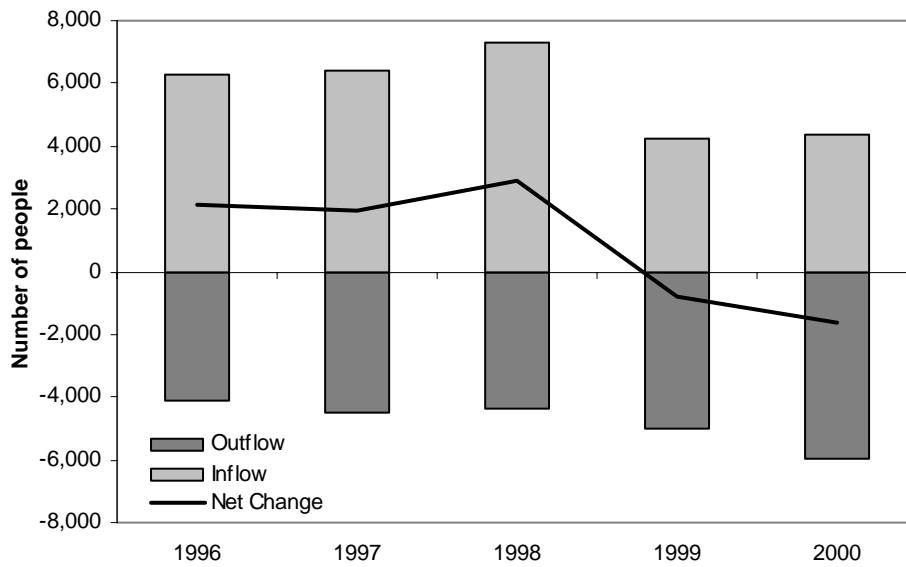
Mobility challenges in Denmark relate primarily to increasing worker exchanges between the public and private sectors. Denmark has a large public sector, with limited incentives for workers to take up industry employment and somewhat adverse attitudes to entrepreneurship. The relative rigidity and security of the public employment system has contributed to a mismatch of skills available to meet business requirements. The government needs to increase the flexibility of public employment practices, including those relating to wage-setting and pensions, to match those in the private sector and accelerate the downsizing and outsourcing of government activities at all levels.

Adjusting to international worker mobility

In addition to low levels of skilled immigrants, there are indications that Denmark is experiencing a brain-drain of the highly skilled. The net outflow of highly skilled workers (as measured by income) was more than 1 500 in 2000, twice as many as in the early 1980s. Based on data on educational attainment, the net inflow of people with tertiary education was over 2 000 in 1996, but changed to a net outflow of over 1 600 persons in 2000 (**Figure 9**). Danish representation among highly skilled foreign workers in the United States, as a percentage of the Danish population, is relatively low (**Figure 10**), but is growing rapidly.

