

Part II

LABOUR SHORTAGES AND THE NEED FOR IMMIGRANTS: A REVIEW OF RECENT STUDIES¹

Introduction

Economic, demographic and political developments, combined with the mounting concern about the future of labour supply have renewed the attention of policy-makers on labour migration issues. A good economic climate and years of economic growth in some OECD countries have led to increasing employment, higher participation rates and lower unemployment rates. Employers started to experience difficulties in filling vacant posts, concerns about the availability of labour on domestic markets arose and the first calls for immigrant labour echoed.

The increasing diversity of migrant's nationalities and of the migration channels used, as well as the growing proportion of movements of temporary and skilled workers in total migration flows reflect the influence of increasing internationalisation on international migration. Migration has not, however, accelerated at a pace comparable to trade flows and capital movements (Tapinos and Delaunay, 2000).

Demographic developments in OECD countries imply an ageing workforce and ultimately result in a declining population of working age. The possibility that these developments also result in labour shortages at the macro-level has added an extra dimension to discussions on the need for immigrants. In the medium term, as early as 2015 for some countries, the increasing number of retiring baby-boomers will in some occupations lead to a replacement labour demand that may be hard to fill from domestic labour supplies. Some countries with low labour force participation rates may be able to use their large labour reserves.

Policy makers have various instruments available to react to potential labour shortages. Increasing

participation rates, postponing retirement ages, stimulating the labour market participation of women and immigrants are among those instruments, as is facilitating selective employment-related immigration policies. Whilst each of these instruments may contribute, no single instrument in itself can promise the complete solution. However, faced with the urgent need to meet a growing demand for workers with specific skills in certain sectors, some countries have already started to facilitate labour market access for skilled immigrant workers. Some countries have considered recruitment of immigrants on the basis of their human capital, *i.e.*, through selective immigration, to compensate for an ageing workforce. Hence, the policy relevance of considering the complete set of options as well as the advantages and limits of selective labour immigration.

The aim of this chapter is first to show how a number of OECD member countries estimate the current and forecast labour shortages (A). The role of migration in alleviating future labour market needs will be then presented (B). Section C will review sector specific and micro-level studies making the link between labour shortages and the need for selective employment-related immigration policies.

A. MEASURING CURRENT LABOUR SHORTAGES

Labour shortages are not easy to measure. At the macroeconomic level, reference is made to falling unemployment rates and increasing employment, sometimes coupled with accelerating real earnings to indicate growing labour market tightness. However, labour market tightness is better measured by comparing actual unemployment rates

with structural rates of unemployment; frictional and structural labour market rigidities can be a cause of persisting unemployment combined with wage inflation. Because structural rates of unemployment are not readily available, unemployment rates are sometimes given in relation to the vacancy rates for a specific occupation (defined as ratio of the number of vacancies and the number of employed in that occupation). Zimmerman *et al.* (2002) have calculated Beveridge curves for 1980-95 for 40 occupational groups in Germany.² They have found indications of shortages in the early 1990s for engineers, stone masons and technicians, persisting until 1995 for health-related occupations. In France, the occupational job-seekers ratio, defined as the ratio of the number of job-seekers in a specific occupation to the total of job-seekers and employed workers in that occupation, provides a disaggregated illustration of the tightness in the labour market. It indicates increasing tightness in the labour market in construction and mechanical industries (DARES, 2001a and 2001b).³

1. Trends in national statistics on the number of registered vacancies by sector of employment and occupational category

Increases in the number of vacancies in and outside the high-tech sectors⁴ in non-European OECD countries give similar indications of strongly increasing numbers of unfilled job vacancies, concentrated in a small number of not necessarily highly-skilled occupations. For example, the Australian vacancy bank *Job Search* listed as the top four most wanted occupational groups among the total of 40 500 job vacancies in mid December 2001: Labourers, Factory and Machine Workers (9 000); Food, Hospitality and Tourism (5 600); Sales Assistants and Storepersons (4 200); and Gardening, Farming and Fishing (3 700) (DEWR, 2002).

Another possible measure of labour market shortages is found in employers' reports where they express their concern about the consequences of developing shortages of qualified workers in certain occupations. The surveys confirm the picture that vacancy data give: shortages appear to be concentrated in specific sectors but these sectors are not the same across countries. The results also show that employers experience shortages mainly at higher skill levels, but not exclusively (see Annex II.1).

2. Causes of labour shortages

Labour shortages have a variety of causes. They may occur because of a lack of geographical mobility on the part of the workers. They may be the result of a mismatch between qualifications. For example, there is evidence of a mismatch between the low qualifications of the numerous unemployed and inactive workers and the high qualifications needed in Germany's technology intensive industry (Winkelman, 2001; Munz and Ochel, 2001; Süßmuth, 2001). Zimmermann *et al.* (2001) find evidence of mismatch-unemployment in shifting Beveridge curves for welders, technicians, electricians, occupations in the food industry and construction workers, carpenters and painters. In other cases, the occupation's image is not good enough, at the going wage rate, to attract a sufficient number of workers, even if supply is abundant. Klaver and Visser (1999) find this effect for different sectors in the Dutch economy. Among the other important factors explaining labour shortages are demographic factors, rapid technological progress and the resulting change in employment structure towards highly skilled labour cyclical variations in demand, production and the derived labour demand, rigid wage structures and collective agreements (Munz and Ochel, 2001; Australian Productivity Commission, 2000).

The Netherlands, for example, argue that labour shortages would develop less if the number of separations were reduced⁵ (Tweede Kamer, 2001b). The Belgian Federal Planning Bureau (FPB) finds in the absence of a positive wage drift and inflation the indication that general labour shortages are neither an issue now nor in the medium term. However, demographic developments may change the situation for the longer term (FBP, 2001). Austria considers labour shortages as a consequence of mismatches in the labour market, but takes the demographic developments into account when predicting the medium term consequences (Biffl and Walterskirchen, 2001). The various explanations of the existence of current labour shortages and the potential effects of demographic trends result in a number of different definitions of labour shortages.

To sum up, the different causes of labour shortages identified from the studies discussed in this chapter can be summarised as follows:

- Continuing technological change may lead to a structural shortage of workers in possession of the needed skills: workers neither had the

time nor the opportunity to invest in these skills.

- Slow adjustments in the labour market may cause shortages. It takes time for employers to recognise labour shortages and to react to them, for example by offering higher wages. It also takes time for workers to recognise better opportunities elsewhere and to react to them. Employers may be reluctant to raise wages or are tied to collective agreements or inflexible remuneration structures.
- Mismatch: wrong education investment decisions resulting in too few engineers, scientists and doctors, for example.
- Insufficient regional labour mobility.
- Institutional or demographic causes: a high number of people in retirement or invalidity pensions, low female participation rates.

There is no universally applied definition of labour shortages. In part this reflects the fact that they are not easy to measure. Macroeconomic data do not reveal that tightness can be severe for some occupations whilst absent in others. Employer reports and surveys confirm that shortages occur in specific occupations and at different skill levels. However, employers report on recruitment difficulties but not on labour shortages *per se*. The studies discussed in this chapter define labour shortages in different ways to explain their possible different causes and forecast their potential development.

3. Labour reserves exist but it would be difficult to mobilise them rapidly

The arguments in favour of attracting immigrant workers to solve labour shortages rest partly on the assumption that the resident labour supply is insufficient, or of inferior quality, to meet labour demand. But if the number of resident unemployed and inactive people can largely fill labour demand in quantitative terms, then why not proceed that way? The answer to this adds considerably to the sensitivity of the issue of labour migration. Some governments hold the view that the unused resident labour supply is sufficient to solve the present and future labour shortages – for example, Finland and the Netherlands – and do not envisage any changes to the existing restrictions on labour immigration rules. At the same time, both these countries, like many others, facilitate the immigration of highly skilled workers for occupations where the national labour market cannot supply sufficient labour.

The need for immigrant labour depends in large part on a country's initial situation. Countries with low unemployment rates and high activity rates, like Norway, might exhaust earlier opportunities to retrain unemployed workers and inactive people than countries with a more abundant stock of people not in work. Two factors play a determining role: the size of the potential labour force and the obstacles to labour-market integration that certain groups face.

The resident potential labour supply consists of unemployed people, people available but not participating in the labour market and people not available and not participating. There also is potential labour supply among people who are employed involuntarily in a part-time job. The group of unemployed people can be further divided into recently unemployed people and people who have been unemployed for a longer period of time. The former could be referred to as frictional unemployment, which is caused by a number of people in the process of changing jobs.

The second group of people, the non-participants, is a much more heterogeneous group than that of the unemployed. Other than the unemployed, not all non-participants are available for work – they may be facing serious obstacles. A considerable part of this group consists of people whose health does not allow them to work. Another part is formed by people who are otherwise not available for work either because care-giving tasks occupy their time or simply because they do not wish to work. The unavailability for work may be temporary, as for students and others temporarily or partly inactive because of education or professional training.⁶ But there are also a number of people who are in principle available for work although they are not actively looking for work.⁷

The size of the unused labour supply varies enormously, ranging in 2000 from 18 to 22% in Switzerland and Sweden to 40% in Italy (OECD, 2001e). Some research argues that for countries like the Netherlands (Tweede Kamer, 2001a and 2001b) and Belgium (Feld, 2002) latent labour supplies are such that general labour shortages are not likely to develop.

The OECD has recently started to investigate the potential labour supply.⁸ Based on the observation that on average for the OECD slightly more than 55% of the working age population in 1999 was in full-time employment, the OECD report aims to

indicate the potential for full-time employment among people in part-time employment, unemployment and inactivity. The remainder, 45%, is either (partly) unemployed or (partly) inactive and, in theory, represents the latent labour supply. Unemployed people accounted for 5% and the biggest chunk, more than 27% of the entire population of working age, was not in the labour force for various reasons.

Labour Force Survey questions on the reasons for not looking for work are subject to a certain amount of interpretation. For example, respondents referring to family responsibilities may mean that they are unable to free themselves of these responsibilities because of non-availability of child-care or because they do not wish to work under current conditions. The availability of child-care could be the object of a policy initiative whereas changes in the individual's personal situation or in labour market or policy inducements to participate could change his/her preference to work. In this regard, the answers to the questions on the desire to work would help distinguish "real" impediments from what could be termed "competing activities" (OECD, 2002d). However, respondents who indicate no desire to work may well change opinion, for example students in their final year.

A considerable portion of the working age population is not actively engaged in any form of employment or study. This is referred to as the resident latent labour force. To the extent that governments succeed in mobilising this unused potential, current labour shortages can be alleviated, reducing the need for immigrant labour. The analysis shows that the most important potential is among middle-aged inactive women, most of whom have less than intermediary qualifications. Another important target group is youth, a state of things caused by a mismatch between education out-turn and labour demand. Further work is needed to obtain timely quality labour force data for the OECD countries. More analysis is also needed to establish the type of education and recent experience of the latent supply.

B. THE ROLE OF MIGRATION IN ADDRESSING FUTURE LABOUR MARKET NEEDS

1. Demographic challenges

Two phenomena mark current demographic trends in most industrialised countries. Fertility

rates on the one hand are very low – well below the replacement level of 2.1 children per woman – and falling. On the other hand, people's life expectancy at birth continues increasing, which goes together with improving prospects of a healthy old age. The combination of low fertility and increasing longevity means that population growth rates are slowing down and that there is an increasing proportion of elderly in the total population.

