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P. Rees, M. Kupiszewski, H. Eyre, T. Wilson, H. Durham

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THE EVALUATION OF REGIONAL POPULATION PROJECTIONS FOR THE EUROPEAN UNION

ERDF STUDY No. 97/00/74/018

Philip Rees[1]
Marek Kupiszewski[1,2]
Heather Eyre[1]
Tom Wilson[1]
Helen Durham[1]

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[1]School of Geography
University of Leeds
Leeds LS2 9JT
United Kingdom

[2]Institute of Geography and Spatial Organization
Polish Academy of Sciences
Twarda 51/55
Warsaw
Poland

Report prepared for the European Commission Directorate General XVI (Regional Policy and Cohesion) and EUROSTAT (Statistical Office of the European Communities).

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EXECUTIVE SUMMARY

The European Union needs national and regional population projections on a harmonized basis for input to its social, economic and regional policy formulations. Directorate General XVI (Regional Policy and Cohesion) has funded four rounds of such projections using 1980, 1985, 1990 and 1995 population bases. The third and fourth round projections were organized in collaboration with the Statistical Office of the European Communities. This report carries out an evaluation of those projections.

- A comprehensive summary of the documents generated by projection contractors is provided (section 1).
- A review of the projection models used is undertaken (section 2). At each round substantial improvements have been made, cumulating in a fourth round model that develops intelligent scenarios for all change components at national scale, uses sophisticated statistical analysis to select a best-compromise interregional migration model and introduces new ways of projecting its intensities for converging and diverging regional systems.
- Suggestions are made for further improvement in a fifth round of projections with a 2000 population base. These include (1) expansion of the multi-regional framework to include all EU NUTS 2 regions in one model, (2) adoption of smaller scale regions (NUTS 3) with the existing model, and (3) introducing interregional migration models linked to social and economic variables (such as density of population and unemployment rate).
- The forecasting assumptions and detailed estimation methods are evaluated in section 3 and projected populations are compared systematically with subsequent population estimates and other round projections in section 4. Projection errors are assessed in section 5 at EU, national and regional levels.
- The main problems occurred in the 1980 and 1985 projection rounds: international migration was virtually ignored as a contribution to population change but subsequent history has shown that it has played a vital role in sustaining the size of populations in many European Union member states and in selected regions. In addition, the assumptions that fertility and mortality would remain constant over time and fixed in space (constant region to nation ratios) proved erroneous.
- These problems were corrected in the 1990 and 1995 projection rounds. In 1995 scenarios were developed for all projection components which probably capture the full range of future outcomes, though as yet there is insufficient evidence to assess the goodness of fit of the central 1990 and 1995 projections. In one respect, we believe a shift in view is needed. The central mortality assumptions in all projection rounds have consistently under-estimated the improvement in middle age and elderly mortality, and hence the growth of the elderly population. This experience suggests that the more optimistic views of progress in this area should be adopted as the baseline.
- Recommendations on further improvements of the EU regional projections are put forward as a collective set in section 6 of the report. Emphasis is placed on the need to disseminate results of the projections to a wider audience and to potential users. There is also a need, in the next round, to involve a wider range of institutions (NSOs and national experts) in a consultation process, with the aim of developing consistent scenarios tailored to developments in the large number (200+ and rising) of NUTS 2 regions in the European Union.

1. INTRODUCTION

1.1 Background

The "European project" can be defined as a coming together of free and democratic nations into one community, in which the flow of people, goods and money is to be encouraged and enabled for the greater good of the European people. Membership by countries has grown from six founder members, Belgium, France, Germany, Italy, Luxembourg, the Netherlands, which signed the Treaty of Rome in 1957 to form the European Economic Community to the current 15 members of the European Union (EU), defined by the Treaty of Maastricht. In 1975 Denmark, Ireland and United Kingdom joined, creating the European Communities/Community. 1983 saw the accession of Greece, Portugal and Spain. In 1990 the Federal Republic of Germany unified with the former German Democratic Republic to form an expanded German state. Austria, Finland and Sweden became members in 1995. Five other states, the Czech Republic, Estonia, Hungary, Poland, and Slovenia, are in current negotiation to join. Each of these nations is composed of regions, whose population size, structure, density and level of development (per capita incomes, employment mix, economic activity and unemployment) varies as much as do the countries making up the EU.

The EU central institutions (the Council of Ministers, the Commission, the Parliament) function in part as the government of Europe and make Europe-wide policy. One of the policy goals adopted by the EU is to reduce inequality across its member states and their regions. This is to be accomplished by a redistribution of EU revenues towards less developed member states (the Cohesion fund) and towards poorer regions (the Regional Development programmes). Objective criteria need to be used in the allocation of funds to countries and regions. Population statistics for these units play an important role. They form inputs to the computation of per caput indices and various labour market measures. There is a need for population statistics projected into the future for two main reasons. First, "current" data always lag one or two years behind the present and projections often provide the best estimates of current conditions. Second, we need to plan collective savings, pension schemes and health care provision decades in advance of the needs of the population. In particular, Europe faces considerable population ageing in the 21st century, and social action is needed now to make this one of the success stories of modern civilization rather than the "burden" it is often portrayed as.

To respond to this need for future knowledge, the European Commission's Directorate General for Regional Policy and Cohesion (DG XVI) commissioned four rounds of national and regional population projections on a harmonized basis across the European Community/European Union. It is these four rounds of population projection activity which are evaluated in this report. Why was it necessary to carry out EU projections when the National Statistical Offices (NSOs) of the member states already carried out national and regional projections (reviewed in van Imhoff *et al.* 1994)? The answer is straightforward. National projections differ in the data, methods and assumptions employed, and so cannot be used for the allocation of central funds to member states or their regions. You need to use data that are as comparable as possible, and use the same projection method and similar assumptions. Achieving harmonized data, a common model and common assumptions has been the goal of the four projection rounds, each one achieving more than its predecessor.

The process of using harmonised statistics was considerably enhanced by the partnership with DG XVI of Eurostat (the Statistical Office of the European Communities) in the third and fourth rounds of projection. Led by the skilled Dutch demographer Harri Cruijsen, Eurostat's participation has stimulated the improvement of the national and regional projections through improved assumption making (early 1990s), improved models for inter-regional migration (middle 1990s) and better, more detailed statistics from NSOs (throughout the 1990s).

1.2 Aims

This document reports on a project to carry out an *Evaluation of Regional Population Projections for the European Union* sponsored by the European Commission, Directorate General XVI (Regional Policy and Cohesion) over the period 1985-98, with the collaboration of Eurostat since 1992. The specific aims of the project are:

- to review and evaluate the methodology adopted in four rounds of European Regional Population Projections (section 2 of the report)
- to compare the main assumptions of the four projection rounds (section 3)
- to compare the main results of the projection rounds (section 4)
- to compare the projection results with observed demographic series for the limited time windows for which both sets of information are available (section 4)
- to analyze the differences between projections and observed demographic series and identify the sources and degrees of error (sections 3 and 5)
- to make recommendations about the future projections to be carried out in the next round after 2000 (section 6).

The word "to evaluate" conventionally means "to assess the worth of". This proposal will assess the worth of the four sets of regional population projections commissioned by Directorate General XVI, Regional Policy and Cohesion, over the past decade. These projections have been used by the Commission to inform its regional policy and results are used in the *Periodic Reports on the social and economic situation and development of the regions of the Community* and in the *Regional Development Studies*. The projections provide a set of demographic projections, which use comparable data, methods and assumptions for the NUTS Level 2 regions in all European Community/Union member states. We can also extend the meaning of "evaluate" to encompass "extract the best from". The regional population projections have not received much use outside of the Commission, so that part of our evaluation will assess how this might be done through various dissemination strategies.

1.3 The four projection rounds: characteristics

Table 1.1 provides summary information about each of the projection rounds. The *first* column simply lists the sequence order of the projections. The *second* column lists the funding and sponsoring organizations involved. In rounds three and four DG XVI provided the funding for the associated projects, while Eurostat managed the projects and oversaw the flow of data, the preparation of assumptions and the production of outputs. The contracting organizations, which did the work, are listed in the *third* column of the table. Each projection round was subject to competitive tender. All contractors were located in the southern arc of the Dutch Randstad, reflecting the concentration of demographic/economic research institutes there and their world class expertise. Dutch research institutions also benefit from the strong ties and flow of contracts from the Netherlands national government agencies, which give them experience and a track record second to none.

The *fourth* column of Table 1.1 sets out the acronym used by the contractors to describe their model and results. The Netherlands Economic Institute adopted DEMETER, which stands for Demographic Evolution through Time in European Regions. To this was added the end date of the projection series generated, e.g. 2010. The fourth round contractors do not appear to have adopted a collective acronym for their models and results. However, it is useful to have a shorthand title for the projection round and the name EUROPOP1995 is suggested, standing for European Union Population Projections for Countries and Regions with a 1995 base. This acronym has several advantages: it is recognizable in most European languages, since the stem "Euro" is widely used. The same reasoning applies to the second component, "Pop". We propose use of the base year of the projection rather than the end year, because the former is fixed whereas the latter is arbitrary. Some round four projections were run to 2050, for example, and it is always possible for the sponsoring organization to request longer projection runs. Using the population base year to label projections is the most common practice among NSOs. A final advantage of this new acronym is its association with the new European currency, and with the idea of making projection results more "popular", more accessible to a wider population. The fifth round of European country and region projections would be called EUROPOP2000, the sixth EUROPOP2005 and so on. The *fifth* column of Table 1.1 reports the end year of the main projection runs carried out in the projection round.

The *sixth* column lists the base year for which the population stocks used in the projection were assembled (January 1 in the year in question). Input data for the fertility, mortality and migration components employed refer, in general, to the latest period for which information was available prior to the base year, if information was not available for that year. In the case of internal migration where the last national census is the source, the information can be quite dated. The *seventh* column of the table gives the age/time interval used in the projection. Note that age and time intervals must be the same for legitimate projection (despite attempts to define models that mix five-year age intervals with one-year time intervals). For rounds one and two, a model and projections with five-year age and time intervals was used. By 1990 both data and software had improved to make possible a model with single years of age and one-year time intervals at rounds three and four.

The *eighth* column notes the number of countries covered by each projection round. The first round, completed in 1986, was able to include statistics for the EUR12 member states, although in 1980 there were only 9 member states in the European Community. The number of countries remained twelve in the 1985 and 1990 rounds, but was expanded to eighteen in the 1995 round through the inclusion of Iceland, Liechtenstein and Norway (de Beer and de Jong 1996) and projections were also carried out for Switzerland by Eurostat (Cruijsen and Eding 1996). The motivation for this expansion in countries was to anticipate accession of these countries to the European Union. However, unlike Austria, Finland and Sweden, these countries declined to join and regional projections were carried out only for European Union member states. The *ninth* column of Table 1.1 lists the number of regions for which projections have been produced together with the number of countries involved. In each round no regional projections have been carried out for Ireland and Luxembourg, the smallest countries among the EUR12/EUR15. The regional scale at which projections have been carried is Level 2 of the harmonized classification of regions called the *Nomenclature des Unités Territoires Statistiques* (Nomenclature of Units for Territorial Statistics), abbreviated NUTS. These average about 2 million inhabitants. The number of regions has risen over the projection rounds as countries have joined the EU and as the spatial extents of local government areas within national territories have been re-organized (see Table 5.4 for an overview of the changes). The main increases have been through addition of Flevoland in the Netherlands (round two), the eastern states in Germany and the regions of Austria, Finland and Sweden. From time to time NUTS 2 boundaries have been changed and we can anticipate further changes in the future (e.g. the complete re-specification in 1998 of the NUTS 2 regions in the United Kingdom as a result of local government re-organization in Scotland, Wales and England). We note here that very little attention has been given to the problem of changing territorial units or to whether NUTS 2 regions are the most appropriate spatial units to use. This topic will be discussed again in section 6 of the report.

1.4 The four projection rounds: a review of documents produced

Before discussing and evaluating the methods, assumptions and results of the four projection rounds it is useful to briefly describe the source documents. Tables 1.2, 1.3, 1.4 and 1.5 set out the documents produced for each projection round. The 1980 and 1985 rounds produced only the contractor reports to DG XVI, while the 1990 and 1995 rounds have resulted in contractors reports, official working papers (of Eurostat), statistical tables in Eurostat and Statistics Netherlands serials, journal articles and one independent review (Rees 1996). Most of the reports were presented at conferences or working meetings associated with or sponsored by Eurostat. How accessible these publications are to a Europe wide readership is debatable. The journal and book articles can probably be obtained through most higher education or research libraries, but the departmental reports and working papers have to be requested from Eurostat or the authors. The way in which such very valuable documentation is being made accessible today is via the World Wide Web. The Web provides a mechanism for placing research reports, whose volume and detail far exceed journal or book capacity, to be placed in a "virtual library" for wider use and dissemination.

1.4.1 Publications from the 1980 projection round

The NEI (1986) report describes the methods used for the 1980 base national and regional projections. Fertility, mortality, international migration and interregional migration are discussed and assumptions about the future development of these components are put forward based on recent trends. For the national projections, total populations for each country are shown at five-year intervals, along with population change and changes in population structure. At regional level, total population change is given for each region and the effects of each component of population change are presented.

1.4.2 Publications from the 1985 projection round

The reports by Haverkate and van Haselen (1990, 1992) are similar in format to NEI (1986). Recent developments in the four components of population change are analyzed and the performance of the assumptions in the 1980 base model are briefly considered. This information is then used to produce new assumptions for each component. The main results of the population projections are shown for both national and regional projections, which consist mainly of population change and the effect on the age composition of the population. This report also contains a section on the effect of the unification of Germany. However, neither the 1980 nor 1985 round reports provides comprehensive tables or computer files holding the detailed input or output variables. The contractor (NEI) may hold such information in their computer system but we were informed that retrieval would require considerable labour because the files were held on magnetic tape in obsolete formats. A copy of the 1985 tape supplied by DG XVI proved unreadable. There is a need to put in place a formal strategy for preserving computer generated project information.

1.4.3 Publications from the 1990 projection round

Table 1.4 lists the much greater volume of publications arising from the 1990 round of European projections. The first set of papers (Cruijsen 1991 to Eurostat 1993b) relate to national scenarios and projections prepared by Eurostat as part of a major conference held in Luxembourg on *Human Resources at the Dawn of the 21st Century* in 1991. The scenarios and projections are described in Eurostat (1991). This paper contains a short summary of the assumptions underlying the two scenarios for the 1990 base national population projections. Detailed data are provided at the national level on population change and the effect that each component has. The future age compositions of the population of EC countries according to the two scenarios are presented. Eurostat (1993a) reports the national projected populations dissagregated by age for the 1990 round. Eurostat (1993b) gives similar detailed results for EFTA countries. The arguments supporting the scenarios are set out in three papers, authored or co-authored by Cruijsen.

Cruijsen (1991) reports on a detailed analysis of national fertility trends. These trends are reviewed in the context of changes in the determinants of fertility. Recent fertility projections produced by individual countries are considered. Two fertility scenarios, of high and low fertility, are produced, which contain projected future paths of national age-specific fertility rates from a birth cohort perspective.

Lopez and Cruijsen (1991) analyze the major trends in national age and cause specific mortality rates over the last 20 years. Sex differences are also considered. Based on these developments, two mortality scenarios, high life expectancy and low life expectancy improvements, are developed at the national level in EC countries and in EFTA countries (Eurostat 1993b).

Muus and Cruijsen (1991) provide an analysis of international migration for the EC, containing a description of how migration is calculated. A description of past national trends in net international migration is provided for different types of migration is undertaken. The migration levels experienced by different countries are outlined.

Factors thought to affect the level of international migration, such as labour market needs and migration policies, are studied. Based on these analyses two scenarios, of high and low net immigration, for future net international migration are developed.

The regional projections in the 1990 round are presented in a series of Netherlands Economic Institute papers (NEI 1993a, 1993b, 1994a, 1994b, 1994c and 1994d). NEI (1994b) and (1994d) cover the labour force scenarios, which are outside the scope of this review. NEI (1993a) reports on the 1990 base regional population projections and includes a brief description of the model. How each component is transformed from a national to a regional factor is briefly described. Detailed historical analysis of fertility and mortality is undertaken which is used to project the regional age specific mortality and fertility rates. The possibility of introducing regional variations in the two scenarios is also reviewed. NEI (1993b) is a detailed study of interregional migration for the 1990 base regional projection model. The paper provides a brief description of alternative methods and outlines the method used in the 1990 projections. Two detailed case studies are presented (Belgium and the Netherlands) concerning the overall mobility level in each countries, the production of schedules of age-specific migration and the distribution of migrants to other regions. These are the variables that are required for the modelling of interregional migration using the multi-regional method.

NEI (1994a) is the main descriptive report for the 1990 regional projections. This work contains descriptions of the methods, analysis, assumptions and main results of the regional population scenarios. The structure of the DEMETER model is described and each component of population change is analysed in detail. The assumptions for the two scenarios are outlined and the main results are presented. NEI (1994c) gives detailed results of the 1990 regional population projections. Projections concerning future levels of fertility, life expectancy, internal and external migration are produced as well as developments in total population and population composition.

Parallel to the DEMETER model work and projections, a set of evaluations was carried out. First, the Netherlands Interdisciplinary Demographic Institute (NIDI) undertook a review of the latest official regional population projections undertaken by EEA countries, in order to identify possible improvements to the regional projection model (van Imhoff et al. 1994). This monograph is essential reading for NSOs reviewing current practice in regional population projection and for students on advanced demography courses. Second, Cruijsen and Eding (1996) presents an evaluation of the 1990 national population projections to aid the production of the 1995 projections. The differences between projected and observed fertility were described and analysis was undertaken to discover which of the two scenarios produced the most accurate projections for each component of population change as well as total population. Third, Rees (1996) provides a review of the 1990 projection round model and results and compares it with a model and set of projections developed at the University of Leeds (Rees, Stillwell and Convey 1992). The modelling issues raised are discussed further in section 2, while further evaluation of assumptions for the 1995 round is reported in section 3.

1.4.4 Publications from the 1995 projection round

Table 1.5 lists the publications from the 1995 round of national and regional population projections. Responsibility for national projections and for the regional fertility, mortality and international migration assumptions was assigned to Statistics Netherlands (Centraal Bureau voor de Statistiek), while Regional projection methods and internal migration scenarios were tasks carried out by the Netherlands Interdisciplinary Demographic Institute.

The 1995 base *national population projections* are presented by de Beer and de Jong (1996). The methods and the assumptions used are outlined and the main results are shown. The development of EEA national populations and components of change is described. The projected changes in the age structure of the populations of the countries in the EEA are also presented. CBS (1996) summarizes the future development of population, disaggregated by age, as projected by each scenario of the 1995 base model. Eurostat (1997b) reports on the new national projections in the EU according to the three population projection scenarios (low, baseline and high). The future development of fertility levels, life expectancy, the size of the working population, the level of population ageing and age dependency are analysed.

Fertility scenarios are described by de Jong (1995, 1997b). He provides a detailed analysis of fertility scenarios for use in the 1995 regional population projection model. Recent trends in total fertility, birth order specific fertility and the timing of fertility are analysed. The factors explaining the differences in fertility experience amongst EEA countries are considered. Previous fertility scenarios in the EEA are evaluated and forecasts of the future fertility are presented. Three new scenarios for the future development of fertility at both national and regional level are produced.

Mortality scenarios are outlined in van Hoorn and de Beer (1998). They produce a detailed analysis of mortality developments, which is employed in the production of regional scenarios for the 1995 round projections. The main trends in mortality are analyzed and the determinants of mortality are studied. The differences in mortality levels between EU countries are reviewed and previous mortality scenarios are evaluated. Three national mortality scenarios and the corresponding regional scenarios are developed and the assumptions that underlie these and the main results produced by them are presented.

International migration scenarios are reported in de Jong and Visser (1997). The international migration pattern of the EEA is described and analysis is undertaken on the effects of economic changes on migration flows. Previous scenarios developed for international migration for the EEA are evaluated and forecasts as to future migration are presented. Qualitative and quantitative assumptions are presented that underlie the scenarios for international migration and the three scenarios are spelled out.

An *overview of regional scenarios* is provided in van der Gaag and de Jong (1997). The future demographic development in the EU at the regional level is presented. The methodology used in the projections and the assumptions that underlie the regional scenarios are described. The regional development of each of the components of population change is analyzed in detail.

Full reports on the *regional projection model*, the *internal migration model and scenarios* and regional projection results are provided in van der Gaag *et al*. (1997a and 1997b), with the NIDI report containing more detailed tables. Alternative migration models for projecting interregional migration are compared and the method chosen for the 1995 model is described. The data available for calculating internal migration scenarios are outlined and current patterns of interregional migration studied. Three scenarios for the 1995 base projection model are developed and the results of the three projections are presented. More detailed accounts of the research into alternative internal migration models are given in van Imhoff *et al.* (1997) and van Imhoff (1999). An update on regional projection practice in European Union member states is presented in van der Gaag *et al.* (1997c).

2. REVIEW AND EVALUATION OF METHODS

Building on an existing review of the 1985 and 1990 rounds of regional projections (Rees 1996), we review the work under six general headings:

- the methods of national and regional population projection used (section 2.1),
- the state-space of the national and regional population system adopted (section 2.2),
- the input data and estimation methods employed (section 2.3),
- the methods of scenario development implemented (section 2.4),
- the ways in which projection model results are verified (section 2.5)
  and
- the population and component variables that are output from the projections (section 2.6).

Specific details of methods used in the four projection rounds are discussed in section 3.

2.1 Methods of national and regional projection

The methods employed in each of the four rounds of projection combine both conventional techniques with a number of innovations that address the problems of making the best estimates of the demographic intensities that need to be input to a population projection. Over the four rounds a programme of successive improvement of both input data and model has been implemented in an impressive way.

At the heart of the projection model is a set of cohort component equations:

population at time t+n in age group x+n
= population at time t in age group x
- deaths in time interval t,t+n of persons in age group x at time t
- total out-migrants in time interval t,t+n of persons in age group x at time t
+ total in-migrants in time interval t,t+n of persons in age group x at time t

These accounting equations are converted into projection equations by substituting mortality and migration intensities for the deaths and migration flow terms. These intensities have to be converted into mortality probabilities and migration probabilities for period-cohort transitions using conventional or multi-regional life table equations (as described in Willekens and Rogers 1978, Rogers 1995, van Imhoff and Keilman 1992). In the national projections throughout and in regional projections in the 1980 and 1985 rounds conventional equations are used. In the 1990 and 1995 regional projections the multi-regional life table derivations are used, as implemented in the MUDEA multi-regional model package (developed by Willekens) in 1990 and in the LIPRO multi-regional model package (developed by van Imhoff and Keilman). These are state of the art multi-regional projection models, but they have one major drawback, which is unacknowledged in the four projection rounds. They each assume that the input intensities are occurrence-exposure rates and treat the intensities computed from census migration data as if they were event data. We return to this issue later.

These equations apply from the first age to the last. The population in the first age group at the end of the time interval is generated by substituting births for starting population stocks:

population at time t+n in age group 0
= births in time interval
- deaths in time interval t,t+n of persons born in the time interval
- total out-migrants in time interval t,t+n of persons born in the time interval
+ total in-migrants in time interval t,t+n of persons born in the time interval

Births in the time interval are computed by applying age-specific fertility rates to populations of women in fertile ages at risk of maternity:

births in time interval t,t+n
= sum over all fertile ages of
the number of women by age multiplied by the age-specific fertility rate

Births must be allocated to each sex by application of a sex probability at birth (usually in the range 0.51-0.52 for males and 0.48-0.49 for females).

These equations are applied at two spatial scales: the national (NUTS 0) and regional (NUTS 2), but the migration component is treated differently. At the national scale, only external migration needs to be taken into account, while at the regional scale, it is necessary to distinguish inter-regional migration internal to each country from external migration. Regional projections are tied to national by linking the regional fertility, mortality and external migration indicators to the national. Net external migration to a country is distributed to regions using a surrogate variable such as the total foreign population stock or residual net migration. Regional fertility and mortality indicators are expressed as ratios of the national total fertility rates and life expectancies and converted into the age-specific intensities needed. There is no requirement that there be a link for inter-regional migration. The levels of inter-regional migration have no immediate effect on the size of national populations. However, over time, under a constant regime of fertility, mortality and external migration intensities, the population will redistribute to higher growth regions and the sum of individual region projected populations will exceed the independently projected national population. There will therefore be an inconsistency between national and regional projections over time. A final step is therefore added that sees the adjustment of regional populations to national totals, projection interval by projection interval. Because the differences between national projected populations and the regional sums are fairly minor, the inconsistencies of this approach have usually been ignored. After adjustment the accounting equations that produce end-of-interval populations will no longer hold. It is necessary therefore to adjust the input fertility and mortality intensities to reflect the adjustments in the populations at risk that have occurred. However, none of the four projection rounds included this step in the model.

The introduction of a multi-regional projection method was a major innovation of the EU projections. However, it is only in the 1990 and 1995 rounds that a full set of external migration assumptions were introduced for each EU member state. The framing of the external migration assumption as a net migration inflow could, we feel, be improved. It is easier to study and to consider the gross migration streams, country by country, and to make informed guesses about their future trajectories than to think about the future of net migration. It is also important to improve the basis upon which external migration is distributed to regional origins and destinations within countries. Both these issues are being researched currently under DG XVI contracts.

One major innovation of the fourth projection round (1995 base) was the investigation by the NIDI team of the alternative representations of inter-regional migration by age and sex in the regional projection model (van Imhoff et al. 1997, van der Gaag 1997a, 1997b, van Imhoff 1999). This work is reviewed in more detail in section 3. A key insight of that work is that the design of the state space of the projection model can be de-coupled from the immediate availability of data. In the interregional migration model the elements have the dimensions origin (O), destination (D), age (A), sex (S) and time (T), which can be represented in shorthand as ODAST. If the regions are large and the time series reliable, then we can observe the migration flows in this ODAST array and compute intensities for input to the project model. However, if the regions are small, if the age detail is fine (e.g. single years of age) and the time series restricted (because of spatial re-organization), then the ODAST array will be sparse and unreliable. We would model the elements in the ODAST array using more aggregate information. For example, we might set all ODAST = ODAS: this would be a time constancy assumption, similar to that adopted in projection rounds one through three. Or we might set all ODAST = OD + AS, which involves the assumption that the age-sex structure of migration is independent of the origin-destination flow. Again this is what was done in the 1980, 1985 and 1990 base projections. Both assumptions were relaxed in the 1995 round, where better data made possible a model of inter-regional migration flows that recognized origin and destination age-sex dependency, i.e. ODAST = OD+OAS+DAS. This model has been assessed as the best choice, which balances parsimony and realism well (van Imhoff *et al.* 1997). The methods for computing migration intensities developed by the NIDI team are elegantly summarized in Chapter 7.2 of van der Gaag *et al.* (1997a, 1997b).

This conceptual leap forward, achieved in the fourth round, enables us to go one step further, we suggest, in a fifth round. The full state-space of the projection model can be reconsidered, independently of current data availability. The intensities (or flows) corresponding to each of the cells in the full state-space can be modelled using available data, or assumed null for the moment if there is no knowledge or a radical scenario assumption could be made, exploring the impact of an event not observed in the past. We now consider what this state-space should be, concentrating on the geographical dimension.

2.2 The state-space of the projection system

At the time of the 1995 base projections there were 202 regions at NUTS 2 level for which regional projections were carried out plus 2 countries (Ireland and Luxembourg), which constituted single NUTS 2 regions, making a total of 204. We might therefore envisage an origin-destination matrix of migration flows set out in the frameworks used in Tables 2.1, 2.2 and 2.3.

The rows of the tables are the possible origins for migrants, while the columns are the destinations. The origins are divided into countries, 1, ..., a, ..., c, within the European Union, and countries in other parts of Europe and countries in the rest of the world. This latter distinction is made because the former are potential future members of the EU, while the later will remain trading and diplomatic partners, except for a few which will also be defence partners. The number of countries in the EU (variable c in the tables) has grown over time, and countries have moved from the outside EU, Europe set to the EU set.

Within each country are a set of regions, 1, ..., i(a), ..., n(a), where i is a typical region in typical country a and n(a) is the number of regions in that country. Flows between regions within countries are represented and modelled in each of the four projection rounds. These flows can be represented as $M^{i(a)j(a)}$ variables. Flows between regions in different countries have not hitherto been represented and modelled – these can be symbolized by $M^{i(a)j(b)}$ variables.

Using this framework, we can see how various models handle the project task. Table 3.1 shows how a *migration pool* model in which information on out-migration from origins and in-migration to destinations only is used, with no origin-destination connections. The review by van Imhoff *et al.* (1994) reveals that this was the commonest model among EEA NSOs for subnational projection. However, the fourth round analysis of internal migration models (van Imhoff *et al.* 1997) emphasizes that it is crucial to include origin-destination dependence, a finding which was intuitively reached by Haverkate and van Haselen in NEI (1986) in their initial DEMETER design. Table 3.2 represents the multi-regional model used in each projection round. The innovations introduced in the fourth round by van der Gaag *et al.* (1997a, 1997b) concern the interaction of origins and destinations with age and sex (substitution of an OD+OAS+DAS model for the previous OD+AS model). Table 3.3 shows the expanded multi-regional model, which we suggest should form the basis of a fifth round projection model.

There are three strong arguments why the inter-regional flows between countries should be included in a future EU projection round.

First, the ideal of the "European project" is to make the flow of people as easy as possible, to remove the barriers against migration between EU countries and to increase the ability of labour markets to adjust to differences in rates of developments. Compared with the United States, migration flows between EU states are very "sticky": this reflects differences in language, labour market regulations and practices, and cultural traditions, of course. But technical instruments used in policy formulation should be aligned to the European ideal.

Second, there are substantial migration flows between European regions in different countries which are as important as many inter-regional flows within countries. For example, there has always been a very large exchange of migrants between Ireland and the large metropolitan areas of the UK (Greater London, West Midlands (County), Merseyside, Greater Manchester). Articles have appeared in the press commenting on the recent increase in migration from northern France to the south-east of England, leading to the establishment of a substantial French community in west London, for example. Such "real world" developments need to be represented in the EU projection model.

Third, expanding the regional space to cover the whole of the EU overcomes the inconsistency problems of a two tier national-regional model. National statistics would clearly be vital in providing the data to estimate model variables, but the projected national populations would merely be one of a number of aggregates that would be produced. There would be an incentive to produce projections for European transnational policy areas (e.g. the North Sea basin, the *Arc Atlantique*, the Eastern borders, the Capitals region). Previously, researchers have been reluctant to construct a multi-regional model with over 200 regions. However, computer capacity (memory, hard disk storage) is no longer a constraint. In the UK the England sub-national model, which has a multi-regional component at its core, now handles 403 territorial units (the so-called "building blocks" or intersections of the smallest local government and health administration areas). Wilson and Rees (1999) report on the design and implementation of a sub-national projection model using 209 regions covering the whole of the United Kingdom.

Another way in which the state-space of the projection model could be altered is to reduce the spatial scale to NUTS 3 from NUTS 2. Elsewhere (Kupiszewski and Rees 1999) we have argued that important population redistribution processes in European countries can only be captured at fine spatial scales. Where a country's population redistribution system lies along the urbanization/turnaround/counter-urbanization spectrum can only be discovered by analysis at a smaller spatial scale than NUTS 2. NUTS 3 regions are also more likely to be administrative areas with a role in spatial planning than are NUTS 2 regions. In France, for example, NUTS 3 areas are the 94 *departèments*, in existence since the French revolution. In Italy, the 95 *provinci* make up the NUTS 3 layer. If policy variables were to be introduced into migration scenarios, then this would be much easier at NUTS 3 scale.

However, there are counter-arguments. The number of regions increases from 204 (NUTS 2) to 1031 (NUTS 3 as of 1995), which is probably beyond the capability of current software. The migration arrays would be very sparse arrays or contain very small migration intensities. So the proposal to integrate regions across countries competes against the proposal to increase the number of regions within a country.

The final consideration that should be addressed in designing the state-space of the fifth projection round is whether to include candidate member states in Central Europe (Estonia, Czech Republic, Hungary, Poland and Slovenia). By the time work is complete on the 2000 projection round in 2002, agreements will probably be in place for accession of some or all of these countries in 2003 to 2005. There should be no difficulty in including this set of countries, which have well developed statistical systems and considerable experience in demographic analysis (Rees and Kupiszewski 1998 includes an analysis of internal migration in three of these states, for example).

2.3 Input data and estimation methods

In this sub-section, we comment on the detailed techniques used to make the best use of available data and the means that could be adopted to encourage the improvement of the input data.

It is clearly a very considerable task to assemble consistent data sets from 12 to 15 NSOs for use in national and regional projections, even if you have the authority vested by the Council of Ministers in the Statistical Office of the European Communities. The four projection rounds follow a strategy of making the best use of available information supplied to Eurostat for the projects. Widespread use is made of the simple but effective technique of adjustment to aggregate regional totals of national event intensities:

regional event intensity by age and sex
= national event intensity by age and sex
× {regional events total / sum of (national events intensities by age & sex × regional PAR)}

This is, in effect, a simple version of the sophisticated IPF used by van der Gaag et al. (1997a, 1997b) to estimate inter-regional migration intensities by age and sex from partial information.

It is clear from the account in Chapter 6 in van der Gaag *et al.* (1997a, pp.33-35) that a lot of the desired input data for inter-regional migration was missing, despite considerable efforts by EUROSTAT over the 1990 and 1995 rounds. How might such deficiencies be remedied before future rounds? There are two steps, which might be taken.

First, the estimation methods and results might be written up as papers so that the problems and their solution were clearly set out. Chapter 6 in the NIDI report covers an enormous amount of detailed work in just two and a half pages. However, such reports would be beyond the obligations of the contractor, once the project had been signed off.

Second, a consultation process might be started in the build up to the fifth round projections with NSOs and national experts, paralleling the effort currently being put into dissemination of the results of the fourth round. A dialogue with data suppliers and projection users would generate a range of useful ideas and sometimes reveals unsuspected data sources, which have been overlooked. In any case, NSOs would understand better why they were being asked for particular data sets and why improved data were needed. For example, to fill the gap in the NHS patient re-registration data for inter-Area Health Board flows within Scotland might only involve a minor change to a tabulation programme on a NHS Scotland computer. This could be swiftly implemented if requested by the right person in the General Register Office for Scotland.

A more general issue, which has not been addressed in any of the projection rounds, is the "one method fits all migration data" problem. In Chapter 7 of van der Gaag *et al.* (1997a, 1997b), an elegant description of the multidimensional projection model is given. However, the account assumes that all migration data come in the form of events, from which occurrence-exposure rates can be computed. This assumption is not tenable because the migration data from Austria, France, Greece and Portugal derive from the decennial census, while in Spain and the United Kingdom census data are available in addition to administrative register data, and could have been used. No account is taken in the analysis of the dependence of migration intensity measures based on census data on the length of the interval used in the retrospective question. This interval in France is period from January 1st in the year of the previous census 1982, an interval of over 8 years. An annual average was taken and this would substantially underestimate the volume of migration over a single year.

There are two aspects to this problem of how to incorporate transition data: (1) what alternative intensity equations to use, and (2) how to convert transition data to a common annual basis.

The first problem could probably be solved quite easily by reorganizing the equations in the multi-dimensional projection so that the matrices of transition probabilities were explicitly defined at the start. There would be two different specifications of these equations, one the existing specification as provided in Chapter 7 of van der Gaag *et al.* (1997a, 1997b) and the second a specification based on transition population accounts (Rees and Wilson 1977) or on census migration tables (Rees, Bell, Duke-Williams and Blake 1999). Once the multi-state transition probabilities are defined then the model proceeds as specified in the MUDEA (1990 round) or LIPRO (1995 round) projections. The differences between movement (event) and transition (migrant) data have been clearly defined and known about since the early 1980s (e.g. Rees and Willekens 1981, 1986): it really is time that one integrated multi-regional projection model was constructed.

The second problem has been much researched but no fully satisfactory solution found that does not require considerable additional information on the frequency of inter-regional moves per inter-regional transition. Retrospective survey or longitudinal migration history data might be used to derive empirical conversion ratios for Austrian, French, Portuguese or United Kingdom migration data derived from the 1999/2000/2001 round of population censuses. However, Austria is putting in place a population registration system (Gisser, personal communication), France is planning a substitution of the comprehensive census by large continuous surveys (Baccaïni, personal communication) and the United Kingdom is intending to use Health Area Registers to provide more comprehensive sub-national migration data (Kilbey, personal communication). These plans might produce better migration data for the next European regional projection round.

2.4 Methods of scenario development

Projections, of course, depend critically on assumptions. We review in section 3 the work carried out at national and sub-national scales on developing fertility, mortality and external migration scenarios (summarized in Shaw, Cruijsen, de Beer and de Jong 1997). Here we concentrate on scenario methods applied to internal migration.

An elegant method for computing convergence of the inter-regional migration system (resulting in decreasing net migration between regions over time) or its divergence (resulting in increasing net migration between regions over time) has been developed. However, while there is strong evidence reported in other studies that regions move in the same direction over time in terms of their fertility or mortality, no strong evidence has been presented in the fourth round papers of such a phenomenon occurring with respect to migration. In a study of UK migration at NUTS 2 level over the 1975-92 period, Rees (1995) showed that while most regions were experiencing convergence (decreasing net migration), there were exceptions. The Grampian region, for example, experienced increasing net in-migration over the period. The south-eastern region of Essex saw a switch from net in-migration to out-migration. In the case of the Grampian region, the strength of inflows was closely tied to the state of the off-shore oil industry. Essex, as part of the middle ring of the wider London metropolitan region, saw the wave of suburban growth pass beyond its borders into East Anglia over the period.

So the arguments for developing global scenarios for internal migration are weak. Regions behave in individual ways, depending on the fortunes of their principal economic activities that influence job-related migration, and on their position in the hierarchy of residential desirability that influences housing related migration. Pan-European research into internal migration patterns has shown that the different life course stages have different agendas (Rees and Kupiszewski 1998, Kupiszewski and Rees 1999). Young adults are attracted to metropolitan centres, offering educational and starter job opportunities and affordable housing. Families seek different residential environments away from the denser parts of urban areas or away from urban areas entirely. At retirement, households (usually empty nest couples) are freed from work ties and the richer retirees may re-evaluate their locations, moving to lower density areas with greater residential amenities. Finally, the elderly may be faced with the need to migrate as a result of widowhood or ill-health to locations where elder/health care is well provided.

What is needed are scenarios that take into account the individual development of each region. Rees and Kupiszewski (1998) recommend the specification of spatial interaction models (SIMs) in which migration flows are linked to regional characteristics and, if possible, regional policy variables. Kupiszewski and Rees (1999) make suggestions about how a range of SIMs fitted to each broad life stage group of migrants might be constructed using variables available across European regions (population density and unemployment), which capture many of the relationships. Several Dutch research institutes have recently begun a programme for the development of demo-economic models of regional population development in central and eastern Europe which takes forward this agenda (see the NIDI Web site, *http://www.nidi.nl/*).

2.5 Calibration of the projections

Most scientific models are tested out against empirical evidence. This has been done in the four projection rounds in the design of models for each of the components. However, it is extremely rare for a projection model to be tested out against a time series of data. Such an exercise is increasingly required when projections are carried out for government or commercial clients. For example, in constructing local population estimates as input to a multi-regional model of ward populations in five local government districts, the researchers were required to demonstrate that the demographic-IPF model for ward population estimates rolled forward from 1981 to 1991 produced good fits to the census populations in the latter year (Rees 1994).

2.6 Output variables

Considerable difficulties were experienced in constructing comparable time series of input and output variables from reports and output files available from the four projection rounds. The set of variables provided by the fourth round was nearly fully comprehensive in terms of outputs but there were many origin-destination variables, which could also be generated. The input database should include all variables input for each scenario. The outputs variables should include: population stocks, by sex and age, births, by sex and age at maternity, deaths, by sex and age, total in-migration, by sex and age, total out-migration, by sex and age, immigration, by sex and age, emigration, by sex and age, and inter-regional migration flows, by sex and age. The summary indicators should include total fertility rates, life expectancies, gross migraproduction rates and migration expectancies for total internal in-migration, total internal out-migration, total emigration, total immigration, total in-migration and total out-migration. For the stocks and flows variables, associated percentage distributions across ages and regions and countries would be useful, together with a battery of time series indicators (where the base year is set to 100). All age classified tables should clearly indicate the age-time observation plan being used, and in the case of period-cohort variables (the norm) tables should be labelled by both start of interval and end of interval ages.

In the next section, we discuss some important details of each of the projection round models and evaluate the assumptions adopted in the projections at both national and regional scale.

3. EVALUATION OF DETAILED METHODS AND FORECASTING ASSUMPTIONS

This section of the report analyses the detailed methods and assumptions adopted in each of European projection rounds and in each variant. We also, whenever possible, try to confront these assumptions with the actual developments. The assumptions for all projections and variants are summarised in Table 3.1 for easy reference. The review of the four EU projection rounds (section 1) has shown how the models and assumptions have become more sophisticated and detailed with time. We now examine how well those models and assumptions have performed at replicating recent historical change over the 1980 to 1996 period. In this examination there is relatively little to assess the more recent projection rounds against, so it is ironic that the earlier, simpler 1980 and 1985 rounds which will be subject to the most scrutiny.

3.1 Detailed methods and assumptions for the 1980 base projections

The first population projection of the then European Communities was prepared by NEI (NEI 1986) using the DEMETER 2010 population projection model. The key difference between this projection and a sum of national projections is that the former was prepared based for the same benchmark year, using the same methodology and uniform set of assumptions. The projection was conducted on two levels: the first was the national, the second was regional (NUTS-2) level. Projections are made for 30 years up to 2010. The method used is a cohort component model and the starting point is the base population at time t, disaggregated by sex and five-year age groups. Projections can only be made for five-year intervals.

Separate sets of assumptions were prepared for each component. At the national level the following assumptions were adopted: (1) there is no international migration; and (2) age-specific fertility and mortality rates observed in 1980 were held constant over time. The detailed methods and these assumptions will be examined now. The comparison is made for three 5-years periods: 1980-1984, 1985-1989 and 1990-1994. We examine the component models and assumptions in the order: international migration, fertility and mortality.

3.1.1 International migration methods and assumptions

All assumptions on external migration in all projection rounds are gathered together in Table 3.2 for 15 EU member states. The figures are net immigration flows for the year recorded in the column. The rows of the table refer to eight projections carried out in the four projection rounds.

Table 3.3 presents errors generated by the assumption of a lack of international migration in each country in subsequent 5-years periods. In the first two five-year periods the error in EUR12 is very low at 0.06% and 0.64% respectively. The last five-year period witnessed a 2.21% error. If we look at each country separately, Luxembourg was the most affected. Over 15 years there was an underestimation of 9.28%, the majority of which occurred in the last five years. However, in absolute terms the error is small – less than 34 thousand. Germany, with the second largest relative error of 7.3%, mostly concentrated in the last five years, has an absolute underestimation of 4.483 millions. Ireland, with an overestimation of 6.11% and Greece with an underestimation of 5.2%, complete the list of countries in which the assumption of no international migration was untenable. Most of the error was generated in the period 1990-1994, when the international migration was particularly high. However, it has continued in the later 1990s at levels much higher than in the 1980s. The magnitude of the error cumulated over 15 years clearly shows that the assumption that international migration could be ignored is incorrect. We can see this more clearly today than was possible in the early 1980s. However, the experience of large wave of guest workers in 1960 and early 1970 should not have been forgotten that easily in 1980s.

3.1.2 Fertility methods and assumptions

3.1.2.1 Methods of deriving fertility rates

In a projection, it is necessary to determine the size of the age group 0-4 at time t+5. This is done by considering the number of births that will occur in the five-year period. Account is taken for the fact that during the five-year period some of the fertile women will die by using the mean of the population of the fertile cohorts i at time t and the cohorts i+1 at time t+1. Again account is made for the moving on process by using the following fertility formula to combine observed fertility rates in two successive five year ages:

$$F=A+((4A+B)/5)+((3A+2B)/5)+((2A+3B)/5)+((A+4B)/5)$$

where A is the fertility rate of age group i, B is the fertility rate of age group i+1, F is the period fertility rate. Division of the births between boys and girls is undertaken using the national percentages of boys for each country. The mortality of new-born infants is then calculated using the following formula:

$$C=1/5*(1-A)((1-B)^4+(1-B)^3+(1-B)^2+(1-B)+1)$$

where A is the death rate of ages less than 1 year old, B is the death rate of ages 1-4 years and C is the survival rate. This survival rate is applied to the number of births to produce the population aged 0-4 at time t+5. This process is repeated for each five-year period. For the 1980 base population projection it is assumed that both age specific mortality rates and age specific fertility rates will remain stable at the 1980 level up to 2010.

3.1.2.2 Fertility assumptions in the 1980 base national projections

We now examine the impact of the assumption of constant age-specific fertility rates on the accuracy of forecast. The authors of the 1980 projection adopted the simple assumption that age specific fertility rates observed in 1980 remained unchanged over the entire projection period. The assumed total fertility rates for the EUR12 are set out in Table 3.5. Figure 3.1 charts age-specific fertility rates in 1980, 1985, 1990 and 1995 in all countries of the EUR12. In a majority of EUR12 countries the assumption of stable fertility rates does not hold. In some countries the reduction of rates was most pronounced. In Spain in 1995 fertility rates for 20-24 year old were only 31% of their 1980 value; for the four subsequent age groups the percentages were reductions of 37%, 19%, 9% and 10%. Smaller but still very substantial reductions for 20-24 year age group occurred in Greece and

Ireland (to 40%), to 36% for Italy, 45% for Portugal and 49% for the Netherlands. This strong reduction of fertility rates in young age groups was to a limited degree compensated by increases in fertility in 30-34 and 35-39 age groups. In Denmark, for example, the 1995 values were 199% and 245% respectively of the 1980 rates in these two age groups. Overall, the pattern of changes is that the general reduction in fertility in most of the EUR12 countries is combined with a shift in the age of motherhood. We suspect that over this period there was a process of widespread postponement of the first pregnancy, but apparently many of postponed pregnancies were never realized. In none of the countries are the adopted assumptions acceptable but they are completely incompatible with values observed in Denmark, Greece, Ireland, Italy, Spain, the Netherlands and Portugal.

An alternative variant for fertility change was defined in the 1980 base projection in terms of changes of total fertility rate (TFR) over time. It was possible to compare the TFR assumed in this variant (Table 3.5) with actual values. The values assumed reflected quite well actual developments for the first 10 years (1985-1990). Only occasionally did the difference between observed and projected values exceeded 0.2. With the exception of Luxembourg in 1985 actual values were lower than predicted ones. In 1995 the differences increased substantially due to a radical reduction in the observed TFR, in particular in Southern Europe. Certainly this alternative projection pictured the fertility change much better than the one of constant rates used in the main projection.