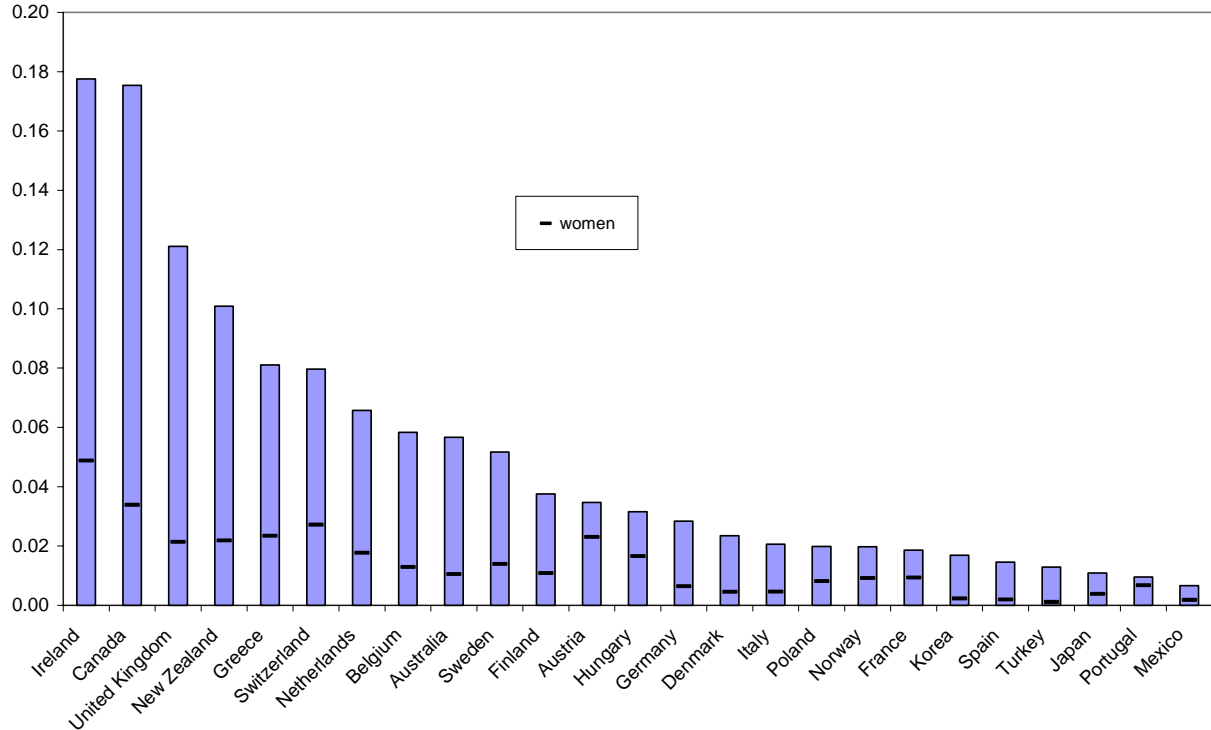
There has been a large increase (47%) in the emigration of university graduates from 1995 to 2000, which partly reflects the corresponding increase in the total number of graduates. Yet, the distribution of the emigrating graduates raises concerns since there is a disproportionately high share of science and technology graduates, accounting for 40% and 38% of those who emigrate. The absolute outflow in these fields has totalled more than eleven thousand since 1981. While the humanities account for about 25% of all graduates, very few emigrate. Of the graduates who leave the country, 66% return after 7-8 years (DMEBA, 2003).

Figure 9. In-/outflows of highly-educated people
(Flows of people to and from Denmark with a medium/long tertiary education)



Source: Statistics Denmark (2003).

Figure 10. High-skilled foreign workers in the United States, 1999



Notes: Non-US OECD citizens with science and engineering doctorates in the United States as % of source country's population.

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

On the other hand, Denmark has limited inflows of the highly skilled. Denmark is at a disadvantage in attracting foreign skilled workers owing to language barriers, compressed wages, high taxes and a lack of appropriate jobs, which are the same factors encouraging emigration (DMSTI, 2003c). In general, regulations for foreigners entering, working and residing in Denmark are quite strict and act as a disincentive. The percentage of foreign knowledge workers and managers (2.4%) is among the lowest among OECD countries. The estimated yearly inflow of highly skilled people who receive work and residence permits has been about 400 in recent years. In 2001, about 300 information technology specialists were allocated work and residence permits and 150 had their permits extended. But highly skilled immigrants tend to leave Denmark faster than the low-skilled, and there are several thousand highly-educated foreigners who are either unemployed or who occupy unskilled jobs (DME, 2001). Many skilled immigrants do not benefit from their qualifications due to the lack of a system for recognising their formal educational credentials.

In order to enable Danish businesses to attract foreign knowledge workers, tax provisions were introduced in 1992 offering certain foreign workers and researchers favourable tax treatment while working and living in Denmark. Under this scheme, key employees recruited abroad can obtain a significantly lower tax rate (25%) for a maximum of three years of residence in Denmark. As of January 2004, there were over 1 500 foreign knowledge workers taking advantage of the tax breaks. The government also introduced a *Green Card programme* in 2002 to encourage increased inflows of skilled workers for selected science and technology sectors, including engineers, doctors and nurses, and more recently, information technology workers. Foreigners with job offers in designated sectors can get work and residence permits for up to three years with a possibility of extension and can also bring their families to Denmark (AMS, 2004).

The government recently set up a website, *workindenmark.dk*, targeted to skilled workers, which gives information on moving to, living and working in Denmark. Detailed information is given about working conditions in Denmark, including salaries, the annual leave system and the public health insurance scheme. However, studies show that the motivations and preferences of foreign knowledge workers differ according to nationality. In the competition for the highly skilled with countries such as the United States and the United Kingdom, Denmark must narrow its focus and aim at attracting those whose preferences match the country's comparative advantages. In this regard, East European countries are considered more feasible sources than, for example, Asian countries (DMSTI, 2003c). There is also a need to increase the awareness of Danish companies and research institutions of the availability of foreign workers and their preferences.

