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INTERNAL MIGRATION COMPONENT IN SUBNATIONAL POPULATION PROJECTIONS IN MEMBER STATES OF THE EUROPEAN UNION

Marek Kupiszewski
Dorota Kupiszewska

ul. Twarda 51/55, 00-818 Warsaw, Poland
tel. +48 22 697 88 34, fax +48 22 697 88 43
e-mail: cefmr@cefmr.pan.pl
Internet: www.cefmr.pan.pl

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INTERNAL MIGRATION COMPONENT IN SUBNATIONAL POPULATION PROJECTIONS IN MEMBER STATES OF THE EUROPEAN UNION

Marek Kupiszewski[*]
Dorota Kupiszewska[*]

[*] Central European Forum for Migration Research in Warsaw

Abstract: The main aim of this paper has been to present how the internal migration component has been treated in subnational population forecasts in EU member states. A comparative overview of the basic features of methodologies used for dealing with internal migration has been provided, based on a survey conducted in the national statistical offices in the EU 15. Among others, the use of non-demographic variables as well as characteristics of migration scenarios (status quo, trend etc.) have been investigated. Availability of movement and transition data have been briefly presented. The information collected through the survey has been summarized in a series of tables. The questionnaire template, list of publications of the results of official forecasts and contact details of persons responsible for projections and relevant data in the national statistical offices have been appended at the end of the paper.

Keywords: internal migration, subnational population forecasts, subnational population projections, European Union

This paper constitutes a part of the *Study of Past and Future Interregional Migration Trends and Patterns within EU Countries – In Search for a Generally Applicable Explanatory Model*, prepared in reply to Invitation to tender No: 2002/S 67-052015/EN; Lot 5.

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Editor
ul. Twarda 51/55, 00-818 Warsaw, Poland
tel. +48 22 697 88 34, fax +48 22 697 88 43
e-mail: cefmr@cefmr.pan.pl
Internet: www.cefmr.pan.pl

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Contents

1. Introduction

This paper constitutes a part of the ***Study of Past and Future Interregional Migration Trends and Patterns within EU Countries – In Search for a Generally Applicable Explanatory Model*** commissioned by the European Commission and Eurostat to a consortium of research institutions lead by NIDI in reply to Invitation to tender No: 2002/S 67-052015/EN; Lot 5.

The main aim of this paper has been to present how the internal migration component has been treated in subnational population forecasts in EU member states and to draw some lessons for population forecasts for the EU from the models designed by the national statistical offices. In order to assemble the information required we have asked national forecasters in twelve countries of the EU (all except Denmark, Ireland and Luxembourg) to fill in a questionnaire describing how subnational projections are prepared in their countries. Nicole van der Gaag, Phil Rees and Leo van Wissen offered us many suggestions, very helpful in preparation of the questionnaire. We have received replies from officials from national statistical offices and experts from Austria (Alexander Hanika), Belgium (Leila Bellamammer, Micheline Lambrecht, Michel Poulain, André Doneux), England (Martin Stringfellow), Finland (Honkanen Ossi), Germany (Hansjoerg Bucher), Italy (Marco Marsili), Portugal (Maria Jose Carillho), Scotland (Claire Boag), Spain (Margarita Cantalapiedra and Arlina Garcia Coll), Sweden (Mats Johanson, Sverker Lindbad, Ake Nilsson) and Wales (Clive Lewis and Rhiannon Davies). In addition, we have obtained a questionnaire describing the projection for Flanders, the Dutch speaking part of Belgium (Paul Willems). Greece reported that they do not prepare projections on subnational level. France did not reply to our queries, however French demographers sent us some information on the model used. Leo van Wissen kindly filled in the questionnaire for Netherlands. Altogether we have received thirteen questionnaires from ten countries (England, Wales and Scotland use different models and Flanders sets up its own projection). To some surprise, none of some dozen academics known to work on population projections and enquired on the results of the forecasts they have made, admitted to conduct subnational projections. This is difficult to interpret, given that there is a large number of unsolved research problems in subnational population forecasting.

In order to maintain backwards comparability, this report uses to some extent the format of *Regional population projections in the countries of the European Economic Area* by van der Gaag, van Imhoff and van Wissen (1997) which is an update of a book by van Imhoff, van Wissen, and Spieß (1994). However, as this report focuses on the issue of internal migration in subnational projections rather than on all the aspects of projections, its structure has been accordingly modified.

The report contains appendices with the questionnaire template, the list of publications on subnational population projections, persons responsible for subnational population projections, stocks of population, census data, internal migration hypothesis and internal and international migration data.

2. General characteristics of subnational population projections in European Union member states

This section of the paper describes the general characteristics of the subnational population projections in the European Union countries. These characteristics have been assembled in Table 1, which serves as the basis of all the analysis in this section, but has not been referred to explicitly.

The methodology used in most cases is based on the cohort-component method. Four countries declare the use of a cohort-component model and another three use a multiregional cohort-component model. Other countries created more complex methodologies, sometimes incorporating additional variables. Probably the most complex is the Dutch model, which uses multiregional cohort component "engine", but controls its parameters with a number of external variables, such as: labour market, school-supply, housing market, distances.

The majority of the projections are labelled by national statistical offices as forecasts. Only the projection for Flanders is supposed to be a more analytical, what-if type of exercise. English, Scottish and Welsh projections are named as "trend-based projection, made on the assumption that no significant change in trends occurs".

Most projections are fairly recent, based on the benchmark population in 2000 or later. Germany, Wales and Portugal use slightly older benchmark populations (1999, 1998 and 1995 respectively). The periods for which projections are made vary substantially, from ten years for Flanders to fifty years for Austria, Belgium, and Italy. Only Austria produces the subnational projections every year. The Netherlands and Scotland produces them every second year and the rest of the countries in intervals from three to five years, in some cases when the need arises.

Geographies used for subnational projections vary substantially, from very small units, as 448 communes in Finland, 308 municipalities in Flanders and 1000 in the Netherlands. Spain, Portugal and Italy use the NUTS2 regional division (18, 7 and 20 regions, respectively). Spain uses also the NUTS 3 regional division, for which only estimated figures are available. As expected, the geographies used are mostly determined by local requirements (labour markets, migration zones).

Even this short and simple description shows a substantial diversification in the ways subnational population projections are made.

3. Data used in subnational projections in EU member states

3.1. Stocks of population

A concise description of benchmark populations used in subnational projections in the EU countries is contained in Table 2. Almost uniformly, population registers serve as the data source. All countries except Portugal use single year age groups, what, one may expect, is consistent with the expectation of users of population projections on the subnational level. Germany estimates single year age groups based on five year regional populations and national single year age groups. Population ageing and increasingly large cohorts of old and very old have resulted in five countries extending the age classification to 100 or more years. Three countries – Portugal, England and Wales - use the oldest age group younger than 90 years. Belgium uses the age of 105 as the oldest age group. In all projections population is divided by gender.

Few countries reported how special populations: prisoners, armed forces and students are treated in the projections. Spain allocates them to permanent places of residence. Sweden does not disclose what they do with the prison population and allocates the students to their places of study. In the Netherlands the prisoners are registered under the home address if the sentence is for less than 1 year and at the institution's address if imprisonment is longer; Armed forces are registered at home address and student population according to where they are registered in the Municipal Basic Registration (MBR). In Belgium, which prepared the projection for benchmark population of 1.1.2000, the stock of population has been increased by the number of persons without papers that might have been regularised on 31.12.2000 and 31.12.2001.

3.2. Fertility and mortality

Main characteristics of data on fertility used in population forecasts in the EU are shown in Table 3. Table 4 presents similar information for the mortality variable. The most popular measure of fertility in subnational population projections are age specific fertility rates. In Italy and in the Netherlands the birth parity dimension is added. Scotland uses rates based on an average completed family size for successive generations of women. Rates are estimated for single year age groups in all countries except Portugal. Spatial division for which fertility data have been collected goes generally in line with the division for which data on population stocks have been assembled, but in some cases certain estimations have been made, using both national and sub-national data. All countries use time series to determine the characteristics of fertility, however the length of period for which time series are constructed vary substantially from three (Finland and Scotland) to 49 years (Italy).

Age specific mortality rates are widely used for the measurement of mortality, but some countries adopted varied measures, for example probabilities (Austria) or used life tables (Italy). In most cases rates have been calculated for single year age groups, but Portugal and Germany use five year age groups, calculating separately infant mortality rates. In line with the practice of calculating other variables, the oldest age group reaches in most countries over 90 years. Similarly to the fertility, mortality is estimated based on time series.

3.3. Migration

3.3.1. Internal migration

The characteristics of internal migration data are shown in Table 5. The strategies adopted by forecasters to model migration flows show a marked transition towards an information-rich environment. In most cases a full matrix of flows has been used, what was indispensable for classical multiregional forecasting model (Rogers 1995). Some countries which use a pool model for migration (Sweden, Spain) rely on data on departures and arrivals. In the case of Scotland, no intra-Scottish migration data are used, all migration flows are external. The Flemish model uses net migration only. Migration data are often available either in five year age groups or in some other aggregations, and estimates are made for single year age groups to meet the requirements of the models, which in most cases operate on single year age groups. Widespread is the use of time series for the estimation of model parameters (from three to nine years). The nature and scope of data on internal migration available in Europe has been widely discussed in Rees and Kupiszewski (1999).

All countries with the exception of Germany, Belgium and the Netherlands use purely demographic models. The Dutch model uses non-demographic variables to control internal (inmigration and outmigration) and international migration (immigration only). Three groups of variables are used: variables depicting changes in the housing market, variables related to the labour market and schooling variables. The former are represented by additions and removals of housing stock, vacancies of housing created through moving households, supply-demand, and prices of housing and housing types (rental, owner occupied; single unit-flat). The following labour market variables are used: vacancies and job-seekers per region (NUTS 3); labour force participation rates and projection based exogenous economic scenarios; variables describing the trade off between commuting and migration (distance dependent) and variables describing the trade off for unemployed between staying unemployed and local demand for labour. Variables characterising the educational system are: higher education schooling facilities by region, forecasts of inflow into higher education by age, sex and municipality and historical flow patterns. Distance between regions is used as a geographical interaction-decay variable.

The German model has a distinct geographic flavour, as it looks at the saturation of the process of urbanization in former East Germany and also considers the consequences of the liberalization of the labour market in Germany for the citizens of accession countries.

3.3.2. International migration

Table 6 contains main characteristics of the data on international migration used in subnational population projections. There is a considerable variety, both in terms of what has been measured and how it has been done. Sweden assumed that there was no

international migration, Flemish and Scottish forecasters amalgamated migration external to their spatial systems: both internal (from the rest of Belgium and the rest of the UK respectively) and international, into one variable. Spain assumes there is no international emigration and accounts for international immigration only.

In terms of measurement, a typical solution is to use emigration rates and immigration numbers. Such a solution is justified by difficulties in estimation of properly defined rates for the migration from the "rest of the World" to a given country. The problem arises due to the difficulties in the reasonably accurate estimation of the at risk population in the "rest of the Word". For the immigration numbers various regional distribution mechanisms are devised.

It should be noted[1] that definitions of international migration and migrant are internationally incomparable, what makes it difficult to directly compare the results of forecasts of the international migration component of population change. In Germany, in the case of immigration, a migrant is every person who arrived from abroad and lived in his own or rented accommodation. The criterion in the case of emigration is the fact of leaving one's accommodation in addition to leaving the country (Langevin and Begeot 1991). The definition of migration reported by Langevin and Begeot is the widest possible. No other European country uses a definition so broad and so general. The problem of comparability of definitions has a much wider range. In the European Union, each country defines international migration depending on its legal regulations and the needs of administrative authorities. A comparison of criteria used in the countries of the EU has been prepared by Langevin and Begeot (1991), for the EFTA countries by Poulain and Gisser (1992), whereas Salt et al. (1994) included the whole of Europe in their survey. This last study contains, as pointed out by Okólski (1996), a lot of mistakes. Langevin and Begeot (1991) have shown that only three countries of the EU, of the then twelve (Belgium, Italy and Luxembourg), have comparable definitions. The administrative procedures used in practice only enlarge these differences. A harmonisation of international migration statistics proposed ten years ago (Poulain et al. 1991) has not been accepted yet. There have been efforts to replace the harmonisation of definitions by mathematical methods (Poulain 1993), but this technique has its own considerable limitations.

The above deliberations have far-reaching practical consequences. First of all, as has already been mentioned, there is no sense in presenting immigration and emigration forecasts if we do not simultaneously specify what definition of emigration or immigration has been adopted. This point especially refers to forecasts concerning groups of countries because of the varied definitions in different countries. In practice, one accepts that forecast flows are defined by the state statistics. This is because the data used in the calibration of the model usually come from official statistics. However, if the model is calibrated based on data collected on the basis of various definitions, which often takes place, it is sometimes difficult to assess what is really forecasted.

[1] This and the next paragraph is based on Kupiszewski (2002).

3.4. Other demographic variables

The use of other demographic variables is not very widespread and mostly limited to nationality and ethnicity. Italy uses division by citizenship (Italian/non-Italian) to define the stocks of immigrants from abroad. Belgium uses nationality (Belgian, other EU members, others) as well as probability to get the Belgian nationality as a measure of the naturalization processes. The Netherlands uses for immigration: ethnicity, based on country of birth with eight categories: 1. Netherlands, 2. Antilles and Aruba, 3. Suriname, 4. EER, 5. Turkey, 6. Morocco, 7. Other European + Asia + Africa and 8. Other non-European.

The Netherlands, which uses a complex model forecasting the household structure and population structure applies a classification by position in the household using the following classes: 1. Child at home, 2. Single, 3. Cohabiting no child, 4. Cohabiting with child(ren), 5. Single parent household, 6. Institutional households.

The disaggregation of population stocks into multistate subpopulations predetermines the disaggregation of the projected populations.

