Future job opportunities in the European Union : towards a EURES database on regional labour market forecasts

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Future Job Opportunities in the European Union

Towards a EURES Database on regional labour market forecasts

ROA-R-1996/5E

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Foreword

This report presents the results of an inventory of the possibilities of generating medium-term labour market forecasts by economic sector, occupation and type of education for the various regional labour markets in the European Union. These forecasts need to be developed to supplement the information available in the EURES General Information Database. This labour market information could inform potential migrants or cross-border commuters about the employment opportunities in the various regions of the EU Member States. It could also serve to indicate the labour market prospects for international firms which are considering starting or expanding their production or services in a particular region of the European Union.

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1 Introduction

Since finding 'the right job' is mainly an individual search process, it is very important to increase the transparency of the European labour market for those who are familiarizing themselves with job opportunities in other Member States of the European Union (Cf. Van Dam, De Grip and Heijke, 1993). In fact, giving adequate information on the employment opportunities in the various EU Member States is the main aim of the EURES Network set up by the European Commission.

EURES has a major role to play in the realization of an integrated European labour market, in the sense that it aims to inform both individual job seekers and firms on the labour market opportunities in the various Member States of the European Union. The available information on the jobs on offer in the various Member States reflects the actual mediation function of the EURES system. Moreover, the EURES General Information Database informs potential migrants or commuters about the living and working conditions in the Member States and also presents more general regional labour market information.

Information on the expected trends (i.e. medium-term forecasts) on the labour market in the various regions of the EU Member States will also be an important aid to 'enlarging the horizons' of potential migrants or commuters. Moreover, this information also serves to signal the labour market prospects for international firms which are considering starting or expanding their production or services in a particular region of the European Union.

A transparent integrated European labour market is an important tool to improve the match between labour demand and supply on a European scale. Particularly in the border regions of the Member States, the match between the various kinds of potential employers and employees suffers from the limited scale of the peripheral labour market due to the restricted geographical mobility of the labour force. Moreover, the introduction of the Economic and Monetary Union (EMU) will probably increase the importance of an integrated European labour market. It will become impossible to cope with macro-economic disequilibria due to external shocks by means of exchange rate adjustments, so labour mobility from high unemployment regions to low unemployment regions will probably become a more important adjustment mechanism.

However the EURES General Information Database does not yet include *trends* in the supply and demand in the regional labour markets by economic sector, occupational class or type of education. A *Labour Market Information* model needs to be developed to enable the Commission to supply this labour market information for

the intended user groups. Generating the various forecasts for economic sectors, occupational classes and types of education at a regional level requires a large data input and a substantial research effort. For this inventory study we therefore propose a 'dual' approach.

First, research will be done on the possibilities of generating the required medium-term forecasts. Here the main focus is on:

1. The formulation of a *modular* forecasting model that can be developed stepwise and which respects the principle of *subsidiarity*, in the sense that it builds on the existing national forecasts in the Member States which are imbedded in public policies in general or the particular policies of Public Employment Services.
2. An investigation of the way in which the forecasts by occupation and type of education can build on (1) the available official national sector models and (2) previous coordinated research projects which were intended to generate employment forecasts for all EU Member States.
3. An investigation of the possibilities of the available EUROSTAT data.¹ In particular, it will be necessary to determine the optimal level of aggregation of economic sectors, occupations, and types of education for the forecasts with respect to the 163 regions distinguished in the EURES database (i.e. more or less similar to the NUTS 2 regional level). This will provide a clear picture of the possibilities of generating the same kind of information for all EU Member States.

Second, two prototype forecasts relating to the information available for the Netherlands and the United Kingdom will be presented. The information for the Netherlands is based upon ROA's experience with data and forecasts for this Member State. The information for the United Kingdom is based on the forecasts of the *Institute of Employment Research* (IER). The advantage of this second line of research is twofold. In the first place it will produce two operational examples of the labour market information that can be given in the 'Trends' section of EURES' Labour Market Information Treechart. In the second place, it shows the consequences of the subsidiary approach, in the sense that somewhat different information will be presented for the various Member States.

To limit the scope of this second line of research, the main focus will be on the possibilities and structure of a basic model, and relatively little attention will be paid to dealing with incidental problems that may be relevant for the quality of the forecasts in operational use. The forecasts should therefore be seen as prototypes,

1. An initial study of this point, commissioned by DG V, was carried out by ROA in 1993. (see Hoevenberg and De Grip, 1994).

which could serve as benchmarks for the future development of the EURES 'Trends' information.

Since it is very important that EURES' labour market information is suitable for those familiarizing themselves with employment opportunities in other Member States, some consideration will also be given to how the large output of forecasts by economic sector, occupational class and type of education for each region can be presented in a transparent way, and combined where appropriate with the information generated by EURES' survey among the EURO advisers of the Public Employment Services in the various regions of the European Union: the *PES Questionnaire*.

The remainder of this report is structured as follows. Chapter 2 describes the proposed forecasting model beginning with an overview of the general structure of the research model to clarify the approach. Section 2.2 then indicates the procedures required to generate the needed data at the regional level distinguished in the EURES Database. Chapters 3 and 4 discuss the availability of the required data. Chapter 3 deals with the availability of sectoral *forecasts* for the various EU Member States while chapter 4 deals with the availability of the required *data* input for modelling the occupational and educational forecasts. Chapters 5 and 6 present the available national and regional forecasts for the Netherlands and the United Kingdom. Chapter 5 outlines ROA's information system on education and the labour market, with section 5.2 presenting ROA's national forecasts by occupational classes and educational qualifications. Section 5.3 presents regional forecasts of the expansion demand. Chapter 6 discusses IER's approach to labour market forecasting. Section 6.2 presents the available national forecasts of expansion demand by economic sector, occupation and forecasts with respect to Higher Education. In addition section 6.3 gives the regional forecasts of expansion demand for the United Kingdom, as constructed by the IER. As an aid to visualizing the information on future job opportunities that could be presented in the EURES system, proposals for the computer screen text with respect to the various regions in the Netherlands and the United Kingdom are given in Appendices A and B, respectively. Finally, Chapter 7 summarizes the main conclusions on the possibility of generating the proposed medium-term labour market forecasts for the EURES Database. Moreover, some conclusions will be drawn with respect to the further development of the required labour market forecasts for the EU Member States on behalf of the EURES Database.

2 Research model

2.1 The general structure of the model

In the 1960s the manpower requirement approach was used as a planning instrument. One response of the advocates of this approach to severe criticism of its usefulness for planning purposes was to switch the function of manpower forecasts to the generation of information for the various participants on the labour market (see Van Eijs, 1994 and OECD, 1994). The prime purpose of the forecasts should therefore be informational: to increase *the transparency* of the match between labour demand and supply on the labour market. Moreover, drawing up labour market forecasts is more promising today than in the past, because of the more regular availability of labour market data from the Labour Force Survey in the various Member States of the European Union.

The most effective approach for generating medium-term labour market forecasts for both occupational categories and educational qualifications in the various Member States of the EU is obviously, a *modular* research model. First, a modular approach makes it possible to set up the requested labour market forecasts step-by-step. Second, with a modular approach it is possible to make allowance for the substantial differences between the various Member States in both the available labour force and student data and the macro-economic or sectoral forecasts.

Figure 2.1 shows the general structure of the research model that generates the required medium-term forecasts.² In its most elaborate form a total of eight modules constitute the labour market information system. If all these modules are developed the information system will produce three kinds of *key information* which provide the labour market signals that are relevant for the intended user groups:

- the expansion demand by economic sector;
- the job openings by occupation;
- the labour market prospects by educational qualification.

2. Figure 2.1 refers to the general structure of the research model. Section 2.2 describes the modelling of the regionalization of the various forecasts.

Figure 2.1
Overall structure of the research model for medium-term labour market forecasts.

The information on the job openings by occupation is generated by the first three modules. Module I produces the *expansion demand by economic sector* (i.e. the expected employment growth). These employment forecasts should be funded in a macro-economic model that differentiates between the various economic sectors. In such a multi-sector model, which is usually developed to generate the benchmarks required for general economic and employment policies, many interrelated financial and socio-economic variables influence the economic and employment forecasts.

Module II refers to the occupational model that transforms the employment forecasts by economic sector into the *expansion demand by occupation*. Since the occupational structure of an economic sector is mainly a reflection of the demand side of the labour market, changes in the occupational structure of employment could be explained by factors which primarily influence the demand for labour (e.g. capacity of production, labour productivity, hours per year worked, use of information technology and a trend term). The macro-economic models that are the basis of the employment forecasts in module I generate the forecasts of all these explanatory variables, except for the growth in the use of information technology. The required historical data on the occupational structure of employment could be derived from the *occupation x economic sector matrix* of the working population, on the basis of the available Labour Force Surveys and/or Population Censuses.

Module III contains a model of the forecasts of *replacement demand by occupation*. In general the replacement demand because of the departure of workers is more important than changes in employment levels in determining how many jobs become available for new entrants of the labour market (see De Grip, Meyboom and Willems, 1993). The replacement demand results for both permanent withdrawals for the labour force as workers reach retirement age or take early retirement, and temporary withdrawals, especially by married women caring for their own children. The replacement demand is therefore closely related to the age structure and sexual composition of occupations and types of education. In forecasting the replacement demand these two factors therefore play an important role.

The first step in modelling future replacement demand per occupational class is a description of the inflow and outflow pattern by occupational class over a historical period. However, in almost all countries no appropriate data for mobility flows on the labour market is available. For these countries there is a proper alternative approach based on stock data. By means of the so-called cohort components method *cohort-change rates* based on the number of persons of the same birth cohort who were employed at two different times can be calculated (see Willems and De Grip,

1993). These cohort-range rates can be rewritten as average annual net inflow or outflow percentages³.

$${}_k\dot{W}_{o,a}^{t,n} = \sqrt[n]{\frac{{}_kW_{o,a+n}^t}{{}_kW_{o,a}^{t-n}}} - 1 \quad (2.1)$$

${}_k\dot{W}_{o,i}^{t,t}$ = the average annual net inflow or outflow ratio of workers in occupational class o of age group a (with class-width k) at time $t-n$, during the period $(t-n, t)$;

${}_kW_{o,a}^t$ = the number of workers in occupational class o of age group a (with class-width k) at time t .

If

$${}_k\dot{W}_{o,a}^{t,n} < 0$$

there is a net outflow for a certain age group from an occupational class, and if

$${}_k\dot{W}_{o,a}^{t,n} > 0$$

there is a net inflow.

The second step in modelling is the translation of these inflow and outflow percentages into the replacement demand by occupational class. For occupational classes with an increase in employment in the period $(t-n, t)$, replacement demand is equal to total net outflow in this period. However, for occupational classes which faced a decrease in employment, not all vacancies due to the outflow of workers will have been filled. Therefore replacement demand for these occupational classes equals the number of vacancies that were actually refilled, that is, the total inflow of workers in the occupational class.

This methodology measures only the *net* flow to or from an occupational class. This means that replacement demand satisfied by re-entering workers of the same age cohort is not measured. So replacement demand is actually measured for *newcomers* on the labour market. However, this is exactly what is intended, in as much as the labour market information system should focus on the prospects for newcomers on the labour market.⁴

3. Flow rates for male and female workers are differentiated.

4. In order to cope with changes in the number of workers re-entering the workforce, there should be a correction with respect to the expected changes in the labour market participation rates of the various age-groups of the workforce.

The third step is to project the historically measured net replacement demand rates per age-sex group for a particular occupational class onto the age-sex structure of the workers at the beginning of the forecasting period. Moreover, the historically observed cohort change rates can be corrected for business cycle effects and for expected changes in participation rates. For more details see Willems and De Grip (1993). The required historical data for forecasting the replacement demand by occupation could be derived from the *occupation x age-group x gender* matrices of the working population on the basis of the available Labour Force Surveys and/or Population Censuses.

Together, the first three modules make it possible to generate the key information on the *job openings by occupation*, which is of major importance for the intended user-group of the EURES labour market information.

Module IV is the first step in extending the labour market information with the required information on types of education. In this module the forecasts of the expansion demand by occupation are transformed into the future *expansion demand by educational qualification*. In the model developed in Borghans and Heijke (1993) the distribution of the educational qualification (e) per occupational segment (o) is determined by the skill structure of this occupation in the most recent year for which observations are available. Because of upgrading or downgrading tendencies and concentration around the average training level for this occupation, the ratios between the shares of the various educational qualification in an occupational segment can shift as follows:

$$\bar{W}_{oe} = W_{oe}^{t-1} e^{(-\gamma_1(5-I_e))} e^{(-\gamma_2(I_e - I_o^{t-1}))} \quad (2.2)$$

where:

- $\bar{a}_{oe}$ = number of people with education e in occupation o according to the adjusted qualification structure;
- a_{oe}^{t-1} = number of people with educational qualification e in occupation o in the base year;
- I_e = the level of educational qualification e (from 1 for primary education to 5 for academic education);
- I_o^{t-1} = the average level of the educational qualification in occupation o in the base year;
- γ_1 = coefficient indicating the extent of upgrading or downgrading in a 5-year period;

γ_2 = coefficient indicating the degree of concentration for a 5-year period.

The required historical data on the educational structure of occupational employment could be derived from the *occupation x educational qualification matrix* of the working population on the basis of the available Labour Force Surveys and/or Population Censuses.

Module V generates the forecasts of *replacement demand by educational qualification*. Replacement demand by educational qualification must be interpreted differently from replacement demand by occupational class, since net mobility between occupational classes need only be taken into account in the latter. When a worker with a certain educational background changes occupation, this does not create a vacancy for a newcomer on the labour market with the same educational background. Therefore this does not influence replacement demand for newcomers for the educational qualification in question.

There is another difference between the replacement demand by occupational class and the educational qualification. If someone leaves a certain occupational class and is replaced by an employee with another (e.g. higher) educational background, there is a replacement demand for the occupational class in question. When such displacement or substitution effects occur, however, there is no question of replacement demand for the type of education in question, but rather of an employment decrease for one type of education and an employment increase for the other.⁵

The modelling is similar to the cohort-change rate modelling of the replacement demand described above (module III). The required historical data for forecasting the replacement demand by educational qualification could be derived from the *educational qualification x age-group x gender matrices* of the working population on the basis of the available Labour Force Surveys and/or Population Censuses.

Together, modules IV and V generate information on the future *job openings by educational qualification*. Although this is not the intended final information on the labour market by educational qualification, the information on the job openings by educational qualification is highly relevant for users of the EURES labour market information.

5. In principle the opposite also holds: if a worker who leaves a shrinking occupational class is not replaced, whereas someone with a similar educational background is recruited in another, growing occupational class, there is replacement demand by type of education but no replacement demand by occupation.

Module VI supplements the demand-side information on the future job openings by educational qualification with supply-side forecasts of the future labour market inflow of school-leavers. The forecasting model used should be based on a *transition-matrix* based on the composition of full-time education and a classification of the population by level of education. Flow coefficients relate the 'origin' of students in year t to the 'destination' of these students in year $t+1$. By means of these flow coefficients, the future numbers of students coming from each educational category can, step-by-step, be forecast. However, such a straightforward approach would suppose that students' choices remain unchanged during the entire forecasting period. Therefore, the flow coefficients of students, which are highly affected by choices and/or selection processes, are considered as the dynamic elements of the model. In general, future changes in these coefficients could be forecast by means of (modified) trend extrapolations. The required information could be derived from recorded data on students in initial education, combined with educational matrices that describe the student flows between the various types of initial education and data on the labour market inflow rates of school-leavers.

It is also necessary to forecast the flow from non-regular education (apprenticeships, recognized correspondence courses, training in medical care *etc.*) onto the labour market. Data about that category has to be taken from available additional statistics, or obtained directly from the training institutions concerned. Moreover, enrolment in non-regular courses changes the qualification profile of 'school leavers'. For that reason, the number of students who have successfully completed such courses has to be proportionally subtracted from their preliminary regular educational groups. Another correction is needed to prevent students enrolling in several non-regular courses or in a regular and non-regular course of the same type being counted twice. In this way a forecast can be drawn up of the flow from both regular and non-regular educational groups onto the labour market.⁶

Module VII refers to the collection of recent data on the numbers of *short-term unemployed by educational background*. The short-term unemployed workers at the beginning of the forecasting period should be included in the modelling of the future labour market prospects as these workers compete on the labour market with school-leavers with the same type of education. The short-term unemployed and the inflow of school-leavers are combined in the forecast of the future *supply of newcomers on the labour market by educational qualification*. The requested data could be derived from existing registered data or surveys on unemployment which include information on the educational qualifications of the unemployed workers.

6. See Berendsen *et al.* (1992) for detailed information about the method and the required data.

In addition to the two labour supply components dealt with in modules VI and VII, labour migration between Member States may of course also affect labour supply in the various countries. However, these migration flows are still relatively small. In the period 1989-1991, about 300,000 persons per year migrated to another Member State (see European Commission, 1993). Moreover, since it is an important aim of the EURES information system to generate migration flows that improve the match between labour demand and supply in the Member States, one could argue that the labour market signals EURES gives should not be corrected for these migration flows.⁷

By matching the forecasts of job openings (labour demand) with the forecasts of labour supply, an indicator of the future labour market situation by educational qualification can be constructed. However, in forecasting the *labour market prospects by educational qualification*, the expected substitution effects between the various skill categories, where *ex ante* shortages or excess supply are forecast, should be taken into account. Module VIII deals with the 'ex post' *substitution effects* that may occur between the various types of education. It measures both the negative 'crowding-out' effect and the positive 'pull-effect' for particular types of education due to the excess supply or supply shortages for competing educational qualifications.

2.2 Regionalization of the forecasting model

The general structure of the research model is actually an outline of a method for producing national forecasts for the various occupations and educational qualifications. To produce information on the job openings by occupation and the labour market prospects by educational qualification at the *NUTS 2 regional level*, a top-down procedure that makes it possible to regionalize the national forecasts for the various Member-States is required. Since it is obvious that, for a particular country, the available Labour Force Survey data at the regional level is much less reliable than at the national level, the general procedure should be to project the expected national developments (e.g. shifts in the occupational structure of employment by industry) onto the regional employment structure. However, the regional forecasts of employment growth by economic sector, form an exception on this point.

These *regional forecasts of expansion demand by economic sector* are the starting point for the regional forecasts. These forecasts should be funded in a multi-regional sector model. Such models usually focus on the explanation of regional diffe-

7. Of course this means that if EURES signals attractive job openings in a particular Member State, too large flows of migrants may be attracted from other Member States.

rences (the 'regional components') within the national developments of employment by economic sector (see e.g. Natzijl and Westra, 1995).

The regional forecasts by economic sector can be transformed into forecasts of the *regional expansion demand by occupation* by combining the regional expansion demand forecasts by economic sector with the changes in national employment shares of occupations in the various economic sectors. The advantage of this approach is that the estimates of the shifts in the occupational structure of employment in the various economic sectors can be based on the more reliable national data. However, this approach assumes that national developments are representative of the developments in the regions within the Member State concerned. In general this will be a reasonable assumption.⁸ However, for particular countries with large regional differences in the occupational structure of particular economic sectors, it could be sensible to estimate the models at a more disaggregated level (e.g. the former East and West Germany; North and South Italy).

The regional forecasts of expansion demand by occupation are the starting point of the forecasts of *regional expansion demand by educational qualification*. The regional occupational forecasts are combined with the national forecasts of employment growth rates for the various types of education in each occupational category.

The forecasts of the *regional replacement demand by occupation and type of education* can be produced by projecting the national turnover ratios by sex and age category for a particular occupation or educational qualification on the actual sex and age structure of regional employment in that particular occupation or type of education.

The forecasts of the *regional inflow of school leavers by educational qualification* should be based on regional data on the numbers of students in the educational system, combined with national forecasts of the student flow coefficients between the various types of education. Again, for some countries it is probably better not to rely on national coefficients but on data on a more disaggregated level.

Of course, the regional labour market situation is often affected not only by labour mobility flows between Member States but also by the mobility flows between the various regions in the country concerned. The relative importance of these mobility flows is highly dependent on the scale of the regions and their geographical location. Moreover, the regional mobility of people with high education is usually larger

8. Moreover, feedback from the regional to the national level is ignored (see e.g. Nijkamp *et al.*, 1986). Such interaction effects probably can better be incorporated at a later stage in the development of the European-level research model.

than the regional mobility of less skilled workers. As it would be very difficult to model these regional labour mobility flows in a reliable way, it is probably better to choose an alternative solution in which the information on regional labour market shortages for a particular type of education is presented in combination with the available information on the labour market prospects of that type of education at the national level of the Member States concerned.

3 Availability of sectoral forecasts

3.1 Introduction

This chapter discusses the availability of medium-term sectoral employment forecasts. As mentioned in chapter 2, these forecasts are the required starting points for the forecasts of expansion demand (module I). The availability of these sectoral employment forecasts will be investigated along two lines. First, section 3.2 investigates the possibilities of a decentralized approach in which the prevailing national employment forecasts are used as the basis of the labour market forecasts to be presented in the EURES information system. An advantage of this decentralized approach is that the labour market information presented for the various Member States would be consistent with the forecasts that are the benchmarks for national economic and labour market policies. However, the investigation shows that such sectoral employment forecasts are not available for some countries. Since the EURES information system requires forecasts for all Member States, section 3.3 describes two previous research projects which were intended to generate employment forecasts for all Member States of the European Union. An advantage of such a coordinated approach would be that more or less similar models would be used for all Member States. Moreover, coordinated model-building makes it possible to link the various national models.

3.2 A decentralized approach

To investigate the possibilities of a decentralized approach consistent with the existing economic forecasts in the various Member States, we made an inventory of the medium-term employment forecasts broken down by economic sector and produced on a regular basis in the various EU Member States. In this approach the starting points for forecasting employment by occupations and types of education i.e. the forecasts of expansion demand by economic sector, are derived for each country in the EU from the work of national institutes. The availability of sectoral employment forecasts in each EU Member State is discussed below.

Austria

In Austria the *Austrian Institute of Economic Research* (*Österreichisches Institut für Wirtschaftsforschung, WIFO*) provides employment forecasts by economic sector on an annual basis. The sectoral employment forecasts cover both the short (1 year) and medium-term (5 years), and regional forecasts are also produced. The forecasts are broken down by 13 economic sectors (In the future 19 economic sectors will be distinguished). These sectors are:

- Agriculture and energy
- Utilities
- Basic materials
- Textiles, leather etc.
- Basic needs
- Technology sector
- Construction
- Trade
- Tourism industry
- Transport and communication
- Finance and insurance
- Personal private services
- Public services

These economic sectors are defined in accordance with the NACE classification. The forecasts are made on behalf of the Ministry of Labour and the Austrian Public Employment Services. The forecasts are published by the Labour Market Service. The most recent publication is *Arbeitsmarktvorschau 1996*.

Belgium

In Belgium the *Federal Planning Bureau* is involved in constructing employment forecasts on a regular basis. Twice a year the Federal Planning Bureau provides medium-term (5-year) forecasts of employment by economic sector, using the HERMES model (see section 3.3). This model distinguishes nine economic sectors:

- Agriculture
- Consumer goods
- Equipment
- Intermediate goods
- Building and construction
- Tradeable services
- Transport and communication
- Energy
- Non-tradeable services

These economic sectors are defined in accordance with the NACO/CLIO⁹ classification (at the 2-digit level). The forecasts are published in the *Economische vooruitzichten*. The most recent publication is *Economische vooruitzichten 1996-*

9. NACE/CLIO is a 'product' classification used in input-output tables (national accounts). The NACE/CLIO classification is compatible with NACE classification which is an 'activity' classification.

2000. The employment forecasts by economic sector provided by the Federal Planning Bureau are not regionally disaggregated. However regional employment forecasts are provided irregularly, based on the MURENA module.

Denmark

In Denmark several institutes provide forecasts on employment, at the national and regional levels. However, these forecasts are generally not coordinated, and the guidelines are not consistent over time. ADAM (Annual Danish Aggregated Model) is a widely used macro-economic model of the Danish economy, developed by the Danish Statistical Bureau and associated researchers. The model distinguishes 19 economic sectors, but the forecasts are published on a much more aggregated level. The economic sectors distinguished are based on the 117 sectors distinguished in the national accounts, which are in turn based on the International Standard Industrial Classification (ISIC) '68. The ADAM model is used for forecasting from one to five years ahead. The Ministry of Economic Affairs presents employment forecasts by economic sectors, using the ADAM model, around four times a year. These forecasts cover the medium-term (2 years) and are broken down by 5 economic sectors.¹⁰ The forecasts are published in *Okonomisk Oversigt*, the most recent being released in December 1995. The sectors distinguished, are:

- Agriculture etc.
- Manufacturing, industry etc.
- Construction
- Private service sector
- Government (or Public) sector

Finland

In Finland there are two institutes that provide sectoral employment forecasts: the *Research Institute of the Finnish Economy (ETLA)* and the Ministry of Finance.

The economics department of the Ministry of Finance publishes forecasts of employment by economic sector twice per year. Each year in February they provide a one-year ahead employment forecast, which is published in the *National February Budget* for that year. Each September the department makes a two-year ahead

10. The Ministry of Finance, using the same model, provides longer term forecasts, which are consistent with these forecasts. The Economic Council of the Labour Movement and the Danish Economic Council also provide medium-term (3 years) sectoral employment forecasts which distinguish 6 and 3 sectors, respectively. The Economic Council of the Labour Movement has occasionally also published a more disaggregated employment forecast by economic sectors. But this was done in special studies, not on a regular basis.

forecast of sectoral employment. These forecasts are published in the *Economic Survey*. In both cases the definitions of the economic sectors are based on the standard industrial classification (SIC). The two-year ahead employment forecast is broken down by 6 economic sectors.¹¹

The second institute providing sectoral employment forecasts, ETLA, publishes forecasts four times a year. The quarterly forecasts are published in *The Finnish Economy*.¹² The forecasts of employment by economic sector are not provided quarterly, but three times a year. Two-year sectoral forecasts are published in March and September, and a five-year forecast of employment by economic sector is published annually in June. ETLA distinguishes 9 economic sectors.¹³ These sectors are based on the standard industrial classification (SIC 1988). The economic sectors are:

- Agriculture
- Forestry
- Industry
- Construction of buildings
- Civil engineering
- Wholesale and retail trade
- Transport and communication
- Finance and insurance
- Public and other services

ETLA's medium-term forecasts are most appropriate for the purposes envisioned in this study, since they cover the desired medium-term period and utilize the most disaggregated sectoral level for Finland.