The prospect of rising shares of the elderly in the population and falling shares of the population of employment age to support pension and health systems has been an issue of previous OECD work (OECD, 1998a and 1998b). Population ageing will have far-reaching effects, some of which are of particular importance for the discussion of the role of migration policies:

- Demographic developments will change labour supply. The labour force changes in composition as the share of older workers grows, and it may dwindle if people continue retiring early. The number of new entrants into the labour market may be insufficient to replace retiring workers.
- The ageing of the workforce may adversely affect macroeconomic performance if future labour supply is inadequate to meet the qualitative and quantitative need for workers to sustain economic expansion or preserve present welfare levels.
- The growing number of people relying on retirement benefits will shift the balance between working people (contributors) and inactive people (beneficiaries) to an extent that may put the finance of social security systems at risk.

The role of migration in addressing these challenges, in particular the third issue of financing social security, was the subject of a recent UN report (UN, 2000). The report concluded that keeping old age dependency ratios at current levels through migration alone seems out of reach because of the extraordinarily large numbers of migrants that would be required. The study presented different scenarios with regards to international migration streams needed to achieve specific population objectives: to maintain the size of the population and of the working population or to maintain the old age dependency ratio at a constant level. The study estimated that to keep the old age dependency ratio constant at the highest level it would reach in

the absence of migration after 1995, “for the EU alone a total number of 674 million migrants over the 2000 to 2050 period, or 13 million per year” would be needed. In comparison, the 1998 revision Population Prospects (medium variant) on the basis of current flows estimated the total over the entire period at 13.5 million or a yearly average of 270 thousand (UN, 2001).

Despite its extraordinarily high estimates the UN report has attracted a lot of media attention and certainly has helped to put the discussion of labour migration issues back high on the political agenda. Increased immigration has the advantage of having an immediate effect on the age and composition of the population because of the younger age structure of net migration. In addition, fertility rates of immigrant women are often relatively high, which can boost fertility and hence long-term population growth. However, the role of migration policies in addressing these challenges can only be complementary to other policies and is subject to a number of practical and political constraints (OECD, 1991).

Tapinos, for example, noted with reference to the UN report that further analysis of the practical and political issues involved in the implementation of an effective demographic and labour market oriented policy is needed. This would enable OECD member countries to have a clearer picture of the extent to which international migration can contribute to positive outcomes (Tapinos, 2000). He quoted different reasons why immigration cannot be a sole solution to population ageing:

- Most OECD countries share the same demographic pattern and the bulk of immigration would have to come from outside the OECD area.
- Migration cannot be treated as a control variable because there are too many factors that limit the ability to control and select migration flows. In addition, migration policies have limited effects on return migration.
- Because the means available to monitor the trend of net migration differ across countries, it is unclear whether migration policy targets are actually attained.
- Finally, immigrants have a better chance of integrating in a society that experiences a natural increase, which reduces the value of immigration as a substitute for declining fertility rates.

Two important observations moderate the extreme hypothesis of the UN report. First, the choice of time horizon is essential to the evaluation of the demographic effects of migration and, more relevant to the present context, of the effects of demographic developments on the labour market. The second observation is that the UN uses its projections of the old age dependency ratios on the assumption that labour force participation and retirement ages do not change. The development of the size of the labour force is under those assumptions proportional to the size of the working age population as shown in Chart II.1. Chart II.1A shows that Australia, New Zealand, Ireland, Canada, and the United States are exempted from the trend of declining working age populations. In many other countries, the working age population will decline rapidly and will fall well below its present levels by 2030. Chart II.1B shows a number of OECD countries with decreasing working age populations. The countries are grouped by the size of their populations. The working-age population will decrease, according to UN projections, slowest in France (–8% by 2050) and fastest in Italy (–42% by 2050). In the Netherlands, the working-age population will decrease by 14% by 2050, in Austria by 36%. The decline of the working age population appears to be relatively moderate in Belgium, Denmark and the Netherlands, the United Kingdom, Norway and France, but rapid in most other countries.

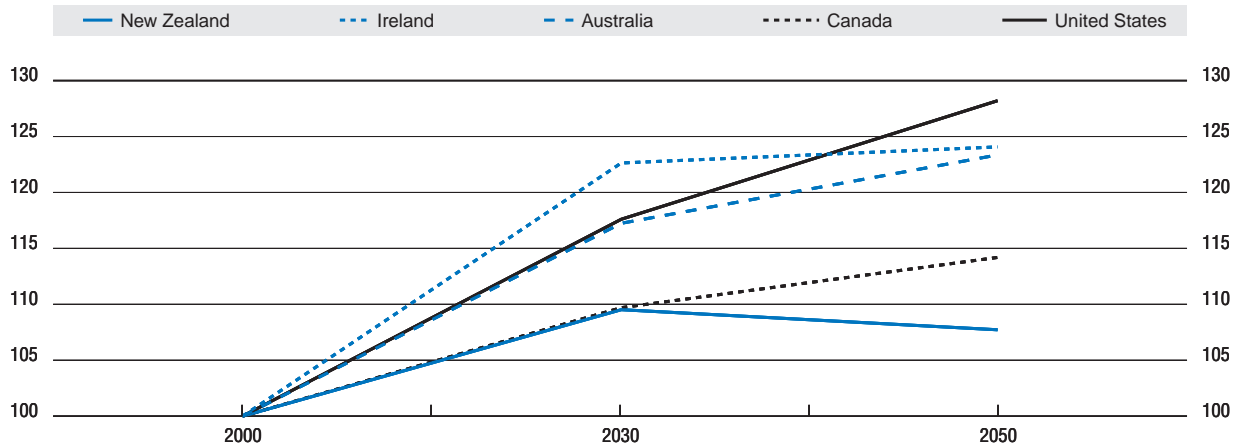
In this context, Tapinos notes that the old age dependency ratio is a demographic ratio that compares age groups and should more realistically be replaced by the ratio of retired persons to employed persons (Tapinos, 2000). Depending mainly on female participation, average retirement ages and on employment rates, there may be a significant difference between the two ratios. The following discussion shows how some countries take account of expected changes in labour force participation rates and retirement ages in the forecasting of labour force developments.

Migration and sustaining the labour force⁹

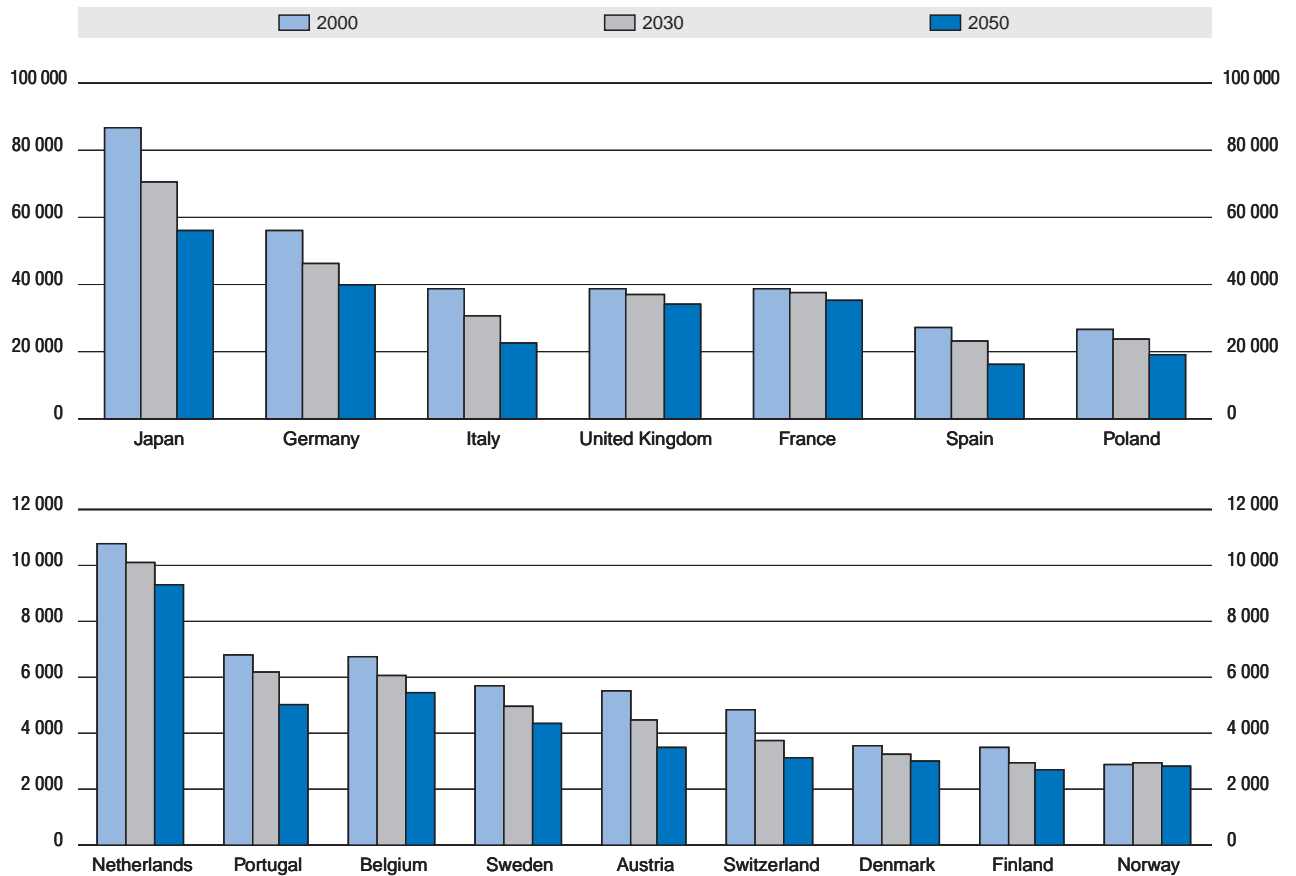
Based on the UN Population Projections of 1999, the Council of Europe has analysed the effects of demographic changes in the working age population on employment and unemployment (Council of Europe, 2000). The study addresses the question of how and to what extent labour migration may be affected by labour shortages, thereby taking into account the possibility that activity rates change

Chart II.1. Projections of the working age population (15-64) in selected OECD countries

A. Countries with working age populations increasing by 2050
2000 = 100



B. Countries with working age populations decreasing by 2050
Thousands



over time and across countries. It does not, however, take account of the effects of possibly changing actual retirement ages. Up to 2010, the size of the labour force is projected to increase in all countries. Projections are given up to 2020 for France, Poland, the Netherlands and Austria; a declining labour force can be seen in Austria, France and Poland.