3.5. Non-demographic explanatory variables used in subnational projection in EU member states

The Dutch model uses a number of explanatory variables to control both internal and international migration. The variables characterising housing market, such as construction and demolition of housing stock, vacancies created through moving households, supply-demand ratios, housing types (rental, owner occupied; single unit-flat), price as well as distance between regions are used to model internal in-migration and international immigration.

Labour market variables, such as vacancies and job-seekers per region (NUTS 3), participation rates and projections based on exogenous economic scenarios, distance dependent parameters describing the trade off between commuting and migration, parameters describing the trade off for unemployed between staying unemployed and local demand for labour and distance between regions, are used to control internal in- and out-migration and international immigration.

In addition, migration flows are controlled by schooling variables, namely higher education schooling facilities by region, inflow into higher education forecasts by age, sex and municipality, historical flow patterns and distance between regions.

Doubtless the Dutch model puts a lot more emphasis on explanation of in-migration and immigration than out-migration. However in general non-demographic variables are not used by European forecasters, who strongly stick to traditional purely demographic models.

4. Migration assumptions

4.1. Internal migration

There is a considerable variability in the internal migration scenarios (see Table 7). Austrian, Belgian, one of the variants of Finnish and Swedish projections and the main variant of the Italian projections assume no change in migration intensities (constant age-specific migration rates were assumed). Trend extrapolation is used in Flanders and in Germany till 2005. In other cases a variety of changes are simulated: In Flanders net rates are linearly halved over the period 2000 - 2010. In Germany a set of factors, such as the saturation of the suburbanization in the East Germany and a balance in East to West Germany migration is taken into account. Italian forecasters assume ±5% variation in certain elements of the OD matrix.

Belgium and the Netherlands use non-demographic variables in setting up internal migration hypothesis. The Netherlands uses regional economic growth variables, regional labour markets variables and housing markets variables as well as regional housing policies. In all countries but Spain and England a bottom-up approach (migration assumptions are formulated for the smallest spatial units and aggregated for larger units and entire country) in setting the internal migration hypothesis has been adopted. In Belgium and Germany spatial aggregations have been made. Apart from the age and sex variables, in Belgium separate assumptions have been adopted according to nationality and in the Netherlands for institutional migration of elderly and students. In Belgium hypothesis is set up on the flows between three categories of regions: urban, periurban and others.

4.2. International migration

The characteristics of assumptions on international migration is presented in Table 8. It should be noted that none of the countries assumes that there is no international migration. That is a substantial change in comparison to the practice from 1970s or even 1980s. The predominant strategy in forecasting international migration is to set up time-varying totals. This is done either for both inflows and outflows or net migration only. Germany determines the size of the inflow based on the assumption that the enlargement of the European Union will generate an additional inflow to Germany. No other country takes the enlargement into account. The Italian forecast assumes that the probabilities of migration are kept constant until 2050 at values estimated for 1997-1999. In consequence flows will vary over time depending on the size and structure of regional populations.

Different techniques are used for the distribution of immigrants to regions and recruitment of emigrants from regions. Some countries distribute international migrants relating the regional shares to existing stocks of foreign populations in regions (Austria, Italy), labour markets (Austria), internal migration (Germany, indirectly the Netherlands). The Netherlands uses a complex system of allocation of international migrants based on housing stock variable and historical time series. Interestingly, there is no technique or variable determining the allocation of international migrants that would be used by a significant number of countries.

5. Data on internal migration on NUTS 2 level in member states of the European Union

5.1. Two types of migration data

It is important to make a distinction between various types of migration data. Figures typically derived from the records of population registers refer to all changes of address, sometimes conditional on crossing an administrative boundary. That means that all *events* (migration) are recorded and one may experience more than one *event* in a given period of time. If a migrant makes several migrations over a period of measurement each of them will count separately. The death of a migrant has no influence on the migration count if his migration(s) took place between the start of a period and the time of death. If a migrant was born in the middle of a period of measurement and subsequently migrated, his migration will count as well. Return migration will count as two independent migrations. Registration is the most exact form of gathering data on migration. Later on we will refer to this data as to movement data.

The transition type of data on migration is obtained by comparing places of residence in two points in time. This information is often collected during censuses of population by asking a question on the place of residence either at a specific date e.g. at the time of previous census or some (often one or five) years ago. This allows for cross-tabulation of places of residence at the beginning and at the end of the period specified in the question. It captures the aggregated result of all migrations of an *individual* over a period of time, irrespective of the actual number of migration (*events*). It does not capture return migration at all (from *i* to *j* and then from *j* to *i*) if they occurred over the period covered in the question asked. Neither the information on mobility of persons who had migrated and subsequently died over this period is available. Migration of children who had been born and migrated during the period of measurement are accounted for. During census tabulation his/her place of residence at the start of the period of measurement is frequently assumed to be the place of birth. Multiple migration are not accounted for and are only represented as a transition resulted from the sum of migrations of an individual.

The difference between the two types of data has been known for long (Courgeau 1973a, Rees 1977, Rees, Willekens 1986). Unlike the movement approach in which the migration events are counted, the transition approach counts migrants – persons who migrated in a given period and survived on a given territory till the end of the period. The longer the period of measurement the larger the difference as more multiple and return migrations (events) are ignored in comparison to the movement approach. The relation between one year and five year migration data have been discussed in general terms by Kitsul and Philipov (1981).

Understanding the differences between the two types of data is very important when making population forecasts as they impose different measures of migration intensity and, in consequence, different formulations of population dynamics models (Woods, Rees 1986). In the review of the data available we did not examine the availability of other types of migration data, such as results of cross-tabulating the place of enumeration with the place of birth or previous place of residence because they do not allow for capturing the mobility over a specific period of time.

5.2. Movement data availability

The definitions used in EU countries have been tabulated in Table 9. They refer to the data immediately available rather than to data available in principle (Rees, Kupiszewski 1999). The majority of countries use registration (movement) data. Portugal and the UK use census data (transition approach). The UK statistics uses simultaneously data from the NHS Central Register. In order for migration to be counted usually the migrant has to cross an administrative boundary of a municipality. In some countries, as for example in the Netherlands or Sweden, the requirement is much weaker: a change of address is enough to count the migration. Mostly there is no requirement to stay in a destination for a specific period of time.

Full flow matrices are available in eight countries listed in Table 10, however the age and sex details availability vary. Belgium does not collect any age details, Germany and the Netherlands collect data in broad age groups and the rest of the countries: Austria, Finland, Italy, Spain and Sweden collect data in single year age groups. These countries collect data up to 95 or even 100 years of age. The length of time series available vary substantially from the period from 1952 till 1999 in the case of Belgium to a relatively short period from 1996 till 2002 in Austria, who previously relied on census data. The UK is able to estimate full flow matrices. Germany has the data available since the unification that is from 1991 onwards.

Data on arrivals and departures (Table 11) as well as on net migration and total number of migrants may be aggregated from the full flow matrix, it is therefore justified to look at the additional information available for these aggregations that are not available for full flow matrices. In fact such added dimension is available only in Belgium, which collects, since 1989, data on the age structure of migrants in 5 year age groups, with the oldest age group 100+.

Apparently, except for some countries which have chosen to base their population statistics on censuses, there is a very good provision of detailed movement data with almost universal availability of ODSA matrices in the last decade.

5.3. Transition data availability

The countries which collect transition data can be divided into two categories. The first one comprises countries that either do not maintain population registers or do not use these registers for statistical purposes: France, Portugal and the UK. In the latter, however, data from health administration is available and supplements the census data. The second category comprises countries which collect both registration and census data: Austria and Italy.

Typically, the so called 1-year or 5-year questions are asked during the census. These questions are usually formulated: What was your usual place of residence one year ago/ five years ago? The 5-year question was asked in Austrian and Italian Censuses, other countries use 1-year question (Table 12). The Netherlands uses the 2-year question in the periodic housing survey.

Predominantly, transition data come from censuses. Only data from this source are analyzed in this section (Table 12). Four countries have a full flow matrix: Austia, Italy, the Netherlands and the UK. Data for departures and arrivals are available for the same countries. In theory, transition data may be also derived from labour force surveys. Surprisingly, this is not a popular option. It is unclear whether it is due to lack of reporting from national statistical offices or due to lack of interest in this type of data.

Apparently, transition data are much less abundant than movement data and, in the case of Austria, the Netherlands and Italy, are collected in parallel to movement data. It seems the main body of information on migration comes from registration, and censuses play only a minor role. They may be, however, very useful in obtaining information not routinely collected by registration.

6. Conclusions

The cohort component method and in particular its more refined variant - multireginal or multistate models dominate the field of subregional forecasting. Modelling and forecasting components of change is much less uniform. This is particularly true for the modelling of migration. It is also very characteristic that the use of non-demographic variables, especially for the allocation of migrants is not widespread, except for the Dutch model, which is based on a complex and sophisticated system of interactions between migration and a variety of housing and social variables.

If we divide all countries along two dimensions: 1) the type of variables used (demographic versus demographic + non-demographic variables), and 2) the character of scenarios (no assumptions and status quo versus explicit assumptions) we will arrive at a simple classification. The Netherlands would be the only country which both uses non-demographic variables and sets up non-trivial migration scenarios. Germany could be counted among countries which use non-demographic variables and makes only simple trend-based migration assumptions. Belgium also uses non-demographic variables in setting internal migration asumptions and sets up a status quo scenario for flows between various categories of regions. However, the use of non-demographic variables is limited to the internal migration scenarios part of the model. Two other classes in which only demographic variables are being used have roughly speaking similar number of entries for both the lack of migration scenarios cell (status quo assumption or no migration assumption - Austria, Belgium, Finland, UK, one variant in Italy and Sweden) and for the migration scenarios cell (Belgium-Flandres, Spain, Sweden, low and high variants in Italy). It should be, however, noted that even if some scenario is adopted, it is rather simple. The most important conclusion drawn from this study is that forecasters use very simple techniques of setting internal migration hypothesis. These techniques, except very few examples, may be defined as status quo projection, no migration projection and linear trend projection. It is a good news and a bad news. The good news is that there is plenty of room for improvement of internal migration forecasting. The bad news is that, despite abundant literature on causes and factors of internal migration, there is quite little expertise accumulated in the European forecasting community, which means that little experience–based input to such forecasting could be gathered locally.

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Tables and Appendices

Table 1: General information on the most recent subnational population projections: date, geography, period covered, time intervals/age groups, consistency

Country	Nature of calculations	Number of variants	Frequency of updating the official regional population projections	Year of the most recent regional population projections	Period covered	Projection interval	Regional classification	Number of spatial units	Are the most recent regional and the national population projections consistent?	General structure of the model
Austria	Forecast	13[1]	Every year	2001	2001-2050	Single year	Bundeslaender	9	Yes, mix top down/bottom up approach	Multiregional cohort component model[2]
Belgium	Forecast	1	Every five years, but not regular	2001	2000-2050	Single year	NUTS 3	44	yes	Component method [3]
Belgium - Flanders	What-if analysis, simulation	1		2000	2000-2010	Single year	Municipalities	308	Not linked	Cohort component model
Finland	Forecast	2[4]	Every three years	2001	2001-2030	Single year	NUTS 5, municipalities	448	Yes, bottom-up consistency	
Germany	Forecast	1	Irregular, usually every three years	2002	1999-2020	Single year	NUTS-3	440	no	Multiregional cohort survival model[5]
Italy	Forecast	3[6]	Every five years	2002	2001-2051	5 years	NUTS 2	20	Yes, bottom-up consistency	Multiregional cohort component model
Netherlands	Forecast	3[7]	Every two years	2001	2001-2030	Single year	Submunicipal level, Municipal level; NUTS 3 level. Interregional migration modelled at NUTS 3 level. Intraragional migration at Submunicipal level.	Submunicipal level: 1000; Municipal level: 500; NUTS 3 level: 40.	Yes, top down	A hybrid form of multistate cohort survival model[8]

Country	Nature of calculations	Number of variants	Frequency of updating the official regional population projections	Year of the most recent regional population projections	Period covered	Projection interval	Regional classification	Number of spatial units	Are the most recent regional and the national population projections consistent?	General structure of the model
Portugal	Forecast	1	Every five years	1997	1995-2025	5 years	NUTS 2	7	Yes, bottom-up consistency	Sequential model[9]
Spain	Projections based on recent trends	1	Varied, depending on the difference between projected and observed figures on birth, death and migration. When figures from a new census are available projections are also revised	1995 revised in 2001	15 years	Single year	NUTS 2[10]	18	Yes, population of each region and national population are projected separately. Afterwards, differences between total and regional projected populations are adjusted.	Component model[11]
Sweden	Forecast	3[12]		2002	2001-2040	Single year	Local Labour Markets can be aggregated into NUTS 2	110	Yes, there is a yearly consistency adjustment to the national forecast	A pure demographic model[13]

Country	Nature of calculations	Number of variants	Frequency of updating the official regional population projections	Year of the most recent regional population projections	Period covered	Projection interval	Regional classification	Number of spatial units	Are the most recent regional and the national population projections consistent?	General structure of the model
United Kingdom - England	Trend-based projection, made on the assumption that no significant change in trends occurs	No, but in the past ad hoc scenarios have been processed	Long term projection every 3 to 5 years, Short-term subnational projections are also produced about every two years when no long-term projections are being produced and when national projections are available based on the same year.	1998 long-term projection 2002 short term projection	1997 - 2021 for the long term projection, 2001 -2010 for the short term projection	Single year	Local and health authorities in existence on 1 April each year[14]	380 local authorities	Yes, bottom-up constrained by national population projections	Cohort component model
United Kingdom-Scotland	Projections based on recent past trends		Every two years	2000	2000-2016	Single year	Council Areas, Health Boards	32 Council Areas, 15 Health Boards	Yes, top-down	Component method
United Kingdom-Wales	Projections based on recent past trends		Every two years	1998	1998-2023	Single year	Four regional groupings of unitary authorities	22 local authorities aggregated to 4 regional groupings	Yes, bottom-up constrained by national population projection	Cohort component model

Source: Questionnaires filled in by representatives of the relevant national statistical offices.