France

In France *Le Bureau d'Information et de Prévision Economique (BIPE)* provides sectoral employment forecasts for the medium term, using the DIVA model. The sectoral forecasts are made 2 or 3 times a year. BIPE distinguishes 36 economic sectors, which are classified in accordance with *La Nomenclature des Activités et des Produits (NAP)*. However, these employment forecasts are not published.

11. In addition to these sectors, there is a category of 'branch unknown'.

12. *The Finnish Economy* is an abridged edition of the Finnish language publication *Suhdanne*.

13. In addition to these 9 economic sectors, they also have a category for 'unknown activity'. For presentational purposes some of these sectors are combined into 7 economic sectors.

Germany

In Germany the *Institute of Employment Research (Institut für Arbeitsmarkt- und Berufsforschung, IAB)* provides sectoral employment forecasts. Since 1989/90 the IAB has been using the econometric macromodel SYSIFO. This model is a quarterly simulation model for West Germany with a submodel for East Germany. It provides forecasts of employment by economic sector for the medium and long-term. SYSIFO distinguishes 14 economic sectors, which are:

- Agriculture, hunting, forestry and fishing
- Energy
- Mining production
- Basic materials industries
- Investment goods industries
- Consumer goods industries
- Food industries
- Construction
- Wholesale and retail trade
- Transportation and communication
- Other services
- Finance and insurance
- Government
- Private households, nonprofit organizations

Greece

In Greece there is no institute which provides regular employment forecasts. Some forecasts on employment are occasionally made by researchers for their own purposes.¹⁴ *The Centre for planning and economic research (KEPE)* has provided some employment forecasts (see for example Glytsos, 1993). These begin with output and productivity forecasts at the one-digit industry level, which are then translated into employment by industry and occupational employment by region.

Ireland

In Ireland the Training and Employment Authority (FAS) is involved in a manpower forecasting project, together with *The Economic and Social Research Institute (ESRI)*. This project produces occupational employment forecasts for the Irish labour market, among other things. In order to make these forecasts, they use

14. The *Experimental Institute of Training and Employment (PIEKA)* has made some plans to provide employment forecasts.

sectoral employment forecasts derived from the ESRI medium-term econometric model, in which 11 economic sectors are distinguished. The ESRI provides these forecasts at approximately two-years intervals. The sectoral employment forecasts are presented in the *Medium-Term Review* which the ESRI publishes. The most recent *Review* is the *Medium-Term Review 1994-2000*. The 11 economic sectors distinguished are:

- Agriculture
- Food processing
- Traditional manufacturing
- Utilities
- High technology
- Building
- Distribution
- Transport and communication
- Other market services
- Health and education
- Public administration

These economic sectors are defined in accordance with the NACE classification

Italy

In Italy, the *Banca Commerciale Italiana* provides sectoral employment forecasts. The forecasts cover both the short (2 years) and medium term (5 years). The short term forecasts are provided twice a year while the medium term forecasts are made annually. The employment forecasts are broken down by 37 economic sectors. However these economic sectors cover only the manufacturing industry. These forecasts are published in *the Italian manufacturing industry, Trends and Forecasts to 2000*, which is a translation from *Analisi dei Settori Industriali*.

Luxembourg

In Luxembourg, the *Service central de la statistique et des études économiques (STATEC)* used to publish regular employment forecasts by economic sector. At this moment STATEC publishes short-term forecasts of the total number of wage earners twice a year. These forecasts are, published in the *Note de conjoncture*. STATEC, however does not provide medium-term forecasts.

The Netherlands

In the Netherlands the *Central Planning Bureau (CPB)* provides sectoral employment forecasts using Athena, their multi-sectoral macromodel of the Dutch

economy. The model distinguishes 14 economic sectors, classified according to the standard industry classification of Statistics Netherlands (comparable to ISIC and NACE). Each year the CPB makes short-term sectoral employment forecasts, and they also provide medium-term forecasts of employment by economic sector at four-year intervals. The most recent medium-term forecasts are presented in the *Centraal Economisch Plan 1993* and cover the period 1995-1998. For forecasting purposes, ROA combines two economic sectors regarding energy which are distinguished by the CPB. The 13 economic sectors distinguished by ROA are:

- Agriculture and fisheries
- Food and beverage industry
- Other industry
- Chemicals
- Metal and electrical industries
- Energy
- Construction
- Commerce
- Transport, storage and communication
- Other commercial services
- Financial services
- Non-commercial services
- Civil services, police, defense and education

Spain

In Spain the *Fundacion Tomillo, Centro de estudios economicos* produces annual forecasts of employment by economic sector. These broken forecasts cover a period of five years and distinguish 43 economic sectors. These sectors are defined as classified in the National Accounts for Spain, which corresponds with the NACE/CLIO classification at the 2-digit level. The forecasts are not published in a particular publication, but the forecasts are used and included in various projects.

Sweden

In Sweden several institutes provide short-term forecasts of sectoral employment (The Business Cycle Institute and Federation of Swedish Industries). The Swedish National Board for Industrial and Technical Development provides long term sectoral employment forecasts. The Business Cycle Institute produces medium-term employment forecasts by economic sector, covering a period of 2-3 years, in addition to its short-term forecasts. These quarterly forecasts are published in *Business Tendency Forecast*.

United Kingdom

In the UK the *Institute for Employment Research (IER)* provides forecasts of employment by economic sector on an annual basis, using the macro-economic model developed by Cambridge Econometrics. The model distinguishes 49 economic sectors, defined in accordance with the standard industrial classification at the 2-digit level (for the latest assessment the SIC 1992 was used). For presentational purposes these 49 sectors are aggregated to 17 economic groups. The forecasts cover a medium-term period. The IER's sectoral employment forecasts are published annually, along with other forecasts, in *The Review of the Economy and Employment*. The sectors which are presented in the *Review* are:

- Agriculture
- Mining
- Food, drink and tobacco
- Textiles and clothing
- Chemicals
- Metals and mineral products
- Mechanical engineering
- Electrical engineering
- Motor vehicles
- Rest engineering
- Other manufacturing
- Utilities
- Construction
- Retailing
- Hotels and catering
- Rest distribution, hotel etc
- Transport and communications
- Banking and business services
- Professional services
- Other services
- Public admin. and defence
- Health and education services

The remaining EU Member States

Information on the availability of medium-term employment forecasts by economic sector is still missing for the five remaining Member States of the European Union.

Conclusion

In order to forecast expansion demand, as described in chapter 2, medium-term employment forecasts by economic sector are required. We investigated the availability of regular medium-term forecasts of sectoral employment for the various EU Member States. Table 3.1 gives an overview of the results. Most Member States have at least one institute which provides medium-term employment forecasts by economic sector on a regular basis for that country. The forecasting period differs from country by country, with a minimum of 2 years. The frequency with which the forecasts are provided also differs between the Member States. In Finland sectoral employment forecasts are provided three times per year, but in some Member States the frequency is much lower. In the Netherlands, for example the medium-term employment forecasts by economic sector are provided at four-year intervals. However, in most of the EU Member States these forecasts are made once a year. The number of economic sectors distinguished ranges from 5 in Denmark to 43 in Spain. The classification used to determine the economic sectors also differs between the EU Member States, but the standard industrial classification (SIC) is most widely used. This classification is comparable to the NACE/CLIO classification.

Table 3.1
Overview of the availability of medium-term employment forecasts by EU Member State

Country	medium-term employment forecasts	number of economic sectors	compatible with NACE-CLIO
Austria	yes	13	yes
Belgium	yes	9	yes
Denmark	yes	5	yes
Finland	yes	9	yes
France	yes	36	unknown
Germany	yes	14	no
Greece	no	-	-
Ireland	yes	11	yes
Italy	yes*	37	unknown
Luxembourg	no	-	-
Netherlands	yes	15	yes
Portugal	unknown	unknown	unknown
Spain	yes	43	yes
Sweden	yes	unknown	unknown
United Kingdom	yes	17	yes

* The manufacturing industry only

On the basis of this investigation of the availability of regular medium-term employment forecasts broken down by economic sector, we can conclude that the possibilities for a decentralized approach are fair. Sectoral employment forecasts are made on a regular basis in many EU Member States. So these existing

employment forecasts can be used as the starting point for forecasting employment by occupations and types of education. However, since the EURES information system requires forecasts for all Member States of the European Union, the gaps in the available sectoral employment forecasts will have to be filled.

3.3 Coordinated approaches

This section will discuss two previous research projects which were intended to generate employment forecasts for the Member States of the European Union. These studies are based on a coordinated approach, in the sense that the forecasts are Europe-wide and that the structures of the national sub-models have been coordinated. The methodology of employment forecasting developed by the *European Economic Research and Advisory Consortium (ERECO)* will be described briefly, followed by an outline of the *HERMES model* which was developed in the 1980s.

ERECO's forecasts by economic sector and EU regions

The ERECO consortium aims to provide disaggregated information on employment developments in the European Union. Their study on "Medium Term Forecasts of Employment by EU Districts and Sectors of Industry" began in December 1992 (for more detail see ERECO, 1994). This study was carried out on behalf of the European Commission, Directorate General for Employment, Industrial relations and Social Affairs (DG V) by ten European labour market research institutes under the coordination of the IFO Institute for Economic Research in Munich. The study provided forecasts of employment by economic sectors, occupational categories and some other qualitative employment features, for all Member States of the EU. The forecasting period was 1991-1997. The forecasting model developed by ERECO is not a purely centralized approach. ERECO does not use a structured econometric model, which is internationally linked and based on input-output techniques, in its medium-term forecasts. Although this is seen as the ideal approach, lack of time and serious doubts about the significance of such a model and the handling of its complexity led ERECO to follow a 'bottom-up-top-down approach'.

In the bottom-up approach, the required data is derived from various sources, most of it from EUROSTAT. The EUROSTAT data was supplemented with national data. The bottom-up approach was complemented with a top-down procedure which made it possible to obtain consistency on the national and the European level. The forecasts of production and of employment by economic sector and occupation were provided on the national level using nationally developed forecasting models. At the European level, consistency was achieved by fixing common assumptions for

the exogenous variables of the national models, adjusting the interim results of the national models and adjusting the sectoral assumptions.

Figure 3.1 gives an overview of the different modules which provide the employment forecasts for the Member States of the EU. In the first module the production (value added in constant prices) is forecast and broken down for 25 economic sectors in each of the 12 countries which were then members of the EU. The economic sectors are based on the NACE/CLIO classification at the 2-digit level.

Figure 3.1
General structure of the forecasting model of ERECO

Source: ERECO

In a second module, a forecast of the employment by economic sector was provided for all Member States of the EU on the basis of the forecasts of sectoral production. The employment forecasts by economic sector were quantified in terms of the number of persons employed and the total hours worked. National econometric models were used to provide these forecasts. The labour input, i.e. the total hours worked, was estimated as a function of real output, labour costs and technical change. The theoretical framework for this was similar in all national models, with a few changes.

ERECO also forecast regional employment by economic sector, based on the sectoral forecasts of employment (second module).¹⁵ In this case 17 economic sectors (NACE/CLIO) and 169 regions were distinguished. These regions are grouped according to the EUROSTAT NUTS 2 classification. Once again EUROS-TAT provided most of the data for this module (from the EUROSTAT REGIO data base). In addition to the *European Regional Economic Model (EREMOD)*, developed by Cambridge Econometrics, a cross-sectional model was estimated for each economic sector.

The HERMES model

In 1981, the HERMES¹⁶ project was started, on the initiative of the Commission of the European Communities (DG XII: Directorate General for Science, Research and Development). Its purpose was to develop a European (dynamic) macrosectoral model (Commission of the European Communities, 1993). The HERMES model consists of medium-term, macroeconomic models, interlinked by a bilateral flow module with regard to the relationships between the economies of the various Member States. HERMES is a 'neo-Keynesian' demand-oriented model, but supply-side elements were also incorporated. The model permits in-depth analysis of productivity, employment and energy requirements, among others things.

The HERMES model includes a national model for each of the 12 Member State in the European Union at that time, and 12 institutes collaborated in its development. Simplified models for other OECD areas and the rest of the world were added to the models of the Member States. HERMES does not link existing national models: the national teams developed their models using the same structure, based on a standard model developed for this purpose (d'Alcantara and Italianer, 1982), and harmonised data. So despite the decentralized execution of the project, the national teams respected compatibility requirements. Nevertheless, it was not possible to prevent some national differences.

Each national model consisted of a macroeconometric sectoral model and an energy sub-model. Energy plays a special role as a factor of production in the HERMES models. The HERMES models have been used for research in very diverse fields, which indicates the wide-ranging capabilities of the model. For example, at the multinational level the consequences of oil price decreases and the consequences of reduction or reorganisation of working hours were investigated.

15. In addition to these regional forecasts, ERECO also transforms the sectoral forecasts into employment forecasts for 10 occupational groups.

16. HERMES is short for Harmonised Economic Model and Energy System.

Also at this level the national research teams who had developed the national HERMES models are brought together in the HERMES Club. Until recently they provided an annual macrosectoral forecast of the European economy as a whole, covering the medium-term. The HERMES model distinguishes 9 branches, related to the NACE/CLIO Code (2-digit). These sectors are :

- Agriculture, forestry and fishery products
- Fuel and power products (energy)
- Intermediate goods (manufacturing)
- Capital equipment (manufacturing)
- Consumer goods (manufacturing)
- Building and construction
- Transport and communication
- Other market services
- Non-market services

Although the HERMES model was not initially created to provide medium-term forecasts of employment by economic sector, the model can be used for this purpose. The MASTER¹⁷ model, which is related to HERMES (see Jansen *et al.*, 1994), is used to analyze the heterogeneity of employment and the role of technical change. The general structure of MASTER resembles the HERMES structure closely. MASTER is composed of an input-output block, a production module and a Skill Allocation Module: SAM. To model technological change, MASTER uses a putty-semi-putty vintage model, in which the scrapping of old vintages of capital goods follows explicitly from decisions taken by entrepreneurs. In the SAM module the demand for labour is translated into employment by sector of industry in terms of skills, in a way which is consistent with the available supply of skills.

At the moment the HERMES model is no longer applied for forecasting employment at European level.

Conclusion

This section discussed two previous research projects which followed a coordinated approach. Both these projects provided employment forecasts for all Member States of the European Union, although the HERMES model was not initially created to provide employment forecasts. Although both the ERECO and HERMES research projects used national models, they did not build on the cardinal macro-economic and sectoral forecasts imbedded in the national public policies in the various Mem-

17. MASTER stands for Model for the Analysis of Sectoral Technology and Employment Relations.

ber States. It would not be practicable for the EURES system to be independent of the existing national forecasts, since the EURES forecasts would then differ from the national forecasts and would not be usable at a national level. Therefore, a coordinated approach to producing the required sectoral labour market forecasts should be supplementary to the existing national forecasts, and should aim only at filling the gaps between the available and required labour market information.

4 Availability of data for occupational and educational forecasts

4.1 The required data

Expansion demand by occupation

As described in Chapter 2, 8 modules can be distinguished within the proposed forecasting model. Module I refers to the *expansion demand by economic sector*. For this module the sectoral forecasts described in Chapter 3 are of crucial importance as these forecasts are the basis of the expansion demand forecasts by both occupations and educational qualifications. Since most economic sectors offer employment to a broad spectrum of occupations, it is important to determine which occupations will profit from the expected expansion demand within an economic sector. For this reason, in the second step (module II) expansion demand by economic sector is translated into the *expansion demand by occupation*. The sum of the predicted employment growth for an occupation in all economic sectors yields the expected expansion demand for that particular occupation. In translating the employment forecasts per economic sector into employment forecasts by occupation, two components play an essential role: changes in the employment levels per economic sector ('the sectoral effect') and changes in the occupational structure of employment within each economic sector (the occupational effect).

To calculate the *expansion demand by occupation*, it is necessary to have data on *sector x occupation matrices*, preferably over a period of some years. If analyses and forecasts are to be reliable, the number of workers in a particular occupation must not be too small. As a rule of thumb we suggest that, in calculating *expansion demand by occupation* the occupational categories to be distinguished should employ more than 5,000 persons at the national level, as this is the level on which the forecasts of changes in the occupational shares in the various economic sectors are based. At the regional level the occupations to be distinguished should employ more than 2,000 persons, in order to provide a reliable basis on which the estimated national shifts in the occupational structure of employment in a particular economic sector can be projected.

Expansion demand by educational qualification

The demand from employers arises primarily from the need to have some particular tasks or jobs carried out. However, the supply of labour is characterized mainly by the educational background of the workers. If a confrontation of demand and supply

is to be made, the forecasts of demand by occupational class must therefore be transformed into forecasts by type of education.¹⁸

For this reason expansion demand by occupation is translated, in module IV, into *expansion demand by educational qualification*. There is in general no single type of education which is uniquely appropriate for a particular occupation. De Grip and Heijke (1991) show that it is important to recognize that people from several different types of education may be eligible for an occupation. The problem therefore arises, that the demand for labour in a given occupation may be assigned to several educational qualifications, but only one person with one particular background can be hired to fill each job. In fact people with a particular educational qualification are generally in demand in several occupations, but are in competition in these occupations with workers with different educational backgrounds. This problem can be resolved by predicting the educational structure of occupations on the basis of their structure in the past. This requires a time series of *occupation x educational qualification matrices*. To produce reliable forecasts we again formulate as a rule of thumb that the educational qualifications to be distinguished should employ more than 5,000 persons at the national level, and that at the regional level all the educational categories distinguished should employ more than 2,000 workers.

Replacement demand by occupation and educational qualification

However, as mentioned in Chapter 2, *expansion demand* is not the only relevant component of demand. *Replacement demand* (modules III and V) is also very important, as this variable determines the vacant jobs due to the mobility between occupations and the flows out of the labour market.

The replacement demand forecasts will be based on the cohort change rates of the people working within each occupation. The *replacement demand by occupation* forecasts require an *occupation x sex x 5 years age group matrix* for at least two years. The *replacement demand by educational qualification* is calculated using the same method as was described for the replacement demand by occupation. These forecasts require a *type of education x sex x 5-year age group matrix* for at least two years.

18. An alternative would be to transfer the forecasts of supply by educational qualification into the supply by occupation.

Supply by educational qualification

Employment forecasts are not sufficient to determine the chances of a person with a particular educational background getting a job in a certain occupation in a certain region. An individual also needs to know how many people will be competing for the job. Competition for jobs will come mainly from school-leavers in the region itself and the surrounding regions. The forecasts of *school-leavers by type of education* (module VI) require data on the number of *students per type of education by school year and sex*, *transition matrices on the flows within initial education by sex*, and data on the *participation in additional training by type of education and initial educational qualification*.

Supply of unemployed

As mentioned in Chapter 2, the forecast of the number of school-leavers should be supplemented with the number of *short-term unemployed workers*, who will compete for the available jobs (module VII). Only the short-term unemployed are important, since the knowledge and skills of people who have been unemployed for a very long time become more or less obsolete. It is important to know what kind of educational background the short-term unemployed have, as an indication of which school-leavers they will compete with. This module requires recent data on the *short-term unemployed by educational qualification*.

Overview of the data required

To conclude this section, Table 4.1 shows the required data matrices for all modules of the labour market forecasting model.

Table 4.1
Data requirements for the labour market forecasting model

Module	Required data	Time series required (x years)
Expansion demand by occupation	occupation x economic sector	5-10
Expansion demand by educational qualification	occupation x educational qualification	5-10
Replacement demand by occupation	occupation x sex x age group	2-10
Replacement demand by educational qualification	educational qualification x sex x age group	2-10
Supply of school-leavers	students x educational qualification x school year x sex	1-5
	transition matrix initial education x sex	1-5
	additional training x educational qualification x initial educational qualification	1-5
Short-term unemployment	short-term unemployed x educational qualification	1

4.2 Data availability at the European level

The main source of data available at the European level is the Labour Force Survey (LFS) of EUROSTAT. Within the Labour Force Survey, survey data from all Member States of the European Union is combined in variables which are comparable with regard to several characteristics of the labour force. This section will analyze whether EUROSTAT's LFS data is of sufficient quality for making labour market forecasts at the regional level. As of 1993, data is available for 12 Member States. No data is yet available for the new Member States (Austria, Finland and Sweden). The Labour Force Survey contains information on 60 economic sectors, 111 occupations and 246 regions (see also Appendix C).

Within the Labour Force Survey, 60 economic sectors can be distinguished according to the Statistical Classification of Economic Activities (NACE) reference 1, 2-digit level. However we will consider only the 17 sectors at the 1-digit NACE level. The 111 occupations are based on the International Standard Classification of Occupations 1988 (ISCO'88) on the 3-digit level. The occupations can be aggregated into 27 occupational classes (2-digit) and 10 occupational sectors (1-digit). The regions distinguished in the Member States are based on the Nomenclature of Territorial Units (NUTS) at the 2-digit level, except that the Italian regions have been aggregated from 96 to 20 regions.

In some cases the regions based on the NUTS classification at the 2-digit level have been adjusted to match the regional classification used in the EURES information system.¹⁹ The result is that the 12 NUTS-2 regions in Belgium have been aggregated into 3 regions, and the 41 NUTS-2 regions in Germany into 16 regions. The EURES regions for some countries are at a lower level of aggregation than the NUTS-2 regions. For instance, EURES subdivides the Irish NUTS-2 region 'East' into 3 regions, and distinguishes various regions within Denmark based on the NUTS 3-digit level, whereas there are no regions within Denmark at the NUTS-2 level.²⁰ In such cases we have not the NUTS-2 regions to the level of the EURES system. The Labour Force Survey also contains information with regard to age and

19. But Ceuta and Mellila (Spain), Poutou-Charentes and Aquitaine (France) and Madeira (Portugal), which are not presented in the EURES information system, are included in the analysis in this chapter.

20. The result of these adjustments is that the number of regions distinguished in each country is as follows: Belgium 3, Denmark 1, Germany 16, Greece 13, Spain 18, France 22, Ireland 8, Italy 20 (was 96), Luxembourg 1, Netherlands 12, Portugal 7 and the United Kingdom 11, giving a total of 132 regions. If the analysis was made on the 1-digit level, the number of regions would be reduced to 69.

sex. The number of households in the sample and, where possible, the sample size are described in table 4.2.

Table 4.2
Sample size of the LFS in the various EU Member States

Country	Number of households	Sample size %
Belgium	35,000	0.95
Denmark	19,000	1.60
Germany	100,000	0.40
Greece	47,000	1.50
Spain	62,000	-
France	65,000	0.33
Ireland	45,000	-
Italy	123,000	-
Luxembourg	10,000	7.81
Netherlands	30,000	1.00
Portugal	35,000	1.00
United Kingdom	85,000	-

Source: EUROSTAT, 1988

The nature of the Labour Force Survey entails a number of problems with regard to various modules of the forecasting model. The main problem is that educational qualifications can, at present, hardly be distinguished. At the best, 9 educational classes could be distinguished in the data from the Labour Force Survey, but EUROSTAT's present position is that it would be wiser to distinguish only 3 educational levels, related to the ISCED 1-digit classification. These three levels are Low (ISCED 0/1/2), Medium (ISCED 3) and High (ISCED 5/6/7). It is not expected to be possible to distinguish more types of education within the Labour Force Survey in the near future. This means that modules IV to VIII cannot be calculated at the moment on the basis of the EUROSTAT LFS data, since *replacement demand* and *expansion demand* on only three levels of education would not give useful results for forecasting job opportunities by educational background. At the moment the OECD work group INES is developing a more extensive system of comparable types of education for its Member States. At the moment it is unclear what the outcome of this will be.

The EUROSTAT data restricts the labour market information that can be generated in addition to the sectoral forecasts to occupational information, i.e. to modules II and III.²¹ At the moment the available data would enable us only to make crude forecasts of expansion demand by occupation. The problems that arise here are the

21. For this reason we have also not investigated the availability of the required labour supply data by type of education from other data sources.

limited time series due to the transition from ISCO'68 to ISCO'88 and from NACE to NACE rev.1, problems arising from Member States' unwillingness to adapt to the new standards²² and definition problems.²³ The result of this transition is that data is only available for 1993 and 1994, whereas a time series of at least five years would be preferred. However, it will probably be possible to obtain an adequate time series in the near future, which could increase the quality of the results of the forecasting model. As was said in section 2.2, we propose estimating the model of shifts in the occupational structure of employment using national data, and to project these shifts onto actual data of the occupational structure of employment in the various economic sectors. For this reason the occupations to be distinguished at the national level should employ more than 5,000 workers, whereas those distinguished at the regional level should employ more than 2,000 workers.

Analyses of EUROSTAT's LFS data show that most cells contain sufficiently large numbers of workers at the national level for the forecast calculations. It is however remarkable that no country distinguishes all 111 occupations which can be distinguished at the ISCO'88 3-digit level. Table 4.3 presents the total working population, the number of occupations with more than 5,000 employed persons and the number of occupations distinguished in the various Member States. In most of the Member States, between 104 and 106 from the 111 3-digit occupations are distinguished. In France only 95 occupations are differentiated. As mentioned before, the 55 occupations in Ireland are the result of the conversion of the available Irish Labour Force Survey data from ISCO'68 to ISCO'88. Leaving Luxembourg and Ireland aside, the number of occupations with more than 5,000 employed persons ranges from 76 in Greece to 103 in Germany. Since Luxembourg has a small population, it is not surprising that there are only a few occupations which exceed the threshold value of 5,000 workers.