Chagny *et al.* (2001) forecast the development of the European labour force, taking into account the effects of migration and changing participation rates. Allowing for an annual immigration that rises from 700 000 persons in the 1995-2000 period to 900 000 persons by 2020, the authors expect the European labour force to decline rapidly after 2015. Taking the analysis of the interactions between demographic trends and the labour force one step further, Feld (2001) looks at 15 EU countries for the period of one generation (25 years) ahead. The author specifically addresses the question whether population ageing will lead to labour shortages and, if so, whether large-scale immigration will be necessary. Bringing together information from different countries using a common methodology, Feld calculates when the labour force in the EU countries will fall back to its 2000-level. He distinguishes between demographic effects (fertility, life expectancy and migration) and behavioural effects (participation rates, retirement age, size of the school-going population). According to Feld's estimate, behavioural effects can compensate for demographic effects in Denmark, France, the Netherlands and the United

Kingdom, but not in the other countries. This could imply a need for more migration, except in the cases of Ireland and Portugal, where the demographic effects are positive.

Feld concludes, however, that the evaluation of the role of migration in attenuating the expected declines of the labour force has a number of methodological and political problems. Forecasts of labour force developments assume that migratory flows in respect of age composition and participation rates are identical to the host country population and neglect the fact that net migratory flows involve inflows and outflows that may vary hugely in composition and magnitude (see also Box II.1). Another issue is that situations of neighbouring countries may vary considerably; labour shortages in some countries may occur 10 or even 20 years before they emerge in other countries.

For Scandinavian countries, the Nordic Council of Labour Ministers recommends a number of actions to deal with the expected decline of the labour force. First and foremost, they intend to mobilise the latent labour supply among four target groups: the ageing population; inactive and unemployed youth; inactive adults and inactive and unemployed foreign-born residents. They do not, however, give quantitative estimates of the potential impact of any of these measures but compare best practices among Nordic countries. One of its conclusions confirms the findings for the EU quoted above (increased migration might contribute to

Box II.1. Gains and losses in high skilled labour through migration

Migration involves inflows and outflows that may vary hugely in composition and magnitude. Some countries have recently drawn up the balance of skill gains involved in immigration and skill losses involved in emigration.

As a result of the international movement of skilled workers to and from Australia over the five-year period 1995-1996 to 1999-2000, Australia registered a net "brain gain". There was a net loss of skilled residents but this loss was more than offset for almost every occupation by gains from permanent and temporary immigration. The lack of quality data leaves open the possibility that Australia is losing high quality residents and replacing them with lower quality settlers and visitors, albeit in greater numbers (Birrell *et al.*, 2001).

Canada suffered a net loss of skilled workers to the United States in several economically important occupations during the 1990s, although the numbers involved have remained small in an historical sense and small relative to the supply of workers in these occupations. (See also Bordt in OECD, 2002b.) However, whilst losses of highly skilled workers to the United States accelerated during the 1990s, so too did the influx of highly skilled workers into Canada from the rest of the world. The balance is neutral: the number of master's and doctoral graduates entering Canada from the rest of the world is equal to the number of university graduates at all levels leaving Canada for the United States (Zhao *et al.*, 2002).

shifting the trend of an ageing workforce). Restricting the immigration of people with low qualifications to prevent integration difficulties is among the policy options; the Nordic Council of Labour Ministers cautions that in this case integration policies need further attention (Nordic Council, 2000).

At the level of individual European countries, studies of demographic impacts on the labour market often confirm the expected trends summarised in the preceding paragraphs. Some of them illustrate the role migration could play in combination with other policies.

- For France, Blanchet (2001) finds contradictory evidence in a literature review of demographic impacts on trends in wages, employment and unemployment. Domingues Dos Santos (2000) looks into the budgetary effects. She argues that to maintain the financial sustainability of the social security system (*i.e.* pension system) with the given unemployment rate, either the retirement age should be raised by 11 years, benefit levels reduced by 14% or contribution rates increased by 4.5%. Whilst both papers discuss the demographic impacts on the labour market, they do not refer to migration as a policy alternative.
- The German Institute for Employment Research (IAB) estimates the potential domestic labour supply from 1996 to 2048 under different assumptions about female participation rates and higher immigration (Fuchs and Thon, 1999; IAB, 1999). IAB argues that German labour supply will decline, whatever policy is chosen. However, high immigration does postpone the year when labour supply will start to decline, especially in combination with an increase in labour participation rates. For example, in the scenario whereby female participation rates catch up with male participation rates and net immigration is zero, the labour force would start to decline by 2000. If in a similar situation, 500 000 immigrants per year as of 2000 are admitted, the onset of the labour force decline could be postponed by 20 years to 2020.
- The Netherlands Bureau for economic policy analysis (CPB) established on the contrary that ageing will have fairly modest economic consequences in the Netherlands, because

the demographic change is limited compared to other EU countries and because it has a large second pillar of privately funded occupational pension schemes (Van Ewijk *et al.*, 2000). However, the study makes some assumptions about participation rate, life expectancy, productivity growth and world interest rates (which might not hold), and fiscal policies alone may not be enough to achieve budget neutrality. The CPB assumes that the bulk of immigrants will come from Third World countries and argues that because their current participation rates are much lower than for natives, they are much more likely to be benefit dependent and add to the stock of inactive persons living off public money.

The Australian Treasury directly links the growth of working-age population to economic growth, thus implying positive effects of net immigration (Australian Treasury, 2000). Withers (1999) demonstrates that a proper estimation of migration rates should include dependency ratios and related budget costs. This can result in an argument in favour of much higher immigration; it would have the effect of halving the public cost of an ageing population. However, McDonald and Kippen (2001) argue that the budgetary effects of higher migration are not clear because the immigrant population also ages. In their estimates, net immigration of about 80 000 persons a year makes a reasonable contribution to the reduction of the ageing of the population. Higher numbers are less effective, mainly because the immigrant population also ages. By comparison, Australia's net immigration has ranged between 80 000 and 107 000 between 1995 and 1999 (OECD, 2001d).

For the United States, the Centre for Retirement Research finds that men and women between 25 and 54 years old account for 71.7% of the labour force in 1998 but expects that their share will fall to 68.1% as early as 2006 (Hammermesh, 2001). As the oldest baby boomers will begin to retire, the implications for the workforce could be enormous (Gottschalk, 2001). The current tight labour market situation could be exacerbated, hindering prospects of economic growth and putting a greater burden on those remaining in the workforce, perhaps forcing them to work longer hours. After 2008, as more and more baby boomers reach retirement age, the impact of their retirements will continue growing (Dohm, 2000).

2. Special studies on the economic need for migration

The developments raised in this chapter, combined with the mounting concern about the future of labour supply have triggered a number of special studies of the economic effects of international migration and the need for foreign labour. The motivation for each of the studies is to provide a basis upon which policy-makers can decide on the need to review migration practices and policies and on the manner in which eventually such revisions could be made. It appears that employer reports of a shortfall of qualified labour supply and studies on the demographic impacts on the labour force and labour market have not been sufficient.

Germany

The German commission on immigration (Süssmuth Commission) has undertaken a study of the role of migration in the economy, now and in future (Süssmuth, 2001). Among its main findings are:

- Large pools of unused labour reserves consisting of unemployed and inactive people co-exist with increasing labour demand. Lack of qualifications is the main reason for the unemployment of around 4 million people. However, the report does not give a clear answer as to the extent to which the present labour demand can be met through activating and upgrading the skills of the unemployed.
- Immigration can contribute to maintaining present economic welfare levels conditional on the good integration of migrants. Better qualified and younger migrants have more immediate and more sizeable positive effects.
- If Germany maintains a net immigration at 200 000 yearly – the average level for the past 20 years – the decline of the German population will be limited to 12 million people. Without immigration, it will shrink by 23 million people by 2020 compared to 1999/2000.¹⁰ The share of older people in the population (relative ageing) will increase whatever the migration scenario, because migrants age as well.
- Immigration has significant effects on wage-flexibility and investment in education. Therefore immigration intake should start at modest levels to give the market time to

adjust to immigrant labour. If migration started with 100 000 yearly, implying a cut in migration compared to the actual situation,¹¹ increasing to 150 000 a year by 2020 and then further to 300 000 a year the active labour force would decline least and economic growth would be maximised.

The activities of the Süssmuth Commission have led to an entirely new and coherent immigration law that should come into force on the 1st of January 2003. This law establishes clearly the rights of foreigners to remain and work in Germany and simplifies the existing law. As to labour migration, the law distinguishes high-skilled from low-skilled workers. Only the highly-skilled are eligible for a permanent permit. However, where shortages exist, the decision to resort to temporary immigrants can be made at a regional level. The law refers to a points-system, yet to be developed, as an additional instrument to attract immigrants. Such a system would be subject to separate approval by the German *Länder*.

The United Kingdom

The Home Office, in charge of immigration and integration, has published a study aiming to contribute to: “a sound understanding of the impact of existing policies affecting migration and migrants, and a framework for assessing the costs and benefits of potential alternatives” (Glover *et al.*, 2001). The study looks at migration “in the round”; proceeding with a discussion of the Government’s higher level objectives and examining the social and economic outcomes that current policy delivers. The study embraces the idea that migration enables industries to expand. Using the information technology (IT) industry as an example: “so if migration of workers in particular sectors is restricted [...] then it will not be primarily the case that supply of, and wages of native British IT workers will increase. The IT industry will simply shrink relative to what would have happened with a less restrictive policy.” The estimate is that a 1% population growth through migration could be associated with a 1.25 to 1.5% increase in GDP for European countries.

Like the German report, the Home Office study is an ad-hoc report that focuses not only on the need for foreign labour and migration policy but analyses the past and present effects of migration as well. Both studies result in a number of policy recommendations. But whereas the German study is

very detailed and extensive, and definitive in that it has led to a proposal for a new immigration law, the UK study serves as a basis for further work. It does not address any of the issues related to the demographic impact on labour supply nor a humanitarian immigration and family reunion, which the German report covers, and hardly touches on the need for good integration policies. However, the study also fits into a broader government-commissioned framework making use of existing infrastructure to improve the documentation on current and future labour market bottlenecks, analysing why companies ask for workers with new skills and – ultimately – assessing labour demand and skill needs (DFES, 2001c; Haskel and Holt, 1999).

Austria

A particularly sizeable study by the Austrian Institute of Economic Research (WIFO), co-funded by the European Social Fund (ESF), the Ministry of Economics and Labour (BMWA) and the Ministry of the Interior (BMI) covers demographic challenges, the educational attainment of foreign-born residents, foreigners' labour market integration, crowding-out effects on the labour market, family reunion, social costs and macroeconomic aspects of immigration. Among the main conclusions are (WIFO, 2001):

- Net immigration can contribute to sustained economic growth and to solving problems related to the sustainability of the social security system, next to a better use of the resident labour potential. However, current migration policies are not adequate to deliver these contributions because family reunion and humanitarian immigration play a dominant role, while labour immigration is marginal.
- Increasing participation rates of the sizeable foreign-born resident population will only have limited success because their qualification structure is too much concentrated on skills that are in low demand. The integration of immigrants' children could be accelerated by legalising accompanying families as quickly as possible, thereby helping them in establishing an education career and helping Austrians in building a higher skilled labour force. However, the Austrian education system is as yet not set up to train the relatively small cohorts of the future labour force for those qualifications that are in growing demand.

- Austria has become a net-immigration country without developing the instruments for an immigration policy. The basics for a targeted immigration policy do not exist yet. Inconsistent data about the foreign population do not give sufficient insight into the resident labour supply. Acknowledging the potential contribution that a qualifications-oriented migration policy can make to solve many economic and social problems may ease the introduction of such policies.