[1] 9 variants: all combinations of 3 variants (medium, high, low) for fertility and migration, 1 variant with constant fertility (medium mortality, medium immigration), 2 additional mortality variants (high, low) with medium fertility and migration, 1 benchmark variant (all constant), internal migration rates are constant in all variants.
[2] LIPRO 4.0 model is used. Step 1: Calculates projection for Austria; Step 2: calculates projection for nine NUTS 2 regions (bottom-up); Step 3: Corrects sums of NUTS 2 for population by age and sex, births and deaths and migration flows with the projection for total of Austria.
[3] Component method : Calculation of the deaths; Calculation of the births; Calculation of the internal migrations; Calculation of the international migrations; Taking into account the nationality changes (naturalizations, regularizations)
[4] Calculation with and without migration
[5] Exogenous rates of fertility, mortality, mobility on the bottom level. International migration is the only top-down element of the model. The exogenous total number of immigrants is distributed to regions and sex/age groups. The outmigration is calculated by rates of mobility of regional population
[6] Assumptions are adopted on mortality, fertility, outmigration, internal migrations. 1 main scenario and 2 variants (low and high) are considered. Main variant: O/D matrix of projection probabilities of migration is kept constant until 2050 at estimated values for 1997-1999. This means that total flows at interregional level may vary over time depending on the structure and total regional populations. High variant: the O/D matrix changes over time until 2010. Some O/D effects between regions increase by 5% in 10 years. Low variant: the O/D matrix changes over time until 2010. Some O/D effects between regions decrease by 5% in 10 years.
[7] Variant 1: Most likely trend; variants 2 and 3: High and low variants: uncertainty interval = trend + / - 2/3.
[8] A hybrid form of multistate cohort survival model, using non-demographic information to calculate values of parameters for the model. Non-demographic information used: labour market, school-supply, housing market, distances. The model performs the folowing steps: 1. Input of national population forecasts; 2. Calculation of region-specific immigration, fertility, mortality; 3. Application for each region (i.e. submunicipal district) of a dynamic household model, which gives starters, 'stoppers", those who want to change residence because of household reasons; 4. Application of a schooling migration module, a work related migration module, another migration module that gives a pool of potential migrants by motive for each departure district; 5. Confrontation of each migration type with supply. First: calculation of interregional moves, in order to generate vacancies. Then: combining interregional and intraregional moves in the housing market demand-supply module:

- immigration: distribution of housing demand over regions
- starters per submunicipality;
- house changers per submunicipality
- schooling: supply = demand, no constraints
- labour market: workplaces through exogenous economic module, those who leave the labour market, and job-changers; iterative approach of spatially matching demand and supply, taking into account unemployment. Gives interregional migration due to work reasons. These movers are added to the housing demand in the work region;, but may end up in adjacent regions because of housing market shortages; see below;
- other migration: distribution over regions.

Demand and supply are matched iteratively in order to clear labour market and housing market. After 6 iterations calculation of unmet demand which is transferred to t+1
[9] The components of growth are projected one at a time, in a fixed sequence. Population projections for the NUTS II units, is constrained by the national population forecast(s) using the "bottom up" approach. The base year population was derived from the most recent census (1991). Mortality assumptions are based on the latest available life table, by age (five years age group) and sex, and by subnational units (NUTS II). Fertility assumptions are based on the analysis of past trends, in particular on the TFR from which age specific fertility rates are extrapolatied. Immigration and emigration are both expressed in absolute numbers and distributed by sex and five-year age groups.

[10] For NUTS 3 estimated figures by sex and five year age groups are avaulable.

[11] Components method: $P_{(t+1)} = P_{(t)} + N_{(t)} - D_{(t)} + I_{(t)} - E_{(t)}$

Initial census population by sex and age at the end of year t.

Surviving population from initial population at the end of t+1 year .

Addition of international immigrant flows during year t and surviving population at the end of the year.

Addition of internal migration (arrivals and departures) by age and sex during year t.

Projected births for the year t and survivals at the end of the year.

[12] Mainly based on various assumptions (historical trends on internal migration)

[13] A pure demographic model on the bottom-up basis, yearly modified to be consistent with the official national population forecast carried out by Statistics Sweden.

Region-specific population by sex and one year age groups are used as a starting point. National forecasts on death and birth rates have been adjusted by regional variations in terms of regional indices. Region-specific outmigration rates and inmigration distribution based on various historical patterns are used.

[14] Published projections are reaggregated and published to take account of changes.

Projections are produced for local and health authority areas of England:

- Government Office Regions;
- counties and unitary authorities;
- local authority districts and London Boroughs.

Table 2: Characteristics of the data on the stocks of population

Country	Definition of the variable	Source of the data	Age groups	Highest age group	Other classification of the data	Time series used (first year – last year)
Austria	Population at 1st January	Yearly population estimates	Single year age groups	95+	Sex	1961 - 2001
Belgium	Population resident in Belgium	National Register	Single year age groups	105+	Sex, arrondissement NUTS3, nationality (Belgian, other EU members, rest)	From 2000
Belgium - Flanders	Number of inhabitants *de jure*	National Population Register	Single year age groups	100+	Sex	1971 - 1998
Finland		Population registration				
Germany	Persons at end of year, with place of residence in NUTS-3 region	Statistical Office	Five years age groups, combined with estimation of single years by using information of the top level	101+	Sex	
Italy	*De jure* Eurostat definition	Population Registers	Single year age groups	90+	Sex	
Netherlands	Population on 1st January	Statistics Netherlands Municipal Basic Registration MBR	Single year age groups for persons, five year age groups for households	100+	Sex	1994 - 2002
Portugal	Resident population	Population census 1991	Five year age groups	85+	Sex	
Spain	Resident population	Population census	Single year age groups	100+	Sex	
Sweden	Population at end of year	Population register	Single year age groups	95+	Sex	
United Kingdom - England	Annual mid-year population estimates rolled-forward	ONS Population Estimates Unit	Single year age groups	85+	Sex	1994 - 1996 for 1996 based projection; 1997 - 2000 for 2000 based projection
United Kingdom - Scotland	Resident population on 30th June	GROS Mid-Year Population Estimate	Single year age groups	90+	Sex, Council, Health Board	2000
United Kingdom - Wales	Annual mid-year population estimates rolled-forward	ONS Population Estimates Unit	Single year age groups	85+	Sex	1996 - 1998

Source: Questionnaires filled in by representatives of the relevant national statistical offices.

Table 3: Characteristics of the data on fertility

	Intensity measure	Age groups of mother	Regional dimension	Aggregations	Smoothing	Other classification of the data	Sex ratio at birth	Time series used (first year – last year)
Austria	Age specific fertility rates	Single year age groups 10 - 49	NUTS 2				0,5139 boys	1961 - 2001
Belgium	Age specific fertility rates	Single year age groups 15 - 50	Arrondissement	Clusters of arrondissements	No	Nationality	0,514 boys	1989 -1994
Belgium - Flanders	Age specific fertility rates	Single year age groups 14 - 49	Flanders, *not* differentiated at subregional level				1.05	1971 - 1998
Finland	Age specific fertility rates		Municipalities were grouped into 158 fertility areas on the basis of TFR value					1998 - 2000
Germany	Age specific fertility rates	Five year groups: 15-19, 20-24, ..., 40-44, combined with estimation of single years by using information of the top level	NUTS 3		Yes, by moving averages over the single years of age		As observed on national level	1991 to 1999
Italy	Age specific fertility rates by birth parity	Single year age groups 15-50	NUTS 2	No	No		0.515 boys	1952 - 1996 (observed) 1997 - 2000 (estimated)
Netherlands	Age specific fertility rates by birth parity	Single year age groups 15-49	Municipalities	TFR by municipality rescaled over ages and parities	No	No	As in national projections 1.05 (estimated)	1994 - now

	Intensity measure	Age groups of mother	Regional dimension	Aggregations	Smoothing	Other classification of the data	Sex ratio at birth	Time series used (first year – last year)
Portugal	Age specific fertility rates	Five year age groups 15 – 49	NUTS 2				1.05	1993 - 1997
Spain	Total fertility rate	Single year age groups 15 – 49	NUTS 2				1.057	1975-2001
Sweden	Rates	Single year age groups 15 – 49	Regionally adjusted national forecast		None		1.02	1995 - 2000
United Kingdom - England	Occurrence- exposure rates	Single year age groups 15 – 44	Equivalent of local authority district or lower level		Average 3 years annual fertility data scaled proportionally to be consistent with national projected fertility rates and births		Calculated from birth register	1993 - 1996 for 1996 based long term projection; 1997 - 2000 for 2000 based short term projection
United Kingdom - Scotland	Rates based on average completed family size for successive generations of women	Single year age groups 15 – 46	Building brick (sub-local authority)	Council Area, Health Board	Assumed national fertility rates adjusted to take account of local variations over last 3 years		1.05	(base year - 2) to (base year)
United Kingdom - Wales	Occurrence- exposure rates	Single year age groups 15 – 44	Building bricks		Average 3 years annual fertility data scaled proportionally to be consistent with national projected fertility rates and births		Calculated from birth register	1995 - 1998

Source: Questionnaires filled in by representatives of the relevant national statistical offices.

Table 4: Characteristics of the data on mortality

	Intensity measure	Age groups	Highest age group	Regional dimension	Aggregations	Smoothing	Other classification of the data	Time series used (first year – last year)
Austria	Age specific mortality rates and probabilities	Single year age groups	95+	NUTS 2		No	Sex	1960 - 2001
Belgium	Age specific mortality rates	Single year age groups	105+	Arrondissement	Clusters of arrondissements		Sex, nationality	1988 - 1997
Belgium - Flanders	Age specific mortality rates	Single year age groups	100+	Flanders, *not* differentiated at subregional level			Sex	1971 - 1998
Finland	Age specific mortality rates			Four mortality areas based on life expectancy at birth			Sex	1998 - 2000
Germany	Observed age specific mortality rates in five year age groups, combined with the estimation of rates by single years by using information of the top level	0 (infant mort.), 1-4, then 5 year age groups	85+	NUTS 3	Life expectancy	Yes	Sex	1991 - 1999
Italy	Regional life expectancy	Single year age groups	90+	NUTS 2	Region Valle d'Aosta joined with Piemonte Region Molise joined with Abruzzo	Yes	Sex	1974 - 2000
Netherlands	Age specific mortality rates	Single year age groups	99+	Municipalities	Age-and sex-specific scaling factors: 0-24; 25-54, 55-64; 65+	No	Sex	1994 - now

	Intensity measure	Age groups	Highest age group	Regional dimension	Aggregations	Smoothing	Other classification of the data	Time series used (first year – last year)
Portugal	Quotient perspective	At birth (infant mortality), 1-4, then 5 year age groups	80+				Sex	1993 - 1997
Spain	Mortality rates	Single year age groups	100+	NUTS 2			Sex; cause of death for young ages	1975 - 2001
Sweden	Survival rates	Single year age groups	95+	Regionally adjusted national forecast		No	Sex	
United Kingdom - England	Occurrence - exposure rates	Single year age groups	85+	Equivalent of local authority district or lower level		Average 3 years annual regional mortality rates scaled to be consistent with nationally projected mortality rates and death count	Sex	1993 - 1996 for local assumptions of the 1996 based long term projection; 1997 - 2000 for 2000 based short term projection
United Kingdom - Scotland	For the first year national death rates based on deaths from mid 2000 till mid 2001; for later years a long term trend	Single year age groups	90+	Building brick (sub-local authority)	Council Area, Health Board	Assumed national mortality rates adjusted to take account of local variations over last 3 years	Sex	(base year -2) to (base year)
United Kingdom - Wales	Occurrence - exposure rates	Single year age groups	85+	Building brick		Average 3 years annual regional mortality rates scaled to be consistent with nationally projected mortality rates and death count	Sex	1995 - 1998

Source: Questionnaires filled in by representatives of the relevant national statistical offices.

Table 5: Characteristics of the data on internal migration

	Type of data	Intensity measure	Age groups	Highest age group	Aggregations	Smoothing	Other classification of the data	Time series used (first year – last year)
Austria	Full flow matrix	Age specific rates	Single year age groups	95+			Sex	1996 - 2001
Belgium	Full flow matrix	Out-migration rate	5 year age groups	85+	Clusters of arrondissements	Yes	Sex, nationality	1989 - 1997
Belgium - Flanders	Net migration (including international migration)	Average age and sex specific net migration rates at the level of municipality	Single year age groups	100+		Age profile smoothed over ages using running mean		1994 - 1996
Finland	Out-migration rates, probabilities of migration between major areas, in-migration shares				158 areas defined based on out-migration susceptibility of the population aged 15-44 years			1996 - 2000
Germany	Full flow matrix , shares of persons leaving place of residence to a specific destination	Migration rates, migration probabilities	Six broad age groups (0-17, 18-24, 25-29, 30-49, 50-64, 65+), combined with the estimation of single years using information of the top level	65+	No	No		1996 - 1999
Italy	Full flow matrix	Matrix of migration probabilities between regions (weighted averages of levels observed in 1997-1999 by age and sex)	Single year age groups	90+	Yes[1]	Yes		1997-1999

	Type of data	Intensity measure	Age groups	Highest age group	Aggregations	Smoothing	Other classification of the data	Time series used (first year – last year)
Netherlands	Full flow matrix	Outmigration rates, and inmigration probabilities conditional on outmigration	Six broad age groups (0-15-15-24, 25-34, 35-49,50-64, 65+), although in principle SN has 1 year interval data, and 5 year interval can be obtained at the regional level	65+		After modelling migration, the groups are redistributed over 1 year age intervals	Sex	1994-2001
Spain	Out-migration, in-migration	In-migration flows. Out-migration rates	Single year age groups	100+			Sex	1986 - 2001
Sweden	Out-migration, in-migration	Out-migration rates, in-migration distribution	Single year age groups	95+		None		Various
United Kingdom - England	Full flow matrix	Occurrence - exposure rates	Single year age groups	85+		Rogers - Castro model for out-migration age distribution, gross migraproduction rates are used to estimate the level of migration	Sex	Combined 1992 - 1996 NHSCR data and 1991 census data

	Type of data	Intensity measure	Age groups	Highest age group	Aggregations	Smoothing	Other classification of the data	Time series used (first year – last year)
United Kingdom - Scotland	Net migration (including international migration)	Net migration	Migration assumption uses totals only. Model disaggregates according to 3 year average migration age distribution based on information from NHSCR controlled to national migration assumptions	Totals only in assumptions dissagregated to single age groups 90+ for councils and Health Boards			Sex	(base year -2) to (base year)
United Kingdom - Wales	Full flow matrix	Occurrence - exposure rates	Single year age groups	85+		Rogers - Castro model for out-migration age distribution, gross migraproduction rates are used to estimate the level of migration	Sex	Combined 1992 - 1996 NHSCR data and 1991 census data

Source: Questionnaires filled in by representatives of the relevant national statistical offices.