22. Germany has not yet implemented the NACE rev. 1, so EUROSTAT itself has converted the German NACE data to the NACE rev. 1 standard. EUROSTAT is not convinced that this conversion is perfect. The conversion to the new economic sector of 'Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods' has caused especially large problems. EUROSTAT therefore advises great caution in interpreting the German sectoral data. Since Ireland had not implemented ISCO'88 yet, EUROSTAT has converted Ireland's ISCO'68 data to ISCO'88, which leads to a total of only 55 occupations. For this reason the Irish data is not comparable with the other EU Member States.

23. In most countries independent farmers are classified as 'Skilled agricultural workers' (ISCED 6), whereas in France they are classified as 'Managers of small enterprises' (ISCED 1).

Table 4.3

Data availability for the European Union: occupations with more than 5,000 employed persons, 1994

Country	Working population	occupations > 5000	occupations total
Belgium	3,731,000	78	106
Germany	35,555,000	103	106
Denmark	2,505,000	79	105
Spain	11,635,000	99	106
France	21,613,000	92	95
Greece	3,679,000	76	107
Ireland	1,179,000	38	55
Italy	19,752,000	100	106
Luxembourg	164,000	9	104
Netherlands	6,623,000	93	105
Portugal	4,263,000	84	106
United Kingdom	25,308,000	99	100
European Union	136,007,000	-	-

Source: EUROSTAT, LFS

Table 4.4 gives an overview of the data availability at regional level. The table shows the working population and the number of occupations which exceed the threshold value for regional data, i.e. those with more than 2,000 workers. The table also shows that a reasonable number of occupations can be distinguished at the regional level using EUROSTAT's Labour Force Survey data. In the various regions in Belgium, Germany, Spain, France, Italy, the Netherlands and the United Kingdom there are relatively many occupations with more than 2,000 workers, although there are some regions even in these countries with just a few occupations containing more than 2,000 employed persons. For instance, Rioja (Spain) has just 11; Corse (France), 9; Valle d'Aosta (Italy), 4 and Flevoland (Netherlands), 21. The number of occupations containing more than 2,000 workers is, in general, much smaller in the regions of Greece, Ireland and Portugal. Over Europe as a whole, the number of occupations with more than 2,000 workers ranges from 4 in Valle d'Aosta (Italy) to 95 in South East (United Kingdom).

Table 4.4

Data availability for the European Union: number of occupations with more than 2,000 employed persons in 1994

Region	Working population	occupations > 2,000
<i>Belgium*</i>		
Vlaams Gewest	2,283,000	87
Région Wallonne	1,127,000	62
Brussel	321,000	41
<i>Germany**</i>		
Schleswig-Holstein	1,203,000	70
Hamburg	780,000	66
Niedersachsen	3,307,000	86
Bremen	282,000	42
Nordrhein-Westfalen	7,314,000	97
Hessen	2,640,000	90
Rheinland-Pfalz	1,681,000	87
Baden-Württemberg	4,652,000	94
Bayern	5,666,000	96
Saarland	415,000	49
Berlin	1,603,000	79
Brandenburg	1,086,000	75
Mecklenburg-Vorpommern	784,000	63
Sachsen	1,888,000	81
Sachsen-Anhalt	1,160,000	68
Thuringen	1,095,000	73
<i>Denmark</i>		
-		
<i>Spain</i>		
Galicia	891,000	59
Asturias	308,000	39
Cantabria	150,000	21
Pais Vasco	657,000	66
Navarra	173,000	29
Rioja	81,000	11
Aragon	384,000	45
Madrid	1,542,000	81
Castilla-Leon	758,000	60
Castilla-La Mancha	476,000	43
Extremadura	270,000	29
Cataluna	2,038,000	85
Cummunidad Valenciana	1,200,000	71
Baleares	243,000	29
Andalucia	1,688,000	76
Murcia	311,000	36
Ceuta y Melilla***	30,000	3
Canarias	434,000	41
<i>France</i>		
Ile de France	4,628,000	85
Champagne-Ardenne	465,000	52
Picardie	609,000	59
Haute-Normandie	640,000	59
Centre	908,000	66
Basse-Normandie	463,000	50

Table 4.4 (continued)

Data availability for the European Union: number of occupations with more than 2,000 employed persons in 1994

Region	Working population	occupations > 2,000
Bourgogne	608,000	57
Nord-Pas-de-Calais	1,247,000	66
Lorraine	861,000	67
Alsace	661,000	58
France-Comite	424,000	55
Pays de la Loire	1,222,000	68
Bretagne	1,104,000	64
Potou-Charentes***	587,000	55
Aquitaine***	1,040,000	66
Midi-Pyrenees	899,000	62
Limousin	249,000	37
Rhone-Alpes	2,259,000	76
Auvergne	462,000	50
Languedoc-Rousillon	744,000	63
Provence-Alpes-Cote d Azur	1,463,000	73
Corse	71,000	9
<i>Greece</i>		
Anatoliki Makedonia, Thraki	226,000	25
Kentriki Makedonia	644,000	55
Dytiki Makedonia	105,000	13
Thessalia	249,000	26
Ipeiros	98,000	13
Ionia Nisia	73,000	9
Dytiki Ellada	217,000	20
Sterea Ellada	156,000	17
Peloponnisos	202,000	15
Attiki	1,360,000	73
Voreio Aigaio	50,000	6
Notio Aigaio	99,000	9
Kriti	200,000	16
<i>Ireland</i>		
East****	496,000	37
South West	172,000	25
South East	115,000	19
North East	64,000	12
Mid-West	100,000	17
North West and Donegal	61,000	11
Midlands	79,000	13
West	92,000	16
<i>Italy</i>		
Piemonte	1,647,000	72
Valle d'Aosta	50,000	4
Liguria	561,000	58
Lomdardia	3,618,000	88
Trentino-Alto Adige	376,000	46
Veneto	1,750,000	78
Fruiti-Venezia Giulia	447,000	47
Emilia-Romagna	1,631,000	77
Toscana	1,340,000	77
Umbria	288,000	38

Table 4.4 (continued)

Data availability for the European Union: number of occupations with more than 2,000 employed persons in 1994

Region	Working population	occupations > 2,000
Marche	546,000	52
Lazio	1,785,000	84
Campania	1,537,000	77
Abruzzi	428,000	47
Molise	104,000	13
Puglia	1,157,000	70
Basilicata	173,000	25
Calabria	552,000	42
Sicilia	1,275,000	68
Sardegna	489,000	50
<i>Luxembourg</i>		
-		
<i>Netherlands</i>		
Groningen	222,000	35
Friesland	237,000	33
Drenthe	183,000	27
Overijssel	433,000	56
Gelderland	801,000	70
Flevoland	113,000	21
Utrecht	489,000	54
Noord-Holland	1,072,000	70
Zuid-Holland	1,440,000	76
Zeeland	152,000	23
Noord-Brabant	1,005,000	71
Limburg	479,000	55
<i>Portugal</i>		
Norte	1,515,000	74
Centro	759,000	60
Lisboa e Vale do Tejo	1,460,000	76
Alentejo	195,000	27
Algarve	143,000	19
Acores	85,000	11
Madeira***	106,000	14
<i>United Kingdom</i>		
North	1,251,000	80
Yorkshire and Humberside	2,150,000	85
East Midlands	1,832,000	84
East Anglia	974,000	72
South East	8,005,000	95
South West	2,153,000	84
West Midlands	2,307,000	84
North West	2,653,000	89
Wales	1,155,000	77
Scotland	2,236,000	89
Northern Ireland	591,000	55

Source: EUROSTAT, LFS

* NUTS 1-digit level; ** Bundesländer; *** Not distinguished in the EURES Database;

**** In the EURES Database this region is subdivided into three regions

The fact that no country distinguishes all 111 occupations found at the ISCO'88 3-digit level could well indicate that there are systematic differences in the way the various occupations are classified in the various Member States. Table 4.5 gives an overview of the 3-digit occupations which are not distinguished, not coded or do not occur in a particular Member State. The table does in fact indicate that there are some systematic differences in the way occupations are classified in the various Member States. For example, *agricultural, fishery and related labourers* certainly will occur in France. Moreover, the table shows the serious drawbacks of the transformation of the ISCO'68 data for Ireland into ISCO'88 occupational categories. However, it is probable that some of these occupations simply do not occur in a particular country: e.g. *shoe cleaning and other street services*, etc.

It is remarkable that in most countries several occupations relating to nursing and education are not distinguished or do not occur, and that *industrial robot operators* and *religious associate professionals* are also missing in many Member States.

Table 4.5

Occupations not distinguished, not coded or not occurring per Member State of the EU, 1994

Missing occupations per country

Belgium

- 321 Life science technicians and related associate professionals
- 346 Social work associate professionals
- 348 Religious associate professionals
- 613 Crop and animal producers
- 912 Shoe cleaning and other street services etc

Germany

- 223 Nursing and midwifery professionals
- 331 Primary education teaching associate professionals
- 613 Crop and animal producers
- 817 Industrial robot operators
- 912 Shoe cleaning and other street services etc

Denmark

- 212 Mathematicians, statisticians and related professionals
- 348 Religious associate professionals
- 521 Fashion and other models
- 744 Pelt, leather and shoemaking trades workers
- 817 Industrial robot operators
- 912 Shoe cleaning and other street services etc

Spain

- 323 Nursery and midwifery associate professionals
- 331 Primary education teaching associate professionals
- 332 Pre-primary education teaching associate professionals
- 333 Special education teaching associate professionals
- 011 Armed forces

France

- 114 Senior officials of special-interest organisations
- 212 Mathematicians, statisticians and related professionals
- 223 Nursing and midwifery professionals
- 233 Primary and pre-primary education teaching professionals
- 234 Special education teaching professionals
- 315 Safety and quality inspectors
- 332 Pre-primary education teaching associate professionals
- 521 Fashion and other models
- 733 Handicraft workers in wood, textile, leather and related materials
- 817 Industrial robot operators
- 823 Rubber- and plastic-products machine operators
- 911 Street vendors and related workers
- 912 Shoe cleaning and other street services etc
- 914 Building caretakers, window and related cleaners
- 921 Agricultural, fishery and related labourers
- 011 Armed forces

Greece

- 333 Special education teaching associate professionals
- 334 Other teaching associate professionals
- 348 Religious associate professionals
- 817 Industrial robot operators

Table 4.5 (continued)

Occupations not distinguished, not coded or not occurring per Member State of the EU, 1994

Missing occupations per country

Ireland

- 114 Senior officials of special-interest organisations
- 121 Directors and chief executives
- 122 Production and operations managers
- 211 Physicists, chemists and related professionals
- 213 Computing professionals
- 221 Life science professionals
- 223 Nursing and midwifery professionals
- 231 College, university and higher education teaching professionals
- 232 Secondary education teaching professionals
- 233 Primary and pre-primary education teaching professionals
- 234 Special education teaching professionals
- 243 Archivists, librarians and related information professionals
- 244 Social science and related professionals
- 247 Public service administrative professionals
- 312 Computer associate professionals
- 313 Optical and electronic equipment operators
- 315 Safety and quality inspectors
- 322 Health associate professionals (except nursing)
- 323 Nursery and midwifery associate professionals
- 331 Primary education teaching associate professionals
- 333 Special education teaching associate professionals
- 334 Other teaching associate professionals
- 342 Business services agents and trade brokers
- 343 Administrative associate professionals
- 344 Customs, tax and related government associate professionals
- 345 Police inspectors and detectives
- 346 Social work associate professionals
- 348 Religious associate professionals
- 412 Numerical clerks
- 422 Client information clerks
- 511 Travel attendants and related workers
- 513 Personal care and related workers
- 521 Fashion and other models
- 612 Animal producers and related workers
- 613 Crop and animal producers
- 713 Building finishers and related trades workers
- 723 Machinery mechanics and fitters
- 733 Handicraft workers in wood, textile, leather and related materials
- 734 Craft printing and related trades workers
- 812 Metal-processing plant operators
- 813 Glass, ceramics and related plant operators
- 816 Power-production and related plant operators
- 817 Industrial robot operators
- 821 Metal- and mineral-products machine operators
- 822 Chemical-products machine operators
- 824 Wood-products machine operators
- 826 Textile-, fur- and leather-products machine operators
- 827 Food and related products machine operators
- 832 Motor vehicle drivers
- 833 Agricultural and other mobile plant operators
- 834 Ships deck crews and related workers
- 911 Street vendors and related workers
- 912 Shoe cleaning and other street services etc

Table 4.5 (continued)

Occupations not distinguished, not coded or not occurring per Member State of the EU, 1994

Missing occupations per country

- 915 Messengers, porters, doorkeepers etc
- 916 Garbage collectors and related labourers
- 932 Manufacturing labourers

Italy

- 123 Other specialist managers
- 223 Nursing and midwifery professionals
- 331 Primary education teaching associate professionals
- 332 Pre-primary education teaching associate professionals
- 829 Other machine operators n.e.c.

Luxembourg

- 521 Fashion and other models
- 612 Animal producers and related workers
- 613 Crop and animal producers
- 615 Fishery workers, hunters and trappers
- 733 Handicraft workers in wood, textile, leather and related materials
- 817 Industrial robot operators
- 912 Shoe cleaning and other street services etc

Netherlands

- 331 Primary education teaching associate professionals
- 332 Pre-primary education teaching associate professionals
- 333 Special education teaching associate professionals
- 733 Handicraft workers etc
- 817 Industrial robot operators
- 912 Shoe cleaning and other street services etc

Portugal

- 212 Mathematicians, statisticians and related professionals
- 223 Nursing and midwifery professionals
- 233 Primary and pre-primary education teaching professionals
- 333 Special education teaching associate professionals
- 348 Religious associate professionals

United Kingdom

- 312 Computer associate professionals
 - 321 Life science technicians and related associate professionals
 - 331 Primary education teaching associate professionals
 - 333 Special education teaching associate professionals
 - 348 Religious associate professionals
 - 521 Fashion and other models
 - 612 Animal producers and related workers
 - 817 Industrial robot operators
 - 829 Other machine operators n.e.c.
 - 912 Shoe cleaning and other street services etc
 - 011 Armed forces
-

Source: EUROSTAT, LFS

Table 4.6

3-digit occupations that do not occur in the Labour Force Survey of the various Member States of the EU, 1994

Country and occupational code	Number of workers
<i>Belgium</i>	
329	200
998	3,200
<i>Germany</i>	
120	181,900
130	302,400
610	354,400
999	1,039,700
<i>Denmark</i>	
120	400
420	300
799	10,500
899	1,000
998	100
999	19,000
<i>Spain</i>	
010	35,300
330	6,000
<i>France</i>	
010	301,200
729	91,900
799	12,000
998	62,400
<i>Greece</i>	
-	-
<i>Ireland</i>	
998	4,300
<i>Italy</i>	
998	639,700
<i>Luxembourg</i>	
299	600
998	100
<i>Netherlands</i>	
230	1,600
410	36,900
799	300
820	4,600
899	1,300
998	231,600
999	18,200
<i>Portugal</i>	
299	400
799	38,000
899	12,300
999	15,000
<i>United Kingdom</i>	
010	117,000
998	164,400

Source: EUROSTAT, LFS

Table 4.6 shows the 3-digit occupations that do not occur in the Labour Force Survey of the various Member States of the EU and the total number of workers in

these occupations. The codes 998 and 999 are most likely workers of which the occupation is unknown. The table shows that in particular in Germany and Italy for a large group of workers the occupation is unknown.

It may well be worthwhile to include information on the largest occupational groups in the various EU regions in the EURES system. Table 4.7 presents the occupations with the largest number of employed persons in the various Member States. In Belgium the number of workers is largest for *other office clerks, managers of small enterprises and secondary education teaching professionals*. In Germany the occupations with the largest number of workers are *other office clerks, shop, stall and market salespersons etc.* and *administrative associate professionals*. The *other office clerks* and *shop, stall and market salespersons etc.* also have a large number of employed persons in Denmark, but it is the *personal care and related workers* which have the largest number of workers in this Member State. In Spain, *managers of small enterprises, domestic and related helpers, cleaners etc.* and, again, *shop, stall and market salespersons etc.* are the occupations with the largest number of workers. In France, *numerical clerks, shop, stall and market salespersons* and *personal care and related workers* are the most important occupations with respect to the number of workers. In Greece and Ireland, *market gardeners and crop growers, managers of small enterprises, other office clerks* and *shop, stall and market salespersons etc.* have the largest number of employed persons. In Italy the occupations with the largest number of workers are *shop, stall and market salespersons etc., secretaries and keyboard-operating clerks* and *numerical clerks*. In Luxembourg, *domestic and related helpers, cleaners etc., other office clerks* and *managers of small enterprises* have the largest number of employed persons. In the Netherlands *managers of small enterprises, shop, stall and market salespersons etc.* and *administrative associate professionals* are important occupations with respect to the number of workers. This also holds for Portugal, except that *market gardeners and crop growers* take the place of the administrative workers. Finally, in the United Kingdom *production and operational managers, other specialist managers* and *shop, stall and market salespersons etc.* have the largest number of workers.

It can be seen that, in most of the Member States of the EU, the occupation of *shop, stall and market salespersons etc.* has a large number of workers. Appendix E presents the occupations with the largest number of employed persons in the various regions of the EU, along with the number of persons employed in the ten occupations defined at the 1-digit level in the various EU regions.

Table 4.7

Occupations with the largest number of employed persons by Member State of the European Union, 1994

Member State	Number of workers
<i>Belgium</i>	
Other office clerks	376,000
Managers of small enterprises	171,000
Secondary education teaching professionals	158,000
Physical and engineering science technicians	141,000
Shop, stall and market salespersons etc	130,000
Building frame and related trades workers	114,000
Transport labourers and freight handlers	112,000
Nursing and midwifery professionals	111,000
Building caretakers, window and related cleaners	110,000
Motor vehicle drivers	105,000
<i>Germany</i>	
Other office clerks	2,073,000
Shop, stall and market salespersons etc	1,595,000
Administrative associate professionals	1,556,000
Building finishers and related trades workers	1,429,000
Physical and engineering science technicians	1,089,000
Manufacturing labourers	977,000
Motor vehicle drivers	973,000
Architects, engineers and related professionals	969,000
Machinery mechanics and fitters	933,000
Finance and sales associate professionals	851,000
<i>Denmark</i>	
Personal care and related workers	183,000
Other office clerks	120,000
Shop, stall and market salespersons etc	119,000
Domestic and related helpers, cleaners etc	118,000
Administrative associate professionals	82,000
Motor vehicle drivers	68,000
Finance and sales associate professionals	67,000
Primary and pre-primary education teaching prof.	66,000
Crop and animal producers	65,000
Physical and engineering science technicians	60,000
<i>Spain</i>	
Managers of small enterprises	731,000
Domestic and related helpers, cleaners etc	607,000
Shop, stall and market salespersons etc	605,000
Motor vehicle drivers	523,000
Secretaries and keyboard-operating clerks	506,000
Building frame and related trades workers	502,000
Housekeeping and restaurant services workers	466,000
Market gardeners and crop growers	435,000
Other office clerks	303,000
Primary and pre-primary education teaching prof.	284,000
<i>France</i>	
Numerical clerks	1,151,000
Shop, stall and market salespersons etc	1,137,000
Personal care and related workers	1,033,000
Domestic and related helpers, cleaners etc	992,000

Table 4.7 (continued)

Occupations with the largest number of employed persons by Member State of the European Union, 1994

Member State	Number of workers
Secretaries and keyboard-operating clerks	827,000
Business professionals	747,000
Finance and sales associate professionals	676,000
Physical and engineering science technicians	675,000
Motor vehicle drivers	593,000
Building frame and related trades workers	567,000
<i>Greece</i>	
Market gardeners and crop growers	561,000
Managers of small enterprises	330,000
Other office clerks	206,000
Shop, stall and market salespersons etc	197,000
Motor vehicle drivers	148,000
Building frame and related trades workers	127,000
Housekeeping and restaurant services workers	110,000
Building finishers and related trades workers	95,000
Textile, garment and related trades workers	95,000
Animal producers and related workers	93,000
<i>Ireland</i>	
Market gardeners and crop growers	92,000
Shop, stall and market salespersons etc	89,000
Other office clerks	85,000
Managers of small enterprises	79,000
Housekeeping and restaurant services workers	63,000
Other teaching professionals	61,000
Health professionals (except nursing)	53,000
Secretaries and keyboard-operating clerks	41,000
Electrical and electronic equipment mechanics etc	39,000
Building frame and related trades workers	37,000
<i>Italy</i>	
Shop, stall and market salespersons etc	1,564,000
Secretaries and keyboard-operating clerks	1,148,000
Numerical clerks	805,000
Finance and sales associate professionals	705,000
Housekeeping and restaurant services workers	662,000
Building frame and related trades workers	638,000
Market gardeners and crop growers	609,000
Machinery mechanics and fitters	569,000
Physical and engineering science technicians	547,000
Motor vehicle drivers	541,000
<i>Luxembourg</i>	
Domestic and related helpers, cleaners etc	13,000
Other office clerks	12,000
Managers of small enterprises	9,000
Secretaries and keyboard-operating clerks	8,000
Building frame and related trades workers	7,000
Administrative associate professionals	6,000
Shop, stall and market salespersons etc	6,000
Housekeeping and restaurant services workers	5,000
Motor vehicle drivers	5,000

Table 4.7 (continued)

Occupations with the largest number of employed persons by Member State of the European Union, 1994

Member State	Number of workers
Market gardeners and crop growers	5,000
<i>Netherlands</i>	
Managers of small enterprises	407,000
Shop, stall and market salespersons etc	353,000
Administrative associate professionals	282,000
Personal care and related workers	234,000
Production and operations managers	227,000
Nursery and midwifery associate professionals	210,000
Domestic and related helpers, cleaners etc	208,000
Motor vehicle drivers	179,000
Secondary education teaching professionals	179,000
Housekeeping and restaurant services workers	152,000
<i>Portugal</i>	
Managers of small enterprises	315,000
Market gardeners and crop growers	301,000
Shop, stall and market salespersons etc	212,000
Textile, garment and related trades workers	190,000
Secretaries and keyboard-operating clerks	157,000
Building frame and related trades workers	155,000
Housekeeping and restaurant services workers	147,000
Numerical clerks	134,000
Secondary education teaching professionals	110,000
Motor vehicle drivers	107,000
<i>United Kingdom</i>	
Production and operations managers	1,367,000
Other specialist managers	1,312,000
Shop, stall and market salespersons etc	1,235,000
Domestic and related helpers, cleaners etc	992,000
Other office clerks	952,000
Secretaries and keyboard-operating clerks	875,000
Personal care and related workers	805,000
Housekeeping and restaurant services workers	781,000
Managers of small enterprises	694,000
Finance and sales associate professionals	689,000

Source: EUROSTAT, LFS

4.3 Occupational specialization of the EU Member States

It will be worthwhile the EURES system to include information on the occupations which are over-represented in the each of the EU Member States. For this purpose we have developed an indicator of the *occupational specialization*. This specialization index is a measure of the relative size of a particular occupation in a particular country as compared to the EU average. Table 4.8 presents the occupations for which the employment share is more than double the EU average for that occupa-

tion, for each Member State, i.e. those for which the specialization index is greater than 2.²⁴

The table shows that in Belgium *directors and chief executives, building caretakers, window and related cleaners and transport labourers and freight handlers* are relatively important occupations in comparison with the EU average. Germany is relatively specialized in *safety and quality inspectors, customs, tax and related government associate professionals and other machine operators*. The occupations of *directors and chief executives, wood-products machine operators and ship and aircraft controllers and technicians* are relatively important in Denmark. Spain appears to specialize in *fishery workers, hunters and trappers and animal producers and related workers*. In France *business professionals, wood-processing- and papermaking plant operators and printing-, binding- and paper products etc.* are relatively important occupations. Greece is particularly specialized in occupations which focus on the primary necessities of life: *market gardeners and crop growers, animal producers and related workers and ship and aircraft controllers and technicians*. This is to a lesser degree also the case in Italy, which is specialized in *pelt, leather and shoemaking trades workers, handicraft workers etc. and legislators and senior government officials*. In Luxembourg *rubber- and plastic-products machine operators and glass, ceramics and related plant operators and mining and mineral-processing-plant operators* are relatively important occupations. The Netherlands is specialized in *wood-products, machine operators, business services agents and trade brokers and social science and related professionals*. In Portugal the *pelt, leather and shoemaking trades workers, textile, garment and related trades workers and market gardeners and crop growers* are relatively important. The United Kingdom is specialized in *other specialist managers, production and operations managers and senior officials of special-interests organisations*.

The occupational specialization of the various regions of the EU is given in appendix E.

24. Since the occupational data of the Irish LFS were originally classified by the old ISCO'68 classification, we excluded the Irish occupational data in calculating the average employment share of each occupation in the total European Union. Moreover, as the index focuses on the most extremely overrepresented occupations it is vulnerable for the still existing differences in the occupational procedures in the various Member States. For this reason the indexes should be dealt with carefully and confronted with national expert judgements on the quality of the data until EUROSTAT succeeds in further improving the quality of the occupational data.