Norway

Against the background of tight labour markets in 1997 and 1998, the Norwegian Ministry of Local Government and Regional Development, which has the responsibility for immigration and integration, commissioned a pan-departmental task force with a study of labour market needs and recruitment possibilities from abroad (Kommunal-og Regionaldepartementet, 1999). The task force proceeded in two steps. First, it identified 11 strands to immigration policy; second, it made recommendations as to the feasibility of each of these strands. Their final report gives very little attention to the evaluation of current labour shortages, other than stating that shortages can be observed but cannot be forecast. Depending on the world-economy, however, and given the near-full utilisation of Norwegian domestic labour supply, present shortages are likely to persist, although they may well shift from one sector to another. Demographic developments will inevitably lead to growing labour market tightness. The main text appears to take the need for foreign labour for granted, although the magnitude may vary according to the scenario.

The report stresses the fact that labour immigration inevitably involves the immigration of people with differing needs for housing, public services, etc. Some options or decisions may cause a conflict with the leading principle in Norwegian politics that all citizens should have equal opportunities, rights and obligations. What to do, for instance, with temporary residents? The task force recommends facilitating the entry of high-qualified specialists and seasonal workers. This needs relatively few adjustments to immigration law and may offer a flexible framework in reaction to the ever-changing labour demands. It will have many positive and few negative side effects.

The Netherlands

The major government institutions in the Netherlands have produced a vast body of research covering microeconomic effects of immigration, the demographic challenges as discussed above, issues of social and labour market integration and case studies of immigration experiences in neighbouring countries and in the United States.

- The Netherlands Bureau for Economic Policy Analysis (CPB) for the first time since 1972 has estimated the labour market effects of migration for the Netherlands (Roodenburg and Van den Boom, 2000). They find that the international evidence need not necessarily hold in Holland among other things because old-age pensions are largely capital funded and more or fewer migrants will hardly effect its affordability. However, they also argue that the social security system is relatively generous compared with that of the United States (where most evidence is based) and costs/benefit ratio may well be negative. They observe that the high population density in the Netherlands may cause much more serious congestion effects than elsewhere.
- The Dutch Scientific Council for Government Policy (WRR), considering that the Netherlands has developed into an immigration country, has initiated a new study on the Multi-Cultural Society (WRR, 2001a). In the context of the study, the WRR has asked several researchers to compile the information necessary to form a solid empirical foundation for policy advice. The issues covered mostly deal with the integration of foreigners into society, ranging from the institutions of Islam in the Netherlands and the demographic profile of foreign born citizens to the effects of advanced economic integration and migration policies in other EU countries. In its final and concluding report on the study, the WRR recommends that policy should facilitate immigrants' integration, but at the same time oblige immigrants to fully participate socially and economically in all segments of society. As to labour migration, the WRR recommends that the government should consider international labour migration as a form of international labour participation and simplify bureaucratic procedures. It explicitly recom-

mends selective and temporary labour migration (WRR, 2001a).

- The Social and Economic Council (SER), commissioned by the Minister of Social Affairs and Employment, has looked into possibilities for improvement of the low intra-EU labour migration and to analyse the potential benefits for the Dutch labour market, in particular in alleviating current labour shortages (SER, 2001). The study identifies obstacles in legislation that should enable EU-citizens to reside and work in an EU-country of their choice. But more importantly, the SER has found that the access to certain professions is limited for citizens from other EU-countries. Examples are jobs where certain certificates are required that may not be obtainable in other EU countries, the incapacity of employers to judge the value of foreign degrees and certain government-jobs that are closed to foreigners. The SER also makes recommendations to better enable job-seekers to orientate themselves in other EU job-markets.

C. STUDIES ON LABOUR SHORTAGES AT MICRO-LEVEL AND THE NEED FOR IMMIGRANT WORKERS

Macroeconomic studies may establish the positive overall effects of migration, the consequences of ageing and the effect of raising participation rates and lowering retirement ages on labour supply; they cannot explain on what migrant-characteristics selective immigration policies could be formulated. Nor can they explain how many immigrants could and should be recruited to meet labour market needs and for how long these needs can be expected to last. These questions are important against the background of the general tendency, particularly in European and Scandinavian countries, to call for restrictions on migration.

Studies by sector or occupation exist in many countries but only some of them relate the development of labour demand to labour supply. These studies often give an indication of labour market prospects for an occupation or a specific kind of education related to that occupation. More recently, kinds of education with good job prospects have been related to labour market tightness. The very limited number of studies that establish a direct link between emerging labour shortages and the need for immigrant labour will be discussed below.

1. Sector-level studies on the need for immigrant workers

The overview in Annex II.1 of employer association's reports and surveys among employers suggested that employers have a pretty good picture of the recruitment difficulties that they can expect in the near future. Economic studies on labour shortages, on the other hand, indicate that precise quantitative estimates may not be that straightforward to give.

- The Centre for International Economics (CIE), commissioned by Australia's association information and communication technology (ICT) employers, estimates that Australia will experience shortage of ICT-professionals. The shortfall of ICT professionals with a university degree is in this study estimated quite precisely at 27 500 persons for the period 2000-2005, over and above the number of graduates and migrants that are already expected to join the industry during that period. Among the reasons for the shortage the CIE mentions a too restrictive immigration policy and emigration to the United States (CIE, 2001).
- The Technology Administration of the United States Department of Commerce has for a number of years drawn attention to the looming shortage of information technology (IT) workers (USDOC, 1997a and 1997b, 1999b). The Technology Administration has weighed the views of employers, who believe that there is not enough trained labour supply, and employees, who believe that labour supply is sufficient both in quality and in quantity, but that industry does not do enough to mobilise existing labour pools. A recent report describes trends in sector-level labour supply and demand and discusses signals of labour market tightness. It anticipates a need for more than 2 million new IT workers in the 2000-2008 period, of whom 15% are to replace retiring and departing workers and 85% to support new job creation. Of these jobs, more than three fourths require at least a bachelor's degree. The report gives signals of developing labour market tightness and implies important shortages at higher skill levels. It discusses developing the latent labour supply of women and older workers, improving the IT-sector's image and interesting

more youth in IT-oriented studies, but does not give estimates of the extent to which these shortages could be covered by the domestic labour force. The report apparently believes that this is sufficient to cover labour needs because recruiting professionals from abroad is not among the policy recommendations to meet the future IT labour-market challenges (USDOC, 1999a and 2000).

- In 1999, the German Ministry for Labour and Social Affairs gave an estimate of 75 000 unfilled job vacancies in the ICT sector and a growth potential for 250 000 jobs in the 1999-2008 period. It drew consequences for migration policies from this observation and gave the starting sign for a programme to strengthen the supply of ICT specialists. The best-known element of this programme is the "Green-Card" initiative to ease the entry of ICT-specialists from outside the European Economic Area (EEA). After 11 months, only 8 000 Greencard visas had been granted, instead of the planned 20 000 (BMA, 2001). The main drawback of the initiative is seen to be the temporary nature of the visas, which are limited to five years. However, the initiative did yield some benefits. First and foremost, it intensified the discussion on the topic of immigration and has contributed to the coming-into-being of the Independent Commission on "Immigration" (Werner, 2001). Also, being part of a bigger programme, it proved successful in raising training places and educational slots at schools, universities and within companies. It is also worth noting that those companies who did employ foreign IT workers with a Green Card showed some important positive spin-offs of immigration. In particular (BMA, 2001):
 - For each Green Card holder, 2.5 complementary posts have been created;
 - More than four out of five companies report having obtained a higher competitive standard through employing the Green Card holder, and nearly half say they have eliminated capacity problems;
 - Nearly one-fifth of all participating companies have renounced plans to relocate a part of their business abroad.

2. Studies on labour shortages by occupation

A great number of studies project employment growth either two, five or ten years ahead but give no indication of labour shortages. They do not analyse the development of labour supply and are not linked to immigration policy questions. In general, occupational demand projections estimate future replacement and expansion demand:

- Labour demand as a result from the need to replace workers who leave a specific job, switch occupations or leave the labour market altogether is a function of the number of people taking retirement, the average age of (early) retirement, mortality and invalidity. But temporary separations, for example people taking sabbatical leave, functional mobility and emigration, also play a role. If employment growth is low or nil, labour demand will mostly consist of replacement demand.¹²
- The demand for labour to support business expansion is a function of economic developments, the phase in the economic cycle, economic policy, technological progress and globalisation, among other factors but these factors need not influence the demand in different occupations across the labour market to the same extent. Economic growth in the last decade has stimulated labour demand in some sectors more than in other, *i.e.*, ICT and construction. The changing structure of economic growth, in favour of the tertiary sector, or the above-average growth of specific occupations, add an extra dimension and difficulty to the forecasting of labour demand.¹³

Studies of labour demand by occupation can predict where employment growth will be the fastest. Annex II.2 gives an overview of projections of occupation-level labour demand for 12 OECD countries. The United States, for example, annually publishes the *Occupational Outlook Handbook*. The Office of Occupational Statistics and Employment Projections, under the Department of Labor, develops information about the labour market for the nation as a whole for 10 years in the future. Total employment is projected to increase by 20.3 million jobs over the 1998-2008 period, rising from 140.5 million to 160.8 million, according to the latest projections of the Bureau of Labor Statistics – (BLS, 2002). Although employment growth rates will go down compared with those of the previous 10-year period, the economy will continue generating jobs for work-

ers at all levels of education and training. Growth rates are projected to be faster, on average, for occupations requiring at least an associate degree than for occupations requiring less training. However, the largest volume of job creation will be in occupations requiring less formal education or training, even though many of these occupations are projected to have below-average growth rates. There will also be numerous job openings resulting from the need to replace workers who leave the labour force or move to other occupations (Braddock, 1999; see also Thomson, 2000). Note that BLS has just started with a *Job Openings and Labour Turnover Survey* (JOLTS) to measure labour market tightness and labour market (matching) efficiency but has not yet analysed the issue of labour shortages using JOLTS.

To quantify the need for workers in short supply estimates of both the quantity and quality (*i.e.*, the skill-level), of labour supply, also need to be made. The supply of labour for a specific occupation consists of first-time labour market entrants, unemployed people and people who move jobs, and suitable people temporarily outside the labour market. The number of first-time entrants in any forecast period can be worked out by grossing up the number of students leaving education in that period and the number of people who have left education just before the forecast period and did not gain employment.

A complicating factor in making accurate prognoses about labour supply is the link between education and employment. It is impossible to determine the supply of labour-market entrants on an occupation-specific level on the basis of the annual number of graduates. To begin with, it is not accurate to determine specific levels of qualifications from the various types of schools. Some schools deliver a standard qualification level but for other qualifications, notably those required for ICT-occupations, there are no fixed standards of reference. Another difficulty in the forecasting of first-time entrants by occupation or by type of education is that the influence of labour market developments and education policy on young peoples' decisions to choose a certain occupation or a certain type of training is almost impossible to model.