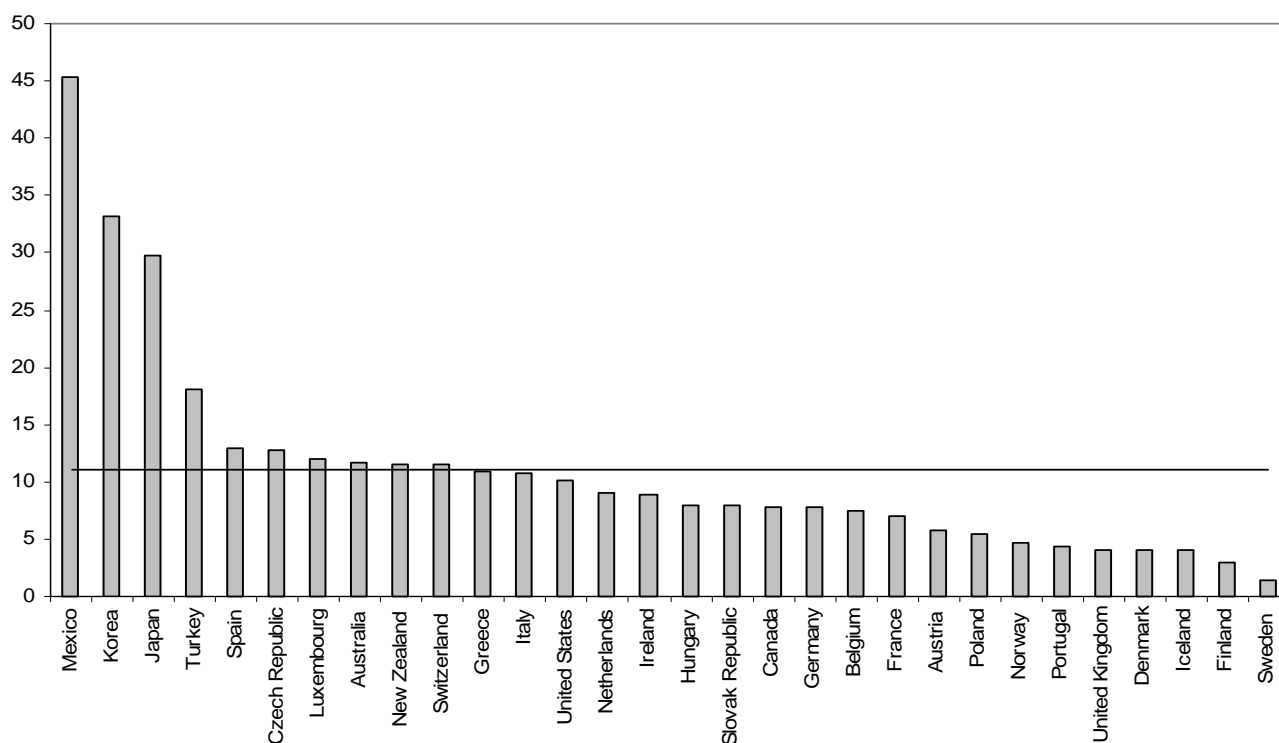
The government has joined in broader efforts to enhance international worker mobility. In 2004, the Nordic ministers responsible for employment initiated a joint scheme, the *Inter-Nordic Digital Job Fair*, to use information technology to share job opportunities across borders. Denmark is creating a Danish mobility network for researchers in order to become an active member of the *European Network of Mobility Centres*. The government has also published an analysis of best practices in the recruitment and employment of highly skilled workers from abroad based on the experiences of 15 Danish companies and research institutions.

In order to boost labour supply and employment, Denmark needs to ensure better integration of highly skilled immigrants in the labour market including through language and cultural programmes. Although the government announced its intention to assure the certification of foreign degrees and diplomas, little action has been taken. Measures to recruit the highly skilled from abroad, including information programmes and the green card scheme, should be strengthened and targeted to nationals of countries which are most likely to provide immigrants to Denmark. The country should also counter-act an increasing brain-drain of its technical graduates by providing attractive employment opportunities at home and adopting schemes to repatriate highly skilled emigrants.