[1] Similar patterns by age were established for certain regions characterized by similar behaviour in terms of internal migration. The groups are:

- Piemonte, Valle d'Aosta, Lombardia;
- Trentino-Alto Adige, Veneto, Friuli-Venezia Giulia;
- Liguria, Emilia Romagna, Toscana;
- Umbria, Marche, Abruzzo, Molise;
- Lazio;
- Campania, Puglia, Basilicata, Calabria, Sicilia, Sardegna

Table 6: Characteristics of the data on international migration

	Definition of variable	Intensity measure	Age groups	Highest age group	Aggregations	Smoothing	Other classification of the data	Time series used (first year – last year)
Austria	Absolute numbers for immigration, age and sex specific rates for emigration	Rates, absolute numbers		95+			NUTS 2	1996 - 2001
Belgium	Number of emigrations from each arrondissement to the rest of the world Number of immigrations from the rest of the world to each arrondissement	Rates for emigration, absolute numbers for immigration	Five year age groups	85+	No	No	Sex, nationality	1989 - 1997
Belgium - Flanders	Included into internal migration variable, see Table 5							
Finland	Net migration	Absolute numbers						
Germany	Persons changing their place of residence, one of the residences must be outside Germany	Distribution top down according to regional shares	Six broad age groups (0-17, 18-24, 25-29, 30-49, 50-64, 65+), combined with the estimation of single years by using information of the top level	65+		No		1991 - 1999
Italy	Changes of residence i.e registration/ deregistration from/to abroad for population registers.	Deregistration: the same model as for internal migration is adopted. This means that probabilities of emigration are computed from each region of origin to abroad. Registration: Stock of immigrants for each year of projection.	Single year age groups	90+	None	Yes		For deregistrations: 1997 - 1999 For registrations: 1980 - 1999

	Definition of variable	Intensity measure	Age groups	Highest age group	Aggregations	Smoothing	Other classification of the data	Time series used (first year – last year)
Netherlands	Immigration and emigration	Immigration shares by age, sex, ethnicity; out-migration rates	Six broad age groups (0-14; 15-19; 20-24; 25-29; 30-39; 40+), although in principle SN has 1 year interval data, and 5 year interval can be obtained at the regional level	40+	None	None	Sex	1994 - 2001
Portugal	Net migration	Only net migration for each region is used, in the form of absolute numbers based on proportion measure. Quotient perspective	Five year age groups	85+			Sex	
Spain	Persons coming to be resident	In-migration flows are taken into account. Emigration rates are assumed to be 0	Single year age groups	100+			Sex	1981 - 2001
Sweden	Not taken into account							

	Definition of variable	Intensity measure	Age groups	Highest age group	Aggregations	Smoothing	Other classification of the data	Time series used (first year – last year)
United Kingdom - England	Immigration and emigration (from and to the rest of the UK and outside the UK). Migration to/from the rest of the UK are treated in the same way as internal migration. (see Table 5). International migration data based on International Passenger Survey, data on Asylum seekers come from the Home Office	Occurrence - exposure rates	Single year age groups	85+				1994 - 1996
United Kingdom - Scotland	Treated jointly with internal migration; see Table 5							
United Kingdom - Wales	Immigration and emigration (from and to the rest of the UK and outside the UK). Migration to/from the rest of the UK are treated in the same way as internal migration. (see Table 5). International migration data based on International Passanger Survey, data on Asylum seekers come from the Home Office	Occurrence - exposure rates	Single year age groups	85+				1994 - 1998

Source: Questionnaires filled in by representatives of the relevant national statistical offices.

Table 7: Characteristics of the scenarios on internal migration

	Number of scenarios / variants	Characteristics of scenarios	Assumptions	Are the assumptions bottom-up or top-down	For which migration parameters are hypotheses made	Are hypotheses for separate groups of internal migrants distinguished?	Age groups	Are specific hypotheses for different groups of regions made?
Austria	1	Status quo	Internal migration rates are constant	Bottom-up	Out-migration rates and in-migration totals	Sex, age	0 - 95+	No
Belgium	1	Status quo	Internal migration rates are constant	Bottom-up	Out-migration rates	Sex, age and nationality	0 - 105+	Rural-urban (urban, periurban, others)
Belgium - Flanders	1	Trend until 2010	Age profiles of net migration rates are stable over time. It was further assumed that these net-migration rates will be halved (in a linear way) in the period 2000-2010.	Bottom-up	Net migration rates			No
Finland	2	Calculations with and without migration	Status quo and no migration		Total net migration, out-migration rates, in-migration shares			
Germany	1	Trend until target year 2005 based on non-demographic information	Institutions receiving ethnic Germans will end their activities to 2005. Suburbanization process in East Germany will normalize after a period of very high mobility. Net East West migration will move towards a balanced situation.	Bottom-up	Out-migration rates, in-migration totals, migrant distribution	Yes	0-17, 18-24, 25-29, 30-49, 50-64, 65+	Yes, 5 clusters, exclusively estimated for the purpose to make assumptions of mobility

	Number of scenarios / variants	Characteristics of scenarios	Assumptions	Are the assumptions bottom-up or top-down	For which migration parameters are hypotheses made	Are hypotheses for separate groups of internal migrants distinguished?	Age groups	Are specific hypotheses for different groups of regions made?
Italy	3	Main, high and low variants	Main variant: OD matrix of probabilities of migration kept constant until 2050 at values estimated for 1997-1999. High variant: OD matrix of probabilities changes over time until 2010. Some O/D effects between regions increase by 5% in 10 years. Low variant: OD matrix of probabilities changes over time until 2010. Some O/D effects between regions decrease by 5% in 10 years.	Bottom-up	Probabilities of migration between regions	Age, sex	Single year up to 90+	
Netherlands	3	Main, high and low variants	Most likely trend, high and low variants = 1±2/3 of the most likely trend value. Mix of policy driven and non-demographic information: internal migration is a result of housing market policies: where to build new houses of what type? These housing market policies are specified at the housing market regions at the level of municipalities.	Bottom-up	Out-migration rates, in-migration shares and migrant distribution	Sex, age, students migration, institutional migration of elderly. Each migrant group: age/sex reacts differently to housing market incentives and constraints. Students are a separate group within the model, as well as institutional households. For each of these groups separate uncertainty intervals apply.		When testing the model and validating it, it turned out that certain interactions were severely underestimated. For these interactions, specific parameters were included, to fill the gap. In the model it is assumed that these parameters will converge to 0 in the future. In this sense, some region-pairs have additional hypotheses.

	Number of scenarios / variants	Characteristics of scenarios	Assumptions	Are the assumptions bottom-up or top-down	For which migration parameters are hypotheses made	Are hypotheses for separate groups of internal migrants distinguished?	Age groups	Are specific hypotheses for different groups of regions made?
Portugal	1			Bottom-up	Total net migration	No		No
Spain	1	Trend	Age-sex profiles of migration flows are stable over time.	Hybrid top-down and bottom-up	Out-migration rates, migrant distribution	Sex, age	Single year up to 100	No
Sweden	3	Status-quo and scenarios based on various assumptions (historical trends on internal migration)		Bottom-up	Net migration, out-migration rates, in-migration rates, migrant distribution	Sex	Single year age groups	No
United Kingdom - England	1	Status quo		Hybrid - bottom-up and top-down	Total net migration, migrant distribution	No		No
United Kingdom - Scotland		No subnational migration in the model						
United Kingdom - Wales	1	Status-quo		Hybrid bottom-up and top-down	Total net migration, migration distribution	No		No

Source: Questionnaires filled in by representatives of the relevant national statistical offices.

Table 8: Characteristics of the scenarios on international migration

	How is the regional international migration hypotheses defined?	Are the regional hypotheses bottom - up or top - down	Are specific hypotheses for different groups of regions made?	Are separate groups of international migrants distinguish in the regional hypotheses?	What information is used in the formulation of the regional international migration assumptions?
Austria	Time varying totals based on regional distribution of migrant population	Bottom - up	No	Sex, single year age groups up to 95+,	Regional labour markets
Belgium	For immigration fixed total inflow and fixed shares. For emigration constant rates per age, sex and nationality	For emigration bottom-up, for immigration top - down	Regional classification	Sex, single year age groups, nationality	
Belgium - Flanders	Time varying totals till 2010; see Table 7	Bottom - up			
Finland	Two runs are prepared, one assumes zero net migration, the second one 5000 annual net migration per year. Migrants are distributed to regions based on fixed shares.				
Germany	Time varying totals, policy driven, assuming that the enlargement of the European Community will trigger migration flows to Germany	Top - down		Age groups: 0-17, 18-24, 25-29, 30-49, 50-64, 65+	Links between internal and international migration
Italy	Fixed total inflow	Top - down	Regional classification	Sex, single age groups up to 90+, nationality	The existing distribution of migrant populations
Netherlands	Time varying shares with target year 2030. Totals from the national projections are distributed as shares over NUTS 3 regions, based on housing supply and region-specific factors derived from historical time series. Depending on housing supply and housing market supply/demand ratios in the regions, the actual distribution takes place.	Bottom - up	No	Sex, age groups (0-14, 15-19, 20-24, 25-29, 30-39, 40+) and country of birth. Each group is treated separately: total numbers at the national level, distribution shares for the regions based on housing supply, and group-specific regional factors.	Indirect links between internal and international migration through housing market demand/supply chain.
Portugal	Time varying totals,	Bottom - up	No	Sex, five year age groups	Regional distribution dependent on migrant population

	How is the regional international migration hypotheses defined?	Are the regional hypotheses bottom - up or top - down	Are specific hypotheses for different groups of regions made?	Are separate groups of international migrants distinguished in the regional hypotheses?	What information is used in the formulation of the regional international migration assumptions?
Spain	Fixed shares	Top - down	No	No	
United Kingdom - England	Fixed total inflow	Top - down	No	Asylum seekers and visitor switchers	
United Kingdom - Scotland	Variants produced by the Government Actuaries Department at national level (to and from Scotland)				
United Kingdom - Wales	Fixed total inflow	Top - down	No	Asylum seekers and visitor switchers	Distribution of migrants at the time of previous Census

Source: Questionnaires filled in by representatives of the relevant national statistical offices.

Table 9: Migration data types and definitions

	Type of data	Is a crossing of an administrative boundary required for a migrant to be counted?	Is it necessary in your definition of migration for a migrant to reside at the destination for more than a certain length of time?
Austria	Movement, Transition	Yes, municipality	No
Belgium	Movement	No	No, declaration of intention
Finland	Movement	Yes, municipality	Declaration of permanent migration
Germany	Movement	Yes, municipality (NUTS-4)	No
Italy	Movement, Transition	Yes, municipality	No
Netherlands	Movement	No, change of address	No, registration is crucial
Portugal	Transition	Yes, municipality	
Spain	Movement	Yes, municipality	No
Sweden	Movement	No, change of address	
UK - England	Transition	Yes	No
UK - Wales	Transition	Yes	No
UK - Scotland	Transition	Yes	No

Source: Questionnaires filled in by representatives of the relevant national statistical offices.

Table 10: Availability of full flow matrix on NUTS-2 level - movement data

	For what time span are the data available	Are the data available by the sex of migrants	Are the data available by the age of migrants	What is the last (oldest) age group for which the data are available?
Austria	1996 - 2002	Yes	Yes, single year age groups	95+
Belgium	1964 - now	Yes	No	
Finland	1987 - 2002	Yes	Yes, single year age groups	All ages
Germany	1991 to 1999	No	Yes, age groups: 0-17, 18-24, 25-29, 30-49, 50-64, 65+	65+
Italy	1952 - 1999	Yes	Yes, single year age groups	No upper limit because data are individual
Netherlands	1970 - now	Yes	Yes, 0-14,-15-24, 25-34, 35-49,50-64, 65+	65+
Spain	1988 - 2002	Yes	Yes, single year age groups	100+
Sweden	1968 - now	Yes	Yes, single year age groups	100+

Source: Questionnaires filled in by representatives of the relevant national statistical offices.

Table11: Availability of migration movement data on NUTS-2 level: arrivals and departures

	Arrivals	For what time span are the data available	Are the data available by the sex of migrants	Are the data available by the age of migrants	What is the oldest age group for which the data are available?	Departures	For what time span are the data available	Are the data available by the sex of migrants	Are the data available by the age of migrants	What is the oldest age group for which the data are available
Austria	Yes	1996 - 2002	Yes	Yes, single year age groups	95+	Yes	1996 - 2002	Yes	Yes, single year age groups	95+
Belgium	Yes	1948 - now	Yes	Yes, five year age groups since 1989	100+	Yes	1948 - now	Yes	Yes, five year age groups since 1989	100+
Finland	Yes	1987 - 2002	Yes	Yes, single year age groups	All ages	Yes	1987 - 2002	Yes	Yes, single year age groups	All ages
Germany	Yes	1991 - 1999	No	Yes, age groups: 0-17, 18-24, 25-29, 30-49, 50-64, 65+	65+	Yes	1991 to 1999	No	Yes, age groups: 0-17, 18-24, 25-29, 30-49, 50-64, 65+	65+
Italy	Yes	1952 - 1999	Yes	Yes, single year age groups	No upper limit because data are individual	Yes	1952 - 1999	Yes	Yes, single year age groups	No upper limit because data are individual
Netherlands	Yes	1970 - now	Yes	Yes, 0-15-15-24, 25-34, 35-49,50-64, 65+	65+	Yes	1970 - now	Yes	Yes, 0-15-15-24, 25-34, 35-49,50-64, 65+	65+
Spain	Yes	1988 - 2002	Yes	Yes, single year age groups	100+	Yes	1988 - 2002	Yes	Yes, single year age groups	100+
Sweden	Yes	1968 - now	Yes	Yes, single year age groups	100+	Yes	1968 - now	Yes	Yes, single year age groups	100+

Source: Questionnaires filled in by representatives of the relevant national statistical offices.