3.1.3 Mortality methods and assumptions

3.1.3.1 Methods of deriving survival rates

The first step in the projection method is to estimate the movement of the present population. This is undertaken using survival rates. The part of a cohort that survives at time t+5 is calculated by multiplying the population in that cohort group at time t by the survival rate for that group. However, it is not correct to simply apply the average death rate for the whole five year age group because each year a portion of the age group moves on to the next age group and is replaced with the highest age year of the age group below it. If it is assumed that each age group is made up of five proportionate age groups the following formula for the survival rate is used which accounts for this moving on process:

$$C=(1-A)*(1-(4A+B)/5)*(1-(3A+2B)/5)*(1-(2A+3B)/5)*(1-(A+4B)/5)$$

where C is the survival rate, A is the death rate of group i, and B is the death rate of group i+1. By multiplying the population of each age group in base year t by its relevant survival rate and subsequently moving it up one age group, the population aged greater than 5 years is obtained for time t+5. This method of computing the five year period-cohort survival probability for use in the projection model is an empirical approximation, which is corrected by adoption of proper multi-regional models in the 1990 projection round. Use of age-time graphs (Lexis-Becker-Verweij-Pressat diagrams, see Vanderschrick 1992) to explain and check projection models is recommended.

3.1.3.2 Mortality assumptions in the 1980 base national projections

The assumption of constant age-specific mortality rates has little impact on the accuracy of forecasts Age-specific death rates provided by REGIO database in member states of the EUR12 remained remarkably stable. Therefore, the assumption of constant age-specific death rates made by authors of projection was fully justified. However, the quality of data on mortality in the REGIO database is very doubtful – for example, inhabitants of Luxembourg below 34 years of age, according to REGIO, experience zero mortality. Also the death rate of those at the age of 70 and over, is reported to be 2.5-2.6 per thousand, rate which are far too low.

3.1.4 Methods used in regional population projections

The projection method used to produce projected regional population is the same as is used for the national projections but with the addition of interregional migration. The differences in regional death rates and fertility rates are calculated in the following way. National death rates and fertility rates are applied to the regional population to produce a theoretical number of births and deaths for the region at time t. This figure is compared to the observed number of births and deaths in the region in order to derive a regional factor that is used to correct the national age specific death rates and fertility rates for each region. These regional rates are subsequently used to calculate the natural movement of regional populations.

Once natural movement of the regional population has been calculated the interregional migration is estimated. The model used to estimate the level of migration is a descriptive model as opposed to an explanatory model and therefore does not include any variables concerning the motivations for migration. The model for internal migration is a two stage model in which the migration process is split into the estimation of out-migration for a region and then the distribution of those migrants to other regions is modelled separately.

The number of out-migrants is calculated using "model migration schedules" that are constructed using observed national age-specific migration rates. We note that, although the authors refer to the Rogers and Castro (1981) model, we were not convinced that it had actually been used until the fourth projection round. Rather, for each region, these national migration schedules are scaled up or down depending on the size of the region and other region specific factors (that are not stated in the report). The distribution of these out-migrants to other regions in the country is projected by constructing a matrix of the observed destination distribution of internal migrants in 1980 (disaggregated by sex). The predicted out-migrants are subsequently distributed according to this matrix.

The net internal migration numbers are then added to the population totals for each region. A further part of the migration process is the calculation of the number of children born to women who migrate during the five- year projection period. This is undertaken using national age-specific fertility rates. Again fully consistent models handling these population flows are not developed until the 1995 projection round.

The final part of the projection process that has to be undertaken is to check that the regional projections are consistent with the national projections already produced.

3.1.5 Assumptions used in the 1980 base regional projections

3.1.5.1 Assumptions about international migration at regional scale

Assumptions for regional population projections are directly linked to the assumptions adopted on national level. At regional level the assumption of no *international migration* will generate considerably higher errors in regional populations than at national level. This is due because foreign migrants tend to concentrate in the largest agglomerations. For example in Germany, according to Jones (1994), in 1989 23% of all foreigners lived in Hamburg and West Berlin, and a further 29% concentrated in the main cities of Nordrhein-Westfalen, Baden-Württemberg and Hessen. The concentration is so high that in some cities (Offenbach, Frankfurt) more than a quarter of population is foreign. Such large shares of foreign populations in selected regions makes them particularly vulnerable to the assumption of no international migration. In these regions the error of population projection may be particularly high.

3.1.5.2 Assumptions about fertility rates at regional scale

The method of calculation of age specific *birth rates* allows for simple scaling of region and age specific birth rates to the level of fertility observed in each region. This method does not cater for regions in which the regional age structure of fertility differ substantially from the national one. We have not got all the data necessary to conduct a thorough check of how the method of projecting age-specific regional birth rates compare to observed values. However, we can check this assumption against 1984 fertility data for Germany. Figure 3.3 shows age-specific regional fertility rates for *Länder* (NUTS-1 regions) standardised to national values. In an ideal situation, when the age structure of births is uniform over entire country and the only dimension differentiating regions is the intensity of procreation, we should obtain a set of lines parallel to horizontal axis. At *Länder* scale the assumption adopted by the authors of forecast holds fairly well. Most significant deviations are observed in the youngest and the oldest age groups, in which the rates are low and have little impact on overall fertility level.

3.1.5.3 Assumptions about mortality rates at regional scale

To check the validity of the way age-specific *death rates* were calculated for regions, we applied a parallel method to the one used for examination of the adequacy of the assumption on fertility rates. Regional age-specific death rates standardized to national values for German *Länder* in 1984 are presented in Figure 3.4. As previously a set of lines parallel to the horizontal axis denotes that the assumption adapted for the projection holds in reality. Unfortunately this is not a case when mortality is considered. Standardized rates form broken lines deviating substantially from assumed values. The examination was conducted for NUTS level 1 units. On NUTS level 2 we may expect substantially higher differentiation and error in calculation of mortality.

3.1.5.4 Assumptions about interregional migration

The method of calculation of regional *out-migration* rates was in fact very similar to the method of calculation of birth or death rates. Intensities of migration by age on the national level were adjusted up or down to fit regional out-migration estimated by applying national rates to regional populations. We have not done specific calculations to support or reject this assumption, as no data were available, but we do not believe it represents reality in a very accurate way. Key arguments to support this statement have been assembled in a study by Rees and Kupiszewski (1998). This study shows that outflows from large urban agglomerations are dominated by family age groups (children and adults between 25 and 45). Out-migration from peripheral and rural regions are dominated by teenagers and young adults (15-24 years). Age structures of migrants from these two types of regions differ fundamentally. Resulting changes in age structure of regions are not accounted for in the model, neither are consequent shifts in fertility and mortality patterns.

3.1.6 Summary of findings for the 1980 base projections

The approach taken in the 1980 projection was, to large extent, governed by data accessibility and lack of expertise in construction of sub-national projections in a large number of countries. Many of the assumptions adopted in the construction of projection were very simple and unrealistic. Some of them, such as time-constant age-specific fertility rates, were already questionable at the time of constructing the projection. Others, in particular the one on zero international migration, proved a decade later to be utterly false – mainly due to unpredicted and unpredictable political changes in Central and Eastern Europe. In consequence the projection was much more a set of twelve separate projections of populations of member states of the European Community than one projection of the EUR12 population system. Despite all these criticisms, the 1980 projection was the first successful attempt to project multi-national populations based on a unified data set and projection assumptions (earlier IIASA projections of populations of 17 member states lack both) and set standards for future studies.

3.2 Detailed methods and assumptions for the 1985 base projections

The 1985 projection (Haverkate, van Haselen 1990, 1992, Eurostat 1991) used the DEMETER 2015 model, a slight modification of the DEMETER 2010 model applied in the 1980 projection. In the 1985 base projection some international migration assumptions are included in the model for Ireland and Germany and a fertility variant is produced. Again projections are made for a 30 year period and are based on a population classified by sex and five year age group.

3.2.1 Assumptions on international migration in the 1985 base national projections

We assess first the impact of the *international migration* assumptions on the accuracy of forecast. In comparison to the 1980 projection some international migration is added, but only for Ireland and Germany and only for the first five-year period of the projection. Ireland is assumed to experience negative net migration. Migration estimates provided for the period 1985-90 the Central Statistics Office of Ireland are used. Germany is assumed to experience positive net international migration between 1985 and 1990, using figures provided by the

Bundesausgleichsamt. Between 1990 and 2015 migration in these countries is not projected due to the difficulties in producing accurate future estimates of migration levels.

As Table 3.3 shows for the 1980 based projection the largest error in arising from the assumption on lack of international migration was introduced in the 1990-1995 period. This is also the case for 1985 based projection. Over a 10 year period forecasting error due to neglecting foreign migration is for the entire EUR12 fairy low – only 2.1% (Table 3.3). It is considerably higher for individual countries: for Luxembourg 8.7%, Germany, despite introducing migration over the first five years of projection, 5.4% and for Greece 4.2%. The assumption adopted allowed for substantial reduction in the error for Ireland. Certainly at the time of construction of the projection it was clear that Germany would continue to gain population beyond 1990 and this should have been incorporated into the projection. Also for Luxembourg, a perennial gainer of immigrants, some corrections should have been devised. It should be noted, however, that introduction of non-zero net migration on a one-off basis for some countries instead of systematically for all countries, may generate error in the balance of population of other countries and lead to counting international migrants twice.

3.2.2 Fertility assumptions in the 1985 base national projections

In the case of *fertility* two variants were produced and tested, a stable fertility variant in which the age specific fertility rates remained at the 1985 level throughout the projection period and a projected fertility variant which assumed time-variable age-specific fertility rates. Examination of Figure 3.1 shows that over the period 1985-1995 only in Germany, Belgium and to lesser extent in the United Kingdom does the former assumption hold in reality. In all other countries either reduction (Greece, Ireland Italy, Portugal, Spain) or increase (Denmark, Luxembourg, the Netherlands) in age-specific rates was observed or a shift in fertility towards older ages (France) was evident.

In the projected fertility variant, age- specific fertility rates are extrapolated up to 2015 based on observed trends. A curve fitting procedure is undertaken in which the most recent fertility developments have the most weight in determining future fertility. The projected curve is smoothed until there is practical stability in fertility levels after 2000. The assumed rates are presented in Haverkate and van Haselen (1990) in a figure, but it was impossible to read the actual values from this figure. It was, however, possible to compare total fertility rates arising from the adopted assumption against observed values (Table 3.5). It was found that this variant more accurately replicated observed fertility trends: in 14 out of 24 measurements it generated smaller error in the TFR than rates stable over time. Therefore it was right to adopt it in the projection model.

3.2.3 Mortality assumptions in the 1985 base national projections

Mortality is included in the model using the same method as in the 1980 projections. As in the 1980 round of projections it is assumed that age-specific mortality rates will remain stable throughout the projection period at the level observed in 1984.

3.2.4 Assumptions for the 1985 base regional projections

The method of producing regional population projections is the same as in the 1980 base population projections. Inclusion of international migration in the first 5 years of projection helped to curb the error at regional level. All comments made with regard to 1980 projection (section 3.1.4) are valid here. The mechanism of calculation of regional age-specific fertility rates for the 1985 base projection was identical to the one used in the 1980 projection. However, improved calculation of age specific fertility rates at the national level most likely had a positive impact on values estimated at regional level. Handling of age specific mortality rates for the 1985 projection is the same as in the 1980 base projection. Therefore the previous comments remain in force.

In the case of interregional migration in 1985, the migration matrices for the distribution of out-migrants to other regions for France and Portugal did not refer to 1985 but were based on the latest available population censuses (1982 for France and 1980 for Portugal). Data for Greece were provided by Eurostat and are not believed to be particularly reliable (Papadakis and Stillwell 1996). In the case of interregional migration in 1985 the same method and assumptions are used as in the 1980 base projections.

3.3 Detailed methods and assumptions for the 1990 base projections

The 1990 base population projections to 2020 use the same modelling procedure as previous rounds. In this case populations are disaggregated by sex and single years of age from 0-90−. Projections are made for single years and not for five-year periods. Another difference between this and previous projections is the order in which the components of population change are introduced. As in the other projections, age specific mortality rates are first used to account for the number of deaths that will occur in that year, but then international migration is introduced before age-specific fertility rates are used to calculate the number of births. International migrants are allowed to be at risk of producing children in destination countries.

3.3.1 International migration assumptions for the 1990 base national projections

In the 1990 base national projections net international migration is projected for all countries in the EC. Observed data were used to determine trends in international migration. Net external migration was calculated from observed data by deducting annual natural growth from total population growth per annum. However, corrections were made to these calculations using data from national censuses and register counts. Age-sex specific net migration figures were estimated using annual population age structures and the number of births and deaths broken down by age and sex.

The two alternative scenarios were also produced for international migration (Muus, Cruijsen 1991). The high scenario foresees a relatively large demand for immigrant labour and the adoption of favourable views of immigrants over the next 30 years. Other factors encouraging net immigration to the EC include the following: chain migration, high return migration of EC nationals, low attraction of EC labour to the third countries, frequent major political disturbances in third countries, restrictive admission policies of EC nationals in third countries, and less restrictive admission policies in EC countries in the next 30 years. For the low scenario, which represents a pessimistic economic view, the current situation of high net external migration levels for countries in the EC will end and be replaced by the lower levels experienced in the past. It was assumed that sufficient labour force will be available within the EUR12, that chain migration will be low, that there will be little return migration of EC nationals, that no major political disturbances occur in third countries, and that EC countries implement restrictive admission policies.

The method of producing the scenarios is as follows. The starting point is a set of national net migration figures, made up of several types of migrants: *Aussiedler*, asylum seekers and labour migrants, those migrating for the purposes of family reunification and EC nationals. Extrapolation is then undertaken for each of these elements for the period 1991-1995. After 1995 it is assumed that there will be no changes in the level of migration.

For the low scenario it is assumed that the number of *Aussiedler* will reduce rapidly from 397000 in 1990 to 50000 in 1993 and remain on this level thereafter. The number of asylum seekers drops from 325000 to 100000 in 1994. The net gains of other categories of migrants reduce from 168000 in 1990 to 100000 in 1994. Total net migration reduces from 890000 in 1990 to 250000 in 1994 and stays on this level.

In the high scenario it is assumed that net migration will only decrease slightly leading to an annual positive net migration of 750,000 from 1994 onwards. The number of *Aussiedler* reduces rapidly from 397000 in 1990 to 100000 in 1994 and remains on this level. The number of asylum seekers drops from 325000 to 250000 in 1994. The net gains of other categories of migrants increase from 360000 in 1990 to 400000 in 1991. Total net migration reduces from 1082000 in 1990 to 750000 in 1994 and stays on this level since then.

Obtaining values for entire EUR12 allows for further estimations of national net gains and loses. In both variants *Aussiedler* were allocated to Germany and two other classes of migrants were distributed proportionally to shares observed in the years 1985-1989 with slight correction benefiting southern Europe and reducing the share of Germany. Results of this operation are presented in Table 3.2.

Table 3.4 shows calculation of projection errors based on the projected low and high variants of international migration over the period 1990-1995 and observed values in the same period. In almost all cases projected migration is lower than observed. Errors in the low variant of projection are comparable to errors in the projections based on 1980 and 1985 populations. However, the very high errors in 1980 and 1985 base projections for countries in which international migration components play important roles in the overall population dynamics have been almost eradicated and do not differ from errors observed in other countries. Assumptions adopted in the high variant of the projection gave even better results with the highest error due to international migration equal to 2.8% of the base year population over six years recorded for the Netherlands.

3.3.2 Fertility assumptions for the 1990 base national projections

Two scenarios were produced for the fertility component of the population projection model (Cruijsen 1991). In the pessimistic scenario, it is assumed conditions will not allow women to combine motherhood and working. In this scenario there is stagnant economic growth and governments have insufficient revenues to extend the provision of childcare facilities or to increase family allowances. This is assumed to lead to increased childlessness of 25%. An EC average total fertility of 1.5 children per women is predicted for 2020. Under this scenario there will be no change in fertility differences between countries. In the high scenario on the other hand, economic growth is experienced and governments and private companies encourage the development of childcare systems. It is assumed that childlessness will reach a level of 10% by 2020 and that total fertility in the EC will increase to 2 children per woman.

Table 3.5 shows that only exceptionally, in Denmark, Luxembourg and Portugal, were observed 1995 TFRs higher than assumed in the low, pessimistic scenario. Observed TFRs never exceeded the values assumed in the high scenario. In all other countries TFR observed in 1985 were lower than those assumed in the low scenario. Overall observed fertility in 1985 was lower than the most pessimistic assumptions adopted in projections. It is quite likely that the period of low fertility has reached its low point. In all countries of EUR12 except Belgium and Denmark, TFR values in 1996 and 1997 were higher than those observed in 1995. As the rise in fertility is remarkably wide, 1995 might have been a turning point in fertility trends in the European Union. One may set a hypothesis that fertility trajectories in Belgium and Denmark are lagging behind trajectories in other countries. In that case it is quite likely the low scenario will be in future closer to reality than in the period 1990-1995.

3.3.3 Mortality assumptions for the 1990 base national projections

The scenarios for mortality are developed using past trends in age specific mortality rates and epidemiological scenarios for major causes of death based on likely changes in risk factors and trends in health care. The lead indicator for the scenarios is life expectancy at birth, which is projected for males and females separately. Observed and assumed life expectancies are listed in Table 3.6. For the period 1990-2000 the scenarios are developed in the following way. The life expectancy in each country is extrapolated from the last known value. The epidemiological scenarios are applied to this figure, but this does not allow for differences between countries in the rate of mortality change. This factor is accounted for by adjusting the epidemiological scenarios by giving equal weight to country specific extrapolations of life expectancy at birth based on the observations from the previous ten years. A similar method is used to produce projections of mortality from 2000 to 2020. The proportions of mortality decreases assumed for the causes of death for 2000-2010 and 2010-2020 are successively applied. These are then adjusted for each country depending on which scenario is being produced. The high scenario assumes that economic growth will lead to a convergence of national mortality rates due to the achievement of more equal health status. The low scenario produces less decrease in mortality rates than the high scenario and no convergence of national mortality rates occurs.

The assumptions that underlie the scenario projections of mortality are that, for the high scenario, on average life expectancy at birth in the EC in 2020 will increase by 5.4 years to 78 years for males, and increase by 4.1 years to 83 years for females (Table 3.6). For the low scenario it is assumed that life expectancy will increase by 1.5

years less than in the high scenario. The low scenario is even more pessimistic for Germany due to the differences in social, environmental and health conditions of the former Federal Republic of Germany (FRG) and the former German Democratic Republic (GDR). For the former GDR life expectancy is only expected to rise by 0.5 years by 2000. With respect to convergence between countries, for the high scenario it is assumed that the variation in life expectancy at birth between countries in the EC will decrease from 1 year in 2000 for females to 0.7 years in 2020 and from 0.8 to 0.5 for males. In this scenario it is also expected that the difference in life expectancy between males and females will decline to 5 years on average by 2020. For the low scenario no convergence is assumed either between countries or between sexes.

3.3.4 Detailed methods for the 1990 regional projections

The modelling procedure at the regional level is the same as in the previous models except that projections are made for single years and two alternative scenarios are produced. In the regional population projection model the components of population change are introduced in the following order: mortality, interregional migration, international migration and fertility. At each step in the projection model the regional results are compared to the national projections to ensure consistency.

For the interregional migration component of the projection model, as in previous rounds, the method is a multi-regional model for all age migration to which is applied national schedules of age-specific migration rates. It is useful to provide here a more detailed account of the methods used for estimating the necessary interregional migration intensities. Out-migration rates from each region are determined by applying national age-specific migration rates to the regional population to generate an expected number of migrants. The ratios of observed to expected regional out-migrants are then computed and applied to the national age-specific migration rates to generate estimates of age-specific regional out-migration rates. The conditional probabilities of migrating to a destination given out-migration from an origin region are computed from the interregional migration matrices for each country. The interregional age-sex specific migration rates are then estimated by multiplying the age-specific out-migration rates by the destination probabilities. In formal terms, these steps are as follows.

(1) Compute national age-sex specific interregional migration rates:

$$m_{as} = M_{as}/P_{as}$$

(2) Estimate regional age-sex specific out-migration rates:

$$m_{ias} = m_{as} \times (M_i / \sum_{as} m_{as} P_{ias})$$

(3) Compute the destination probabilities conditional on origin and interregional migration:

$$p(j|i) = M_{ij} / M_i$$

(4) Estimate the interregional age-sex specific migration rates

$$m_{ijas} = m_{ias} \times p(j|i)$$

(5) Use these rates in the multiregional population projection model.

M represents the number of migrations, m represents an occurrence-exposure migration rate, P represents the population at risk (normally the average population in the measurement interval), a stands for age and s for sex. While, for a general audience, such a description is "too mathematical", it is essential to use formal representations in order to achieve precision. The accounts in projection rounds one to three lack this formal precision (though we do not believe that it has seriously compromised the projection results). Compare, for example, the description given above with that in NEI (1994a, p.28) of the DEMETER model, which is full of ambiguities and imprecision. Fortunately, the regional projection model in the fourth round is described with both precision and economy, and this should be the standard for future rounds.

3.3.5 Assumptions for the 1990 base regional projections

For the 1990 base projections two alternative scenarios are produced to account for possible variations in economic circumstances in the future affecting population change within the EU. The two scenarios are called the low (or pessimistic) scenario and the high (or optimistic) scenario. The two scenarios are developed for each of the components of population change.

3.3.5.1 Assumptions about region-specific international migration

It is necessary to allocate international migrants assumed at the national level between regions. A fourth component model was used for this process: i.e. natural growth and net internal migration were subtracted from the total yearly population growth to yield an "indication" of the distribution of net international migration. A regional distribution of the migrants is calculated using the national net flow multiplied by the percentage of net external migration having a destination in that region. These "percentages" are numbers at severe risk. If they are 100 × (regional net international migration/national net international migration), what happens when the denominator is zero? The lesson to be drawn from these difficulties is that future projection models should handle external migration as gross flows, even if some pretty crude estimates are needed. Planners in regions need to know about the gross number of arrivals in refugee crises: providing bed-spaces and resources for only the net number would be a disaster.

For the low scenario it is assumed that the distribution of international migrants across regions in 1990 is maintained throughout the projection period. In the high scenario it is assumed that international migrants will become more evenly spread across regions. The distribution in the final projection year is calculated as the average of the 1990 distribution and the population distribution in 2019. The distribution of migrants for years between 1990 and 2019 are calculated through interpolation. There is little empirical evidence for such a process occurring in the past with respect to immigration destinations. Yes, successive generations of some immigrant groups have dispersed in part, but there is evidence of concentration over time for other groups (see Rees and Phillips 1996 for analysis of the changing distribution of ethnic minorities in the UK in the 1981-91 decade). However, this misses the point. The international migrants are new arrivals and they go to the locations within countries where jobs are available and communities of fellow ethnic group members are established. These are the metropolises which are currently experiencing economic growth, particularly capital cities. This occurs even when a policy of dispersal to available temporary accommodation is adopted of necessity because of large waves of asylum seekers and refugees. They relocate from their initial "transit camps" quite rapidly.

3.3.5.2 Assumptions about region-specific fertility rates

Analysis of fertility levels was undertaken through the production of gamma curves. The age-specific vector of fertility rates for national projections is modelled by a gamma curve, characterised by three parameters. These are the average number of children per woman, average age of mother at birth and the variance. For each parameter a region specific correction factor is introduced and applied to the national parameters. Subsequently, region specific gamma curves can be constructed and from them region and age specific fertility rates can be derived. The regional correction factors are determined through historical analysis and can be varied according to the scenario being produced. Both low and high scenarios assume regional convergence of fertility rates. For the low scenario observed regional fertility variation coefficients between 1970 and 1990 are used to set a target value for the average number of children per women for each region for the final projection year. For the high scenario the targets are 0.5 higher than in the low scenario.

3.3.5.3 Assumptions about region-specific mortality rates

As in the previous projection rounds, regional mortality rates are applied by calculating a region specific correction factor that is determined by historical analysis. These regional factors can be varied according to which projection scenario is being calculated. For the low scenario, economic stagnation means that socio-cultural differences and variations in standards of living between regions will not decrease. It is therefore assumed that regional mortality differences will remain stable in the low scenario. For the high scenario economic growth means that differences in standards of living and socio-cultural factors between regions will decrease. Therefore convergence in regional mortality rates occurs. It is assumed that the rate of convergence will be an average of 1% per annum. For countries with relatively small regional differences it is assumed that these differences will decrease by 0.5% per annum. For countries with regional differences that are relatively large, regional mortality rates will converge at a rate of 1.5% per annum. Differences will decrease by 1% per annum in countries with intermediate levels of differences between regional mortality rates.

3.3.5.4 Assumptions about interregional migration

For the interregional migration component of the projection model, as in previous round, the method of determining the level of migration is made up of a mixture of a multi-regional model and a migrant pool model. For the 1990 projection the estimated migration rate schedules are region specific and provide for each age group and gender the proportion of the risk population that leaves a region. These proportions are stable over time and cannot be varied according to which scenario is being used. As in previous projection rounds the distribution of the out-migrants to other regions in the country is based on the latest available migration information. The only element that can be altered is the overall level of mobility. This factor can be varied according to which scenario is being used. In the low scenario overall mobility remains stable at the 1985-1990 level. The high scenario assumes that differences between regions will decrease due to economic growth and therefore it is assumed that the tendency to move to another region will decrease. Therefore, overall mobility is reduced, a reduction to 70% of the 1985-1990 level by 2020 was assumed.

3.4 Detailed methods and assumptions for the 1995 population projections

The 1995 base projections cover the period 1995-2050, though most attention is focussed on the 30 year period to 2025. Forecasts of population by sex and single year of age are generated for each annual period. The projection model uses fertility, mortality and migration to estimate future changes in population. A multi-dimensional cohort component model similar to that used in previous projection rounds is used, but with a much more sophisticated interregional migration component.

The 1995 round of population projections was prepared for entire European Economic Area at national level. de Beer and de Jong (1996) prepared five national scenarios for 18 countries for the period 1995-2050. Regional scenarios for the 15 countries have been described by van der Gaag and de Jong (1997) for the period 1995-2025 and prepared by van der Gaag *et al.* (1997a, 1997b). These regional scenarios correspond to three of the national scenarios (baseline, high and low) and are expressed in terms of convergence and divergence of regional patterns.

Five scenarios are compiled for the 1995 base round of projections in order to reflect the uncertainty of future demographic development. These scenarios are labelled *baseline*, *high*, *low*, *young* and *old* and are based on combinations of low, medium and high variations in fertility, life expectancy (the mortality indicator) and net international migration. The *baseline* scenario represents a continuation of current trends and reflects the medium variant assumptions used in national forecasts wherever possible. The *low* scenario represents a pessimistic view of economic growth, which leads to a pessimistic view of population change. The *high* scenario is more optimistic in terms of economic growth and its effect on population change. The *young* and *old* scenarios account for uncertainty about changes in the age structure of the population. Changes in fertility, mortality and net international migration are specified up to target years, after which no further change occurs and fertility and mortality rates and net migration remain stable. The target year is 2010 for migration, 2035 for fertility and 2050 for mortality.

3.4.1 The international migration assumptions of the 1995 base national projections

The variable used for the production of external migration scenarios is net international migration. The levels of migration for individual countries were calculated by subtracting natural growth from annual total population growth. The age composition of migration is taken as the observed average age composition (by sex) of all countries and it is assumed that all countries will have this age composition of migration up to 2010. The age composition that occurs up to the target year is calculated using linear interpolation.

De Jong and Visser (1997) prepared the international migration scenarios. The assumptions that are made for each of the scenarios concerning international migration are based on the possible developments in the political response to economic developments.

The *baseline* scenario represents a continuation of current trends in migration and the level of net migration is lower than migration numbers observed in recent years. Net migration to the EU in the target year (2010) will amount to 600 thousand which is equivalent to the average migration levels experienced 1980-1994. This is based on the assumption that immigration policy will become increasingly restrictive.

The *high* scenario presents what is thought to happen to migration if economic growth is experienced. It is assumed that higher economic growth will lead to an increase in demand for labour and relaxed migration policies. Therefore net migration will increase in the short run, but in the long run a decrease will be experienced as governments tighten migration policies as a result of higher previous migration. Overall it is assumed that net migration will decrease by 20% by 2010. Convergence between the migration experience of countries is also expected because asylum seekers will be more evenly distributed and economic growth will benefit poorer countries more than richer countries, leading to a decrease in disparities of migration rates.

In the *low* scenario economic growth is not experienced and this stagnation leads to a decrease in mobility due to a decrease in labour demand and increasingly restrictive migration policies. It is assumed that net migration will decrease by 50% by 2010. Disparities in migration rates between countries will increase in this scenario because the lack of economic growth has a more negative impact on countries that are already poor.

3.4.2 Fertility assumptions of the 1995 base national projections

Fertility scenarios have been developed by de Jong, (1995). For the fertility component of the model, a cohort-oriented approach is used. The variables on which the assumptions for the scenarios are based are the total fertility rate and the age at childbirth of the mother. Age specific fertility rates for each year are derived through analysis of the effect on cumulative fertility at different ages of changes in the timing of fertility.

The assumptions on which each of the scenarios is built are derived using the total fertility rate. In the *baseline* scenario, total fertility in the target year (2035) will be slightly higher than the 1995 level. The assumption is made that there will be a moderate decrease in the completed fertility of young cohorts due to a decrease in fertility at young ages that is not fully compensated by an increase at higher ages. However, the total fertility rate will increase by a small amount due to increased fertility at higher ages, in combination with almost constant fertility at lower ages.

In the *low* scenario the total fertility rate will decrease in most countries because the decrease in fertility at lower ages is not compensated for by an increase at higher ages. It is assumed that due to economic stagnation people will postpone fertility until a better economic climate is achieved.

The *high* scenario assumes that the northern countries of Europe are forerunners in fertility experience and so an increase in fertility due to catching up of fertility at higher ages that has been experienced in those countries will eventually be experienced in all countries. High economic growth also leads to high fertility because women are encouraged to combine motherhood and working. These assumptions mean that young cohorts will approach the fertility of older cohorts and the total fertility rate will increase in all countries. Convergence in fertility rates between countries will also be experienced.

3.4.3 Mortality assumptions of the 1995 base national projections

The scenarios for mortality have been defined by van Hoorn and de Beer (1998). The scenarios for mortality are built from assumptions made as to the development of life expectancy by sex. Unlike the 1990 base projections, cause of death is not used quantitatively to develop the scenarios. It is argued that opinions concerning longevity and developments in society are more important in determining life expectancy. The *baseline* scenario assumes that the annual increase of life expectancy at birth will be the same as that observed in the 10 years preceding 1995 and that after 2000 some decrease in the annual improvement will occur. This is because mortality rates at young ages are already very low and therefore only a limited improvement can be expected. It is assumed that by 2050 average life expectancy will have increased by 6 years for males and 4.5 years for females. The gender gap in life expectancy will have decreased by 1.5 years. Some convergence in life expectancies between countries will also occur but not as much as is observed in the high scenario. In the *high* scenario, by 2050 life expectancy will be 9 years higher for males and 6.5 years higher for females. The high scenario assumes the gender gap will decrease more than in the baseline scenario. Convergence between countries will also occur. The *low* scenario produces only limited increase in life expectancy with an increase of 2 years for men and 1.5 years for females. The gender gap decreases by only 0.5 years.

3.4.4 Detailed methods and assumptions for the 1995 base regional projections

The regional model introduces the component interregional migration. For each of the national scenarios a regional scenario is developed. The differences between the scenarios at the regional level are not in terms of the *levels* of fertility, mortality and migration in each region but are concerned with the rate of *convergence* that is assumed to occur between regions.

3.4.4.1 Detailed methods and assumptions for region-specific international migration

Index figures are also calculated for the production of regional scenarios for international migration. For the production of these index figures it is necessary to calculate the crude net migration rate for each region and for the country as a whole.

$CNMR^r = NM^r/P^r$

$CNMR^c = NM^c/P^c$

where r is the region index, c is the country index, CNMR is the crude net migration rate, NM is the net migration flow and P is the population. The regional index is the calculated as follows:

$I^r = CNMR^r/CNMR^c$

How the indexes change by the end of the projection period are determined for each scenario and the index figure for years between 1995 and 2010 are calculated using linear interpolation. The migration rates are made age and sex specific using the national distribution of migrants by age and sex. In the *baseline* scenario it is assumed that the difference between regions and the national average will decrease by 25%. For the *high* scenario differences will decrease by 50% and regional differences will remain stable in the *low* scenario.

3.4.4.2 Detailed methods and assumptions for region-specific fertility rates

With respect to fertility, as in the previous projection rounds the formation of the regional model begins with the calculation of a factor that indicates how much a region deviates from the national average. For each scenario, assumptions are then made concerning how these regional indexes will change over the projection period. The regional index figures are age specific and are calculated as follows:

$I^r = AFR^r/AFR^c$

where r represents region, c stands for country, AFR is the age specific fertility rate and I is the region/country index.

In the *baseline* scenario average economic development is experienced and convergence occurs between regions intermediate between degrees assumed in the high and low scenarios. It is assumed that the difference between the index figure and the national average will decrease by 25%. In the *high* scenario more convergence occurs and the difference between index figures and the national average is assumed to decrease by 50%. In the *low* scenario it is assumed that no convergence occurs. Germany is treated as an exception to these assumptions. For this country, regional differences are assumed to decrease by 25% for the low scenario, 50% in the baseline scenario and 75% in the high scenario. The index figures for each year of the projection are calculated using linear interpolation and age specific fertility rates for each region are subsequently calculated as follows:

$AFR^r_y = I^r_y * AFR^c_y$

where y indexes the year.

3.4.4.3 Detailed methods and assumptions for region-specific mortality rates

For mortality, regional indexes are used in the same way as for fertility. The equation for calculating these indexes is as follows:

$$I^r = LE^r/LE^c$$

where LE is life expectancy. These indexes are disaggregated by age and sex, and mortality probabilities are deduced using standard life table relationships. In the *baseline* scenario some convergence is experienced and it is assumed that regional differences will decrease by 25% by 2050. For the *high* scenario there is a good economic climate in the Europe and it is assumed that the EU will use the money surplus to decrease regional inequalities. Under this scenario regional differences will decrease by 50%. For the *low* scenario there is economic stagnation and thus no money available for reducing region inequalities and it is therefore assumed that the regional pattern of mortality will remain static.

3.4.4.4 Detailed methods and assumptions for interregional migration

The inclusion of interregional migration in the regional population projection model is more complicated and is treated in different fashion from previous projection rounds. A short hand is used by the authors (van der Gaag *et al.* 1997a, 1997b) to explain the framework within which the particular inter-regional projection model was chosen. The migration variables used in projection consist of a multi-dimensional array with dimensions S for sex, A for age, O for origins, D for destination and T for time. A full set of migration intensities of dimension SAODT is rarely available for any one country, and even when the information is published, the resulting data array is sparse because single years of age are used. The task is to find the set of partial arrays that capture the systematic structure of the full array but with the minimum number of cells. Full details of the framework and the experiments carried out are given in van Imhoff *et al.* (1997). The framework is a very useful way of thinking about the problem of estimating multi-regional model input variables. It has strong links to the statistical field of log-linear modelling, which can be further developed in future. Earlier we suggested that Spatial Interaction Models should be introduced into inter-regional projections: this can be accomplished within the framework established by the NIDI team in the fourth round. One important innovation of their work was to develop Iterative Proportional Fitting methods to compute model parameters for the variety of models being tested, given the failure of the standard software available (GLIM, General Linear Model package) to cope with the array sizes represented by the larger SAODT arrays.

The model chosen for the 1995 round for predicting interregional migration is more complicated in 1995, in that it uses more information. In 1990 the model for internal migration used the following constraints to estimate the model interregional migration intensities

$$SA + SOD + T$$

where SA is an array of national sex and age specific migration flows, SOD is an array for both sexes of origin and destination flows, and T is an array of total mobility over successive time intervals. Corresponding to each constraint are a set of adjustment parameters (also called balancing factors in the SIM literature), which capture the effects of variation of migration intensities by the dimensions singly or in combination.

By contrast the 1995 internal migration model includes the following constraints:

$$SAO + SAD + OD + TAS + TO + TD$$

where SAO is an array of sex and age specific migration by origin region, SAD is an array of sex and age specific migration by destination region, OD is an array of origin and destination migration flows, TAS is an array of time, age and sex specific migration, TO is an array of time specific origin migration, and TD is an array of time specific destination migration. van der Gaag *et al.* (1997a, 1997b) describe this as a migrant pool model with an additional origin destination pair specific factor. The migration intensities are specified as a linear multiplication of the factors associated with each of the constraints

$$m_{ijast} = X_{ias} \times X_{jas} \times X_{ij} \times X_{ast} \times X_{it} \times X_{jt} \times 1$$

and interregional migrations are projected as

$$M_{ijast} = m_{ijast} P_{iast}$$

where i is the index for origins, j is the index for destinations, a is the index for ages, s is the index for sexes and t for time intervals, and P stands for population at risk in origin regions at the start of the time interval. The X factors are derived in part by calibration on a historical migration data array, or through extrapolation into the future of such factors (see van Imhoff *et al.* 1997 for further exposition).

How did the model of migration intensities used in the 1995 projection round come to be selected? The researchers calibrated and measured the goodness of fit of all possible combinations of S, A, O, D with some investigation of the interactions of these dimensions with time (van Imhoff *et al.* 1997 and van der Gaag *et al.* 1997, Chapter 4). The model chosen was a reasonable compromise between achievement of deviance reduction and minimizing the number of parameters required. One overriding concern was to choose a model that would give reasonable results across all 13 countries for which regional projections were developed. In the fifth round, it should be possible and indeed necessary to relax this "one size fits all" approach, especially if SIMs are introduced to estimate migration intensities. The predictive origin and destination variables may well vary between countries. Even, if the fifth round projections are confined to demographic predictions, there is a strong argument for shifting the target of modelling endeavours to selecting the best model, given available data, for each country. Each country's regional projection would have the same overall model structure but different models for predicting input variables.

Within each scenario for internal migration two variables are subject to change, these are the overall level of mobility and regional differences in departure rates and destination shares. In the *baseline* scenario the mobility level in the target year is the same as in the base year and regional differences remain the same throughout the projection period. In the *high* scenario internal mobility is high and it is assumed that the mobility level in the target year will be 120% of the level in the base year. Regional differences will decrease by 50%. In the *low* scenario internal mobility is low with the mobility level in the target year being 80% of the level in the base year. There is a divergence between regions with regional differences increasing by 50% by the target year.

3.5 Evolution of methods and assumptions, 1980-1995

Running population projections for a dozen or more countries and over two hundred regions is a serious challenge. In the early 1980s it was a pioneering task, with few earlier experiences at that scale to rely on. This is quite visible in the way the two first forecasts were prepared: at national level the authors adopted most simple and hardly plausible assumptions that fertility, mortality and internal migration would stay stable over time. International migration was assumed not to exist in the 1980 forecast and for the 1985 projection that scenarios were prepared two countries only and for the first five years of forecast. Such assumptions reduced the whole exercise to a projection of a set of twelve separate states with no interaction between them.

These problems were solved in the 1990 and 1995 projections rounds by introducing international migration assumptions for all countries and by developing high and low as well as baseline projections. In 1995 proper scenarios for interregional migration were prepared. In the 1990 and 1995 projections, the demographic scenarios were based on two economic scenarios: a booming or a stagnating European economy. Increase in fertility and migration and decrease in mortality are associated with the former scenario, opposite changes with the latter. The mortality scenario in 1990 was handled based on epidemiological forecasts, but in 1995 forecasters returned to demographic methods. Future regional changes are treated in terms of convergence (favourable economic conditions) and divergence (poor economic conditions), which provides an effective way of handling large number of regions. The downside of this methodology is that it does not differentiate between different types of regions, in either demographic or economic terms. Inclusion of these regional differences into the scenario setting constitutes a challenge for the fifth European national and regional projection round.

4. COMPARISON OF PRINCIPAL PROJECTION RESULTS AND OBSERVED POPULATION SERIES

In this section of the report we evaluate a selection of the results of the four rounds of European Union national and regional projections. It is only possible to scratch the surface of an analysis of the projection results for two reasons. The first reason is that, in principle, projections of 12-15 countries and 161-202 regions generates a vast quantity of statistical information, which it is beyond the remit of this project to address. Our goal in examining projection outputs is simply to assess plausibility of the results of the projections and to ask whether it is reasonable to suppose that the input data and estimations used in each projection round together with the assumptions for each of the components produced the projected results. The second reason is that for the two earlier rounds of projection no computer files (of inputs or outputs) were accessible, and we had to rely on re-entry of the data given in tables in the 1980 and 1985 round reports. As a result we have to confine our attention to the population stocks generated by the projections, and were unable to assemble systematically an account across all four projections of the components of change. We make recommendations in the final section of the report about proper archiving of the projection results. With comprehensive component information it might have been possible to make robust statements about the influence of component assumptions on the projection outcomes. Ideally, we would have liked to identify which assumption produced which result. However, to achieve such a goal would require a systematic programme of experimental projections, possible only with both input data files and project software to hand. A recommendation is made in the final section on this matter.

What we have done is to assemble projected populations from the four rounds in one set of spreadsheet files at both national and regional level. From these files we have extracted total populations (all ages) together with the populations aged 0-14 (children), aged 15-59 (students and workers and parents) and aged 60 and over (the retired, the elderly, the infirm). These broad ages have particular policy relevance. Each broad age is most intimately connected, in the short/medium run to assumptions about a different component. The numbers of children are most affected by fertility assumptions. The studying/working ages are very affected by the external migration assumption. The elderly are most affected by the mortality assumption.

Alongside these data have been set the population estimates from the REGIO (regional) database maintained by Eurostat. The integrated population data are presented in a set of tables (Tables 4.1 to 4.12) for the EUR12 countries, in a set of national graphs showing the total and broad age group populations for the EUR15 countries (Figures 4.1 through 4.15) and in a set of regional graphs for total populations for the 13 of the EUR15 countries for which regional projections were carried out (Figure 4.16 through 4.28). An outline map and accompanying key shows the location of each NUTS 2 region (1995 definition) and its 1990 and 1995 Eurostat codes. In the Final Report we intend to fill in the gaps in this integrated information system (national tables for Austria, Finland and Sweden, regional graphs for the broad ages and regional tables) and supply it as a set of linked spreadsheets for deposit at Eurostat for further analysis and dissemination.

We now proceed to comment on the results, country by country. Many points may well apply to more than one country, so the reader may wish to turn to his/her own country, and then to the concluding sub-section where some general evaluative remarks are made. The countries are arranged in their EUR15 official order, alphabetically by native language name. The order is as follows with the native language name in parentheses: Belgium (België/Belgique), Denmark (Danmark), Germany (Deutschland), Greece (Ellada), Spain (España), France, Ireland (Ireland), Italy (Italia), Luxembourg (Luxembourg), Netherlands (Nederland), Austria (Österreich), Portugal (Portugal), Finland (Suomi), Sweden (Sverige) and United Kingdom (United Kingdom of Great Britain and Northern Ireland).

4.1 A comparison of projected national populations for Belgium

4.1.1 Total population (Figure 4.1a)

The observed trend for Belgium is of constant population between 1980 and 1990, followed by population growth. The 1980 and 1985 projections do not reflect this population increase after 1990 showing a decrease in population from this time, but are relatively accurate up to that point. The absence of external migration from these projections could explain why population is underestimated. The observed trend from 1990 to 1995 falls between the low and high scenarios for the 1990 projection. The 1990 and 1995 high scenarios both show the same trend of increasing population. The 1995 baseline scenario also indicates an increase in population but of a lesser degree than is shown by the high scenarios. Both low scenarios predict that population decrease will start in about 2000 in Belgium. One useful measure of population change that can be compared across projections is the 30 year percentage change. Comparing the sole projections for 1980 and 1985, the average of the 1990 low and high and the 1995 baseline, we find a shift from 3% loss in the 1980 round, a 7% loss in the 1985 round and 6% gains in the 1990 and 1995 rounds. The 1990 and 1995 rounds put back the missing international migrants, reduce mortality losses in a systematic way and are less pessimistic about fertility.

4.1.2 Ages 0-14 (Figure 4.1b)

The high scenarios project a fairly constant level of population in this age group. The other projections show a decrease. Both of the 1990 scenarios are close to the REGIO data up to 1995, after which they diverge from each other. The 1985 projection shows the decrease in the size of this age group occurring earlier than in the later projections and in doing so diverges from the observed trend that shows less decrease in fertility between 1985 and 1990. The 30 year change for this age group is 31% loss in the 1985 projection, but only 6 and 7 % losses in the 1990 and 1995 rounds.

4.1.3 Ages 15-59 (Figure 4.1c)

The general trend in the size of this age group is of a slight increase followed by a decrease after 2010, reflecting the entry of low fertility cohorts into the labour force ages. The REGIO data show an almost constant level of the size of this age group up to 1995. The 30 year changes show minor losses of 3, 9, 1 and 5 % respectively across the four projection rounds.

4.1.4 Ages 60+ (Figure 4.1d)

All projections forecast ageing of the population of Belgium. As we move through the projections, the degree of relative ageing increases substantially. The 30 year change is +17% for the 1980 projection, +20% for the 1985 projection, +36% for the 1990 projection but a massive +48% increase for the 1995 projection. Why this shift in expectations? Part of the reason is too conservative assumptions about middle age and elderly mortality. Quite small improvements across ages from 50 onwards lead to an accumulation of survivors in the retired ages. Another contribution will be the survival beyond age 60 of the higher number of middle age immigrants.

4.1.5 Regional projections (Figure 4.16)

The regional graphs for Belgium for the all age population show a moderate amount of variation around the national average. The region containing the capital, Brabant, was divided into three in the 1995 NUTS 2 schema, but for comparability with earlier projections the 1995 results have been summed to form a projection for Brabant. This masks significant deconcentration/suburbanization out of Brussels, which loses a 1.3% share of the national population by 2025, while Vlaams Brabant and Brabant Wallon gain 0.9%. However, at NUTS 2 scale, the picture is one of relative stability.

4.2 A comparison of projected national populations for Denmark

4.2.1 Total population (Figure 4.2a)

The observed population trend in Denmark is of stable population between 1980 and 1990 followed by a slight increase by 1995. The 1980 and 1985 projections do not predict this increase in population and therefore diverge from the observed trend after 1990. The low scenario of the 1990 projection also does not forecast the increase in population that was experienced between 1990 and 1995, but the high scenario for the 1990 projection is fairly accurate for this period. Both low scenarios and the earlier projections indicate a decreasing population in Denmark after about 2000. The high scenarios both show continually increasing population, as does the baseline scenario for the 1995 projection (but to a lesser extent).