Increasing workforce participation by highly skilled women

As in other Nordic countries, the gender employment gap for highly-educated women in Denmark is among the lowest in the OECD (**Figure 11**). Among the highly skilled Danish, there are only minor differences between the employment rates of men and women, and the gap is smaller than for the total population. In October 2003, the unemployment rate of the university educated was 6.4%, with male unemployment at 6.3% and female unemployment at 8.4%. The Danish labour market tends to be gender-segregated in terms of sectors. Participation of women is very high in the humanities (where unemployment is rising), health care and education and very low in other, more technical fields.

Figure 11. Gender employment gap for highly-educated women, 2002



Notes: Percentage point difference between the employment rates for men and women with tertiary education.
 Source: OECD (2004), *Employment Outlook*.

The gender wage gap in Denmark is among the lowest in Europe, generally between 12% and 17% although there are large differences across sectors (Pedersen and Deding, 2000). Efforts are being made to further narrow the wage difference between men and women, which is partly due to the gender-segregated labour market. Denmark, together with Sweden and Austria, has gained financial support through the European Union for reviewing the wage bargaining process and making it more gender neutral. Given the decentralised wage bargaining system in Denmark, this will require increased interaction and dialogue between the government, the social partners and enterprises. The gender mainstreaming strategy of the public employment system is focused on countering this sectoral segregation through more detailed registration of the qualifications of unemployed women and a better match of their competences with different sectors.

Initiatives have also been taken to increase the number of women in decision-making positions. At present, Denmark is among the OECD countries with the lowest share of female leaders in both political and

professional sectors (UNDP, 2003). The Ministry of Science, Technology and Innovation has developed performance contracts with universities to increase female professors in science and technology fields and the number of female PhD students, to employ more gender equality experts, and to conduct evaluations of the outcomes of these initiatives (DMSTI, 2003b). However, more could be done to stimulate further elevation of women in the public and private sectors.

High female labour force participation in Denmark has been supported by the favourable evolution of child benefits (where disposable income for families with two children increased by over 8%) and a lengthening of paid parental leave (which increased from 16 weeks to over 40 weeks). Denmark is now one of the most generous OECD countries in terms of these provisions. In addition, the relative tax rate of second earners to single persons has decreased from above to below the OECD average (Jaumotte, 2003). Recently, the government introduced measures to make parental leave even more flexible by providing options to prolong leave to a maximum of 52 weeks, granting parental leave of up to 32 weeks with financial support, and providing for sharing parental leave between parents or postponing leave.

Since 1999, Denmark has had a *Ministry for Gender Equality* which took over the responsibilities of the former Equal Status Council. The Ministry is responsible for overall activities in the field of gender equality and co-ordinates the equality work of other ministries. In accordance with a gender mainstreaming principle introduced in 2000, government ministries and other public institutions are “to promote gender equality between women and men by incorporating a gender and gender equality perspective in every aspect of state policy, planning and management” (GD, 2002). A five-year action plan was adopted whereby all ministries are to adopt concrete initiatives such as bills, budgets, data, statistics and other information from the point of view of gender and gender equality. A steering committee will review and guide ministry initiatives and evaluate progress at the end of the five-year period.

Denmark ranks highly among OECD countries in terms of female labour market participation, the narrow gender wage gap and its family-friendly policies. Gender equality and gender mainstreaming are stressed in all government programmes and evaluation mechanisms are in place for assessing these initiatives. A number of concrete steps have been taken to further narrow the wage gap, primarily through broader representation of high-skilled women across industrial sectors and technical fields. Efforts to facilitate and promote labour market entry of females in those sectors where they are not well represented should be accelerated.