The most obvious method to estimate future labour market tightness for first-time entrants is to work out the development of demand by occupation and to determine which type of education is most wanted for the various occupations. If the demand of first-time entrants with a certain type of

education is greater than the supply, labour market tightness may result. However, a number of things can obscure the resulting picture:

- Employers may react to abundant supply by adjusting their recruitment criteria and employ people who are overqualified (in a slack labour market) or underqualified (in a tight labour market) for the job.¹⁴
- Difficulties exist in translating the expected employment growth by sector in the development of total employment at the occupational level and the future employment structure by qualification. A key of correspondence has to be used, which inevitably results in some aggregation and hence, a loss of precision.

One example of a study of the labour market prospects of graduates is the regular employment projections carried out by the Research Centre for Education and the Labour Market (ROA), commissioned by the government of the Netherlands (ROA, 2001a). The forecasts apply to a total of 207 occupational groups and 104 different education types across the labour market. For these groups, the numbers of people moving into the labour market and separating from the labour market are forecast for specific future time periods. The demand for labour consists of the demand to replace departing workers and the demand to realise business expansion. Labour demand for business expansion is estimated on the basis of short and medium term forecasts of the economy by the Netherlands Bureau for Economic Policy Analysis (CPB). Labour demand is further distinguished by occupational group and by type of education. A systematic comparison with labour demand by type of education results in a summary of the labour market perspectives for new entrants by type of education, and the future possible recruitment difficulties by type of education. The value of the *Indicator Future Labour market perspectives* (ITA) indicates for which types of education a future mismatch between supply and demand can be expected. Reminiscent of the Australian and Canadian practice describing labour market prospects, the indicator takes the values "Mediocre", "Good", "Very Good" or "Fair". Government migration-policy discussion documents (Tweede Kamer der Staten-Generaal, 2001a and 2001b) and the main advisory bodies to the government (WRR 2001a, 2001b and 2001d), (SER, 2001) frequently quote these results. This is in recognition of the fact that the mirror image of good labour market perspectives for a certain occupation is the difficulties that employers

are expected to have in recruiting workers for that specific occupation.

Applying a similar methodology, the ROA has assessed whether the higher education systems in the EU Member States will provide sufficient numbers of Science and Technology (S&T) graduates to meet the demand for scientists and engineers (RSE's) up to 2002 (Marley *et al.*, 2001). The report identifies opportunities for international labour mobility to solve the labour market bottlenecks. The forecasts use four alternative scenarios and indicate considerable shortages of RSEs in one or more fields of study in all EU Member States except Belgium, Greece, Spain, Finland and the United Kingdom. At the same time, for the EU as a whole there is excess supply in each of the four fields of study distinguished, illustrating the importance of international labour mobility.

Comparable institutions can be found, for example, in Australia, Canada and in the United Kingdom. The Australian Department of Employment and Workplace Relations publishes the Job Outlook Report, a guide to the skills projected to be in demand in the future and highlights occupations with good prospects. *Job Outlook Online* is an on-line version accessible to all interested job-seekers and aspirant immigrants (DEWR, 2002). The Australian Job Outlook publishes job prospects with a rating. Nearly 400 occupations are listed with an indication of the career prospects ("Good", "Average", "Limited") they offer to first-time labour market entrants. The prognoses applied to the 2001-2006 period is very accessible and includes the National Skill Shortage List (see Annex II.2). There are two important differences with the Dutch ROA study. First, the DEWR pays considerable attention to regional differences in labour market tightness and draws up State skill shortage lists. Second, there is an explicit link with immigration policy through:

- The facilitating of immigration for people with skills that feature on the National Shortage List (more on this in the last section).
- The *Skills Matching Database*. Introduced in 1997, the database contains information about skilled workers who have lodged migration applications outside Australia in the Skilled-Independent and Skill-Matching visa classes. On the one hand, it is designed to assist State and Territory governments and employers to attract skilled migrants to areas of Australia who wish to increase their skilled

migration intake and help regional employers to meet skill shortages where they cannot fill skilled positions from the local labour market. On the other hand, it aims to assist independent skilled migrants by creating potential links with employers and employment opportunities in Australia (DIMA, 2002).

Human Resource Development Canada has developed the *Overview of Outlooks by Occupation*. The Overview presents overall trends and average ratings related to current and future labour market conditions by skill level, the amount of education and training required to work in an occupation; and finally, skill type and the broad industry category in which occupations are concentrated. Like Australia and the Netherlands, HRDC does not give numeric estimates of labour surpluses or shortfalls but categorises job prospects as “Good”, “Fair” or “Limited”. The Outlooks, presented under the general heading *Job Futures 2000*, are primarily directed at job-seekers and those who have to make a choice about education. It provides an assessment of several economic indicators that people may want to take into account when making education or career choices. Like the Australian study, it emphasises the regional context. It presents a sample of occupations with favourable outlooks over the next few years for Canada as well as for each province (HRDC, 2002). However, there is no apparent link with the Canadian Government’s yearly immigration plan (CIC, 2002).

The United Kingdom has made use of existing infrastructure to improve its documentation on current and future labour market bottlenecks. The Institute for Employment Studies (IER) carries out *Projections of Occupations and Qualifications* as a continuation of the Review of the Economy and Employment, which has been in place for 20 years. The employment projections (covering the years 1999-2010) are done on multi-sectoral and regional levels and include 17 broad sectors and 79 occupational groups. The projections take account of demographic developments in the labour force (to estimate replacement demand) and estimates of the number of new labour market entrants (DFES, 2001a and 2001b). These projections are carried out for the Department for Education and Skills to estimate future labour demand and skill needs. They do not feature on the standing Occupational Shortage List, used with reference to facilitating the entry of immigrants with much-wanted skills, which are drawn up on the basis of current reported labour shortages.

The Austrian Institute for Economic Research, WIFO, has a very impressive record in this type of projection. It has carried out detailed projections about labour demand and demographic changes in the labour force since the 1960s (Biffel and Walterskirchen, 2001). Austria carries out regular occupational job prospects and publishes quantitative estimates of expected shortfalls in labour supply on an occupation-specific level. Its occupational labour shortage lists for the year 2002 are based on a combination of prognoses with a microeconomic forecasting model and employer surveys. The indication is a labour shortage of 17 600 persons in various professions, mainly ICT-professions, by 2002 (BMWA, 2001).

An example of a study that forecasts labour shortages on the basis of an analysis of the age structures of different occupations and the expected number of retirements can be found in France. The number of job-openings that will be available to first-time labour market entrants is estimated for three educational levels. The study forecasts employment growth based on replacement and expansion demand for 23 sectors and 74 different occupations. Over the 2000-2005 period, the standard scenario (global variation) forecasts the strongest employment growth for the very highly qualified (16%). Mainly as a result of replacement demand, the demand for the least qualified workers will grow strongly as well (12.5%), labour demand for workers with the intermediary-level skills will grow by 9%. As the supply of highly qualified labour is estimated to grow by 10%, demand will exceed supply by more than 2% in 2005 (Tiopol, 2001a and 2001b; Duchamp and Amar, 2001). However, these estimates of the shortfall in labour supply do not take account of the expected number of first-time labour entrants like the quoted Australian, Canadian and Dutch studies do. In theory, if their numbers are sufficiently high, there is no shortfall.

Conclusion

In spite of the methodological problems that may be involved in assessing labour shortages, all the available data and research as set out in the review of recent studies confirm that labour markets are tight in several OECD member countries. However, factors such as the amount of pressure on the market, the type of shortages involved (absolute/relative, short/long term), their key features (sectors/skill levels affected) and their determinants (skills mismatch, inadequate labour supply, persistent

labour-marked rigidities) all vary markedly across countries.

A number of specific studies were reviewed. Some of them underline current and future labour market needs and refer to the necessity to increase labour migration in order to alleviate labour shortages. Other studies do not mention at all this possibility. While substantial research has shown that migration alone could not alleviate the impact of population ageing, the question remains open as to whether selective labour recruitment policies can

resolve current and future imbalances on OECD labour markets.

Migration policies in several OECD countries tend to facilitate the recruitment of foreign workers, particularly the more skilled but there are limits to selective employment-related immigration policies. Current efforts to introduce a raft of measures to tap existing labour reserves should therefore be encouraged and pursued. It is also important to improve the way present and future generations are prepared and trained to meet the needs of the labour market.

NOTES

1. This Chapter is a shortened version of a document prepared by Marco Doudeijns, Consultant to the OECD and presented to the Working Party on Migration during its meeting in June 2002 (OECD, 2002e).
2. The Beveridge curve is used to describe the theoretical relation between unemployment and unfilled job vacancies for a specific occupation in a situation of labour market equilibrium.
3. However, the quoted surveys cover only construction and industry.
4. See the OECD *Science, Technology and Industry Scoreboard* (OECD, 2001g) for an overview of the extent to which innovation, science, technology and economies are becoming global; this study also reviews the new growth industries and occupations, and includes indicators of the international mobility of human capital.
5. In 1998, 110 000 persons separated from the labour market because of invalidity and a further 35 000 took early retirement (CPB, 2001b).
6. However, because the obtained qualifications are as yet unknown, students' availability for the labour market can only be determined after they have finished their studies.
7. These are often referred to as discouraged workers.
8. *The Potential Labour Supply*, OECD Working Party on Employment and Unemployment Statistics. (OECD, 2001f and 2002d). The analysis is based on analysis of Labour Force Survey data.
9. A vast body of research on the social and labour market consequences of ageing has been produced within the OECD. The implications of population ageing for fiscal, economic and social policies have been analysed in depth (OECD, 1998). Recently, more emphasis was given to the potential effects of changes in retirement ages (OECD, 2000).
10. Note that Germany's own calculations show even more drastic declines than the latest UN projections (UN, 2001).
11. In 2000, net immigration amounted to 202 000, of which 118 000 was net external migration (OECD, 2001d).
12. It has to be noted, however, that not every temporary or permanent separation from the labour market needs to result in replacement demand for labour for a specific occupation. The employer may wish to respond to a decreasing employment trend through not replacing people who retire or leave their jobs for other reasons. Thus the increase in the incidence of (early) retirement need not have a one-on-one relation with an increasing replacement demand.
13. See Takenouchi (2001) for an in-depth analysis of this issue.
14. Using data for the Netherlands, Wieling and Borghans describe the different adjustment processes on the labour market (Wieling and Borghans, 2001).