4.2.2 Ages 0-14 (Figure 4.2b)

The REGIO data shows a decrease in fertility. This is reflected in all projections, but then a recovery in fertility is predicted by the 1990 and 1995 projections after 1995.

4.2.3 Ages 15-59 (Figure 4.2c)

There is not a significant change in the size of this age group projected. The 1980 and 1985 projections are too low, reflecting the absence of external migration from these models. The early projections and the low scenarios show a decrease in the working population from 1995, whereas the high scenarios predict a continued increase.

4.2.4 Ages 60+ (Figure 4.2d)

Ageing will be experienced. Under the 1995 baseline scenario there will be 46% increase in the 60+ population over the thirty years to 2025.

4.2.5 Regional projections (Figure 4.17)

Denmark's three regions provide little differentiation of its territory in terms of relative attractiveness to migrants. The three regions mirror the national pattern and shares do not change at all over the 1995-2025 period under the fourth round projections. Here we have a classic example of the failure of the regional classification to capture the migration dynamics within a country, of which Illeris (1996) provides plenty of evidence at the *Amter* (county) scale.

4.3 A comparison of projected national populations for Germany

4.3.1 Total population (Figure 4.3a)

There is not a large amount of population change forecast by either the 1980 or the 1985 base projections and both of these projections produce population estimates close to the values from REGIO until unification in 1990 and very similar to each other. After 1990, the projections for the 1990 base low scenario indicate a decrease in population from 1995 and the high scenario projects a continual increase in population throughout the projection period. For the 1995 base projections the low scenario shows a decrease in population occurring later than in the 1990 projection, starting in 2005. The baseline scenario projects an increase in population followed by a decrease and the high scenario shows a continual increase in population. The 1995 projections are higher than those for the 1990 projection round. Overall these projections show that Germany's low fertility will, if it continues, bring eventual population decline, but that high immigration has postponed that decline by several decades.

The assessment of the population projections for Germany is difficult due to the unification that took place in 1990. However, the 1980 and 1985 projections do appear to have projected population relatively accurately up to 1990. What they failed to do was to project the fall of the Berlin Wall, communism and the subsequent opening up of central and eastern Europe to emigration to Germany. Hands up any demographers who predicted such event before 1989!

4.3.2 Ages 0-14 (Figure 4.3b)

All of the projections indicate that not much further decrease in fertility will be experienced in Germany. The early projections and the pessimistic scenarios show more fertility decrease than the high scenarios. The 1980 and 1985 projections produced estimates close to the REGIO data up to unification. However, a steady diminution in the numbers of children is in prospect, unless the 1990 and 1995 optimistic scenarios are realised.

4.3.3 Ages 15-59 (Figure 4.3c)

Not much change in the working population is projected for Germany, although all projections show an eventual decrease by the end of the projection period. The 1980 projection is close to the REGIO data between 1980 and 1985 but then does not project enough population in this age group. This could be due to the lack of external migration in this projection. The underestimation of this age group by the 1985 projection could also be explained by this factor. Under the 1995 baseline scenario, there is a 9% decrease in the 15-59 population by 2025.

4.3.4 Ages 60+(Figure 4.3d)

All projections show an ageing of the population. There is not a large amount of difference between the alternative projections for this age group and all are close to the observed trend. The 60+ population grows by 52% to 2025 under the 1995 baseline scenario. These age group changes have profound implications for the social pension and health care system in Germany. The projections also indicate that high immigration will not compensate for changes induced by continuing low fertility and continuously improving survival chances.

4.3.5 Regional projections (Figure 4.18)

The 38 NUTS 2 regions of Germany show considerable variation around the national picture. The industrial regions of eastern Germany are projected to experience considerable population decline and loss in shares of the national population. These include Dessau, Halle, Magdeburg, Mecklenburg-Vorpommern, Sachsen and Thüringen. However, the declines are considerably lower than projected by Rees, Stillwell and Convey (1992), where the *Länder* containing these regions saw decreases to 25-50% of their 1990 populations in 30 years. This latter projection used migration data from the *annus mirabilis* of 1989. Since 1989 out-migration volumes from the eastern *Länder* have decreased and the counterflow increased. Such a process means that neither Berlin nor Brandenburg will experience the same declines as the industrial states of southern eastern Germany. The German migration system is, in effect, relaxing from the systemic shock of unification and responding to the massive investment by Germany in its eastern states. These are the kinds of trends and policy links that need to be taken into account in framing migration scenarios attuned to the particular situations of regions.

4.4 A comparison of projected national populations for Greece

4.4.1 Total population (Figure 4.4a)

The observed trend for Greece is of population growth higher than that experienced in Belgium. This is reflected in the 1980 projection, which is a fairly accurate representation of population change in Greece. The 1985 projection is not accurate in this case due to its projection of population decrease after 1990. Of the 1990 scenarios, the high scenario produces population projections closer to the observed data than the low scenario which forecasts slow growth followed by a decrease in population after 2005. The 1995 high scenario shows continuous population increase, as does the baseline scenario (but less growth). The 1995 low scenario projects low growth followed by population decrease after 2010.

4.4.2 Ages 0-14 (Figure 4.4b)

The 1980 projection does not reflect the observed trend of decreasing fertility rates up to 1995. All other projections do show this trend and it is followed in 2000 by an increase in fertility in the high scenarios and the 1995 baseline scenario. The initial decrease in fertility is more than will be experienced in Belgium.

4.4.3 Ages 15-59 (Figure 4.4c)

Most projections show an increase in the working population of Greece, although the early projections and the pessimistic scenarios show a decrease later in the projection period. The REGIO data shows an increasing trend up to 1995. The 1980 and 1985 projections underestimate the size of this age group.

4.4.4 Ages 60+ (Figure 4.4d)

Ageing is predicted by all projections. The 60+ population increases by 41% between 1995 and 2025 under the 1995 baseline scenario.

4.4.5 Regional projections (Figure 4.19)

There are considerable discrepancies in the Greek region time series, which need detailed investigation. The regional definitions in 1980 and 1985 were clearly different from those used in 1990 and 1995. The time series of data for Greece would benefit from inputs from a Greek expert and use of backward reconstruction using look-up tables.

4.5 A comparison of projected national populations for Spain

4.5.1 Total population (Figure 4.5a)

The REGIO data for Spain indicates a gradual slowing down of population growth. The 1980 projection and the high scenarios of the 1990 and 1995 projections do not show this slowing down of growth. The other projections do, but the timing of the change to population decrease differs in each case. The 1985 projection and the 1995 baseline scenario indicate that population decrease will begin around 2015, population decrease begins in 2005 in the 1990 low scenario and 2000 for the 1995 low scenario. The 1980 projection diverges from the observed data very quickly, producing population projections that are higher than in reality this is due to the over estimation of fertility in the projection as will be seen when age group populations are analyzed in the next section. The 1985 projection fits the REGIO data relatively well, as does the 1990 low scenario. The 1990 high scenario produces population estimates that are too high.

4.5.2 Ages 0-14 (Figure 4.5b)

The 1980 base projection does not reflect the decrease in fertility that has been experienced in Spain because it uses stable age specific fertility rates based on observed fertility in the late 1970s and early 1980s. The REGIO data for this country shows that a dramatic decrease in fertility has occurred in Spain since 1980. All other projections reflect the observed trend well and show a recovery in fertility will occur from about 2000.

4.5.3 Ages 15-59 (Figure 4.5c)

The discrepancies in the fertility variant in the 1980 projection are also evident in the forecasts made for the size of the working population. After 1995 the 1980 projections diverge from the observed trend as the excess births predicted earlier in the projection period reach this age group. Most of the other projections show a decrease in the working population of Spain after 2005. All projections are close to the observed trend up to 1995.

4.5.4 Ages 60+ (Figure 4.5d)

All projections show an increase in the size of this age group. The 60+ age group grows by 41% by 2025 according to the 1995 baseline projection.

4.5.5 Regional projection (Figure 4.20)

The regional graphs reveal a wide range of experiences around the national average at each of the projection rounds. Internal migration is effecting considerable redistribution out of northern industrial and rural interior provinces to southern and eastern coastal areas and the islands, where the tourist industry provides Northern Europe's playground.

4.6 A comparison of projected national populations for France

4.6.1 Total population (Figure 4.6a)

The 1980 and 1985 base projections are close to the REGIO population data up to 1990, which indicates an increasing population from 1980 to 1995. After this year the earlier projections diverge from the observed data as they project a slowing down in population growth. This underestimation of population could be caused by the omission of external migration as a component of change in these projections. After 1990, the high scenario of the 1990 projection is more accurate because it shows a trend of continued increase in population. The low scenario for the 1990 projection predicts a slowing down of population growth leading to population decrease after 2015. The low scenario for the 1995 base projection shows the same trend. The 1995 high scenario also produces a trend of continual increase in population similar to the 1990 high scenario. The 1995 baseline scenario shows a slowing down of population increase, but no population decrease is projected.

4.6.2 Ages 0-14 (Figure 4.6b)

A gentle decrease in fertility is experienced in most projections with the exception of the high scenarios. The lower scenarios tend to reflect the observed trend most accurately and the 1980 projection with its stable fertility rates projects too many children being born.

4.6.3 Ages 15-59 (Figure 4.6c)

All projections except the 1980 base and the 1990 high scenario project a peak in the size of this age group in 2005. The 1980 and 1985 base projections produce forecasts for this age group that are lower than seen in the REGIO data. This could be because of the lack of the external migration component in these models. Both of the 1990 scenarios follow the increasing observed trend.

4.6.4 Ages 60+(Figure 4.6d)

All projections forecast ageing. A higher increase in the size of this age group is projected than for Spain and the United Kingdom, with a 56% increase in the period 1995-2025 according to the baseline scenario.

4.6.5 Regional projections (Figure 4.21)

The regional graphs reveal that quite a bit of redistribution is projected for the future, mainly from older industrial regions of eastern France and the remoter regions of the west and Massif Central. Gains are made by southeastern and southwestern regions. There is a shift in the pattern in the 1990 and 1995 base projections compared with the earlier ones, reflecting the input of 1982-90 migration data compared with 1975-82 information. The Île de France is projected to decline in population in the two earlier projections but to increase in the 1990 and 1995 forecasts. This indicates that the tide of de-metropolitanization in France has ebbed.

4.7 A comparison of projected national populations for Ireland

4.7.1 Total population (Figure 4.7a)

Ireland shows a similar picture to Denmark, with the exception of the 1980 projection. The 1980 projection assumed continuing fertility trends and therefore has very high fertility rates for Ireland as were experienced in the 1970s and early 1980s. However this situation has changed and fertility rates have decreased in Ireland, leading to a decrease in population growth. This has not been accounted for in the 1980 projection. The REGIO data for Ireland indicates a slowly increasing population. The 1985 projection fits this trend well, as does the 1990 high scenario. The 1990 low scenario seems too pessimistic for Ireland, forecasting a decrease in population starting in 1990. The 1995 projection low scenario does not show population decreasing until 2020. The high and baseline scenarios for the 1995 projection both show continued increase in population throughout the projection period.

4.7.2 Ages 0-14 (Figure 4.7b)

The 1980 base projection overestimates the size of this age group by a large amount due to its use of stable fertility rates from 1980. Stable fertility rates mean that this projection cannot reflect the decrease in fertility that has been experienced in Ireland. All other projections do reflect this trend of decreasing fertility. However, the projections show that fertility will begin to recover after about 2005.

4.7.3 Ages 15-59 (Figure 4.7c)

The 1980 base projection over predicts the size of this age group due to its over-prediction of fertility and not accounting for negative external migration. Most of the other projections show an increase in the working population of Ireland for most of the projection period.

4.7.4 Ages 60+ (Figure4.7d)

Ageing is predicted by all projections, and a 68% increase in the 60+ population is projected in the baseline scenario, one of the highest in the EU. Ireland has a traditionally youthful age structure associated with high fertility followed by emigration. This will rapidly change in the next 30 years towards the European norm of old age concentration accompanied by low fertility and net immigration (although no projection forecast correctly the turnaround that has occurred in Irish international migration in the 1990s).

4.8 A comparison of projected national populations for Italy

4.8.1 Total population (Figure 4.8a)

The observed data from the REGIO database indicates very little population change up to 1990, followed by a slight increase up to 1995. Most of the projections are close to the REGIO trend. The general trend for the projections is a constant level of population up to 2000 followed by differing degrees of population decrease, with the 1985 projection, the 1995 low scenario and the 1990 low scenario showing the biggest decrease. The exceptions to this trend are the high scenarios for both the 1990 and the 1995 projections which project a slowly increasing population, but with the 1990 high scenario predicting population to be 2 million higher than the 1995 high scenario. More population decrease is projected than for France, Spain and the United Kingdom.

4.8.2 Ages 0-14 (Figure 4.8b)

A sharp decrease in fertility is forecasted, followed by a recovery after about 2000. Fertility is too high in the 1980 base projection, leading to an overestimation of the size of this age group when compared to the observed data. The 1985 projection fits the REGIO data well. The 1990 low scenario fits better than the high scenario.

4.8.3 Ages 15-59 Figure 4.8c)

All projections except the 1990 high scenario project a large decrease in the working population of Italy.

4.8.4 Ages 60+ (Figure 4.8d)

All projections indicate that ageing will occur. Although the increase in the 60+ age group is only 39% in the 1995-2025 interval, relative ageing is more pronounced because of the decreases in younger ages. The elderly make up 32% of the 2025 population as against 22% of the 1995.

4.8.5 Regional projections (Figure 4.22)

The graphs for Italian regions show a variety of experiences in which natural increases in the southern regions compared with natural decreases in the northern regions out-weigh the net counter-flows from south to north. Even under 1990 and 1995 high scenarios, population decreases are projected for Piemonte, Liguria, Friuli-Venezia Giulia, Emilia-Romagna, Toscana. However, under the average of 1990 scenarios or the 1995 baseline scenario even southern regions such as Basilicata, Calabria, Sicilia and Sardegna will experience population decline after 2015. Gains and losses in regional shares are more complex: in the north west, Piemonte loses 0.7% share in the 1995-2025 period, while Lombardia retains a constant 15.6% share. Sicilia and Sardegna gain shares while Calabria and Basilicata lose them. To properly understand regional population dynamics in Italy we must carry out analysis at province (NUTS 3) or commune scale (NUTS 5) (as in Rees *et al.* 1998).

4.9 A comparison of projected national populations for Luxembourg

4.9.1 Total population (Figure 4.9a)

The REGIO data indicates a relatively stable population between 1980 and 1990 followed by an increase in population. The 1980 and 1985 projections do not show this increase in population and both projection forecast a decrease in population starting in 1985. Of the two 1990 projection scenarios, the high scenario fits the observed trend most accurately because the low scenario does not predict enough population growth, this scenario shows very little change in population over the projection period. The high scenario for the 1995 projection forecasts population growth higher than in the 1990 high scenario and the baseline scenario shows a continually increasing population.

4.9.2 Ages 0-14 (Figure 4.9b)

The 1980 and 1985 projections are too low. The other projections show a slight increase in fertility, which levels out and turns into a decrease in the pessimistic scenarios.

4.9.3 Ages 15-59 (Figure 4.9c)

The 1980 and 1985 projections are too low for this age group reflecting the absence of external migration in these projections. Other projections show an increase in the working population. Of the later projections, only the pessimistic scenarios show a decrease in the size of this age group during the projection period.

4.9.4 Ages 60+ (Figure 4.9d)

Ageing is projected, with a 78% increase in the 60+ population between 1995 and 2025 under the baseline scenario. Under the high scenario, which we have said is probably more realistic for mortality, the component that influences the growth of the elderly most, this increase is 89%. Since Luxembourg is one of the richest places in Europe, even such increase should not cause distress, but the continued immigration of workers into the health and eldercare sectors can be projected.

4.10 A comparison of projected national populations for Netherlands

4.10.1 Total population (Figure 4.10a)

The REGIO data reveals that a high rate of population growth has been experienced by the Netherlands between 1980 and 1995. The 1980 and 1985 projections do not reflect this observed trend and project a much slower rate of population growth followed by decreasing population after 2005. The 1990 high scenario forecasts too much population growth and for the period 1990 to 1995 the 1990 low scenario is a more accurate representation of observed trends. Both low scenarios indicate a slowing of population growth leading to eventual negative growth after 2010. The 1995 baseline scenario projects relatively high population growth, but not as high as the two high scenarios.

4.10.2 Ages 0-14 (Figure 4.10b)

The early projections show a continued trend of decreasing size of this age group in the Netherlands. The 1990 and 1995 projections show an increase in fertility up to about 2005 which is reflected by the REGIO data.

4.10.3 Ages 15-59 (Figure 4.10c)

All projections except the 1980 and 1985 base show a significant increase in the size of the working population in the Netherlands, although this is followed by a decrease later on in the projection period (except in the 1990 high scenario). The shortfall in the estimates by the 1980 and 1985 base projections could be due to the lack of external migration in these models.

4.10.4 Ages 60+ (Figure 4.10d)

A lot of ageing is projected for the Netherlands, more than for Greece, Belgium and Portugal. The increase in this age group between 1995 and 2025 is 81% under the baseline scenario.

4.10.5 Regional projections (Figure 4.23).

The Dutch graphs for Flevoland, Gelderland and Overijssel reflect one of the difficulties in making comparisons of regional projections, when regional entities change their boundaries. The second and third regions donate populated territory to the new province on its creation in 1986. Hence the discontinuities in the graphs. Apart from growth in Flevoland's share of the national population and decreases in peripheral Limburg's share, most other shifts are relatively modest. Virtually all Dutch regions are still growing at the end of the projection period, in contrast to regions in very many of other countries where peaks are reached before 2025.

4.11 A comparison of projected national populations for Austria

4.11.1 Total population (Figure 4.11a)

Only the 1995 base projections are available for this new EU member. However, the characteristic EU pattern of modest growth under the baseline scenario occurs.

4.11.2 Ages 0-14 (Figure 4.11b)

The overall increase masks small declines in the child population.

4.11.3 Ages 15-59 (Figure 4.11c)

There is projected stability in the studying/working ages until 2015, after which decline sets in.

4.11.4 Ages 60+ (Figure 4.11d)

As elsewhere substantial increases in the elderly population occur (55% in the 30 years to 2025).

4.11.5 Regional projections (Figure 4.24)

Before the end of the projection horizon, declines occur in the eastern and southern *Länder,* while the western states still experience growth, although this is slowing by the end of the period. Wien's population remains relatively stable.

4.12 A comparison of projected national populations for Portugal

4.12.1 Total population (Figure 4.12a)

The observed trend for Portugal shows a relatively stable population. Less population change is projected for Portugal than was forecasted for the Netherlands. Only the 1985 projection and the low scenarios indicate that population decrease will be experienced by Portugal over the projection period. The timing of the decrease in population is different for each projection. For the 1985 projection the decrease in population starts early in 1990. The decrease begins in 2005 for the 1990 low scenario and 2010 in the 1995 low scenario. The 1980 projection shows a rate of population increase similar to that indicated by the 1995 baseline scenario. The high scenarios both forecast continual population growth.

4.12.2 Ages 0-14 (Figure 4.12b)

The 1980 base projection over-predicts the size of this age group due to not reflecting the decrease in fertility that has been experienced. The later projections that use variable fertility rates do reflect this trend of decreasing fertility but then the optimistic and baseline scenarios project a recovery in fertility rates after about 2000.

4.12.3 Ages 15-59 (Figure 4.12c)

All projections show an initial increase in the working population of Portugal, although the pessimistic scenarios and the 1985 base projection show a decrease after 2005 (when the decrease in fertility experienced in the 1990s is felt in the working age groups).

4.12.4 Ages 60+ (Figure 4.12d)

Again, all projections show an increase in the size of this age group, though the increase in the 1995 baseline projection of 37% in the 1995-2025 period is modest.

4.12.5 Regional projections (Figure 4.25)

The corrections to Portugal's population estimates after the 1991 Census cause some discontinuities in these graphs (see section 5 for further discussion). The 1980, 1985 and 1990 projections fare very badly at predicting population change in Portugal's regions in the period to 1995, for which we have population estimates. This raises some questions about whether the 1995 will fare any better. The directions of population shifts are plausible. There are strong losses to the interior, rural Alentejo region, strong gains to the tourist coast region of the Algarve, with the urbanized Norte and Lisboa e Vale Tejo regions predicted to have moderate growth. A clearer picture of population change would emerge if NUTS 3 regions (*Grupos de concelhos)* were used.

4.13 A comparison of projected national populations for Finland

4.13.1 Total population (Figure 4.13a)

The 1995 baseline projection sees the Finnish population grow over the 30 years but at decreasing rates.

4.13.2 Ages 0-14 (Figure 4.13b)

Decreases occur in the childhood ages but these stabilize towards the end of the projection period.

4.13.3 Ages 15-59 (Figure 4.13c)

After an initial increase this broad age group goes into fast decline, raising serious concerns for the Finnish economy.

4.13.4 Ages 60+ (Figure 4.13d)

The elderly increase very rapidly after 2005, so that the 60+ population is 65% of its 1995 value by 2025.

4.13.5 Regional projections (Figure 4.26)

The regional graphs show that Finland is experiencing a process of concentration in the capital region, Uusimaa.

4.14 A comparison of projected national populations for Sweden

4.14.1 Total population (Figure 4.14a)

Relatively high fertility in Sweden drives up the population steadily over the projection period.

4.14.2 Ages 0-14 (Figure 4.14b)

These relatively high fertility levels also mean that Sweden is projected to see the numbers of children recover after an initial decline.

4.14.3 Ages 15-59 (Figure 4.14c)

The studying/working ages maintain a stable number over the projection period, under the baseline scenario.

4.14.4 Ages 60+ (Figure 4.14d)

The elderly population increase but a modest amount compared with most other EU countries of one third.

4.14.5 Regional projections (Figure 4.27)

The regional graphs show a shift from northern regions to Stockholm and southern Sweden.

4.15 A comparison of projected national populations for United Kingdom

4.15.1 Total population (Figure 4.15a)

For the United Kingdom, the observed trend is of an increasing population. The 1980 and 1985 projections fit the REGIO data up to 1990, but then they predict a slowing down of population growth which is not reflected in the observed data. Between 1990 and 1995 the high scenario of the 1990 projection fits well whereas the low scenario does not project enough population growth. Both high scenarios and the 1995 baseline scenario show a continuing increase in population. The 1990 and 1995 high scenarios produce very similar projections. The low scenarios and the 1980 and 1985 projections all predict an eventual decrease in population.

4.15.2 Ages 0-14 (Figure 4.15b)

All projections fit the REGIO data quite well and show a recovery of fertility rates from 1990 followed by a decrease later on in the projection period after about 2005.

4.15.3 Ages 15-59 (Figure 4.15c)

All projections show an increase in the working population of the United Kingdom until quite late in the projection period when a decrease will be experienced. The 1980 and 1985 base projections fit the REGIO data well up to 1990 and then do not project enough population in this age group. This could be because of the absence of external migration from these projections. Of the 1990 scenarios the optimistic one is the most accurate between 1990 and 1994.

4.15.4 Ages 60+ (Figure 4.15d)

At the start of the projection period there is a slow increase in the size of this age group. The pace of this growth increases after 2005.

4.15.5 Regional projections (Figure 4.28)

The graphs show that the shifts of population shares from the large metropolitan regions to the less dense non-metro regions. However, there are substantial changes between the 1980 and 1985 round results and those from the 1990 and 1995 projections. The large cities were projected for rapid decline in the former projections but are projected to keep their populations or lose them more slowly in the latter projections. Urban deconcentration continues but at less intense level.

5. ANALYSIS OF PROJECTION ERRORS

There is a degree of doubt whether the measurement of errors in population projection after the fact (*ex-post* errors) serves any useful purpose. Opponents say the calculation of such errors is not useful because they only tell us how wrong forecasters were some time ago. They maintain there is no way the knowledge of *ex-post* errors may be used for improvement of future forecasts. However, we believe that knowledge of past errors may be of use in examining how the assumptions of forecasts have impacted the direction and magnitude of errors and in identifying where and why errors were large or small. For this purpose the projections error have been calculated for the entire European Union/European Community, for each of the member states and finally for regions on NUTS2 level, wherever it was possible. The analysis is confined to a comparison of projected population stocks and subsequently observed or estimated populations. The 1980 and 1985 rounds did not produce systematic outputs of the components of change in their final reports.

5.1. Sources of forecast errors unrelated to population projection procedures

In the calculation of *ex-post* forecasting errors of population projections a number of issues have to be taken into account.

5.1.1 Errors in calculating stock of population

The first issue to be considered is that the base year population for the projection may be inaccurate. In this case comparison of the results of the forecast with corrected observed population is inadequate as the difference consists of two components: forecast error itself and the difference between the base year populations used in the forecast and corrected populations. Corrections in the stocks of population are mostly introduced after censuses of population and affect the total number of population, its geographical distribution and occasionally its age-sex structure.

Post-census population corrections have been introduced retrospectively to the REGIO database after the population projections were made. The consequence is that population stocks used as a base for projections differ from the ones for identical years and administrative units present in the REGIO database. This problem was addressed by calculation of differences between stocks of population used as a base for the projection and those reported in REGIO. The differences were deducted from population projection results in each projection year. This "corrected" population is assumed not to experience any demographic events, such as births, deaths or migration. This solves the problem in a satisfactory way for all units in which the correction in percentage terms was not too high. The same method was used both for correcting regional and national population counts as well as to population age structures where appropriate.

5.1.2 Errors due to changes of administrative and state boundaries

Another problem occurred due to the changes of political boundaries of states or changes in the classification of some extra-European territories as a part of the European mainland. Both problems were present and were solved in as simple a way as possible. The first problem affects Germany, which after the unification increased its population substantially. The only year impacted in the error calculations was 1995. For this year the actual population of Germany was replaced with the population that inhabited the territory of the former (pre-unification) population of the Federal Republic of Germany obtained from the Council of Europe (1997). The second problem refers to Spanish total population in 1990 and 1995, when population of Ceuta ceased to be counted in the total population of Spain reported in the REGIO data base. In order to obtain fully comparable populations for Spain, the populations of Ceuta observed in 1990 and 1995 were deducted from relevant total values for Spain. In both cases only national values, total and by age, were affected.

In order to calculate the error in the regional distribution of projected population one of two conditions has to be met: either administrative boundaries of regions remain stable over time or each change is carefully documented in terms of population shifts between regions. Otherwise the errors also include population deficiencies and surpluses in regions. These differences occurred due to boundary changes and have nothing to do with the quality of forecasting.

In such vast territory as the European Union, it is inevitable that regional boundary changes will occur. National administrations are at liberty to change administrative boundaries in their countries as they see fit, and this will lead to changes to NUTS boundaries. For example, local government re-organization in the United Kingdom over the years 1996-1998 (Office for National Statistics 1999) now means that the 1995 NUTS 2 regions have been radically changed. A number of changes in the NUTS 2 regions occurred over the period 1980-1995. Harri Cruijsen of Eurostat kindly provided us with a list of changes recorded unofficially by Eurostat. This list is shown in Table 5.1.

It is, however, crucial that Eurostat adopt an official strategy to maintain comparability of data in the Eurostat databases. The data in the new administrative divisions should be recalculated backwards using look-up tables. Wilson and Rees (1998) provide a guide to the structure of such look-up tables. This is not a very easy task, which requires co-operation of Eurostat with National Statistical Offices. So far Eurostat does not have a system allowing for tracing the impact of the changes in administrative division on the time series of data presented. This makes any comparative research quite difficult.

5.2 Methods of analysis of projection error

There are two ways to estimate errors in population projections. Either they may be calculated *ex post*, through comparison of results of projections with the actual population numbers of a given category or with counts of demographic events, or *ex ante*, through estimation of the error magnitudes already known or guessed at the time of projection construction. The *ex-post* approach is most suitable to the assessment of the quality of the forecast, the *ex-ante* approach defines the intervals of confidence. All error calculations can be applied to stocks of population, to all components of change or to structures and distributions.

There are two reasons for estimation of errors of population projections and forecasts. Firstly, it is done for the purpose of the assessment of the quality of the forecast. In that case the underlying assumption is that the smaller the error the better the forecast. The analysis of errors may lead us to the improvement of the methodology of population projections and above all the critical assessment of the assumptions underlying the forecast. The second reason is purely practical. Application of the results of forecasts for broadly understood planning purposes, for the determination of strategy of various social institutions (e.g. educational institutions or social security agencies), makes it necessary to estimate the errors of forecasts in order to define some sort of confidence intervals. Often information on the magnitude and distribution of past errors are used for construction of "empirical confidence limits" (Williams and Goodman 1971, applied by Stoto 1983 or Smith 1987).

Cohen (1986) classified the methods of confidence interval calculation into two classes: the model based ones, in which values of confidence intervals of a projection are derived from the model formulation simultaneously with the projection results (e.g. Alho and Spencer 1985, Cohen 1986), and the empirical ones, where the errors are estimated on the basis of the error distribution observed *ex post* in other forecasts (Keyfitz 1981, Stoto 1983, Smith and Sincich 1988). An essential drawback of the first method lies in the fact that it is not universal, but depends upon the projection model adopted. It was also criticised as not feasible by Smith and Sincich (1988) who advocated the latter method as delivering good predictions of future forecast accuracy.

Ex post estimation of the projection error made on the basis of comparison of the forecast and true values allows one to evaluate the quality and adequacy of the forecasting models, as well as the assumptions adopted as to the future fertility, mortality and mobility trajectories.

The *ex post* error can be calculated either with regard to scalar values (population stocks in a given population category, number of demographic events or migration flows), vectors (for instance age structure of population in a given region), or matrices (for instance a matrix or age structure and spatial distribution of population in the country or distribution of births by age and region).

Comparison of the scalar values can be performed in many ways, starting with the very simple calculation of the magnitude of the average annual forecast error in percentage points, or calculation with the formula proposed by Keyfitz (1972) and labelled "quality of prediction":

$$e = 100 * (P - c) / (R - c)$$

where: P is the forecast population number, R is the true population number, c is a benchmark, e is the measure of projection accuracy. This method has been extensively used and discussed in detail by Kujisten (1984) for the assessment of Dutch population forecasts.

Among typical measures are:

The mean percentage error ($100 N^{-1} \sum_{i=1}^{N} (P_i - O_i)/O_i$). This measure shows the direction of the error (underestimation for negative values of the measure and overestimation for positive) (Keilman and Schruers 1988). If the signs of the error change from year to year the overall absolute value of the error will be relatively small, as the annual errors will cancel out. In the above formulae P_i denotes projected population, O_i denotes observed population, N is the number of years for which the error is calculated and i numbers these years.

The root mean square percentage error ($100\sqrt{N^{-1}\sum_{i=1}^{N}((P_i - O_i)/O_i)^2}$). This measure does not show the direction of the error and is suitable for the assessment of the overall cumulative error of projection (Keilman and Schruers 1988).

The Theil U coefficient ($\sqrt{\sum_{i=1}^{N}(P_i - O_i)^2/(A_i - O_i)^2}$). (Keilman and Kucera, 1991), where A_i denotes population projected in an alternative projection. The U coefficient measures the quality of the projection in question in comparison to the alternative projection. If U is larger than 1 the alternative projection gives better results. For U smaller than 1 the examined projection is better. Such construction allows for a direct comparison of the accuracy of two projections.

The index of dissimilarity, given by D, is a useful measure due to its straightforward interpretation.

$$D = 100\frac{1}{2}\sum_i\left|\frac{P_i}{P} - \frac{O_i}{O}\right|$$

$$D = \frac{1}{2}\sum_{i=1}^{N}\left|100(\frac{P_i}{P}) - 100\frac{O_i}{O}\right|$$

where P_i and O_i denote projected and observed populations of a certain class. P and O represent the projected and observed total populations of the system investigated, where $\sum_i P_i = P; \sum_i O_i = O$. D takes a value between 0, which means complete similarity and 100, which means complete dissimilarity. The D value is the percentage of the projected population which would have to be moved to produce the same relative distribution as the observed population. This error measure is particularly useful for the assessment of the error of distribution, but does not take into account the errors occurring due to poor calculation of the rate of population change.

A more refined technique, in which the magnitude of the *ex post* error is measured as the difference between the population growth rate according to the projection and observed for a certain period, was applied by Stoto (1983). Extensive overviews of different measures could be found in Armstrong (1985) or Ahlburg (1982).

From the point of view of the needs of users, as well as from the point of view of modern trends in the development of demography is seems that the calculation of errors with regard to scalar magnitudes is presently not sufficient, and that it is necessary to calculate errors with regard to vector and matrix values, since the results of projection are usually presented in the form of multidimensional matrices. Attention should be turned to the fact that in spite of numerous studies of projection accuracy a vast majority of publications refer to the simplest projection methods, such as extrapolation of population with elementary mathematical functions, while there is a lack of such accuracy studies for more complex methods. In particular, apart from Isserman's (1993) Kotowska's

(1980) and Jóźwiak's (1980) papers, the authors are not aware of any attempt to assess the accuracy of multi-regional (called interregional by Isserman) or multistate projections.

The methods meant for studying vector values may be easily generalised so as to become useful for the analysis of phenomena described by matrices, for instance, through deployment of the matrix into a vector row by row, wherever it makes sense. In the econometric literature there exist quite a number of methods which allow for the comparison of phenomena which can be described with vectors. Extensive reviews of these can be found in the literature concerning taxonomy, classification and cluster analysis (see, for instance Cormack 1971, Anderberg 1973, Rao 1977). Demographers have been interested by these questions as well, though to a lesser degree than econometricians. More attention was devoted to these problems by scholars studying migrations (Sommermeijer 1961, Baydar 1983), who were looking for a tool for comparing changes in migration matrices. Recently, a review of literature concerning applications of methods of determination of similarity (dissimilarity) measures for vectors to estimation of accuracy of demographic forecasts was presented by Józwiak (1987).

Another option designed for the measurement of the errors of structures is proposed by Jozwiak (1980) and Kotowska (1980). They propose to calculate at a fixed time of projection:

$$D = PA - PP$$

where PA is vector/matrix of shares of actual and PP of projected populations (for convenience, the time subscript t has been dropped compared with the original). Both PP and PA sum up to 1 therefore the sum of the elements of D is 0. They define the error d as:

$$d = \|D\| = (D^T D)^{1/2}$$

d takes value between 0 and $\sqrt{2}$. It is easy to recalculate the error by dividing it by $\sqrt{2}$ so that it takes a value between 0 and 1.

It is possible to calculate the level of consistency, E of the projection over k projection periods, assessing with one number the accuracy of a projection over a number of projection steps:

$$E = \frac{\sum_{t=1,k} d(t)}{k\sqrt{2}}$$

E takes a value between 0 and 1. The larger the value of E the lower is the consistency between projections. Values of E for different projections and over different periods of time can be compared. Unfortunately there is no intuitive interpretation of this measure.

For the purpose of this evaluation it was decided to use as simple and easy to interpret measures as possible. A hierarchical system of measurement was design. At the top of the hierarchy comes a synthetic one-number error measure for each projection of the age and country distribution which was calculated using the E measure proposed by Jozwiak (1980) and Kotowska (1980). This measure tells us which is the most accurate and least accurate population distribution among all the projections and is not influenced by the length of the projection period. The last statement would have been true in the case when the magnitude of error was independent from the length of projection period, that is in each projection period the statistical distribution and the magnitude of the error was the same. This is not true as the error increases with the projection time. In addition percentage errors, both annualised and cumulative for the population of the entire European Union and for each country will be calculated. For geographical distribution errors of national populations within the European Union and for age distribution errors in each country, an index of dissimilarity D will be used. The value of it may be interpreted as a percentage of the projected population, which would have to be moved to produce the same relative distribution as the observed population. On the regional level the same set of measures as on the national level will be applied. The unit of measurement will be regions rather than countries, so we will get errors in the regional population distribution in a country and errors in the age distribution in regions.

Such a system of analysis provides measures of accuracy of three key values on each level of spatial resolution (the European Union, member states and regions): overall percentage error of projection, error of spatial distribution of population and error of age distribution of population. In addition, a summary indicator of overall projection error will be provided.

5.3 Forecasting errors at EU level

Corrected observed populations were computed for the projections made for base years of 1980, 1985 and 1990. The method of calculation of corrected values is given in section 5.1. The national numbers for each projection are shown in Tables 5.2, 5.3 and 5.4 respectively. The largest corrections have been introduced for Italy, Spain, the UK and France. The corrected numbers have been used in the calculation of all errors.

Annualized and cumulative percentage errors for the EU populations are presented in Table 5.5 for the 1980 projection, in Table 5.6 for the 1985 projection and in Table 5.7 for the 1990 projection. No error was calculated for 1995 projection, as the time elapsed since the base year of projection was very short.

For the entire European Union, annualized error varies from -0.27% for the 1985 projection after 10 years to -0.01% for the 1990 projection after five years. However, calculation of percentage errors for the entire European Union has little significance as large positive and negative errors for individual countries may cancel out. This is the case in particular for the 1980 and 1985 projections, which are sums of independent projections of member states rather than a projection of the population for the entire EU.

The value of error E was calculated based on the distribution of the European Union populations by broad age groups and country. For the 1980 and 1985 projections three age groups (0-14, 15-59 and 60+ years) were used. For the 1990 projection the age groups were different (0-14, 15-24, 25-64 and 65+ years). Portugal, for which there was no observed age distribution available was excluded from the calculation. It was impossible to supply missing data from another available source – the Council of Europe (1995) as totals in the Regio database differed from those reported in the Council of Europe publication. The largest value of the error E of population projection was observed for 1985 projection and equaled 0.0184. Two other projections noted considerably lower errors equal to 0.0059 for the 1980 projection and 0.0039 for the 1995 projection. It should be stressed that these errors concern the accuracy of distributions not the numbers itself.

Judging by the projection errors calculated above, the most accurate in terms of forecasting both the magnitude and the distribution of the EU population was the 1990 projection. The worst results were obtained in the 1985 projection.

5.4 Forecasting errors at national level

Annualized and cumulative percentage errors for each country are presented in Table 5.5 for the 1980 projection, in Table 5.6 for the 1985 projection and in Table 5.7 for the 1990 projection.

On the national level we get a diversified picture. The first two projections are characterized by quite large errors in some countries. In the 1980 projection (Table 5.5) Ireland had over 1% annual error after 10 and 15 years. Considerable errors, over ±0.5% per annum, are observed in Germany and Luxembourg after 15 years and in Greece and Portugal after 10 and 15 years. Also, Spain noted fairly high errors. In the 1985 projection (Table 5.6) the list of countries with the highest errors is similar: Luxembourg, Germany and Portugal. These are countries in which the external migration component was poorly projected.

Cumulative errors in the 1980 projection were 15.8% in 1995 for Ireland (10.2% in 1990), -11.7% for Luxembourg (-4.36% in 1990) and -8.91% in Germany (-3.34% in 1990). Projection errors for the 1985 projection were respectively: 0.85%, -12.15% and -8.54% after 10 years for the same countries. All countries on this list have experienced large positive or negative net international migration. The magnitude and sign of these errors show clearly that international migration unaccounted for in the projection model is a very important factor in the determination of the level of projection error.

In general, the 1990 projection has extremely low errors (Table 5.7). The largest annualized error -0.009% over a period of 5 years is noted for Luxembourg and is insignificant. All other errors were of a smaller magnitude. The 1990 projection seems to be ideal in terms of *ex-post* accuracy.

In the following paragraphs we analyse the errors in the distribution of population by age in each of the countries, each of the projections and in each time point of projection. For this purpose we use the dissimilarity index D discussed earlier. The values of this index are shown in Table 5.5 for the 1980 projection, in Table 5.6

for the 1985 projection and in Table 5.7 for the 1990 projection. As expected, errors increase with the time of projection. This is apparent when one looks at the 1980 projection, for which in several countries (Greece, Ireland, Luxembourg, Portugal, Spain) the value of D trebled or nearly trebled between 1985 and 1990 that is between the first and the second step of projection, or doubled or nearly doubled between 1990 and 1995. For the 1985 projection we observed steep increases of the value of error in Belgium, Denmark, Germany, Greece and Luxembourg.

Let us recall here the interpretation of the dissimilarity index: an error value equal to 1 denotes that in order to obtain an age distribution of the projected population exactly the same as in observed population we would need to move 1% of projected population between age groups. In the first step of projection the value of D only sporadically exceeded 1. This happens in Portugal for the 1980 and 1985 projections and in Germany for 1990 projection. For the 1990 projection the error in the age distribution for Portugal was not calculated. Roughly speaking in a half of all countries the magnitude of error in the first step of projection does not exceed 0.33. The lowest errors after the first step of projection are observed for the 1990 projection.

The geographical distribution of the error in the age distribution of the population for the 1980 projection after 5 years of projection time varied from 0.09 for Luxembourg and 0.17 for the Netherlands to 0.67 for Ireland and 1.61 for Portugal. The latter country has very consistently the highest error in the age distribution for this projection, except after 15 years of projection time when Ireland and Spain have even larger errors of 6.01 and 5.15 respectively. It is quite striking, that in the third step of the projection a quite clear split of countries into two groups can be identified: the first group with low errors, below 1, to which belong mostly countries of North and Western Europe, and the second group with high errors to which belong South European countries and Ireland. This may be explained by the rapid decline in fertility that occurred in these countries that was unexpected at the time of the preparation of the projection (see Figure 3.1).

For the 1985 projection, the largest errors in the age distribution after 10 years of projection are in Denmark, Luxembourg and Germany. In the two latter cases the large errors may be attributed to international migration being unaccounted for or only partly accounted for in the projection. The magnitude of errors for the 1990 projection after five years is in many cases higher than comparable errors for 1985 projection. The notable exception is the quite high error for the age distribution for Germany in the 1990 projection.

In the next step we will look at the errors in the geographic distribution of the population. The measure of error used is again the dissimilarity index, but the unit of measurement is the population of a country, either for all ages or in a specific age group. The value of an error indicates the percentage of the projected population in the European Union, either for all ages or in a specific age group, which would have to be moved between countries, in order to obtain the geographical distribution of population by countries identical to the observed one. It is well worth noticing that with the total population of the European Union exceeding 320 million, an error of 1 percent means that over 3.2 million would have to be moved if we wanted to obtain identical geographic population distribution of observed and projected populations. Values of errors for each projection for total populations and for populations in selected age groups is shown in Table 5.8 for the 1980 projection, in Table 5.9 for the 1985 projection and in Table 5.10 for the 1990 projection.

After the first five years of each projection the error in the geographic distribution of total population is quite small. Only after ten years for the 1985 projection and after 15 years for the 1980 projection does it exceed 1. The error in the geographic distribution of population in various age groups is larger. In the first two projections the largest error occurs in the youngest age group, most likely due to unexpected changes in fertility. After 15 years for the 1980 projection it equalled to 6.22. For these two projections the error of the distribution of the oldest age group was small and for the middle age group moderate. The 1995 projection is characterised by low errors in the geographic distribution of total population and high errors of the distribution of population in all age groups.

5.5 Forecast errors at regional level

On a regional level we encounter a number of problems with error measurement, which are not related to the projection procedures, which are discussed in section 5.1. Based on the above discussion we had to select those countries for which measurement on regional level was possible, that is for which we were able to correct errors of enumeration and boundary changes with reasonable accuracy. Table 5.11 and Table 5.12 show the criteria used and the list of countries chosen for projections in 1980, and 1990 respectively. For 1985 the results of the projection at regional level were not available. Three criteria have been taken into account: the first was if a country was divided into regions at NUTS level 2. Two countries, Ireland and Luxembourg, were not and in consequence excluded from further consideration and no other criteria were applied for these countries. In the second step we checked whether it was possible to calculate corrected regional population. It was somewhat optimistically assumed that if national populations did not need corrections (Table 5.2, Table 5.3 and Table 5.4) there was no need to correct regional populations. Small discrepancies, less than 1/10000 of corrected national populations, were deemed to be insignificant. In the case when it was decided that regional corrections should be calculated the availability of corrected data on regional level determined whether it was possible to obtain corrected results of projected populations. A procedure identical to the one applied for national populations was applied. For those countries for which there was no need to calculate corrected regional populations or for which it was possible, the final step was applied. This was aimed at establishing if there were any changes in regional boundaries and if yes, whether it was possible to calculate by aggregation any regional set of boundaries which was consistent over the entire period for which the error measurement was planned. The results of calculation of regional corrected projected populations for 1980 and 1990 projections are shown in Table 5.13 and Table 5.14.

Figure 5.1 displays the percentage errors of the 1980 projection in regions over time for total populations. Figure 5.2, Figure 5.3 and Figure 5.4 display relevant values for broad age groups. The projection of total population (Figure 5.1) consequently underestimated populations in almost all regions of four countries under investigation. The only exceptions are the six southernmost regions of Italy. The largest errors occurred in Germany and Southern Italy. Very clearly the magnitude of errors increase with the length of the projection. The last five years of the projection resulted in a particularly rapid increase in error. The percentage errors calculated for the 0-14 years age group are very high, in some cases exceeding 30% after 15 years of projection, in terms of differences between projected and observed population. Particularly high overestimation occurred in south Italian regions, most likely due to rapid decrease in fertility. All German regions experienced high underestimation. Hamburg suffered the largest error. This can be explained by the way international migration was treated in this projection. Two other age groups (Figure 5.3 and Figure 5.4) show very consistent underenumeration, more widespread for the oldest ages, which is in line with the earlier observation that improvement in mortality was underestimated in population forecasts. The magnitude of errors was for these age groups was much smaller than for the youngest one. Figure 5.5 shows annualised percentage error of the 1980 projection after 15 years of projection for total population and for each broad age group which in a concise manner summarizes previous four figures.

Figure 5.6 shows annualised percentage error of the 1990 projection after 5 years of projection for total population and for each broad age group, The largest errors occurred in Germany and Greece whereas the lowest are found in Italy and France. In West Germany underestimation is widespread, whereas in East Germany overestimation prevails. The error is due to large scale migration from Eastern to Western Germany. Not surprisingly the largest errors occurred in 15-24 age group. Île de France and Madrid noted underestimation for these age groups. The Greek island regions showed for this age group substantial overestimation. Apparently more effort should be put into the proper accounting of migrants in this most mobile age group.

As it was said earlier, two types of errors in the distribution of population were calculated at regional level. The first was the regional error of geographic distribution, the second was regional age distribution error. The Dissimilarity index D discussed in earlier section was used.

The regional error of geographic distribution was calculated for the total population and for age groups. This error tells us how well the observed regional distribution for total population and within each age group within each country has been reproduced in the projection. The relevant values are shown in Table 5.15 for the 1980 projection and in Table 5.16 for the 1990 projection.