Table 12: Characteristics and availability of census based transition data on NUTS-2 level

	Type of data	Question asked	What is the date of the census/survey from which data are available?	Are the data available by the sex of migrants	Are the data available by the age of migrants	What is the last (oldest) age group for which the data are available?
Austria	Full flow matrix, arrival vector, departure vector	Where did you live 5 years ago?	1991	Yes	Yes, single year age groups	95+
Italy	Full flow matrix, arrival vector, departure vector	Where did you live 5 years ago?	1991	Yes	Yes, single year age groups	100+
Portugal	Arrival vector,	Where did you live on a specific date (approximately 1 year ago and 5 years ago)?	1991 and 2001			
UK - England	Not available	What was your usual address 1 year ago?	2001			
UK - Scotland	Full flow matrix, arrival vector, departure vector	What was your usual address 1 year ago?	2001	Yes	Yes	90+
UK - Wales	Not available	What was your usual address 1 year ago?	2001	Yes	Yes	90+

Source: Questionnaires filled in by representatives of the relevant national statistical offices.

Appendix A. List of publications of results of subnational population projections and relevant methodological studies by country

AUSTRIA

Alexander Hanika, Bevölkerungsvorausschätzung 2001 – 2050 für Österreich und die Bundesländer, Statistics Austria, Vienna. ISBN: ISSN 0029-9960

Statistics Austria, ‚Statistisches Jahrbuch Österreichs 2003, Statistics Austria,Vienna. ISBN: 3-901400-71-0; http://www.statistik.at/jahrbuch/englisch/start.shtml

Statistics Austria, Statistisches Jahrbuch Österreichs 2003, Statistics Austria, Vienna. ISBN: 3-901400-31-1

BELGIUM

Institut national de Statistique & Bureau fédéral du Plan, 2001, Perspectives de population 2000-2050 par arrondissement, Publisher: Institut national de Statistique, Bruxelles. http://statbel.fgov.be

Institut national de Statistique, Statistiques démographiques, Institut national de Statistique, Bruxelles

BELGIUM - FLANDERS

Paul Willems, 2000, MIRA-S-2000 bevolkings- en huishoudensprojecties, Brussels. www.wvc.vlaanderen.be >> Statistieken (ManagementInformatieSysteem) >> "Ga naar de volgende pagina en meld je aan als gast" >> Username: gast Password: gast >> "Geprojecteerd aantal inwoners naar ..etc.." >> Clic on icon marked with i left of question mark. This action opens the metadata where you will find a hyperlink to a text (in Dutch) describing methods, hypotheses etc.

FINLAND

Statistics Finland, Population projection by municipalities 2001-2030, Statistics Finland, Helsinki. ISBN: 951-727-967-1

Statistics Finland, Vital Statistics 2001, Statistics Finland, Helsinki. ISBN: 952-467-122-0

Statistics Finland, Foreigners and international migration 2001, Statistics Finland, Helsinki. ISBN: 952-467-100-X

FRANCE

«Le modèle de projection démographique OMPHALE», Laurence Descours et François Poinat, Insee, *Insee méthodes n° 19 (*1992).

«Projections de population à l'horizon 2050, Présentation générale», Insee, *Economie et Statistique* n°355-356 (décembre 2002).

«Projections de population active en 2050: l'essoufflement de la croissance des ressources en main-d'œuvre», Emmanuelle Nauze-Fichet, Insee, *Economie et Statistique* n°355-356 (décembre 2002).

*«*Projection de population à l'horizon 2050 un vieillissement inéluctable», Chantal Brutel, Insee, *Insee Première* n° 762 (mars 2001).

Regional studies

«Projections régionales de population pour 2030 : l'impact des migrations», Laure Omalek, Insee, *Insee Première* n° 805 (septembre 2001).

«Projections démographiques pour la France, ses régions et ses départements à l'horizon 2030», Chantal Brutel, Laure Omalek, Insee,

La société française : données sociales 2002-2003 (novembre. 2002).

ALSACE

«2 millions d'Alsaciens en 2030?», Insee Alsace, *Chiffres pour l'Alsace* n° 9 (juin 2002).

AQUITAINE

«La population aquitaine en 2030», Eric Amrane, Insee Aquitaine, *Le quatre pages* n° 98 (octobre 2001).

AUVERGNE

«Démographie et territoire Auvergne horizon 2030» Vincent Vallès et alii, Insee Auvergne, *Les dossiers* n° 7 (mars 2003) Cédérom.

«Population et Territoires : horizon 2030», Vincent Vallès, Insee Auvergne, *La Lettre* n° 8 (février 2003).

BASSE-NORMANDIE

«Projections de population en Basse-Normandie à l'horizon 2030», Jean-Luc Lacuve, Insee Basse-Normandie,

L'économie bas-normande n° 32 (novembre 2001).

«Baisse de la population Bas-normande après 2020», Daniel Morales, Insee Basse-Normandie, *Cent pour cent Basse Normandie* n° 104 (décembre 2001).

BOURGOGNE

«Projection tendancielle de la population bourguignonne pour 2030», Claude Gauffroy et Denis Quenelle, Insee Bourgogne, *Dimensions* n° 90 (février 2002).

BRETAGNE

«Projections démographiques: des scénarios pour la Bretagne», Michel Rouxel, Insee Bretagne, *Octant* N° 87 (octobre 2001).

CENTRE

«2030, l'ère des seniors», Insee Centre, *Insee Centre info* n°111 (septembre 2001).

CORSE

«287000 habitants en 2030?», Roman Janik, Insee Corse, *Economie Corse* n° 98 (février 2002).

FRANCHE-COMTE

«Démographie: projections de population à l'horizon 2030, un vieillissement inéluctable», Sophie Carrier, Insee Franche-Comté, *L'essentiel* n° 48 (octobre 2001).

HAUTE-NORMANDIE

«Horizon 2030 Perspectives démographiques de la Haute-Normandie», Jérôme Follin et alii, Insee Haute-Normandie, *Cahier d'Aval* n° 62 (novembre 2002).

ILE DE FRANCE

«L'Ile de France pourrait dépasser 12 millions d'habitants en 2030», Nadine Laroche,. Insee Ile- de-France, *A la page* n° 201 (septembre 2001).

LANGUEDOC-ROUSSILLON

«Projections de population en Languedoc-Roussillon à l'horizon 2030», Françoise Auzeby, Insee Languedoc-Roussillon, *Repères pour l'économie du Languedoc-Roussillon* n° 3 (mars 2002).

LIMOUSIN

«Limousin, horizon 2030: projection de population», Véronique Livertout, Insee Limousin, *Chiffres clés* n° 7 (novembre 2002).

«Population limousine à l'horizon 2030», Dominique Hilaire, Insee Limousin, *Revue* n° 33 (janvier 2002).

LORRAINE

«Horizon 2020 : moins de Lorrains?», Stéphane Counot et alii, Insee Lorraine, *Economie Lorraine* n° 211 (septembre 2001).

MIDI-PYRENEES

«Projections de population à l'horizon 2030», Hélène Projetti, Insee Midi-Pyrénées, *Dossiers* n° 107 (novembre 2001).

NORD-PAS-DE-CALAIS

«Projections infra régionales pour 2030: des situations contrastées sur les différents territoires du Nord-Pas-de-Calais», Patricia Antonov Zafirov et alii, Insee Nord-Pas-de-Calais, *Profils Nord-Pas-de-Calais* n° 9 (octobre 2001).

«Projections de population du Nord-Pas-de-Calais en 2050 : un vieillissement inéluctable», Patricia Antonov-Zafirov et alii, Insee Nord-Pas-de-Calais, *Profils Nord-Pas-de-Calais* n° 10 (novembre 2001).

PAYS DE LA LOIRE

«Croissance et vieillissement en Pays de la Loire, Loire Atlantique, Maine et Loire, Mayenne, Sarthe, Vendée : horizon 2030», Serge Fraboul ; Insee Pays de la Loire, *Références Pays de la Loire : la revue économique et sociale régionale*, n° 35 (octobre 2001).

PICARDIE

«Projections de population à l'horizon 2030: une croissance dans la dynamique du Bassin parisien », Anne Evrard, Insee Picardie, *Insee Picardie Relais* ; n° 102 (février 2002); Zone d'emploi des régions Picardie, Ile de France, Champagne -Ardennes, Centre, Basse Normandie, Haute Normandie et des départements de la Sarthe et Yonne.

POITOU-CHARENTES

«Population en 2030: 1.750.000 ou 1.620.000?», Monique Pépin,. Insee Poitou-Charentes,. *Décimal* n° 218 (septembre 2001).

PROVENCE-ALPES-COTE D'AZUR

«La région pourrait compter 5 millions d'habitants dès 2020», Colette Pillet, Insee PACA, *Sud Insee l'essentiel* n° 57 (mai 2003).

RHONE-ALPES

«Rhône-Alpes : 6,6 millions d'habitants en 2030 »,. Pascal Arros, Insee Rhône-Alpes, *Résultats* n° 89 (octobre 2001).

ANTILLES GUYANE

«Projections de population à l'horizon 2030: les Antilles vieillissent, la Guyane se peuple»,. Nadine Lhuillier et alii, Insee Antilles Guyanne, *Antiane Eco, la revue économique des Antilles et de la Guyane* n° 50.

REUNION

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Tablas de mortalidad de la población española. Años 1960-70. INE 1977.

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UNITED KINGDOM - ENGLAND

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Appendix B. Persons responsible for subnational population projections

AUSTRIA
Alexander HANIKA, STATISTICS AUSTRIA, Hintere Zollamtsstrasse 2b, A-1033 Vienna, Austria, Tel.:+43 1 711 28 7279, Fax:+43 1 715 68 30, E-mail:,Alexander.hanika@statistik.gv.at

BELGIUM
Leïla Bellamammer & Micheline Lambrecht, Institut national de Statistique & Bureau fédéral du Plan, 44 rue de Louvain B-1000 Bruxelles Belgique & 47-49, avenue des Arts B-1000 Bruxelles Belgique, Tel.00.32-2.548.66.63 & 00.32-2.507.73.49, Fax:,00.32-2.548.66.33 & 00.32.-507.73.73, E-mail:,Leila.bellamammer@statbel.mineco.fgov.be & ml@plan.be .

FINLAND
Mr. Ossi Honkanen, Statistics Finland, P.O.Box 4B, FIN-00022 STATISTICS FINLAND, Tel.: +358 9 1734 3294, Fax: +358 9 1734 2990, E-mail: ossi.honkanen@stat.fi .

FRANCE
Jean-François ROYER, Chef du département de l'Action régionale, Direction générale de l'Insee, 18 Bd Adolphe Pinard, 75675 Paris cedex 14.

GERMANY
Hansjoerg Bucher, Bundesamt fuer Bauwesen und Raumordnung, Deichmanns Aue 31-37, D-53179 Bonn, Tel.: +49 (0) 1888 401 2320, Fax: +49 (0) 1888 401 2346, E-mail: hansjoerg.bucher@bbr.bund.de .

ITALY
Marco Marsili, Istat, Viale Liegi 13 – 00198 ROMA - Italy, Tel.: +390685227352, Fax: +390685391609, E-mail: marsili@istat.it .

THE NETHERLANDS
Eichperger Ch. L., Netherlands Institute for Spatial Research, PO Box 3031`4, 2500 GH Den Haag, Netherlands, Tel.: 070 3490768, Fax: 070 349 0799, E-mail: eichperger@rpb.nl .

PORTUGAL
Maria José Carrilho, Maria Graça Magalhães, Instituto Nacional de Estatística (National Statistical Institute - Portugal), Av. António José de Almeida, 1000-043 LISBOA, PORTUGAL, Tel.: 351 21 8426100, Fax: 351 21 8426358, E-mail: mjose.carrilho@ine.pt, mgraca.magalhaes@ine.pt .

SWEDEN
Mats Johansson, ITPS, Box 574, S-101 31 Stockholm, Sweden, Tel.: +46-8-456 67 72, E-mail: mats.johansson@itps.se .
Ola Nygren, Ministry of Health and Social Affairs, S- 103 33 Stockholm, Sweden, Tel.: +46-8-405 36 98, E-mail: ola.nygren@social.ministry.se .

UK - ENGLAND
Richard Pereira, Statistician, Subnational Population Population Projections Unit, Office for National Statistics (ONS), Segensworth Road, Titchfield, Fareham, PO15 5RR, England, Tel.: 00 44 (0)1329 813531, Fax: 00 44 (0)1329 813407, E-mail: Richard.pereira@ons.gov.uk .

UK - SCOTLAND
Garnett Compton, General Register Office for Scotland (GROS), Ladywell House, Ladywell Road, Edinburgh EH12 7TF, Scotland, Tel.: 44 131 3144298, Fax:44 131 3144696.

UK - WALES
Rhiannon Davies, Welsh Assembly Government, Cathays Park, Cardiff, CF10 3NQ, Wales, Tel.: 00 44 (0)2920 825058, Fax: 00 44 (0)2920 825350, E-mail: Rhiannon.Davies@Wales.gsi.gov.uk .