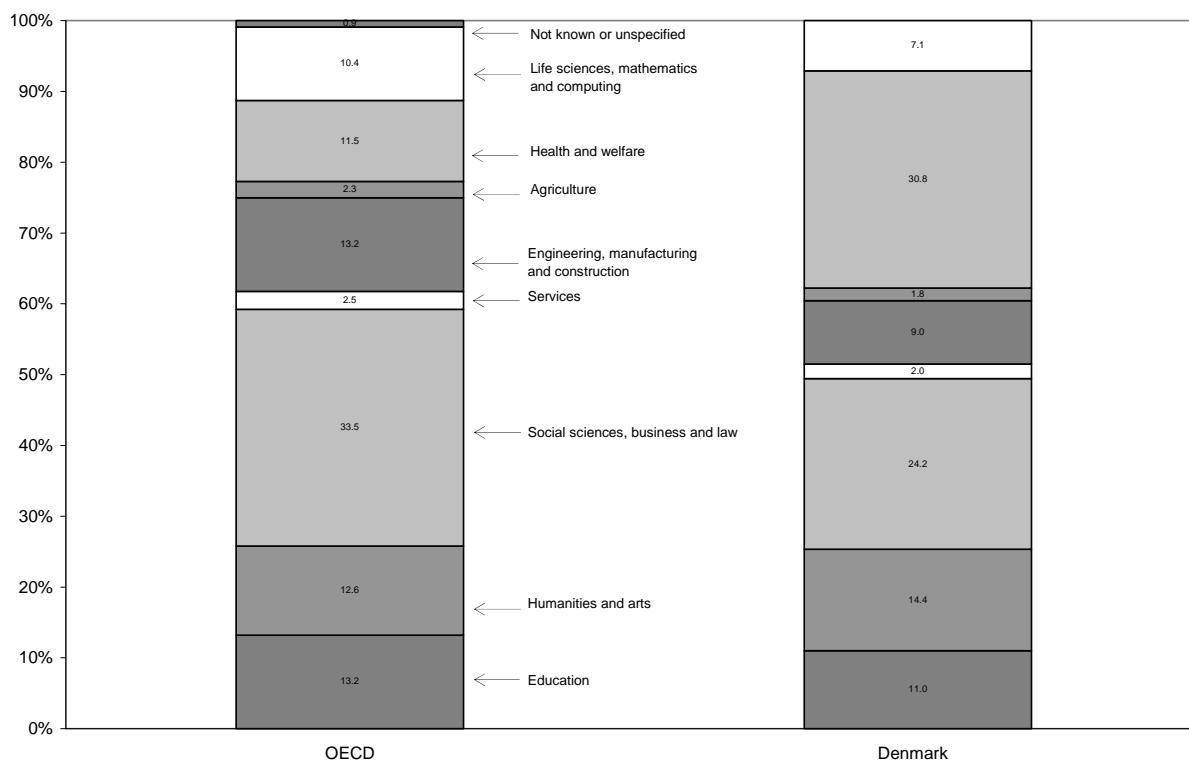
Developing human resources for science and technology (HRST)

Fostering the development of human capital for research and high-technology industrial sectors is a major policy issue for Denmark. Expenditures on research and development (R&D) at about 2.1% of GDP are slightly lower than the OECD average, but growing at a faster pace. Business research expenditures are slightly above OECD average, and the share of research financed by industry is growing, whereas that financed by the government is decreasing. These trends imply that demand for researchers and human resources in science and technology (HRST), especially in the private sector, will continue to grow.

However, the composition of tertiary graduates by field of study is not encouraging from this perspective (**Figure 12**). Compared to the OECD average, a larger share of students specialise in health and welfare and a smaller share in life sciences, mathematics and computing, engineering, manufacturing and construction. Denmark has a below-average share of graduates in science and engineering compared to the OECD countries at a little over 20% (**Figure 13**). There is a higher share of graduates in science than in engineering in contrast to Sweden and Finland, which have a much larger share of graduates in engineering. This is attributed to the structure of the tertiary education system. Sweden and Finland have well-developed technical universities whereas in Denmark, there is only one university out of twelve

focusing on technological training and research. Other tertiary education institutions focus on teacher training and medical sciences and have few offerings in engineering (OECD, 2003b).