For the 1980 projection, it was possible to calculate the errors of regional distribution of the population for only four countries (see Table 5.15) after 5, 10 and 15 years of projection. Reasons why the calculation of the error for other countries was impossible are given in Table 5.11. The lowest error of geographical distribution of total regional populations was observed for Belgium and was only marginally lower than those observed for Germany and the Netherlands. Italy had much higher errors at all points over the projection, more than two times higher than Belgian ones. The errors of distribution population by age groups are, as expected much higher than for all ages. Italy has the larger errors for the two first age groups 0-14 and 15-59 years, but quite good fit for the last age group 65+. The youngest age group has the largest error reaching at the extreme 7.87% for Italy after 15 years of projection. As expected errors increase with the time of projection, in many cases close to doubling every five years.

A similar tabulation has been prepared for the 1990 projection (Table 5.16). Different age groups have been used (0-14, 15-24, 25-64 and 65+) and more countries could be compared. There are striking differences in the magnitude of errors in the regional distribution of total populations. The lowest error (0.34 for France) was less than 1/15th of the largest error (5.35 for Greece). Errors in the distribution of population in certain age groups tend to be on a similar level for a country rather than for an age group as it was the case in the 1980 projection. Belgium has the lowest values for all age group but the youngest one, but even in this case it is only 0.01 behind France. Greece has consistently the highest values of dissimilarity index. In general, the two older age groups have larger errors than the two younger age groups. Higher mobility might be an explanation of this phenomenon for the 15-24 years age group.

The second type of error of distribution of population is the error in regional age distribution. The Dissimilarity index D was used again. It has been calculated separately for each region and the calculation was based on age groups used in each projection (three broad age groups for 1980 projection and four broad age groups for 1990 projection). The values of D for the 1980 projection measured in 1985,1990 and 1995 are shown in Figure 5.7. The value of D for the 1990 projection measured in 1995 is shown in Figure 5.8. For the 1980 projection the largest errors of the projection of the age structure occurred in southern Italy, where after 15 years of projection error levels approach 9%. The Northern part of Germany experienced the lowest errors. The magnitude of errors increased significantly with the length of the projection. For example, in Sardegna the value of D was 0.93 in 1985. It rose to 4.79 in 1990 and to 8.91 in 1995. The pattern of the value of D for 1990 projection in 1990 shows geographic clustering of regions of similar level of error. Low errors could be observed in Italy and southern France. Large values characterize Greece and to less extent Germany.

Three factors contributed to the magnitude of errors: underestimation of international migration, or internal migration in the case of migration between East and West Germany after the unification, overestimation of fertility, especially in countries in which rapid decline of fertility occurred in the last two decades, and overestimation of mortality. These problems have been fully recognized by the Eurostat and in the last decade research has been conducted, aimed at the improvement of the understanding of the variation in the components of change, which will bring about the improvement of the accuracy of forecasts.

6. DISCUSSION AND RECOMMENDATIONS

In this final section of the report, we provide a summary evaluation of regional population projections for the European Union and present recommendations to the European Commission for the conduct of the next round of projections based on the year 2000.

6.1 Summary evaluation

The projection activities reviewed in this report have been extremely impressive. Each round introduced new features designed to improve on the models and assumptions used in previous rounds. The rate of improvement seems to have accelerated in the 1990s with the involvement of Eurostat and the inclusion of a variety of research institutes. The strategies of continuous improvement and multi-organization projects are to be commended. Extrapolating to future rounds, we would welcome involvement of even more organizations, to reflect the complexities involved in the projection of the populations of over 200 regions.

The first and second regional projection rounds were commissioned by Directorate General XVI of the European Commission with two uses in mind. They would form inputs to the development of regional development and as material for inclusion in the key periodic reports on the state of development of Europe's regions. The third and fourth rounds saw a partnership of DGXVI with the Statistical Office of the European Communities, which was very helpful in improving data inputs from National Statistical Offices and introducing statistical and demographic rigour into models originally developed by economists at the Netherlands Economic Institute. The competence and expertise of all contractors are clearly evidenced in the reports from each round, and it is pleasing that in the fourth round quite a lot of the work has been published in journals or conference proceedings. In our recommendations below we make further suggestions.

The original DEMETER model was an innovative and ambitious undertaking, and represented the first time that multiregional methods had been applied across a set of countries in a harmonized way. The difficulties of the task enable us to forgive some of the crudities of the model: the virtual absence of external migration from the first two projection rounds and the crude assumptions of constancy in component intensities. In the third round the problems with the national part of the projection model were solved with the development of proper scenarios for all components including external migration, the adoption of a more sophisticated multi-regional cohort-component software package for its implementation. However, it was not until the fourth round that the needed improvements to the interrregional migration model were introduced. In the fourth round an impressive investigation of modelling alternatives at the regional scale was carried out and a sensible compromise between the number of model variables and available data was chosen. The fourth round also saw a much more systematic set of outputs being produced and the later development of an output database on CD ROM for future dissemination.

We now put forward some specific recommendations for taking this process of continuous improvement forward into the twenty-first century. Against each recommendation is placed a reference to the report section where it was initially discussed.

6.2 Recommendations about input data

In the fourth round, the input data were probably as detailed and close to model specifications as was possible in the mid-1990s. We would anticipate that some NSOs would have improved their ability to produce interregional migration arrays in the meantime, which will benefit the fifth round projection. So, the only major improvement we would see as being necessary is the collection of better information about international migration and its regional distribution. It is this component which is contributing to the postponement of population decline in many of the European Union's member states.

Recommendation (section 2.9.2)
In future projection rounds, international migration should be dealt with as gross migration flows not net. A unified definition of international migration (such as that proposed by the United Nations) should be used and all international migration data should be recalculated accordingly, as it was done for example in Portugal (Peixoto, 1998).

The following recommendation is being currently implemented. This evaluation confirms its value.

Recommendation (section 2.9.2)
DGXVI and Eurostat commission research into the regional distribution of international migrants with a view to improving this increasingly important aspect of regional population projections. Similar research should be done to identify regions from which intra-EU international migrants originate.

6.3 Recommendations about estimation methods

Methods of estimation of variables input to the regional projections improved radically over the four projection rounds, as more regional detail became available, for example, on the age distribution of fertility rates or on the age-sex disaggregation of migration. The major gap in estimation methods that needs to be filled in a systematic way concerns the harmonization of regional definitions against time. We understand that Eurostat's GISCO database incorporates a strategy to harmonize NUTS unit definitions over time, based on reference back to a fixed frozen geography. However, we believe such a strategy does not meet user needs and is very difficult to implement. We argue instead that a systematic set of look-up tables be generated by NSOs and supplied to Eurostat, that can be used to convert, on an approximate basis, past time series of demographic data to current definitions of geographical areas. We also believe that these rough and ready versions of such look-up tables produced quickly will be of much more use than the very detailed products which the GIS community strives for but which take enormous resources and time to generate. If regional projections are to be carried out at a finer spatial scale than NUTS 2, then the problem of geographical comparability over time will grow.

Recommendation (section 5)

A future regional projection model should include an additional module that is applied to projection outputs to re-estimate these outputs for any new national or regional definitions that may come into force after the base year of the projection. Such a module could also be applied when preparing projection inputs.

6.4 Recommendations about projection calibration

In many national contexts, contractors are required to demonstrate that their projection model does successfully reproduce recent population change. This exercise is helpful in ironing out input data difficulties and provides feedback to model builders about the degree of success of various innovations.

Recommendation (section 2.4)

DG XVI should require, in the fifth round of projections, that the contractors demonstrate that their model and input variable estimates can roll forward from the previous 1995 base and reproduce the new 2000 base population.

6.5 Recommendations about scenarios

The strategy of adopting a baseline, a high and a low scenario is sound. The adoption of regional convergence and regional divergence in association with the high and low scenarios is perhaps less convincing, and need some empirical verification in a future projection round. We would see linkage of demographic developments to social and economic trends in regions as a more fruitful way forward, particularly with respect to interregional migration that is driven by the differences in economic and settlement character of regions. We hesitate to make proposals about the direction that future scenarios should take on the basis of reviewing the performance of scenarios from past projections, but some observations are probably appropriate, though they would need confirmation or rejection in the studies leading up to the fifth round of projections.

There is evidence that successive projection rounds have under-estimated the degree to which mortality has improved at middle and elderly ages. Each successive projection has seen an increase in the projected elderly population. In the early 1990s it was thought that the AIDS epidemic might change the situation and increase young and middle age adult mortality, but the epidemic has been contained in most countries and survival therapies developed.

Recommendation (section 3)

In developing mortality scenarios, future projections should take a more optimistic view, based on past under-prediction of middle age and elderly age mortality.

Experience in forecasting external migration also suggests that we should not assume too easily a return to low levels of immigration to EU countries after the waves generated by the transition from communism to post-communism in Central and Eastern Europe. In addition, internal migration scenarios should be designed on the basis of job and housing market factors, taking into account the nature and history of developments in individual regions.

6.6 Recommendations about projection methods

There are a number of ways in which the projection methods can be developed in the fifth round of European region projections. Our recommendations constitute a list of options which need to be explored for feasibility. The first concerns the recognition that migration can be measured and is measured in at least two major ways in EU countries, while the projection models treat all input migration data as movement data derived from population registers.

Recommendation (all sections)

Introduce a glossary of terms into the report on the next projection that clears up a number of ambiguities. Define migration flows as terms including migration movements (register counts of migration events) and migration transitions (census counts of migrants). Define intensities as the general term to describe the level of a demographic activity. Make it clear that intensities can be measured in two ways, depending on data source, as occurrence-exposure rates or as transition probabilities. Make it clear that transition probabilities can be computed as either joint probabilities of migration and survival or as conditional probabilities of migration given survival. When describing methods of intensity estimation or projection methods, make liberal use of the age-time diagram to identify the exact relationships between data and model variables.

Recommendation (section 2.9.2)

Future projection round reports should include a full mathematical description of the models used.

We believe the fifth round projections should use the fourth round methods as a benchmark against which new alternatives can be compared and tested. However, the methodology should be "tweaked" to cater for transition data, and to allow migration intensities to be estimated from the best data in each country.

Recommendation (section 2.1)

The methods of migration intensity modelling used in the 1995 round should be retained in the fifth round for baseline projections.

Recommendation (section 2.3)

The existing state-of-the-art multi-regional/multistate population projection be upgraded to deal satisfactorily with migrant count data from censuses (transition concept data). In addition, the method developed by Courgeau (1973) for converting French census migration intensities over different time intervals and scales to estimates of intensities over a one year period should be applied to make French regional projections more comparable with other countries.

Recommendation (section 2.3)

A review should be commissioned by DG XVI and Eurostat of the state of knowledge of the time interval problem in harmonising migration data derived from national censuses.

Recommendation (section 2.10.2).
Consideration be given in the fifth round of EU projections to moving from a "one size fits all" approach to "a best model for the country" approach when designing the interregional migration models.

We argued strongly in section 2 that the way in which interregional migration be handled should be improved. We put forward two possibilities, both of which are feasible with today's computing technology and modelling techniques. However, we were uncertain whether it would be feasible to implement both improvements together. We therefore propose a discussion about the merits and demerits of the two suggestions.

Recommendation (section 2.2)
Either
DG XVI and Eurostat use a single, integrated multi-regional projection model across EU states at NUTS 2 scale.
Or
DG XVI and Eurostat continue to use the current national-regional mixed model but employ NUTS 3 regions as the building blocks.

We argue that the time is ripe for the development of an interregional migration model that links to demo-economic developments, and if possible, to policy variables. However, to do this will require a wide range of expertise from EU member states, because knowledge of the determinants of migration is needed.

Recommendation (sections 2 and 3)
The model of interregional migration at present based solely on statistical and demographic factors should be extended to incorporate models that include the determinants of migration for each life course stage. Spatial interaction models provide a variety of models from which to choose and can be framed in a way compatible with the IPF/log-linear model used in the 1995 projection round.

Recently, a research group at the International Institute for Applied Systems Analysis (IIASA) in Austria has developed methods of probabilistic projection, arguing that these are more useful to planners than middle, high and low scenarios (Lutz, Sanderson and Scherbov 199). The computational requirements of such an approach are considerable but could be made available via national or international scientific research organizations. There would also be a requirement to set up a consultation process to arrive at a consensus of expert views on the confidence limits around component scenarios.

Recommendation.
Consideration be given to generating a set of probabilistic projections of European national and regional population.

6.7 Recommendations about consultation on regional results

If regional scenarios are to be improved, then a wider range of views needs to be canvassed. The consultation could be linked to efforts to publicize and disseminate results from the fourth round of projections.

Recommendation (section 2.3)
DG XVI and Eurostat organize a consultative meeting with NSOs and national experts to disseminate the results of the fourth round of projections and to consult with NSOs about improving the migration data supplied for the fifth round.

6.8 Recommendations about outputs

If results are to be published and widely disseminated, then thought needs to be given to a uniform set of outputs that can be maintained into the future, irrespective of the particular methods used. Such a development we believe to be in train.

Recommendation (section 1.4.2)
In future projection rounds DG XVI and Eurostat should agree with the contractor what input and output files should be deposited (with Eurostat) and devise a strategy for their preservation over time. At a minimum, stocks of population, births, deaths, internal and international in- and outmigration by age, sex and region should be shown.

Recommendation (section 2.6)
DG XVI and Eurostat agree with the fifth round contractor a definitive set of outputs from the projections.

Based on our experience of importing population and migration data from ten European countries, we feel it is important to provide data in simple, easily accessible formats as well as in comprehensive databases. We found it hardest to import data from general database packages (e.g. CBSVIEW) and easiest if transparent spreadsheets were provided. Text/ASCII data files fell in between in terms of degree of difficulty in importation and use.

6.9 Recommendations about dissemination strategy

We consider it essential that DGXVI and Eurostat advertise their achievements and provide the results of the extensive work for further use throughout Europe. At the most basic level, the VAT payers of Europe have funded the work, so the VAT payers should see some return. We make a series of suggestions about how this might be accomplished.

Recommendation (section 1.3)
DG XVI and Eurostat adopt a new acronym for future projection rounds, namely EUROPOP plus base year numerals (e.g. EUROPOP2000, EUROPOP2005).

Recommendation.

The results need to be made much more widely available and could contribute valuably to the planning activities of public and private organizations throughout the EU.

Recommendation (section 1.4)

Reports from future projection rounds should be made available via the World Wide Web, after acceptance by DG XVI and Eurostat. Computer file versions of reports should be delivered and then converted to a suitable format (e.g. Adobe Acrobat) for placing on Eurostat's Web Site, where policy makers, researchers and the public can access the information.

Recommendation (section 6)

Organize a team of NSOs experts to help in defining the national/regional level assumptions for the fifth round and to produce detailed analyses for their countries/regional projections. This could be supported by a concerted action bid to the EU's fifth framework.

Recommendation

Consideration be given to making available the projection base data and input assumptions together with the projection software, so that other researchers or businesses or governmental bodies can run their own projections. This is common practice with national economic models (cf. Independent Treasury Economic Model in the UK, which the UK government provides to research institutes and economic/financial firms so that they can run different scenarios and compare the model with their own).

Recommendation

Consideration should be given to producing a book giving a full account of the work carried out in the third and fourth projection rounds, to coincide with the release of the project results.

6.10 Expansion of the spatial scope of the model

One of the challenges facing the European Union is its expansion to the East. The statistical services of the European Union and its units making decisions on policy matters and policy implementation will need detailed information soon. Local experts should be involved both in the process of data collection and verification and setting scenarios of population change. Such involvement has two types of benefits: It will help the experts of the European Commission and Eurostat to understand the specificity and problems of Central Europe and will serve as a technology transfer from the EU to Central-European states.

Recommendation

In view of likely admission of six countries which are in the process of negotiation of the accession agreement (Cyprus, Czech Republic, Estonia, Hungary, Poland and Slovenia) to the EU the geographical scope of the *population projection should be extended to cover these countries on the regional level. Consideration should be given whether other countries, with signed and ratified association agreements should be added to this list at whether on national or regional level.*

Recommendation

Experts from central Europe should be involved in the process of data gathering, scenario preparation for their countries and for the generation of the population projections for the European Union and candidate countries.

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2001-04-23.16:16:44 Remote Task ID: FLNR_1LY_MUL to Host: JCQV
2001-04-23.16:16:44 RUNJC
\\SV2F\SSB6\Eindintg\werk\flnr\analyse_bron\1998\ww98 31.jcp TL=1h JG=I
2001-04-23.16:16:44 Job received in batch queue.
2001-04-23.16:17:05 Starting job FLNR_1LY_MUL on IV14R (CBS\FLNR)
2001-04-23.16:17:05 Owner: FLNR (sector SIP), JobGroup: I, TimeLimit: 1 hour
2001-04-23.16:17:05 Getting \\SV1F\SEC1\Users\FLNR\RSTATUS\ww98_31.j01
2001-04-23.16:17:05 RUNJC
2001-04-23.16:17:10. PROGRAM {ww98_31} { 2001-04-23.16:16:39 }
2001-04-23.16:17:12. COMMANDS
2001-04-23.16:17:12-- Start NET: get 411334360 bytes
(NET:CBS,U=flnr)\\SV2F\SSB5\Technkop\Eindintg\Bronbest\1998\wwexp
2001-04-23.16:18:14-- Start NET: get 8335 bytes
(NET:CBS,U=flnr)\\SV2F\SSB6\Eindintg\werk\flnr\analyse_bron\1998\Ww98_31.msf
2001-04-23.16:18:14.   manipulaw(m0) USING i0, u0
2001-04-23.16:18:15-- Start: MANIPULAW /b .\Ww98_31.msf
2001-04-23.16:30:11-- Seconds   Elapsed:   713.38   User:   631.11   System:
  16.66
2001-04-23.16:30:12-- Start NET: put 0 bytes
(NET:CBS,U=flnr)\\SV2F\SSB6\Eindintg\werk\flnr\analyse_bron\1998\WW98_31.ASC
2001-04-23.16:30:13. ENDPROG {ww98_31}
2001 04-23.16:30:13-- Seconds   Elapsed:   789.84   User:   639.33   System:
  24.20
2001-04-23.16:30:15 Commando is succesvol beeindigd.
2001 04 23.16:30:15 Writing 474 bytes
\\SV1F\SEC1\Users\FLNR\RSTATUS\ww98_31.101
2001-04-23.16:30:15 Remote proces is succesvol beeindigd.
```

```
{ww98_31.JCS}

PROGRAM

VARIABLES
  DIR1      : dir := "NET:\\SV2F\SSB5\TECHNKOP\EINDINTG\BRONBEST\1998"
  DIR2      : dir := "NET:\\SV2F\SSB6\EINDINTG\WERK\FLNR\analyse_bron\1998"

  I0        : (input $last)        file := dir1.file("wwEXP")


  M0        : (input $last)        file := dir2.file("ww98_31.MSF")


  U0        : (output $last)       file := dir2.file("ww98_31.ASC")

COMMANDS

  MANIPULAW(M0)
  USING I0,
        U0
  DETACH(I0)
  DETACH(U0)