BIBLIOGRAPHY

- ACCI (Australian Chamber of Commerce and Industry) (2002), www.acci.asn.au
- AETAT (2001), *Rapport om Arbeidsmarkedet*, Number 1, 2001, AETA, Oslo.
- AUSTRALIAN PRODUCTIVITY COMMISSION (2000), *The Increasing Demand for Skilled Workers in Australia: The Role of Technological Change*, www.pc.gov.au
- AUSTRALIAN TREASURY (2000), "Demographic influences on long-term economic growth in Australia", *Economic Roundup Spring 2000*, www.treasury.gov.au
- BIFFL, G. and KRATENA, K. (2001), *Die Zukunft der Österreichischen Berufs- und Qualifikationslandschaft bis 2005*, Gutachten im Auftrag der Wirtschaftskammer, Vienna.
- BIFFL, G. and WALTERSKIRCHEN, E. (2001), *Knappheit an Arbeitskräften*, WIFO (Österreichisches Institut für Wirtschaftsforschung) Gutachten im Auftrag der Wirtschaftskammer, Vienna.
- BIRRELL, B., DOBSON, I.R., RAPSON, V. and SMITH, T.F. (2001), *Skilled Labour: Gains and Losses*, Centre for Population and Urban Research, Australian Department of Immigration, Multicultural and Indigenous Affairs.
- BLANCHET, D. (2001), *L'impact des changements démographiques sur la croissance et le marché du travail : faits, théories et incertitudes*, Sirey Editions, *Revue d'économie politique*, 111 (4) July-August.
- BLS (2002), *Employment Projections*, Bureau of Labor Statistics, www.bls.gov, 8 April.
- BMA (2001), *Erster Bericht "Monitoring des IT-Sofortprogramms" von 2. Juli 2001*, Bundesministerium für Arbeit und Sozialordnung, Berlin.
- BMA (2002), BMA Pressestelle 16/01, www.bma.bund.de, Bundesministerium für Arbeit und Sozialordnung, Berlin.
- BMWA (2001), *Fachkräftemangel 2002*, Presseunterlage BM Dr. Martin Bartenstein, 28 May, Bundesministerium für Wirtschaft und Arbeit, Vienna.
- BRADDOCK, D. (1999), "Occupational employment projections to 2008", *Monthly Labor Review Online*, Vol. 122, November, Bureau of Labor Statistics, US Department of Labor, <http://stats.bls.gov/emp/home.htm>
- CARNEIRO, R., PISCO, M., FAZENDEIRO, A., FIALHO, J.S., MINISTRY OF EMPLOYMENT AND SOCIAL SECURITY, FERNANDEZ, A.P., FARO, A.C., FERNANDES, N., ROCHETEAU, S. (2001), *Diagnóstico e prospetiva a curto prazo das Necessidades de mão-de-obra em Portugal*, unpublished Working Paper, Portugal.
- CBS (2002), *Sociaal-Economisch Maandstatistiek*, Jaargang 19, February, www.cbs.nl/nl/producten/
- CCP (2000), *Les difficultés de recrutement : quelles réalités ? Quels remèdes ?*, Report presented by Jean-Paul Vermès, Chambre de Commerce et d'Industrie, Paris.
- CGP (2000), *Les effets démographiques sur l'offre de travail*, Commissariat général du Plan, Paris.
 - November 14, Meeting of the workshop "Prospective des métiers et qualifications".
 - January 16, 2001 meeting of the workshop "Prospective des métiers et qualifications".
- CGP (2001), *Difficultés de recrutement : effets récurrents et structurels, se souvenir pour prévoir*, Commissariat général du Plan, Paris, Seminar, 15 May.
 - Eymard-Duvernay, Francois, "Savoir recruter, pas si facile".
 - Sauvageot, Claude, "Face aux difficultés de recrutement quelles interrogations et quelles réponses possibles du système éducatif ?".
 - Géry Coomans, "Peut-on mesurer les difficultés de recrutement en [...] Europe ?".
- CHAGNY, O., DÖPKE, J., PLANE, M. and SCHMIDT, R. (2001), *Labour Supply and Labour Force Participation in Europe – A Discussion of Some Recent Developments and Projections*, Kiel Working Paper No. 1049, Institut für Weltwirtschaft (IFW), Kiel.
- CIC (2002), *Citizenship and Immigration Canada*, www.cic.gc.ca
- CIE (2001), *Breaking the Skills Barrier*, Centre for International Economics, Canberra and Sydney, Australia.
- COPPEL, J., DUMONT, J.C. and VISCO, I. (2001), *Trends in Immigration and Economic Consequences*, OECD Economic Department Working Papers No. 284.
- COUNCIL OF EUROPE (2000), *La Population et le marché du travail en Europe au-delà de l'an 2000*, Vol. I & II, Editions du Conseil de l'Europe, Strasbourg.
 - *The Immigration Plan for 2002*.
 - *Introducing a Multi-year Planning Process and the Immigration plan for 2001 and 2002*.
 - *Reports on Plans and Priorities 2001-2002*.
 - *Performance Report for the Period ending March 31, 2001*.
 - *Building a Strong Foundation for the 21st Century; New Directions for Immigration and Refugee Policy and Legislation*.
- CPB (2001), *Macro Economische Verkenningen 2002*, Centraal Economisch Planbureau, The Hague, Netherlands.
- CSSA (2001), *Latest News*, The Computing Services and Software Association www.cssa.co.uk

- DA (2001), *Arbejdsmarkedsrapport 2001*, Dansk Arbejdsgiverforening, Copenhagen.
- DARES (2001a), *Premières informations : Les tensions sur le marché du travail en décembre 2000*, March, No. 12.3 ; various issues, Direction de l'animation de la recherche, des études et des statistiques, Ministère de l'Emploi et de la Solidarité, Paris.
- DARES (2001b), *Premières synthèses : la dimension régionale des difficultés de recrutement, Situation en juin 2000*, October, No. 43.1, Direction de l'animation de la recherche, des études et des statistiques, Ministère de l'Emploi et de la Solidarité, Paris.
- DENEUVE, C (2002), *Besoins de main-d'œuvre des entreprises et recours à l'immigration : Quelles perspectives ?*, Document de travail No. 55, Centre d'observation économique, Paris.
- DEWR (2002), *Labour Market Information – Skills Shortages and Vacancy Trends*, on the same site: *Job Outlook Online*, Department of Employment and Workplace Relations, www.workplace.gov.au/Workplace
- DFES (2001a), *Opportunity and Skills in the Knowledge-driven Economy, A final Statement of the Work of the Skills Task Force from the Secretary of State for Education and Employment*, Department for Education and Skills, Nottingham, United Kingdom.
- DFES (2001b), *Projections of Occupations and Qualifications 2000/2001*, Vol. I, Department for Education and Skills, Sheffield, United Kingdom.
- DFES (2001c), *Skillsbase*, Department for Education and Skills, www.skillsbase.dfee.gov.uk/default.asp
- DIMA (2002), *Fact Sheet No. 59 – Assisting skilled and business people*, Australian Department of Immigration, Multi-cultural and Indigenous Affairs, Canberra.
- DOHM, A.. (1999), "Gauging the labor force effects of retiring baby-boomers", *Monthly Labor Review Online*, Vol. 122, November, US Department of Labor, <http://stats.bls.gov/emp/home.htm>
- DOMINGUES DOS SANTOS, M. (2000), "Vieillesse démographique et chômage", *Revue française de l'économie*.
- DUCHAMP, P. and AMAR, M. (2001), "Construction d'un indicateur de tension du marché du travail par niveau de qualification à l'horizon 2005", DARES, No. 46, June, Direction de l'animation de la recherche, des études et des statistiques, Ministère de l'Emploi et de la Solidarité, Paris.
- EC (2001a), *Employment in Europe 2001, Recent Trends and Prospects*, European Commission Directorate General for Employment and Social Affairs, Unit A.1 Employment Analysis, European Communities, Belgium.
- EC (2001b), *The Role of Immigrants in the Labour Market*, survey among Member States.
- ECOTEC (2000), *Admission of Third Country Nationals for Paid Employment or Self-Employed Activity*, ECOTEC Research and Consulting Ltd, Brussels, Belgium.
- FBP (2001), *Economische Vooruitzichten 2001-2006*, Federaal Planbureau, April, Henri Bogaert, Belgium.
- FELD, S. (2001), "Labour Force Trends in the European Union (2000-2025) and International Manpower Movements: an Initial Outlook", Paper presented at the XXIV General Population Conference, Salvador, Brasil, 18-24 August, Université de Liège (GRESF), Belgium.
- FELD, S. (2002), *Évolution démographique, population active, migration internationale et pénurie de main-d'œuvre en Belgique. Premières analyses*, Unpublished working document, Université de Liège (GRESF), Belgium.
- FNV (2001), *Notitie Arbeidsmigratie*, 19 October, Federatie Nederlandse Vakverenigen.
- FUCHS, J. and THON, M. (1999), *Nach 2010 sinkt das Angebot and Arbeitskräften – Selbst hohe Zuwanderung wird diesen Trend nicht stoppen können*, IAB Kurzbericht No. 4, Institut für Arbeit- und Berufsforschung, Nürnberg, Germany.
- FUCHS, J. and THON, M. (2001), *Wieviel Potenzial steckt in den heimischen Reserven?*, IAB Kurzbericht No. 15, Institut für Arbeit- und Berufsforschung, Nürnberg, Germany.
- FULLERTON, Jr., H.N. (1999a), "Labor force projections to 2008", *Monthly Labor Review Online*, Vol. 122, November, Bureau of Labor Statistics, US Department of Labor, <http://stats.bls.gov/emp/home.htm>
- FULLERTON, Jr., H.N. (1999b), "Labor force participation: 75 years of change, 1950-98 and 1998-2025", *Monthly Labor Review Online*, Vol. 122, November, US Department of Labor, <http://stats.bls.gov/emp/home.htm>
- GLOVER, S., GOTT, C., LOIZILLON, A., PORTES, J., PRICE, R., SPENCER, S., STINIVASAN, V. and WILLIS, C., (2001), *Migration: an Economic and Social Analysis*, RDS Occasional Paper, Home Office, London, United Kingdom.
- GOTTSCHALK, P. (2001), *What can we learn from the Cohort Size Literature about the Future Demand for the Greying Baby-Boomers?* Centre for Retirement Research, The Brookings Institution.
- HAMMERMESH, D.S. (2001), *Older Workers in the Coming Labor "Shortage": Implications on Labor Demand*, Centre for Retirement Research, Boston (www.bc.edu/bc_org/avp/csom/executive/crr/public_spe.shtml).
- HASKEL, J., and HOLT, R. (1999), *Anticipating Future Skill Needs: Can it be Done? Does it Need to be Done?* Skills task Force research Paper 1, Department for Education and Skills, Nottingham.
- HECKER, D.E. (2001), "Occupational employment projections to 2000-10", *Monthly Labor Review Online*, November, Bureau of Labor Statistics, US Department of Labor, <http://stats.bls.gov/emp/home.htm>
- HRDC (2001), "The Quest for Workers: A portrait of Job Vacancies in Canada", *The Evolving Workplace Series*, Human Resource Development Canada.
- HRDC (2002), *JOB FUTURES 2000*, <http://jobfutures.ca/jf-ea/jf.page?p=WHATISJF#whatis>
- IAB (1999), *Arbeitslandschaft 2010 – Teil 1 und 2*, IAB Kurzbericht No. 9 and 10, Institut für Arbeit- und Berufsforschung, Nürnberg, Germany.
- ITAA (2000), *Bridging the Gap: Information Technology Skills for a New Millennium*, Information Technology Association of America, Arlington (VA), United States.