Table 4.8
Occupational specialization of the EU Member States, 1994*

Member State and occupation	specialization-index
<i>Belgium</i>	
Industrial robot operators	13.5
Fashion and other models	5.0
Nursing and midwifery professionals	4.9
Directors and chief executives	4.3
Building caretakers, window and related cleaners	4.2
Special education teaching associate professionals	3.9
Transport labourers and freight handlers	3.9
Armed forces	3.6
Other office clerks	2.9
<i>Germany</i>	
Religious associate professionals	3.2
Pre-primary education teaching associate professionals	2.8
Safety and quality inspectors	2.4
Customs, tax and related government associate professionals	2.2
Armed forces	2.2
Other machine operators n.e.c.	2.1
<i>Denmark</i>	
Special education teaching associate professionals	9.6
Crop and animal producers	4.6
Wood-products machine operators	3.4
Directors and chief executives	3.4
Ship and aircraft controllers and technicians	3.0
Pre-primary education teaching associate professionals	3.0
Personal care and related workers	2.8
Food and related products machine operators	2.6
Blacksmiths, tool-makers and related trades workers	2.6
Primary and pre-primary education teaching professionals	2.3
Ships deck crews and related workers	2.5
Travel attendants and related workers	2.3
Other teaching associate professionals	2.2
Archivists, librarians etc	2.1
<i>Spain</i>	
Fashion and other models	7.0
Fishery workers, hunters and trappers	3.6
Animal producers and related workers	2.9
Mining and construction labourers	2.4
Glass, ceramics and related plant operators	2.4
Street vendors and related workers	2.3
Managers of small enterprises	2.2
Primary and pre-primary education teaching professionals	2.2
Industrial robot operators	2.2
Agricultural, fishery and related labourers	2.1
Garbage collectors and related labourers	2.1
Special education teaching professionals	2.1
<i>France</i>	
Primary education teaching associate professionals	4.8
Business professionals	2.9
Crop and animal producers	2.9
Wood-processing- and papermaking-plant operators	2.6
Printing-, binding-, and paper-products etc	2.3

Table 4.8 (continued)
Occupational specialization of the EU Member States, 1994

Member State and occupation	specialization-index
Animal producers and related workers	2.2
Public service administrative professionals	2.2
Life science technicians and related associate professionals	2.2
Food and related products machine operators	2.1
Assemblers	2.1
<i>Greece</i>	
Market gardeners and crop growers	6.8
Animal producers and related workers	4.7
Ship and aircraft controllers and technicians	4.4
Other teaching professionals	3.4
Armed forces	3.4
Ships deck crews and related workers	3.2
Managers of small enterprises	3.1
Fishery workers, hunters and trappers	2.5
Textile, garment and related trades workers	2.5
Mining and mineral-processing-plant operators	2.5
<i>Italy</i>	
Pelt, leather and shoemaking trades workers	3.6
Handicraft workers etc	3.2
Industrial robot operators	2.8
Legislators and senior government officials	2.6
Life science professionals	2.4
Special education teaching associate professionals	2.3
Street vendors and related workers	2.2
Garbage collectors and related labourers	2.2
Agricultural, fishery and related labourers	2.1
Building caretakers, window and related cleaners	2.1
Primary and pre-primary education teaching professionals	2.1
Ships deck crews and related workers	2.1
<i>Luxembourg</i>	
Rubber- and plastic-products machine operators	6.7
Mining and construction labourers	3.8
Domestic and related helpers, cleaners etc	2.6
Other office clerks	2.2
<i>Netherlands</i>	
Wood-products machine operators	3.2
Business services agents and trade brokers	2.4
Social science and related professionals	2.3
Health associate professionals (except nursing)	2.3
Production and operations managers	2.2
Nursery and midwifery associate professionals	2.2
Computing professionals	2.2
Police inspectors and detectives	2.1
Managers of small enterprises	2.1
Directors and chief executives	2.1

Table 4.8 (continued)

Occupational specialization of the EU Member States, 1994

Member State and occupation	specialization-index
<i>Portugal</i>	
Primary education teaching associate prof.	5.0
Pelt, leather and shoemaking trades workers	4.5
Textile, garment and related trades workers	4.3
Market gardeners and crop growers	3.1
Wood-products machine operators	3.0
Business services agents and trade brokers	2.8
Armed forces	2.8
Managers of small enterprises	2.6
Other personal services workers	2.5
Safety and quality inspectors	2.3
Potters, glass-makers and related trades workers	2.3
Street vendors and related workers	2.2
Garbage collectors and related labourers	2.2
<i>United Kingdom</i>	
Other specialist managers	3.8
Nursing and midwifery professionals	3.5
Production and operations managers	3.4
Mathematicians, statisticians and related professionals	2.9
Senior officials of special-interest organisations	2.5
Special education teaching professionals	2.1
Library, mail and related clerks	2.1
College, university and higher education teaching professionals	2.1
Legislators and senior government officials	2.1

Source: EUROSTAT, LFS

* Probably the over-representation of some occupations is partly due to the fact that it is not distinguished in some Member States (see table 4.5).

5 National and regional forecasts for the Netherlands

5.1 ROA's information system on education and the labour market

In the Netherlands, the Research Centre for Education and the Labour Market (ROA) has developed the Information System on Education and the Labour Market. This information system is intended to increase the transparency of the labour market. The information system indicates both the current and future labour market positions of various occupational and educational categories. It focuses on medium-term labour market forecasts, in order to give those who are now facing choices regarding their further studies the best possible information about the labour market situation at the time that they will enter the labour market on the completion of their studies. This means that ROA's labour market forecasts have a primarily informational function, like the EURES system. This chapter will briefly describe ROA's approach in forecasting the occupational and educational structure of the labour market in the Netherlands.²⁵

Like the research model proposed in Chapter 2, ROA's approach focuses on the relevant flows in the labour market. Under this approach, medium-term forecasts are made of the flows entering and leaving the labour market. The forecasts refer to a period of about five years. The forecasts are compiled for a total of 93 occupational classes and 79 types of education, over the full width of the labour market (see ROA, 1995a).

As a matter of fact, figure 2.1 gives a schematic overview of the forecasting model used in the information system for education and the labour market. In this model the expected demand for new entrants to the labour market and the future supply are brought together for each occupational class and type of education, to indicate their future labour market prospects and the discrepancies between demand and supply in the labour market. The total demand for newcomers to the labour market (i.e., the job openings) consists of the expansion and replacement demand. The expansion demand reflects the movements in employment levels in a particular class or for a particular type of education. Replacement demand refers to the replacement of workers who retire, leave the workforce under the early retirement scheme or due to work disability, temporarily withdraw from the labour market or switch to another occupation etc. The supply side forecasts refer to the supply of new entrants to the labour market, which is the future flow of school-leavers entering the labour market combined with the number of short-term unemployed at the beginning of the forecasting period.

25. See ROA (1995a) and De Grip *et al.* (1995) for more details.

The starting point for calculating the expected expansion demand by occupational class and type of education is the medium-term employment forecasts by economic sector in the Netherlands, made by the Central Planning Bureau (CPB). The CPB uses their ATHENA model to forecast employment by economic sector (see module 1 in figure 2.1). This is a multi-sectoral macromodel of the Dutch economy, which distinguishes 14 economic sectors. These economic sectors are classified according to the standard industry classification of Statistics Netherlands (CBS).²⁶

In contrast to the traditional manpower-requirements approach, no fixed relations between occupations and types of education are assumed to determine the forecasts of employment by occupational class and type of education. A somewhat more flexible relationship is assumed, based on explanatory variables for the changes in both the occupational and educational structures of employment. In the 'occupational model', the CPB forecasts by economic sector are first transformed into employment by occupational segment using an explanatory model. These forecasts of expansion demand per occupational segment are then further disaggregated into forecasts per occupational class (see module II in figure 2.1 and section 2.1 for a more detailed description of the methodology). As mentioned before, 93 occupational classes are distinguished at present. These occupational classes are an aggregation of the 320 three-digit occupational groups distinguished by Statistics Netherlands according to their standard occupational classification.²⁷

In the educational model the forecasts of the expansion demand per type of education (module IV in figure 2.1) are derived from the forecasts by occupational segment, allowing for the fact that changes on the supply side of the labour market affect relative scarcities and lead to substitution processes. Section 2.1 describes the model used to determine these forecasts by type of education (module IV) in more detail. Altogether 79 types of education, based on the five-digit Standard Education Classification (SOI) of the CBS, are distinguished.²⁸

A larger component of the expected demand for newcomers to the labour market is the replacement demand. The expected replacement demand per occupational class is modelled in several steps. In the first step, inflow and outflow percentages are determined by means of the so-called cohort components method. These

26. This classification allows for comparability with the International Standard Industrial Classification (ISIC) and the Nomenclatura statistique des activités économiques dans la communauté européenne (NACE) classifications.

27. The standard occupational classification of the CBS is comparable to the ISCO'68 classification.

28. The SOI is an educational classification designed for the Dutch situation, and related to the ISCED classification.

percentages are translated into the replacement demand by occupational class in the second step, considering only the net flows. In the third step the recent cohort change rates are used to provide the future replacement demand by occupational classes (module III in figure 2.1). The methodology used for modelling this expected replacement demand is described in more detail in section 2.1.

Module V of figure 2.1 refers to the forecast of replacement demand by type of education. As described in section 2.1, replacement demand per type of education differs from replacement demand by occupational class.

By providing forecasts of the expected expansion demand and replacement demand by occupational classes and types of education, respectively, the total demand for newcomers to the labour market can be generated. Modules I, II and III, together, provide information on the job openings per occupational class, while modules I, IV and V provide this information per educational qualification.

The data required for forecasting the expansion and replacement demand by occupational classes and types of education, as described in section 2.1, is derived from the Labour Force Survey (EBB) of Statistics Netherlands.

The total supply of newcomers on the labour market is forecast in modules VI and VII in the lower part of figure 2.1. Module VI generates the future flow of school-leavers entering the labour market, beginning with the so-called 'Reference projections' (Referentieraming) of the Dutch Ministry of Education, Culture and Sciences. These projections cover the number of school-leavers coming from regular education (i.e. full-time initial education) annually. The projections are at a level of aggregation which is too high for the purposes of the information system, so ROA disaggregates them. In a second step, supplementary data is used to estimate the effects of the flows from non-regular education on the educational composition of the flows entering the labour market. The forecasting model to determine the future flow of school-leavers, as described briefly above, is similar to the model described in more detail in section 2.1. The historical data from which the inflow of school-leavers is derived is taken from various available additional statistics.

In module VII the number of short-term unemployed persons at the beginning of the forecasting period is derived from data from Statistics Netherlands.

Indicators of the future labour market situation for newcomers to the labour market and the future risk of labour supply problems are derived, for each type of education, by confronting the expected flows of demand and supply with each other. These indicators show what discrepancy may be expected between the demand and supply for each type of education. To forecast the future labour market

prospects by educational qualification, an allowance is made for the substitution effects between the various skill categories which can be expected where *ex ante* shortages or excess supply are forecast. Module VIII represents these substitution effects (see section 2.1 for a more detailed description).

Regional forecasts of occupational employment

The forecasting model described above provides forecasts on a national level only. ROA has not made regular regional forecasts for the Netherlands, although a study was carried out in 1992 to investigate the possibilities of providing regional forecasts by education and occupation for the Netherlands (see Berendsen *et al.*, 1992). The method used for these regional forecasts was similar to the approach described in section 2.2. The starting point was the regional employment forecasts of the National Bureau of the Public Employment Services, which are based on a multi-regional sector model (see Natzijs and Westra, 1991).

5.2 National forecasts by economic sector, occupation and educational qualification

This section presents the relevant national forecasts by economic sector, occupation and educational qualification. These forecasts are the most recent results of ROA's information system, and are published in *The labour market by education and occupation to 2000* and its *Statistical Appendix* (see ROA, 1995a,b). Before presenting these specific forecasts, some general assumptions and the expected expansion demand by economic sector will be discussed.

According to the CPB's employment forecasts per economic sector, the economic upturn of 1994 was set to continue more strongly in 1995, and to weaken somewhat in 1996. Since the current economic upturn may be only temporary, ROA chose the more conservative scenario from the CPB. This scenario assumes a growth in the relevant world trade flows of 4.5% per year, and deduces economic growth averaging 2% per year. For 1999 and 2000, the forecasts are based on the assumption that the employment trends predicted by the CPB for 1997 and 1998 will continue.

Forecasts of sectoral employment

Table 5.1 shows the expected expansion demand for the Netherlands in the period 1995-2000, broken down by economic sectors. The average annual growth in the number of people working is expected to be more than 0.8% per year. Employment is expected to increase in most of the economic sectors, with the highest growth expected in the *non-commercial services* sector. Expansion demand for *other*

commercial services, the chemical industry and in commerce is expected to be almost as high. The largest relative decrease in employment will be in the agricultural sector.

Table 5.1

Expected expansion demand per economic sector for the Netherlands, 1995-2000 (total numbers and average annual percentage)

Economic sector	number	average annual %	qualitative characteriz.
Agriculture and fisheries	-38,300	-2.9	very low
Food and beverage industry	-4,900	-0.6	low
Other industry	-3,000	-0.3	average
Chemicals	11,400	1.8	high
Metal and electrical industries	9,000	0.5	average
Energy	1,300	0.4	average
Construction	13,000	0.6	average
Commerce	92,200	1.8	high
Transport, storage and communication	12,800	0.7	average
Other commercial services	102,400	1.9	high
Financial services	-5,600	-0.6	low
Non-commercial services	87,700	2.0	high
Civil service, police, defense and education	-35,100	-0.9	low
Total		0.8	

Source: ROA

All the modules (figure 2.1) generate information which together comprises the labour market information system results for the Netherlands. Forecasts can be made on the basis of the results from each module, but only the forecasts on job openings by occupational classes and educational qualification and the labour market prospects by type of education are presented here, because this is the final information which is most useful for the intended user group (and for presentational purposes).

Job openings by occupation

Table 5.2 shows the occupational classes with the highest number of job openings in the Netherlands in the period 1995-2000, in both absolute and relative terms. The table shows that the highest number of job openings in absolute terms is expected in the occupational class of *managers and supervisors in manufacturing* (126,700 job openings in the forecasting period), which relates largely to middle-management functions in industry and construction. This high number of job openings arises mainly because of the expected expansion demand for this occupational class.

In relative terms, the *programmers and system analysts* are expected to enjoy by far the greatest employment growth (12.6% per year), and this is mainly due to the creation of new jobs. Three-quarters of the job openings arise from expansion demand. The other occupational classes with large relative numbers of job openings also exhibit a high or very high expansion demand. In the case of *nursing staff, student nurses and home nursing personnel, senior finance and sales managers* and *journalists and announcers*, the replacement demand is also high.

Most of the occupational classes are also the classes for which the employers' recruitment requirements, in absolute or relative terms, will be highest. The exception is the class of *book-keepers and bank employees*, for which employment is falling, so that the large number of expected job openings does not immediately mean that employers have to recruit many newcomers.

Table 5.2

Occupational classes with the largest numbers of expected job openings in the Netherlands, in absolute or relative terms, 1995-2000 (total numbers and average annual percentages)

Occupational class	forecast 1995-2000		
	number	average annual %	qualitative characteriz.
<i>absolute</i>			
Managers and supervisors in manufacturing	126,700	7.1	high
Programmers and system analysts	97,500	12.6	very high
Sales assistants	90,300	6.4	high
Book-keepers and bank employees	63,200	3.3	average
Student nurses and home nursing personnel	52,500	7.7	high
Purchasing and sales clerks	49,900	2.6	low
Secondary and tertiary education teachers	48,700	5.6	average
Drivers and conductors	48,200	4.8	average
Shopkeepers, retail and wholesale staff	48,000	5.3	average
Nursing staff	46,200	7.6	high
Commercial reps., buyers and branch managers	44,800	6.4	high
Senior finance and sales managers	44,400	8.2	high
<i>relative</i>			
Programmers and system analysts	97,500	12.6	very high
Journalists and announcers	15,400	8.5	very high
Accountants and economists	27,500	8.3	very high
Senior finance and sales managers	44,400	8.2	high
Physiotherapists and occupational therapists	13,800	7.9	high
Student nurses and home nursing personnel	52,500	7.7	high
Nursing staff	46,200	7.6	high
Higher electrical engineers	5,700	7.3	high
Scientific researchers, technicians and statisticians	22,000	7.2	high
Managers and supervisors in manufacturing	126,700	7.1	high
Physicians, medical specialists and pharmacists	15,300	6.9	high
Agricultural and environmental engineers	1,700	6.9	high

Source: ROA

Table 5.3 shows the occupational classes in the Netherlands which face the lowest number of job openings, in absolute and relative terms, in the forecasting period. With one exception, the occupational classes with the fewest job openings in relative terms all face declining demand, which means that the number of job openings for newcomers is entirely determined by the replacement demand. The exception is the class of *technical and medical representatives*, where the low number of job openings is mainly the result of the very low replacement demand.

Table 5.3

Occupational classes with the lowest numbers of job openings in the Netherlands, in absolute or relative terms, 1995-2000 (total numbers and average annual percentages)

Occupational class	forecast 1995-2000		
	number	average annual %	qualitative characteriz.
<i>absolute</i>			
Fishermen and gamekeepers	300	2.0	very low
Electricity and gas supply workers	500	3.2	low
Sailors, deckhands and engine-room workers	600	2.1	very low
Vetinary surgeons	900	5.2	average
Datatypes and computer operators	1,200	2.0	very low
Agricultural and environmental engineers	1,700	6.9	high
Ship's officers and marine inspectors	1,700	3.0	low
Dentists and dental specialists	1,700	6.1	high
Smelter workers and drilling hands	1,800	3.0	low
Intermediate electrical engineers	1,800	5.9	high
Higher mechanical engineers	1,900	3.5	average
Translators and other literary professions	2,000	5.7	average
Textile production workers	2,000	4.1	average
Wood, paper and cardboard product workers	2,000	3.5	average
<i>relative</i>			
Fishermen and gamekeepers	300	2.0	very low
Datatypes and computer operators	1,200	2.0	very low
Sailors, deckhands and engine-room workers	600	2.1	very low
Agricultural workers	12,300	2.2	very low
Road construction workers and pipelayers	7,100	2.3	very low
Military professionals	3,800	2.3	very low
Purchasing and sales clerks	49,900	2.6	low
Hairdressers and beauticians	4,900	2.7	low
Welders and engineering workers	8,600	2.8	low
Technical and medical representatives	3,500	2.9	low
Bakers and bakery personnel	3,300	2.9	low
Smelter workers and drilling hands	1,800	3.0	low
Ship's officers and marine inspectors	1,700	3.0	low

Source: ROA

In absolute terms, *fishermen and gamekeepers*, *electricity and gas supply workers*, *sailors, deckhands and engine-room workers* and *veterinary surgeons* are expected to face the lowest number of job openings, ranging from 300 to 900 persons.

In relative terms, *fishermen and gamekeepers, datatypists and computer operators, sailors, deckhands and engine-room workers, agricultural workers, road construction workers and pipelayers* and *military professionals* offer very low numbers of job openings, ranging from 2.0 to 2.3% per year. These occupational classes have both a negative expansion demand and a very low replacement demand.

Job openings by educational qualification

Table 5.4 shows the types of education with the highest total number of job openings for newcomers to the Dutch labour market, in both absolute and relative terms. The types of education with the highest expected numbers of job openings in absolute terms are all in educational categories which are very large in terms of present employment levels, but for which the number of job openings in relative terms is in general only average or low. The fact that they are large means that there is a large replacement demand in absolute terms, but they are no longer growing strongly. With 86,100 job openings in the period 1995-2001, *Retail* education at the intermediate vocational level is the largest. *Teacher training* at higher vocational level and *Primary education*, both with almost 70,000 job openings, are also high.

The types of education with the most job openings in relative terms are not so large. The list of these types of education consists entirely of higher education courses. Although many of these types of education also enjoy a relatively high replacement demand, for most of them the majority of the job openings result from very high expansion demand. The exception in this respect is *Theology* at university level, for which the large number of job openings is mainly due to the very high need for replacement workers. *Economics, econometrics and business administration, Electrical engineering and information technology* and *Management* at university level are expected to face the largest job openings in relative terms, ranging from 9.3 to 8.5% per year.

The types of education with the most job openings in relative terms are also those for which employers' recruitment requirements, in relative terms, will be the greatest. Because none of these types of education face any fall in demand, there is in this case no question of an entire group of workers who are more or less being forced to leave the labour market.

Table 5.4

Types of education with the largest numbers of job openings in the Netherlands, in absolute or relative terms, 1995-2000 (total numbers and average annual percentages)

Type of education	forecast 1995-2000		
	number	average annual %	qualitative characteriz.
<i>absolute</i>			
IVE, Retail	86,100	5.0	average
HVE, Teacher training	69,400	5.1	average
Primary education	68,900	2.6	low
Lower General Secondary Education	55,800	2.6	low
Higher General Secondary Education	53,700	3.3	average
IVE, nursing and paramedical services	50,700	5.2	average
IVE, Community care	40,600	3.5	average
PVE, Community care, hotel and catering	39,100	3.6	average
HVE, Social and cultural	32,400	5.3	average
IVE, Construction technology	32,000	3.6	average
UE, Social sciences	29,100	6.7	high
HVE, Nursing and paramedical services	27,700	6.2	high
<i>relative</i>			
UE, Economics, econometrics and business admin.	22,600	9.3	very high
UE, Electrical engineering and information tech.	6,600	8.7	very high
UE, Management	4,700	8.5	very high
UE, Information science	2,000	8.3	very high
HVE, Commercial information science	13,300	8.2	very high
UE, Theology	2,400	8.1	very high
HVE, Accounting	12,500	8.1	very high
UE, Mathematics and natural sciences	17,600	7.7	high
PVE, Security	4,300	7.6	high
UE, Mechanical engineering	3,500	7.4	high
UE, Veterinary and medical sciences and dentistry	20,700	7.2	high
UE, Civil engineering	7,200	7.2	high

PVE = Preparatory Vocational Education; IVE = Intermediate Vocational Education;

HVE = Higher Vocational Education; UE = University Education.

Source: ROA

Table 5.5 lists the types of education with the fewest job openings in the Netherlands, in absolute and relative terms. Most of these types of education face negative expansion demand, which means that the number of job openings is almost entirely dependent on the need to replace departing workers. The exception to this is education in *Tourism and recreation* at intermediate and higher vocational level. The limited number of job openings for those with these types of education results mainly from the very low replacement demand, combined with the modest size of these educational categories in the labour market.

Printing trades and *Utilities installation* at preparatory vocational level and *Tourism and recreation* at intermediate and higher vocational level are expected to face the

lowest number of job openings, in absolute terms. The number of job openings ranges from 800 to 1,200.

In relative terms, the number of job openings for preparatory vocational education in *Commerce*, *Food trades* and *Administration* and the intermediate vocational course in *Tourism and recreation* which has just been mentioned is very low, ranging from 0.9 to 1.8% per year. The need for replacement workers from all three types of education is very low.

Table 5.5

Types of education with the lowest numbers of job openings in the Netherlands, in absolute or relative terms, 1995-2000 (total numbers and average annual percentages)

Type of education	forecast 1995-2000		
	number	average annual %	qualitative characteriz.
<i>absolute</i>			
PVE, Printing trades	800	2.1	low
HVE, Tourism and recreation	900	2.5	low
IVE, Tourism and recreation	1,000	1.3	very low
PVE, Utilities installation	1,200	2.4	low
UE, Pharmacy	1,400	5.5	high
PVE, Commerce	1,500	0.9	very low
PVE, Food trades	1,700	1.7	very low
HVE, Police, fire and defense forces	1,800	3.7	average
HVE, Interpreter and translator	2,000	4.6	average
UE, Information science	2,000	8.3	very high
UE, Theology	2,400	8.1	very high
UE, Fine Arts	2,500	5.3	average
<i>relative</i>			
PVE, Commerce	1,500	0.9	very low
IVE, Tourism and recreation	1,000	1.3	very low
PVE, Food trades	1,700	1.7	very low
PVE, Administration	5,800	1.8	very low
PVE, Automobile trades	5,300	2.1	low
PVE, Printing trades	800	2.1	low
PVE, Electrical trades	7,000	2.2	low
PVE, Construction trades	17,300	2.4	low
PVE, Utilities installation	1,200	2.4	low
IVE, Secretarial	12,100	2.4	low
HVE, Tourism and recreation	900	2.5	low
Primary education	68,900	2.6	low
Lower General Secondary Education	55,800	2.6	low
IVE, Agriculture and the natural environment	19,100	2.6	low

PVE = Preparatory Vocational Education; IVE = Intermediate Vocational Education;

HVE = Higher Vocational Education; UE = University Education.

Source: ROA

Labour market prospects by educational qualification

Table 5.6 gives an overview of the types of education with good labour market prospects in the year 2000. IFL stands for Indicator of the Future Labour market situation. The table shows that it is mainly types of education at higher vocational and university level which have good labour market prospects. But even at the preparatory vocational level there are a number of types of education with good prospects: *Transport and harbour* and *Community care, hotel and catering*. The good prospects for these types of education are due to relatively low inflows of school-leavers and relatively high replacement demand.

At the intermediate level the labour market prospects are good for: *Legal and fiscal, Micro-mechanical technology, Medical laboratory, Police, fire and defense, Transport and harbour, Printing technology, Textile and leather technology* and *Nursing and paramedical services*.

Most types of education at higher vocational level have good labour market prospects (the prospects are less than good for only five types). The best prospects are for the higher vocational course in *Accounting*, followed by *Commercial information science* at higher vocational level. The expansion demand for these types of education is, in relative terms, very high. For *Accounting* at higher vocational level there is also a very high replacement demand and a low flow of school-leavers entering the labour market.

Other types of education at the higher vocational level with good labour market prospects include *Transport and harbour, Construction and civil engineering, Technical laboratory, Medical laboratory, Fine arts, Legal and Fiscal, Teaching training, Electronic and information technology, Nursing and paramedical services, Interpreter and translator, Mechanical engineering, Social and cultural* and *Police, fire and defense*.

With only four exceptions, the labour market prospects for university graduates are good. For most types of education at the university level, the good labour market prospects are due to the relatively high number of job openings. The following types of education at university level are expected to face good prospects: *Civil engineering, Theology, Mathematics and natural sciences, Veterinary and medical sciences and dentistry, Electrical engineering and information technology, Economics, econometrics and business administration, Public administration, Information science, Social sciences, Pharmacy, Agriculture and environmental science* and *Mechanical engineering*.