ENDPROC
```

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Table 1.1: Characteristics of the four regional projection rounds

Round	Funding/ sponsoring organizations	Principal contractors	Projection acronym	Projection horizon	Base year	Age/time interval (years)	No. of Countries	No. of regions (NUTS 2) in no. of countries
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
One	DG XVI	NEI	DEMETER2010	2010	1980	Five	12	161 in 10
Two	DG XVI	NEI	DEMETER2015	2015	1985	Five	12	164 in 10
Three	DG XVI, Eurostat	NEI, EU, NIDI	DEMETER2020	2020	1990	One	12	179 in 10
Four	DG XVI, Eurostat	SN, NIDI	EUROPOP1995	2025	1995	One	18	202 in 13

Notes:

1. Abbreviations defined: NEI = Netherlands Economic Institute, Rotterdam, The Netherlands, EU = Erasmus University, Rotterdam, The Netherlands
   NIDI = Netherlands Interdisciplinary Demographic Institute, The Hague, The Netherlands, SN = Statistics Netherlands, Voorburg, The Netherlands
   DEMETER = Demographic Evolution through Time in European Regions (NEI acronym)
   EUROPOP = European Population Projections for Countries and Regions of the European Economic Area/European Union (acronym invented for use in this report only).
   DG XVI = Directorate-General XVI, Regional Policy and Cohesion, Formulation of Regional Policies, Analysis of the socio-economic situation of the regions, periodic report, eligibility, quantification of the development objectives and additionality
   Eurostat = Statistical Office of the European Communities, Social and regional statistics and geographical information system, Unit: Regional indicators and account, population and geographical information system.
2. The No. of countries column refers to the number of member states of the European Community (the pre- Treaty of Maastricht entity) in 1980, 1985 and 1990, and to the number of countries in the European Union (the post Treaty of Maastricht entity) (15) and additional European Economic Area countries (3). The EC/EU countries for which no regional projections were carried were Ireland and Luxembourg.
3. The No. of regions column gives the number of regions for which regional projections were carried out, and the number of countries with regional projections.

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Table 1.2: Publications from the first projection round: 1980 population base (DEMETER 2010)

Author(s)/Institutions	Year	Title/Journal	Publisher	Place of publication
NEI	1986	Long-term regional demographic developments up to the beginning of the next century and regional policy.	CEC, NEI	Rotterdam

Notes: CEC = Commission of the European Communities

Table 1.3: Publications from the second projection round: 1985 population base (DEMETER 2015)

Author(s)/Institutions	Year	Title/Journal	Publisher	Place of publication
Haverkate R, H van Haselen	1990	Demographic evolution through time in European regions (Demeter 2015)	NEI	Rotterdam
Haverkate R, H van Haselen	1992	Demographic evolution in time in European Regions (Demeter 2015). Regional Development Studies, N° 01.	OOPEC	Luxembourg

Notes: NEI = Netherlands Economic Institute, CEC = Commission of the European Communities, OOPEC = Office of Official Publications of the European Communities

Table 1.4: Publications from the third projection round: 1990 population base (DEMETER 2020)

Author(s)/Institutions	Year	Title/Journal	Publisher	Place of publication
Cruijsen H	1991	Fertility in the European Community: main trends, recent projections and two future paths. In *Background papers on fertility, mortality and international migration under two long term population scenarios for the European Community*. Proceedings of the International Conference "Human resources in Europe at the dawn of the 21st Century".	Eurostat	Luxembourg
Eurostat	1991	Two long-term population scenarios for the European Community, principal assumptions and main results. Proceedings of the International Conference "Human Resources in Europe at the Dawn of the 21st Century".	Eurostat	Luxembourg
Lopez A, Cruijsen H	1991	Mortality in the European Community: trends and perspectives. In *Background papers on fertility, mortality and international migration under two long term population scenarios for the European Community*. Proceedings of the International Conference "Human resources in Europe at the dawn of the 21st Century".	Eurostat	Luxembourg
Muus P, Cruijsen H	1991	International migration in the European Community: two scenarios. In *Background papers on fertility, mortality and international migration under two long term population scenarios for the European Community*. Proceedings of the International Conference "Human resources in Europe at the dawn of the 21st Century".	Eurostat	Luxembourg
Eichperger L	1993	Regional population and labour force scenarios for the EEA. Interim report: population, *NEI Working Paper*.	EU	Rotterdam
Eurostat	1993a	Demographic statistics 1993.	Eurostat	Luxembourg
Eurostat	1993b	Two long-term population scenarios for the European Free Trade Association.	Eurostat	Luxembourg
NEI(DRUD), EU(DPHSM), NPPA	1993a	Regional population and labour force scenarios for the EEA. Interim report: population.	NEI	Rotterdam
NEI(DRUD)	1993b	Regional population and labour force scenarios for the EEA: interregional migration. NEI Working paper.	NEI	Rotterdam
NEI(DRUD), EU(DPH), NIDI	1994a	Regional population and labour force scenarios for the European Union. Part I: Two long-term population scenarios.	NEI	Rotterdam
NEI(DRUD), EU(EGI)	1994b	Regional population and labour force scenarios for the European Union. Part II: Two long term labour force scenarios.	NEI	Rotterdam
NEI(DRUD), EU(DPH)	1994c	Regional population and labour force scenarios for the European Union. Part III: Results population scenarios.	NEI	Rotterdam
NEI(DRUD), EU(EGI)	1994d	Regional population and labour force scenarios for the European Union. Part IV: Results labour force scenarios.	NEI	Rotterdam
van Imhoff E, L van Wissen, K Spiess	1994	*Regional population projections in the countries of the European Economic Area*. NIDI CBGS Publications.	Swets & Zeitlinger	Lisse
Cruijsen H, H Eding	1996	An evaluation of recent population scenarios for the EEA and Switzerland. *Maandstatistiek van de bevolking*, 44, Juli, 20-30.	CBS	Voorburg
Rees P	1996	Projecting the national and regional populations of the European Union using migration information. Chapter 16 in P Rees, J Stillwell, A Convey, M Kupiszewski (eds.) *Population migration in the European Union*. 331-364.	John Wiley	Chichester

Notes to Table 1.4:

EEA = European Economic Area.
EU(DPHSM) = Erasmus University (Department of Public Health and Social Medicine).
EU(DPH) = Erasmus University (Department of Public Health).
EU(EGI) = Erasmus University (Economic Geography Institute).
Eurostat = Statistical Office of the European Communities.
NEI(DRUD) = Netherlands Economic Institute (Department of Regional and Urban Development).
NPPA = National Physical Planning Agency.
NIDI = Netherlands Interdisciplinary Demographic Institute

Table 1.5: Publications from the fourth projection round: 1995 population base (EUROPOP 1995)

Author(s)/Institutions	Year	Title/Journal	Publisher	Place of publication
de Jong A	1995	Long term fertility scenarios for the countries of the European Economic Area. A paper prepared for an international seminar "New long term population scenarios for the EEA" , Luxembourg.	CBS	Voorburg
de Beer J, A de Jong	1996	National population scenarios for countries of the European Economic Area. *Maandstatistiek van de bevolking*, 44, Juli, 7-19.	CBS	Voorburg
Eurostat	1996	*Demographic statistics 1996.*	Eurostat	Luxembourg
Statistics Netherlands	1996	Population scenarios for countries of the European Economic Area. *Maandstatistiek van de bevolking*, 44, Juli, 31-36.	CBS	Voorburg
de Jong A	1997a	Population scenarios for the European Economic Area: components of population growth. *Maandstatistiek van de bevolking*, 45 December, 9-16.	CBS	Voorburg
de Jong A	1997b	Long-term fertility scenarios for the countries of the European Economic Area. Report.	CBS	Voorburg
de Jong A, H Visser	1997	Long term international migration scenarios for the European Economic Area. *Eurostat Working Paper E4/1997/no.6.*	Eurostat	Luxembourg
Eurostat	1997a	*Demographic statistics 1997.*	Eurostat	Luxembourg
Eurostat	1997b	Beyond the predictable: demographic changes in the EU up to 2050. *Statistics in Focus. Population and Social Conditions*, 7.	Eurostat	Luxembourg
Shaw C, H Cruijsen, J de Beer and A de Jong	1997	Latest projections for the European Union. *Population Trends* 90, Winter, 18-30.	ONS	London
van der Gaag N, A de Jong	1997	Population scenarios for the European Union: Regional scenarios. *Maandstatistiek van de bevolking*, 45, December, 17-31.	CBS	Voorburg
van der Gaag N, E van Imhoff, L van Wissen	1997a	Internal migration scenarios in the countries of European Union. Report with full tables.	NIDI	the Hague
van der Gaag N, E van Imhoff, L van Wissen	1997b	Long term internal migration scenarios for the countries of European Union. *Eurostat Working Paper E4/1997/no.5.*	Eurostat	Luxembourg
van der Gaag N, E van Imhoff, L van Wissen	1997c	Regional population projections in the countries of the European Economic Area. Update of 1992 Questionnaire. *NIDI Working Paper 97/16.*	NIDI	the Hague
van Imhoff E, N van der Gaag, L van Wissen, P Rees	1997	The selection of internal migration models for European regions. *International Journal of Population Geography*, 3, 137-159.	John Wiley	Chichester
van Hoorn W, J de Beer	1998	Long term mortality scenarios for the countries of European Economic Area. *Eurostat Working Paper E4/1998/no.8.*	Eurostat	Luxembourg
van Imhoff E	1999	Internal migration models and projections for European regions. Paper presented at the Session on Population Projections, Annual Conference of the Royal Geographical Society with the Institute of British Geographers, University of Leicester, Leicester,UK, January 7.	NIDI	the Hague

Notes: CBS = Centraal Bureau voor de Statistiek (Statistics Netherlands), Eurostat = Statistical Office of the European Communities, NIDI = Netherlands Interdisciplinary Demographic Institute, ONS = Office for National Statistics.

Table 1.6: Data files from the four projection rounds and new integrated files

PROJECTION	FILENAME	DESCRIPTION
1980 BASE		
	1980_n.xls	Projections of total and age disaggregated populations for countries in the EU
	1980_r.xls	Projections of total and age disaggregated populations for regions
1985 BASE		
	1985_n.xls	Projections of total and age disaggregated populations for countries
	1985_r.xls	Projections of total and age disaggregated populations for regions
1990 BASE		
	1990_n.xls	Projections of total and age disaggregated populations, natural growth and external migration for the low and high scenarios, for countries
	1990_r.xls	Projections of total and age disaggregated populations, natural growth, external migration and internal migration for the low and high scenarios, for regions
1995 BASE		
	1995_l.xls	Projections of total population, natural growth, net internal migration and net external migration, for the low scenario, for regions and countries
	1995_b.xls	Projections of total population, natural growth, net internal migration and net external migration, for the baseline scenario, for regions and countries
	1995_h.xls	Projections of total population, natural growth, net internal migration and net external migration, for the high scenario, for regions and countries
	b95_n.xls	Projections of births for countries
	b95_r.xls	Projections of births for regions
	d95_n.xls	Projections of deaths for countries
	d95_r.xls	Projections of deaths for regions
	0_1495_n.xls	Projections of the 0-14 age group for countries
	0_1495_r.xls	Projections of the 0-14 age group for regions
	15-5995_n.xls	Projections of the 15-59 age group for countries
	15-5995_r.xls	Projections of the 15-59 age group for regions
	60_n.xls	Projections of the 60+ age group for countries
	60_r.xls	Projections of the 60+ age group for regions
COMBINED		
	totpop_n.xls	Total population projections for all projections and regio, for countries
	totpop_r.xls	Total population projections for all projections and regio, for regions
	natgro_n.xls	Projections of natural growth for regio and the 1990 and 1995 base projections, for countries
	natgro_r.xls	Projections of natural growth for regio and the 1990 and 1995 base projections, for regions
	agepop_r.xls	Projections of three broad age groups for regio and all projections

Table 2.1: A migration pool model for European multiregional projection

Origins Member State	Member State Region	Destination l l(1)	i(1)	m(1)	Totals	a l(a)	l(a)	n(a)	Totals	c l(c)	i(c)	n(c)	Totals	Outside Europe	Europe Rest	Totals
l	l(1)		m	m		x	x	x	x	x	x	x	x	x	x	x
	i(1)	m		m		x	x	x	x	x	x	x	x	x	x	x
	m(1)	m	m			x	x	x	x	x	x	x	x	x	x	x
	Totals				s	x	x	x	x	x	x	x	x	x	x	x
a	l(a)	x	x	x	x		m	m		x	x	x	x	x	x	x
	i(a)	x	x	x	x	m		m		x	x	x	x	x	x	x
	m(a)	x	x	x	x	m	m			x	x	x	x	x	x	x
	Totals	x	x	x	x				s	x	x	x	x	x	x	x
c	l(c)	x	x	x	x	x	x	x	x		m	m		x	x	x
	i(c)	x	x	x	x	x	x	x	x	m		m		x	x	x
	m(c)	x	x	x	x	x	x	x	x	m	m			x	x	x
	Totals	x	x	x	x	x	x	x	x				s	x	x	x
Outside EU	Europe	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Rest	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Totals														x	x	x

Key: Migration flow types

	Within region term: usually computed from population accounting equation
	Total internal out-migration from regions within EU member state
	Total internal in-migration from regions within EU member state
	Net external migration into EU member states/regions
m	Migration flow modelled
x	Migration flows not considered in projection
s	Migration terms found by summation

Table 2.2: The DEMETER and EUROPOP migration models for European multiregional projection

Origins Member State	Member State Region	Destination 1 1(1)	i(1)	m(1)	Totals	a l(a)	i(a)	n(a)	Totals	c l(c)	i(c)	n(c)	Totals	Outside Europe	Europe Rest	Totals
1	1(1)				s	x	x	x	x	x	x	x	x	x	x	x
	i(1)				s	x	x	x	x	x	x	x	x	x	x	x
	m(1)				s	x	x	x	x	x	x	x	x	x	x	x
	Totals	s	s	s	s	x	x	x	x	x	x	x	x	x	x	x
a	l(a)	x	x	x	x				s	x	x	x	x	x	x	x
	i(a)	x	x	x	x				s	x	x	x	x	x	x	x
	m(a)	x	x	x	x				s	x	x	x	x	x	x	x
	Totals	x	x	x	x	s	s	s	s	x	x	x	x	x	x	x
c	l(c)	x	x	x	x	x	x	x	x				s	x	x	x
	i(c)	x	x	x	x	x	x	x	x				s	x	x	x
	m(c)	x	x	x	x	x	x	x	x				s	x	x	x
	Totals	x	x	x	x	x	x	x	x	s	s	s	s	x	x	x
Outside EU	Europe	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Rest	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Totals														x	x	x

Key: Migration flow types

	Within region term: usually computed from population accounting equation
	Migration between regions within EU member state
	Net external migration into EU member states/regions
m	Migration flow modelled
x	Migration flows not considered in projection
s	Migration terms found by summation

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Table 2.3: An expanded framework for European multiregional projection

Origins Member State	Member State Region	Destination: 1 l(1)	1 i(1)	1 m(1)	Total	a l(a)	a i(a)	a n(a)	Total	c l(c)	c i(c)	c n(c)	Total	Outside Europe	Europe Rest	Total
1	l(l)				s	m	m	m	s	m	m	m	s	m	m	s
	i(l)				s	m	m	m	s	m	m	m	s	m	m	s
	m(l)				s	m	m	m	s	m	m	m	s	m	m	s
	Total	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s
a	l(a)	m	m	m	s				s	m	m	m	s	m	m	s
	i(a)	m	m	m	s				s	m	m	m	s	m	m	s
	m(a)	m	m	m	s				s	m	m	m	s	m	m	s
	Total	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s
c	l(c)	m	m	m	s	m	m	m	s				s	m	m	s
	i(c)	m	m	m	s	m	m	m	s				s	m	m	s
	m(c)	m	m	m	s	m	m	m	s				s	m	m	s
	Total	s	s	s	s	s	s	s	s	s	s	s	s	s	s	s
Outside EU	Europe	m	m	m	s	m	m	m	s	m	m	m	s	x	x	s
	Rest	m	m	m	s	m	m	m	s	m	m	m	s	x	x	s
Totals		s	s	s	s	s	s	s	s	s	s	s	s	s	s	s

Key: Migration flow types

[pattern]	Within region term: usually computed from population accounting equation
[pattern]	Migration between regions within EU member state
[pattern]	Migration between regions in different EU member states
[pattern]	Migration from countries outside EU (immigration)
[pattern]	Migration to countries outside EU (emigration)
m	Migration flow modelled
x	Migration flows not considered in projection
s	Migration terms found by summation

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Table 3.1: Summary of assumptions on Eurostat population projections 1980-1995

A. Assumptions for the 1980 projection round

Year of projection and variant	Fertility	Mortality	International migration	Internal migration
1980-national level	Age specific birth rates remain stable at the observed 1980 level	Age and sex specific death rates remain stable at the observed 1980 level	Net international migration is equal to zero.	
1980-regional level	Fixed ratios of regional to national are used, calculated by dividing expected births, calculated by applying national rates to regional age group populations, by observed numbers. This implies constant age specific rates fixed on 1980 level.	Fixed ratios of regional to national are used, calculated by dividing expected deaths, calculated by applying national rates to regional age group populations, by observed numbers. This implies constant age specific rates fixed on 1980 level.	Net international migration is equal to zero.	The age structure of internal migrants is said to be generated by a Rogers-Castro model. However, in practice national observed schedules are applied to regional populations constrained to outmigration from regions, allowing for calculation of age and sex specific migration rates as observed in 1980. These rates remain constant over time. Distribution of migrants to destinations is based on the OD matrix for regions.
1980-national level. Sensitivity analysis of assumption on constant age-specific fertility rates.	Age specific birth rates in Germany, France, the Netherlands, Belgium, Luxembourg, the United Kingdom, and Denmark will rise in the years 1985-2005 to the level equal to average value observed in the period 1965-1980. For Italy stability on 1980 level is assumed until 1990. Fertility rises later to the level of other Western countries. Greece, Spain and Portugal will reduce fertility to average European level in 1985, stabilisation on this level till 1995 and then rise parallel to Italian. Ireland to reduce its fertility in 2000 to the average level of EUR12 as observed in 1980. A rise in the period 2010-2015 is expected.	Age and sex specific death rates remain stable on level observed in 1980.	Net international migration is equal to zero.	

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Table 3.1 Continued

B. Assumptions for the 1985 projection round

Year of projection and variant	Fertility	Mortality	International migration	Internal migration
1985-national level – stable fertility variant	Age specific birth rates remain stable on level observed in 1985.	Age and sex specific death rates remain stable on level observed in 1985.	Net international migration is set to zero for all countries except Germany (gain of 1,172,000) and Ireland (loss of 153,400) based on net migration over the period 1985-1990.	
1985-national level – variable fertility variant	Age specific birth rates were estimated based on the trend of the age specific rates in each country over the period 1960-1985 with higher weights attached to more recent observations. Trends stabilise from the year 2000.	Age and sex specific death rates remain stable on level observed in 1985.	Net international migration is set to zero for all countries except Germany (gain of 1,172,000) and Ireland (loss of 153,400) based on net migration over the period 1985-1990.	
1985-regional level – variable fertility variant	Fix ratio, calculated by dividing theoretical (calculated by application of national rates to regional populations by age) by observed numbers, exists between national and regional rates. The regional rates will therefore change in line with national rates (see above).	Fix ratio, calculated by dividing theoretical (calculated by application of national rates to regional populations by age and sex) by observed numbers, exists between national and regional rates. This implies constant age and sex specific rates fixed on 1985 level.	Net international migration is set to zero for all countries except Germany (gain of 1,172,000) and Ireland (loss of 153,400) based on net migration over the period 1985-1990. The way the net migrants were distributed to regions has not been clearly specified.	The age structure of internal migrants is said to be generated by a Rogers-Castro model. However, in practice national observed schedules are applied to regional populations constrained to outmigration from regions, allowing for calculation of age and sex specific migration rates as observed in 1980. These rates remain constant over time. Distribution of migrants to destinations is based on the OD matrix for regions.
1985 – special run for unified Germany where former GDR formed one region – additional assumptions	Regional fertility rates in the GDR will converge to the level projected in the FRG until 2040.	Regional mortality rates in GDR will converge to the FRG level until 2015.		High migration scenario (based on the assumption of slow economic integration between FRG and GDR) of the *Deutsches Institut für Wirtschaftsforschung* was adopted. It assumes total net losses from the former GDR equal to 1880 thousand over the period 1990-2014. Flows between the two Germanies were disaggregated based on flows observed between 1985-1989.

Table 3.1 Continued

C. Assumptions for the 1990 projection round

Year of projection and variant	Fertility	Mortality	International migration	Internal migration
1990 – low scenario for national projection	Several conditions that allow women to combine motherhood and working will not be experienced. In this scenario there is stagnant economic growth and governments lack the finance to improve childcare facilities or family allowances. This will lead to an increase in childlessness to 25%. An EC average total fertility of 1.5 children per women is reached by 2020. It is also assumed that there will be no change in the differences in fertility levels between countries.	Mortality changes are expressed in terms of life expectancy and are estimated by application of combination of extrapolation of changes in life expectancy and epidemiological scenarios for main causes of deaths. In addition it is assumed that male-female gap will decline to 5 years on average by 2020 and convergence in mortality will occur between countries. In 2020 average life expectancy will reach 78 years for males and 83 years for females (with standard deviations of 0.5 and 1.0).	Sufficient labour is available within the EUR12. Low chain migration occurs, low return migration of EC nationals and no major political disturbances, restrictive admission policies. The number of *Aussiedler* reduces rapidly from 397000 in 1990 to 50000 in 1993 and remains on this level. Number of asylum seekers drops from 325000 to 100000 in 1994. Total net migration reduces from 890000 in 1990to 250000 in 1994 and stays on this level.	
1990 -- high scenario for national projection	In the high scenario economic growth is experienced and governments and private companies encourage the development of childcare systems. It is assumed that childlessness will reach a level of 10% by 2020 in this scenario and that total fertility in the EC will increase to 2 children per woman.	Mortality changes are expressed in terms of life expectancy. A scenario is constructed for the period 1990-2000 only. High scenario values of the increase in life expectancy were decreased by 1.5 years. A more pessimistic scenario was prepared for Germany. Life expectancy in 2000 is assumed to reach on the average 73.2 and 79.6 years for males and females respectively.	Insufficient labour is available within the EUR12, high chain migration, high return migration of EC nationals, third countries do not attract EC labour. Frequent major political disturbances occur in third countries, restrictive admission policies towards EC nationals in third countries but less restrictive admission policies in EC countries. The number of *Aussiedler* reduces from 397000 in 1990 to 100000 in 1994 and remains on this level. Number of asylum seekers drops from 325000 to 250000 in 1994. Total net migration reduces from 1082000 in 1990 to 750000 in 1994 and stays on this level.	

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Table 3.1 Continued

C. Assumptions for the 1990 projection round (continued)

Year of projection and variant	Fertility	Mortality	International migration	Internal migration
1990 – low scenario for regional projection	Regional convergence of fertility rates is assumed. Observed regional fertility variation coefficients between 1970 and 1990 are used to set a target value for the average number of children per women for each region for the final projection year	Regional mortality differences will remain stable over time.	It is assumed that the distribution of international migrants across regions in 1990 is maintained throughout the projection period.	Overall mobility remains stable at the 1985-1990 level.
1990 – high scenario for regional projection	Regional convergence of fertility rates is assumed. Target total fertility rates are assumed to exceed those calculated for low scenario by 0.5.	Convergence in regional mortality rates occurs. It is assumed that the rate of convergence will be an average of 1% per annum on average. For countries with relatively small regional differences it is assumed that these differences will decrease by 0.5% per annum. For countries with regional differences that are relatively large, regional mortality rates will converge at a rate of 1.5% per annum. Differences will decrease by 1% per annum in countries with intermediate levels of differences between regional mortality rates.	It is assumed that international migrants will become more evenly spread across regions. The distribution in the final projection year is calculated as the average of the 1990 distribution and the population distribution in 2019. The distribution of migrants for years between 1990 and 2019 are calculated through extrapolation.	Overall mobility is reduced, a reduction to 70% of the 1985-1990 level by 2020 was assumed.

Table 3.1 Continued

D. Assumptions for the 1995 projection round

Year of projection and variant	Fertility	Mortality	International migration	Internal migration
1995 – national baseline scenario	Total fertility in the target year (2035) will be slightly higher than the 1995 level in most countries. There will be a small decrease in fertility in later cohorts due to a decrease at young ages, not compensated by an increase at higher ages. In Northern countries completed TFR will exceed 1.8. In other countries, it is set at 1.8, except for Germany (1.5), Austria (1.6), Italy (1.5), Spain (1.5), Portugal (1.7) and Greece (1.7).	The average annual increase of life expectancy at birth will be slightly lower than that observed in the last 25 years preceding 1995 and that after 2000 some decrease will occur. By 2050 the average life expectancy will have increased by 6 years for males and 4.5 years for females. The gender gap in life expectancy will have decreased by 1.5 years. Some convergence in life expectancies between countries will also occur.	Net international migration to be reduced to reach 600 thousand in 2010.	
1995 - national low scenario	Decline of fertility at young ages observed recently is not compensated by increase in older ages. In consequence decrease of total fertility rate is experienced in all countries.	Limited increase in life expectancy with an increase of 2 years for men and 1.5 years for females is expected by 2050. The gender gap decreases by 0.5 years.	Net international migration will be lower than the average in the last 10 years but above the early 1980s. A decrease to 50% of value in the early 1990s is expected by 2010. Divergence in the distribution of migrants is expected.	
1995 – national high scenario	The northern countries of Europe catch up in fertility at higher ages. This will occur in all countries. High economic growth will lead to high fertility because women combine motherhood and working. Later cohorts will approach the fertility of earlier cohorts and TFR will increase and converge in all countries.	By 2050 life expectancy will be 9 years higher for males and 6.5 years higher for females than observed in 1995. Therefore the high scenario assumes that the gender gap will decrease by more than in the baseline scenario. Convergence between countries will also occur to a larger extent in the baseline scenario.	Net international migration to be reduced slightly in comparison to values observed in early 1990s to decrease by 20% in 2010. Convergence in the distribution of migrants between countries is expected.	

Table 3.1 Continued

D. Assumptions for the 1995 projection round (Continued)

Year of projection and variant	Fertility	Mortality	International migration	Internal migration
1995 – national old scenario	Low national scenario was adopted.	High national scenario was adopted.	Low national scenario was adopted.	
1995 – national young scenario	High national scenario was adopted.	Low national scenario was adopted.	High national scenario was adopted.	
1995 – regional baseline scenario	Regional differences in fertility will decrease by 25% by 2035 except for Germany where 50% reduction is expected.	It is assumed that regional differences in mortality will decrease by 25% by 2050.	It is assumed that regional differences in international migrants distribution will decrease by 25% by 2010.	Both the level of mobility and regional differentiation will remain stable over time.
1995 – regional low scenario	Regional differences in fertility will remain unchanged till 2035 except for Germany where 25% reduction is expected.	It is assumed that regional differences in mortality will remain unchanged by 2050.	It is assumed that regional differences in international migrants distribution will remain unchanged by 2010.	The mobility level in 2010 will equal to 80% of the level observed in the base year. Regional differences will increase by 50%.
1995 – regional high scenario	Regional differences in fertility will decrease by 50% by 2035 except for Germany where 75% reduction is expected.	It is assumed that regional differences in mortality will decrease by 50% by 2050.	It is assumed that regional differences in international migrants distribution will decrease by 50% by 2010.	The mobility level in 2010 will equal to 120% of the level observed in the base year. Regional differences will decrease by 50%.

Source: NEI 1986, Haverkate, van Haselen 1990, 1992, Eurostat 1991, 1993, Muus, Cruijsen 1991, Cruijsen 1991, Lopez, Cruijsen 1991, NEI, 1993, de Beer, de Jong, 1996, de Jong, 1995, de Jong, Visser, 1997, van der Gaag, de Jong, 1997, van der Gaag, van Imhoff and van Wissen 1997, van Hoorn, de Beer, 1998.

Table 3.2: Net external migration assumed in Eurostat population projections

A. Net external migration assumptions, Belgium

Projection	1980	1985	1990	1995	2000	2010	2020	2050
1980	0	0	0	0	0	0	-	-
1985	-	0	0	0	0	0	-	-
1990 Low	-	-	10000	9000	9000	9000	9000	-
1990 Base	-	-	12500	15500	15500	15500	15500	-
1990 High	-	-	15000	22000	22000	22000	22000	-
1995 Low	-	-	-	15000	5900	10000	10000	10000
1995 Base	-	-	-	18000	10200	15000	15000	15000
1995 High	-	-	-	21000	18000	20000	20000	20000

B. Net external migration assumptions, Denmark

Projection	1980	1985	1990	1995	2000	2010	2020	2050
1980	0	0	0	0	0	0	-	-
1985	-	0	0	0	0	0	-	-
1990 Low	-	-	7000	5000	5000	5000	5000	-
1990 Base	-	-	8000	10000	10000	10000	10000	-
1990 High	-	-	9000	15000	15000	15000	15000	-
1995 Low	-	-	-	27600	6000	5000	5000	5000
1995 Base	-	-	-	28600	11000	10000	10000	10000
1995 High	-	-	-	29600	16000	15000	15000	15000

C. Net external migration assumptions, Germany

Projection	1980	1985	1990	1995	2000	2010	2020	2050
1980	0	0	0	0	0	0	-	-
1985	-	0	0	0	0	0	-	-
1990 Low	-	-	650000	100000	100000	100000	100000	-
1990 Base	-	-	675000	190000	190000	190000	190000	-
1990 High	-	-	700000	280000	280000	280000	280000	-
1995 Low	-	-	-	390000	300000	150000	150000	150000
1995 Base	-	-	-	420000	390600	200000	200000	200000
1995 High				450000	500000	250000	250000	250000

D. Net external migration assumptions, Greece

Projection	1980	1985	1990	1995	2000	2010	2020	2050
1980	0	0	0	0	0	0	-	-
1985	-	0	0	0	0	0	-	-
1990 Low	-	-	10000	15000	15000	15000	15000	-
1990 Base	-	-	20000	27500	27500	27500	27500	-
1990 High	-	-	30000	40000	40000	40000	40000	-
1995 Low	-	-	-	25000	13800	20000	20000	20000
1995 Base	-	-	-	30000	21700	25000	25000	25000
1995 High	-	-	-	35000	29500	30000	30000	30000

E. Net external migration assumptions, Spain

Projection	1980	1985	1990	1995	2000	2010	2020	2050
1980	0	0	0	0	0	0	-	-
1985	-	0	0	0	0	0	-	-
1990 Low	-	-	20000	25000	25000	25000	25000	-
1990 Base	-	-	20000	47500	47500	47500	47500	-
1990 High	-	-	20000	70000	70000	70000	70000	-
1995 Low	-	-	-	18300	4900	40000	40000	40000
1995 Base	-	-	-	28500	31100	60000	60000	60000
1995 High	-	-	-	38700	57200	80000	80000	80000

Table 3.2 Continued

F. Net external migration assumptions, France

Projection	1980	1985	1990	1995	2000	2010	2020	2050
1980	0	0	0	0	0	0	-	-
1985	-	0	0	0	0	0	-	-
1990 Low	-	-	30000	25000	25000	25000	25000	-
1990 Base	-	-	40000	47500	47500	47500	47500	-
1990 High	-	-	50000	70000	70000	70000	70000	-
1995 Low	-	-	-	40000	20400	30000	30000	30000
1995 Base	-	-	-	50000	50100	50000	50000	50000
1995 High	-	-	-	60000	79800	70000	70000	70000

G. Net external migration assumptions, Ireland

Projection	1980	1985	1990	1995	2000	2010	2020	2050
1980	0	0	0	0	0	0	-	-
1985	-	-30000	0	0	0	0	-	-
1990 Low	-	-	-22000	-15000	-15000	-15000	-15000	-
1990 Base	-	-	-17000	-7500	-7500	-7500	-7500	-
1990 High	-	-	-12000	0	0	0	0	-
1995 Low	-	-	-	-10000	-10000	-5000	-5000	-5000
1995 Base	-	-	-	-8400	-7700	-2700	-2700	-2700
1995 High	-	-	-	-6800	-3400	-400	-400	-400

H. Net external migration assumptions, Italy

Projection	1980	1985	1990	1995	2000	2010	2020	2050
1980	0	0	0	0	0	0	-	-
1985	-	0	0	0	0	0	-	-
1990 Low	-	-	120000	30000	30000	30000	30000	-
1990 Base	-	-	130000	65000	65000	65000	65000	-
1990 High	-	-	140000	100000	100000	100000	100000	-
1995 Low	-	-	-	20000	20000	60000	60000	60000
1995 Base	-	-	-	50000	50000	80000	80000	80000
1995 High	-	-	-	80000	80000	100000	100000	100000

I. Net external migration assumptions, Luxembourg

Projection	1980	1985	1990	1995	2000	2010	2020	2050
1980	0	0	0	0	0	0	-	-
1985	-	0	0	0	0	0	-	-
1990 Low	-	-	1200	1000	1000	1000	1000	-
1990 Base	-	-	2100	2000	2000	2000	2000	-
1990 High	-	-	3000	3000	3000	3000	3000	-
1995 Low	-	-	-	4100	2000	1000	1000	1000
1995 Base	-	-	-	4600	3100	2000	2000	2000
1995 High	-	-	-	5100	4300	3000	3000	3000

J. Net external migration assumptions, Netherlands

Projection	1980	1985	1990	1995	2000	2010	2020	2050
1980	0	0	0	0	0	0	-	-
1985	-	0	0	0	0	0	-	-
1990 Low	-	-	46000	20000	20000	20000	20000	-
1990 Base	-	-	48000	35000	35000	35000	35000	-
1990 High	-	-	50000	50000	50000	50000	50000	-
1995 Low	-	-	-	13000	10000	20000	20000	20000
1995 Base	-	-	-	13500	33400	35000	35000	35000
1995 High	-	-	-	14000	56800	50000	50000	50000

Table 3.2 Continued

K. Net external migration assumptions, Austria

Projection	1980	1985	1990	1995	2000	2010	2020	2050
1980	-	-	-	-	-	-	-	-
1985	-	-	-	-	-	-	-	-
1990 Low	-	-	-	-	-	-	-	-
1990 Base	-	-	-	-	-	-	-	-
1990 High	-	-	-	-	-	-	-	-
1995 Low	-	-	-	12100	9900	15000	15000	15000
1995 Base	-	-	-	13300	14800	22500	22500	22500
1995 High	-	-	-	17200	26400	30000	30000	30000

L. Net external migration assumptions, Portugal

Projection	1980	1985	1990	1995	2000	2010	2020	2050
1980	0	0	0	0	0	0	-	-
1985	-	0	0	0	0	0	-	-
1990 Low	-	-	5000	15000	15000	15000	15000	-
1990 Base	-	-	10000	27500	27500	27500	27500	-
1990 High	-	-	15000	40000	40000	40000	40000	-
1995 Low	-	-	-	4500	5800	20000	20000	20000
1995 Base	-	-	-	5000	12100	25000	25000	25000
1995 High	-	-	-	5500	28600	30000	30000	30000

M. Net external migration assumptions, Finland

Projection	1980	1985	1990	1995	2000	2010	2020	2050
1980	-	-	-	-	-	-	-	-
1985	-	-	-	-	-	-	-	-
1990 Low	-	-	-	-	-	-	-	-
1990 Base	-	-	-	-	-	-	-	-
1990 High	-	-	-	-	-	-	-	-
1995 Low	-	-	-	3000	-500	0	0	0
1995 Base	-	-	-	3500	5600	5000	5000	5000
1995 High	-	-	-	4000	11700	10000	10000	10000

N. Net external migration assumptions, Sweden

Projection	1980	1985	1990	1995	2000	2010	2020	2050
1980	-	-	-	-	-	-	-	-
1985	-	-	-	-	-	-	-	-
1990 Low	-	-	-	-	-	-	-	-
1990 Base	-	-	-	-	-	-	-	-
1990 High	-	-	-	-	-	-	-	-
1995 Low	-	-	-	11500	6300	10000	10000	10000
1995 Base	-	-	-	12000	15200	20000	20000	20000
1995 High	-	-	-	13500	32000	30000	30000	30000

O. Net external migration assumptions, United Kingdom

Projection	1980	1985	1990	1995	2000	2010	2020	2050
1980	0	0	0	0	0	0	-	-
1985	-	0	0	0	0	0	-	-
1990 Low	-	-	30000	20000	20000	20000	20000	-
1990 Base	-	-	45000	40000	40000	40000	40000	-
1990 High	-	-	60000	60000	60000	60000	60000	-
1995 Low	-	-	-	73000	16200	20000	20000	20000
1995 Base	-	-	-	93000	38300	45000	45000	45000
1995 High	-	-	-	103000	73000	70000	70000	70000

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Table 3.3: Projection error generated by the assumption on lack of international migration in 1980 and 1985 base projection calculated in percent terms of the base populations

Variable, period	EUR12	Belgium	Denmark	Germany	Greece	Spain	France	Ireland	Italy	Luxem-bourg	Netherlands	Portugal	United Kingdom
							1980 based projection						
Net International migration													
1980-1984	198365	-35527	5312	9152	86134	4121	261549	-32834	-138819	2042	70838	22296	-55899
1985-1989	2044514	41030	31819	1660596	121999	-98526	249000	-164442	-12689	11014	137077	-226933	294569
1990-1994	4779573	96097	52991	2812978	290586	81236	380000	-10097	544722	20678	206760	-64031	367653
Total	7022452	101600	90122	4482726	498719	-13169	890549	-207373	393214	33734	414675	-268668	606323
Population in 1980 (1000s)	318039.5	9843.2	5122.1	61439.2	9587.5	37241.5	53882.1	3392.8	56998.9	363.7	14091.3	9755.6	56321.6
% error													
1980-1984	0.06	-0.36	0.10	0.01	0.90	0.01	0.49	-0.97	-0.24	0.56	0.50	0.23	-0.10
1985-1989	0.64	0.42	0.62	2.70	1.27	-0.26	0.46	-4.85	-0.02	3.03	0.97	-2.33	0.52
1990-1994	1.50	0.98	1.03	4.58	3.03	0.22	0.71	-0.30	0.96	5.69	1.47	-0.66	0.65
Total error 1980-1994	2.21	1.03	1.76	7.30	5.20	-0.04	1.65	-6.11	0.69	9.28	2.94	-2.75	1.08
							1985 base projection						
Total migration 1985-1994	6824087	137127	84810	4473574	412585	-17290	629000	-174539	532033	31692	343837	-290964	662222
Migration assumed in the 1985 projection	0	0	0	1172000	0	0	0	-153400	0	0	0	0	0
The difference between actual and assumed migration	6824087	137127	84810	3301574	412585	-17290	629000	-21139	532033	31692	343837	-290964	662222
Total % error 1985-1994	2.1	1.4	1.7	5.4	4.2	0.0	1.1	-0.6	0.9	8.7	2.4	-2.9	1.2

Source: NEI 1986, Council of Europe 1995, 1998, Eurostat 1997a, 1998

Table 3.4: Projection error generated by the assumed international migration in 1990 base projection calculated in percent terms of the base populations

	EUR12	Belgium	Denmark	Germany	Greece	Spain	France	Ireland	Italy	Luxembourg	Netherlands	Portugal	United Kingdom