- KARR, W (2001), *Fachkräftebedarf oder Fachkräftemangel, Inwieweit signalisieren die gegenwärtigen Besetzungsdauern offener Stellen Anspannungstendenzen?*, unpublished IAB manuscript, 09/03/01, Institut für Arbeit und Berufsforschung, Nürnberg, Germany.
- KLAVER and VISSER (1999), *Evaluatie Wet Arbeid Vreemdelingen*, Ministry of Social Affairs and Employment, The Hague, Netherlands.
- KÖLLING, A. (2001), *Fachkräftebedarf und unbesetzte Stellen – Ergebnisse des IAB Betriebspanels 2000*, Unveröffentlichtes Manuskript, Institut für Arbeitsmarkt- und Berufsforschung, Nürnberg, Germany.
- KOMMUNAL- OG REGIONALDEPARTEMENTET (1999), *Arbeidskraftbehov og rekruttering fra utlandet*, Ministry of Local Government and Regional Development, Oslo, Norway.
- MAGVAS and SPITZNAGEL (2001), *Personalmangel – Hemmnis für Wachstum und Beschäftigung? Erste Ergebnisse der Erhebung zum gesamtwirtschaftlichen Stellenangebot, 4. Quartal 2000*, Institut für Arbeit- und Berufsforschung, Nürnberg, Germany.
- MARLEY, P., de GRIP A., CÖRVERS, F. (2001), *Forecasting the Labour Markets for Research Scientists and Engineers in the European Union*, ROA-W-2001/3E, Research Centre for Education and the Labour Market (ROA), Maastricht, Netherlands.
- McDONALD, P. and Kippen, R. (2001), "The Impact of Immigration on the Ageing of Australia's Population", in *International Migration in the 21st Century*, M.A.B. Siddique (editor), Edward Elgar.
- MEDEF, 2000, *Rapport sur les pénuries de main-d'œuvre*, November 14, Paris.
- MINISTRY OF EDUCATION IN SWEDEN (2001), *Report on Migration and need for Skills* ("En framtidsberäkning vad gäller tillgång och efterfrågan av arbetskraft,"), Discussion report, July, nistry of Employment and Solidarity in France, www.travail.gouv.fr/dossiers/dossiers_f.html
- MKB (2001), *Vacaturemarkts mkb 2001*, Koninklijke Vereniging MKB-Nederland, Delft, Netherlands.
- MKW (2001), *Obstacles to Mobility of Workers in the Digital Culture in the European Union*, MKW Wirtschaftsforschung GMBH, Munich, Germany.
- MUNZ, S. and OCHEL, W. (2001), *Fachkräftebedarf bei hoher Arbeitslosigkeit*, Institut für Wirtschaftsforschung (Ifo), Munich, Germany.
- NEW ZEALAND IMMIGRATION SERVICE (2002), *Labour Market Shortage List, 1 February 2002 – 1 May 2002*, www.immigration.govt.nz/work/
- NORDIC COUNCIL (2000), *Supply of Labour in the Nordic Countries*, Nordic Council of Ministers, Copenhagen.
- NORDIC COUNCIL (2001), *Labour Force Mobility*, Meeting of Nordic Council of Ministers in Hämeenlinna, October 22, Finland.
- OECD (1991), *Migration. The Demographic Aspects*, Paris.
- OECD (1998a), *Ageing Populations. The Social Policy Implications*, Paris.
- OECD (1998b), *Maintaining Prosperity in an Ageing Society*, Paris.
- OECD (2000), *Reforms for an Ageing Society*, Paris.
- OECD (2001a), *Review of Systems of Retirement Income Provisions in Nine Countries: Social Policy responses to Ageing*, Internal discussion document, OECD, Paris.
- OECD (2001b), *Society at a Glance: OECD Social Indicators*, OECD, Paris.
- OECD (2001c), "Work and family life: How do they Balance Out?", *Employment Outlook*, Paris.
- OECD (2001d), *Trends in International Migration*, various issues, OECD, Paris.
- OECD (2001e), *Employment Outlook*, OECD, Paris.
- OECD (2001f), *The Potential Labour Supply*, Discussion document for the OECD working party on employment and unemployment statistics, Paris.
- OECD (2001g), *Labour Market Policies and the Public Employment Service*, OECD, Paris.
- OECD (2002a), *Service Providers on the Move: A Closer Look at Labour Mobility and the GATS*, OECD, Paris. (www.oecd.org/ech)
- OECD (2002b), *International Mobility of the Highly Skilled*, OECD, Paris.
- OECD (2002c), *Main Economic Indicators*, OECD, Paris.
- OECD (2002d), *The Potential Labour Supply*, Discussion document for the OECD Working Party on Employment and Unemployment Statistics, Paris.
- OECD (2002e), *Labour Shortages and the Need for Immigrants: A Review of Recent Studies*, Discussion document for the OECD Working Party on International Migration, Paris
- PARKKINEN, P. (2001), "Regional Reserves of Employment", Government Institute for Economic research, Helsinki in *Finnish Labour Review*, Ministry of Labour, Helsinki, Finland.
- PERSSON, O. L. (2000), *Emerging Patterns of Labor Mobility in the Knowledge Economy*, Presentation at the migration symposium "Muuttoliikesymposium 2000" in Turku, Finland.
- PINOMAA, S. (2001), "Will there be Enough Labour in Finland?", Government Institute for Economic research, in *Finnish Labour Review*, Ministry of Labour, Helsinki, Finland.
- ROA (2001a), *De Arbeidsmarkt naar Opleiding en Beroep tot 2006*, Researchcentrum voor Onderwijs en Arbeidsmarkt, Maastricht, Netherlands.
- ROODENBURG, H. and van den BOOM, L. (2000), "Economische Gevolgen van Immigratie", *Tijdschrift voor Politieke Economie*, jaargang 2000, nummer 3, The Hague, Netherlands.
- SER (2001), *Arbeidsmobiliteit in de EU*, Sociaal Economische Raad, Advies 01/04, The Hague, Netherlands.
- SCHERER, P. (2001), "Age of withdrawal from the labour market in OECD Countries", *Labour Market and Social Policy Occasional Papers*, No. 49, OECD, Paris.
- STATISTICS FINLAND (1999), *Foreigners and International Migration 1998*, Väestö 9, Vaanta, Finland.
- STATISTICS SWEDEN (2001), *Analysis, Trends and Forecasts for the Labour Market*, Labour Market Page www.scb.se/eng/arbetsmarknad/arbetsmarknad.asp

- SÜSSMUTH, (2001), *Zuwanderung Gestalten, Integration Fördern*, Bericht der Unabhängigen Kommission "Zuwanderung", Berlin, Germany.
- TAKENOUCI, M (2001), *International Division of Labour and Migration as a Global Labour Supply – A Theoretical Perspective to International Migration*, Discussion paper, University of Tokyo, Japan.
- TAPINOS, G. (2000), *The role of migration in moderating the effects of population ageing*, contribution to the Working Party on Migration June 2000, ref. DEELSA/ELSA/WP2(2000)6, OECD, Paris.
- TAPINOS, G. and DELAUNAY, D. (2000), "Can one really talk of the globalisation of migration flows?", in *Globalisation, Migration and Development*, OECD, Paris.
- THOMSON, A. (1999), "Industry output and employment projections to 2008", *Monthly Labor Review Online*, Vol. 122, Nov 1999, US Department of Labor, <http://stats.bls.gov/emp/home.htm>
- TIAINEN, P. (1999), *Employment and Welfare in Finland in the Years 1860-2030*, Labour Policy Study 211, Ministry of Labour, Helsinki, Finland.
- TOPIOL, A. (2001a), *Prospective des métiers à l'horizon 2010 : une approche par familles d'activité professionnelles*, DARES, wp No. 47, June.
- TOPIOL, A. (2001b), *L'évolution des sorties d'emploi vers la retraite et la préretraite – une approche par métiers*, DARES, wp No. 48, July.
- TWEDE KAMER DER STATEN GENERAAL (2001a), *Knelpunten op de Arbeidsmarkt en Arbeidsmigratie*, Brief van Vermeend aan de Tweede Kamer, 28 September, The Hague, Netherlands.
- TWEDE KAMER DER STATEN GENERAAL (2001b), *Regeringsnotitie: Het Nederlandse Standpunt over het communautair immigratiebeleid*, 15 October, (Parlando Systeem 19 637, nr. 616), The Hague, Netherlands.
- UN (2000), *Replacement Migration: Is it a Solution to Declining and Ageing Populations?*, Population Division, Department of Economics and Social Affairs, New York.
- UN (2001), *World Population Prospects 1950-2050 (The 2000 Revision)*, February 2001, New York.
- USDOC (1997a), *Building the 21st Century Workforce*, United States Department of Commerce, Technology Administration Office, Speech by Kelly H. Carnes on April, 11.
- USDOC (1997b), *America's New Deficit: The Shortage of Information Technology Workers*, United States Department of Commerce, Technology Administration Office, Speech by Andrew Pincus on September, 29.
- USDOC (1999a), *The Digital Workforce: Building Infotech Skills at the Speed of Innovation*, United States Department of Commerce, Technology Administration Office.
- USDOC (1999b), *The American Workforce in the New Millennium, The Growing Demand for Skills*, United States Department of Commerce, Technology Administration Office.
- USDOC (2000), *Update: The Digital Workforce*, United States Department of Commerce, Technology Administration Office.
- Van EWIJK, KUIPER, C., B., ter RELE, H., van de VEN, M. and WESTERHOUT, E. (2000), *Ageing in the Netherlands*, CPB (Netherlands Bureau for Economic Policy Analysis) The Hague, August.
- VATT (2000), *The Finnish Welfare State at the Turn of the Millennium*, Government Institute for Economic Research, Helsinki, Finland.
- VBO (2001a), *Immigratiebeleid heeft Internationaal Kader nodig*, Verbond van Belgische Ondernemingen, Persbericht 29 June, Brussels, Belgium.
- VBO (2001b), *Immigratiebeleid: houding van het VBO*, Verbond van Belgische Ondernemingen, Perscontact 29 June, Brussels, Belgium.
- VENERI, C.N. (1999), "Can occupational labor shortages be identified using available data?", *Monthly Labor Review Online*, Vol. 122, November, Bureau of Labor Statistics, US Department of Labor, <http://stats.bls.gov/emp/home.htm>
- VNO-NCW (2002), *Bestuurscommissie buigt zich over Internationale Arbeidsmobiliteit*, 14 January, The Confederation of Netherlands Industry and Employers, (www.vno-ncw.nl/indrecht.html?code=340)
- WALWEI, U. (2001), *Arbeitsmarktbedingte Zuwanderung und bedenkenswerte Alternativen, Strategien zur Erschliessung von Personalreserven*, IAB Werkstattbericht Nr 4/21, March, Institut für Arbeit und Berufsforschung, Nürnberg, Germany.
- WERNER, H. (2001), *From Guests to Permanent Stayers? – From the German "Guestworker" Programmes of the Sixties to the Current "Green Card" Initiative for IT-Specialists*, IAB Werkstattbericht. 43, March, Institut für Arbeit und Berufsforschung, Nürnberg, Germany.
- WIELING and BORGHANS, L. (2001) "Discrepancies between supply and Demand and Adjustment Processes on the Labour Market", *Labour*, Vol. 15, pp. 33-56.
- WIFO (2000), *Arbeits- und Qualifikationsnachfrage im Telekom- und Mediensektor*, WIFO presseinformationen, www.wifo.at
- WIFO (2001), *Arbeitsmarktrelevante Effekte der Ausländerintegration in Österreich*, Österreichisches Institut für Wirtschaftsforschung, Wien
- WINKELMANN, R. (2001), *Why do Firms Recruit Internationally? Results from the IZA International Employer Survey 2000*, IZA Discussion Paper No. 331, Institute for the Study of Labor, July 2001, Bonn, Germany.
- WINKELMANN, R., KUNZE, A., LOCHER, WARD, L. M. (2001), *Die Nachfrage nach Internationalen Hochqualifizierten Beschäftigten*, IZA International Employer Surveys 2000, IZA Research Report No. 4, May, Institute for the Study of Labor, Bonn, Germany.
- WITHERS, G. (1999), *A Younger Australia?*, Discussion paper No. 63, Public Policy Program, Australian National University, Canberra, Australia.
- WITSA (2000), *International Survey of E-Commerce*, World Information and Technology Services Alliance, Arlington (VA), United States.
- WITSA (2001), *WITSA Inventory on IT Skills and Workforce Initiatives*, World Information and Technology Services Alliance, USA, Arlington (VA), United States.
- WRR (2001a), *Nederland als Immigratiesamenleving*, WRR Rapport No. 60, Wetenschappelijke Raad voor het Regeringsbeleid, The Hague, Netherlands.