Table 5.6

Types of education with good labour market prospects in the Netherlands in 2000

Type of education	IFL*
<i>Lower General Secondary Education, Preparatory Vocational Education</i>	
PVE, Transport and harbour	0.97
PVE, Community care, hotel and catering	0.99
<i>Higher General Secondary Education, Intermediate Vocational Education</i>	
IVE, Legal and fiscal	0.91
IVE, Micro-mechanical technology	0.93
IVE, Medical laboratory	0.94
IVE, Police, fire and defense	0.95
IVE, Transport and harbour	0.98
IVE, Printing technology	0.99
IVE, Textile and leather technology	1.00
IVE, Nursing and paramedical services	1.00
<i>Higher Vocational Education</i>	
HVE, Accounting	0.73
HVE, Commercial information science	0.77
HVE, Transport and harbour	0.79
HVE, Construction and civil engineering	0.83
HVE, Technical laboratory	0.85
HVE, Medical laboratory	0.91
HVE, Fine Arts	0.91
HVE, Legal and fiscal	0.92
HVE, Teacher training	0.93
HVE, Electronic and information technology	0.94
HVE, Nursing and paramedical services	0.94
HVE, Interpreter and translator	0.95
HVE, Mechanical engineering	0.98
HVE, Social and cultural	0.99
HVE, Police, fire and defense	0.99
<i>University Education</i>	
UE, Civil engineering	0.76
UE, Theology	0.79
UE, Mathematics and natural sciences	0.83
UE, Veterinary and medical sciences and dentistry	0.83
UE, Electrical engineering and information technology	0.86
UE, Economics, econometrics and business administration	0.88
UE, Public administration	0.88
UE, Information science	0.93
UE, Social sciences	0.97
UE, Pharmacy	0.98
UE, Agriculture and environmental science	1.00
UE, Mechanical engineering	1.00

* IFL = Indicator Future Labour market situation

PVE = Preparatory Vocational Education; IVE = Intermediate Vocational Education;

HVE = Higher Vocational Education; UE = University Education.

Source: ROA

Finally, Table 5.7 presents the types of education with bad prospects in the Netherlands in the year 2000. Only a limited number of types of education are expected to offer bad future labour market prospects for newcomers to the labour market, but it is striking that there is at least one such type of education at every educational level.

Table 5.7
Types of education with bad prospects in the Netherlands in 2000

Type of education	IFL*
<i>Lower General Secondary Education, Preparatory Vocational Education</i>	
PVE, Food trades	1.29
PVE, Commerce	1.22
<i>Higher General Secondary Education, Intermediate Vocational Education</i>	
IVE, Tourism and recreation	1.26
IVE, Automobile technology	1.22
IVE, Social and cultural	1.20
<i>Higher Vocational Education</i>	
HVE, Commerce	1.22
<i>University Education</i>	
UE, Fine Arts	1.19

* IFL = Indicator Future Labour market situation
PVE = Preparatory Vocational Education; IVE = Intermediate Vocational Education;
HVE = Higher Vocational Education; UE = University Education.
Source: ROA

The bad prospects for *Food trades* at preparatory vocational level are attributable mainly to the very low replacement demand and the negative expansion demand. Moreover, school-leavers from this type of education are being crowded out of their traditional occupational domain by school-leavers from other types of education. For *Tourism and recreation* at intermediate vocational level, a relatively high flow of school-leavers entering the labour market is coupled with a limited number of job openings for newcomers to the labour market, mainly because of the very low replacement demand. The labour market prospects for school-leavers from *Commerce, Intermediate Vocational Education, Automobile technology* at higher vocational level and *Social and cultural* at intermediate vocational level are also bad, because of a combination of high flows entering the labour market and a limited number of job openings for newcomers. For *Commerce* at preparatory vocational level, the bad labour market prospect result from the very small number of job openings for newcomers to the labour market, which is due largely to the very

low replacement demand. At university level the labour market prospect are bad for *Fine Arts*.

5.3 Regional forecasts by occupation

As mentioned before, ROA has not provided regional employment forecasts for the Netherlands on a regular basis. However regional forecasts of expansion demand by occupational class for the Netherlands have been compiled especially for this report. The method used for these regional forecasts is similar to the approach described in section 2.2 and a previous regional forecasting study by ROA (see Berendsen *et al.*, 1992). The forecasts of expected expansion demand by occupation and region are based on the existing regional employment forecasts of the National Bureau of Public Employment Services, the CBA (see Natzijs and Westra, 1995). These forecasts employ a multi-regional sector model and build on the national short-term and medium-term employment forecasts by economic sector made by the Central Planning Bureau. ROA also uses these CPB forecasts as a starting point for the national employment forecasts (see section 2.1, 5.1 and 5.2). However ROA's forecasts of national expansion demand are built on the more conservative scenario of the CPB, whereas the CBA built its forecasts on the optimistic CPB scenario. To make the regional employment forecasts by economic sector from the CBA consistent with ROA's national forecasts, we calculated the difference between the CBA's figure for employment growth rate per economic sector for each region²⁹ and the national employment growth rate in that particular sector, also provided by the CBA. The differences per economic sector and region are combined with the national employment growth rate used by ROA. This gives the employment growth rate per economic sector³⁰ and region. From this point forward the method is identical to that described in section 2.2 (and Berendsen *et al.*), which results in forecasts of the regional expansion demand by occupational class.

Regional forecasts of sectoral employment

Table 5.8 presents the expected expansion demand by economic sector and region in the Netherlands for the period 1995-2000. The forecast expansion demand is, on average, highest in the regions of Flevoland, Noord-Brabant and Gelderland and lowest in Noord-Holland and Zuid-Holland. In most of the regions the *other*

29. The 28 regions distinguished by the CBA have been aggregated to the 12 regions distinguished in the EURES system.

30. The sectoral classification used by the CBA, which differs in some respects from that used by ROA, has been transformed into the ROA classification system.

commercial services sector is expected to enjoy high relative expansion demand, ranging from 0.6% in Noord-Holland to 5.3% per year in Flevoland. In absolute terms, the *commerce, other commercial services* and *non-commercial services* sectors are expected to show by far the greatest employment growth in most of the regions. In all regions the expansion demand is expected to decline most sharply, relative to employment levels, in the *agriculture and fisheries* sector, by amounts ranging from -3.6% in Zeeland to -1.6% per year in Zuid-Holland. Negative expansion demand is also expected for *civil servants, police, defence and education* in all regions, except Flevoland. This fall in employment levels ranges from -1.8% in Groningen to -0.6% per year in Noord-Brabant.

In absolute terms the expected expansion demand in the period 1995-2000 is expected to be lowest for *civil servants, police, defence and education* in most regions, with employment falls ranging from 9,800 persons in Zuid-Holland to 1,400 in Zeeland. However, for Flevoland an increase of employment in this occupational class of 4,200 is forecast.

Table 5.8

Regional expected expansion demand by economic sector for the Netherlands, 1995-2000
(total number and average annual percentage)

Region and economic sector	number	average annual %	qualitative characteriz.
<i>Groningen</i>			
Agriculture and fisheries	-1,400	-3.5	very low
Food and beverage industry	-400	-1.6	very low
Other industry	-300	-0.6	low
Chemicals	200	0.9	average
Metal and electrical industries	-900	-1.0	low
Energy	-	0.1	average
Construction	1,200	1.7	high
Commerce	400	0.4	average
Transport, storage and communication,	-	-0.0	average
Other commercial services	4,000	3.3	very high
Financial services	200	0.9	average
Non-commercial services	1,800	1.1	average
Civil servants, police, defence and education	-3,500	-1.8	very low
<i>Friesland</i>			
Agriculture and fisheries	-2,600	-3.4	very low
Food and beverage industry	-400	-0.9	low
Other industry	200	0.3	average
Chemicals	200	1.6	high
Metals and electrical industries	1,000	1.4	high
Energy	-	-0.4	low
Construction	3,600	3.1	very high
Commerce	3,700	2.6	very high
Transport, storage and communication	400	0.7	average
Other commercial services	3,600	3.0	very high
Financial services	300	0.6	average
Non-commercial services	2,000	1.2	average
Civil servants, police, defence and education	-2,500	-1.7	very low
<i>Drenthe</i>			
Agriculture and fisheries	-2,100	-3.5	very low
Food and beverage industry	-500	-2.5	very low
Other industry	900	2.8	very high
Chemicals	-	-0.1	average
Metals and electrical industries	800	0.9	average
Energy	-100	-0.4	low
Construction	300	0.5	average
Commerce	2,600	2.6	very high
Transport, storage and communication.	200	0.6	average
Other commercial services	2,300	2.4	very high
Financial services	-	-0.1	average
Non-commercial services	2,200	1.7	high
Civil servants, police, defence and education	-1,600	-1.2	low

Table 5.8 (continued)

Regional expected expansion demand by economic sector for the Netherlands, 1995-2000
(total number and average annual percentage)

Region and economic sector	number	average annual %	qualitative characteriz.
<i>Overijssel</i>			
Agriculture and fisheries	-3,100	-2.9	very low
Food and beverage industry	200	0.3	average
Other industry	-1,100	-0.9	low
Chemicals	1,700	2.6	very high
Metals and electrical industries	2,500	1.3	high
Energy	100	0.5	average
Construction	3,500	1.8	high
Commerce	5,000	2.0	high
Transport, storage and communication	700	0.8	average
Other commercial services	7,800	3.5	very high
Financial services	500	1.1	average
Non-commercial services	5,700	1.9	high
Civil servants, police, defence and education	-2,600	-1.0	low
<i>Gelderland</i>			
Agriculture and fisheries	-5,100	-3.1	very low
Food and beverage industry	-400	-0.3	low
Other industry	3,000	1.6	high
Chemicals	1,700	2.1	high
Metals and electrical industries	4,900	1.6	high
Energy	300	0.8	average
Construction	3,000	1.0	average
Commerce	16,100	3.2	very high
Transport, storage and communication	4,600	2.4	very high
Other commercial services	12,100	2.4	very high
Financial services	-	-0.0	average
Non-commercial services	10,600	1.6	high
Civil servants, police, defence and education	-6,700	-1.3	low
<i>Utrecht</i>			
Agriculture and fisheries	-1,600	-2.9	very low
Food and beverage industry	-900	-2.1	very low
Other industry	100	0.1	average
Chemicals	100	0.3	average
Metals and electrical industries	2,100	1.8	high
Energy	100	0.9	average
Construction	1,600	1.2	average
Commerce	7,000	1.9	high
Transport, storage and communication	3,900	3.0	very high
Other commercial services	9,000	2.5	very high
Financial services	100	0.1	average
Non-commercial services	8,800	2.1	high
Civil servants, police, defence and education	-3,000	-0.8	low

Table 5.8 (continued)

Regional expected expansion demand by economic sector for the Netherlands, 1995-2000
(total number and average annual percentage)

Region and economic sector	number	average annual %	qualitative characteriz.
<i>Noord-Holland</i>			
Agriculture and fisheries	-3,600	-2.7	very low
Food and beverage industry	-900	-0.9	low
Other industry	-500	-0.3	low
Chemicals	1,100	1.6	high
Metals and electrical industries	-2,900	-1.1	low
Energy	100	0.2	average
Construction	-4,000	-1.2	low
Commerce	4,200	0.6	average
Transport, storage and communication	900	0.2	average
Other commercial services	5,000	0.6	average
Financial services	-4,700	-1.9	very low
Non-commercial services	19,900	2.1	high
Civil servants, police, defence and education	-5,500	-0.8	low
<i>Zuid-Holland</i>			
Agriculture and fisheries	-3,700	-1.6	very low
Food and beverage industry	-700	-0.6	low
Other industry	-1,200	-0.7	low
Chemicals	2,400	1.9	high
Metals and electrical industries	-3,400	-0.9	low
Energy	300	0.3	average
Construction	-300	-0.1	average
Commerce	11,400	1.1	average
Transport, storage and communication	-4,700	-0.9	low
Other commercial services	8,400	0.8	average
Financial services	-4,100	-1.6	very low
Non-commercial services	21,200	2.0	high
Civil servants, police, defence and education	-9,800	-0.9	low
<i>Zeeland</i>			
Agriculture and fisheries	-1,400	-3.6	very low
Food and beverage industry	-100	-0.7	low
Other industry	100	0.9	average
Chemicals	600	1.8	high
Metals and electrical industries	-100	-0.1	average
Energy	100	0.4	average
Construction	200	0.4	average
Commerce	1,600	1.5	high
Transport, storage and communication	-100	-0.3	average
Other commercial services	1,400	1.5	high
Financial services	-100	-0.9	low
Non-commercial services	1,600	1.5	high
Civil servants, police, defence and education	-1,400	-1.4	very low

Table 5.8 (continued)

Regional expected expansion demand by economic sector for the Netherlands, 1995-2000
(total number and average annual percentage)

Region and economic sector	number	average annual %	qualitative characteriz.
<i>Noord-Brabant</i>			
Agriculture and fisheries	-4,300	-2.3	very low
Food and beverage industry	200	0.1	average
Other industry	-1,300	-0.6	low
Chemicals	3,300	2.5	very high
Metals and electrical industries	2,700	0.5	average
Energy	300	0.9	average
Construction	5,500	1.4	high
Commerce	19,300	2.7	very high
Transport, storage and communication	6,500	2.6	very high
Other commercial services	15,900	2.8	very high
Financial services	600	0.4	average
Non-commercial services	14,700	2.3	very high
Civil servants, police, defence and education	-3,700	-0.6	low
<i>Limburg</i>			
Agriculture and fisheries	-2,200	-2.3	very low
Food and beverage industries	-700	-1.4	very low
Other industry	-2,500	-1.8	very low
Chemicals	800	1.0	average
Metals and electrical industries	3,200	1.2	average
Energy	100	0.6	average
Construction	-500	-0.3	low
Commerce	6,200	2.1	high
Transport, storage and communication	-300	-0.2	average
Other commercial services	7,200	2.6	very high
Financial services	100	0.1	average
Non-commercial services	6,600	1.8	high
Civil servants, police, defence and education	-3,000	-1.0	low
<i>Flevoland</i>			
Agriculture and fisheries	-900	-2.8	very low
Food and beverage industry	500	3.3	very high
Other industry	200	0.9	average
Chemicals	.	5.4	very high
Metals and electrical industries	2,100	7.2	very high
Energy	.	4.2	very high
Construction	-300	-1.0	low
Commerce	5,200	5.1	very high
Transport, storage and communication	2,400	5.5	very high
Other commercial services	4,000	5.3	very high
Financial services	700	3.2	very high
Non-commercial services	6,900	7.2	very high
Civil servants, police, defence and education	4,200	4.8	very high

- = nil

. = less than 2,000 employed persons in 1995

Source: ROA

Regional expansion demand by occupation

Table 5.9 presents the occupational classes which are expected to enjoy the largest relative expansion demand by region in the Netherlands in the period 1995-2000.³¹ The table shows that, in all regions, the relative expected expansion demand is by far the highest for *programmers and system analysts*. The expected employment growth for this occupational class ranges from 7.6% in Zuid-Holland to 12.7% per year in Flevoland. In most regions the next highest expansion demand is forecast for *accountants and economists*, ranging from 4.0% in Noord-Holland and Zuid-Holland to 5.5% per year in Utrecht. In Groningen and Friesland *senior finance and sales managers* are expected to have the next highest expansion demand (2.7 and 4.0% per year, respectively). In Drenthe and Zeeland the *sales assistants* are expected to have the next highest expansion demand (3.8 and 2.7% per year, respectively), whereas in Flevoland *student nurses and home nursing personnel* are expected to hold the second place (7.2% per year). Other occupations which are expected to enjoy high relative expansion demand in this period include *journalists and announcers* (all regions except Groningen, Friesland, Drenthe, Zeeland and Flevoland), *managers and supervisors in manufacturing* (Groningen, Friesland, Drenthe, Gelderland, Zeeland, Flevoland), *physiotherapists and occupational therapists* (Utrecht, Noord-Holland, Zuid-Holland, Limburg), *scientific researchers, technicians and statisticians* (Overijssel, Noord-Brabant, Limburg) and finally *commercial representatives, buyers and branch managers* (Friesland, Drenthe).

Table 5.10 gives an overview of the occupational classes with the lowest relative expected expansion demand by regions in the Netherlands for the period 1995-2000.³² The *agricultural workers* and *civil servants (public administration)* are expected to be the major *occupational losers*. The expected expansion demand for this occupational class ranges from -2.2% per year in Flevoland to -3.8% per year in Zuid-Holland. Falling employment is also forecast for *farmers* and for *porters, cleaners and domestics*, except that the latter group may expect employment growth in Flevoland of 2.2% per year.

31. Only the occupational classes which have more than 2,000 employed persons at the beginning of the forecasting period are presented.

32. Again, only the occupational classes which have more than 2,000 employed persons at the beginning of the forecasting period are presented.

Table 5.9

Occupational classes forecast to have the largest relative expansion demand per region in the Netherlands, 1995-2000 (total numbers and average annual percentages)

Region and occupational class	number	average annual %	qualitative characteriz.
<i>Groningen</i>			
Programmers and system analysts	2,100	8.4	very high
Senior finance and sales managers	500	2.7	high
Managers and supervisors in manufacturing	1,400	2.5	high
Sales assistants	800	2.1	high
Nursing staff	400	1.9	high
<i>Friesland</i>			
Programmers and system analysts	2,200	8.9	very high
Senior finance and sales managers	700	4.0	very high
Sales assistants	1,800	3.8	very high
Managers and supervisors in manufacturing	2,400	3.8	very high
Commercial reps., buyers and branch managers	600	2.5	high
<i>Drenthe</i>			
Programmers and system analysts	1,700	8.4	very high
Sales assistants	1,300	3.8	very high
Senior finance and sales managers	400	3.2	high
Commercial reps., buyers and branch managers	400	2.8	high
Managers and supervisors in manufacturing	1,400	2.6	high
<i>Overijssel</i>			
Programmers and system analysts	4,100	9.0	very high
Accountants and economists	1,000	5.3	very high
Journalists and announcers	600	4.2	very high
Scientific researchers, technicians and statisticians	800	3.9	very high
Senior finance and sales managers	1,300	3.8	very high
<i>Gelderland</i>			
Programmers and system analysts	8,200	8.9	very high
Accountants and economists	2,000	5.2	very high
Journalists and announcers	1,200	4.9	very high
Sales assistants	7,300	4.3	very high
Senior finance and sales managers	2,600	4.0	very high
<i>Utrecht</i>			
Programmers and system analysts	5,800	9.2	very high
Accountants and economists	1,400	5.5	very high
Journalists and announcers	500	4.0	very high
Physiotherapists and occupational therapists	600	3.9	very high
Senior finance and sales managers	1,500	3.8	very high
<i>Noord-Holland</i>			
Programmers and system analysts	10,900	7.7	very high
Accountants and economists	2,400	4.0	very high
Physiotherapists and occupational therapists	1,200	3.9	very high
Journalists and announcers	1,000	3.5	very high
Visual and performing artists	1,100	3.1	high

Table 5.9 (continued)

Occupational classes forecast to have the largest relative expansion demand per region in the Netherlands, 1995-2000 (total numbers and average annual percentages)

Region and occupational class	number	average annual %	qualitative characteriz.
<i>Zuid-Holland</i>			
Programmers and system analysts	13,500	7.6	very high
Accountants and economists	2,900	4.0	very high
Physiotherapists and occupational therapists	1,400	3.7	very high
Journalists and announcers	1,200	3.3	very high
Visual and performing artists	1,200	3.0	high
<i>Zeeland</i>			
Programmers and system analysts	1,300	7.6	very high
Sales assistants	900	2.7	high
Managers and supervisors in manufacturing	1,000	2.5	high
Senior finance and sales managers	300	2.5	high
Nursing staff	300	2.3	high
<i>Noord-Brabant</i>			
Programmers and system analysts	10,100	8.9	very high
Accountants and economists	2,500	5.2	very high
Journalists and announcers	1,200	4.4	very high
Higher electrical engineers	600	4.1	very high
Scientific researchers, technicians and statisticians	1,900	4.1	very high
<i>Limburg</i>			
Programmers and system analysts	4,900	8.6	very high
Accountants and economists	1,200	5.0	very high
Physiotherapists and occupational therapists	500	3.6	very high
Scientific researchers, technicians and statisticians	900	3.6	very high
Journalists and announcers	500	3.4	very high
<i>Flevoland</i>			
Programmers and system analysts	1,900	12.7	very high
Student nurses and home nursing personnel	900	7.2	very high
Secondary and tertiary education teachers	1,200	7.0	very high
Managers and supervisors in manufacturing	2,000	6.3	very high
Sales assistants	1,900	6.2	very high

Source: ROA

Table 5.10

Occupational classes forecast to have the lowest relative expansion demand per region in the Netherlands, 1995-2000 (total numbers and average annual percentages)

Region and occupational class	number	average annual %	qualitative characteriz.
<i>Groningen</i>			
Agricultural workers	-600	-3.4	very low
Farmers	-700	-3.1	very low
Porters, cleaners and domestics	-700	-2.5	very low
Welders and engineering workers	-200	-1.9	low
Purchasing and sales clerks	-1,100	-1.8	low
<i>Friesland</i>			
Agricultural workers	-1,100	-3.3	very low
Farmers	-1,200	-3.1	very low
Porters, cleaners and domestics	-600	-2.3	very low
Food and beverage processors	-200	-1.5	low
Primary and special education teachers	-200	-1.4	low
<i>Drenthe</i>			
Agricultural workers	-900	-3.4	very low
Farmers	-1,000	-3.2	very low
Porters, cleaners and domestics	-400	-2.2	low
Purchasing and sales clerks	-600	-1.3	low
Primary and special education teachers	-100	-1.0	low
<i>Overijssel</i>			
Agricultural workers	-1,300	-2.7	very low
Farmers	-1,400	-2.5	very low
Porters, cleaners and domestics	-800	-1.8	low
Ceramic and glass industry production workers	-200	-1.2	low
Carpenters and woodworkers	-500	-0.8	low
<i>Gelderland</i>			
Civil servants (public administration)	-600	-3.4	very low
Agricultural workers	-2,200	-2.8	very low
Farmers	-2,300	-2.6	very low
Porters, cleaners and domestics	-2,100	-2.1	low
Hairdressers and beauticians	-400	-1.7	low
<i>Utrecht</i>			
Civil servants (public administration)	-400	-3.3	very low
Agricultural workers	-700	-2.4	very low
Farmers	-700	-2.1	low
Porters, cleaners and domestics	-1,300	-2.0	low
Hairdressers and beauticians	-300	-1.6	low
<i>Noord-Holland</i>			
Civil servants (public administration)	-900	-3.5	very low
Hairdressers and beauticians	-1,200	-3.1	very low
Datatypes and computer operators	-400	-3.1	very low
Glaziers and concreting hands	-600	-2.9	very low
Painters	-700	-2.7	very low

Table 5.10 (continued)

Occupational classes forecast to have the lowest relative expansion demand per region in the Netherlands, 1995-2000 (total numbers and average annual percentages)

Region and occupational class	number	average annual %	qualitative characteriz.
<i>Zuid-Holland</i>			
Civil servants (public administration)	-1,300	-3.8	very low
Dat typists and computer operators	-500	-3.5	very low
Hairdressers and beauticians	-1,300	-2.9	very low
Porters, cleaners and domestics	-4,400	-2.5	very low
Intermediate mechanical engineers	-400	-2.4	very low
<i>Zeeland</i>			
Agricultural workers	-600	-3.5	very low
Farmers	-700	-3.3	very low
Porters, cleaners and domestics	-400	-2.5	very low
Purchasing and sales clerks	-600	-1.5	low
Primary and special education teachers	-100	-1.1	low
<i>Noord-Brabant</i>			
Civil servants (public administration)	-600	-3.1	very low
Agricultural workers	-2,000	-2.2	very low
Upholsterers, shoemakers and leatherworkers	-400	-2.2	very low
Clothing production workers and sailmakers	-300	-2.2	low
Farmers	-2,100	-2.0	low
<i>Limburg</i>			
Agricultural workers	-1,000	-2.2	very low
Porters, cleaners and domestics	-1,100	-2.1	low
Painters	-300	-2.0	low
Plumbers	-300	-2.0	low
Farmers	-1,100	-2.0	low
<i>Flevoland</i>			
Agricultural workers	-300	-2.2	very low
Farmers	-300	-2.0	low
Porters, cleaners and domestics	300	2.2	high
Purchasing and sales clerks	900	2.7	high
Secretaries and typists	500	3.6	very high

Source: ROA

6 National and regional forecasts for the United Kingdom

6.1 IER's approach

National forecasts by economic sector, occupation and educational qualification

In the United Kingdom, the Institute for Employment Research (IER) of the University of Warwick is concerned with modelling and forecasting the structure of employment. Since 1978, the IER has generated employment forecasts on an annual basis. This section will briefly describe the approach adopted by the IER in forecasting the structure of employment in the UK (for more details see Wilson, 1994). The prime objective of employment forecasts according to the IER is "to provide a set of points of reference for policy makers and all those interested".

The starting point for analyzing and projecting developments in the labour market is a macroeconomic model developed by Cambridge Econometrics (CE). This model distinguishes 49 economic sectors which are now based on the 1992 standard industrial classification (SIC). The model is still being improved and extended. The IER derives its own forecasts of employment by economic sector using their own version of the Cambridge multisectoral dynamic macroeconomic model (MDM)³³ of the UK economy. The IER has added several sub-models to disaggregate employment by occupation, employment status³⁴ and higher types of education. The institute has also implemented a regional disaggregation.

Figure 6.1 shows the links between the macroeconomic (MDM) model and the submodels, with the exception of the regional/occupation model which will be described later.