1990 based projection													
Net International migration (including Aussiedler)													
1990	892737	19961	8533	656166	71135	-20012	80000	-7667	24212	3937	48730	-60644	68386
1991	950579	13321	10880	602563	87246	32285	90000	4210	4163	4158	49998	-24644	76399
1992	1241126	25289	11583	776397	48878	20223	90000	541	181913	4272	43185	-9587	48432
1993	978300	18472	11468	462284	56025	24717	70000	-4599	181070	4262	44418	19954	90229
1994	716235	19054	10507	315568	27302	24023	50000	-2582	153364	4049	20429	10314	84207
1995	763969	2554	28665	398263	20859	47422	40000	3864	90287	4576	14929	5375	107175
Total	5542946	98651	81636	3211241	311445	128658	420000	-6233	635009	25254	221689	-59232	474828
Asylum seekers (as various definitions apply in different countries this measure is completely incomparable, see Eurostat 1997, p.198)													
1990	348553	12954	5292	193063	10569	8647	54813	62	3570	114	21208	61	38200
1991	457634	15444	4609	256112	5944	8138	47380	31	24490	238	21615	233	73400
1992	570166	17675	13884	438191	3822	11712	28872		2589	120	20346	655	32300
1993	792110	26717	14347	322599	862	12645	27564	91	1571	225	355399	2090	28000
1994	283006	14340	6651	127210	1107	10145	25964	355	1844		52576	614	42200
1995	258508	11409	5104	127937	1300	5678	20170	400	1752		29258	500	55000
Total	2709977	98539	49887	1465112	23604	56965	204763	939	35816	697	500402	4153	269100
Total net International migration including Aussiedler and asylum seekers													
1990	1241290	32915	13825	849229	81704	-11365	134813	-7605	27782	4051	69938	-60583	106586
1991	1408213	28765	15489	858675	93190	40423	137380	4241	28653	4396	71613	-24411	149799
1992	1811292	42964	25467	1214588	52700	31935	118872	541	184502	4392	63531	-8932	80732
1993	1770410	45189	25815	784883	56887	37362	97564	-4508	182641	4487	399817	22044	118229
1994	999241	33394	17158	442778	28409	34168	75964	-2227	155208	4049	73005	10928	126407
1995	1022477	13963	33769	526200	22159	53100	60170	4264	92039	4576	44187	5875	162175
Total	8252923	197190	131523	4676353	335049	185623	624763	-5294	670825	25951	722091	-55079	743928

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Table 3.4 Continued

	EUR12	Belgium	Denmark	Germany	Greece	Spain	France	Ireland	Italy	Luxem-bourg	Netherlands	Portugal	United Kingdom
Projected net international migration													
Low variant													
1990	890000	10000	7000	650000	10000	0	30000	-20000	120000	2000	46000	5000	30000
1991	650000	9000	5000	410000	25000	20000	50000	-30000	70000	1000	35000	10000	45000
1992	500000	9000	5000	290000	25000	20000	40000	-25000	60000	1000	25000	15000	35000
1993	350000	9000	5000	180000	20000	20000	30000	-20000	45000	1000	20000	15000	25000
1994	250000	9000	5000	100000	15000	20000	25000	-15000	35000	1000	20000	15000	20000
1995	250000	9000	5000	100000	15000	25000	25000	-15000	30000	1000	20000	15000	20000
Total	2890000	55000	32000	1730000	110000	105000	200000	-125000	360000	7000	166000	75000	175000
High variant													
1990	1082000	15000	9000	700000	30000	20000	50000	-10000	140000	3000	50000	15000	60000
1991	1100000	22000	15000	710000	40000	30000	70000	-20000	100000	3000	50000	20000	60000
1992	1100000	22000	15000	690000	40000	40000	70000	-15000	100000	3000	50000	25000	60000
1993	900000	22000	15000	470000	40000	50000	70000	-10000	100000	3000	50000	30000	60000
1994	750000	22000	15000	300000	40000	60000	70000	-5000	100000	3000	50000	35000	60000
1995	750000	22000	15000	280000	40000	70000	70000	0	100000	3000	50000	40000	60000
Total	5682000	125000	84000	3150000	230000	270000	400000	-60000	640000	18000	300000	165000	360000
Population in 1990 (1000s)	343911.5	9947.8	5135.4	79112.8	10204.5	38924.5	56581.3	3507.9	57576.4	378.4	14892.6	10336.9	57313.0
Difference between observed and assumed net migration													
Low variant total	5362923	142190	99523	2946353	225049	80623	424763	119706	310825	18951	556091	-130079	568928
High variant total	2570923	72190	47523	1526353	105049	-84377	224763	54706	30825	7951	422091	-220079	383928
% error 1991-1995													
Low variant total	1.6	1.4	1.9	3.7	2.2	0.2	0.8	3.4	0.5	5.0	3.7	-1.3	1.0
High variant total	0.7	0.7	0.9	1.9	1.0	-0.2	0.4	1.6	0.1	2.1	2.8	-2.1	0.7

Source: Eurostat 1997, UNHCR 1998, Muss, Cruijsen 1991.

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Table 3.5 Observed and assumed total fertility rate in EUR12 countries, 1980-2020

A. Total fertility rate assumptions, Belgium

Projection	1980	1985	1990	1995	2000	2010	2020
1980 Constant scenario	1.67	1.67	1.67	1.67	1.67	1.67	
1980 Variable scenario	1.67	1.88	1.93				
1985 Constant scenario		1.60	1.60	1.60	1.60	1.60	
1985 Variable scenario	-	1.60	1.70	1.63	1.55	1.53	1.51
1990 Low scenario	-	-	1.61	1.56	1.53	1.50	1.50
1990 Base scenario	-	-	1.62	1.66	1.69	1.74	1.75
1990 High scenario	-	-	1.63	1.75	1.85	1.97	2.00
1995 Low scenario	-	-	-	1.51	1.46	1.48	1.50
1995 Base scenario	-	-	-	1.57	1.67	1.74	1.80
1995 High scenario	-	-	-	1.60	1.81	1.91	2.00
Observed	1.69	1.51	1.62	1.55	-	-	-

B. Total fertility rate assumptions, Denmark

Projection	1980	1985	1990	1995	2000	2010	2020
1980 Constant scenario	1.55	1.55	1.55	1.55	1.55	1.55	
1980 Variable scenario	1.56	1.85	1.88	1.93			
1985 Constant scenario		1.40	1.40	1.40	1.40	1.40	
1985 Variable scenario	-	1.40	1.61	1.62	1.63	1.50	1.38
1990 Low scenario	-	-	1.66	1.63	1.60	1.55	1.50
1990 Base scenario	-	-	1.67	1.73	3.51	1.76	1.75
1990 High scenario	-	-	1.68	1.82	1.91	1.97	2.00
1995 Low scenario	-	-	-	1.72	1.55	1.53	1.50
1995 Base scenario	-	-	-	1.79	1.77	1.78	1.79
1995 High scenario	-	-	-	1.82	1.94	1.97	2.00
Observed	1.55	1.45	1.67	1.81	-	-	-

C. Total fertility rate assumptions, France

Projection	1980	1985	1990	1995	2000	2010	2020
1980 Constant scenario	1.97	1.97	1.97	1.97	1.97	1.97	
1980 Variable scenario	1.97	1.90	2.00	2.10			
1985 Constant scenario		1.75	1.75	1.75	1.75	1.75	
1985 Variable scenario	-	1.75	1.95	1.88	1.81	1.79	1.77
1990 Low scenario	-	-	1.79	1.78	1.76	1.71	1.70
1990 Base scenario	-	-	1.80	1.89	1.92	1.93	1.95
1990 High scenario	-	-	1.81	1.99	2.08	2.15	2.20
1995 Low scenario	-	-	-	1.64	1.62	1.59	1.55
1995 Base scenario	-	-	-	1.66	1.73	1.77	1.80
1995 High scenario	-	-	-	1.72	1.97	2.04	2.10
Observed	1.94	1.81	1.78	1.70	-	-	-

D. Total fertility rate assumptions, Germany

Projection	1980	1985	1990	1995	2000	2010	2020
1980 Constant scenario	1.44	1.44	1.44	1.44	1.44	1.44	
1980 Variable scenario	1.44	1.40	1.50	1.60			
1985 Constant scenario		1.25	1.25	1.25	1.25	1.25	
1985 Variable scenario	-	1.25	1.51	1.43	1.34	1.28	1.22
1990 Low scenario	-	-	1.45	1.37	1.31	1.29	1.30
1990 Base scenario	-	-	1.46	1.48	1.48	1.53	1.55
1990 High scenario	-	-	1.47	1.59	1.65	1.76	1.80
1995 Low scenario	-	-	-	1.24	1.26	1.28	1.30
1995 Base scenario	-	-	-	1.28	1.41	1.46	1.50
1995 High scenario	-	-	-	1.33	1.62	1.71	1.80
Observed, all Germany				1.25			
Observed, former FRG	1.45	1.28	1.45	1.34			

Table 3.5 Continued

E. Total fertility rate assumptions, Greece

Projection	1980	1985	1990	1995	2000	2010	2020
1980 Constant scenario	2.23	2.23	2.23	2.23	2.23	2.23	
1980 Variable scenario	2.23	1.80	1.80	1.80			
1985 Constant scenario		1.70	1.70	1.70	1.70	1.70	
1985 Variable scenario	-	1.70	1.64	1.62	1.59	1.51	1.43
1990 Low scenario	-	-	1.43	1.42	1.45	1.52	1.58
1990 Base scenario	-	-	1.46	1.54	1.63	1.77	1.84
1990 High scenario	-	-	1.48	1.65	1.81	2.02	2.09
1995 Low scenario	-	-	-	1.34	1.36	1.38	1.40
1995 Base scenario	-	-	-	1.40	1.59	1.65	1.70
1995 High scenario	-	-	-	1.43	1.72	1.81	1.90
Observed	2.23	1.68	1.43	1.32	-	-	-

F. Total fertility rate assumptions, Ireland

Projection	1980	1985	1990	1995	2000	2010	2020
1980 Constant scenario	3.23	3.23	3.23	3.23	3.23	3.23	
1980 Variable scenario	3.23	2.85	2.50	2.15			
1985 Constant scenario		2.50	2.50	2.50	2.50	2.50	
1985 Variable scenario	-	2.50	2.32	2.24	2.16	2.07	1.97
1990 Low scenario	-	-	2.16	1.94	1.81	1.70	1.70
1990 Base scenario	-	-	2.19	2.08	2.00	1.94	1.95
1990 High scenario	-	-	2.21	2.22	2.19	2.17	2.19
1995 Low scenario	-	-	-	1.86	1.67	1.64	1.60
1995 Base scenario	-	-	-	1.90	1.83	1.81	1.79
1995 High scenario	-	-	-	1.94	2.02	2.06	2.10
Observed	3.23	2.50	2.12	1.85	-	-	-

G. Total fertility rate assumptions, Italy

Projection	1980	1985	1990	1995	2000	2010	2020
1980 Constant scenario	1.66	1.66	1.66	1.66	1.66	1.66	
1980 Variable scenario	1.66	1.75	1.75	1.85			
1985 Constant scenario		1.40	1.40	1.40	1.40	1.40	
1985 Variable scenario	-	1.40	1.53	1.55	1.56	1.39	1.21
1990 Low scenario	-	-	1.29	1.34	1.33	1.30	1.30
1990 Base scenario	-	-	1.32	1.46	1.51	1.54	1.55
1990 High scenario	-	-	1.34	1.57	1.68	1.77	1.80
1995 Low scenario	-	-	-	1.18	1.20	1.24	1.27
1995 Base scenario	-	-	-	1.22	1.37	1.44	1.50
1995 High scenario	-	-	-	1.27	1.58	1.69	1.80
Observed	1.68	1.45	1.36	1.18	-	-	-

H. Total fertility rate assumptions, Luxembourg

Projection	1980	1985	1990	1995	2000	2010	2020
1980 Constant scenario	1.51	1.51	1.51	1.51	1.51	1.51	
1980 Variable scenario	1.51	1.50	1.60	1.93			
1985 Constant scenario		1.30	1.30	1.30	1.30	1.30	
1985 Variable scenario	-	1.30	1.61	1.49	1.36	1.40	1.44
1990 Low scenario	-	-	1.59	1.52	1.48	1.43	1.40
1990 Base scenario	-	-	1.61	1.63	1.64	1.65	1.65
1990 High scenario	-	-	1.63	1.73	1.80	1.87	1.90
1995 Low scenario	-	-	-	1.67	1.55	1.53	1.50
1995 Base scenario	-	-	-	1.71	1.72	1.76	1.79
1995 High scenario	-	-	-	1.74	1.89	1.95	2.00
Observed	1.50	1.38	1.62	1.67	-	-	-

Table 3.5 Continued

I. Total fertility rate assumptions, Netherlands

Projection	1980	1985	1990	1995	2000	2010	2020
1980 Constant scenario	1.60	1.60	1.60	1.60	1.60	1.60	
1980 Variable scenario	1.60	1.60	1.75	1.95			
1985 Constant scenario		1.50	1.50	1.50	1.50	1.50	
1985 Variable scenario	-	1.50	1.78	1.73	1.67	1.55	1.43
1990 Low scenario	-	-	1.61	1.61	1.60	1.56	1.50
1990 Base scenario	-	-	1.62	1.71	1.75	1.77	1.75
1990 High scenario	-	-	1.63	1.80	1.90	1.97	2.00
1995 Low scenario	-	-	-	1.52	1.47	1.49	1.50
1995 Base scenario	-	-	-	1.58	1.67	1.74	1.80
1995 High scenario	-	-	-	1.59	1.74	1.87	1.99
Observed	1.60	1.51	1.62	1.53	-	-	-

J. Total fertility rates, assumptions, Portugal

Projection	1980	1985	1990	1995	2000	2010	2020
1980 Constant scenario	2.19	2.19	2.19	2.19	2.19	2.19	
1980 Variable scenario	2.19	1.80	1.80	1.80			
1985 Constant scenario		1.70	1.70	1.70	1.70	1.70	
1985 Variable scenario	-	1.70	1.64	1.60	1.55	1.44	1.32
1990 Low scenario	-	-	1.41	1.36	1.34	1.44	1.51
1990 Base scenario	-	-	1.44	1.47	1.51	1.67	1.76
1990 High scenario	-	-	1.46	1.58	1.67	1.89	2.00
1995 Low scenario	-	-	-	1.40	1.38	1.39	1.40
1995 Base scenario	-	-	-	1.45	1.53	1.61	1.69
1995 High scenario	-	-	-	1.48	1.67	1.79	1.90
Observed	2.19	1.73	1.57	1.41	-	-	-

K. Total fertility rate assumptions, Spain

Projection	1980	1985	1990	1995	2000	2010	2020
1980 Constant scenario	2.17	2.17	2.17	2.17	2.17	2.17	
1980 Variable scenario	2.17	1.80	1.80	1.803			
1985 Constant scenario		1.70	1.70	1.70	1.70	1.70	
1985 Variable scenario	-	1.70	1.69	1.70	1.71	1.56	1.42
1990 Low scenario	-	-	1.36	1.32	1.29	1.38	1.42
1990 Base scenario	-	-	1.39	1.44	1.47	1.60	1.66
1990 High scenario	-	-	1.42	1.56	1.64	1.81	1.89
1995 Low scenario	-	-	-	1.22	1.22	1.25	1.28
1995 Base scenario	-	-	-	1.24	1.36	1.43	1.50
1995 High scenario	-	-	-	1.30	1.59	1.70	1.80
Observed	2.21	1.64	1.36	1.18	-	-	-

L. Total fertility rate assumptions, United Kingdom

Projection	1980	1985	1990	1995	2000	2010	2020
1980 Constant scenario	1.89	1.89	1.89	1.89	1.89	1.89	
1980 Variable scenario	1.89	1.80	1.90	2.10			
1985 Constant scenario		1.75	1.75	1.75	1.75	1.75	
1985 Variable scenario	-	1.75	2.03	1.97	1.91	1.88	1.84
1990 Low scenario	-	-	1.78	1.75	1.70	1.66	1.69
1990 Base scenario	-	-	1.81	1.86	1.86	1.89	1.94
1990 High scenario	-	-	1.83	1.96	2.02	2.12	2.19
1995 Low scenario	-	-	-	1.70	1.63	1.62	1.60
1995 Base scenario	-	-	-	1.74	1.81	1.86	1.90
1995 High scenario	-	-	-	1.77	1.94	2.02	2.10
Observed	1.89	1.80	1.84	1.71			

Sources for Table 3.5:
NEI 1986, Harverkate and van Haselen 1990, NEI 1994a, NEI 1994c, Eurostat 1997b, Council of Europe 1995, 1998.

Notes to Table 3.5:
1. Germany sub-table. Former FRG in 1980 and 1985 projections, unified Germany for 1990 and 1995 projections.
2. Observed values of the total fertility rates reported by the Council of Europe (1998) differ from those reported by the Eurostat. Council of Europe data were used in the "Observed" row.

CONTENTS

Table 3.6: Life expectancy assumptions, 1990 and 1995 base projection rounds, European Union countries

A. Life expectancy assumptions, Belgium

Projection	Male						Female					
	1990	1995	2000	2010	2020	2050	1990	1995	2000	2010	2020	2050
1990 Low	72.2	72.6	73.2	73.2	73.2	-	78.9	79.4	79.8	79.8	79.8	-
1990 Base	72.3	72.9	73.9	74.9	75.5	-	79.0	79.6	80.5	81.1	81.3	-
1990 High	72.3	73.2	74.6	76.6	77.7	-	79.0	79.8	81.1	82.3	82.8	-
1995 Low	-	73.3	74.0	74.8	75.5	76.0	-	80.0	80.7	81.2	81.7	82.0
1995 Base	-	73.6	74.8	76.8	78.7	80.0	-	80.2	81.3	82.8	84.2	85.0
1995 High	-	73.9	75.6	78.2	80.8	83.0	-	80.4	81.9	83.8	85.7	87.0
Observed	72.7	73.4					79.4	80.2				

B. Life expectancy assumptions, Denmark

Projection	Male						Female					
	1990	1995	2000	2010	2020	2050	1990	1995	2000	2010	2020	2050
1990 Low	71.7	71.9	72.2	72.2	72.2	-	77.4	77.6	77.7	77.7	77.7	-
1990 Base	71.8	72.1	72.7	73.8	74.7	-	77.5	77.9	78.3	79.1	79.7	-
1990 High	71.8	72.3	73.2	75.3	77.2	-	77.6	78.1	78.8	80.5	81.7	-
1995 Low	-	72.6	72.9	73.5	74.0	75.0	-	77.8	77.9	78.3	78.6	79.5
1995 Base	-	72.9	73.7	75.4	77.1	79.0	-	78.0	78.5	79.7	80.8	83.0
1995 High	-	73.3	74.6	77.1	79.5	82.0	-	78.3	79.3	81.2	83.1	85.0
Observed	72.0	72.7					77.7	77.8				

C. Life expectancy assumptions, France

Projection	Male						Female					
	1990	1995	2000	2010	2020	2050	1990	1995	2000	2010	2020	2050
1990 Low	72.2	72.7	73.3	73.3	73.3	-	80.4	80.9	81.3	81.3	81.3	-
1990 Base	72.3	73.0	74.0	75.0	75.6	-	80.5	81.1	81.9	82.5	82.8	-
1990 High	72.4	73.2	74.6	76.6	77.8	-	80.6	81.3	82.5	83.7	84.2	-
1995 Low	-	73.6	74.0	74.8	75.6	76.0	-	81.6	82.2	82.9	83.6	84.0
1995 Base	-	74.0	74.8	76.6	78.3	80.0	-	81.9	82.8	84.1	85.4	87.0
1995 High	-	74.3	75.6	78.0	80.3	83.0	-	82.2	83.2	84.9	86.6	88.0
Observed	72.7	73.9					78.6	81.5				

D. Life expectancy assumptions, Germany

Projection	Male						Female					
	1990	1995	2000	2010	2020	2050	1990	1995	2000	2010	2020	2050
1990 Low	71.8	72.0	72.2	72.2	72.2	-	78.4	78.6	78.8	78.8	78.8	-
1990 Base	71.9	72.4	73.2	74.3	75.0	-	78.5	79.0	79.6	80.4	80.8	-
1990 High	71.9	72.8	74.1	76.4	77.8	-	78.5	79.3	80.4	82.0	82.8	-
1995 Low	-	72.9	73.3	74.0	74.7	75.0	-	79.4	79.8	80.5	81.1	81.5
1995 Base	-	73.4	74.1	75.8	77.4	79.0	-	79.7	80.4	81.7	82.9	84.0
1995 High	-	73.7	75.0	77.4	79.8	82.0	-	80.0	81.1	82.8	84.4	86.0
Observed	72.0	73.3					78.4	79.7				

E. Life expectancy assumptions, Greece

Projection	Male						Female					
	1990	1995	2000	2010	2020	2050	1990	1995	2000	2010	2020	2050
1990 Low	73.0	73.2	73.4	73.4	73.4	-	78.2	78.6	79.0	79.0	79.0	-
1990 Base	73.1	73.6	74.2	75.1	75.7	-	78.3	78.8	79.6	80.5	80.8	-
1990 High	73.1	73.9	75.0	76.8	77.9	-	78.3	79.0	80.2	81.9	82.6	-
1995 Low	-	75.0	75.5	76.2	76.8	77.5	-	80.0	80.5	81.1	81.7	82.0
1995 Base	-	75.3	76.3	77.9	79.4	81.0	-	80.2	81.1	82.4	83.6	85.0
1995 High	-	75.6	77.0	79.4	81.8	84.0	-	80.4	81.7	83.4	85.1	87.0
Observed	74.6	75.0					79.5	80.3				

Table 3.6 Continued

F. Life expectancy assumptions, Ireland

Projection	Male						Female					
	1990	1995	2000	2010	2020	2050	1990	1995	2000	2010	2020	2050
1990 Low	71.1	71.5	71.9	72.2	72.2	-	76.6	77.0	77.5	77.7	77.7	-
1990 Base	71.1	71.6	72.4	73.7	74.5	-	76.6	77.1	78.0	79.0	79.6	-
1990 High	71.1	71.7	72.9	75.1	76.8	-	76.6	77.2	78.4	80.2	81.4	-
1995 Low	-	72.7	73.2	73.9	74.5	75.0	-	78.3	78.8	79.4	80.0	80.5
1995 Base	-	73.0	74.0	75.6	77.2	79.0	-	78.5	79.4	80.9	82.3	84.0
1995 High	-	73.4	74.9	77.3	79.6	82.0	-	78.8	80.2	82.2	84.1	86.0
Observed	72.1	73.0					77.6	78.6				

G. Life expectancy assumptions, Italy

Projection	Male						Female					
	1990	1995	2000	2010	2020	2050	1990	1995	2000	2010	2020	2050
1990 Low	72.9	73.5	74.0	74.0	74.0	-	79.5	80.1	80.6	80.6	80.6	-
1990 Base	73.0	73.8	74.8	75.8	76.3	-	79.6	80.3	81.2	82.0	82.1	-
1990 High	73.1	74.0	75.5	77.5	78.6	-	79.7	80.5	81.8	83.3	83.6	-
1995 Low	-	74.2	74.3	75.0	75.6	76.0	-	80.9	81.1	81.6	82.1	82.5
1995 Base	-	74.8	75.1	76.7	78.3	80.0	-	81.3	81.7	82.9	84.0	85.0
1995 High	-	75.1	75.9	78.2	80.4	83.0	-	81.5	82.2	83.8	85.4	87.0
Observed	73.6	74.9					80.1	81.4				

H. Life expectancy assumptions, Luxembourg

Projection	Male						Female					
	1990	1995	2000	2010	2020	2050	1990	1995	2000	2010	2020	2050
1990 Low	70.9	71.4	71.9	72.2	72.2	-	78.0	78.2	79.0	79.2	79.2	-
1990 Base	70.9	71.5	72.4	73.7	74.6	-	78.0	78.3	79.4	80.4	80.9	-
1990 High	70.9	71.5	72.8	75.2	76.9	-	78.0	78.4	79.7	81.5	82.5	-
1995 Low	-	72.6	73.6	74.4	75.2	75.5	-	79.2	79.7	80.4	81.0	81.5
1995 Base	-	72.9	74.4	76.6	78.8	80.0	-	79.4	80.3	81.9	83.4	85.0
1995 High	-	73.2	75.3	78.0	80.7	83.0	-	79.7	81.0	83.2	85.3	87.0
Observed	72.3	73.0					78.5	80.2				

I. Life expectancy assumptions, Netherlands

Projection	Male						Female					
	1990	1995	2000	2010	2020	2050	1990	1995	2000	2010	2020	2050
1990 Low	73.4	73.6	73.7	73.7	73.7	-	79.8	80.0	80.2	80.2	80.2	-
1990 Base	73.5	73.9	74.4	75.4	76.0	-	79.9	80.2	80.8	81.4	81.7	-
1990 High	73.6	74.2	75.1	77.0	78.2	-	79.9	80.4	81.3	82.6	83.2	-
1995 Low	-	74.4	74.7	75.2	75.7	76.5	-	80.3	80.5	80.9	81.3	82.0
1995 Base	-	74.6	75.5	76.9	78.2	80.0	-	80.5	81.1	82.2	83.3	85.0
1995 High	-	74.9	76.3	78.6	80.8	83.0	-	80.7	81.7	83.3	84.9	87.0
Observed	73.8	74.6					80.9	80.4				

J. Life expectancy assumptions, Portugal

Projection	Male						Female					
	1990	1995	2000	2010	2020	2050	1990	1995	2000	2010	2020	2050
1990 Low	70.4	71.1	71.8	71.8	71.8	-	77.5	78.0	78.4	78.4	78.4	-
1990 Base	70.5	71.4	72.6	73.8	74.4	-	77.6	78.3	79.2	79.9	80.2	-
1990 High	70.5	71.6	73.3	75.7	77.0	-	77.6	78.5	79.9	81.4	82.0	-
1995 Low	-	70.7	71.1	71.7	72.3	73.0	-	78.0	78.4	79.0	79.6	80.0
1995 Base	-	71.0	71.9	73.6	75.3	78.0	-	78.2	79.0	80.5	81.9	84.0
1995 High	-	71.4	72.9	75.7	78.5	82.0	-	78.5	79.8	81.7	83.5	86.0
Observed	70.4	71.3					77.4	78.6				

Table 3.6 Continued

K. Life expectancy assumptions, Spain

Projection	Male						Female					
	1990	1995	2000	2010	2020	2050	1990	1995	2000	2010	2020	2050
1990 Low	73.1	73.3	73.6	73.6	73.6	-	79.7	80.0	80.2	80.2	80.2	-
1990 Base	73.2	73.6	74.3	75.2	75.9	-	79.8	80.2	80.9	81.5	81.8	-
1990 High	73.3	73.9	74.9	76.8	78.1	-	79.8	80.4	81.5	82.7	83.3	-
1995 Low	-	73.6	73.6	74.1	74.5	75.5	-	81.1	81.2	81.7	82.2	82.5
1995 Base	-	74.0	74.4	75.6	76.7	79.0	-	81.4	81.8	82.9	84.0	85.0
1995 High	-	71.4	72.9	75.7	78.5	82.0	-	81.7	82.3	83.9	85.4	87.0
Observed	73.3	74.3					80.4	81.5				

L. Life expectancy assumptions, United Kingdom

Projection	Male						Female					
	1990	1995	2000	2010	2020	2050	1990	1995	2000	2010	2020	2050
1990 Low	72.2	72.6	73.0	73.0	73.0	-	77.8	78.2	78.6	78.6	78.6	-
1990 Base	72.3	72.9	73.8	74.8	75.3	-	77.9	78.5	79.3	80.0	80.3	-
1990 High	72.3	73.2	74.6	76.5	77.5	-	77.9	78.7	79.9	81.4	82.0	-
1995 Low	-	73.7	74.4	75.2	76.0	76.5	-	79.2	79.7	80.4	81.0	81.5
1995 Base	-	74.1	75.2	76.8	78.3	80.0	-	79.5	80.3	81.8	83.2	85.0
1995 High	-	74.5	76.0	78.2	80.4	83.0	-	79.8	81.0	82.8	84.6	87.0
Observed	72.9	74.0					78.5	79.2				

M. Life expectancy assumptions, Austria

Projection	Male						Female					
	1990	1995	2000	2010	2020	2050	1990	1995	2000	2010	2020	2050
1990 Low	-	-	-	-	-	-	-	-	-	-	-	-
1990 Base	-	-	-	-	-	-	-	-	-	-	-	-
1990 High	-	-	-	-	-	-	-	-	-	-	-	-
1995 Low	-	73.2	73.7	74.5	75.2	75.5	-	79.6	80.1	80.2	81.2	81.5
1995 Base	-	73.6	74.5	75.6	76.6	80.0	-	79.9	80.7	81.6	82.4	85.0
1995 High	-	74.0	75.3	77.8	80.3	83.0	-	80.2	81.4	83.2	84.9	87.0
Observed	72.4	73.6					78.9	80.1				

N. Life expectancy assumptions, Finland

Projection	Male						Female					
	1990	1995	2000	2010	2020	2050	1990	1995	2000	2010	2020	2050
1990 Low	-	-	-	-	-	-	-	-	-	-	-	-
1990 Base	-	-	-	-	-	-	-	-	-	-	-	-
1990 High	-	-	-	-	-	-	-	-	-	-	-	-
1995 Low	-	72.0	72.5	73.3	74.0	74.5	-	79.6	80.1	80.7	81.2	81.5
1995 Base	-	72.3	73.3	75.0	76.6	79.0	-	79.8	80.7	82.0	83.3	85.0
1995 High	-	72.7	74.3	76.9	79.5	82.0	-	80.1	81.4	83.3	85.1	87.0
Observed	70.9	72.8					78.9	80.2				

O. Life expectancy assumptions, Sweden

Projection	Male						Female					
	1990	1995	2000	2010	2020	2050	1990	1995	2000	2010	2020	2050
1990 Low	-	-	-	-	-	-	-	-	-	-	-	-
1990 Base	-	-	-	-	-	-	-	-	-	-	-	-
1990 High	-	-	-	-	-	-	-	-	-	-	-	-
1995 Low	-	75.6	76.2	77.0	77.7	78.0	-	80.8	81.2	81.9	82.5	83.0
1995 Base	-	75.9	77.0	78.0	78.9	82.0	-	81.3	81.8	82.6	83.4	86.0
1995 High	-	76.4	77.6	79.0	80.4	85.0	-	81.5	82.3	84.3	86.3	88.0
Observed	74.8	76.2					80.4	81.4				

Source: NEI 1986, Harverkate and van Haselen 1990, NEI 1994b, Eurostat 1997b,

Table 4.1: Projected populations for Belgium

A. Projection results for total population, Belgium

Year	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	9843.2							9855.1
1985	9879.8	9857.5						9857.7
1990	9915.0	9865.7	9947.8	9947.8				9947.8
1995	9908.4	9824.5	10057.8	10165.7	10130.6	10130.6	10130.6	10130.6
2000	9794.7	9725.7	10105.3	10411.5	10171.5	10252.3	10332.1	
2005	9680.9	9569.6	10084.3	10655.5	10142.1	10367.1	10574.3	
2010	9567.2	9372.4	10003.4	10886.5	10089.1	10484.0	10823.9	
2015		9147.3	9879.4	11100.2	10004.3	10577.5	11051.7	
2020			9731.3	11309.9	9897.9	10657.9	11269.8	
2025					9766.1	10725.8	11486.9	

B. Projection results for population aged 0-14, Belgium

Year	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	1971.4							1998.9
1985	1863.4	1862.7						1862.8
1990	1833.9	1753.6	1801.2	1801.2				1801.2
1995	1815.9	1675.7	1796.9	1849.1	1826.8	1826.8	1826.8	1826.8
2000	1725.4	1583.9	1742.7	1908.2	1761.3	1811.2	1850.7	
2005	1635.0	1483.4	1650.2	1965.0	1653.5	1787.8	1896.4	
2010	1544.5	1386.1	1526.7	1974.1	1509.0	1735.7	1919.0	
2015		1293.1	1439.7	1976.7	1437.2	1713.8	1940.9	
2020			1393.5	2004.3	1398.8	1700.3	1944.3	
2025					1371.8	1701.3	1961.6	

C. Projection results for population aged 15-59, Belgium

Year	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	6048.2							6075.8
1985	6088.0	6072.2						6072.0
1990	6066.6	6084.9	6114.4	6114.4				6114.3
1995	6029.1	6033.7	6109.8	6155.9	6145.5	6145.5	6145.5	6145.5
2000	5981.2	6009.8	6146.6	6252.1	6189.6	6202.7	6226.1	
2005	5933.3	5987.3	6205.9	6380.2	6243.1	6283.2	6339.1	
2010	5885.4	5794.4	6128.3	6416.6	6183.6	6255.1	6340.6	
2015		5550.9	5974.7	6439.9	6020.6	6168.4	6314.2	
2020			5725.4	6403.1	5768.8	6024.4	6258.5	
2025					5468.2	5838.1	6167.9	

D. Projection results for population aged 60+, Belgium

Year	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	1823.6							1780.4
1985	1928.4	1922.6						1922.9
1990	2014.5	2027.2	2032.2	2032.2				2032.3
1995	2063.6	2115.1	2151.1	2160.7	2158.2	2158.2	2158.2	2158.3
2000	2088.1	2132.0	2216.0	2251.3	2220.5	2238.4	2255.3	
2005	2112.7	2098.8	2228.2	2310.2	2245.5	2296.2	2338.9	
2010	2137.2	2191.9	2348.4	2495.8	2396.5	2493.2	2564.3	
2015		2303.3	2465.0	2683.6	2546.5	2695.2	2796.6	
2020			2612.4	2902.4	2730.3	2933.2	3067.1	
2025					2926.0	3186.5	3357.4	

CONTENTS

Table 4.2: Projected populations for Denmark

A. Projection results for total population, Denmark

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	5122.1							5122.1
1985	5121.4	5111.2						5111.1
1990	5112.0	5084.6	5135.4	5135.4				5135.4
1995	5094.4	5056.0	5174.5	5243.4	5215.7	5215.7	5215.7	5215.7
2000	5032.2	5014.0	5193.7	5383.3	5270.5	5320.5	5364.7	
2005	4969.9	4949.7	5183.7	5525.0	5258.1	5398.1	5528.9	
2010	4907.7	4852.9	5136.8	5652.1	5214.8	5452.3	5679.5	
2015		4721.7	5062.4	5773.3	5148.0	5487.2	5811.9	
2020			4976.1	5912.2	5075.2	5525.7	5950.0	
2025					4999.5	5575.7	6106.3	

B. Projection results for population aged 0-14, Denmark

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	1081.4							1081.4
1985	966.8	950.8						950.7
1990	887.8	852.7	880.6	880.6				880.6
1995	852.3	803.0	874.6	904.8	900.9	900.9	900.9	900.9
2000	818.1	802.3	909.7	1005.4	953.5	984.0	1006.0	
2005	783.8	781.8	902.9	1081.7	940.4	1020.6	1087.6	
2010	749.6	730.0	839.5	1086.8	850.8	980.5	1097.5	
2015		664.8	767.1	1056.5	764.6	915.6	1062.5	
2020			715.7	1046.2	716.5	877.9	1034.4	
2025					707.8	890.2	1055.9	

C. Projection results for population aged 15-59, Denmark

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	3049.8							3049.8
1985	3121.6	3123.4						3123.5
1990	3184.0	3188.2	3207.6	3207.6				3207.5
1995	3209.0	3216.9	3261.0	3294.5	3277.1	3277.1	3277.1	3277.1
2000	3124.1	3168.9	3240.5	3318.2	3282.1	3291.7	3301.9	
2005	3039.3	3064.0	3180.0	3307.5	3228.5	3261.9	3295.6	
2010	2954.4	2916.8	3097.8	3300.4	3170.1	3229.2	3288.0	
2015		2804.7	3046.0	3361.3	3128.6	3241.9	3345.3	
2020			2971.4	3419.3	3049.6	3233.5	3401.7	
2025					2916.8	3171.0	3409.0	

D. Projection results for population aged 60+, Denmark

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	990.9							990.9
1985	1033.0	1037.0						1036.9
1990	1040.1	1043.8	1047.2	1047.2				1047.3
1995	1033.2	1036.1	1039.0	1044.1	1037.7	1037.7	1037.7	1037.7
2000	1090.0	1042.8	1043.5	1059.7	1035.0	1044.8	1056.8	
2005	1146.8	1103.9	1100.8	1135.8	1089.1	1115.7	1145.7	
2010	1203.6	1206.0	1199.6	1264.9	1193.8	1242.6	1293.9	
2015		1252.2	1249.4	1355.6	1254.8	1329.6	1404.1	
2020			1288.9	1446.8	1309.2	1414.3	1513.9	
2025					1374.9	1514.5	1641.4	

Table 4.3: Projected populations for Germany

A. Projection results for total population, Germany

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	61439.2							61439.3
1985	60953.2	61049.0						61049.3
1990	60585.3	61672.3	79112.8	79112.8				62678.9
1995	60126.7	61055.0	80521.7	82282.9	81538.6	81538.6	81538.6	81493.3
2000	58631.4	59950.7	80127.8	84060.4	82323.2	83123.5	84013.1	
2005	57136.0	58251.4	78960.1	85571.3	82402.4	84373.6	86793.6	
2010	55640.7	56049.5	77283.7	86978.8	81721.6	84853.6	88779.0	
2015		53556.2	75329.1	88415.3	80534.7	84869.5	90262.7	
2020			73189.9	89904.7	79073.6	84670.0	91558.6	
2025					77275.2	84178.8	92643.5	

B. Projection results for population aged 0-14, Germany

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	11363.3							11363.4
1985	9459.3	9341.5						9341.3
1990	9213.0	8972.4	12638.5	12638.5				9436.8
1995	9533.1	9002.8	13264.2	13856.5	13294.3	13294.3	13294.3	13294.4
2000	8857.3	8631.9	12804.8	14456.4	12875.7	13230.4	13662.1	
2005	8181.5	7848.5	11565.1	14494.7	11892.6	12789.8	14034.0	
2010	7505.7	6808.3	10077.7	14065.4	10887.1	12320.0	14423.5	
2015		5925.9	9188.1	13890.9	10216.6	11908.3	14495.1	
2020			8963.8	14353.2	9803.8	11627.6	14386.0	
2025					9526.2	11489.7	14409.6	

C. Projection results for population age 15-59, German

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	38271.9							38271.9
1985	39185.9	39336.0						39336.0
1990	38580.7	39659.1	50391.8	50391.8				40168.3
1995	37425.6	38554.2	50552.2	51516.7	51370.7	51370.7	51370.7	51370.6
2000	36119.4	36688.6	49015.4	50760.3	50909.8	51127.9	51370.7	
2005	34813.1	35101.9	47986.2	50583.7	50759.6	51330.1	52007.7	
2010	33506.9	34098.4	47854.2	51749.7	50886.0	51764.2	52785.8	
2015		32352.5	46304.0	52033.8	49515.3	50977.7	52656.9	
2020			43725.0	51529.4	47325.4	49523.3	52180.8	
2025					43972.4	46907.9	50613.1	

D. Projection results for population aged 60+, Germany

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	11804.0							11804.0
1985	12308.0	12371.5						12372.0
1990	12791.6	13040.8	16082.5	16082.5				13073.8
1995	13168.0	13497.9	16705.3	16909.7	16873.6	16873.6	16873.6	16828.3
2000	13654.7	14630.1	18307.6	18843.8	18537.6	18765.2	18980.3	
2005	14141.5	15301.1	19408.8	20492.8	19750.2	20253.7	20751.9	
2010	14628.2	15142.9	19351.7	21163.7	19948.5	20769.5	21569.7	
2015		15277.8	19837.0	22490.6	20802.7	21983.5	23110.6	
2020			20501.1	24022.2	21944.4	23519.2	24991.8	
2025					23776.6	25781.3	27620.8	

Table 4.4: Projected populations for Greece

A. Projection results for total population, Greece

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	9587.5							9588.1
1985	9871.0	9919.0						9919.5
1990	10150.3	10026.5	10204.5	10204.5				10121.8
1995	10417.8	10034.5	10303.9	10455.7	10442.9	10442.9	10442.9	10442.9
2000	10599.0	9982.3	10351.4	10763.0	10538.8	10642.8	10720.3	
2005	10780.2	9885.6	10374.2	11128.5	10590.9	10870.0	11074.8	
2010	10961.4	9731.5	10363.4	11533.4	10613.9	11079.3	11422.3	
2015		9528.7	10294.2	11916.3	10566.5	11212.6	11698.1	
2020			10155.3	12240.6	10449.8	11269.4	11900.5	
2025					10293.5	11299.7	12085.5	

B. Projection results for population aged 0-14, Greece

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	2213.6							2213.6
1985	2147.4	2093.5						2093.9
1990	2182.8	1954.0	2003.2	2003.2				1978.8
1995	2237.3	1744.3	1798.2	1856.6	1785.1	1785.1	1785.1	1785.1
2000	2246.4	1555.3	1608.7	1794.8	1625.0	1687.2	1722.0	
2005	2255.6	1464.1	1565.4	1937.7	1585.1	1758.1	1860.3	
2010	2264.7	1419.5	1587.2	2142.0	1576.6	1867.5	2044.0	
2015		1358.7	1582.0	2274.7	1529.2	1871.5	2095.3	
2020			1530.6	2319.9	1435.0	1775.3	2019.1	
2025					1333.5	1675.5	1940.0	

C. Projection results for population aged 15-59, Greece

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	5697.4							5697.9
1985	5953.4	6046.4						6046.5
1990	5997.9	6084.5	6224.1	6224.1				6151.0
1995	6012.7	6079.7	6263.8	6313.2	6412.9	6412.9	6412.9	6412.9
2000	6119.2	6057.2	6303.6	6440.7	6496.4	6517.1	6541.5	
2005	6225.8	6046.8	6328.0	6568.9	6502.0	6553.7	6609.2	
2010	6332.3	5862.6	6205.8	6605.9	6418.2	6497.8	6580.9	
2015		5671.4	6097.1	6729.0	6318.5	6483.2	6622.5	
2020			5978.6	6903.1	6187.1	6481.9	6707.2	
2025					6014.7	6449.1	6769.8	

D. Projection results for population aged 60+, Greece

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	1676.5							1676.6
1985	1770.2	1779.1						1779.1
1990	1969.2	1988.0	1977.1	1977.1				1992.0
1995	2167.8	2210.4	2241.9	2285.8	2244.9	2244.9	2244.9	2244.9
2000	2233.3	2369.9	2439.1	2527.6	2417.5	2438.5	2456.8	
2005	2298.8	2374.7	2480.8	2621.8	2503.9	2558.1	2605.3	
2010	2364.3	2449.4	2570.5	2785.6	2619.1	2714.1	2797.5	
2015		2498.6	2615.1	2912.7	2718.8	2858.0	2980.3	
2020			2646.1	3017.5	2827.7	3012.2	3174.2	
2025					2945.3	3175.1	3375.6	

Table 4.5: Projected populations for Spain

A. Projection results for total population, Spain

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	37241.5							37241.9
1985	38642.1	38300.2						38423.0
1990	40099.1	38998.4	38924.5	38924.5				38924.5
1995	41544.5	39421.8	39327.6	39708.5	39177.4	39177.4	39177.4	39177.4
2000	42703.0	39726.3	39614.8	40830.5	39239.4	39544.5	39945.5	
2005	43861.5	39870.8	39704.5	42029.6	39166.4	39981.5	41066.0	
2010	45020.0	39757.1	39540.0	43137.4	38981.4	40372.4	42198.2	
2015		39368.3	39058.0	43964.3	38525.9	40487.7	43019.1	
2020			38312.0	44548.2	37809.1	40307.4	43503.7	
2025					36951.5	39983.4	43868.1	

B. Projection results for population aged 0-14, Spain

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	9692.8							9692.6
1985	9304.7	8962.6						8995.8
1990	9089.5	7960.4	7802.0	7802.0				7802.0
1995	9139.1	6988.0	6701.6	6940.6	6609.0	6609.0	6609.0	6609.1
2000	9319.5	6672.8	6198.5	6979.4	5919.2	6057.6	6294.3	
2005	9499.9	6583.3	6071.1	7575.3	5742.2	6174.4	6857.7	
2010	9680.3	6454.1	5915.9	7998.0	5628.4	6405.9	7568.4	
2015		6066.3	5585.2	7963.4	5348.9	6342.5	7732.4	
2020			5123.2	7629.2	4852.0	5867.2	7240.6	
2025					4357.9	5326.3	6673.0	

C. Projection results for population aged 15-59, Spain

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	21966.0							21966.4
1985	23013.0	22924.1						22997.7
1990	23925.5	23860.7	23912.3	23912.3				23912.3
1995	24609.0	24536.9	24652.2	24740.8	24484.9	24484.9	24484.9	24484.8
2000	25299.9	24850.8	25087.0	25370.2	24911.1	24989.4	25068.9	
2005	25990.9	24893.4	25068.6	25571.7	24788.4	24978.6	25183.1	
2010	26681.8	24551.1	24712.3	25683.3	24338.5	24640.2	24969.5	
2015		24191.0	24280.3	26015.5	23822.9	24352.0	25012.8	
2020			23501.2	26188.8	23064.7	23975.0	25169.9	
2025					21953.7	23295.9	25054.1	

D. Projection results for population aged 60+, Spain

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	5582.7							5582.9
1985	6324.5	6413.5						6429.5
1990	7084.1	7177.2	7210.2	7210.2				7210.2
1995	7796.3	7897.0	7973.7	8027.0	8083.5	8083.5	8083.5	8083.5
2000	8083.5	8202.8	8329.2	8480.9	8409.1	8497.5	8582.4	
2005	8370.7	8394.1	8564.8	8882.6	8635.8	8828.5	9025.2	
2010	8657.9	8751.8	8911.8	9456.1	9014.5	9326.3	9660.3	
2015		9111.0	9192.5	9985.4	9354.2	9793.2	10273.9	
2020			9687.7	10730.2	9892.4	10465.1	11093.2	
2025					10639.9	11361.3	12140.9	

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Table 4.6: Projected populations for France

A. Projection results for total population, France

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	53882.1							53713.9
1985	55115.1	55061.8						55172.9
1990	56330.1	56117.4	56581.3	56581.3				56597.6
1995	57435.7	56900.2	57861.3	58297.3	58020.4	58020.4	58020.4	58020.1
2000	58004.0	57311.7	58935.3	60332.0	58814.7	59178.8	59709.6	
2005	58572.4	57424.3	59675.9	62379.8	59331.3	60330.3	61684.4	
2010	59140.7	57286.4	60028.9	64286.4	59614.4	61386.8	63626.3	
2015		56996.5	60058.1	66030.3	59570.0	62202.2	65345.1	
2020			59893.9	67743.1	59306.8	62830.7	66896.1	
2025					58879.3	63302.0	68382.1	

B. Projection results for population aged 0-14, France

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	12223.9							11969.1
1985	11862.6	11743.6						11783.4
1990	11713.7	11247.2	11394.5	11394.5				11395.5
1995	12037.0	11160.3	11490.8	11751.5	11386.3	11386.3	11386.3	11386.3
2000	11802.8	10803.3	11343.2	12230.9	10909.8	11058.0	11401.5	
2005	11568.5	10304.8	11077.5	12793.7	10317.0	10827.0	11747.1	
2010	11334.3	9837.1	10600.2	13029.3	9758.6	10743.3	12284.1	
2015		9459.7	10105.7	12996.5	9273.9	10675.5	12532.6	
2020			9775.7	13085.6	8888.5	10495.1	12446.6	
2025					8627.1	10293.8	12375.7	

C. Projection results for population aged 15-59, France

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	32284.0							32502.9
1985	33290.1	33345.2						33401.4
1990	34025.7	34187.1	34434.5	34434.5				34435.9
1995	34289.6	34434.0	34888.2	35019.0	35030.3	35030.3	35030.3	35030
2000	34738.4	34983.5	35694.6	36040.5	35875.1	35982.1	36087.1	
2005	35187.3	35591.3	36479.2	37083.9	36705.5	36947.9	37186.1	
2010	35636.1	34941.6	36157.8	37273.0	36233.5	36605.4	36967.9	
2015		34018.6	35612.6	37600.8	35407.5	36021.3	36812.5	
2020			34905.2	37970.3	34429.4	35502.0	36955.0	
2025					33208.0	34852.2	37009.7	

D. Projection results for population aged 60+, France

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	9374.3							9241.9
1985	9962.4	9973.1						9988.1
1990	10590.8	10683.2	10752.3	10752.3				10766.2
1995	11109.1	11306.0	11482.3	11526.8	11603.8	11603.8	11603.8	11603.8
2000	11462.8	11525.0	11897.5	12060.5	12029.8	12138.8	12221.0	
2005	11816.6	11528.2	12119.2	12502.1	12308.8	12555.4	12751.2	
2010	12170.3	12507.8	13270.9	13984.1	13622.3	14038.1	14374.4	
2015		13518.2	14339.7	15433.0	14888.5	15505.3	16000.0	
2020			15213.0	16687.1	15988.9	16833.6	17494.4	
2025					17044.3	18156.1	18996.7	

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Table 4.7: Projected populations for Ireland

A. Projection results for total population, Ireland

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	3392.8							3392.8
1985	3606.8	3537.3						3537.3
1990	3864.1	3537.3	3507.9	3507.9				3506.5
1995	4162.8	3631.0	3484.8	3562.9	3579.6	3579.6	3579.6	3594.7
2000	4511.9	3716.2	3472.2	3696.1	3594.0	3624.6	3660.6	
2005	4860.9	3820.2	3454.1	3862.2	3601.9	3681.3	3783.8	
2010	5210.0	3934.2	3427.6	4049.5	3625.7	3760.1	3938.6	
2015		4036.8	3379.1	4229.9	3649.1	3842.8	4101.5	
2020			3293.3	4381.6	3651.9	3908.7	4248.2	
2025					3621.8	3947.3	4368.2	

B. Projection results for population aged 0-14, Ireland

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	1034.0							1034.1
1985	1074.8	1036.0						1036.0
1990	1151.3	999.2	963.0	963.0				963.1
1995	1277.2	909.6	856.5	883.0	885.7	885.7	885.7	887.1
2000	1379.8	835.8	742.8	832.8	773.1	788.6	802.8	
2005	1482.4	796.9	680.9	864.6	698.2	740.9	791.1	
2010	1585.0	826.8	659.3	934.1	658.6	732.3	832.5	
2015		862.1	642.5	981.2	650.4	742.0	884.6	
2020			598.3	974.9	641.4	740.0	902.7	
2025					609.2	713.6	881.0	

C. Projection results for population aged 15-59, Ireland

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	1856.9							1856.8
1985	2022.8	1978.4						1978.4
1990	2207.1	2010.1	2013.9	2013.9				2012.8
1995	2385.9	2199.2	2089.6	2139.1	2145.9	2145.9	2145.9	2160.1
2000	2608.7	2356.5	2179.9	2305.4	2262.0	2272.3	2288.9	
2005	2831.5	2475.6	2197.6	2401.5	2315.9	2340.0	2379.2	
2010	3054.3	2508.9	2133.8	2441.2	2312.6	2350.8	2406.3	
2015		2520.1	2043.6	2490.9	2272.2	2339.0	2421.0	
2020			1952.0	2567.5	2214.1	2321.2	2450.9	
2025					2158.6	2309.3	2501.0	

D. Projection results for population aged 60+, Ireland

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	501.9							501.9
1985	509.1	522.9						522.9
1990	505.7	528.0	531.0	531.0				530.6
1995	499.6	522.2	538.7	540.8	547.9	547.9	547.9	547.5
2000	523.3	523.9	549.5	557.9	558.9	563.7	569.0	
2005	547.1	547.7	575.6	596.1	587.8	600.4	613.5	
2010	570.8	598.5	634.5	674.2	654.4	677.0	699.8	
2015		654.6	693.0	757.8	726.5	761.8	795.9	
2020			743.0	839.1	796.3	847.5	894.7	
2025					854.0	924.3	986.3	

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Table 4.8: Projected populations for Italy

A. Projection results for total population, Italy

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	56998.9							56388.5
1985	57440.4	57080.2						56602.3
1990	57870.2	57275.6	57576.4	57576.4				56696.6
1995	58225.3	57208.5	58011.9	58582.6	57268.6	57268.6	57268.6	57268.6
2000	57861.7	56865.0	58193.7	59945.3	56911.3	57454.9	57997.4	
2005	57498.2	56165.7	57962.2	61294.7	56294.7	57626.2	58977.9	
2010	57134.6	55012.2	57135.0	62260.1	55443.0	57632.9	59820.1	
2015		53472.7	55753.2	62720.7	54223.5	57238.8	60230.5	
2020			54061.9	62895.2	52752.9	56543.5	60334.4	
2025					51152.6	55721.5	60388.4	

B. Projection results for population aged 0-14, Italy

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	12698.4							12725.3
1985	11317.3	11177.7						11166.9
1990	10352.4	9676.4	9620.1	9620.1				9528.7
1995	10094.2	8822.5	8858.0	9190.7	8620.5	8620.5	8620.5	8620.5
2000	9846.6	8625.1	8782.4	9848.7	8170.8	8435.5	8747.9	
2005	9599.1	8363.1	8725.1	10737.8	7839.5	8591.7	9442.7	
2010	9351.5	7860.6	8212.1	10927.0	7296.8	8568.9	9975.5	
2015		7094.2	7324.5	10370.1	6687.3	8185.6	9821.4	
2020			6487.5	9701.6	6084.5	7531.2	9161.7	
2025					5680.0	7035.0	8706.1	

C. Projection results for population aged 15-59, Italy

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	34576.4							34173.7
1985	35382.7	35397.5						34937.5
1990	35933.9	36061.2	36341.0	36341.0				35621.6
1995	35822.9	35988.5	36536.2	36689.4	35929.6	35929.6	35929.6	35929.6
2000	35278.7	35188.3	35921.0	36374.1	35254.2	35371.3	35484.2	
2005	34734.5	34441.2	35232.7	36026.8	34501.6	34746.6	34985.4	
2010	34190.3	33282.7	34284.3	35755.0	33482.7	33849.0	34202.6	
2015		32236.2	33513.5	36047.7	32485.0	33209.4	33959.7	
2020			32261.7	36078.5	31161.6	32466.4	33838.2	
2025					29113.1	31029.3	33041.1	

D. Projection results for population aged 60+, Italy

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	9724.2							9489.5
1985	10740.4	10505.1						10497.9
1990	11584.0	11537.9	11615.3	11615.3				11546.3
1995	12308.3	12397.5	12617.8	12702.5	12718.4	12718.4	12718.4	12718.5
2000	12736.5	13051.6	13490.3	13722.5	13486.3	13648.1	13765.3	
2005	13164.6	13361.5	14004.4	14530.1	13953.6	14287.9	14549.7	
2010	13592.8	13868.9	14638.7	15578.1	14663.4	15215.0	15642.0	
2015		14142.3	14915.3	16303.0	15051.2	15843.8	16449.4	