- WRR (2001b), *A Comparison of American and Dutch Immigration and Integration Experiences; What Lessons can be Learned?*, Werkdocumenten W.120, Wetenschappelijke Raad voor het Regeringsbeleid, The Hague, Netherlands.
- WRR (2001c), *Oude en Nieuwe Allochtonen in Nederland, Een Demografisch Profiel*, Werkdocumenten W.60, Wetenschappelijke Raad voor het Regeringsbeleid, The Hague, Netherlands.
- WRR (2001d), *Immigratie- en Integratieregimes in vier Europese Landen*, Werkdocumenten W.125, Wetenschappelijke Raad voor het Regeringsbeleid, The Hague, Netherlands.
- ZANFRINI, L. (2002), *Learning by Programming, Secondo rapporto sui fabbisogni professionali delle imprese italiane e la politica di programmazione dei flussi migratori*, Fondazione Ismu, Centro Studio Unioncamere, Franco Angeli, Milano, Italy.
- ZHAO, J., DREW, D. and SCOTT MURRAY, T (2002) *Brain Drain and Brain Gain: The Migration of Knowledge Workers to and from Canada*, Website http://strategis.ic.gc.ca/sc_ecnmy/mera/engdoc/07.html
- ZIMMERMANN, K.F., BAUER, T.K., BONIN, H., FAIR, R. and HINTE, H. (2001), *Arbeitskräftebedarf bei hoher Arbeitslosigkeit, Ein ökonomisches Zuwanderungskonzept für Deutschland*, Forschungsinstitut zur Zukunft der Arbeit (IZA), Bonn, Germany.

Annex II.1. Employer surveys of labour shortages

| | Kind of body involved in the study (employers, public body...) | Scope (sectors, regions) | Period of time (forecast period; date of the survey) | Results (labour shortages, calls for or recommendations on immigration) | Comments (regularity, lacks, reliability) | Source |
|-------------|--|--------------------------------------|--|--|--|--|
| Australia | Employer Associations | IT sector | 2001-2006 | 27 500 IT-professionals with university degrees | Takes account of proposed policy changes, including immigration | CIE 2001 |
| | Chamber of Commerce | All Sectors | 2002 | Skills shortages and seasonal shortages are an increasingly important issue | | ACCI 2002 |
| | Dept. of employment and Workplace Relations | All Sectors | Monthly | "Occupational wastage" is an important factor in explaining some skill shortages, otherwise reasons are complex and varied (economic, demographic and education factors; technological change) | State wide, regional or metropolitan skill shortages are defined as recruitment difficulties | DEWR 2002 (National and State Skill Shortage List) |
| Austria | Academic Institution | ICT-sector | 2000-2003 | 13 000 persons; recommendations on selective labour immigration policy | | WIFO 2000 |
| | Ministry of Labour | All sectors | 2002 | 10 200 persons mainly in technical, commercial, health and gastronomic occupations | Regular, not strictly a survey, based on institutional analytical work also | BMW 2001 |
| Belgium | Statistical Institute | IT sector | 2001 | 5 000 persons | Incidental, no forecasts given | WITSA 2001 |
| | Employers associations | All sectors | 2002 | No shortages for skilled personnel, shortages for lower skilled occupations, calls for unskilled immigration | | VBO 2001a |
| Canada | Official source | All Sectors | 2000-2006 | No shortage in IT sectors; 50% of recruitment difficulties in retail trade and consumer services | | HRDC 2001 and 2002 |
| EC | European Commission | All Sectors | 1999-2001 | Indications of shortages found in 7 countries across the EU | Based on regular harmonised labour market surveys | EC 2001a |
| Finland | Employers Associations | IT- sector | 2000-2001 | 2 500-5 000 persons, calls for skilled immigration | | WITSA 2001 |
| France | Statistical office | Construction and Industry | 2001 | Recruitment problems are in low-skills occupations | | DARES 2001a&b |
| Germany | Employment Office | All sectors | 2001 | 15% of MSE in services, investment and consumer goods sectors face recruitment difficulties, refer to immigration | Regular survey, Official estimates seem to underestimate shortages relative to academic studies | Magvas and Spitznagel 2001; Kölling 2001 |
| | Institute for the Study of Labour | Chemical, industry, finance, IT, R&D | Autumn 2000 | Foreigner's complementary knowledge is main reason for recruiting (wishing to recruit) from abroad, not labour shortages. | Incidental study, covers France, Britain, Germany and Holland; limited to highly skilled workers | Winkelmann 2001 |
| Netherlands | Employers Associations | IT-sector | 2001 and beyond | 2001: 10 770 persons; 2002: 3 400 | Approximate calculations | Fenit 2002 |
| | Employers Associations | Construction and trade | 2002-2003 | 50% of all hard-to-fill vacancies are on low skills levels, calls for unskilled immigration | | VNO-NCW 2002 |

Annex II.1. **Employer surveys of labour shortages** (cont.)

| | Kind of body involved in the study (employers, public body...) | Scope (sectors, regions) | Period of time (forecast period; date of the survey) | Results (labour shortages, calls for or recommendations on immigration) | Comments (regularity, lacks, reliability) | Source |
|----------------|--|--------------------------|--|--|---|------------------------|
| | Statistical office | All Sectors | 3rd quarter 2001 | Growing tightness in non-commercial services and small businesses (general) | Quarterly vacancy survey | CBS 2002 |
| Norway | Employers Association | IT-sector | 2001-2003 | 45 000 specialists lacking in total | Norway School of Management , incidental | WITSA 2001 |
| | Labour Market Administration | Economy-wide | 2001-2002 | Labour shortage of 39 000 persons, asks for intentions to hire abroad | Regular survey, official small-scale survey, possibly overestimates shortages | AETAT 2001 |
| Sweden | Statistics Office | All sectors | 2001 | Difficulties dominate in education, health and IT sectors | | Statistics Sweden 2001 |
| United Kingdom | Employer Associations | IT sector | Immediate future | 51% of members believed that the Government was not effectively reducing the skills shortages. | Survey methodology unclear – liable to various biases | WITSA 2001; CSSA 2001 |
| | Ministry of Education and Skills | All sectors | 2001 | 20% of hard-to-fill vacancies in crafts | Part of large-scale evaluation | DFES 2001 |
| United States | Employer Organisations | IT-sector | 2000-2001 | 843 328 persons on annual basis | Small sample telephone survey | ITAA 2000 |

Annex II.2. Projections of occupational labour demand in OECD countries

| | Model | Detail | Projection period | Outcomes | Sources |
|-------------|---|---|-------------------|---|--------------------------------------|
| Australia | Job Prospects Matrix – economic model | 400 occupations | 2001-2006 | Occupations with good prospects are generally more highly skilled | DEWR 2002 |
| Austria | WIFO projections – employer survey and economic model | Data on 300 000 employers; forecasts on 6 educational levels | 1999-2005 | An economic expansion between 1999 and 2005 will hardly be restrained by a shortfall in labour supply; only in the IT sector problems might occur | Biffi and Kratena 2001 |
| Canada | 1. Job Futures 2000 – economic model | 1. Prospects by occupation, field of study for each Province | 1. one year | Good prospects mainly in IT and technical but also in hospitality occupations | HRDC 2002 |
| | 2. Occupational Projection System | 2. 512 occupations and 62 sectors on provincial and national levels | 2. one year | | |
| EU | ROA Labour Market Forecasting Model | 4 broad S&T fields in 14 EU countries | 1998-2002 | Considerable shortages in one or more fields in all countries except Belgium, Greece, Spain, Finland and the United Kingdom. | Marley <i>et al.</i> 2001 |
| Finland | Ministry of Labour Shortage lists: surveys and economic model | Outcomes on sector level | 20 years | In the base scenario, where employment will vary between 2 100 000 and 2 200 000 jobs, the study forecasts some drastic changes in the structure of employment. | Tiainen 1999 |
| France | Flip-Flap economic model | 22 sectors and 55 occupations | 5 years | Over the 2000-2005 period, employment growth is strongest for the very qualified (16%) | Duchamp and Amar 2001; Dares 1999 |
| Germany | 1. IFO study – employer survey and economic model | 22 sectors; 21 occupations; 11 educational levels | 15 years | Most employment creation in occupations requiring technical college training or higher degrees (Health/social; Socio-cultural jobs; Technical jobs; Construction; Administrative) | Munz and Ochel 2001 |
| | 2. IAB/Prognos – economic model | Forecasts on sector level | 1998-2010 | Labour demand in the primary sector, the processing industries and in the trade sector are expected to decline by 2010. Commercial and non-commercial services and trade are expected to grow while banking and public administration are expected to remain stable | IAB 1999 |
| Italy | Excelsior – economic model | Regional and occupational labour shortages | One year | To establish yearly immigration quota: 2002 quotas total 80 000 persons | Zanfrini 2002 |
| Netherlands | ROA – CPB economic model | 207 occupational groups; 104 different educational types | 2001-2006 | Prospects are excellent for university graduates, good for people with post-secondary education, reasonable for the low skilled and mediocre for other groups – big occupational variations | ROA 2001a |
| New Zealand | Labour Market Skills Shortage Lists | Nation wide | 4 months | Qualified aircraft engineers, technicians, auto electricians and mechanics and bakers are on top of the list | New Zealand Immigration Service 2002 |
| Portugal | Attempts underway | Occupational labour shortage projections | 1 year | Will serve to establish yearly immigration quota | Carneiro <i>et al.</i> 2001 |

Annex II.2. Projections of occupational labour demand in OECD countries (*cont.*)

| | Model | Detail | Projection period | Outcomes | Sources |
|----------------|---|--|-------------------|---|------------------------------|
| United Kingdom | 1. Projections of Occupations and Qualifications – economic model and surveys | 17 sectors, 79 occupations | 2000-2010 | The strongest job growth caused by expansion demand will occur in professional services and to a lesser extent in distribution hotels and catering. | DFES 2001b |
| | 2. Skill Shortage Lists | Nation wide | 1 year | Exhaustive list of skill deficiencies and skills demand by employers | DFES 2001c |
| United States | Bureau of Labor Statistics economic model | 82 occupations, 24 sectors, 53 education types on 5 levels | 2 years | Growing skills deficit especially in the IT sector | Fullerton 1999a; Hecker 2001 |