33. This model will be referred to as the MDM, ME or CE macroeconomic model.

34. Employment status refers to full-time versus part-time and employee versus self-employed.

Figure 6.1
IER's macroeconomic model and submodels

* 10 subject categories are differentiated at each of the 3 levels which are distinguished.

As was noted above, the forecasts of employment by economic sector (module I in figure 6.1) provide the starting point of the manpower forecasting model. These forecasts are the output from a multisectoral macroeconomic model of the national economy. The model consists of a large set of interrelated economic equations which are estimated by means of long time series data sets. The CE model distinguishes 49 economic sectors, which are aggregated into 17 groups³⁵ and 6 main sectors for presentation purposes. Although the IER forecasts are, strictly speaking, forecasts of total employment by economic sector, occupation etc., they also pre-

35. In fact these are called industry groups. However in this report they will also be termed economic sectors, to be consistent with the terminology used in the other chapters.

sent the expansion demand, which is obtained by subtracting employment in the base year of the forecasting period.

Module II disaggregates this sectoral employment to employment by occupation (see figure 6.1). For this model the IER uses data on the occupational structure of employment in the United Kingdom obtained from the Censuses of Population. This occupational structure is forecast basically by extrapolations from recent developments. The resulting occupational proportions are then modified using the available information from the Labour Force Survey (LFS). The resulting occupational structures for employment in each industry are imposed on the industrial employment projections to obtain projections of employment by occupation. In this way each sectoral projection is broken down into projections for 22 occupational categories. These occupations are based on the 1990 Standard Occupational Classification (SOC) of the Office of Population Censuses and Surveys. In presenting the results of the occupational model, these 22 occupations are also aggregated into 9 major occupational groups.

Module IV, which is similar to the one in the research model proposed in chapter 2, transforms the forecasts of expansion demand by occupation into the future expansion demand by educational qualification. To date, the IER has restricted itself to projections of employment for people with higher education (module IV in figure 6.1). The projections of employment by occupation used for this purpose are at a lower level of aggregation, with 79 occupational categories rather than 22 occupations. As these 79 occupations are only used to forecast employment for those with higher qualifications, they are not presented by the IER. Trend extrapolation models are again used, based on data from several Censuses of Population and additional information from the LFS. Altogether 30 types of education are distinguished,³⁶ referring to 10 subject categories on each of the 3 levels of qualification which are distinguished: postgraduate, first degree and equivalent, and intermediate-level tertiary education. The 10 fields of study distinguished are given in appendix D. Projections of the employment shares of workers with the various educational qualifications in the employment in each of the 79 occupational categories are combined with the projected employment levels in each category. This yields a projection of future demand for highly qualified persons.

The IER has not, in the past, provided regular forecasts of replacement demand by occupation or by educational qualification (respectively module III and module V in figure 2.1). However, as part of their labour market forecasts by educational qualification, the IER has recently published forecasts of replacement demand for the 3

36. All qualifications above GCE 'A' level are included.

levels of education which are distinguished. The inflow of school-leavers by educational qualification (module VI) is also not projected in the way described in chapter 2. The IER combines the inflow and outflow methods (modules V and VI in figure 2.1, respectively) with a stock (accounting) method, to forecast supply, but only for highly qualified persons.³⁷

Regional forecasts of employment by occupation

To obtain forecasts of the occupational employment by region, the IER applies the same method as in its forecasts of employment by occupation, which was briefly described above. However, in this case the starting point is a multisectoral regional model (MRM) resembling the multisectoral dynamic model developed by Cambridge Econometrics. In general, the regional forecasts are consistent with the national forecasts: the MRM model is an elaboration of the MDM model. The model produces projections of employment by economic sector at the regional level. Detailed examination of data from the Census of Population and the LFS yields projections of the occupational structure of each industry in each region, using trend extrapolation. Combining these regional/occupational coefficients with the projections of employment by economic sector in each region gives projections of occupational employment (structure) at a regional level. The regions which are distinguished are the 11 Standard Planning Regions of the United Kingdom. These Standard Planning Regions correspond to the regions defined at the NUTS 2 level, except that the South East region is subdivided into Greater London and the rest of South East.

6.2 National forecasts by economic sector, occupation and educational qualification

The results of the latest projections of employment by occupation for the UK provided by the IER are presented in the *Review of the Economy and Employment 1995: Occupational Assessment* (Institute for Employment Research, 1995a). The *Review* consists of three main parts. First the macroeconomic scenario and assumptions underlying the projections and the resulting macroeconomic and labour force prospects for the UK are presented. Then, in accordance with the 'top-down approach', the forecasts of sectoral employment are discussed in detail. Finally the

37. The basis for projecting the supply of persons with higher qualifications is the number of economically active highly qualified persons. To obtain the total number of highly qualified persons for year $t+1$, losses due to deaths and net migration between t and $t+1$ are subtracted and new entrants during this period are added. Combining these with participation rate forecasts yields a projection of the total number of economically active persons with higher qualification. The data for this exercise comes from the Census of Population, the former Department of Education (Age Participation Index) and the Office of Population Censuses and Surveys (official population projection).

projections of occupational employment are presented. The information contained in the first part of the *Review* will not be discussed in detail here, but a few aspects will be highlighted.

Expectations are that the growth in GDP will be just under 3 per cent in 1995. For 1996-2001 it is forecast to grow at a rate of 2½ per cent per year. Government expenditures are also expected to grow over the medium and longer term, except for defence expenditures. Total employment is expected to grow by an average of 0.9% annually. The labour force is expected to grow steadily, primarily as a result of increasing female participation rates, especially for women aged 25-50, but the cyclical recovery of the economy will also contribute its share. Unemployment is expected to remain above the 2 million mark until 2001. In general, the additional employment is expected to be captured by women and much of it will be part-time employment. Male full-time employment is forecast to decline. It is also expected that there will be 400 thousand additional self-employed persons.

Forecasts of employment by economic sector

Table 6.1 presents the expected expansion demand for the United Kingdom in the period 1994-2001, broken down by economic sectors. As mentioned before, the average annual growth in the number of people working is expected to be 0.9% per year. Although employment levels are expected to rise, most of the economic sectors are expected to face a decline in employment. Overall there is a shift from agriculture and manufacturing industries to the service sector. This shift is expected to continue in the coming years.

The greatest decline in employment in relative terms is expected for *utilities* (3% per year) followed by *mining and metals and mineral products* (both 1.8% per year). *Banking and business services* and *hotels and catering* are expected to have the highest expansion demand (3.2 and 2.8% per year, respectively), closely followed by *other services* and *professional services* (2.7 and 2.6% per year).

In absolute terms, employment is expected to grow most strongly in *banking and business services*, *health and education services*, *hotels and catering*, and *retailing*. Job creation in these sectors in the period 1994-2001 will range from 616,000 in *banking and business services* to 290,000 in *retailing*. The greatest decline in employment in absolute terms is expected for *public administration and defence* (176,000 persons).

Table 6.1

Expected expansion demand by economic sector for the UK, 1994-2001 (total numbers and average annual percentage)

Economic sector	number	total %	average annual %	qualitative characteriz.
Agriculture	-19,000	-3	-0.5	average
Mining	-12,000	-13	-1.8	low
Food, drink and tobacco	-19,000	-4	-0.5	average
Textiles and clothing	-15,000	-3	-0.4	average
Chemicals	-23,000	-4	-0.6	average
Metals and mineral products	-43,000	-13	-1.8	low
Mechanical engineering	-68,000	-12	-1.6	low
Electrical engineering	-14,000	-6	-0.8	low
Motor vehicles	13,000	6	0.9	average
Rest engineering	-75,000	-9	-1.2	low
Other manufacturing	43,000	5	0.7	average
Utilities	-52,000	-23	-3.0	very low
Construction	18,000	1	0.2	average
Retailing	290,000	12	1.7	high
Hotels and catering	296,000	21	2.8	very high
Rest distribution, hotel etc.	56,000	3	0.5	average
Transport and communications	-36,000	-3	-0.4	average
Banking and business services	616,000	25	3.2	very high
Professional services	250,000	20	2.6	very high
Other services	257,000	21	2.7	very high
Manufacturing	-201,000	4	0.6	average
All industries above	1,464,000	8	1.1	high
Public admin. and defence	-176,000	-11	-1.5	low
Health and education services	309,000	7	0.9	high
All industries	1,597,000	6	0.9	average

Source: IER, Review of the Economy and Employment: Occupational Assessment, 1995

Expansion demand by occupation

Table 6.2 shows the expected expansion demand for the UK in the period 1994-2001, broken down by occupational groups. In absolute terms, the expected expansion demand will be highest for *personal service occupations*, *corporate managers and administrators*, *other associate professional occupations* and *other professional occupations*. Employment in these occupations will grow by amounts ranging from 530,000 (*personal services occupations*) to 247,000 (*other professional occupations*) persons over the period 1994-2001. The occupations with the lowest absolute expected expansion demand are *other elementary occupations*, *skilled engineering trades* and *clerical occupations*, which will suffer job losses in the forecasting period of 181,000, 140,000 and 71,000 jobs respectively.

In relative terms, the expected expansion demand is highest for *other professional occupations* (5.2% per year), *personal service occupations* (3.6% per year) and *other associate professional occupations* (3.2% per year). These occupational groups were also among the four occupational groups with the greatest expected growth in absolute terms.

Skilled engineering trades, other occupations in agriculture etc. and other elementary occupations are expected to face the largest declines in employment in relative terms, ranging from -1.8 to -1.4% per year.

Table 6.2

Expected expansion demand by occupational group for the UK, 1994-2001 (total number and average annual percentage)

Occupational group	number	total %	average annual %	qualitative characteriz.
Corporate managers and administrators	453,000	17	2.3	high
Managers/proprietors in agr. & services	181,000	11	1.5	average
Science and engineering professionals	108,000	18	2.4	high
Health professionals	28,000	16	2.2	high
Teaching professionals	36,000	4	0.5	average
Other professional occupations	247,000	42	5.2	very high
Science and eng. associate occupations	62,000	10	1.4	average
Health associate professionals	14,000	2	0.3	average
Other associate professional occupations	259,000	25	3.2	high
Clerical occupations	-71,000	-3	-0.4	low
Secretarial occupations	-19,000	-2	-0.2	low
Skilled construction trades	63,000	11	1.4	average
Skilled engineering trades	-140,000	-14	-1.8	very low
Other skilled trades	-16,000	-1	-0.1	low
Protective service occupations	25,000	7	0.9	average
Personal service occupations	530,000	28	3.6	very high
Buyers, brokers and sales representatives	18,000	4	0.6	average
Other sales occupations	101,000	7	1.0	average
Industrial plant & machine operators etc.	1,000	0	0.0	low
Drivers and mobile machine operators	-3,000	-0	-0.1	low
Other occupations in agriculture etc.	-22,000	-13	-1.7	very low
Other elementary occupations	-181,000	-10	-1.4	very low
All occupations	1,674,000	7	0.9	average

Source: IER, Review of the Economy and Employment: Occupational Assessment, 1995

Expansion demand by educational qualification

As mentioned before, the IER forecasts by educational qualification refer only to projections of employment for highly qualified persons. The results of the most recent of these forecasts are presented in the *Review of the Economy and Employment 1995: Future Employment Prospects for the Highly Qualified* (Institute for Employment Research, 1995b). The *Review* presents projections of the labour

market for highly qualified persons and is linked to the 1995 *Occupational Assessment* of the IER, which was discussed above. The data presented in the *Occupational Assessment* refers to the whole of the UK, whereas the projections of employment of highly qualified persons refer only to Great Britain (i.e. excluding Northern Ireland).

The IER distinguishes between a 'medium-term' and 'high demand' scenario in forecasting employment for highly qualified persons. Only the results of the 'medium-term' scenario will be presented here.³⁸ Table 6.3 gives an overview of the expected expansion demand for Great Britain in the period 1991-2001, for highly qualified persons by subject, according to the 'medium-term' scenario. Employment is expected to grow during this period for all highly qualified persons, except those with teacher training at the intermediate level. In all, employment for highly qualified persons is expected to grow by some 1.5 million jobs in this period. The expected relative expansion demand is in general highest for postgraduate studies and lowest for those with intermediate qualifications. With regard to educational qualifications, the expected expansion demand is highest for the social sciences, science, vocational studies and music and other degrees.

The highest expected relative expansion demand for postgraduates is for *vocational studies* (5.8% per year), while *agriculture* is expected to grow most slowly of all the studies at postgraduate level (2.3% per year). In absolute terms, *social science* has the highest growth, while *agriculture* again has the lowest growth (49,000 and 1,000 jobs in the forecasting period, respectively).

For first degree graduates the expected relative expansion demand is highest for those with *social science* and *music and other* degrees (both 4.7% per year) and lowest for *education* degrees i.e. teacher training (1.2% per year). In absolute terms, the expected expansion demand is highest for *social science* and lowest for *agriculture* (352,000 and 10,000 jobs in the period 1991-2001, respectively).

Finally, with respect to intermediate-level qualifications the relative expansion demand is expected to be highest for *language* (4.8% per year) and lowest for *education* (-2.4% per year). In absolute terms, the expected expansion demand is highest for *social science*, while *education* again faces the greatest fall (181,000 and -80,000 jobs in the forecasting period, respectively).

38. These scenario represents the main features of the trends observed over the 1980s and how these have influenced the projections for the year 2001.

Table 6.3

Expected expansion demand for highly qualified persons by subject in Great Britain, medium-term demand scenario, 1991-2001 (total number and average annual percentage)

Subject	number	average annual %	qualitative characteriz.
<i>Postgraduates</i>			
Education	14,000	4,7	high
Health	10,000	2,8	average
Technology	20,000	3,7	average
Agriculture	1,000	2,3	low
Science	33,000	2,9	average
Social science	49,000	5,0	high
Vocational	9,000	5,8	very high
Language	8,000	3,6	average
Music & other	4,000	4,1	high
Other arts	9,000	3,5	average
Total	158,000	3,8	average
<i>First degree graduates</i>			
Education	30,000	1,2	low
Health	34,000	2,0	low
Technology	73,000	1,9	low
Agriculture	10,000	3,4	average
Science	187,000	4,2	high
Social science	352,000	4,7	high
Vocational	32,000	3,4	average
Language	44,000	2,5	average
Music & other	57,000	4,7	high
Other arts	75,000	3,6	average
Total	893,000	3,4	average
<i>Intermediate qualifications</i>			
Education	-80,000	-2,4	very low
Health	133,000	1,9	low
Technology	87,000	1,8	low
Agriculture	5,000	1,9	low
Science	46,000	4,3	high
Social science	181,000	4,1	high
Vocational	18,000	2,6	average
Language	3,000	4,8	high
Music & other	25,000	4,6	high
Other arts	2,000	2,9	average
Total	423,000	2,0	low

Source: IER, Review of the Economy and Employment: Future employment prospects for the highly qualified, 1995/96

A comparison of supply and demand indicates an overall surplus of highly qualified persons. However the IER expects that substitution between highly qualified persons is likely to lead to a more balanced distribution of any shortfalls or surpluses in practice. The largest imbalances for those with higher degrees are in *education* and *social science*. For first degree graduates, *science*, *languages* and *music and other*

are the disciplines with the greatest surpluses. At the intermediate level, *education*, *technology*, *social science* and *vocational studies* are areas in which particularly large excess supply may be expected.

Replacement demand by occupation

As mentioned before, the IER does not provide explicit forecasts of replacement demand by occupation or by educational category.

6.3 Regional employment forecasts by economic sector and occupation

The results of the most recent projections of regional employment by economic sector and occupation provided by the IER are presented in the *Review of the Economy and Employment 1994: Regional Assessment* (Institute for Employment Research, 1994). The *Review* presents employment forecasts by economic sector and occupation for the various regions of the UK. These forecasts correspond to those in the 1994 *Occupational Assessment* of the IER. The regions which are distinguished by the IER are consistent with the regions used by the EURES Labour Market Information, except that the IER subdivides South East into Greater London and the rest of South East.

Regional expansion demand by economic sector

The regional forecasts by economic sector are presented in a more aggregated form, for 14 economic sectors rather than the 22 sectors distinguished at the national level. Table 6.4 presents the expected expansion demand broken down by economic sectors and regions in the UK for the period 1993-2001.

The expected expansion demand is, on average, highest in the regions of East Anglia, South West and East Midlands. The sector with the highest expected expansion demand in both absolute and relative terms in the period 1993-2001 is *business and miscellaneous services* (except that in Northern Ireland the absolute expansion demand for *public services* is expected to be higher). The expected expansion demand for *business and miscellaneous services* varies from 1.9% in Northern Ireland to 3.1% per year in East Midlands. In most regions the next highest expansion demand is expected to be for *public services*. This ranges from 0.5% in Greater London to 1.9% per year in East Midlands.

Expansion demand is expected to decline for most economic sectors during the period 1993-2001, with *mineral products* experiencing the greatest decline in most regions, ranging from -2.1% in Yorkshire & Humberside and Wales to -5.0% in Greater London. The expansion demand for *utilities* is also expected to decline

considerably in most regions, ranging from -2.1% in Scotland to -3.7% per year in West Midlands. *Metals and mining etc.* are also expected to loose employment.

Table 6.4
Regional expected expansion demand by economic sector for the UK, 1993-2001

Economic sector	number	average annual %	qualitative characteriz.
<i>Greater London</i>			
Agriculture	-	-0.4	average
Mining etc.	-	-0.1	average
Food, drink and tobacco	-11,000	-3.4	very low
Textiles and clothing	-5,000	-2.2	very low
Chemicals	-9,000	-2.9	very low
Mineral products	-2,000	-5.0	very low
Metals	-2,000	-3.5	very low
Engineering	-23,000	-2.0	very low
Other manufacturing	-4,000	-0.4	average
Utilities	-5,000	-2.5	very low
Construction	3,000	0.2	average
Distr. hotels, transp. etc.	14,000	0.2	average
Public services	29,000	0.5	average
Business and misc. services	225,000	2.3	very high
Total	207,000	0.7	average
<i>Rest South East</i>			
Agriculture	-6,000	-0.8	low
Mining etc.	-1,000	-1.3	low
Food, drink and tobacco	-8,000	-1.8	very low
Textiles and clothing	-6,000	-2.8	very low
Chemicals	-9,000	-1.1	low
Mineral products	-6,000	-3.6	very low
Metals	-3,000	-2.1	very low
Engineering	-45,000	-1.4	low
Other manufacturing	-3,000	-0.2	average
Utilities	-10,000	-2.5	very low
Construction	31,000	1.3	high
Distr. hotels, transp. etc.	74,000	0.7	average
Public services	133,000	1.5	high
Business and misc. services	245,000	2.9	very high
Total	386,000	1.0	average
<i>East Anglia</i>			
Agriculture	-3,000	-0.9	low
Mining etc.	0,000	-0.3	average
Food, drink and tobacco	-3,000	-1.1	low
Textiles and clothing	-1,000	-1.9	very low
Chemicals	-3,000	-1.5	low
Mineral products	-1,000	-3.1	very low
Metals	0,000	-1.3	low
Engineering	0,000	0.0	average
Other manufacturing	2,000	0.7	average
Utilities	-2,000	-2.5	very low
Construction	6,000	1.2	high
Distr. hotels, transp. etc.	25,000	1.2	high
Public services	30,000	1.7	high
Business and misc. services	36,000	2.6	very high
Total	87,000	1.2	average

Table 6.4 (continued)

Regional expected expansion demand by economic sector for the UK, 1993-2001

Economic sector	number	average annual %	qualitative characteriz.
<i>South West</i>			
Agriculture	2,000	0.3	average
Mining etc.	-1,000	-1.5	low
Food, drink and tobacco	-5,000	-1.5	low
Textiles and clothing	-2,000	-1.1	low
Chemicals	-5,000	-1.9	very low
Mineral products	-2,000	-2.7	very low
Metals	-1,000	-1.2	low
Engineering	-12,000	-1.0	low
Other manufacturing	-1,000	-0.3	average
Utilities	-5,000	-2.6	very low
Construction	17,000	1.7	high
Distr. hotels, transp. etc.	55,000	1.2	high
Public services	58,000	1.5	high
Business and misc. services	100,000	3.0	very high
Total	197,000	1.2	average
<i>West Midlands</i>			
Agriculture	-2,000	-0.4	average
Mining etc.	-3,000	-4.1	very low
Food, drink and tobacco	-7,000	-1.9	very low
Textiles and clothing	-4,000	-1.5	low
Chemicals	-6,000	-1.5	low
Mineral products	-11,000	-3.2	very low
Metals	-9,000	-2.7	very low
Engineering	-16,000	-0.6	average
Other manufacturing	-2,000	-0.4	average
Utilities	-6,000	-3.7	very low
Construction	9,000	0.9	high
Distr. hotels, transp. etc.	52,000	1.1	high
Public services	42,000	1.0	high
Business and misc. services	84,000	2.7	very high
Total	122,000	0.7	average
<i>East Midlands</i>			
Agriculture	-4,000	-1.1	low
Mining etc.	-11,000	-6.0	very low
Food, drink and tobacco	-1,000	-0.2	average
Textiles and clothing	-10,000	-1.2	low
Chemicals	-3,000	-0.9	low
Mineral products	-7,000	-4.1	very low
Metals	-3,000	-2.9	very low
Engineering	7,000	0.6	average
Other manufacturing	8,000	1.5	high
Utilities	-4,000	-3.1	very low
Construction	9,000	1.2	high
Distr. hotels, transp. etc.	40,000	1.1	high
Public services	63,000	1.9	high
Business and misc. services	70,000	3.1	very high
Total	155,000	1.1	average

Table 6.4 (continued)

Regional expected expansion demand by economic sector for the UK, 1993-2001

Economic sector	number	average annual %	qualitative characteriz.
<i>Yorkshire & Humberside</i>			
Agriculture	-1,000	-0.3	average
Mining etc.	-7,000	-4.2	very low
Food, drink and tobacco	-8,000	-1.3	low
Textiles and clothing	-9,000	-1.8	very low
Chemicals	-3,000	-0.7	low
Mineral products	-4,000	-2.1	very low
Metals	-8,000	-2.7	very low
Engineering	-11,000	-0.9	low
Other manufacturing	4,000	0.7	average
Utilities	-5,000	-3.3	very low
Construction	9,000	0.9	high
Distr. hotels, transp. etc.	26,000	0.6	average
Public services	59,000	1.5	high
Business and misc. services	78,000	2.7	very high
Total	120,000	0.7	average
<i>North West</i>			
Agriculture	-2,000	-0.7	low
Mining etc.	-1,000	-3.4	very low
Food, drink and tobacco	-4,000	-0.8	low
Textiles and clothing	-12,000	-1.9	very low
Chemicals	-8,000	-1.1	low
Mineral products	-5,000	-3.2	very low
Metals	-3,000	-2.4	very low
Engineering	-20,000	-1.2	low
Other manufacturing	-4,000	-0.6	average
Utilities	-7,000	-3.0	very low
Construction	2,000	0.2	average
Distr. hotels, transp. etc.	23,000	0.4	average
Public services	63,000	1.2	high
Business and misc. services	95,000	2.4	very high
Total	117,000	0.6	average
<i>North</i>			
Agriculture	-1,000	-0.5	average
Mining etc.	-4,000	-4.2	very low
Food, drink and tobacco	0,000	0.0	average
Textiles and clothing	-2,000	-0.8	low
Chemicals	-2,000	-0.5	average
Mineral products	-1,000	-2.3	very low
Metals	-3,000	-2.9	very low
Engineering	-2,000	-0.2	average
Other manufacturing	0,000	0.1	average
Utilities	-4,000	-2.7	very low
Construction	6,000	1.0	high
Distr. hotels, transp. etc.	11,000	0.5	average
Public services	23,000	0.9	high
Business and misc. services	34,000	2.3	very high
Total	56,000	0.6	average

Table 6.4 (continued)

Regional expected expansion demand by economic sector for the UK, 1993-2001

Economic sector	number	average annual %	qualitative characteriz.
<i>Wales</i>			
Agriculture	-1,000	-0.4	average
Mining etc.	-2,000	-3.4	very low
Food, drink and tobacco	2,000	0.9	high
Textiles and clothing	-3,000	-2.2	very low
Chemicals	-2,000	-0.7	low
Mineral products	-1,000	-2.1	very low
Metals	-7,000	-3.2	very low
Engineering	-2,000	-0.4	average
Other manufacturing	4,000	1.4	high
Utilities	-3,000	-2.8	very low
Construction	5,000	0.9	high
Distr. hotels, transp. etc.	30,000	1.3	high
Public services	31,000	1.3	high
Business and misc. services	37,000	2.5	very high
Total	87,000	1.0	average
<i>Scotland</i>			
Agriculture	-3,000	-0.6	average
Mining etc.	0,000	0.2	average
Food, drink and tobacco	-8,000	-1.5	low
Textiles and clothing	-8,000	-2.0	very low
Chemicals	-3,000	-0.9	low
Mineral products	-3,000	-2.9	very low
Metals	-2,000	-2.3	very low
Engineering	-11,000	-0.9	low
Other manufacturing	3,000	0.6	average
Utilities	-4,000	-2.1	very low
Construction	8,000	0.7	average
Distr. hotels, transp. etc.	17,000	0.4	average
Public services	42,000	0.9	high
Business and misc. services	76,000	2.2	high
Total	106,000	0.6	average
<i>Northern Ireland</i>			
Agriculture	0,000	0.1	average
Mining etc.	0,000	-1.7	low
Food, drink and tobacco	-1,000	-0.7	average
Textiles and clothing	-1,000	-0.3	average
Chemicals	0,000	0.2	average
Mineral products	-1,000	-3.2	very low
Metals	0,000	-4.9	very low
Engineering	-5,000	-1.8	very low
Other manufacturing	2,000	1.4	high
Utilities	-2,000	-3.2	very low
Construction	1,000	0.3	average
Distr. hotels, transp. etc.	5,000	0.4	average
Public services	19,000	1.2	high
Business and misc. services	16,000	1.9	high
Total	33,000	0.7	average

Source: IER, Review of the Economy and Employment: Regional Assessment, 1994

Regional expansion demand by occupation

The regional occupational forecasts, like the sectoral forecasts, are presented at a higher level of aggregation than was used at the national level. Instead of the 22 occupational groups presented at national level, 9 major occupational groups are distinguished.