2020			15312.7	17115.0	15506.8	16545.8	17334.5	
2025					16359.6	17657.3	18641.2	

Table 4.9: Projected populations for Luxembourg

A. Projection results for total population, Luxembourg

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	363.7							363.7
1985	363.1	366.0						366.1
1990	361.9	365.7	378.4	378.4				378.4
1995	359.1	363.6	388.0	399.6	406.6	406.6	406.6	406.6
2000	351.1	357.9	393.2	421.7	427.6	434.5	439.8	
2005	343.0	349.1	394.9	444.0	437.8	454.9	472.4	
2010	335.0	338.3	394.3	466.7	442.3	471.2	501.0	
2015		326.4	392.2	490.5	444.1	485.9	527.7	
2020			389.3	515.5	445.0	500.8	555.0	
2025					445.3	516.2	583.7	

B. Projection results for population aged 0-14, Luxembourg

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	69.2							69.2
1985	63.2	63.4						63.4
1990	61.4	61.3	65.4	65.4				65.4
1995	60.3	59.5	69.0	73.3	74.6	74.6	74.6	74.6
2000	56.3	54.7	68.2	79.9	80.1	82.8	85.2	
2005	52.4	49.4	63.9	84.7	78.6	85.7	93.5	
2010	48.4	44.2	57.9	86.8	71.0	83.2	96.7	
2015		40.7	55.0	90.2	65.1	81.2	98.5	
2020			54.7	95.8	63.3	82.1	101.3	
2025					64.2	85.6	106.6	

C. Projection results for population aged 15-59, Luxembourg

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	230.7							230.7
1985	234.1	236.3						236.4
1990	230.4	232.7	241.4	241.4				241.3
1995	224.6	227.6	241.9	249.0	254.3	254.3	254.3	254.3
2000	218.4	223.7	243.3	258.9	264.8	268.3	270.3	
2005	212.2	218.3	245.6	270.8	271.4	279.4	286.9	
2010	206.0	209.0	245.6	283.5	276.1	288.8	301.5	
2015		195.8	240.3	294.2	275.0	294.4	313.8	
2020			230.6	302.6	267.5	295.3	323.6	
2025					255.4	292.1	329.8	

D. Projection results for population aged 60+, Luxembourg

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	63.8							63.8
1985	65.7	66.3						66.3
1990	70.1	71.7	71.7	71.7				71.7
1995	74.1	76.5	77.1	77.4	77.7	77.7	77.7	77.7
2000	76.3	79.5	81.6	82.8	82.7	83.5	84.3	
2005	78.4	81.4	85.5	88.5	87.8	89.9	92.0	
2010	80.6	85.1	90.8	96.5	95.2	99.2	102.7	
2015		89.9	96.9	106.1	103.9	110.4	115.3	
2020			103.9	117.1	114.2	123.5	130.1	
2025					125.7	138.4	147.2	

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Table 4.10: Projected populations for Netherlands

A. Projection results for total population, Netherlands

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	14091.3							14089.5
1985	14410.9	14453.4						14453.6
1990	14712.3	14715.6	14892.6	14892.6				14890.9
1995	14965.1	14959.7	15372.4	15556.5	15422.8	15422.8	15422.8	15424.1
2000	14990.2	15100.3	15743.2	16294.6	15684.4	15868.2	15982.2	
2005	15015.3	15118.3	15984.9	16999.9	15837.4	16311.3	16642.1	
2010	15040.4	15003.7	16068.4	17608.8	15899.8	16659.1	17231.1	
2015		14789	16045.5	18166.9	15882.5	16940.3	17773.7	
2020			15963.1	18736.9	15818.9	17204.5	18319.4	
2025					15706.4	17459.0	18874.5	

B. Projection results for population aged 0-14, Netherlands

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	3184.1							3183.8
1985	2856.9	2850.2						2850.0
1990	2701.5	2643.7	2714.9	2714.9				2714.8
1995	2746.5	2663.4	2830.9	2918.4	2836.3	2836.3	2836.3	2838.4
2000	2618.1	2647.1	2924.2	3213.6	2846.4	2950.5	2986.7	
2005	2489.8	2538.6	2889.1	3435.1	2745.0	3002.9	3121.0	
2010	2361.4	2317.0	2688.2	3446.5	2521.1	2928.6	3152.9	
2015		2106.4	2455.8	3348.7	2332.5	2807.7	3132.3	
2020			2302.1	3323.5	2211.2	2729.0	3127.2	
2025					2183.3	2765.6	3215.6	

C. Projection results for population aged 15-59, Netherlands

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	8709.3							8708.2
1985	9139.4	9191.1						9191.5
1990	9435.1	9501.9	9602.4	9602.4				9601.0
1995	9499.3	9583.4	9814.9	9898.0	9858.6	9858.6	9858.6	9857.8
2000	9415.1	9611.9	9953.7	10167.9	9974.6	10029.5	10082.6	
2005	9330.9	9547.1	10032.3	10394.7	10025.7	10173.5	10318.5	
2010	9246.7	9260.8	9920.5	10508.2	9889.3	10119.9	10346.9	
2015		8955.6	9821.5	10748.3	9711.3	10110.0	10437.0	
2020			9578.5	10903.0	9405.3	10013.1	10476.8	
2025					8934.2	9750.9	10379.4	

D. Projection results for population aged 60+, Netherlands

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	2197.9							2197.5
1985	2414.6	2412.1						2412.1
1990	2575.6	2570.0	2575.3	2575.3				2575.1
1995	2719.3	2712.9	2726.5	2740.1	2727.9	2727.9	2727.9	2727.9
2000	2957.0	2841.4	2865.3	2913.0	2863.3	2888.1	2912.9	
2005	3194.7	3032.6	3063.4	3170.1	3066.7	3134.9	3202.6	
2010	3432.4	3425.9	3459.7	3654.1	3489.4	3610.7	3731.2	
2015		3727.1	3768.3	4069.8	3838.7	4022.6	4204.4	
2020			4082.4	4510.4	4202.4	4462.4	4715.4	
2025					4588.9	4942.5	5279.6	

Table 4.11: Projected populations for Portugal

A. Projection results for total population, Portugal

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	9755.6							9883.2
1985	10035.2	10128.9						10128.9
1990	10339.5	10287.2	10336.9	10336.9				9886.6
1995	10649.4	10320.3	10470.9	10599.5	9912.1	9912.1	9912.1	9912.1
2000	10890.4	10293.4	10595.2	11003.4	9910.7	9993.0	10084.6	
2005	11131.3	10239.1	10684.5	11461.5	9915.1	10130.6	10406.5	
2010	11372.3	10130.2	10724.8	11928.0	9926.9	10292.7	10737.7	
2015		9960.6	10704.0	12361.1	9892.5	10421.2	11021.6	
2020			10623.1	12756.2	9807.9	10512.6	11265.2	
2025					9693.5	10594.4	11508.5	

B. Projection results for population aged 0-14, Portugal

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	2532.1							2601.3
1985	2423.2	2410.2						2410.2
1990	2378.4	2183.3	2159.8	2159.8				
1995	2412.0	1905.7	1901.8	1966.0	1783.6	1783.6	1783.6	1783.6
2000	2440.8	1717.8	1755.8	1969.7	1642.0	1687.3	1724.5	
2005	2469.5	1600.8	1713.7	2130.0	1629.6	1749.4	1871.0	
2010	2498.3	1541.0	1704.0	2295.4	1596.2	1801.0	2010.8	
2015		1460.3	1662.8	2372.3	1541.0	1795.1	2057.2	
2020			1584.8	2379.0	1434.3	1718.9	1994.8	
2025					1331.2	1647.8	1933.3	

C. Projection results for population aged 15-59, Portugal

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	5699.4							5865.6
1985	5959.0	6015.1						6015.1
1990	6183.8	6256.1	6291.8	6291.8				
1995	6360.6	6448.6	6529.7	6576.0	6162.8	6162.8	6162.8	6162.8
2000	6536.2	6535.3	6687.9	6837.7	6233.4	6249.6	6277.0	
2005	6711.8	6581.9	6771.7	7037.8	6223.1	6266.4	6354.7	
2010	6887.4	6476.9	6749.7	7199.1	6187.8	6259.1	6388.6	
2015		6302.8	6685.3	7396.8	6120.5	6263.3	6456.6	
2020			6552.4	7582.2	6041.7	6283.1	6575.6	
2025					5907.1	6259.2	6661.9	

D. Projection results for population aged 60+, Portugal

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	1524.1							1416.3
1985	1653.0	1703.6						1703.6
1990	1777.3	1847.8	1885.3	1885.3				
1995	1876.9	1966.0	2039.3	2057.5	1965.8	1965.8	1965.8	1965.7
2000	1913.4	2040.3	2151.6	2196.0	2035.3	2056.1	2083.0	
2005	1950.0	2056.5	2199.1	2293.8	2062.4	2114.8	2180.9	
2010	1986.5	2112.4	2271.1	2433.4	2142.9	2232.6	2338.3	
2015		2197.5	2355.9	2592.0	2231.1	2362.8	2507.8	
2020			2485.9	2795.1	2332.0	2510.6	2694.9	
2025					2455.2	2687.4	2913.3	

Table 4.12: Projected populations for United Kingdom

A. Projection results for total population, United Kingdom

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	56321.6							56314.2
1985	56730.0	56537.8						56617.8
1990	57190.8	56937.9	57313.0	57313.0				57323.5
1995	57602.2	57315.1	58038.0	58531.3	58503.7	58503.7	58503.7	58500.2
2000	57544.5	57499.4	58426.7	59897.7	58842.3	59269.2	59794.8	
2005	57486.8	57401.5	58422.6	61179.3	58776.8	59748.7	61168.0	
2010	57429.1	57094.0	58103.4	62379.9	58569.4	60146.1	62507.7	
2015		56688.8	57705.1	63680.3	58305.4	60557.9	63867.2	
2020			57309.6	65167.1	58013.0	61038.3	65325.8	
2025					57556.4	61460.4	66828.2	

B. Projection results for population aged 0-14, United Kingdom

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	2532.1							2601.3
1985	2423.2	2410.2						2410.2
1990	2378.4	2183.3	2159.8	2159.8				
1995	2412.0	1905.7	1901.8	1966.0	1783.6	1783.6	1783.6	1783.6
2000	2440.8	1717.8	1755.8	1969.7	1642.0	1687.3	1724.5	
2005	2469.5	1600.8	1713.7	2130.0	1629.6	1749.4	1871.0	
2010	2498.3	1541.0	1704.0	2295.4	1596.2	1801.0	2010.8	
2015		1460.3	1662.8	2372.3	1541.0	1795.1	2057.2	
2020			1584.8	2379.0	1434.3	1718.9	1994.8	
2025					1331.2	1647.8	1933.3	

C. Projection results for population aged 15-59, United Kingdom

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	33239.9							33255.5
1985	33940.9	33912.0						34018.4
1990	34412.9	34478.5	34574.5	34574.5				34577.5
1995	34416.2	34583.0	34846.1	34970.6	35142.5	35142.5	35142.5	35138.7
2000	34520.6	34830.6	35260.5	35581.4	35695.5	35797.4	35889.1	
2005	34625.1	35031.5	35673.6	36226.7	36134.8	36344.4	36581.7	
2010	34729.5	34613.0	35389.5	36466.1	35895.7	36229.1	36599.9	
2015		34368.8	35172.2	37091.4	35533.1	36173.7	36952.0	
2020			34390.9	37311.3	34602.2	35627.7	37091.7	
2025					32885.1	34305.7	36524.5	

D. Projection results for population aged 60+, United Kingdom

	1980 projection	1985 projection	1990 low scenario	1990 high scenario	1995 low scenario	1995 baseline scenario	1995 high scenario	regio data
1980	11281.2							11256.4
1985	11783.3	11678.9						11702.9
1990	11830.3	11767.2	11870.0	11870.0				11874.0
1995	11670.3	11660.9	11909.7	11970.9	11998.1	11998.1	11998.1	12001.3
2000	11877.7	11557.4	11960.0	12182.2	11995.7	12127.9	12267.0	
2005	12085.1	11635.1	12136.6	12636.2	12203.8	12499.3	12793.3	
2010	12292.5	12345.5	12902.8	13777.8	13157.4	13639.2	14080.4	
2015		12674.0	13283.9	14570.9	13795.8	14486.3	15080.3	
2020			13822.0	15536.5	14644.1	15581.1	16344.1	
2025					15954.8	17192.3	18162.0	

Table 5.1: Changes in NUTS 2 classification since 1980 and their implications for monitoring population and labour force projections

BELGIUM	As from 1995 three new regions: Régione Bruxelles, Vlaams Brabant, Brabant Wallon were created. Before 1995 these regions were aggregated under 'Brabant'. *Projections 1980, 1985, 1990 can be monitored after 1994 by taking the sum of the three new regions mentioned*
DENMARK	No changes. NUTS 2 data are not available via REGIO. *All projections can be monitored on national level.*
GERMANY	As from 1990 Berlin-West has been amalgamated with East Berlin into Berlin, and up to and including 1994 nine NUTS 2 regions for Eastern Germany were added. As from 1995 the regions Chemnitz, Dresden and Liepzig have been merged into the new NUTS 2 region Sachsen. *Projections 1980 and 1985 cannot be monitored for Berlin-West for the calendar years after 1990. Projection 1985 cannot be monitored for Eastern Germany (which was handled as a whole). Projection 1990 cannot be monitored for the regions Chemnitz, Dresden and Leipzig separately; it is only possible for their sum that equals the current Sachsen.*
GREECE	In 1987 the current NUTS 2 classification (13 regions) was approved and introduced. Earlier nine NUTS 2 regions were distinguished. A few of them (Ipeiros and Kriti) remained unchanged. It is unclear whether figures for the old, more aggregated NUTS 2 classification can be reconstructed with data of the actual, more detailed classification. *Projections 1980 and 1985 can probably only be monitored partially.*
SPAIN	In 1987 Ceuta was added to the NUTS 2 classification. Projections 1980 and 1985 didn't comprise Ceuta and therefore the national totals for Spain should be monitored without this region.
FRANCE	No changes. For the calendar years 1980 and 1981. *Projection 1980 cannot be monitored for the calendar years 1980 and 1981.*
ITALY	No changes.
NETHERLANDS	On 1.1.1987 the region Flevoland was created. Apart from new land, it consisted of parts of two other regions, Gelderland and Overijssel. Therefore, the latter two NUTS II regions have changed since 1986. *Projection 1980 cannot be monitored for the calendar years after 1985.*
PORTUGAL	Probably in 1985 the current NUTS 2 classification (7 regions) has been approved and introduced. Before five regions were used. Some of them (at least North and Centre). It is unclear whether figures for the old, more aggregated NUTS 2 classification can be reconstructed with data of the actual, more detailed classification. *Projections 1980 can probably only be monitored partially.*
UNITED KINGDOM	Somewhere between 1985 and 1990 Scotland was been split up into 4 NUTS II regions. From 1996 to 1998 local government areas in Scotland, Wales and England were redefined, so that from 1998 there are new NUTS 2 regions. *Projections 1980 and 1985 can be completely monitored by using the sum of the four Scottish regions. No projection can be monitored directly after 2000 except by using approximate look-up tables.*

Source: Informal communication from Harri Cruijsen.

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Table 5.2: Projected and corrected observed populations for the 1980 base projection, totals and by age

Ages / Countries	Population on 1.1.1980 (1000s) 1980 (base year)	Regio data for 1980	Difference	Projected population (000s) 1985	1990	1995	Corrected projected population (000) 1985	1990	1995	Observed population (000) 1985	1990	1995
All ages												
Belgium	9843.2	9855.1	-11.9	9879.8	9915	9908.4	9891.7	9926.9	9920.3	9857.7	9947.8	10130.6
Denmark	5122.1	5122.1	0	5121.4	5112	5094.4	5121.4	5112	5094.4	5111.1	5135.4	5215.7
France	53882.1	53713.9	168.2	55115.1	56330.1	57435.7	54946.9	56161.9	57267.5	55172.9	56597.6	58020.1
Germany	61439.2	61439.3	-0.1	60953.2	60585.3	60126.7	60953.3	60585.4	60126.8	61049.3	62678.9	66007.2
Greece	9587.5	9588.1	-0.6	9871	10150.3	10417.8	9871.6	10150.9	10418.4	9919.5	10121.8	10442.9
Ireland	3392.8	3392.8	0	3606.8	3864.1	4162.8	3606.8	3864.1	4162.8	3537.3	3506.5	3594.7
Italy	56998.9	56388.5	610.4	57440.4	57870.2	58225.3	56830	57259.8	57614.9	56602.3	56696.6	57268.6
Luxembourg	363.7	363.7	0	363.1	361.9	359.1	363.1	361.9	359.1	366.1	378.4	406.6
Netherlands	14091.3	14089.5	1.8	14410.9	14712.3	14965.1	14409.1	14710.5	14963.3	14453.6	14890.9	15424.1
Portugal	9755.6	9883.2	-127.6	10035.2	10339.5	10649.4	10162.8	10467.1	10777	10128.9	9886.6	9912.1
Spain	37241.5	37241.9	-0.4	38642.1	40099.1	41544.5	38642.5	40099.5	41544.9	38423	38799.7	39046.5
UK	56321.6	56314.2	7.4	56730	57190.8	57602.2	56722.6	57183.4	57594.8	56617.8	57323.5	58500.2
Ages 0-14												
Belgium	1971.4	1998.9	-27.5	1863.4	1833.9	1815.9	1890.9	1861.4	1843.4	1862.8	1801.2	1826.8
Denmark	1081.4	1081.4	0	966.8	887.8	852.3	966.8	887.8	852.3	950.7	880.6	900.9
France	12223.9	11969.1	254.8	11862.6	11713.7	12037	11607.8	11458.9	11782.2	11783.4	11395.5	11386.3
Germany	11363.3	11363.4	-0.1	9459.3	9213	9533.1	9459.4	9213.1	9533.2	9341.3	9436.8	10636.8
Greece	2213.6	2213.6	0	2147.4	2182.8	2237.3	2147.4	2182.8	2237.3	2093.9	1978.8	1785.1
Ireland	1034	1034.1	-0.1	1074.8	1151.3	1277.2	1074.9	1151.4	1277.3	1036	963.1	887.1
Italy	12698.4	12725.3	-26.9	11317.3	10352.4	10094.2	11344.2	10379.3	10121.1	11166.9	9528.7	8620.5
Luxembourg	69.2	69.2	0	63.2	61.4	60.3	63.2	61.4	60.3	63.4	65.4	74.6
Netherlands	3184.1	3183.8	0.3	2856.9	2701.5	2746.5	2856.6	2701.2	2746.2	2850	2714.8	2838.4
Portugal	2532.1	2601.3	-69.2	2423.2	2378.4	2412	2492.4	2447.6	2481.2	2410.2	1977.3	1783.6
Spain	9692.8	9692.6	0.2	9304.7	9089.5	9139.1	9304.5	9089.3	9138.9	8995.8	7771	6578.3
UK	11800.6	11802.3	-1.7	11005.8	10947.6	11515.8	11007.5	10949.3	11517.5	10896.5	10872	11360.2

Table 5.2 Continued

Ages / Countries	Population on 1.1.1980 (1000s) 1980 (base year)	Regio data for 1980	Difference	Projected population (000s) 1985	1990	1995	Corrected projected population (000s) 1985	1990	1995	Observed population (000s) 1985	1990	1995
Ages 15-59												
Belgium	6048.2	6075.8	-27.6	6088	6066.6	6029.1	6115.6	6094.2	6056.7	6072	6114.3	6145.5
Denmark	3049.8	3049.8	0	3121.6	3184	3209	3121.6	3184	3209	3123.5	3207.5	3277.1
France	32284	32502.9	-218.9	33290.1	34025.7	34289.6	33509	34244.6	34508.5	33401.4	34435.9	35030
Germany	38271.9	38271.9	0	39185.9	38580.7	37425.6	39185.9	38580.7	37425.6	39336	40168.3	41599.4
Greece	5697.4	5697.9	-0.5	5953.4	5997.9	6012.7	5953.9	5998.4	6013.2	6046.5	6151	6412.9
Ireland	1856.9	1856.8	0.1	2022.8	2207.1	2385.9	2022.7	2207	2385.8	1978.4	2012.8	2160.1
Italy	34576.4	34173.7	402.7	35382.7	35933.9	35822.9	34980	35531.2	35420.2	34937.5	35621.6	35929.6
Luxembourg	230.7	230.7	0	234.1	230.4	224.6	234.1	230.4	224.6	236.4	241.3	254.3
Netherlands	8709.3	8708.2	1.1	9139.4	9435.1	9499.3	9138.3	9434	9498.2	9191.5	9601	9857.8
Portugal	5699.4	5865.6	-166.2	5959	5183.8	6360.6	6125.2	5350	6526.8	6015.1	6030.8	6162.8
Spain	21966	21966.4	-0.4	23013	23925.5	24609	23013.4	23925.9	24609.4	22997.7	23836.1	24404.3
UK	33239.9	33255.5	-15.6	33940.9	34412.9	34416.2	33956.5	34428.5	34431.8	34018.4	34577.5	35138.7
Ages 60+												
Belgium	1823.6	1780.4	43.2	1928.4	2014.5	2063.6	1885.2	1971.3	2020.4	1922.9	2032.3	2158.3
Denmark	990.9	990.9	0	1033	1040.1	1033.2	1033	1040.1	1033.2	1036.9	1047.3	1037.7
France	9374.3	9241.9	132.4	9962.4	10590.8	11109.1	9830	10458.4	10976.7	9988.1	10766.2	11603.8
Germany	11804	11804	0	12308	12791.6	13168	12308	12791.6	13168	12372	13073.8	13761
Greece	1676.5	1676.6	-0.1	1770.2	1969.2	2167.8	1770.3	1969.3	2167.9	1779.1	1992	2244.9
Ireland	501.9	501.9	0	509.1	505.7	499.6	509.1	505.7	499.6	522.9	530.6	547.5
Italy	9724.2	9489.5	234.7	10740.4	11584	12308.3	10505.7	11349.3	12073.6	10497.9	11546.3	12718.5
Luxembourg	63.8	63.8	0	65.7	70.1	74.1	65.7	70.1	74.1	66.3	71.7	77.7
Netherlands	2197.9	2197.5	0.4	2414.6	2575.6	2719.3	2414.2	2575.2	2718.9	2412.1	2575.1	2727.9
Portugal	1524.1	1416.3	107.8	1653	1777.3	1876.9	1545.2	1669.5	1769.1	1703.6	1878.5	1965.7
Spain	5582.7	5582.9	-0.2	6324.5	7084.1	7796.3	6324.7	7084.3	7796.5	6429.5	7192.6	8063.8
UK	11281.2	11256.4	24.8	11783.3	11830.3	11670.3	11758.5	11805.5	11645.5	11702.9	11874	12001.3

Note: Age distribution of population of Portugal for 1990 was estimated based on UN 1998.

Table 5.3: Projected and corrected observed populations for 1985 base projection, totals and by age

Ages, countries	Base population (1000s) 1985	Regio population (1000s) 1985	Difference (1000s)	Projected population 1990	Projected population 1995	Observed population 1990	Observed population 1995	Corrected projected population 1990	Corrected projected population 1995
All ages									
Belgium	9856.7	9857.7	-1.0	9866	9796	9947.8	10130.6	9867	9797
Denmark	5111.5	5111.1	0.4	5085	5050	5135.4	5215.7	5085	5049
France	55064.2	55172.9	-108.7	56117	56715	56597.6	58020.1	56226	56823
Germany	61046.4	61049.3	-2.9	61672	60812	62678.9	66007.2	61675	60814
Greece	9918.8	9919.5	-0.7	10027	10005	10121.8	10442.9	10028	10005
Ireland	3537.5	3537.3	0.2	3537	3627	3506.5	3594.7	3537	3626
Italy	57080.5	56602.3	478.2	57276	57071	56696.6	57268.6	56798	56592
Luxembourg	365.6	366.1	-0.5	366	362	378.4	406.6	367	363
Netherlands	14453.7	14453.6	0.1	14716	14908	14890.9	15424.1	14716	14908
Portugal	10129.1	10128.9	0.2	10287	10290	9886.6	9912.1	10287	10290
Spain	38299.4	38423	-123.6	38998	39362	38799.7	39046.5	39122	39486
UK	56536.4	56617.8	-81.4	56938	57219	57323.5	58500.2	57019	57300
Ages 0-14									
Belgium	1862.7	1862.8	-0.1	1753.6	1675.7	1801.2	1826.8	1754	1676
Denmark	950.8	950.7	0.1	852.7	803	880.6	900.9	853	803
France	11743.6	11783.4	-39.8	11247.2	11160.3	11395.5	11386.3	11287	11200
Germany	9341.5	9341.3	0.2	8972.4	9002.8	9436.8	10636.8	8972	9003
Greece	2093.5	2093.9	-0.4	1954	1744.3	1978.8	1785.1	1954	1745
Ireland	1036	1036	0.0	999.2	909.6	963.1	887.1	999	910
Italy	11177.7	11166.9	10.8	9676.4	8822.5	9528.7	8620.5	9666	8812
Luxembourg	63.4	63.4	0.0	61.3	59.5	65.4	74.6	61	60
Netherlands	2850.2	2850	0.2	2643.7	2663.4	2714.8	2838.4	2644	2663
Portugal	2410.2	2410.2	0.0	2183.3	1905.7	1977.3	1783.6	2183	1906
Spain	8962.6	8995.8	-33.2	7960.4	6988	7771	6578.3	7994	7021
UK	10946.9	10896.5	50.4	10693.2	11071.2	10872	11360.2	10642	11021
Ages 15-59									
Belgium	6072.2	6072	0.2	6084.9	6033.7	6114.3	6145.5	6085	6034
Denmark	3123.4	3123.5	-0.1	3188.2	3216.9	3207.5	3277.1	3188	3217
France	33345.2	33401.4	-56.2	34187.1	34434	34435.9	35030	34243	34490
Germany	39336	39336	0.0	39659.1	38554.2	40168.3	41599.4	39659	38554
Greece	6046.4	6046.5	-0.1	6084.5	6079.7	6151	6412.9	6085	6080
Ireland	1978.4	1978.4	0.0	2010.1	2199.2	2012.8	2160.1	2010	2199
Italy	35397.5	34937.5	460.0	36061.2	35988.5	35621.6	35929.6	35601	35529
Luxembourg	236.3	236.4	-0.1	232.7	227.6	241.3	254.3	233	228
Netherlands	9191.1	9191.5	-0.4	9501.9	9583.4	9601	9857.8	9502	9584
Portugal	6015.1	6015.1	0.0	6256.1	6448.6	6030.8	6162.8	6256	6449
Spain	22924.1	22997.7	-73.6	23860.7	24536.9	23836.1	24404.3	23934	24611
UK	33912	34018.4	-106.4	34478.5	34583	34577.5	35138.7	34585	34689
Ages 60+									
Belgium	1922.6	1922.9	-0.3	2027.2	2115.1	2032.3	2158.3	2028	2115
Denmark	1037	1036.9	0.1	1043.8	1036.1	1047.3	1037.7	1044	1036
France	9973.1	9988.1	-15.0	10683.2	11306	10766.2	11603.8	10698	11321
Germany	12371.5	12372	-0.5	13040.8	13497.9	13073.8	13761	13041	13498
Greece	1779.1	1779.1	0.0	1988	2210.4	1992	2244.9	1988	2210
Ireland	522.9	522.9	0.0	528	522.2	530.6	547.5	528	522
Italy	10505.1	10497.9	7.2	11537.9	12397.5	11546.3	12718.5	11531	12390
Luxembourg	66.3	66.3	0.0	71.7	76.5	71.7	77.7	72	77
Netherlands	2412.1	2412.1	0.0	2570	2712.9	2575.1	2727.9	2570	2713
Portugal	1703.6	1703.6	0.0	1847.8	1966	1878.5	1965.7	1848	1966
Spain	6413.5	6429.5	-16.0	7177.2	7897	7192.6	8063.8	7193	7913
UK	11678.9	11702.9	-24.0	11767.2	11660.9	11874	12001.3	11791	11685

Note: Age distribution of population of Portugal for 1990 was estimated based on UN 1998.

Table 5.4: Projected and corrected observed populations for 1990 base projection, totals and by age

Ages, countries	Base population for projection (1000s) 1990	Regio population (1000s) 1990	Difference (1000s)	Projected population 1995	Observed population 1995	Corrected projected population 1995
All ages						
Belgium	9947.8	9947.8	0.0	10057.8	10130.6	10057.8
Denmark	5135.4	5135.4	0.0	5174.5	5215.7	5174.5
France	56581.3	56597.6	-16.3	57861.3	58020.1	57877.6
Germany	79112.8	79112.8	0.0	80521.7	81493.3	80521.7
Greece	10204.5	10121.8	82.7	10303.9	10442.9	10221.2
Ireland	3507.9	3506.5	1.4	3484.8	3594.7	3483.4
Italy	57576.4	56696.6	879.8	58011.9	57268.6	57132.1
Luxembourg	378.4	378.4	0.0	388.0	406.6	388.0
Netherlands	14892.6	14890.9	1.7	15372.4	15424.1	15370.7
Portugal	10336.9	9886.6	450.3	10470.9	9912.1	10020.6
Spain	38924.5	38924.5	0.0	39327.6	39177.4	39327.6
United Kingdom	57313.0	57323.5	-10.5	58038.0	58500.2	58048.5
Ages 0-14						
Belgium	1801.16	1801.2	0.0	1796.882	1826.8	1796.9
Denmark	880.557	880.6	0.0	874.578	900.9	874.6
France	11394.53	11395.5	-1.0	11490.78	11386.3	11491.8
Germany	12638.55	9436.8	3201.7	13264.19	13294.4	10062.4
Greece	2003.21	1978.8	24.4	1798.177	1785.1	1773.8
Ireland	963	963.1	-0.1	856.531	887.1	856.6
Italy	9620.07	9528.7	91.4	8857.952	8620.5	8766.6
Luxembourg	65.36	65.4	0.0	69.019	74.6	69.1
Netherlands	2714.869	2714.8	0.1	2830.936	2838.4	2830.9
Portugal	2159.8			1901.837	1783.6	
Spain	7801.973	7802	0.0	6701.635	6609.1	6701.7
United Kingdom	10868.5	10872	-3.5	11282.17	11360.2	11285.7
Ages 15-24						
Belgium	1411.372	1411.3	0.1	1289.238	1299.4	1289.2
Denmark	768.742	768.7	0.0	698.621	702.3	698.6
France	8603.378	8603.9	-0.5	8100.449	8083.2	8101.0
Germany	11139.62	8929.2	2210.4	8903.709	9298.1	6693.3
Greece	1514.838	1527.8	-13.0	1455.016	1557.1	1468.0
Ireland	599.7	599.6	0.1	625.277	626.4	625.2
Italy	9235.477	9051.1	184.4	8229.249	8138.8	8044.9
Luxembourg	50.461	50.5	0.0	45.234	48.2	45.3
Netherlands	2371.107	2370.9	0.2	2056.071	2067	2055.9
Portugal	1723.7 :			1701.896	1635	
Spain	6586.357	6586.3	0.1	6428.931	6496.2	6428.9
United Kingdom	8603	8601.5	1.5	7444.618	7501.9	7443.1

Table 5.4 Continued

Ages, countries	Base population for projection (1000s) 1990	Regio population (1000s) 1990	Difference (1000s)	Projected population 1995	Observed population 1995	Corrected projected population 1995
Ages 25-64						
Belgium	5261.191	5261.3	-0.1	5380.595	5408	5380.7
Denmark	2685.725	2685.8	-0.1	2800.204	2813.9	2800.3
France	28723.38	28724.6	-1.2	29692.66	29867.7	29693.9
Germany	43540.35	34699.4	8841.0	45980.37	46404.2	37139.4
Greece	5287.413	5230.1	57.3	5465.194	5495.4	5407.9
Ireland	1547.6	1546.7	0.9	1597.668	1669.7	1596.8
Italy	30385.25	29804	581.3	31625.31	31108.3	31044.1
Luxembourg	211.882	211.8	0.1	217.857	227.4	217.8
Netherlands	7900.974	7899.7	1.3	8452.041	8485.1	8450.8
Portugal	5094.6	:		5366.775	5062.4	
Spain	19375.32	19375.5	-0.2	20387.35	20156.4	20387.5
United Kingdom	28874	28879.2	-5.2	30179.86	30432.7	30185.1
Ages 65+						
Belgium	1474.1	1474.1	0.0	1591.1	1596.6	1591.1
Denmark	800.4	800.4	0.0	801.1	798.7	801.2
France	7860.0	7873.8	-13.8	8577.4	8682.9	8591.2
Germany	11794.3	9613.5	2180.8	12373.4	12496.5	10192.6
Greece	1399.0	1384.9	14.1	1585.5	1605.4	1571.4
Ireland	397.6	397.1	0.5	405.3	411.7	404.8
Italy	8335.6	8312.8	22.8	9299.4	9401.1	9276.5
Luxembourg	50.7	50.7	0.0	55.9	56.6	55.9
Netherlands	1905.6	1905.5	0.1	2033.3	2033.5	2033.2
Portugal	1358.8	:		1500.4	1431	
Spain	5160.8	5160.8	0.0	5809.6	5915.7	5809.6
United Kingdom	8967.5	8970.8	-3.3	9131.4	9205.3	9134.7

Table 5.5: Annualised and cumulative percentage errors in 1980 projection of the EU and member states

Country	Annualised percentage error			Total percentage error			Dissimilarity index D – error of age distribution		
	1985	1990	1995	1985	1990	1995	1985	1990	1995
Belgium	0.07	-0.02	-0.14	0.34	-0.21	-2.08	0.45	0.64	0.94
Denmark	0.04	-0.05	-0.16	0.20	-0.46	-2.33	0.28	0.22	0.54
France	-0.08	-0.08	-0.09	-0.41	-0.77	-1.30	0.44	0.40	0.95
Germany	-0.03	-0.33	-0.59	-0.16	-3.34	-8.91	0.22	0.41	1.05
Greece	-0.10	0.03	-0.02	-0.48	0.29	-0.23	0.64	1.95	4.38
Ireland	0.39	1.02	1.05	1.96	10.20	15.80	0.67	2.33	6.01
Italy	0.08	0.10	0.04	0.40	0.99	0.60	0.23	1.32	2.51
Luxembourg	-0.16	-0.44	-0.78	-0.82	-4.36	-11.68	0.09	0.42	1.55
Netherlands	-0.06	-0.12	-0.20	-0.31	-1.21	-2.99	0.17	0.34	0.48
Portugal	0.07	0.59	0.58	0.33	5.87	8.73	1.61	5.85	5.03
Spain	0.11	0.34	0.43	0.57	3.35	6.40	0.67	2.64	5.15
UK	0.04	-0.02	-0.10	0.19	-0.24	-1.55	0.22	0.18	0.58
EU	0.02	0.00	-0.08	0.09	-0.02	-1.24			

Table 5.6: Annualised and cumulative percentage errors in 1985 projection of the EU and member states

Countries	Annualised percentage error		Total percentage error		Dissimilarity index D– error of age distribution	
	1990	1995	1990	1995	1990	1995
Belgium	-0.16	-0.34	-0.82	-3.40	0.33	0.98
Denmark	-0.20	-0.33	-1.00	-3.30	0.38	1.39
France	-0.13	-0.21	-0.66	-2.11	0.06	0.14
Germany	-0.33	-0.85	-1.63	-8.54	0.51	1.37
Greece	-0.19	-0.44	-0.94	-4.37	0.15	0.82
Ireland	0.17	0.09	0.86	0.87	0.78	0.85
Italy	0.04	-0.12	0.18	-1.20	0.21	0.48
Luxembourg	-0.65	-1.22	-3.23	-12.15	0.65	1.99
Netherlands	-0.24	-0.35	-1.19	-3.46	0.27	0.60
Portugal	0.78	0.37	3.89	3.67	1.22	0.78
Spain	0.16	0.11	0.82	1.11	0.40	0.91
UK	-0.11	-0.21	-0.53	-2.09	0.34	0.37
EU	-0.08	-0.27	-0.38	-2.74		

Table 5.7: Annualised and cumulative percentage errors in 1990 projection of the EU and member states

Countries	Annualised percentage error 1995	Percentage error 1995	Dissimilarity index D– error of age distribution 1995
Belgium	-0.001	-0.007	0.18
Denmark	-0.002	-0.008	0.37
France	0.000	-0.002	0.30
Germany	-0.002	-0.012	1.58
Greece	-0.004	-0.021	0.55
Ireland	-0.006	-0.031	0.69
Italy	0.000	-0.002	0.31
Luxembourg	-0.009	-0.046	0.71
Netherlands	-0.001	-0.003	0.06
Portugal	0.002	0.011	
Spain	0.001	0.004	0.56
UK	-0.002	-0.008	0.02
EU	-0.001	-0.006	

Table 5.8: Error of geographical distribution of EU population by age groups for 1980 projection

Dissimilarity index D– error of geographical distribution	1985	1990	1995
Total	0.17	0.88	1.74
0-14	0.57	3.06	6.22
15-59	0.18	0.87	1.63
60+	0.51	0.51	0.62

Table 5.9: Error of geographical distribution of EU population by age groups for 1985 projection

Dissimilarity index D- error of geographical distribution	1990	1995
Total	0.39	1.17
0-14	1.24	2.74
15-59	0.31	1.17
60+	0.14	0.25

Table 5.10: Error of geographical distribution of EU population by age groups for 1990 projection

Dissimilarity index D error of geographical distribution	1995
Total	0.25
0-14	4.51
15-24	4.69
25-64	3.93
65+	3.33

Table 5.11: Selection of countries for which the measurement of forecasting error on regional level for 1980 projection was feasible

Country	Does regional division exist? **(1)**	Was the national population count corrected? (Table 5.2)	Does REGIO database contains regional data for 1980 **(2)**	Was it possible to calculate regional corrections? **(3)**	Were there any changes in regional boundaries (see Table 5.1)	Was the data available to calculate correction due to changes in regional boundaries **(4)**	Was it possible to calculate errors on regional level (Number in parentheses refers to a specific reason)
Belgium	Yes	Yes	Yes	Not needed	Yes	Yes	Yes
Denmark	Yes	No	No[3]				No(2)
France	Yes	Yes	No	No			No(3)
Germany	Yes	No[1]	Yes[2]	Yes	Yes	Partially[4]	Partially
Greece	Yes	No[1]	Yes	Not needed	Yes	No	No(4)
Ireland	No						No (1)
Italy	Yes	Yes	Yes	Yes	No		Yes
Luxembourg	No						No (1)
Netherlands	Yes	Yes	Yes	Yes	Yes	Partially	Partially[5]
Portugal	Yes	Yes	No	No			No(3)
Spain	Yes	No[1]	No	Not needed	Yes	Yes	Yes
UK	Yes	Yes	No	No			No(3)

Notes:
[1] Correction existed but was so small (less than 0.1 *pro mille* of corrected population) that it was reasonable to disregard it.
[2] For West Germany only
[3] No regional population was available for Denmark for 1985, 1990 and 1995.
[4] With exception of West Berlin after 1990.
[5] Error was calculated for 1985 only

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Table 5.12: Selection of countries for which the measurement of forecasting error on regional level for 1990 projection was feasible

Country	Does regional division exist? (1)	Was the national population count corrected? (Table5.4)	Does REGIO database contains regional data for 1990 (2)	Was it possible to calculate regional corrections? (3)	Were there any changes in regional boundaries (Table 5.1)	Was the data available to calculate correction due to changes in regional boundaries (4)	Was it possible to calculate errors on regional level (Number in parentheses refers to a specific reason)
Belgium	Yes	No	Yes	Not needed	Yes	Yes	Yes
Denmark	Yes	No	No[2]				No(2)
France	Yes	Yes	Yes	Yes	No		Yes
Germany	Yes	No	Yes[1]	Not needed	Yes	Partially[3]	Partially
Greece	Yes	Yes	Yes	Yes	No		Yes
Ireland	No						No (1)
Italy	Yes	Yes	Yes	Yes	No		Yes
Luxembourg	No						No (1)
Netherlands	Yes	Yes	Yes	Yes	No	No	Yes
Portugal	Yes	Yes	No	No			No(3)
Spain	Yes	No	Yes	Not needed	Yes	Yes	Yes
UK	Yes	Yes	Yes	Yes	No		Yes

Notes:
[1] For West Germany and some East German regions only
[2] No regional population was available for Denmark for 1995.
[3] With exception of West Berlin after 1990.

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Table 5.13: Projected and corrected observed regional populations of selected countries for the 1980 base projection, totals and by age

Ages Regions	Population as on 1.1.1980 (000)			Projected populations			Corrected population			Corrected projected population		
	1980 (base year	Regio data for 1980	Difference	1985	1990	1995	1985	1990	1995	1985	1990	1995
All ages												
BRABANT	2219.8	2220.8	-1.0	2220.7	2215.7	2199.1	2217.4	2243.1	2283.2	2221.7	2216.7	2200.1
ANT	1568.0	1573.8	-5.8	1581.2	1592.5	1595.0	1581.5	1597.4	1629.0	1587.0	1598.3	1600.8
BLI	716.6	710.8	5.8	742.7	768.1	787.7	729.7	745.1	771.7	736.9	762.3	781.9
OOS	1330.5	1330.1	0.4	1333.0	1337.2	1337.6	1330.4	1331.7	1349.4	1332.6	1336.8	1337.2
WES	1079.1	1078.2	0.9	1089.7	1101.9	1110.1	1088.6	1102.5	1121.3	1088.8	1101.0	1109.2
HAI	1300.8	1308.7	-7.9	1290.6	1281.9	1270.4	1282.3	1278.0	1286.6	1298.5	1289.8	1278.3
LIE	999.3	1006.0	-6.7	990.6	982.4	970.9	992.5	998.1	1014.9	997.3	989.1	977.6
BLU	221.8	222.3	-0.5	223.3	225.6	227.7	224.4	230.9	240.0	223.8	226.1	228.2
NAM	407.3	404.4	2.9	408.0	409.6	410.0	411.1	421.2	434.7	405.1	406.7	407.1

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Table 5.13 Continued

Ages Regions	Population as on 1.1.1980 (000) 1980 (base year)	Regio data for 1980	Difference	Projected populations 1985	1990	1995	Corrected population 1985	1990	1995	Corrected projected population 1985	1990	1995
SHH	2599.1	2599.1	-0.0	2565.9	2542.4	2522.4	2613.9	2594.6	2706.8	2565.9	2542.4	2522.4
HAM	1653.0	1653.1	-0.1	1601.7	1552.7	1502.0	1592.3	1626.2	1704.5	1601.8	1552.8	1502.1
BRS	1632.7	1633.0	-0.3	1609.6	1591.2	1571.5	1604.3	1614.2	1677.7	1609.9	1591.5	1571.8
HAN	2054.5	2054.5	0.0	2018.9	1987.8	1955.8	2022.9	2032.4	2129.3	2018.9	1987.8	1955.8
LUN	1446.7	1446.5	0.2	1433.2	1425.8	1422.0	1467.9	1467.4	1580.3	1433.0	1425.6	1421.8
WES	2099.9	2099.9	0.0	2109.5	2133.5	2164.0	2121.2	2169.8	2324.1	2109.5	2133.5	2164.0
BRM	695.2	695.1	0.1	680.5	666.6	651.8	665.6	673.7	679.5	680.4	666.5	651.7
DUS	5208.9	5209.7	-0.8	5136.7	5067.9	4985.6	5057.6	5167.7	5284.0	5137.5	5068.7	4986.4
KOL	3902.3	3902.6	-0.3	3879.4	3853.8	3812.4	3879.7	3963.1	4159.6	3879.7	3854.1	3812.7
MUN	2406.5	2406.6	-0.1	2415.0	2430.5	2440.3	2402.7	2437.8	2557.1	2415.1	2430.6	2440.4
DET	1810.2	1810.4	-0.2	1797.6	1792.5	1788.0	1786.6	1849.7	1989.9	1797.8	1792.7	1788.2
ARN	3688.1	3688.0	0.1	3653.2	3627.4	3596.2	3577.4	3685.2	3815.1	3653.1	3627.3	3596.1
DAR	3422.6	3422.3	0.3	3390.9	3352.8	3301.1	3396.1	3491.4	3668.1	3390.6	3352.5	3300.8
GIE	966.2	966.1	0.1	962.8	961.0	956.1	963.5	981.5	1048.5	962.7	960.9	956.0
KAS	1187.4	1187.4	-0.0	1170.7	1158.5	1147.0	1175.6	1187.7	1260.8	1170.7	1158.5	1147.0
KOB	1360.3	1360.2	0.1	1347.2	1340.2	1333.0	1353.0	1377.0	1476.2	1347.1	1340.1	1332.9
TRI	470.5	470.7	-0.2	469.2	471.5	474.0	470.4	478.0	502.3	469.4	471.7	474.2
RHE	1802.0	1802.3	-0.3	1787.0	1776.2	1760.8	1800.7	1846.7	1971.1	1787.3	1776.5	1761.1
STU	3459.7	3459.6	0.1	3477.8	3496.0	3505.1	3453.6	3610.0	3839.7	3477.7	3495.9	3505.0
KAR	2380.6	2380.8	-0.2	2368.9	2357.3	2337.0	2396.2	2484.0	2643.5	2369.1	2357.5	2337.2
FRE	1853.1	1853.3	-0.2	1859.1	1869.1	1874.7	1873.7	1934.8	2069.8	1859.3	1869.3	1874.9
TUB	1497.0	1496.7	0.3	1509.5	1536.3	1555.6	1517.4	1589.9	1713.5	1509.2	1536.0	1555.3
OBA	3629.8	3630.1	-0.3	3611.5	3581.5	3534.0	3687.7	3721.3	3957.6	3611.8	3581.8	3534.3
NBA	994.1	994.1	0.0	995.5	1003.1	1012.2	1010.8	1057.4	1131.0	995.5	1003.1	1012.2
OPF	965.4	965.2	0.2	966.0	971.5	976.8	963.4	991.3	1047.0	965.8	971.3	976.6
OFR	1052.8	1052.8	-0.0	1038.4	1029.5	1022.1	1040.0	1055.8	1103.9	1038.4	1029.5	1022.1
MFR	1514.9	1514.5	0.4	1499.4	1485.2	1467.1	1515.2	1566.1	1659.2	1499.0	1484.8	1466.7
UFR	1190.8	1190.7	0.1	1193.3	1200.6	1206.2	1199.5	1234.9	1307.5	1193.2	1200.5	1206.1
SCW	1523.8	1523.4	0.4	1519.9	1521.5	1523.6	1540.9	1593.9	1710.0	1519.5	1521.1	1523.2
SAA	1068.8	1068.5	0.3	1056.6	1047.2	1034.4	1050.9	1064.9	1083.7	1056.3	1046.9	1034.1

Table 5.13 Continued

Ages Regions	Population as on 1.1.1980 (000) 1980 (base year	Regio data for 1980	Difference	Projected populations 1985	1990	1995	Corrected population 1985	1990	1995	Corrected projected population 1985	1990	1995
PIE	4531.2	4488.0	43.2	4461.1	4383.5	4300.5	4397.2	4325.2	4298.0	4417.9	4340.3	4257.3
VDA	114.5	112.4	2.1	113.2	111.8	109.9	112.7	114.1	118.4	111.1	109.7	107.8
LIG	1844.7	1824.0	20.7	1783.9	1720.3	1652.8	1762.9	1694.5	1663.8	1763.2	1699.6	1632.1
LOM	8941.7	8868.1	73.6	8915.3	8869.6	8805.6	8842.3	8839.4	8910.2	8841.7	8796.0	8732.0
TRE	876.3	870.7	5.6	883.9	892.4	900.3	875.1	883.4	908.9	878.3	886.8	894.7
VEN	4351.3	4326.0	25.3	4353.2	4352.3	4342.7	4348.3	4365.3	4422.2	4327.9	4327.0	4317.4
FVG	1240.1	1235.4	4.7	1214.8	1183.2	1150.8	1218.7	1200.1	1191.2	1210.1	1178.5	1146.1
EMI	3964.6	3953.5	11.1	3891.9	3804.0	3702.8	3928.0	3901.8	3922.5	3880.8	3792.9	3691.7
TOS	3600.4	3576.7	23.7	3539.8	3469.3	3390.0	3558.8	3534.0	3526.3	3516.1	3445.6	3366.3
UMB	808.3	804.0	4.3	802.8	794.0	782.1	808.5	809.7	822.7	798.5	789.7	777.8
MAR	1415.6	1407.6	8.0	1414.0	1407.5	1395.5	1416.3	1423.1	1440.9	1406.0	1399.5	1387.5
LAZ	4999.1	4972.8	26.3	5111.0	5152.9	5179.8	5048.7	5115.7	5193.1	5084.7	5126.6	5153.5
CAM	5457.8	5421.2	36.6	5689.4	5948.1	6216.4	5534.6	5605.4	5745.6	5652.8	5911.5	6179.8
ABR	1239.7	1212.8	26.9	1249.3	1257.3	1261.7	1228.3	1243.2	1267.6	1222.4	1230.4	1234.8
MOL	334.2	328.3	5.9	336.2	338.2	339.6	329.3	330.5	332.4	330.3	332.3	333.7
PUG	3917.0	3843.3	73.7	4077.7	4250.1	4425.8	3943.9	4014.3	4076.0	4004.0	4176.4	4352.1
BAS	618.8	612.2	6.6	635.8	655.4	674.6	611.3	610.9	610.7	629.2	648.8	668.0
CAL	2078.3	2057.3	21.0	2157.1	2246.0	2334.9	2080.9	2078.7	2075.9	2136.1	2225.0	2313.9
SIC	4998.8	4893.9	104.9	5156.8	5327.0	5497.7	4941.8	4968.1	5082.8	5051.9	5222.1	5392.8
SAR	1601.6	1581.2	20.4	1653.1	1707.6	1761.2	1615.2	1638.4	1659.6	1632.7	1687.2	1740.8
GRO	553.8	553.6	0.2	562.6	571.0	576.9	561.2	553.9	557.9	562.4	570.8	576.7
FRI	583.8	584.0	-0.2	600.0	618.4	638.3	597.6	599.4	609.5	600.2	618.6	638.5
DRE	418.6	418.5	0.1	427.9	437.4	447.1	429.4	441.2	454.8	427.8	437.3	447.0
UTR	890.6	895.3	-4.7	917.8	938.1	953.5	936.2	1015.4	1063.5	922.5	942.8	958.2
NHO	2308.0	2307.8	0.2	2340.1	2363.7	2373.8	2311.7	2376.0	2463.8	2339.9	2363.5	2373.6
ZHO	3083.6	3083.5	0.1	3142.7	3193.5	3229.7	3152.5	3219.8	3325.0	3142.6	3193.4	3229.6
ZLD	348.5	348.3	0.2	355.2	361.8	368.1	356.4	356.0	365.9	355.0	361.6	367.9
NBR	2051.7	2051.2	0.5	2115.2	2177.6	2234.3	2113.1	2189.6	2276.4	2114.7	2177.1	2233.8
LIM	1069.2	1069.1	0.1	1089.7	1108.6	1122.3	1085.6	1104.2	1130.0	1089.6	1108.5	1122.2

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Table 5.13 Continued

Ages / Regions	Population as on 1.1.1980 (000) 1980 (base year	Regio data for 1980	Difference	Projected populations 1985	1990	1995	Corrected population 1985	1990	1995	Corrected projected population 1985	1990	1995
Ages 0-14												
BRABANT	418.3	417.7	0.6	400.2	391.6	380.3	399.6	397.0	407.0	399.6	391.0	379.7
ANT	306.6	315.9	-9.3	290.1	293.0	292.2	291.7	283.4	289.9	299.4	302.3	301.5
BLI	166.1	167.3	-1.2	159.3	162.6	161.9	156.1	148.1	145.1	160.5	163.8	163.1
OOS	267.6	273.3	-5.7	250.2	246.6	245.3	249.8	232.0	229.8	255.9	252.3	251.0
WES	221.7	227.2	-5.5	208.3	208.6	210.9	208.8	199.5	200.0	213.8	214.1	216.4
HAI	263.0	266.4	-3.4	246.0	232.3	228.6	244.3	233.0	235.3	249.4	235.7	232.0
LIE	194.4	197.1	-2.7	181.4	173.3	169.9	183.0	179.4	185.8	184.1	176.0	172.6
BLU	47.7	47.7	0.0	46.0	46.1	47.2	46.2	47.2	49.5	46.0	46.1	47.2
NAM	86.0	86.2	-0.2	81.8	79.8	79.5	83.2	81.8	84.3	82.0	80.0	79.7

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Table 5.13 Continued

Ages Regions	Population as on 1.1.1980 (000) 1980 (base year	Regio data for 1980	Difference	Projected populations 1985	1990	1995	Corrected population 1985	1990	1995	Corrected projected population 1985	1990	1995
SHH	497.2	497.1	0.1	392.1	371.3	388.4	393.7	378.0	422.7	392.0	371.2	388.3
HAM	244.3	244.3	0.0	199.5	192.7	191.9	191.8	200.6	227.4	199.5	192.7	191.9
BRS	291.3	291.3	0.0	240.0	232.7	241.8	233.0	229.0	257.7	240.0	232.7	241.8
HAN	364.4	364.3	0.1	293.0	277.2	283.4	289.1	279.9	319.0	292.9	277.1	283.3
LUN	292.5	292.4	0.1	232.2	218.1	230.1	237.3	225.5	262.7	232.1	218.0	230.0
WES	471.8	471.8	0.0	385.1	372.8	404.0	382.8	367.2	420.8	385.1	372.8	404.0
BRM	116.8	116.9	-0.1	92.9	87.9	88.6	88.9	87.3	93.7	93.0	88.0	88.7
DUS	903.6	903.8	-0.2	742.3	720.3	737.3	717.8	738.0	815.1	742.5	720.5	737.5
KOL	704.0	703.9	0.1	580.9	562.8	570.1	571.6	588.8	664.0	580.8	562.7	570.0
MUN	494.7	494.8	-0.1	412.3	405.3	425.9	404.5	401.2	448.8	412.4	405.4	426.0
DET	353.0	353.0	0.0	290.3	282.3	298.3	285.1	290.1	344.3	290.3	282.3	298.3
ARN	685.6	685.6	0.0	567.9	555.7	578.6	548.5	555.5	617.6	567.9	555.7	578.6
DAR	590.9	590.8	0.1	497.0	473.3	465.5	489.6	494.8	546.5	496.9	473.2	465.4
GIE	179.4	179.3	0.1	153.9	152.1	156.2	151.2	151.8	173.3	153.8	152.0	156.1
KAS	223.0	222.9	0.1	180.7	172.0	180.0	181.2	176.8	202.3	180.6	171.9	179.9
KOB	255.0	255.0	0.0	210.6	210.0	224.3	209.8	211.8	248.9	210.6	210.0	224.3
TRI	94.6	94.7	-0.1	79.0	80.8	88.7	78.4	76.1	84.9	79.1	80.9	88.8