Figure 12. A-level tertiary graduates by field of study



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

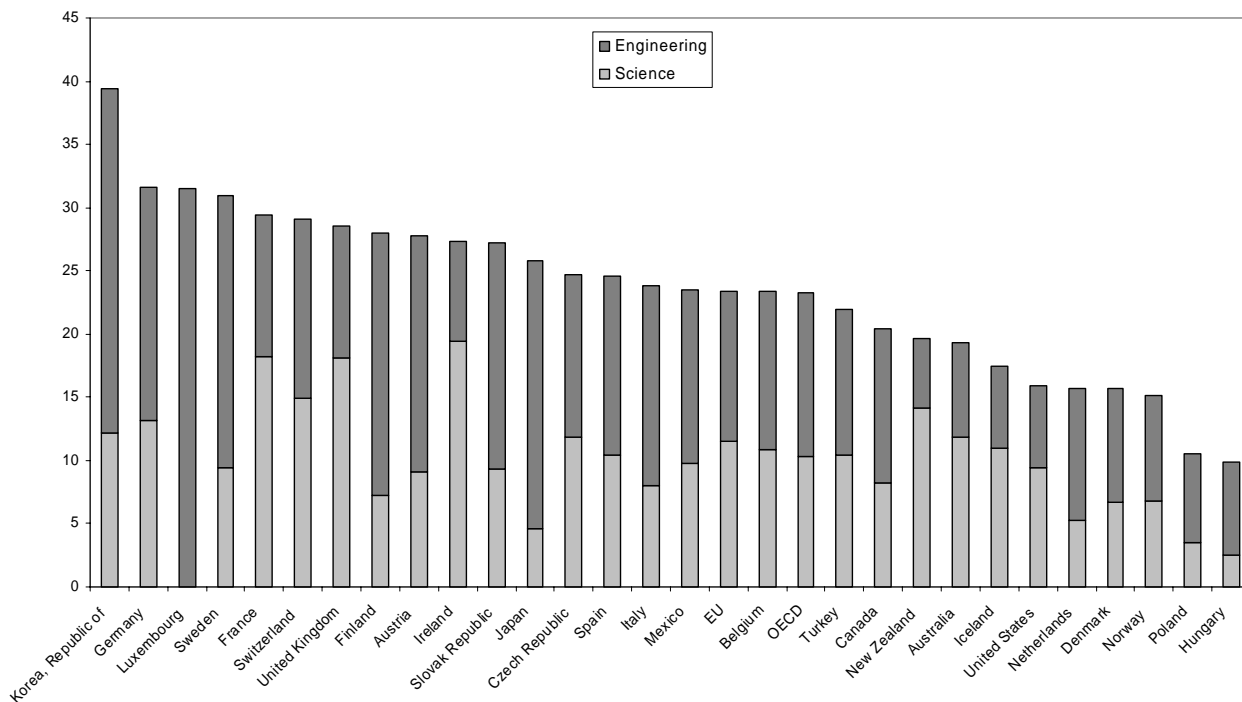
Finland and Sweden also provide financing incentives to higher education institutions to create relevant and attractive courses, increase educational attainment and assure that their graduates find employment. These institutions are encouraged to have a close dialogue with the businesses in their surrounding environment and to play a central regional role. Grants to students, to some extent, are based on post-graduation employment. Denmark could provide greater economic incentives to higher education institutions and students to increase the level and relevance of their education (Klyngje and Riis, 2004).

Although the quality of Danish research is high in terms of the number of scientific publications and citations, the number of scientists and engineers in employment does not compare with other OECD countries. Interaction between public research institutes and the private sector is also limited. According to an “interaction index” comprising five research-related items, Denmark is ranked in the middle compared to twenty other OECD member countries, indicating unexploited potential in fostering more interaction between the business sector and public research (DMEBA, 2002b).

To meet these challenges, the Danish government recently introduced the action plan *New Ways of Interaction Between Research and Industry – Turning Science into Business* (DMSTI, 2003a). This aims to promote joint research and innovation through restructuring appropriation schemes to fund collaborative projects and establishing centres of excellence and research consortia. Universities are encouraged to form strategic alliances with private training programmes as well as international alliances for continuing education. Highly skilled human resources are to be fostered through industrial Ph.Ds and post-Ph.D. programmes directed at business and offered collaboratively with public research institutions. More flexible leave-of-absence schemes for researchers will encourage them to start businesses or take up

temporary employment in the private sector. One initiative is a website for knowledge co-operation, *vidensamarbejde.dk*, which provides information to companies and research institutions on increasing linkages. In addition, rules concerning intellectual property rights arising from collaborative research are to be modified to alleviate conflicts of interest.

Figure 13. Science and engineering degrees as % of new degrees, 2001



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

In the shift to the knowledge-based economy, the demand for human resources in science and technology will likely grow more rapidly than supply in Denmark. The recently introduced reforms to enhance public/private research interactions and introduce flexibility in the public research sector are steps in the right direction. Measures to reform job structure and work conditions for researchers at universities should enhance the supply of skilled labour for industry. However, reforms in the tertiary education system to increase graduates in science and engineering and increasing the business relevance of the content of education are also needed.

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