Table 6.5 gives an overview of the expected expansion demand broken down by occupational groups and regions in the UK for the period 1993-2001. The table shows that the expected expansion demand is highest in the regions of East Anglia, South West and East Midlands. In several regions expansion demand is highest for the *professional occupations*. The expected employment growth for this occupational group ranges from 1.8% in the North region to 3.4% in Greater London. The expected expansion demand is also large for *managers and administrators*, ranging from 1.6% in Northern Ireland and the West Midlands to 2.9% in Greater London. The largest *occupational winners* are however the *personal and protective services occupations*. For this occupational group the expected expansion demand is lowest in Greater London and highest in the East Midlands.

The *plant and machine operatives* are one of the major *occupational losers*. However the expansion demand for this occupational group ranges from a expected annual decrease of employment in Greater London of 2.6% to an employment growth of 1.1% in the South West and Wales.

Table 6.5

Regional expected expansion demand by major occupational groups for the UK, 1993-2001

Major occupational groups	number	average annual %	qualitative characteriz.
<i>Greater London</i>			
Managers and administrators	166,000	2.9	high
Professional occupations	114,000	3.4	very high
Associate prof. and technical occ.	102,000	2.7	high
Clerical and secretarial occupations	-95,000	-1.7	very low
Craft and related occupations	-19,000	-0.6	low
Personal and protective services occ.	49,000	1.9	average
Sales occupations	-5,000	-0.3	low
Plant and machine operatives	-51,000	-2.6	very low
Other occupations	-56,000	-2.7	very low
Total	207,000	0.7	average
<i>Rest South East</i>			
Managers and administrators	186,000	2.5	high
Professional occupations	114,000	2.9	high
Associate prof. and technical occ.	71,000	1.9	average
Clerical and secretarial occupations	-18,000	-0.3	low
Craft and related occupations	-6,000	-0.1	low
Personal and protective services occ.	122,000	3.4	very high
Sales occupations	0,000	0.0	low
Plant and machine operatives	-46,000	-1.5	very low
Other occupations	-38,000	-1.4	very low
Total	386,000	1.0	average
<i>East Anglia</i>			
Managers and administrators	29,000	2.2	high
Professional occupations	19,000	2.7	high
Associate prof. and technical occ.	14,000	2.1	high
Clerical and secretarial occupations	-2,000	-0.2	low
Craft and related occupations	0,000	0.0	low
Personal and protective services occ.	20,000	3.0	high
Sales occupations	7,000	1.3	average
Plant and machine operatives	2,000	0.3	average
Other occupations	-3,000	-0.4	low
Total	87,000	1.2	average
<i>South West</i>			
Managers and administrators	65,000	2.2	high
Professional occupations	32,000	2.2	high
Associate prof. and technical occ.	27,000	1.8	average
Clerical and secretarial occupations	1,000	0.04	low
Craft and related occupations	2,000	0.1	average
Personal and protective services occ.	55,000	3.3	very high
Sales occupations	14,000	1.1	average
Plant and machine operatives	17,000	1.1	average
Other occupations	-16,000	-1.2	low
Total	197,000	1.2	average

Table 6.5 (continued)

Regional expected expansion demand by major occupational groups for the UK, 1993-2001

Major occupational groups	number	average annual %	qualitative characteriz.
<i>West Midlands</i>			
Managers and administrators	45,000	1.6	average
Professional occupations	39,000	2.5	high
Associate prof. and technical occ.	27,000	1.9	average
Clerical and secretarial occupations	5,000	0.2	average
Craft and related occupations	-11,000	-0.4	low
Personal and protective services occ.	54,000	3.2	high
Sales occupations	11,000	0.9	average
Plant and machine operatives	-11,000	-0.5	low
Other occupations	-36,000	-2.4	very low
Total	122,000	0.7	average
<i>East Midlands</i>			
Managers and administrators	56,000	2.4	high
Professional occupations	42,000	3.3	high
Associate prof. and technical occ.	22,000	2.0	high
Clerical and secretarial occupations	3,000	0.2	average
Craft and related occupations	-21,000	-0.9	low
Personal and protective services occ.	48,000	3.6	very high
Sales occupations	8,000	0.8	average
Plant and machine operatives	5,000	0.3	average
Other occupations	-7,000	-0.6	low
Total	155,000	1.1	average
<i>Yorkshire & Humberside</i>			
Managers and administrators	50,000	1.9	average
Professional occupations	34,000	2.4	high
Associate prof. and technical occ.	29,000	2.0	high
Clerical and secretarial occupations	7,000	0.3	average
Craft and related occupations	-14,000	-0.6	low
Personal and protective services occ.	52,000	3.0	high
Sales occupations	2,000	0.2	average
Plant and machine operatives	-11,000	-0.5	low
Other occupations	-27,000	-1.7	very low
Total	120,000	0.7	average
<i>North West</i>			
Managers and administrators	55,000	1.7	average
Professional occupations	43,000	2.2	high
Associate prof. and technical occ.	40,000	2.0	high
Clerical and secretarial occupations	-3,000	-0.1	low
Craft and related occupations	-20,000	-0.7	low
Personal and protective services occ.	65,000	2.9	high
Sales occupations	17,000	1.0	average
Plant and machine operatives	-28,000	-1.2	low
Other occupations	-51,000	-2.8	very low
Total	117,000	0.6	average

Table 6.5 (continued)

Regional expected expansion demand by major occupational groups for the UK, 1993-2001

Major occupational groups	number	average annual %	qualitative characteriz.
<i>North</i>			
Managers and administrators	22,000	1.7	average
Professional occupations	14,000	1.8	average
Associate prof. and technical occ.	9,000	1.1	average
Clerical and secretarial occupations	-8,000	-0.6	low
Craft and related occupations	-9,000	-0.6	low
Personal and protective services occ.	27,000	2.6	high
Sales occupations	9,000	1.1	average
Plant and machine operatives	4,000	0.4	average
Other occupations	-12,000	-1.2	low
Total	56,000	0.6	average
<i>Wales</i>			
Managers and administrators	25,000	1.7	average
Professional occupations	17,000	2.1	high
Associate prof. and technical occ.	14,000	1.8	average
Clerical and secretarial occupations	-3,000	-0.2	low
Craft and related occupations	-5,000	-0.4	low
Personal and protective services occ.	31,000	3.1	high
Sales occupations	3,000	0.5	average
Plant and machine operatives	13,000	1.1	average
Other occupations	-10,000	-1.1	low
Total	87,000	1.0	average
<i>Scotland</i>			
Managers and administrators	52,000	2.0	high
Professional occupations	40,000	2.3	high
Associate prof. and technical occ.	24,000	1.4	average
Clerical and secretarial occupations	-8,000	-0.3	low
Craft and related occupations	-26,000	-1.0	low
Personal and protective services occ.	39,000	2.1	high
Sales occupations	-8,000	-0.6	low
Plant and machine operatives	-6,000	-0.3	low
Other occupations	0,000	0.0	low
Total	106,000	0.6	average
<i>Northern Ireland</i>			
Managers and administrators	14,000	1.6	average
Professional occupations	12,000	2.3	high
Associate prof. and technical occ.	6,000	1.4	average
Clerical and secretarial occupations	-3,000	-0.4	low
Craft and related occupations	-2,000	-0.3	low
Personal and protective services occ.	15,000	2.5	high
Sales occupations	1,000	0.3	average
Plant and machine operatives	-1,000	-0.2	low
Other occupations	-7,000	-1.5	very low
Total	33,000	0.6	average

Source: IER, Review of the Economy and Employment: Regional Assessment, 1994

7 Conclusions

Medium-term labour market forecasts: a research outline

This report investigates the possibilities of generating medium term labour market forecasts for the various EU Member States as part of the EURES General Information Database. Information on expected developments in the labour market could be an important aid to 'enlarge the horizons' of potential migrants or commuters within a common European labour market. Moreover, this labour market information also signals the labour market possibilities for international firms (or potential international firms) which consider starting or expanding their production or services in a particular region of the European Union.

For this purpose a *modular* forecasting model, which produces the required medium-term forecasts in eight steps (see figure 2.1) was first formulated. However it would be superfluous to present all these labour demand and supply forecasts by economic sector, occupation and educational classification. Therefore we suggest that the EURES information system should focus on the *key information* that produces the labour market signals that are relevant for the intended user groups. In its complete form the forecasting model could produce three kinds of key information:

- the expansion demand by economic sector (NACE);
- the job openings by occupation (ISCO);
- the labour market prospects by educational qualification (ISCED + national classification).

The proposed modular structure offers three very important advantages:

- it enables a *stepwise development* of the labour market forecasts;
- it respects the principle of *subsidiarity*, since it builds on the existing sectoral, occupational and/or educational forecasts that are imbedded in public policies in the various Member States in general and those of the Public Employment Services in particular. This also guarantees that national information is contained in the forecasts;
- it is *cost effective* as it avoids double work.

We have also investigated the availability of medium-term sectoral employment forecasts in the various Member States. These forecasts are the required starting points for the proposed research model, and are the major link between the labour market forecasts presented in EURES and existing national economic forecasting activities. The investigation showed that medium-term employment forecasts are produced on a regular basis in several Member States. The number of economic sectors distinguished ranges from 5 in Denmark to 43 in Spain (see table 3.1).

Since the EURES information system requires forecasts for all Member States of the European Union, we also discussed two previous research projects which were intended to generate employment forecasts for all Member States: the HERMES model and the ERECO forecasts. The major disadvantage of these two earlier coordinated research projects is probably that they did not build on the primary macro-economic and sectoral forecasts which are imbedded in public policies in the various Member States. Therefore we suggest that the coordination of the sectoral forecasts should be restricted to filling the gaps in the available information on the Member States.

However demand forecasts by occupational categories and educational qualifications are only available on a regular basis in a few Member States. Occupational forecasts are produced in Germany, Ireland, the Netherlands and the United Kingdom, and in the Netherlands forecasts for educational categories are also made regularly. Of course the subsidiarity principle should also apply here, but because such occupational and educational forecasts are not produced on a regular basis in many Member States, there is much more room for a more coordinated approach. Moreover, the sector by occupation and occupation by educational qualification matrices available in the Labour Force Survey of EUROSTAT are the major data source for transforming the sectoral forecasts into occupational forecasts. For this reason we investigated the data available in the Labour Force Survey of 1994 for 12 Member States.³⁹ An analysis of the available data shows that the main problem is that educational qualifications can, at the moment, hardly be distinguished in the Labour Force Survey since the data refers only to three levels of education.

The EUROSTAT data therefore limit the labour market information that can be generated in addition to the sectoral forecasts to occupational information. In principle EUROSTAT's Labour Force Survey makes it possible to distinguish an adequate number of occupations in all Member States and in most EURES regions (see tables 4.3 and 4.4). However, partly due to the switch from the old ISCO '68 classification to the new ISCO '88 classification, there are still some severe transition problems with regard to the data availability and quality for some Member States. Moreover, it will be some years before the desired time series are available, which means that at the moment only crude forecasts of both expansion and replacement demand by occupation can be constructed.

The EUROSTAT data also offers opportunities to construct EU-wide labour market indicators that may be of great importance for the EURES information system. This is shown by the *specialisation index* we have constructed for the various EURES

39. No data is available for the new Member States yet.

regions. This indicates the occupational categories in which a particular region is specialized, relative to the EU average.

Finally, two operational examples of the 'Trends' information that can be presented in the EURES information system have been described. Chapters 5 and 6 presented the available national and regional forecasts for the Netherlands and the United Kingdom, respectively. The information system of the *Research Centre for Education and the Labour Market* in the Netherlands regularly generates the required forecasts by both occupation and educational qualification at a national level. For this study, regional forecasts of expansion demand by occupation have also been compiled. The regular occupational forecasts of the *Institute of Employment Research* in the United Kingdom are restricted to the expansion demand at both national and regional level. Moreover, educational forecasts are compiled for higher education. The latter refer to both expansion demand and replacement demand.

Computer screen texts

As an aid to visualizing the information on future job opportunities that could be presented in the EURES information system, the 'Trends' information that could be given for the various regions in the Netherlands and the United Kingdom is shown in Appendices A and B, respectively. These prototype computer screen texts focus on the most striking information available with respect to the key information on economic sectors, occupations and educational qualification. Moreover, the regional information is imbedded in the context of national labour market developments.

These examples also show the applicability of the subsidiarity-approach, in the sense that it need not be a problem if the labour market information presented for the various Member States differs to some extent due to differences in the information available.

It is however important to consider carefully whether the information to be presented should refer only to the most striking 'winners and losers' in the various regional labour markets. Although such an approach has the advantage that the users of the information system do not have to struggle with labour market information on a large number of economic sectors, occupations and educational qualifications, it has the disadvantages that persons or firms who are interested in labour market information for a particular occupation or educational qualification can often not find this information. An alternative would be to develop screen texts for each region for all economic sectors, occupations and educational qualifications. However this would require the labour market forecasts to be presented in a menu-driven tree structure that facilitates users' search processes.

Another problem to be addressed is the dual character of the intended user groups for the EURES labour market information system. Persons searching for future job opportunities should receive information in a different form to firms who are interested in the labour market situation, as it affects their activities, in an EU region. Both the emphasis of the key information to be presented and the way it is presented in texts should be different for these two user groups. The sample screen texts in Appendices A and B would be typical presentations for individuals who want information about the future labour market opportunities in a particular region. For firms, it would be more relevant to emphasize any skill shortages which are forecast or the educational qualifications which are in relative abundance in an EU region. Probably it is most efficient to deduce two different ways of presentation from one central database.

Towards a EURES Database of regional labour market forecasts

Since a huge effort will be required to generate the key information for economic sectors, occupations and educational qualifications for all Member States of the European Union, a pragmatic stepwise development of the EURES labour market information system is recommended (see also Teunis and De Grip, 1996). As mentioned above, earlier attempts to generate coordinated labour market forecasts for all Member States have not been continued. A major disadvantage of these forecasting models was that they did not build on the existing macro-economic and sectoral forecasts in the various Member States. The EURES forecasts should therefore take the principle of national subsidiarity as a starting point, as is the case with the currently available EURES Database.

It is also an important advantage that — in contrast to the earlier coordinated forecasting models — the labour market forecasts constructed on behalf of EURES serve a crucial policy target: to increase the transparency of the European labour market so as to improve the overall performance of this labour market. Moreover, EURES offers a concrete tool which has the potential to disseminate the information on a large scale among EU citizens.

The proposed stepwise development of the labour market forecasts should combine a long-term strategy focusing on the development of a complete information system that includes all key information for economic sectors, occupations and educational qualifications for all EU Member States with a short-term strategy which makes it possible to feed the information system with the available relevant labour market information as soon as possible. The latter has the important advantage that the feedback of users could strengthen the further development of both the contents and the presentation of the labour market information provided.

In particular, an investigation of the available EUROSTAT Labour Force Data indicates that it is probably most effective to focus this short-term strategy on the relevant sectoral and occupational forecasts. Since forecasts by educational qualification are still lacking for most Member States, the occupational forecasts can provisionally be supplemented by the more qualitative experts' judgements in areas such as skill shortages, obtained by sampling using the EURES' PES questionnaire.

In the light of these considerations, we suggest the following lines of action to develop the required future labour market information step-by-step:

1. Presentation of the labour market information generated in this study for the Netherlands and the United Kingdom and the occupational specialisation indices for the other Member States in the EURES information system in combination with the information currently available in the EURES Database as e.g. the information derived from the PES-Questionnaire.
2. Adding the available employment forecasts by economic sector in the other Member States and the available occupational forecasts in Belgium, Germany and Ireland, along with the forecasts by educational qualification which are available for Finland and Norway.
3. Establish a research network of forecasting institutes with the aim of developing (1) national sectoral forecasts for the Member States for which these forecasts are not yet available, (2) regional sectoral forecasts for the Member States for which these forecasts are not available and (3) the missing occupational expansion demand and replacement demand forecasts, using EUROSTAT's Labour Force Survey. This network should also be the regular supplier of the labour market forecasts required for the EURES Database. Within the actual structure of EURES it would be most appropriate if the National Public Employment Services play an active role in stimulating the forecasting activities for their own country. Probably European programmes as e.g. the *Leonardo programme* could facilitate the network activities required for a Europe-wide co-ordinated approach.

However, both the sectoral forecasts and the occupational and educational forecasts will probably also be useful for other policy purposes of the European Commission, both within and outside DG V. Cooperation in financing the research network will probably be an effective strategy to develop the required labour market forecasts. In this respect also the *Circle for Research Cooperation on Trends in Occupations and Qualifications (CIRETOQ)* network recently set up by CEDEFOP should be mentioned.

4. Initiate a research project to investigate the availability of national forecasts of the numbers of school-leavers entering the labour market and/or the required underlying data on student numbers and student flows in initial and continuing education.⁴⁰
5. For the future development of the labour market information presented by EU-RES it is also of great importance to organize systematic evaluations of the usefulness of the information for the various users of the system. The Euro-advisors could probably play a central role in generating this feedback with regard both to the contents and the presentation of the labour market information provided.
6. Encouraging the improvement of EUROSTAT's labour force data by educational qualification, by differentiating more types of education at each level. For this purpose, the existing ISCED classification should be further developed by extending the differentiation of the various educational qualifications to the relevant types of education. However, due to the institutional differences between the educational systems in the Member States, there should be some room for country specific differentiation in the educational qualifications distinguished.

40. As mentioned before this information is highly relevant for firms which consider starting or expanding their production or services in a particular EU region. Moreover, this school leavers information is required for matching the labour demand forecasts with forecasts of labour supply.

References

- d'Alcantara, G. and A. Italianer, *European Project for a Multinational Macroeconomic Model*, Commission of the European Communities, DG XII, Documents MS-11, Brussels, 1982.
- Berendsen, H., A. de Grip, M.H. Wieling and E.J.T.A. Willems, *Regional labour market forecasts by education and occupation in the Netherlands*, ROA-RM-1992/5E, Maastricht, 1992.
- Borghans, L., A. de Grip, A.G.M. Matheeuwsen, W. Smits, E.J.T.A. Willems, *Methodiek van het informatiesysteem onderwijs-arbeidsmarkt 1995*, ROA-W-1995/3, Maastricht, 1995.
- Borghans, L., H. Heijke, *Forecasting the Educational Structure of Occupations: a Manpower Requirement Approach with Substitution*, ROA-RM-1993/2E, 1993.
- Commission of the European Communities, *HERMES: Harmonised Econometric Research for Modelling Economic Systems*, North-Holland, 1993.
- Dam, J.W. van, A. de Grip, H. Heijke, Towards a Maas-Rhine European Labour Market, in: *European Business and Economic Development (EBED)*, vol. 1, no. 6, 1993, pp. 14-18.
- Eijs, P. van, *The manpower requirements approach: background and methodology*, ROA-RM-1993/3E, Maastricht, 1993.
- Eijs, P. van, *Manpower forecasting in the western world: the current state of the art*, ROA-RM-1994/1E, Maastricht, 1994.
- ERECO, *Medium-term Forecasts of Employment by EU districts and Sectors of Industry: Summary Report*, Ifo Institute for Economic Research, Munich, 1994.
- European Commission, *Employment in Europe 1993*, Luxembourg, 1993.
- Glytsos, Nicholas, P., *Demographic Changes, and Labour Shortages in Greece: An Occupational and Regional Outlook*, KEPE, Athens, 1993.
- Grip, A. de and J.A.M. Heijke, *The Information System on Education and the Labour Market developed by ROA*, ROA-W-1991/2E, Maastricht, 1991.
- Grip, A. de, L. Borghans, E. Willems, *Methodology of the ROA information system on occupational groups and types of education*, ROA-W-1995/1E, Maastricht, 1995.
- Hoevenberg, J., A. de Grip, *Indicators of Occupational Employment in the European Union*, ROA-R-1994/3E, Maastricht, 1994.
- Institute for Employment Research, *Review of the Economy and Employment: Regional Assessment 1994*, University of Warwick, Coventry, 1994.
- Institute for Employment Research, *Review of the Economy and Employment: Occupational Assessment 1995*, University of Warwick, Coventry, 1995a.
- Institute for Employment Research, *Review of the Economy and Employment: Future Employment Prospects for the Highly Qualified*, University of Warwick, Coventry, 1995b.
- Jansen, M., H. Meijers, J. van der Meulen, J. Muysken, M. Oude Wansink, P. Verberne, A. van der Zon, *Technical change, unemployment and skill mismatch* (preliminary draft), Maastricht, 1994.
- Natzijl, H. and P. Westra, *Regionale Arbeidsmarktprognose 1991-1996*, OAV-rapport 91-08, Rijswijk, 1991.
- Natzijl, H. and P. Westra, *Regionale Arbeidsmarktprognose 1995-2000*, O&A-rapport 95-07, Rijswijk, 1995.
- Nijkamp, P., P. Rietveld and F. Snickars, 'Regional and econometric models', in P. Nijkamp (ed.), *Handbook of Regional and Urban Economics*, Amsterdam/New York/Oxford/Tokyo: North-Holland, pp. 257-294, 1986.
- OECD, *Employment Outlook 1994*, Paris, 1994.
- ROA, *The Labour Market by Education and Occupation to 2000*, ROA-R-1995/3E, Maastricht, 1995a.
- ROA, *The Labour Market by Education and Occupation to 2000. Statistical Appendix*, ROA-R-1995/3BE, Maastricht, 1995b.
- Teunis, U., A. de Grip, *International Labour Market Indicators: a proposal for development*, ROA-R-1996/2E, Maastricht.

Wilson, R.A., 'Modelling and Forecasting the Structure of Employment in the UK', in H. Heijke (ed.), *Labour Market Forecasts by Occupation and Education*.. Massachusetts, USA: Kluwer Academic Press, 1994.

Appendix A Presentation of information on the future job opportunities in the Netherlands for the EURES system

Groningen⁴¹

Occupational specialization

The occupational profile of the Province of Groningen, relative to the EU-averages, shows that the following occupational groups are strongly over-represented: Business services agents and trade brokers; Artistic, entertainment and sports associate professionals; Health associate professionals (except nursing); Nursery and midwifery associate professionals; Archivists, librarians etc; Printing-, binding-, and paper-products etc; Nursing and midwifery professionals; Managers of small enterprises; Agricultural and other mobile plant operators; Directors and chief executives.

With respect to the number of workers the largest occupational groups are:

	Employed persons 1994
Managers of small enterprises	14,600
Personal care and related workers	10,400
Nursery and midwifery associate professionals	9,300
Administrative associate professionals	8,400
Other office clerks	8,100
Secondary education teaching professionals	7,700
Motor vehicle drivers	6,400
Shop, stall and market salespersons etc	6,300
Numerical clerks	6,100
Production and operations managers	5,900

Forecasts

For the coming years, employment growth in the Netherlands is expected to be highest in the health sector, the miscellaneous commercial services, commerce and the chemical industry. In Groningen, employment growth will be highest in miscel-

41. In the separately published Appendices of this report similar information is presented for the other 11 provinces of the Netherlands.

laneous commercial services and in construction. The fast growing occupations in Groningen are expected to be:

	Average annual growth % till 2000
Programmers and system analysts ,	8.4
Senior finance and sales managers	2.7
Managers and supervisors in manufacturing	2.5
Sales assistants	2.1
Nursing staff	1.9

On the other hand, employment for agricultural workers, farmers, porters, cleaners and domestics, welders and engineering workers and purchasing and sales clerks will shrink considerably.

Forecasts for the Netherlands show that over the next few years replacement demand will be particularly high for intermediate electrical engineers, civil servants (public administration), student nurses and home nursing personnel, machinery mechanics and instrument makers, pastoral vocations and painters.

There are a large number of educational qualifications which offer good future labour market prospects for new entrants to the labour market. These are, by level of education:

Preparatory Vocational Education: Transport and harbour, Community care, hotel and catering.

Intermediate Vocational Education: Legal and fiscal, Micro-mechanical technology, Medical laboratory, Police, fire and defense, Transport and harbour, Printing technology, Textile and leather technology and Nursing and paramedical services.

Higher Vocational Education: Accounting, Commercial information science, Transport and harbour, Construction and civil engineering, Technical laboratory, Medical laboratory, Fine Arts, Legal and fiscal, Teacher training, Electronic and information technology, Nursing and paramedical services, Interpreter and translator, Mechanical engineering, Social and cultural and Police, fire and defense.

University Education: Civil engineering, Theology, Mathematics and natural sciences, Veterinary and medical sciences and dentistry, Electrical engineering and information technology, Economics, econometrics and business administration, Public administration, Information science, Social sciences, Pharmacy, Agriculture and environmental science and Mechanical engineering.

On the other hand there are some types of education which offer bad future labour market prospects for new entrants to the labour market:

Preparatory Vocational Education: Food trades and Commerce.

Intermediate Vocational Education: Tourism and recreation, Automobile technology and Social and cultural.

Higher Vocational Education: Commerce.

University Education: Fine Arts.

For more information see:

ROA, *The labour market by education and occupation to 2000*, ROA-R-1995/3E, Maastricht, 1995 (tel. + 31 43 3883751).

Appendix B Presentation of information of future job opportunities in the United Kingdom for the EURES system

South East/Greater London⁴²

Occupational specialization

The occupational profile of the South East/Greater London region, relative to the EU-average, shows that the following occupational groups are strongly over-represented: Other specialist managers; Mathematicians, statisticians and related professionals; Production and operations managers; Senior officials of special-interest organisations; Nursing and midwifery professionals; Travel attendants and related workers; Artistic, entertainment and sports associate professionals; Legislators and senior government officials; Optical and electronic equipment operators; Computing professionals; Library, mail and related clerks; Writers and creative or performing artists; College, university and higher education teaching professionals; Physicists, chemists and related professionals; Special education teaching professionals.