Appendix C. Persons responsible for census data

AUSTRIA
Adelheid BAUER, STATISTICS AUSTRIA, Hintere Zollamtsstrasse 2b, A-1033 Vienna, Austria, Tel.: +43 1 711 28 7210, Fax: +43 1 718 24 01, E-mail: adelheid.bauer@statistik.gv.at

BELGIUM
Edouard Wiliquet, Institut national de Statistique, Address 44 rue de Louvain B-1000 Bruxelles Belgique, Tel.: 00.32-2.548.66.36, Fax: 00.32.2.548.66.26, E-mail: edouard.wiliquet@statbel.mineco.fgov.be

GERMANY
Hansjoerg Bucher, Bundesamt fuer Bauwesen und Raumordnung, Deichmanns Aue 31-37, D-53179 Bonn, Tel.: +49 (0) 1888 401 2320, Fax: +49 (0) 1888 401 2346, E-mail: hansjoerg.bucher@bbr.bund.de

ITALY
Angela Ferruzza, Istat, Via Alfonso Ravà 150 – ROMA - Italy, Tel.: +390659524369, Fax: +39065943011, E-mail: ferruzza@istat.it.

PORTUGAL
Fernando Casimiro, Instituto Nacional de Estatística (National Statistical Institute - Portugal), Av. António José de Almeida, 1000-043 LISBOA, PORTUGAL, Tel.: 351 21 8426100, Fax: 351 21 8426358, E-mail: fernando.casimiro@ine.pt .

UK - ENGLAND
Paul Vickers, Census Data Quality Needs & Disclosure Control, Organization: Office for National Statistics (ONS), Address: Segensworth Road, Titchfield, Fareham, PO15 5RR, England , Tel.: 00 44 (0)1329 813685, Fax: 00 44 (0)1633 652 3844, E-mail: paul.vickers@ons.gov.uk .

UK - SCOTLAND
David Orr, General Register Office for Scotland (GROS), Ladywell House, Ladywell Road, Edinburgh EH12 7TF, Scotland, Tel.: 44 131 3144207.

UK - WALES
Rhiannon Davies, Welsh Assembly Government, Cathays Park, Cardiff, CF10 3NQ, Wales, Tel.: 00 44 (0)2920 825058, Fax: 00 44 (0)2920 825350, E-mail: Rhiannon.Davies@Wales.gsi.gov.uk .

Appendix D. Persons responsible for stocks of population

AUSTRIA
Alexander HANIKA, STATISTICS AUSTRIA, Hintere Zollamtsstrasse 2b, A-1033 Vienna, Austria, Tel.:+43 1 711 28 7279, Fax:+43 1 715 68 30, E-mail: Alexander.hanika@statistik.gv.at

BELGIUM
Edouard Wiliquet, Institut national de Statistique, Address 44 rue de Louvain B-1000 Bruxelles Belgique, Tel.: 00.32-2.548.66.36, Fax: 00.32.2.548.66.26, E-mail: edouard.wiliquet@statbel.mineco.fgov.be .

FINLAND
Mr. Ossi Honkanen,: Statistics Finland, P.O.Box 4B, FIN-00022 STATISTICS FINLAND, Tel.: +358 9 1734 3294, Fax: +358 9 1734 2990, E-mail: ossi.honkanen@stat.fi .

GERMANY
Hansjoerg Bucher, Bundesamt fuer Bauwesen und Raumordnung, Deichmanns Aue 31-37, D-53179 Bonn, Tel.: +49 (0) 1888 401 2320, Fax: +49 (0) 1888 401 2346, E-mail: hansjoerg.bucher@bbr.bund.de .

ITALY
Angela Silvestrini, Istat, Via Alfonso Ravà 150 – ROMA - Italy, Tel.: +390659524397, Fax: +39065943011, E-mail: ansilves@istat.it .

THE NETHERLANDS
Heida H.R., Organization: ABF Research, Verwersdijk 8, 2611 NH Delft, Netherlands, Telephone: 0152123748, Fax: 0152135403, E-mail: hansh@abfresearch.nl .

PORTUGAL
Maria José Carrilho, Instituto Nacional de Estatística (National Statistical Institute - Portugal), Av. António José de Almeida, 1000-043 LISBOA, PORTUGAL, Tel.: 351 21 8426100, Fax: 351 21 8426358, E-mail: mjose.carrilho@ine.pt .

UK - ENGLAND
Jonathan Swan, Statistician, Population Estimates Unit, Organization: Office for National Statistics (ONS), Segensworth Road, Titchfield, Fareham, PO15 5RR, England, Tel.: 00 44 (0)1329 813262, Fax: 00 44 (0)1329 813295, E-mail: Jonathan.swan@ons.gov.uk , Craig.Duncan@ons.gov.uk (Senior Research Officer).

UK - SCOTLAND
Garnett Compton, General Register Office for Scotland (GROS), Ladywell House, Ladywell Road, Edinburgh EH12 7TF, Scotland, Tel.: 44 131 3144298, Fax:44 131 3144696.

UK - WALES
Population Estimates Unit, Office for National Statistics (ONS), Segensworth Road, Titchfield, Fareham, PO15 5RR, England, Tel.: 00 44 (0)1329 813262, Fax: 00 44 (0)1329 813295.

Appendix E. Persons responsible for migration hypothesis in subnational population projections

AUSTRIA
Alexander HANIKA, STATISTICS AUSTRIA, Hintere Zollamtsstrasse 2b, A-1033 Vienna, Austria, Tel.:+43 1 711 28 7279, Fax:+43 1 715 68 30, E-mail: Alexander.hanika@statistik.gv.at .

BELGIUM
Michel Poulain, Gédap – Centre d'étude de Gestion Démographique pour les Administrations Publiques, 1 boite 4 place Montesquieu B-1348 Louvain-la-Neuve Belgique, Tel.: 00.32-10.47.41.53, Fax: 00.32-10.47.41.92, E-mail: poulain@sped.ucl.ac.be .

GERMANY
Hansjoerg Bucher, Bundesamt fuer Bauwesen und Raumordnung, Deichmanns Aue 31-37, D-53179 Bonn, Tel.: +49 (0) 1888 401 2320, Fax: +49 (0) 1888 401 2346, E-mail: hansjoerg.bucher@bbr.bund.de .

ITALY
Marco Marsili, Istat, Viale Liegi 13 – 00198 ROMA - Italy, Tel.: +390685227352, Fax: +390685391609, E-mail: marsili@istat.it .

THE NETHERLANDS
Visser P, Netherlands Institute for Spatial Research, PO Box 3031`4, 2500 GH Den Haag, Netherlands, Tel.: 070 3490768, Fax: 070 349 0799, E-mail: visser@rpb.nl .

UK - ENGLAND
Richard Pereira, Statistician, Subnational Population Population Projections Unit, Office for National Statistics (ONS), Segensworth Road, Titchfield, Fareham, PO15 5RR, England, Tel.: 00 44 (0)1329 813531, Fax: 00 44 (0)1329 813407, E-mail: Richard.pereira@ons.gov.uk .

UK - SCOTLAND
Garnett Compton, General Register Office for Scotland (GROS), Ladywell House, Ladywell Road, Edinburgh EH12 7TF, Scotland, Tel.: 44 131 3144298, Fax:44 131 3144696.

UK - WALES
Jenny Wood, Office for National Statistics (ONS), Segensworth Road, Titchfield, Fareham, PO15 5RR, England, Tel.: 00 44 (0)1329 813403, Fax: 00 44 (0)1329 813295, E-mail: Jenny.wood@ons.gov.uk .

Appendix F. Person responsible for internal migration data

AUSTRIA
Gerhard LOPATA, STATISTICS AUSTRIA, Hintere Zollamtsstrasse 2b, A-1033 Vienna, Austria, Tel.:+43 1 711 28 7206, Fax:+43 1 718 50 60, E-mail: gerhard.lopata@statistik.gv.at

BELGIUM
Edouard Wiliquet, Institut national de Statistique, Address 44 rue de Louvain B-1000 Bruxelles Belgique, Tel.: 00.32-2.548.66.36, Fax: 00.32.2.548.66.26, E-mail: edouard.wiliquet@statbel.mineco.fgov.be

FINLAND
Mr. Matti Saari, Statistics Finland, P.O.Box 4B, FIN-00022 STATISTICS FINLAND, Tel.: +358 9 1734 3401, Fax: +358 9 1734 2990, E-mail: matti.saari@stat.fi

GERMANY
Hansjoerg Bucher, Bundesamt fuer Bauwesen und Raumordnung, Deichmanns Aue 31-37, D-53179 Bonn, Tel.: +49 (0) 1888 401 2320, Fax: +49 (0) 1888 401 2346, E-mail: hansjoerg.bucher@bbr.bund.de

ITALY
Costanza Giovannelli, Istat, Viale Liegi 13 – 00198 ROMA - Italy, Tel.: +390685227340, Fax: +390685391609, E-mail: cogiovan@istat.it.

THE NETHERLANDS
Heida H.R., Organization: ABF Research, Verwersdijk 8, 2611 NH Delft, Netherlands, Telephone: 0152123748, Fax: 0152135403, E-mail: hansh@abfresearch.nl

UK - ENGLAND
Emma Wright, Statistician, Migration Statistics Unit, Office for National Statistics (ONS), Segensworth Road, Titchfield, Fareham, PO15 5RR, England, Tel.: 00 44 (0)1329 813610, Fax: 00 44 (0)1329 813638, E-mail: Emma.wright@ons.gov.uk .

UK - SCOTLAND
Garnett Compton, General Register Office for Scotland (GROS), Ladywell House, Ladywell Road, Edinburgh EH12 7TF, Scotland, Tel.: 44 131 3144298, Fax:44 131 3144696.

UK - WALES
Emma Wright, Office for National Statistics (ONS), Segensworth Road, Titchfield, Fareham, PO15 5RR, England, Tel.: 00 44 (0)1329 813610, Fax: 00 44 (0)1329 813638, E-mail: Emma.wright@ons.gov.uk .

Appendix G. Person responsible for international migration data

AUSTRIA
Gerhard LOPATA, STATISTICS AUSTRIA, Hintere Zollamtsstrasse 2b, A-1033 Vienna, Austria, Tel.:+43 1 711 28 7206, Fax:+43 1 718 50 60, E-mail: gerhard.lopata@statistik.gv.at

BELGIUM
Edouard Wiliquet, Institut national de Statistique, Address 44 rue de Louvain B-1000 Bruxelles Belgique, Tel.: 00.32-2.548.66.36, Fax: 00.32.2.548.66.26, E-mail: edouard.wiliquet@statbel.mineco.fgov.be

FINLAND
Mr. Matti Saari, Statistics Finland, P.O.Box 4B, FIN-00022 STATISTICS FINLAND, Tel.: +358 9 1734 3401, Fax: +358 9 1734 2990, E-mail: matti.saari@stat.fi

GERMANY
Hansjoerg Bucher, Bundesamt fuer Bauwesen und Raumordnung, Deichmanns Aue 31-37, D-53179 Bonn, Tel.: +49 (0) 1888 401 2320, Fax: +49 (0) 1888 401 2346, E-mail: hansjoerg.bucher@bbr.bund.de

ITALY
Costanza Giovannelli, Istat, Viale Liegi 13 – 00198 ROMA - Italy, Tel.: +390685227340, Fax: +390685391609, E-mail: cogiovan@istat.it.

THE NETHERLANDS
Heida H.R., Organization: ABF Research, Verwersdijk 8, 2611 NH Delft, Netherlands, Telephone: 0152123748, Fax: 0152135403, E-mail: hansh@abfresearch.nl

PORTUGAL
Humberto Moreira, Instituto Nacional de Estatística (National Statistical Institute - Portugal), Av. António José de Almeida, 1000-043 LISBOA, PORTUGAL, Tel.: 351 21 8426100, Fax: 351 21 8426358, E-mail: humberto.moreira@ine.pt .

UK - ENGLAND
Emma Wright, Statistician, Migration Statistics Unit, Office for National Statistics (ONS), Segensworth Road, Titchfield, Fareham, PO15 5RR, England, Tel.: 00 44 (0)1329 813610, Fax: 00 44 (0)1329 813638, E-mail: Emma.wright@ons.gov.uk .

UK - SCOTLAND
Garnett Compton, General Register Office for Scotland (GROS), Ladywell House, Ladywell Road, Edinburgh EH12 7TF, Scotland, Tel.: 44 131 3144298, Fax:44 131 3144696.

UK - WALES
Emma Wright, Office for National Statistics (ONS), Segensworth Road, Titchfield, Fareham, PO15 5RR, England, Tel.: 00 44 (0)1329 813610, Fax: 00 44 (0)1329 813638, E-mail: Emma.wright@ons.gov.uk .

Appendix H. Questionnaire template

Internal Migration and Subnational Population Projections for the European Union (EU)

Follow-up of the 1992/1995 inventory conducted by NIDI for EUROSTAT and the 1995 inventory conducted by the School of Geography of the University of Leeds for the Council of Europe

Country

January 2003

Netherlands Interdisciplinary Demographic Institute (NIDI),
P.O. Box 11650, 2502AR The Hague, The Netherlands

School of Geography, University of Leeds
Leeds LS2 9JT, United Kingdom

This questionnaire is being carried out on behalf of Eurostat, the Statistical Office of the European Communities, by the Netherlands Interdisciplinary Demographic Institute (NIDI) and the School of Geography, University of Leeds as part of an investigation of internal migration at regional scale (REGMIG) in EU member and candidate states. We would be very grateful if you could complete the questionnaire and return it to Marek Kupiszewski, c/o Central European Forum for Migration Research, ul. Twarda 51/55, 00-919 Warszawa, Poland (m.kupisz@twarda.pan.pl, tel. 48 22 6978822) by 27 January 2003.

Part A: General aspects of subnational population projections

Contact Details

Please provide the addresses of the institutions and persons responsible for subnational population projections and for collecting, processing and disseminating population data in your country.