With respect to the number of workers the largest occupational groups are:

	Employed persons 1994
Other specialist managers	599,900
Production and operations managers	470,400
Secretaries and keyboard-operating clerks	371,900
Shop, stall and market salespersons etc	366,300
Other office clerks	274,600
Finance and sales associate professionals	265,600
Domestic and related helpers, cleaners etc	252,100
Personal care and related workers	238,400
Numerical clerks	233,600
Housekeeping and restaurant services workers	227,100

42. In the separately published Appendices of this report similar information is presented for the other 10 regions in the United Kingdom.

Forecasts

For the coming years, employment growth in the UK is expected to be highest in banking and business services, hotels and catering and the professional and other services. The *fast growing occupations* are expected to be:

	Annual growth %
Various professional occupations	5.2
Personal service occupations	3.6
Various associate professional occupations	3.2
Science and engineering professionals	2.4
Corporate managers and administrators	2.3

In the South East the expected average employment growth is slightly above the UK average, although in Greater London the expected increase of employment is slightly below the national average. In sectoral terms, annual employment growth in the South East/Greater London region is by far the highest in business and miscellaneous services (yearly 59,000 new jobs). On the other hand, employment in all manufacturing sectors will shrink. In occupational terms, the highest increase of employment is expected to be for the managers and administrators (yearly 44,000 new jobs), professional occupations (28,500 new jobs), associate professional and technical occupations (22,000 new jobs) and personal and protective services occupations (21,000 new jobs), while employment in clerical and secretarial occupations and for plant and machine operatives will be shrinking considerably.

The occupational employment forecasts indicate that people with managerial skills and other highly skilled workers will continue to enjoy good job opportunities in the near future. However, national forecasts for intermediate and higher skilled workers indicate substantial excess supply, in particular for teacher training and social sciences at postgraduate level, for first degree graduates in science, languages and music, and for technology and social science at intermediate level.

For more information see:

IER, *Review of the Economy and Employment, 1994: Regional Assessment*. Coventry, 1994: Institute for Employment Research, University of Warwick (tel. +44 1203 524127).

Appendix C Regional, Occupational and Economic sector classifications EUROSTAT

NUTS II Regions

Belgium

Vlaams Gewest
Région Wallone
Brussel

Germany

Schleswig-Holstein
Hamburg
Niedersachsen
Bremen
Nordrhein-Westfalen
Hessen
Rheinland-Pfalz
Baden-Württemberg
Bayern
Saarland
Berlin
Brandenburg
Mecklenburg-Vorpommern
Sachsen
Sachsen-Anhalt
Thüringen

Denmark

Denmark

Spain

Galicia
Asturias
Cantabria
País Vasco
Navarra
Rioja
Aragón
Madrid
Castilla-León
Castilla-La Mancha
Extremadura
Cataluña
Comunidad Valenciana
Baleares
Andalucía
Murcia
Ceuta y Melilla*
Canarias

France

Ile de France
Champagne-Ardenne
Picardie
Haute-Normandie
Centre
Basse-Normandie

Bourgogne
Nord-Pas-de-Calais
Lorraine
Alsace
France-Comté
Pays de la Loire
Bretagne
Poitou-Charentes*
Aquitaine*
Midi-Pyrénées
Limousin
Rhône-Alpes
Auvergne
Languedoc-Roussillon
Provence-Alpes-Côte d'Azur
Corse

Greece
Anatoliki Makedonia, Thraki
Kentriki Makedonia
Dytiki Makedonia
Thessalia
Ipeiros
Ionia Nisia
Dytiki Ellada
Stereia Ellada
Peloponnisos
Attiki
Voreio Aigaio
Notio Aigaio
Kriti

Ireland
East**
South West
South East
North East
Mid-West
North West and Donegal
Midlands
West

Italy
Piemonte
Valle d'Aosta
Liguria
Lombardia
Trentino-Alto Adige
Veneto
Friuli-Venezia Giulia
Emilia-Romagna
Toscana
Umbria
Marche
Lazio
Campania
Abruzzi
Molise
Puglia
Basilicata
Calabria

Sicilia
Sardegna

Luxembourg
Luxembourg

Netherlands
Groningen
Friesland
Drenthe
Overijssel
Gelderland
Flevoland
Utrecht
Noord-Holland
Zuid-Holland
Zeeland
Noord-Brabant
Limburg

Portugal
Norte
Centro
Lisboa e Vale do Tejo
Alentejo
Algarve
Açores
Madeira*

United Kingdom
North
Yorkshire and Humberside
East Midlands
East Anglia
South East
South West
West Midlands
North West
Wales
Scotland
Northern Ireland

* not distinguished in the EURES Database

** in the EURES Database this region is subdivided into three regions

Occupations, ISCO'88

1 Legislators, senior officials and managers

- 11 Legislators and senior officials
- 111 Legislators and senior government officials
- 114 Senior officials of special-interest organisations
- 12 Corporate managers
- 121 Directors and chief executives
- 122 Production and operations managers
- 123 Other specialist managers
- 13 Managers of small enterprises
- 131 Managers of small enterprises

2 Professionals

- 21 Physical, mathematical and engineering science professionals
- 211 Physicists, chemists and related professionals
- 212 Mathematicians, statisticians and related professionals
- 213 Computing professionals
- 214 Architects, engineers and related professionals
- 22 Life science and health professionals
- 221 Life science professionals
- 222 Health professionals (except nursing)
- 223 Nursing and midwifery professionals
- 23 Teaching professionals
- 231 College, university and higher education teaching professionals
- 232 Secondary education teaching professionals
- 233 Primary and pre-primary education teaching professionals
- 234 Special education teaching professionals
- 235 Other teaching professionals
- 24 Other professionals
- 241 Business professionals
- 242 Legal professionals
- 243 Archivists, librarians and related information professionals
- 244 Social science and related professionals
- 245 Writers and creative or performing artists
- 246 Religious professionals
- 247 Public service administrative professionals

3 Technicians and associate professionals

- 31 Physical and engineering science asso. professionals
- 311 Physical and engineering science technicians
- 312 Computer associate professionals
- 313 Optical and electronic equipment operators
- 314 Ship and aircraft controllers and technicians
- 315 Safety and quality inspectors
- 32 Life science and health associate professionals
- 321 Life science technicians and related associate professionals
- 322 Health associate professionals (except nursing)
- 323 Nursery and midwifery associate professionals
- 33 Teaching associate professionals
- 331 Primary education teaching associate professionals
- 332 Pre-primary education teaching associate professionals
- 333 Special education teaching associate professionals
- 334 Other teaching associate professionals
- 34 Other associate professionals
- 341 Finance and sales associate professionals
- 342 Business services agents and trade brokers
- 343 Administrative associate professionals

- 344 Customs, tax and related government associate professionals
- 345 Police inspectors and detectives
- 346 Social work associate professionals
- 347 Artistic, entertainment and sports associate professionals
- 348 Religious associate professionals

4 Clerks

- 41 Office clerks
- 411 Secretaries and keyboard-operating clerks
- 412 Numerical clerks
- 413 Material-recording and transport clerks
- 414 Library, mail and related clerks
- 419 Other office clerks
- 42 Customer services clerks
- 421 Cashiers, tellers and related clerks
- 422 Client information clerks

5 Service workers and shop and market sales workers

- 51 Personal and protective services workers
- 511 Travel attendants and related workers
- 512 Housekeeping and restaurant services workers
- 513 Personal care and related workers*
- 514 Other personal services workers
- 516 Protective services workers
- 52 Models, salespersons and demonstrators
- 521 Fashion and other models
- 522 Shop, stall and market salespersons etc

6 Skilled agricultural workers

- 61 Skilled agricultural and fishery workers
- 611 Market gardeners and crop growers
- 612 Animal producers and related workers
- 613 Crop and animal producers
- 614 Forestry and related workers
- 615 Fishery workers, hunters and trappers

7 Craft and related trades workers

- 71 Extraction and building trades workers
- 711 Miners, shotfirers, stone cutters and carvers
- 712 Building frame and related trades workers
- 713 Building finishers and related trades workers
- 714 Painters, building structure cleaners etc
- 72 Metal, machinery and related trades workers
- 721 Metal moulders, welders, sheet-metal workers, and related trades workers
- 722 Blacksmiths, tool-makers and related trades workers
- 723 Machinery mechanics and fitters
- 724 Electrical and electronic equipment mechanics etc
- 73 Precision, handicraft, craft printing and etc
- 731 Precision workers in metal and related materials
- 732 Potters, glass-makers and related trades workers
- 733 Handicraft workers in wood, textile, leather and related materials
- 734 Craft printing and related trades workers
- 74 Other craft and related trades workers
- 741 Food processing and related trades workers
- 742 Wood treaters, cabinet-makers and related trades workers
- 743 Textile, garment and related trades workers
- 744 Pelt, leather and shoemaking trades workers

8 Plant and machine operators and assemblers

- 81 Stationary-plant and related operators
- 811 Mining and mineral-processing-plant operators
- 812 Metal-processing plant operators
- 813 Glass, ceramics and related plant operators
- 814 Wood-processing- and papermaking-plant operators
- 815 Chemical-processing-plant operators
- 816 Power-production and related plant operators
- 817 Industrial robot operators
- 82 Machine operators and assemblers
- 821 Metal- and mineral-products machine operators
- 822 Chemical-products machine operators
- 823 Rubber- and plastic-products machine operators
- 824 Wood-products machine operators
- 825 Printing-, binding-, and paper-products etc
- 826 Textile-, fur- and leather-products machine operators
- 827 Food and related products machine operators
- 828 Assemblers
- 829 Other machine operators n.e.c.
- 83 Drivers and mobile plant operators
- 831 Locomotive engine drivers and related workers
- 832 Motor vehicle drivers
- 833 Agricultural and other mobile plant operators
- 834 Ships' deck crews and related workers

9 Elementary occupations

- 91 Sales and services
- 911 Street vendors and related workers
- 912 Shoe cleaning and other street services etc
- 913 Domestic and related helpers, cleaners etc
- 914 Building caretakers, window and related cleaners
- 915 Messengers, porters, doorkeepers etc
- 916 Garbage collectors and related labourers
- 92 Agricultural, fishery and related labourers
- 921 Agricultural, fishery and related labourers
- 93 Labourers in mining, construction, manuf. and trans.
- 931 Mining and construction labourers
- 932 Manufacturing labourers
- 933 Transport labourers and freight handlers

0 Armed forces

- 01 Armed forces
- 011 Armed forces

Economic sector, NACE rev. 1

A	Agriculture, hunting and forestry
B	Fishing
C	Mining and quarrying
D	Manufacturing
E	Electricity, gas and water supply
F	Construction
G	Wholesale and retail trade, repair
H	Hotels and restaurants
I	Transport, storage and communication
J	Financial intermediation
K	Real estate, renting and business activities
L	Public administration and defence etc
M	Education
N	Health and social work
O	Other community, social and personal service activities
P	Private households with employed persons
Q	Extra-territorial organizations and bodies

Appendix D IER's educational qualification

Table D.1

Levels of qualification distinguished by the IER

Level of qualification
<ul style="list-style-type: none">- Higher university degrees (postgraduate)- First degree and all other qualifications of equivalent standard- Qualifications obtained at 18 years of age or above, beyond 'A' level but below first degree. This includes most nursing and many teaching qualifications (intermediate)

Source: IER

Table D.2

Subjects of qualification distinguished by the IER

Subject of qualification
<ul style="list-style-type: none">- Education- Health, Medicine and Dentistry- Technology and Engineering- Agriculture, Forestry and Veterinary Studies- Science (including mathematics and applied science)- Social, Administrative and Business Studies (including accountancy and law)- Vocational (including Architecture and other professional studies)- Language (Literature and Area) Studies- Arts (other than Language and Performing Arts)- Music, Drama and Visual Arts

Source: IER

Appendix E Regional tables EU

Table E.1

Occupations with the largest number of employed persons by region and Member State of the European Union, 1994

Member State and region	Number of workers
PORTUGAL ⁴³	
<i>Norte</i>	
Managers of small enterprises	145,000
Textile, garment and related trades workers	137,200
Market gardeners and crop growers	115,200
Numerical clerks	74,400
Shop, stall and market salespersons etc	65,100
Building frame and related trades workers	64,800
Pelt, leather and shoemaking trades workers	53,500
Other personal services workers	50,500
Secondary education teaching professionals	43,500
Agricultural, fishery and related labourers	39,300
<i>Centro</i>	
Market gardeners and crop growers	136,400
Shop, stall and market salespersons etc	42,600
Other office clerks	36,200
Textile-, fur- and leather-product machine operators	32,400
Building frame and related trades workers	29,800
Managers of small enterprises	28,700
Housekeeping and restaurant services workers	25,400
Motor vehicle drivers	21,100
Domestic and related helpers, cleaners etc	21,000
Secondary education teaching professionals	19,800
<i>Lisboa e Vale do Tejo</i>	
Secretaries and keyboard-operating clerks	144,100
Managers of small enterprises	100,900
Shop, stall and market salespersons etc	78,300
Housekeeping and restaurant services workers	62,200
Domestic and related helpers, cleaners etc	55,800
Motor vehicle drivers	39,300
Secondary education teaching professionals	37,100
Numerical clerks	36,400
Administrative associate professionals	35,200
Building frame and related trades workers	33,500

43. In the separately published Appendices of this report similar regional information is presented for the other EU Member States.

Table E.1 (continued)

Occupations with the largest number of employed persons by region and Member State of the European Union, 1994

Member State and region	Number of workers
<i>Alentejo</i>	
Managers of small enterprises	16,900
Housekeeping and restaurant services workers	9,700
Agricultural, fishery and related labourers	9,500
Other personal services workers	9,400
Market gardeners and crop growers	8,800
Building frame and related trades workers	7,700
Shop, stall and market salespersons etc	7,400
Mining and construction labourers	7,300
Motor vehicle drivers	6,800
Numerical clerks	6,600
<i>Algarve</i>	
Managers of small enterprises	16,200
Housekeeping and restaurant services workers	10,100
Shop, stall and market salespersons etc	9,200
Market gardeners and crop growers	7,800
Numerical clerks	6,900
Building frame and related trades workers	6,200
Other personal services workers	6,000
Fishery workers, hunters and trappers	3,500
Personal care and related workers	3,500
Domestic and related helpers, cleaners etc	3,400
<i>Acores</i>	
Building frame and related trades workers	8,300
Animal producers and related workers	7,500
Shop, stall and market salespersons etc	5,000
Managers of small enterprises	4,200
Other personal services workers	3,800
Market gardeners and crop growers	3,700
Motor vehicle drivers	3,200
Food processing and related trades workers	3,000
Secretaries and keyboard-operating clerks	2,500
Numerical clerks	2,400
<i>Madeira</i>	
Textile, garment and related trades workers	13,500
Market gardeners and crop growers	10,600
Housekeeping and restaurant services workers	6,400
Mining and construction labourers	6,100
Domestic and related helpers, cleaners etc	5,600
Shop, stall and market salespersons etc	4,600
Building frame and related trades workers	4,400
Motor vehicle drivers	3,700
Other personal services workers	3,400
Managers of small enterprises	3,200

Source: EUROSTAT, LFS

Table E.2
Number of workers per occupation at 1 digit level by region, 1994

Member State and Region	Number of workers
GERMANY⁴⁴	
<i>Schleswig-Holstein</i>	
Technicians and associate professionals	301,600
Craft and related trades workers	204,000
Service workers and shop and market sales workers	133,600
Clerks	125,500
Elementary occupations	115,600
Professionals	112,600
Plant and machine operators and assemblers	83,400
Legislators, senior officials and managers	56,800
Skilled agricultural and fishery workers	46,000
Armed forces	23,900
<i>Hamburg</i>	
Technicians and associate professionals	166,600
Clerks	131,300
Professionals	117,200
Elementary occupations	92,700
Craft and related trades workers	91,500
Service workers and shop and market sales workers	75,100
Legislators, senior officials and managers	47,900
Plant and machine operators and assemblers	45,300
Skilled agricultural and fishery workers	8,200
Armed forces	4,300
<i>Niedersachsen</i>	
Craft and related trades workers	603,000
Technicians and associate professionals	586,100
Clerks	445,300
Elementary occupations	400,400
Service workers and shop and market sales workers	375,800
Professionals	348,000
Plant and machine operators and assemblers	236,800
Legislators, senior officials and managers	178,100
Skilled agricultural and fishery workers	99,000
Armed forces	34,200
<i>Bremen</i>	
Technicians and associate professionals	50,100
Craft and related trades workers	50,000
Clerks	46,200
Professionals	35,800
Elementary occupations	30,100
Service workers and shop and market sales workers	29,900
Plant and machine operators and assemblers	19,900
Legislators, senior officials and managers	14,100
Armed forces	3,400
Skilled agricultural and fishery workers	2,700

44. In the separately published Appendices of this report similar regional information is presented for the other EU Member States.

Table E.2 (continued)
Number of workers per occupation at 1 digit level by region, 1994

Member State and Region	Number of workers
<i>Nordrhein-Westfalen</i>	
Craft and related trades workers	1,327,400
Technicians and associate professionals	1,326,600
Clerks	1,085,700
Elementary occupations	824,000
Professionals	812,100
Service workers and shop and market sales workers	771,700
Plant and machine operators and assemblers	578,700
Legislators, senior officials and managers	424,200
Skilled agricultural and fishery workers	116,700
Armed forces	47,100
<i>Hessen</i>	
Technicians and associate professionals	529,200
Craft and related trades workers	424,800
Clerks	418,900
Professionals	327,600
Elementary occupations	285,300
Service workers and shop and market sales workers	263,800
Legislators, senior officials and managers	166,300
Plant and machine operators and assemblers	164,800
Skilled agricultural and fishery workers	45,300
Armed forces	14,300
<i>Rheinland-Pfalz</i>	
Technicians and associate professionals	343,300
Craft and related trades workers	320,800
Clerks	231,300
Service workers and shop and market sales workers	187,300
Plant and machine operators and assemblers	168,100
Professionals	167,300
Elementary occupations	127,200
Legislators, senior officials and managers	75,300
Skilled agricultural and fishery workers	45,400
Armed forces	15,000
<i>Baden-Wurtemberg</i>	
Craft and related trades workers	957,900
Technicians and associate professionals	855,300
Clerks	666,900
Professionals	525,900
Elementary occupations	514,200
Service workers and shop and market sales workers	440,600
Plant and machine operators and assemblers	333,400
Legislators, senior officials and managers	251,300
Skilled agricultural and fishery workers	93,300
Armed forces	13,400

Source: EUROSTAT, LFS

Table E.3
Regional occupational specialization of the EU regions, 1994

Member State, region and occupation	specialization-index
SPAIN⁴⁵	
<i>Galicia</i>	
Fishery workers, hunters and trappers	26.0
Animal producers and related workers	12.7
Crop and animal producers	11.4
Ships deck crews and related workers	7.6
Managers of small enterprises	2.9
Market gardeners and crop growers	2.8
Miners, shotfirers, stone cutters and carvers	2.5
Mining and construction labourers	2.2
Building frame and related trades workers	2.1
<i>Asturias</i>	
Animal producers and related workers	18.5
Miners, shotfirers, stone cutters and carvers	9.7
Metal-processing plant operators	9.2
Primary and pre-primary education teaching prof.	2.8
Mining and construction labourers	2.6
Managers of small enterprises	2.1
<i>Cantabria</i>	
Animal producers and related workers	12.7
Fishery workers, hunters and trappers	12.5
Mining and construction labourers	3.1
Primary and pre-primary education teaching prof.	3.1
Managers of small enterprises	2.8
Metal- and mineral-product machine operators	2.8
Motor vehicle drivers	2.2
Food processing and related trades workers	2.2
<i>Pais Vasco</i>	
Rubber- and plastics-products machine operators	7.1
Metal- and mineral-product machine operators	6.5
Metal-processing plant operators	4.1
Fishery workers, hunters and trappers	4.1
Forestry and related workers	3.3
Chemical-products machine operators	2.7
Primary and pre-primary education teaching prof.	2.5
Other teaching professionals	2.2
Garbage collectors and related labourers	2.1
Physicists, chemists and related professionals	2.1
Travel attendants and related workers	2.1
<i>Navarra</i>	
Assemblers	4.8
Food and related products machine operators	3.5
Food processing and related trades workers	3.3
Primary and pre-primary education teaching prof.	2.8
Mining and construction labourers	2.5
Textile-, fur- and leather-product machine operators	2.4

45. In the separately published Appendices of this report similar regional information is presented for the other EU Member States.

Table E.3 (continued)
Regional occupational specialization of the EU regions, 1994

Member State, region and occupation	specialization-index
<i>Rioja</i>	
Textile-, fur- and leather-product machine operators	6.9
Market gardeners and crop growers	3.9
Food processing and related trades workers	3.2
Primary and pre-primary education teaching prof.	2.7
Managers of small enterprises	2.4
<i>Aragon</i>	
Mining and construction labourers	3.3
Assemblers	3.1
Rubber- and plastics-products machine operators	2.9
Market gardeners and crop growers	2.9
Metal- and mineral-product machine operators	2.8
Textile-, fur- and leather-product machine operators	2.5
Agricultural, fishery and related labourers	2.4
Animal producers and related workers	2.4
Primary and pre-primary education teaching prof.	2.3
Building caretakers, window and related cleaners	2.2
Managers of small enterprises	2.1
<i>Madrid</i>	
Fashion and other models	14.2
Special education teaching professionals	3.2
Mining and mineral-processing-plant operators	3.0
Secretaries and keyboard-operating clerks	2.9
Legal professionals	2.6
Physicists, chemists and related professionals	2.5
Messengers, porters, doorkeepers etc	2.3
Craft printing and related trades workers	2.3
Social science and related professionals	2.2
Street vendors and related workers	2.1
Garbage collectors and related labourers	2.1
<i>Castilla-Leon</i>	
Industrial robot operators	16.8
Miners, shotfirers, stone cutters and carvers	6.6
Animal producers and related workers	5.3
Crop and animal producers	3.9
Mining and construction labourers	3.3
Forestry and related workers	3.3
Market gardeners and crop growers	3.1
Managers of small enterprises	2.7
Rubber- and plastics-products machine operators	2.6
Food processing and related trades workers	2.5
Wood-processing- and papermaking-plant operators	2.2

Table E.3 (continued)
Regional occupational specialization of the EU regions, 1994

Member State, region and occupation	specialization-index
<i>Castilla-La Mancha</i>	
Textile-, fur- and leather-product machine operators	5.5
Mining and construction labourers	4.3
Market gardeners and crop growers	4.1
Animal producers and related workers	3.3
Managers of small enterprises	2.9
Food processing and related trades workers	2.7
Street vendors and related workers	2.4
Agricultural, fishery and related labourers	2.4
Agricultural and other mobile plant operators	2.3
Building frame and related trades workers	2.3
Primary and pre-primary education teaching prof.	2.2
<i>Extremadura</i>	
Mining and construction labourers	7.8
Agricultural, fishery and related labourers	4.9
Animal producers and related workers	4.7
Market gardeners and crop growers	4.2
Managers of small enterprises	2.6
Primary and pre-primary education teaching prof.	2.6
<i>Cataluna</i>	
Fashion and other models	10.1
Manufacturing labourers	2.9
Special education teaching professionals	2.8
Rubber- and plastics-products machine operators	2.7
Textile-, fur- and leather-product machine operators	2.4
Chemical-products machine operators	2.2
<i>Cummunidad Valenciana</i>	
Glass, ceramics and related plant operators	11.7
Pelt, leather and shoemaking trades workers	6.6
Textile-, fur- and leather-product machine operators	6.1
Potters, glass-makers and related trades workers	3.8
Wood-products machine operators	2.9
Agricultural, fishery and related labourers	2.6
Rubber- and plastics-products machine operators	2.5
Manufacturing labourers	2.5
Managers of small enterprises	2.4
Street vendors and related workers	2.4
Chemical-products machine operators	2.3
<i>Baleares</i>	
Pelt, leather and shoemaking trades workers	4.8
Client information clerks	3.8
Housekeeping and restaurant services workers	3.2
Managers of small enterprises	2.8
Domestic and related helpers, cleaners etc	2.5
Wood treaters, cabinet-makers etc	2.4
Food processing and related trades workers	2.2

Table E.3 (continued)
Regional occupational specialization of the EU regions, 1994

Member State, region and occupation	specialization-index
<i>Andalucia</i>	
Agricultural, fishery and related labourers	7.4
Street vendors and related workers	4.3
Fishery workers, hunters and trappers	3.6
Mining and construction labourers	3.5
Garbage collectors and related labourers	3.3
Primary and pre-primary education teaching prof.	2.8
Forestry and related workers	2.6
Managers of small enterprises	2.6
Special education teaching professionals	2.5
Domestic and related helpers, cleaners etc	2.1
<i>Murcia</i>	
Agricultural, fishery and related labourers	6.2
Fishery workers, hunters and trappers	4.6
Street vendors and related workers	3.8
Food processing and related trades workers	3.2
Wood treaters, cabinet-makers etc	3.0
Mining and construction labourers	2.9
Managers of small enterprises	2.5
Market gardeners and crop growers	2.3
Pelt, leather and shoemaking trades workers	2.3
Manufacturing labourers	2.1
<i>Ceuta y Melilla</i>	
Protective services workers	6.0
Managers of small enterprises	4.8
<i>Canarias</i>	
Street vendors and related workers	4.3
Primary and pre-primary education teaching prof.	4.0
Mining and construction labourers	3.6
Housekeeping and restaurant services workers	2.8
Domestic and related helpers, cleaners etc	2.3
Managers of small enterprises	2.2
Motor vehicle drivers	2.1