A1 Person responsible for subnational population projections

Name:	
Organization:	
Address:	
Telephone:	
Fax:	
E-mail:	

A2 Person responsible for migration hypotheses in subnational population projections

Contact person:	
Organization:	
Address	
Telephone:	
Fax:	
E-mail:	

A2 Person responsible for data on stocks of population

Contact person:	
Organization:	
Address	
Telephone:	
Fax:	
E-mail:	

A3 Person responsible for census data (if applicable)

Name:	
Organization:	
Address:	
Telephone:	
Fax:	
E-mail:	

A4 Person responsible for internal migration data

Name:	
Organization	
Address:	
Telephone:	
Fax:	
E-mail:	

A5 Person responsible for international migration data

Name:	
Organization	
Address:	
Telephone:	
Fax:	
E-mail:	

Frequency of updating of the official regional population projections

A6 Frequency of updating of the official regional population projections

Every: Year ☐ 2 years ☐ 5 years ☐

Other:

Publications

A7 Publications on projections' methods and results, and relevant data (both on paper and in electronic form)

Please provide titles of statistical publications (demographic yearbooks, statistical yearbooks, methodological analyses etc.) relevant to national and subnational population projections and related migration modelling, and to internal and international migration statistics in your country. Kindly include also important unpublished works. Please supply the following information for each title:

Author:	
Title:	
Publisher:	
Place of publication:	
ISBN:	

Language of publication	
Is there a summary in English?	
Year(s) of publication (or freqency and since when, if published periodically)	
Is this publication available on a CD?	
Is this publication available as a .pdf or similar file?	
Can this publication be downloaded via the World Wide Web? If yes please provide a web reference	

Distributor: Name	
Address	
Fax:	

Author:	
Title:	
Publisher:	
Place of publication:	
ISBN:	

Language of publication	
Is there a summary in English?	
Year(s) of publication (or freqency and since when, if published peridcally)	
Is this publication available on a CD?	
Is this publication available as a .pdf or similar file?	
Can this publication be downloaded via the World Wide Web? If yes please provide a web reference	

Distributor: Name	
Address	
Fax:	

Author:	
Title:	
Publisher:	
Place of publication:	
ISBN:	

Language of publication	
Is there a summary in English?	
Year(s) of publication (or freqency and since when, if published peridcally)	
Is this publication available on a CD?	
Is this publication available as a .pdf or similar file?	
Can this publication be downloaded via the World Wide Web? If yes please provide a web reference	

Distributor: Name	
Address	
Fax:	

Please add additional pages if needed.

Please provide (if available) a catalogue of relevant publications published by your institution.

Part B: The most recent subnational population projections

In this part of the questionnaire, specific questions are asked about the most recent regional population projections. If English documentation is available, some points may be answered by referring to the specific sections in these documents. Please provide the relevant documentation.

Projections

B1 When were the most recent regional population projections made?

B2 Do you consider these projections to be forecasts in the sense that they describe the most likely future trends?

- If not, how would you characterize your regional population projections?

B3 What is the period covered?

B4 What is the time interval used?

B5 What regional classification did you use? (If changed since previous inventory, please provide a map.)

To what extent is this classification consistent with NUTS-2?

B6 For how many spatial units were the projections produced?

B7 What is the relation between your most recent regional population projection and the official *national* population forecast(s)?

- Are they consistent?

- If consistent, how was this achieved: by "top down" or "bottom up"?

- If not consistent: how do they differ?

- Are they produced at the same time or with a fixed time delay?

Projection model

B8 General structure of the model:

B9 Procedures (i.e. order of components in calculations, consistency step, order of specific age groups etc):

In the following parts of the questionnaire a number of terms are used that may need some explanation. These explanations are given in Annex 1.

Part C: Data used in subnational population projections

Data (stocks of population and components of growth)

In the 1992/1995 inventory, information was collected on the data that underlie the regional population projections. In Annex 2, an overview is given of the data availability within each country for total population, internal and international migration. We ask you to update this information filling in the forms below. Please note that in this section we ask about data actually used in population projections rather than about data available in principle (which are specified in Annex 1).

C1 Data components

Name of variable	**Population**
Definition of variable	
Source of the data	
Age groups	
Highest age group	
Other classification of the data	
Time series you used (first year – last year)	

Name of variable	**Fertility**
Intensity measure	
Age groups of mother	
Regional dimension	
Aggregations	
Smoothing	
Other classification of the data	
Sex ratio at birth	
Time series you used (first year – last year)	

Name of variable	**Mortality**
Intensity measure	
Age groups	
Highest age group	
Regional dimension	
Aggregations	
Smoothing	
Other classification of the data	
Time series you used (first year – last year)	

Name of variable	**Internal Migration**
Definition of variable	
Model	
Intensity measure	
Age groups	
Highest age group	
Aggregations	
Smoothing	
Other classification of the data	
Time series you used (first year – last year)	

Name of variable	**International Migration**
Definition of variable	
Model	
Intensity measure	
Age groups	
Highest age group	
Aggregations	
Smoothing	
Other classification of the data	
Time series you used (first year – last year)	

C2 Special populations: Please specify how do you account for special populations.

	Permanent place of residence	Temporary place of residence
Prisoners		
Armed forces		
Students		
Other (please specify)		

Other demographic variables

C3 Are there additional demographic data components used in the most recent projections? If so, we would like to have information for each additional component:

Name of variable	
Definition of variable	
Source of the data	
Classification of the data	
Time series you used (first year – last year)	

Name of variable	
Definition of variable	
Source of the data	
Classification of the data	
Time series you used (first year – last year)	

Name of variable	
Definition of variable	
Source of the data	
Classification of the data	
Time series you used (first year – last year)	

Add additional pages if needed.

Non-demographic explanatory variables

In this part of questionnaire we would like to understand whether and how non-demographic variables are used in the population dynamics model you use in population projections. As there are many possibilities, kindly use open questions C5 and C6 to explain in as much detail as possible how you incorporated these variables into your model.

C4 Indicate if you incorporate any non-demographic explanatory variables into population projection models. For each variable specify:

Name of variable	
Definition of variable	
Source of data	
Classification of the data	
Time series you used (first year – last year)	

This variable is used to control (please tick):

total population	☐	fertility	☐	mortality	☐
internal migration	☐	international migration	☐		

In case you ticked 'internal migration' please specify if the variable is used to control:

in-migration	☐	out-migration	☐	net migration	☐

In case you ticked 'international migration' please specify if the variable is used to control:

immigration	☐	emigration	☐	net migration	☐

Please add additional pages if needed.

C5 If you use non-demographic variables in your population projections model please explain how these variables are used in the model (specify the type of model and provide as much details as possible)

C6 Please explain how you selected, tested significance and eliminated non-demographic variables in the process of selecting variables to be used in the model

Part D: Hypotheses on internal and international migration

Internal migration hypotheses

In the next questions we ask about a number of key characteristics of the internal migration assumptions in the most recent subnational population projections. This is a complicated issue. Since there are many different aspects related to internal migration, in principle many types of hypotheses may be postulated, e.g. hypotheses on the overall level of mobility, on net migration, on spatial differences in mobility or net migration, on the attractiveness of regions, or on the spatial distribution between origin and destination regions. Furthermore, there may be links with regional economic growth assumptions, with regional planning and other policies. The following questions relate to the main features of these assumptions.

D1 Do you use variants or scenarios, and if yes, how many?

Variants:	No	☐	Yes: #	☐
Scenarios:	No	☐	Yes: #	☐

Please give a short description of each of the variants/scenarios.

For each variant/scenario specified in question D1 answer question D2 – D8. Please photocopy relevant pages if needed.

D2 Which of the options below is the best characteristic of the internal migration hypotheses?

status quo ☐

trend ☐

trend until target year (please specify year) ☐

policy driven ☐

based on non-demographic information ☐

Please explain in more detail:

D3 Are the assumptions bottom-up (hypotheses specified for individual/groups of regions) or top-down (national level assumptions applied to the regional level)?

Bottom-up ☐ Top-down ☐

D4 For which migration parameters are hypotheses made:

net migration ☐ totals ☐ rates

outmigration ☐ totals ☐ rates

inmigration ☐ totals ☐ shares

migrant distribution ☐

D5 Do you distinguish in the hypotheses separate groups of internal migrants?

No ☐ Yes ☐ :

Age groups (please specify) ☐

Sexes ☐

Students ☐

Armed forces ☐

Institutional migration of the elderly ☐

Other, namely:

Please specify the different hypotheses for each of the groups in more detail:

D6 Do you make specific hypotheses for different groups of regions?

No ☐ Yes ☐ :

Urban – rural classification ☐

Regional classification (e.g. northern – southern regions) ☐

Other, namely:

Please give details on the classification and the hypotheses

D7 Do you use regional non-demographic information in specifying the assumptions?

No ☐ Yes ☐ :

- Regional-economic growth ☐
- Regional labour markets ☐
- Housing markets ☐
- Regional infrastructure ☐
- Other, namely:

Please explain if possible:

D8 Do you take (regional) policies into account in specifying your hypotheses?

No ☐ Yes ☐ :

Housing policies ☐

Regional-economic policies ☐

Infrastructure policies ☐

EU Structural funds ☐

Other, namely:

Please explain if possible:

Regional international migration hypotheses

An important component of subnational population growth is international migration at the regional level. The following questions relate to this component.

D9 Which option below best describes the regional international migration hypotheses?

Fixed total inflow	☐
Time varying totals	☐
Fixed shares	☐
Time varying shares (please specify)	☐

If a target year is used, please specify:

D10 If time varying totals/shares are used, what are the driving factors?

Regional distribution of total population	☐
Regional distribution of migrant populations	☐
Policy driven	☐
Based on non-demographic information	☐

Please explain in more detail:

D11 Are the regional hypotheses bottom-up (hypotheses specified for individual/groups of regions) or top-down (national level hypotheses applied to the regional level?)

Bottom-up ☐ Top-down ☐

D12 Do you make specific hypotheses for different groups of regions?

No ☐ Yes ☐ :

Urban – rural classification ☐

Regional classification (e.g. northern – southern regions) ☐

Other, namely:

Please give details on the classification and the hypotheses

D13 Do you distinguish in the regional hypotheses separate groups of international migrants?

No ☐ Yes ☐ :

Age groups(please specify ☐

Sexes ☐

Asylum migrants ☐

Etnicity ☐

Country of birth ☐

Nationality ☐

Other, namely:

Please specify the different hypotheses for each of the groups in more detail:

D14 Do you use the following information in your hypotheses on regional international migration?

Links between internal and international migration	☐
Asylum policies	☐
The exisiting distribution of migrant populations	☐
Regional-economic growth	☐
Regional labour markets	☐

Other, namely:

Please explain if possible:

Country specific issues

D15 Is there any other information of potential relevance for your most recent subnational population projections and associated migration modelling, not covered by the previous questions?

Part E: Data on internal migration at NUTS 2 level

Please note that this part of the questionnaire refers to the availability of data on internal migration NUTS2 level only and is not directly connected to previous sections of the questionnaire.

Definition of internal migration

Definitions we use:

By internal migration we mean migration within national boundaries, from one place to another. By migration we mean the event associated with a change of usual residence by a person either alone or as part of a household.

By FULL FLOW MATRIX we mean a table of migration between regions where for each source region data on the flow of migrants to all destination regions are available.

By DATA ON DEPARTURES (or migration origins) we mean a table where data on departures from each region are available, but the destinations of the migrants are not stated.

By DATA ON ARRIVALS (or migration destination) we mean a table where data on arrivals to each region are available, but the origins of the migrants are not stated.

By TOTAL NUMBER OF MIGRATIONS we mean a table where neither information on origins nor destinations of migrants is available.

By NET MIGRATION we mean the difference between the number of in-migrants and out-migrants in each region.

Definitions you use:

E1 Please provide the definition of migration as used in your country by the official statistical service. In particular please specify:

Is a crossing of an administrative boundary required for a migrant to be counted?

If yes, which boundary (i.e. municipality)?

Is it necessary in your definition of migration for a migrant to reside at the destination for more than a certain length of time? If yes, please state the minimum length of time involved.

Please provide the answer in this box. Add additional pages if needed.

Data on migration usually originate from two main sources: current registration (movement data) and censuses of population (transition data). The following questions refer to these two main sources.

Data from population registers

E2 Data on migration: Full flow matrix for NUTS 2 units

Not available ☐ Available ☐ :

For what time span are the data available (specify a range of years)?

Are the data available by the sex of migrants? No ☐ Yes ☐

Are the data available by the age of migrants? No ☐ Yes ☐ :

- by 5-years age groups ☐
- by single ages ☐
- other age grouping (please specify)
- What is the last (oldest) age group for which the data are available?

On which media are the data available?

E3 Data on migration: Departures for NUTS 2 units

Not available ☐ Available ☐ :

For what time span are the data available (specify a range of years)?

Are the data available by the sex of migrants? No ☐ Yes ☐

Are the data available by the age of migrants? No ☐ Yes ☐ :

- by 5-years age groups ☐
- by single ages ☐
- other age grouping (please specify)
- What is the last (oldest) age group for which the data are available?

On which media are the data available?

E4 Data on migration: Arrivals for NUTS 2 units

Not available ☐ Available ☐ :

For what time span are the data available (specify a range of years)? ☐

Are the data available by the sex of migrants? No ☐ Yes ☐

Are the data available by the age of migrants? No ☐ Yes ☐ :

by 5-years age groups ☐

by single ages ☐

other age grouping (please specify) ☐

What is the last (oldest) age group for which the data are available? ☐

On which media are the data available? ☐

E5 Data on migration: Total number of migrations for NUTS 2 units

Not available ☐ Available ☐ :

For what time span are the data available (specify a range of years)? ☐

Are the data available by the sex of migrants? No ☐ Yes ☐

Are the data available by the age of migrants? No ☐ Yes ☐ :

by 5-years age groups ☐

by single ages ☐

other age grouping (please specify) ☐

What is the last (oldest) age group for which the data are available? ☐

On which media are the data available? ☐

E6 Data on migration: Net migration for NUTS 2 units

Not available ☐ Available ☐ :

For what time span are the data available (specify a range of years)?

Are the data available by the sex of migrants? No ☐ Yes ☐

Are the data available by the age of migrants? No ☐ Yes ☐ :

- by 5-years age groups ☐
- by single ages ☐
- other age grouping (please specify)
- What is the last (oldest) age group for which the data are available?

On which media are the data available?

E7 Data on population for NUTS 2 units

Not available ☐ Available ☐ :

For what time span are the data available (specify a range of years)?

Are the data available by sex? No ☐ Yes ☐

Are the data available by age? No ☐ Yes ☐ :

- by 5-years age groups ☐
- by single ages ☐
- other age grouping (please specify)
- What is the last (oldest) age group for which the data are available?

On which media are the data available?

E8 Do you recalculate backwards the stock of registered population after each census? If yes please state the availability of such corrected stocks for NUTS 2 units.

Not available ☐ Available ☐ :

What is the date of the census for which the corrected population is available?		
Are the data available by sex?	No ☐	Yes ☐
Are the data available by age?	No ☐	Yes ☐ :
by 5-years age groups		☐
by single ages		☐
other age grouping (please specify)		
What is the last (oldest) age group for which the data are available?		
On which media are the data available?		

Data from censuses and/or surveys

E9 Please state the dates of the last two censuses:

The last census was on ☐ (day/month/year)

The previous census was on ☐ (day/month/year)

E10 Did you have any national survey that included questions on internal migration, other than the census over the period 1980-2002?

Yes ☐ No ☐

If yes please provide details stating the date of the survey and the sample on which the survey was conducted

Survey	Date of the survey	Sample size

E11 Data on population for NUTS 2 units: Please provide the following information for each census/survey identified in E9 and E10.

Not available ☐ Available ☐ :

Census/survey ☐

Are the data available by sex? No ☐ Yes ☐

Are the data available by age? No ☐ Yes ☐ :

- by 5-years age groups ☐
- by single ages ☐
- other age grouping (please specify) ☐
- What is the last (oldest) age group for which the data are available? ☐

On which media are the data available? ☐

Census/survey	
Are the data available by sex?	No ☐ Yes ☐
Are the data available by age?	No ☐ Yes ☐ :
by 5-years age groups	☐
by single ages	☐
other age grouping (please specify)	
What is the last (oldest) age group for which the data are available?	
On which media are the data available?	

Census/survey	
Are the data available by sex?	No ☐ Yes ☐
Are the data available by age?	No ☐ Yes ☐ :
by 5-years age groups	☐
by single ages	☐
other age grouping (please specify)	
What is the last (oldest) age group for which the data are available?	
On which media are the data available?	

Add additional pages if needed.

E12 For each migration question in each census/survey please provide the following information:

E12.1 Tabulation of the results of the census/survey in .....(please state the year)

E12.2 Question asked:

E12.3 By filling the table below please provide the information what concept of migration you used in the censuses/surveys.

Census/Survey (please specify the date)	Place of birth	Previous address	The date of move from this address to the address at the time of enumeration	Place of residence at a specific point in time in the past (please specify the point of time)

E12.4 Data on migration: Full flow matrix for NUTS 2 units

Not available ☐ Available ☐ :

For what time span are the data available (specify a range of years asked in migration question)?

Are the data available by the sex of migrants? No ☐ Yes ☐

Are the data available by the age of migrants? No ☐ Yes ☐ :

by 5-years age groups ☐

by single ages ☐

other age grouping (please specify)

What is the last (oldest) age group for which the data are available?

On which media are the data available?

E12.5 Data on migration: Departures for NUTS 2 units

Not available ☐ Available ☐ :

For what time span are the data available (specify a range of years asked in migration question)?	
Are the data available by the sex of migrants?	No ☐ Yes ☐
Are the data available by the age of migrants?	No ☐ Yes ☐ :
by 5-years age groups	☐
by single ages	☐
other age grouping (please specify)	
What is the last (oldest) age group for which the data are available?	
On which media are the data available?	

E12.6 Data on migration: Arrivals for NUTS 2 units

Not available ☐ Available ☐ :

For what time span are the data available (specify a range of years asked in migration question)?	
Are the data available by the sex of migrants?	No ☐ Yes ☐
Are the data available by the age of migrants?	No ☐ Yes ☐ :
by 5-years age groups	☐
by single ages	☐
other age grouping (please specify)	
What is the last (oldest) age group for which the data are available?	
On which media are the data available?	

E12.7 Data on migration: Total number of migrations for NUTS 2 units

Not available ☐ Available ☐ :

For what time span are the data available (specify a range of years asked in migration question)?	tc
Are the data available by the sex of migrants?	No ☐ Yes ☐
Are the data available by the age of migrants?	No ☐ Yes ☐ :
by 5-years age groups	☐
by single ages	☐
other age grouping (please specify)	
What is the last (oldest) age group for which the data are available?	
On which media are the data available?	

E12.8 Data on migration: Net migration for NUTS 2 units

Not available ☐ Available ☐ :

For what time span are the data available (specify a range of years asked in migration question)?	
Are the data available by the sex of migrants?	No ☐ Yes ☐
Are the data available by the age of migrants?	No ☐ Yes ☐ :
by 5-years age groups	☐
by single ages	☐
other age grouping (please specify)	
What is the last (oldest) age group for which the data are available?	
On which media are the data available?	

THANK YOU FOR COMPLETING THE QUESTIONNAIRE

Annex 1: Explanation of terms

Intensity measures

Basically, the following measures may be used in any projection model:
1. The *occurrence-exposure rate*, or simply *rate*. This measure is the number of events per person-year. Usually, the total exposure time is approximated by the average population during the observation period, multiplied by the length of the period in years.
2. The "*French probability*", or conditional probability, giving the relative frequency of events for an initial population, conditional on no disturbing events taking place. In other words, this probability measure takes account of the effect of disturbing events on the size of the population.
3. The "*quotient perspective*", or unconditional probability. This is the simplest measure, and gives the relative frequency of events for an initial population, without taking into account the disturbing effects of other events.

Migration
Internal migration streams can be classified by region of origin and by region of destination. If external migration is included as well, an additional region "rest of the world" may be defined, functioning as the origin of immigration and the destination of emigration. The terms "immigration" and "emigration" refer to migration across national boundaries. From the point of view of individual regions, the term "outmigration" is used for all migrations out of the region, regardless of whether the destination is "rest of the world" (external) or another region in the same country (internal). Similarly, the term "inmigration" is used for all migrations into the region, whether internal or external.

Migration models
Three classes of migration models may be distinguished on the basis of the amount of information used in the model.
1. The *multiregional model* disaggregates migration flows by each combination of region of origin *and* region of destination. That is, the matrix of migrants by origins and destinations (OD-matrix) is completely specified. Rates are specified for each cell in the matrix, which implies that in the projection each origin-destination combination is projected independently.
2. In the *migrant pool model* outmigration as well as inmigration is known for each region, but a complete cross-classification of migrants by origin and destination cannot be made. In other words, only the marginal totals of the migration matrix are known. Projection proceeds in two step: in the first step the pool is filled with all projected outmigrants, using some form of intensity measure of outmigration. In the second step, the pool is allocated to the respective destination regions, based on a distribution algorithm. Usually, fixed inmigration proportions are used.
3. The simplest form of migration model is the *net migration model*. Here, only net migration for each region is used, either in the form of absolute numbers or in the form of net migration proportions or some related measure.

Simultaneous versus sequential models
In a simultaneous projection models all components can be projected simultaneously, i.e. in one single calculation step. If intensity measures are specified in the form of rates, than the model should be simultaneous. On the other hand, in a sequential model the components are projected one at a time, in a fixed sequence.

Annex 2: Data availability

Table A.1. Population data

	Country	Source	Age	Date	Regions used	Time series as from
1.	Austria	Census	0,1,.., 95+	1 January	Bundesländer	1961
2.	Belgium	Register	0,1,.., 99+[a]	31 December	NUTS 3	1971
3.	Denmark	Register	0,1,.., 99+	1 January	NUTS 3	1972
4.	Finland	Register	0,1,..,100+	31 December	Municipality	1980
5.	France	Census	0,1,.., 99+	1 January	Municipality	1975-1990
6.	Germany	Register	0-4,.., 75+	31 December	Kreise	W:1977; E:1985
7.	Greece	Census	0,1,.., 90+	1 January	NUTS 2	1990[b]
8.	Italy	Register	0,1,.., 90+	1 January	Regioni	1952
9.	Netherlands	Register	0,1,.., 99+	1 January	Municipality	1970[c]
10.	Norway	Register	0,1,.., 99+	31 December	Municipality	1965
11.	Portugal	Census	0-4,.., 85+[d]	16 April	NUTS 2	1981
12.	Spain	Census	0,1,..,100+	31 December[e]	NUTS 2[f]	1980
13.	Sweden	Register	0,1,.., 95+	31 December	Municipality	1970
14.	United Kingdom					
	England	Census	0-4,.., 85+	30 June	LAA[g] and DHAA[h]	at least 1981
	Scotland	Census	0-4,.., 90+	30 June	Standard area	1981
	Wales	Census	0-4,.., 90+	30 June	County and DHAA[h]	1981[i]

[a] Recent data: age range 0,1,..,104+.
[b] Regional data is also available at NUTS 3 level (nomos), classification and time series unknown.
[c] Total population per municipality available since 1811 in the Hofstee Archive at NIDI.
[d] Unknown whether also in one-year age groups.
[e] Estimated backwards from census day 1 March 1981.
[f] Five-year age groups (0-4,..,85+) available for NUTS 3 level.
[g] Local Authority Area.
[h] District Health Authority Area.
[i] One-year age groups (0,1,..,85+) available from 1992 onwards.

Table A.2. Internal migration data

	Country	Age	Age at	Region	Type	Time series as from
1.	Austria	Estimates for one-year age groups	Various	Bundesländer	Net	1961[a]
2.	Belgium	0,1,2,..,99+	31 Dec.	NUTS 3	OD	1961[b]
3.	Denmark	-1,0,1,2,..,99+	1 Jan.	NUTS 3	OD	1974
4.	Finland	0,1,2,..,100+	31 Dec.	Municipality	OD	1981
5.	France	Estimates for one-year age groups	1 Jan.	Municipality	Net	
6.	Germany[c]	Kreise: 0-17,18-24,25-29,30-49,50-64,65+[d] Länder: one-year age groups	Event	Kreise	OD[e]	WE/EW: Oct. 1991
7.	Greece	Unknown	Unknown	Unknown	Net	1981
8.	Italy	0,1,2,..,90+	Event	Municipality	OD	1969[f]
9.	Netherlands	-1,0,1,2,..,99+	1 Jan.	Municipality	Mixed[g]	1970
10.	Norway	0,1,2,..,69	31 Dec.	Municipality	OD	1967
11.	Portugal	0-4,5-9,..,85+	16 Apr	NUTS 2	Unknown	1981
12.	Spain	0,1,2,..,100+	Event	NUTS 2[h]	Mixed[g]	1981
13.	Sweden	0,1,2,..,95+	Event	Municipality	Pool	1970
14.	United Kingdom	All countries:				
	England	Estimates for one-year age-groups from NHSCR;	30 June	LAA	OD[i]	1981
	Scotland	Scotland also from electoral registration	30 June	Standard area	Net[i]	1981
	Wales	returns	30 June	County,DHAA	Net[j]	1984

[a] More detailed data available from 1981 onwards.
[b] OD matrix on NUTS 3 level without breakdown by age. From 1981 onwards breakdown by five-year age groups. From 1989 also on municipality level.
[c] For East Germany, these migration data have not been (and should not be) used as inputs for the projection because of the completely changed migration flows after the German reunification.
[d] Including WE and EW from 1 October 1990. For EE: 19 age groups, Kreise level, until October 1990.
[e] For EW and WE migration: OD since 1 October 1991.
[f] Age at January 1st available since 1982.
[g] Pool data by age and sex, OD data not by age and sex.
[h] Five-year age groups available for NUTS 3 level.
[i] Estimated from NHSCR and census 1981.
[j] Estimated from NHSCR and mid-year population estimates.

Table A.3. External migration data

	Country	Age	Age at	Origin/Destination	Time series as from
1.	Austria	Estimates for one-year age groups	Various	Net	1961[a]
2.	Belgium	0,1,..,99+	31 December	Im: D; EM: O	1981[b]
3.	Denmark	-1,0,1,..,99+	1 January	Im: D; Em: O	1974
4.	Finland	0,1,2,..,100+	31 December	Im: D; Em: O	1981
5.	France	Estimates for one-year age groups	1 January	Net	
6.	Germany	0-17,18-24,25-29,30-49,50-64,65+	Event	Im: D; Em: O[3]	1978[c]
7.	Greece[d]	Estimates for five-year age groups	Event	Unknown	1981
8.	Italy	0,1,..,90+	Event	Im: D; Em: O	1969[e]
9.	Netherlands	-1,0,1,..,99+	1 January	Im: D; Em: O	1970
10.	Norway	0,..,69	31 December	Im: D; Em: O	1967
11.	Portugal	0-4,5-9,..,85+	Unknown	Unknown	Unknown
12.	Spain	0,1,..,100+[f]	Event	Im: D	1981
13.	Sweden	0,1,2,..,99+	Unknown	Im: D; Em: O	1970
14.	United Kingdom	All countries: Estimates for five-year age groups (Inside UK: NHSCR; Outside UK: IPS)		All countries: Inside UK: OD; Outside UK: Im: D; EM: O	
	England		30 June		1981
	Scotland		30 June		1981
	Wales		30 June		1984

[a] More detailed information from 1981 onwards.
[b] Five-year age groups. Since 1989 one-year age groups.
[c] No data for former GDR before October 1990.
[d] Data for immigrants are received from the permits of stay (Ministry of Public Order); data for outmigration are received from surveys (Labour Force Survey, etc.).
[e] Age at January 1st available since 1982.
[f] Five-year age groups available for NUTS 3 level.

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