RHE	326.1	326.2	-0.1	273.7	270.6	281.2	274.0	278.7	319.9	273.8	270.7	281.3
STU	669.1	669.1	0.0	574.3	562.6	581.1	558.3	570.2	644.6	574.3	562.6	581.1
KAR	424.5	424.6	-0.1	356.3	349.8	359.4	354.0	368.8	422.7	356.4	349.9	359.5
FRE	365.4	365.4	0.0	302.8	297.5	312.2	302.3	311.1	357.3	302.8	297.5	312.2
TUB	312.7	312.7	0.0	263.8	267.0	282.9	264.3	270.9	311.5	263.8	267.0	282.9
OBA	608.5	608.8	-0.3	513.8	494.2	490.8	519.5	535.2	608.6	514.1	494.5	491.1
NBA	213.1	213.2	-0.1	181.5	179.4	192.6	183.1	179.2	197.9	181.6	179.5	192.7
OPF	198.4	198.3	0.1	169.8	169.3	181.1	168.6	165.6	182.4	169.7	169.2	181.0
OFR	199.7	199.6	0.1	167.8	164.4	173.5	167.1	163.7	181.7	167.7	164.3	173.4
MFR	268.4	268.2	0.2	226.9	221.6	226.4	227.4	234.7	266.1	226.7	221.4	226.2
UFR	237.9	237.9	0.0	203.6	205.5	217.8	202.9	205.9	230.1	203.6	205.5	217.8
SCW	304.0	304.0	0.0	259.2	256.3	269.2	260.0	263.8	298.6	259.2	256.3	269.2
SAA	187.6	187.5	0.1	155.2	156.5	164.1	152.5	153.5	166.4	155.1	156.4	164.0

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Table 5.13 Continued

Ages Regions	Population as on 1.1.1980 (000) 1980 (base year	Regio data for 1980	Difference	Projected populations 1985	1990	1995	Corrected population 1985	1990	1995	Corrected projected population 1985	1990	1995
PIE	871.5	859.7	11.8	738.3	624.2	575.0	714.4	581.2	517.2	726.5	612.4	563.2
VDA	22.2	22.0	0.2	19.2	16.7	15.7	18.7	15.8	14.9	19.0	16.5	15.5
LIG	307.2	304.9	2.3	243.8	194.7	175.3	242.3	188.6	170.4	241.5	192.4	173.0
LOM	1895.7	1888.9	6.8	1604.4	1376.6	1290.6	1586.1	1305.4	1170.9	1597.6	1369.8	1283.8
TRE	200.0	200.0	0.0	172.8	157.2	156.9	170.6	148.2	143.9	172.8	157.2	156.9
VEN	959.7	962.2	-2.5	811.9	703.1	668.4	807.0	659.2	592.7	814.4	705.6	670.9
FVG	223.4	229.1	-5.7	189.7	157.0	144.2	189.9	150.3	133.5	195.4	162.7	149.9
EMI	707.3	713.0	-5.7	586.0	483.4	436.7	593.7	474.6	426.3	591.7	489.1	442.4
TOS	654.5	659.1	-4.6	556.6	471.6	432.2	563.4	462.4	411.5	561.2	476.2	436.8
UMB	149.4	151.0	-1.6	132.9	119.8	112.8	135.1	116.5	105.4	134.5	121.4	114.4
MAR	275.5	277.6	-2.1	244.8	221.8	209.8	246.6	212.6	191.6	246.9	223.9	211.9
LAZ	1136.3	1127.6	8.7	994.6	886.4	856.1	985.2	835.7	759.2	985.9	877.7	847.4
CAM	1518.5	1535.0	-16.5	1454.0	1447.5	1492.8	1427.4	1277.9	1189.3	1470.5	1464.0	1509.3
ABR	262.4	265.4	-3.0	237.5	222.3	215.5	241.7	214.7	198.0	240.5	225.3	218.5
MOL	71.0	72.0	-1.0	65.2	62.4	60.8	65.5	58.8	53.8	66.2	63.4	61.8
PUG	1066.7	1072.2	-5.5	1011.4	991.3	1000.7	983.5	869.4	768.7	1016.9	996.8	1006.2
BAS	156.2	155.1	1.1	144.3	140.2	140.3	138.7	123.3	110.6	143.2	139.1	139.2
CAL	537.6	548.2	-10.6	511.4	515.8	532.8	510.1	458.4	405.8	522.0	526.4	543.4
SIC	1258.7	1257.3	1.4	1211.4	1194.6	1216.0	1166.3	1053.8	980.8	1210.0	1193.2	1214.6
SAR	419.6	425.2	-5.6	387.0	365.9	361.6	380.9	321.5	276.1	392.6	371.5	367.2
GRO	121.4	121.4	0.0	109.8	102.6	103.0	106.9	93.3	93.2	109.8	102.6	103.0
FRI	146.4	146.6	-0.2	132.7	127.5	135.3	131.6	118.5	117.8	132.9	127.7	135.5
DRE	100.2	100.3	-0.1	88.0	81.4	84.6	88.6	82.3	84.1	88.1	81.5	84.7
UTR	202.4	202.2	0.2	182.4	171.8	172.7	185.6	188.4	199.5	182.2	171.6	172.5
NHO	471.6	471.5	0.1	423.4	397.2	392.7	412.9	399.6	428.1	423.3	397.1	392.6
ZHO	657.8	657.8	0.0	604.2	577.9	581.7	602.3	581.1	613.7	604.2	577.9	581.7
ZLD	80.2	80.1	0.1	73.0	68.9	70.5	72.3	65.9	67.8	72.9	68.8	70.4
NBR	495.4	495.2	0.2	435.3	408.6	418.8	432.5	406.1	420.8	435.1	408.4	418.6
LIM	233.0	232.9	0.1	199.4	187.5	190.9	199.0	188.2	195.0	199.3	187.4	190.8

Table 5.13 Continued

Ages Regions	Population as on 1.1.1980 (000) 1980 (base year	 Regio data for 1980	 Difference	Projected populations 1985	 1990	 1995	Corrected population 1985	 1990	 1995	Corrected projected population 1985	 1990	 1995
Ages 15-59												
BRABANT	1368.8	1381.1	-12.3	1361.7	1345.8	1330.0	1360.5	1375.9	1388.6	1374.0	1358.1	1342.3
ANT	975.6	980.0	-4.4	986.0	976.5	966.7	986.4	990.8	991.6	990.4	980.9	971.1
BLI	463.9	460.7	3.2	483.6	491.3	497.9	476.6	483.8	494.0	480.4	488.1	494.7
OOS	810.0	808.6	1.4	820.6	820.1	812.5	818.8	826.2	827.6	819.2	818.7	811.1
WES	659.2	661.5	-2.3	670.2	670.7	666.4	670.1	674.1	671.1	672.5	673.0	668.7
HAI	783.7	792.8	-9.1	778.9	778.4	775.8	771.3	768.8	767.6	788.0	787.5	784.9
LIE	610.1	614.7	-4.6	606.3	600.5	593.7	606.4	605.6	605.8	610.9	605.1	598.3
BLU	131.3	132.3	-1.0	133.4	134.6	135.8	133.7	136.1	140.3	134.4	135.6	136.8
NAM	245.6	244.1	1.5	247.2	248.6	250.3	248.4	253.1	259.2	245.7	247.1	248.8

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Table 5.13 Continued

Ages Regions	Population as on 1.1.1980 (000) 1980 (base year	Regio data for 1980	Difference	Projected populations 1985	1990	1995	Corrected population 1985	1990	1995	Corrected projected population 1985	1990	1995
SHH	1583.0	1583.2	-0.2	1646.4	1641.5	1600.0	1682.1	1665.4	1715.4	1646.6	1641.7	1600.2
HAM	1021.5	1021.6	-0.1	1016.0	977.2	933.6	1022.6	1044.8	1102.7	1016.1	977.3	933.7
BRS	1000.9	1001.2	-0.3	1018.5	998.7	967.1	1019.6	1019.1	1044.0	1018.8	999.0	967.4
HAN	1256.9	1257.0	-0.1	1280.8	1255.1	1211.1	1286.2	1290.0	1334.2	1280.9	1255.2	1211.2
LUN	876.4	876.3	0.1	914.3	914.5	894.3	934.2	931.3	988.0	914.2	914.4	894.2
WES	1261.7	1261.7	0.0	1341.8	1361.4	1345.6	1348.7	1382.4	1450.6	1341.8	1361.4	1345.6
BRM	427.0	426.9	0.1	432.0	421.9	407.1	423.5	430.2	430.4	431.9	421.8	407.0
DUS	3295.6	3295.9	-0.3	3336.2	3230.9	3085.0	3291.8	3320.5	3307.1	3336.5	3231.2	3085.3
KOL	2515.9	2516.2	-0.3	2571.4	2517.3	2429.0	2578.4	2586.8	2654.1	2571.7	2517.6	2429.3
MUN	1514.6	1514.6	0.0	1573.8	1559.2	1522.4	1566.8	1559.8	1594.3	1573.8	1559.2	1522.4
DET	1097.6	1097.8	-0.2	1135.1	1125.1	1093.2	1123.7	1157.4	1216.8	1135.3	1125.3	1093.4
ARN	2304.3	2304.4	-0.1	2348.2	2290.4	2207.7	2295.4	2340.0	2367.5	2348.3	2290.5	2207.8
DAR	2190.1	2189.9	0.2	2213.5	2163.6	2093.5	2228.4	2280.4	2380.0	2213.3	2163.4	2093.3
GIE	604.1	604.1	0.0	616.6	607.9	594.2	617.9	625.4	659.7	616.6	607.9	594.2
KAS	713.5	713.6	-0.1	727.9	718.2	698.6	728.7	735.8	774.4	728.0	718.3	698.7
KOB	830.3	830.3	0.0	849.3	832.5	807.8	849.9	853.2	897.7	849.3	832.5	807.8
TRI	285.2	285.2	0.0	294.2	290.1	283.4	293.9	295.2	305.1	294.2	290.1	283.4
RHE	1134.4	1134.5	-0.1	1155.6	1129.2	1089.5	1167.2	1179.3	1236.6	1155.7	1129.3	1089.6
STU	2183.8	2183.6	0.2	2253.0	2237.8	2179.8	2248.5	2347.1	2446.7	2252.8	2237.6	2179.6
KAR	1517.9	1517.9	0.0	1547.2	1517.4	1467.0	1570.9	1611.3	1683.7	1547.2	1517.4	1467.0
FRE	1156.0	1156.1	-0.1	1203.8	1198.0	1169.0	1212.4	1238.6	1296.9	1203.9	1198.1	1169.1
TUB	927.4	927.3	0.1	972.4	979.2	966.3	977.0	1021.3	1080.2	972.3	979.1	966.2
OBA	2344.3	2344.2	0.1	2377.5	2334.6	2260.5	2444.3	2444.1	2570.9	2377.4	2334.5	2260.4
NBA	597.0	597.0	0.0	621.7	625.0	617.3	630.3	665.3	704.9	621.7	625.0	617.3
OPF	594.6	594.5	0.1	614.7	612.6	600.4	610.3	627.4	652.3	614.6	612.5	600.3
OFR	637.6	637.7	-0.1	648.5	637.8	617.6	648.0	658.3	678.3	648.6	637.9	617.7
MFR	948.6	948.4	0.2	962.0	943.5	912.9	974.8	1001.5	1047.2	961.8	943.3	912.7
UFR	735.5	735.3	0.2	759.5	753.7	740.8	763.5	778.3	811.4	759.3	753.5	740.6
SCW	923.3	923.1	0.2	951.6	949.4	933.6	964.9	998.6	1061.6	951.4	949.2	933.4
SAA	682.7	682.5	0.2	689.7	668.3	641.5	685.6	682.1	675.5	689.5	668.1	641.3

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Table 5.13 Continued

Ages Regions	Population as on 1.1.1980 (000) 1980 (base year)	Regio data for 1980	Difference	Projected populations 1985	1990	1995	Corrected population 1985	1990	1995	Corrected projected population 1985	1990	1995
PIE	2767.4	2754.4	13.0	2771.4	2749.4	2657.5	2755.4	2745.2	2697.8	2758.4	2736.4	2644.5
VDA	72.1	70.4	1.7	72.0	71.5	69.2	71.7	73.8	75.9	70.3	69.8	67.5
LIG	1108.3	1092.1	16.2	1082.8	1050.3	992.4	1066.6	1032.3	996.2	1066.6	1034.1	976.2
LOM	5572.0	5559.8	12.2	5679.1	5715.9	5590.0	5695.2	5803.3	5793.9	5666.9	5703.7	5577.8
TRE	535.5	531.3	4.2	554.6	566.7	566.2	548.1	562.6	575.4	550.4	562.5	562.0
VEN	2680.1	2659.1	21.0	2754.1	2797.3	2775.3	2749.5	2821.4	2854.3	2733.1	2776.3	2754.3
FVG	745.4	744.9	0.5	733.1	727.8	707.4	744.0	750.5	746.6	732.6	727.3	706.9
EMI	2440.2	2434.8	5.4	2395.5	2347.7	2253.7	2427.7	2433.6	2422.5	2390.1	2342.3	2248.3
TOS	2179.8	2166.1	13.7	2138.9	2107.1	2040.2	2163.7	2175.0	2164.0	2125.2	2093.4	2026.5
UMB	496.5	494.3	2.2	485.2	474.0	460.1	490.3	488.9	494.4	483.0	471.8	457.9
MAR	864.4	860.0	4.4	858.1	848.4	830.8	862.5	866.9	872.7	853.7	844.0	826.4
LAZ	3151.0	3096.9	54.1	3226.0	3275.2	3240.8	3200.6	3307.4	3330.8	3171.9	3221.1	3186.7
CAM	3226.8	3192.1	34.7	3445.2	3630.8	3783.2	3338.8	3470.3	3585.3	3410.5	3596.1	3748.5
ABR	747.3	724.9	22.4	755.5	757.8	753.9	737.4	751.5	766.5	733.1	735.4	731.5
MOL	198.9	192.9	6.0	201.6	202.5	202.3	194.5	195.8	196.4	195.6	196.5	196.3
PUG	2308.1	2247.7	60.4	2457.6	2589.2	2697.9	2371.2	2479.8	2556.2	2397.2	2528.8	2637.5
BAS	364.5	361.3	3.2	382.6	395.5	404.1	366.9	370.4	369.1	379.4	392.3	400.9
CAL	1223.3	1200.1	23.2	1297.3	1354.7	1398.0	1233.8	1252.6	1259.6	1274.1	1331.5	1374.8
SIC	2945.8	2862.3	83.5	3079.5	3205.0	3296.0	2933.4	2998.0	3095.5	2996.0	3121.5	3212.5
SAR	949.0	928.6	20.4	1012.6	1067.2	1104.0	986.5	1041.6	1077.0	992.2	1046.8	1083.6
GRO	335.3	335.2	0.1	349.5	362.2	365.5	351.6	356.6	359.5	349.4	362.1	365.4
FRI	337.5	337.6	-0.1	362.3	383.2	392.6	360.1	371.9	378.3	362.4	383.3	392.7
DRE	251.7	251.6	0.1	266.0	277.2	279.3	265.7	277.4	281.7	265.9	277.1	279.2
UTR	553.9	558.8	-4.9	587.8	608.1	613.3	601.6	662.3	689.5	592.7	613.0	618.2
NHO	1444.4	1444.4	0.0	1489.0	1516.0	1515.3	1483.2	1548.6	1598.7	1489.0	1516.0	1515.3
ZHO	1899.7	1899.5	0.2	1967.3	2014.7	2023.4	1984.2	2053.7	2109.3	1967.1	2014.5	2023.2
ZLD	202.9	202.7	0.2	212.5	221.3	225.1	213.8	217.3	222.2	212.3	221.1	224.9
NBR	1298.6	1298.3	0.3	1386.1	1441.2	1450.1	1385.1	1450.3	1480.4	1385.8	1440.9	1449.8
LIM	689.1	689.0	0.1	720.7	733.2	726.8	716.5	726.3	726.3	720.6	733.1	726.7

Table 5.13 Continued

Ages Regions	Population as on 1.1.1980 (000) 1980 (base year	Regio data for 1980	Difference	Projected populations 1985	1990	1995	Corrected population 1985	1990	1995	Corrected projected population 1985	1990	1995
Ages 60–												
BRABANT	432.7	422.0	10.7	458.8	478.3	488.8	457.3	470.2	487.6	448.1	467.6	478.1
ANT	285.8	277.9	7.9	305.1	323.0	336.1	303.4	323.2	347.5	297.2	315.1	328.2
BLI	86.6	82.8	3.8	99.8	114.2	127.9	97.0	113.2	132.6	96.0	110.4	124.1
OOS	252.9	248.2	4.7	262.2	270.5	279.8	261.8	273.5	292	257.5	265.8	275.1
WES	198.2	189.5	8.7	211.2	222.6	232.8	209.7	228.9	250.2	202.5	213.9	224.1
HAI	254.1	249.5	4.6	265.7	271.2	266.0	266.7	276.2	283.7	261.1	266.6	261.4
LIE	194.8	194.2	0.6	202.9	208.6	207.3	203.1	213.1	223.3	202.3	208.0	206.7
BLU	42.8	42.3	0.5	43.9	44.9	44.7	44.5	47.6	50.2	43.4	44.4	44.2
NAM	75.7	74.1	1.6	79.0	81.2	80.2	79.5	86.3	91.2	77.4	79.6	78.6

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Table 5.13 Continued

Ages Regions	Population as on 1.1.1980 (000) 1980 (base year	Regio data for 1980	Difference	Projected populations 1985	1990	1995	Corrected population 1985	1990	1995	Corrected projected population 1985	1990	1995
SHH	518.9	518.8	0.1	527.4	529.6	534.0	538.1	551.2	568.7	527.3	529.5	533.9
HAM	387.2	387.2	0.0	386.2	382.8	376.5	377.9	380.8	374.4	386.2	382.8	376.5
BRS	340.5	340.5	0.0	351.1	359.8	362.6	351.7	366.1	376.0	351.1	359.8	362.6
HAN	433.2	433.2	0.0	445.1	455.5	461.3	447.6	462.5	476.1	445.1	455.5	461.3
LUN	277.8	277.8	0.0	286.7	293.2	297.6	296.4	310.6	329.6	286.7	293.2	297.6
WES	366.4	366.4	0.0	382.6	399.3	414.4	389.7	420.2	452.7	382.6	399.3	414.4
BRM	151.4	151.3	0.1	155.6	156.8	156.1	153.2	156.2	155.4	155.5	156.7	156.0
DUS	1009.7	1010.0	-0.3	1058.2	1116.7	1163.3	1048.0	1109.2	1161.8	1058.5	1117.0	1163.6
KOL	682.4	682.5	-0.1	727.1	773.7	813.3	729.7	787.5	841.5	727.2	773.8	813.4
MUN	397.2	397.2	0.0	428.9	466.0	492.0	431.4	476.8	514.0	428.9	466.0	492.0
DET	359.6	359.6	0.0	372.2	385.1	396.5	377.8	402.2	428.8	372.2	385.1	396.5
ARN	698.2	698.0	0.2	737.1	781.3	809.9	733.5	789.7	830.0	736.9	781.1	809.7
DAR	641.6	641.6	0.0	680.4	715.9	742.1	678.1	716.2	741.6	680.4	715.9	742.1
GIE	182.7	182.7	0.0	192.3	201.0	205.7	194.4	204.3	215.5	192.3	201.0	205.7
KAS	250.9	250.9	0.0	262.1	268.3	268.4	265.7	275.1	284.1	262.1	268.3	268.4
KOB	275.0	274.9	0.1	287.3	297.7	300.9	293.3	312.0	329.6	287.2	297.6	300.8
TRI	90.7	90.8	-0.1	96.0	100.6	101.9	98.1	106.7	112.3	96.1	100.7	102.0
RHE	341.5	341.6	-0.1	357.7	376.4	390.1	359.5	388.7	414.6	357.8	376.5	390.2
STU	606.8	606.9	-0.1	650.5	695.6	744.2	646.8	692.7	748.4	650.6	695.7	744.3
KAR	438.2	438.3	-0.1	465.4	490.1	510.6	471.3	503.9	537.1	465.5	490.2	510.7
FRE	331.7	331.8	-0.1	352.5	373.6	393.5	359.0	385.1	415.6	352.6	373.7	393.6
TUB	256.9	256.7	0.2	273.3	290.1	306.4	276.1	297.7	321.8	273.1	289.9	306.2
OBA	677.0	677.1	-0.1	720.2	752.7	782.7	723.9	742.0	778.1	720.3	752.8	782.8
NBA	184.0	183.9	0.1	192.3	198.7	202.3	197.4	212.9	228.2	192.2	198.6	202.2
OPF	172.4	172.4	0.0	181.5	189.6	195.3	184.5	198.3	212.3	181.5	189.6	195.3
OFR	215.5	215.5	0.0	222.1	227.3	231.0	224.9	233.8	243.9	222.1	227.3	231.0
MFR	297.9	297.9	0.0	310.5	320.1	327.8	313.0	329.9	345.9	310.5	320.1	327.8
UFR	217.4	217.5	-0.1	230.2	241.4	247.6	233.1	250.7	266.0	230.3	241.5	247.7
SCW	296.5	296.3	0.2	309.1	315.8	320.8	316.0	331.5	349.8	308.9	315.6	320.6
SAA	198.5	198.5	0.0	211.7	222.4	228.8	212.8	229.3	241.8	211.7	222.4	228.8

Table 5.13 Continued

Ages Regions	Population as on 1.1.1980 (000) 1980 (base year	Regio data for 1980	Difference	Projected populations 1985	1990	1995	Corrected population 1985	1990	1995	Corrected projected population 1985	1990	1995
PIE	892.3	873.9	18.4	951.4	1009.9	1068.0	927.4	998.8	1083.0	933.0	991.5	1049.6
VDA	20.2	20.0	0.2	22.0	23.6	25.0	22.3	24.5	27.6	21.8	23.4	24.8
LIG	429.2	427.0	2.2	457.3	475.3	485.1	454.0	473.6	497.2	455.1	473.1	482.9
LOM	1474.0	1419.4	54.6	1631.8	1777.1	1925.0	1561.0	1730.7	1945.4	1577.2	1722.5	1870.4
TRE	140.8	139.4	1.4	156.5	168.5	177.2	156.4	172.6	189.6	155.1	167.1	175.8
VEN	711.5	704.7	6.8	787.2	851.9	899.0	791.8	884.7	975.2	780.4	845.1	892.2
FVG	271.3	261.4	9.9	292.0	298.4	299.2	284.8	299.3	311.1	282.1	288.5	289.3
EMI	817.1	805.7	11.4	910.4	972.9	1012.4	906.6	993.6	1073.7	899.0	961.5	1001.0
TOS	766.1	751.5	14.6	844.3	890.6	917.6	831.7	896.6	950.8	829.7	876.0	903.0
UMB	162.4	158.7	3.7	184.7	200.2	209.2	183.1	204.3	222.9	181.0	196.5	205.5
MAR	275.7	270.0	5.7	311.1	337.3	354.9	307.2	343.6	376.6	305.4	331.6	349.2
LAZ	711.8	748.3	-36.5	890.4	991.3	1082.9	862.9	972.6	1103.1	926.9	1027.8	1119.4
CAM	712.5	694.1	18.4	790.2	869.8	940.4	768.4	857.2	971.0	771.8	851.4	922.0
ABR	230.0	222.5	7.5	256.3	277.2	292.3	249.2	277.0	303.1	248.8	269.7	284.8
MOL	64.3	63.4	0.9	69.4	73.3	76.5	69.3	75.9	82.2	68.5	72.4	75.6
PUG	542.2	523.4	18.8	608.7	669.6	727.2	589.2	665.1	751.1	589.9	650.8	708.4
BAS	98.1	95.8	2.3	108.9	119.7	130.2	105.7	117.2	131.0	106.6	117.4	127.9
CAL	317.4	309.0	8.4	348.4	375.5	404.1	337.0	367.7	410.5	340.0	367.1	395.7
SIC	794.3	774.3	20.0	865.9	927.4	985.7	842.1	916.3	1006.5	845.9	907.4	965.7
SAR	233.0	227.4	5.6	253.5	274.5	295.6	247.8	275.3	306.5	247.9	268.9	290.0
GRO	97.1	97.0	0.1	103.3	106.2	108.4	102.7	104.0	105.2	103.2	106.1	108.3
FRI	99.9	99.8	0.1	105.0	107.7	110.4	105.9	109.0	113.4	104.9	107.6	110.3
DRE	66.7	66.6	0.1	73.9	78.8	83.2	75.1	81.5	89.0	73.8	78.7	83.1
UTR	134.3	134.3	0.0	147.6	158.2	167.5	149.0	164.7	174.5	147.6	158.2	167.5
NHO	392.0	391.9	0.1	427.7	450.5	465.8	415.6	427.8	437.0	427.6	450.4	465.7
ZHO	526.1	526.2	-0.1	571.2	600.9	624.6	566.0	585.0	602.0	571.3	601.0	624.7
ZLD	65.4	65.5	-0.1	69.7	71.6	72.5	70.3	72.8	75.9	69.8	71.7	72.6
NBR	257.7	257.7	0.0	293.8	327.8	365.4	295.5	333.2	375.2	293.8	327.8	365.4
LIM	147.1	147.2	-0.1	169.6	187.9	204.6	170.1	189.7	208.7	169.7	188.0	204.7

Table 5.14: Projected and corrected observed regional populations of selected countries for the 1990 base projection by age

Age Region	Population as on 1.1.1990 in thousands 1990 population projection base year data	Regio data for 1990	Difference	Projected populations 1995	Corrected projected populations 1995	Observed populations 1995
Age 0-14						
BRABANT	397.0	397.0	0.0	398.1	398.1	407.0
ANT	283.4	283.4	-0.0	285.7	285.7	289.9
BLI	148.1	148.1	-0.0	143.9	144.0	145.1
OOS	232.0	232.0	-0.0	229.9	229.9	229.8
WES	199.5	199.5	-0.0	198.2	198.3	200.0
HAI	233.0	233.0	0.0	230.4	230.4	235.3
LIE	179.4	179.4	-0.0	179.9	179.9	185.8
BLU	47.1	47.2	-0.1	48.5	48.6	49.5
NAM	81.8	81.8	0.0	82.2	82.2	84.3
IDF	2155.1	2155.6	-0.5	2270.3	2270.9	2228.1
CAR	286.9	286.9	0.0	278.6	278.6	275.3
PIC	407.7	407.7	-0.0	402.5	402.5	407.3
HNO	386.6	386.7	-0.1	389.4	389.5	385.3
CEN	471.3	471.6	-0.3	470.0	470.4	468.5
BNO	295.2	295.2	0.0	289.6	289.6	284.7
BOU	311.2	311.3	-0.1	304.0	304.1	299.9
NPC	933.6	933.3	0.3	916.2	916.0	903.6
LOR	484.5	484.5	0.0	469.5	469.5	467.5
ALS	326.3	326.3	0.0	335.8	335.8	338.5
FRC	231.3	231.4	-0.1	223.2	223.3	223.1
PDL	662.3	662.5	-0.2	640.3	640.5	633.9
BRE	560.2	560.2	-0.0	552.5	552.5	539.7
PCH	298.3	298.4	-0.1	287.9	288.0	285.9
AQU	501.6	501.7	-0.1	505.3	505.3	497.4
MPY	416.8	416.9	-0.1	423.1	423.3	421.8
LMO	114.0	114.0	0.0	109.4	109.4	107.8
RHA	1103.9	1103.9	0.0	1127.2	1127.2	1128.0
AUV	235.6	235.6	0.0	225.2	225.1	221.6
LNR	381.8	381.7	0.1	402.1	402.0	399.9
PAC	785.4	785.5	-0.1	822.5	822.5	821.5
COR	44.9	44.9	-0.0	46.1	46.1	46.7

Table 5.14 Continued

Age Region	Population as on 1.1.1990 in thousands 1990 population projection base year data	 Regio data for 1990	 Difference	Projected populations 1995	Corrected projected populations 1995	Observed populations 1995
HAM	200.6	200.6	0.0	231.2	231.2	227.4
BRS	229.0	229.0	-0.0	244.9	244.9	257.7
HAN	279.9	279.9	-0.0	298.1	298.1	319.0
LUN	225.6	225.5	0.1	232.0	232.0	262.7
WES	367.2	367.2	-0.0	384.4	384.4	420.8
BRM	87.3	87.3	-0.0	97.3	97.3	93.7
DUS	738.0	738.0	-0.0	784.4	784.5	815.1
KOL	588.7	588.8	-0.1	632.8	632.9	664.0
MUN	401.2	401.2	0.0	418.3	418.3	448.8
DET	290.1	290.1	0.0	305.6	305.6	344.3
ARN	555.6	555.5	0.1	574.9	574.8	617.6
DAR	494.8	494.8	-0.0	536.5	536.5	546.5
GIE	151.8	151.8	-0.0	157.9	158.0	173.3
KAS	176.8	176.8	0.0	186.7	186.7	202.3
KOB	211.8	211.8	0.0	221.6	221.6	248.9
TRI	76.1	76.1	-0.0	79.6	79.7	84.9
RHE	278.7	278.7	-0.0	297.7	297.7	319.9
STU	570.2	570.2	-0.0	620.6	620.7	644.6
KAR	368.8	368.8	-0.0	408.8	408.9	422.7
FRE	311.0	311.1	-0.1	339.6	339.8	357.3
TUB	270.9	270.9	-0.0	295.2	295.2	311.5
OBA	535.2	535.2	0.0	608.5	608.4	608.6
NBA	179.2	179.2	0.0	186.6	186.5	197.9
OPF	165.6	165.6	-0.0	172.5	172.6	182.4
OFR	163.6	163.7	-0.1	172.2	172.3	181.7
MFR	234.7	234.7	-0.0	259.8	259.8	266.1
UFR	205.9	205.9	0.0	221.1	221.1	230.1
SCW	263.8	263.8	-0.0	284.0	284.1	298.6
SAA	153.5	153.5	-0.0	159.0	159.0	166.4
SAC	902.4	902.4	-0.0	874.4	874.4	740.8
DESS	114.6	114.5	0.1	110.6	110.5	94.8
HALL	196.1	196.1	-0.0	192.6	192.6	149.8
MAGD	246.6	246.6	0.0	245.0	244.9	216.5
AMT	116.5	110.4	6.1	103.2	97.1	99.8
KMA	325.3	323.4	1.9	286.5	284.5	298.3
DMA	57.9	60.5	-2.6	58.6	61.1	55.1
THE	147.7	149.0	-1.3	127.4	128.8	130.5
IPE	64.5	64.7	-0.2	54.9	55.2	58.7
ION	34.6	35.2	-0.6	29.3	29.9	33.2
DEL	150.7	150.9	-0.2	133.6	133.8	134.6
SEL	104.8	110.3	-5.5	92.6	98.1	105.6
PEL	107.5	110.0	-2.5	90.8	93.3	103.4
ATT	685.2	660.7	24.5	643.8	619.3	578.3
VAI	37.4	35.0	2.4	30.4	28.0	31.8
NAI	56.2	54.0	2.2	47.1	44.9	50.9
KRI	114.9	114.9	0.0	100.2	100.2	105.2

Table 5.14 Continued

Age Region	Population as on 1.1.1990 in thousands 1990 population projection base year data	Regio data for 1990	Difference	Projected populations 1995	Corrected projected populations 1995	Observed populations 1995
PIE	586.3	581.2	5.1	521.3	516.2	517.2
VDA	16.0	15.8	0.2	15.0	14.8	14.9
LIG	191.7	188.6	3.1	174.8	171.7	170.4
LOM	1311.4	1305.4	6.0	1187.8	1181.8	1170.9
TRE	148.4	148.2	0.2	141.8	141.6	143.9
VEN	661.1	659.2	1.9	601.3	599.4	592.7
FVG	151.6	150.3	1.3	135.9	134.6	133.5
EMI	475.8	474.6	1.2	425.5	424.3	426.3
TOS	463.9	462.4	1.5	415.9	414.3	411.5
UMB	118.0	116.5	1.5	107.3	105.8	105.4
MAR	211.9	212.6	-0.7	191.5	192.2	191.6
LAZ	838.7	835.7	3.0	781.6	778.6	759.2
ABR	216.5	214.7	1.8	201.2	199.4	198.0
MOL	59.1	58.8	0.3	55.3	55.0	53.8
CAM	1310.2	1277.9	32.3	1254.7	1222.4	1189.3
PUG	871.1	869.4	1.7	805.7	804.0	768.7
BAS	124.6	123.3	1.3	116.3	115.1	110.6
CAL	462.9	458.4	4.5	428.9	424.4	405.8
SIC	1083.3	1053.8	29.5	1014.1	984.5	980.8
SAR	317.6	321.5	-3.9	282.0	286.0	276.1
GRON	93.3	93.3	-0.0	96.4	96.4	93.2
FRIE	118.4	118.5	-0.1	117.3	117.4	117.8
DREN	82.4	82.3	0.1	82.6	82.5	84.1
OVER	199.8	199.8	0.0	206.2	206.2	204.0
GELD	337.6	337.6	0.0	345.2	345.2	349.5
FLEV	54.1	54.1	-0.0	61.7	61.7	64.9
UTRE	188.4	188.4	0.0	202.6	202.6	199.5
N-HO	399.6	399.6	-0.0	428.3	428.3	428.1
Z-HO	581.1	581.1	0.0	613.5	613.5	613.7
ZEEL	65.9	65.9	0.0	66.0	66.0	67.8
N-BR	406.1	406.1	0.0	418.8	418.8	420.8
LIMB	188.1	188.2	-0.1	192.4	192.5	195.0
GAL	507.4	507.4	0.0	413.9	413.8	410.5
AST	192.2	192.3	-0.1	151.7	151.8	144.0
CAB	101.5	101.5	0.0	83.8	83.8	80.8
PAV	386.9	386.9	-0.0	310.4	310.4	289.0
NAV	95.4	95.4	-0.0	79.9	79.9	78.4
RIO	47.4	47.4	0.0	39.2	39.2	38.9
ARA	204.1	204.2	-0.1	171.5	171.6	167.6
MAD	991.2	991.2	0.0	834.6	834.6	815.6
CYL	448.4	448.4	0.0	383.8	383.8	364.4
CMA	336.6	336.5	0.1	304.7	304.6	301.6
EXT	228.8	228.8	0.0	210.3	210.3	202.1
CAT	1115.9	1115.8	0.1	912.1	912.0	931.8
VAL	784.1	784.1	0.0	668.9	668.9	669.7
BAL	140.6	140.6	0.0	124.8	124.8	129.2
AND	1605.0	1605.1	-0.1	1458.7	1458.7	1435.5
MUR	242.3	242.3	0.0	220.8	220.8	216.8
CAN	343.1	343.1	0.0	303.1	303.1	302.6

Table 5.14 Continued

Age Region	Population as on 1.1.1990 in thousands 1990 population projection base year data	Regio data for 1990	Difference	Projected populations 1995	Corrected projected populations 1995	Observed populations 1995
CLE	224.6	224.5	0.1	228.8	228.7	235.2
CUM	86.8	86.9	-0.1	87.3	87.4	89.6
NTW	267.1	267.0	0.1	271.1	270.9	274.1
HUM	166.9	166.8	0.1	168.0	167.9	175.3
NYO	124.9	124.6	0.3	132.6	132.3	131.0
SYO	239.5	239.3	0.2	246.2	246.0	249.9
WYO	408.8	408.6	0.2	420.9	420.7	426.5
DNO	362.0	362.0	0.0	380.4	380.3	377.6
LEN	291.1	291.0	0.1	305.6	305.5	304.7
LIN	104.8	104.7	0.1	110.1	110.0	110.2
EAN	387.0	386.7	0.3	403.1	402.8	394.8
BHE	296.0	295.9	0.1	304.2	304.2	311.5
BBO	388.6	388.4	0.2	402.8	402.6	406.0
SES	412.6	412.3	0.3	433.6	433.4	444.7
ESS	286.2	286.2	0.0	285.0	284.9	298.5
GLO	1261.0	1260.2	0.8	1377.8	1377.1	1348.7
HIW	313.5	313.5	0.0	321.5	321.4	330.6
KEN	284.6	284.4	0.2	284.7	284.4	299.3
AGW	375.7	375.4	0.3	395.9	395.6	398.1
CDE	260.9	260.6	0.3	265.2	264.9	274.4
DSO	189.4	189.5	-0.1	203.1	203.1	202.6
HWW	215.0	215.0	0.0	217.0	217.0	224.0
SST	273.2	273.1	0.1	279.2	279.1	283.9
WMI	518.5	517.7	0.8	535.1	534.3	546.1
CHE	183.9	183.7	0.2	187.4	187.2	191.1
GMA	507.6	507.4	0.2	530.0	529.8	530.7
LAN	267.5	267.3	0.2	272.7	272.4	281.4
MER	282.1	281.9	0.2	279.8	279.5	287.4
CDG	206.1	205.9	0.2	212.0	211.8	210.1
GMG	340.5	340.4	0.1	353.8	353.7	358.0
BOR	335.5	335.4	0.1	360.4	360.3	346.3
DUM	469.5	469.2	0.3	479.4	479.2	468.7
HIG	55.7	55.7	0.0	52.7	52.7	55.9
GRA	95.8	95.6	0.2	97.7	97.6	101.8
NIR	385.5	395.2	-9.7	397.2	406.9	391.6
Age 15-24						
BRABANT	303.3	303.3	0.0	276.8	276.7	284.7
ANT	221.7	221.8	-0.1	197.3	197.4	198.9
BLI	115.2	115.1	0.1	104.6	104.6	106.3
OOS	191.3	191.2	0.1	173.4	173.3	174.2
WES	159.5	159.5	0.0	144.2	144.2	143.7
HAI	184.7	184.7	-0.0	172.3	172.3	171.2
LIE	140.3	140.3	0.0	129.2	129.2	129.9
BLU	33.9	34.0	-0.1	32.7	32.8	32.3
NAM	61.4	61.4	0.0	58.7	58.7	58.2

Table 5.14 Continued

Age	Population as on 1.1.1990 in thousands			Projected populations	Corrected projected populations	Observed populations
Region	1990 population projection base year data	Regio data for 1990	Difference	1995	1995	1995
IDF	1632.5	1632.6	-0.1	1445.7	1445.8	1581.2
CAR	214.3	214.3	-0.0	199.3	199.4	195.6
PIC	285.1	285.1	0.0	280.6	280.6	267.7
HNO	271.1	271.1	-0.1	261.4	261.5	253.1
CEN	350.4	350.5	-0.1	343.8	343.8	328.1
BNO	215.6	215.6	0.0	209.9	209.9	201.2
BOU	235.9	236.0	-0.1	226.7	226.7	217.1
NPC	650.1	649.9	0.2	623.5	623.3	615.2
LOR	363.5	363.6	-0.1	329.7	329.7	326.6
ALS	259.0	259.0	0.0	227.4	227.3	236.6
FRC	172.7	172.7	-0.0	162.2	162.2	158.6
PDL	480.1	480.1	-0.0	483.2	483.3	461.8
BRE	429.7	429.7	0.0	419.1	419.1	400.2
PCH	231.0	231.2	-0.2	225.1	225.2	211.2
AQU	408.9	409.0	-0.1	390.2	390.2	382.2
MPY	356.2	356.3	-0.1	327.4	327.5	327.3
LMO	96.3	96.3	-0.0	90.6	90.6	87.7
RHA	832.2	832.2	0.0	782.7	782.7	790.1
AUV	193.4	193.3	0.1	181.2	181.1	174.7
LNR	303.6	303.6	-0.0	293.1	293.2	286.3
PAC	589.6	589.6	-0.0	566.6	566.6	550.5
COR	32.0	32.0	0.0	31.2	31.2	30.3

Table 5.14 Continued

Age Region	Population as on 1.1.1990 in thousands 1990 population projection base year data	Regio data for 1990	Difference	Projected populations 1995	Corrected projected populations 1995	Observed populations 1995
SHH	382.5	382.5	0.0	288.8	288.7	303.8
HAM	214.9	215.0	-0.1	162.2	162.3	184.2
BRS	229.9	229.9	-0.0	175.6	175.6	190.3
HAN	282.9	283.0	-0.1	217.8	217.9	233.3
LUN	213.0	213.0	-0.0	170.5	170.5	178.2
WES	349.7	349.7	-0.0	273.8	273.9	292.9
BRM	93.8	93.8	0.0	71.6	71.6	74.9
DUS	695.4	695.4	-0.0	529.4	529.5	552.8
KOL	559.3	559.4	-0.1	424.6	424.6	454.0
MUN	375.5	375.4	0.1	287.4	287.3	309.2
DET	271.4	271.3	0.1	212.5	212.4	234.8
ARN	519.7	519.7	-0.0	393.7	393.7	430.1
DAR	466.8	466.8	0.0	373.4	373.4	395.7
GIE	146.1	146.1	0.0	109.2	109.2	126.8
KAS	170.1	170.1	-0.0	136.7	136.7	145.9
KOB	189.1	189.1	0.0	150.2	150.2	161.6
TRI	70.1	70.1	-0.0	54.7	54.7	58.7
RHE	251.8	251.9	-0.1	201.9	202.0	215.1
STU	525.9	525.9	-0.0	417.5	417.5	451.2
KAR	355.4	355.4	0.0	271.6	271.5	297.5
FRE	290.5	290.5	0.0	224.2	224.2	242.1
TUB	248.3	248.3	-0.0	194.9	194.9	210.5
OBA	513.4	513.4	-0.0	405.0	405.0	437.5
NBA	161.9	161.9	-0.0	131.0	131.0	139.7
OPF	148.8	148.8	-0.0	118.2	118.2	125.5
OFR	151.4	151.4	0.0	119.3	119.3	127.2
MFR	218.5	218.5	0.0	171.8	171.7	184.4
UFR	181.7	181.7	0.0	145.1	145.1	152.1
SCW	233.5	233.6	-0.1	188.8	188.8	201.8
SAA	141.8	141.8	0.0	107.5	107.5	113.1
SAC	635.4	635.4	0.0	567.4	567.4	533.4
DESS	83.3	83.3	0.0	71.1	71.1	67.0
HALL	142.7	142.7	-0.0	124.2	124.2	107.9
MAGD	177.7	177.7	0.0	153.4	153.4	147.9
AMT	82.7	80.2	2.5	83.2	80.7	77.7
KMA	279.5	273.9	5.6	248.1	242.5	273.8
DMA	43.3	42.3	1.0	40.4	39.4	43.5
THE	98.1	100.4	-2.3	101.1	103.4	107.4
IPE	47.8	45.4	2.4	45.0	42.6	54.0
ION	24.9	23.6	1.3	26.3	25.0	26.5
DEL	110.7	107.7	3.0	108.9	105.9	114.5
SEL	76.9	79.0	-2.1	80.5	82.6	92.1
PEL	80.1	77.8	2.3	83.0	80.8	88.4
ATT	534.9	552.8	-17.9	487.8	505.6	532.9
VAI	23.7	24.6	-0.9	26.8	27.6	22.7
NAI	37.1	38.4	-1.3	40.8	42.2	38.2
KRI	75.1	81.7	-6.6	83.1	89.7	85.5

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Table 5.14 Continued

Age Region	Population as on 1.1.1990 in thousands 1990 population projection base year data	 Regio data for 1990	 Difference	Projected populations 1995	Corrected projected populations 1995	Observed populations 1995
PIE	624.0	624.6	-0.6	543.2	543.8	541.5
VDA	17.4	16.8	0.6	15.2	14.6	14.9
LIG	235.2	227.6	7.6	193.4	185.7	189.1
LOM	1389.5	1388.4	1.1	1206.4	1205.3	1199.9
TRE	146.7	145.7	1.0	124.7	123.7	125.1
VEN	719.2	708.4	10.8	615.7	604.9	613.1
FVG	176.7	172.7	4.0	149.7	145.6	148.1
EMI	554.5	541.8	12.7	475.3	462.5	472.7
TOS	509.5	495.9	13.6	443.7	430.1	437.8
UMB	115.6	110.1	5.5	104.7	99.1	103.1
MAR	206.3	201.2	5.1	186.3	181.2	185.6
LAZ	844.0	824.4	19.6	744.3	724.7	734.1
ABR	199.0	190.0	9.0	180.3	171.3	176.6
MOL	51.9	50.1	1.8	47.5	45.7	46.1
CAM	1055.6	1036.3	19.3	989.6	970.3	968.0
PUG	732.3	719.7	12.6	690.1	677.5	684.3
BAS	103.9	102.4	1.5	96.2	94.7	93.5
CAL	373.3	361.9	11.4	343.7	332.3	330.3
SIC	878.8	840.0	38.8	805.7	766.8	800.2
SAR	301.9	293.0	8.9	273.8	264.9	274.7
GRON	97.3	97.3	-0.0	74.2	74.2	86.3
FRIE	99.1	99.2	-0.1	87.6	87.6	85.3
DREN	67.4	67.5	-0.1	63.6	63.7	56.7
OVER	174.4	174.3	0.1	151.1	151.0	152.9
GELD	295.3	295.2	0.1	261.3	261.2	256.9
FLEV	30.2	30.2	0.0	37.9	37.9	33.7
UTRE	167.5	167.4	0.1	144.6	144.6	148.5
N-HO	362.9	362.8	0.1	304.6	304.5	314.1
Z-HO	498.2	498.1	0.1	425.7	425.6	441.5
ZEEL	54.1	54.1	0.0	49.1	49.1	47.1
N-BR	358.2	358.2	0.0	314.7	314.6	306.7
LIMB	166.5	166.5	0.0	141.7	141.7	137.3
GAL	440.1	440.1	-0.0	433.7	433.7	436.1
AST	170.8	170.8	-0.0	168.4	168.4	165.1
CAB	83.2	83.2	-0.0	82.9	82.9	84.4
PAV	363.9	364.0	-0.1	352.3	352.3	340.8
NAV	84.3	84.3	0.0	81.3	81.3	82.1
RIO	39.1	39.1	-0.0	39.3	39.3	39.4
ARA	181.5	181.4	0.1	172.7	172.6	172.7
MAD	836.4	836.4	0.0	830.3	830.3	856.3
CYL	411.5	411.6	-0.1	376.5	376.6	378.3
CMA	282.0	282.0	0.0	263.8	263.8	260.3
EXT	190.2	190.3	-0.1	173.5	173.6	169.8
CAT	986.5	986.5	-0.0	984.6	984.6	984.2
VAL	637.6	637.6	0.0	642.5	642.5	654.1
BAL	108.7	108.8	-0.1	105.1	105.2	113.9
AND	1269.9	1269.9	0.0	1235.9	1235.9	1260.2
MUR	186.4	186.4	-0.0	185.6	185.6	191.7
CAN	290.9	290.8	0.1	277.7	277.6	284.3

Table 5.14 Continued

Age Region	Population as on 1.1.1990 in thousands 1990 population projection base year data	 Regio data for 1990	 Difference	Projected populations 1995	Corrected projected populations 1995	Observed populations 1995
CLE	168.1	167.9	0.2	148.0	147.8	149.2
CUM	69.4	69.2	0.2	60.3	60.1	56.8
NTW	206.5	206.1	0.4	178.9	178.4	188.4
HUM	123.9	123.6	0.3	108.0	107.7	115.8
NYO	110.1	109.8	0.3	97.3	97.0	86.0
SYO	193.6	193.1	0.5	164.1	163.6	168.1
WYO	312.2	311.6	0.6	267.6	267.0	283.8
DNO	287.7	287.0	0.7	255.4	254.7	250.9
LEN	224.1	223.6	0.5	201.5	201.0	206.0
LIN	85.3	85.2	0.1	78.3	78.2	70.6
EAN	306.1	305.3	0.8	274.2	273.4	268.4
BHE	222.5	222.1	0.4	198.1	197.7	191.7
BBO	325.9	325.2	0.7	274.1	273.4	270.3
SES	327.3	326.5	0.8	303.3	302.5	284.6
ESS	217.2	216.8	0.4	184.4	184.0	196.0
GLO	1067.4	1065.1	2.3	844.9	842.6	907.6
HIW	262.9	262.2	0.7	217.5	216.8	220.7
KEN	222.8	222.5	0.3	188.8	188.5	191.1
AGW	310.4	309.7	0.7	270.5	269.8	267.2
CDE	210.3	209.8	0.5	183.3	182.8	181.8
DSO	153.9	153.6	0.3	146.5	146.2	134.7
HWW	169.3	168.9	0.4	151.7	151.3	142.2
SST	214.1	213.7	0.4	185.6	185.3	185.4
WMI	397.3	396.1	1.2	332.4	331.2	355.3
CHE	139.8	139.4	0.4	124.6	124.1	119.8
GMA	398.1	397.2	0.9	337.3	336.4	341.0
LAN	197.4	197.0	0.4	174.4	174.0	180.6
MER	212.6	212.1	0.5	176.3	175.8	187.6
CDG	162.6	162.3	0.3	148.7	148.4	138.1
GMG	260.8	260.2	0.6	229.6	229.0	226.6
BOR	293.1	292.5	0.6	257.1	256.5	254.5
DUM	379.6	378.8	0.8	325.0	324.1	321.9
HIG	36.6	36.4	0.2	37.2	37.0	33.2
GRA	80.0	79.9	0.1	69.5	69.4	73.9
NIR	254.2	271.1	-16.9	250.4	267.2	251.9
25-64						
BRABANT	1197.0	1197.1	-0.1	1207.0	1207.1	1226.3
ANT	857.9	857.8	0.1	878.5	878.4	884.5
BLI	404.9	405.0	-0.1	423.8	423.9	428.2
OOS	707.6	707.8	-0.2	729.5	729.7	731.8
WES	576.9	576.9	-0.0	594.4	594.5	593.6
HAI	660.3	660.3	0.0	669.4	669.4	666.1
LIE	525.4	525.3	0.1	533.8	533.7	532.9
BLU	115.3	115.2	0.1	121.0	120.9	120.7
NAM	215.9	215.9	0.0	223.1	223.1	224.1

Table 5.14 Continued

Age	Population as on 1.1.1990 in thousands			Projected populations	Corrected projected populations	Observed populations
Region	1990 population projection base year data	Regio data for 1990	Difference	1995	1995	1995
IDF	5713.6	5714.6	-1.0	5954.0	5955.0	5937.1
CAR	669.3	669.2	0.1	679.2	679.1	686.3
PIC	897.4	897.5	-0.1	933.1	933.2	938.4
HNO	865.1	865.0	0.1	897.5	897.4	901.6
CEN	1178.9	1179.2	-0.3	1226.6	1226.9	1230.8
BNO	684.1	684.3	-0.2	698.5	698.6	705.1
BOU	797.9	797.9	0.0	807.2	807.2	818.4
NPC	1915.9	1915.6	0.3	1933.0	1932.7	1959.3
LOR	1175.4	1175.3	0.1	1176.1	1175.9	1194.7
ALS	844.6	844.5	0.1	883.4	883.3	896.8
FRC	547.3	547.2	0.1	559.0	558.9	567.4
PDL	1491.2	1491.3	-0.1	1538.3	1538.4	1562.5
BRE	1378.9	1378.6	0.3	1408.7	1408.4	1428.0
PCH	792.0	792.1	-0.1	800.6	800.8	816.6
AQU	1412.1	1412.0	0.1	1467.8	1467.8	1470.8
MPY	1237.0	1237.0	0.0	1291.2	1291.2	1287.1
LMO	363.7	363.6	0.1	360.4	360.4	363.8
RHA	2722.6	2722.5	0.1	2876.1	2876.0	2883.0
AUV	672.0	672.0	0.0	674.1	674.1	678.8
LNR	1057.3	1057.2	0.1	1123.5	1123.5	1124.8
PAC	2175.7	2175.7	-0.0	2270.0	2270.0	2279.3
COR	131.5	131.5	0.0	134.4	134.4	137.9

Table 5.14 Continued

Age / Region	Population as on 1.1.1990 in thousands: 1990 population projection base year data	Regio data for 1990	Difference	Projected populations 1995	Corrected projected populations 1995	Observed populations 1995
SHH	1417.8	1417.7	0.1	1528.8	1528.7	1548.8
HAM	919.8	919.8	0.0	985.2	985.2	1003.7
BRS	883.5	883.4	0.1	939.0	938.9	944.3
HAN	1124.1	1124.1	-0.0	1188.0	1188.1	1215.4
LUN	798.5	798.5	0.0	841.2	841.2	890.7
WES	1146.0	1146.0	-0.0	1233.7	1233.8	1274.7
BRM	374.1	374.0	0.1	400.6	400.5	391.3
DUS	2934.2	2934.2	0.0	3029.1	3029.1	3061.6
KOL	2247.6	2247.5	0.1	2382.4	2382.3	2422.6
MUN	1324.3	1324.3	-0.0	1397.4	1397.4	1421.9
DET	990.3	990.3	0.0	1047.7	1047.7	1088.6
ARN	2043.5	2043.3	0.2	2078.1	2077.9	2153.1
DAR	2003.8	2003.9	-0.1	2136.6	2136.7	2171.2
GIE	534.1	534.2	-0.1	563.4	563.5	586.4
KAS	635.7	635.8	-0.1	679.0	679.1	694.9
KOB	747.5	747.6	-0.1	779.3	779.4	816.2
TRI	254.6	254.6	-0.0	267.5	267.5	273.8
RHE	1035.4	1035.4	-0.0	1095.0	1095.0	1129.1
STU	2006.4	2006.4	0.0	2164.4	2164.3	2194.0
KAR	1390.5	1390.5	-0.0	1505.5	1505.6	1523.0
FRE	1049.7	1049.6	0.1	1144.2	1144.1	1160.3
TUB	851.6	851.5	0.0	937.8	937.7	951.9
OBA	2118.9	2118.9	-0.0	2333.7	2333.8	2325.8
NBA	561.5	561.5	0.0	600.0	600.0	623.0
OPF	534.2	534.1	0.1	563.1	563.1	581.9
OFR	569.3	569.4	-0.1	596.6	596.7	612.5
MFR	868.7	868.8	-0.1	932.8	932.9	949.3
UFR	664.9	665.0	-0.1	716.7	716.8	725.5
SCW	848.6	848.6	-0.0	917.7	917.7	944.5
SAA	604.6	604.6	0.0	618.9	618.9	625.7
SAC	2607.5	2607.5	0.0	2638.7	2638.7	2549.8
DESS	334.2	334.2	0.0	337.6	337.5	326.9
HALL	572.5	572.6	-0.1	578.3	578.4	517.8
MAGD	691.4	691.4	-0.0	711.3	711.3	714.3
AMT	303.0	294.1	8.9	306.5	297.6	298.7
KMA	924.7	893.7	31.0	957.1	926.1	951.5
DMA	157.2	148.0	9.2	163.7	154.5	157.8
THE	386.9	375.9	11.0	376.2	365.2	385.2
IPE	170.0	166.3	3.7	164.6	161.0	187.0
ION	95.4	93.5	1.9	90.9	89.1	99.6
DEL	340.1	337.8	2.3	353.7	351.4	364.6
SEL	298.8	280.7	18.1	302.5	284.4	340.0
PEL	299.6	291.5	8.1	289.2	281.0	338.3
ATT	1834.8	1877.5	-42.7	1978.2	2020.9	1871.1
VAI	98.0	92.1	5.9	94.2	88.3	91.1
NAI	123.9	123.7	0.2	126.3	126.1	137.4
KRI	255.1	255.6	-0.5	262.0	262.5	273.2

Table 5.14 Continued

Age Region	Population as on 1.1.1990 in thousands 1990 population projection base year data	 Regio data for 1990	 Difference	Projected populations 1995	Corrected projected populations 1995	Observed populations 1995
PIE	2415.1	2392.4	22.7	2433.2	2410.5	2437.7
VDA	64.7	63.9	0.8	68.4	67.5	68.2
LIG	943.9	925.0	18.9	945.2	926.4	924.5
LOM	4956.4	4917.1	39.3	5149.7	5110.4	5131.9
TRE	467.4	464.5	2.9	495.5	492.6	497.5
VEN	2375.8	2362.6	13.2	2495.5	2482.3	2489.2
FVG	653.3	651.6	1.7	671.7	670.0	669.2
EMI	2167.4	2152.7	14.7	2211.9	2197.2	2205.6
TOS	1931.8	1910.7	21.1	1974.6	1953.5	1950.1
UMB	441.7	434.2	7.5	451.9	444.4	444.8
MAR	766.8	758.2	8.6	786.2	777.6	778.3
LAZ	2799.3	2768.6	30.7	2943.7	2913.1	2901.2
ABR	654.8	637.4	17.4	685.6	668.2	665.8
MOL	170.0	165.9	4.1	176.3	172.2	170.8
CAM	2829.8	2700.7	129.1	3029.1	2900.0	2894.7
PUG	1996.8	1955.5	41.3	2136.2	2094.9	2077.7
BAS	309.3	302.4	6.9	322.6	315.8	311.2
CAL	1046.2	995.2	51.0	1095.7	1044.7	1039.7
SIC	2552.8	2418.6	134.2	2653.0	2518.8	2565.2
SAR	842.1	826.1	16.0	899.3	883.3	885.4
GRON	283.9	283.8	0.1	302.6	302.5	298.1
FRIE	299.0	299.0	0.0	314.7	314.7	320.5
DREN	231.2	231.3	-0.1	243.4	243.6	248.0
OVER	518.4	518.3	0.1	558.2	558.1	555.8
GELD	945.5	945.4	0.1	1014.4	1014.2	1014.4
FLEV	109.4	109.3	0.1	134.9	134.8	140.1
UTRE	537.5	537.4	0.1	591.0	590.9	584.3
N-HO	1292.6	1292.4	0.2	1375.3	1375.1	1389.8
Z-HO	1700.0	1699.7	0.3	1808.8	1808.5	1812.8
ZEEL	180.3	·180.3	-0.1	188.4	188.5	192.5
N-BR	1188.7	1188.6	0.1	1279.9	1279.8	1281.5
LIMB	614.6	614.6	0.0	640.5	640.5	647.2
GAL	1421.6	1421.5	0.1	1466.5	1466.4	1397.6
AST	588.0	588.0	0.0	593.8	593.8	570.5
CAB	266.2	266.2	-0.0	275.8	275.8	273.2
PAV	1129.4	1129.4	0.0	1178.3	1178.2	1147.4
NAV	266.5	266.5	0.0	279.3	279.3	277.6
RIO	134.1	134.1	-0.0	137.3	137.4	136.1
ARA	620.6	620.7	-0.1	630.6	630.7	612.4
MAD	2473.2	2473.3	-0.1	2621.1	2621.1	2665.8
CYL	1325.0	1325.0	-0.0	1356.9	1356.9	1284.3
CMA	824.7	824.6	0.1	858.6	858.5	819.7
EXT	544.4	544.6	-0.2	567.6	567.8	522.7
CAT	3078.8	3078.9	-0.1	3202.0	3202.1	3202.0
VAL	1873.3	1873.5	-0.2	1979.6	1979.8	2000.5
BAL	334.3	334.4	-0.1	344.2	344.3	373.5
AND	3246.9	3247.0	-0.1	3522.3	3522.4	3487.0
MUR	480.1	480.1	-0.0	520.4	520.4	527.4
CAN	709.8	709.8	0.0	787.2	787.2	795.1

Table 5.14 Continued

Age Region	Population as on 1.1.1990 in thousands 1990 population projection base year data	Regio data for 1990	Difference	Projected populations 1995	Corrected projected populations 1995	Observed populations 1995
CLE	589.6	589.9	-0.3	610.2	610.5	606.2
CUM	252.8	253.1	-0.3	257.1	257.4	257.2
NTW	728.1	728.7	-0.6	742.8	743.4	742.3
HUM	431.4	431.3	0.1	444.0	443.9	454.6
NYO	368.4	368.8	-0.4	395.0	395.4	381.6
SYO	659.1	659.7	-0.6	682.2	682.7	677.8
WYO	1032.5	1033.3	-0.8	1071.5	1072.2	1079.4
DNO	996.6	997.2	-0.6	1053.7	1054.3	1042.7
LEN	744.6	745.1	-0.5	798.8	799.3	785.1
LIN	301.1	301.3	-0.2	321.5	321.7	315.1
EAN	1015.2	1016.0	-0.8	1089.7	1090.5	1086.9
BHE	788.7	789.5	-0.8	817.3	818.0	831.8
BBO	1004.2	1005.0	-0.8	1088.1	1088.8	1095.5
SES	1203.1	1204.1	-1.0	1251.4	1252.4	1290.0
ESS	782.8	783.3	-0.5	791.6	792.1	823.8
GLO	3437.4	3440.0	-2.6	3599.1	3601.7	3786.1
HIW	839.1	839.5	-0.4	891.3	891.7	907.3
KEN	767.7	768.5	-0.8	776.9	777.7	802.4
AGW	1024.8	1025.4	-0.6	1092.3	1092.9	1109.7
CDE	733.9	734.4	-0.5	756.3	756.8	774.2
DSO	549.2	549.7	-0.6	589.4	589.9	575.5
HWW	599.5	599.8	-0.3	622.8	623.1	635.3
SST	748.7	749.1	-0.4	777.2	777.6	781.1
WMI	1306.4	1305.9	0.5	1332.0	1331.5	1326.5
CHE	497.3	497.9	-0.6	514.9	515.5	518.4
GMA	1293.9	1295.0	-1.1	1354.9	1356.0	1322.1
LAN	698.1	698.6	-0.5	706.6	707.1	725.4
MER	721.4	721.9	-0.5	721.4	721.9	725.9
CDG	554.1	554.3	-0.2	581.4	581.7	569.7
GMG	875.1	875.7	-0.6	908.2	908.8	908.0
BOR	942.2	942.8	-0.6	1037.4	1038.0	993.9
DUM	1248.8	1249.8	-1.0	1302.6	1303.6	1278.0
HIG	141.6	141.6	-0.0	144.7	144.7	147.6
GRA	257.5	257.7	-0.2	274.6	274.9	283.2
NIR	739.3	725.3	14.0	781.3	767.3	792.1
Age 65+						
BRABANT	345.6	345.7	-0.1	364.7	364.8	365.2
ANT	234.4	234.4	-0.0	254.4	254.4	255.7
BLI	76.9	76.9	0.0	91.4	91.4	92.1
OOS	200.8	200.7	0.1	212.3	212.2	213.7
WES	166.6	166.6	0.0	180.2	180.2	183.9
HAI	200.0	200.0	0.0	211.9	211.9	214.0
LIE	153.1	153.1	0.0	164.7	164.7	166.4
BLU	34.5	34.5	-0.0	37.3	37.3	37.6
NAM	62.1	62.1	-0.0	67.1	67.1	68.0

Table 5.14 Continued

Age / Region	Population as on 1.1.1990 in thousands: 1990 population projection base year data	Regio data for 1990	Difference	Projected populations 1995	Corrected projected populations 1995	Observed populations 1995
IDF	1148.4	1148.6	-0.2	1272.2	1272.4	1231.3
CAR	177.7	178.1	-0.4	190.5	190.9	195.3
PIC	219.2	219.5	-0.3	239.1	239.4	241.9
HNO	213.3	213.6	-0.3	233.1	233.4	236.7
CEN	368.4	369.0	-0.6	393.9	394.5	405.7
BNO	196.1	196.3	-0.2	216.6	216.8	221.6
BOU	264.7	265.1	-0.4	277.8	278.2	288.5
NPC	467.0	468.2	-1.2	511.2	512.4	516.7
LOR	283.5	284.2	-0.7	317.0	317.7	322.9
ALS	193.6	194.2	-0.6	215.2	215.8	217.8
FRC	146.2	146.5	-0.3	160.3	160.6	164.2
PDL	423.7	424.3	-0.6	466.5	467.1	481.8
BRE	425.9	426.7	-0.8	466.6	467.4	478.9
PCH	273.4	273.9	-0.5	292.5	293.0	305.5
AQU	470.8	471.8	-1.0	506.8	507.8	515.8
MPY	418.8	419.7	-0.9	451.7	452.6	458.1
LMO	149.4	149.7	-0.3	153.0	153.3	159.6
RHA	686.6	688.1	-1.5	767.2	768.7	768.0
AUV	220.9	221.5	-0.6	234.4	235.0	240.4
LNR	368.7	369.7	-1.0	402.5	403.5	410.5
PAC	702.2	703.9	-1.7	764.3	766.0	777.0
COR	41.2	41.2	-0.0	44.9	44.9	44.9

Table 5.14 Continued

Age / Region	Population as on 1.1.1990 in thousands: 1990 population projection base year data	Regio data for 1990	Difference	Projected populations 1995	Corrected projected populations 1995	Observed populations 1995
SHH	416.4	416.4	-0.0	424.7	424.7	431.5
HAM	290.8	290.8	0.0	291.1	291.0	289.2
BRS	271.8	271.9	-0.1	283.1	283.2	285.4
HAN	345.5	345.4	0.1	356.3	356.1	361.5
LUN	230.4	230.4	-0.0	239.8	239.9	248.6
WES	307.0	306.9	0.1	328.8	328.7	335.7
BRM	118.5	118.6	-0.1	120.2	120.2	119.5
DUS	800.1	800.1	-0.0	857.2	857.2	854.5
KOL	567.5	567.4	0.1	617.4	617.3	619.1
MUN	336.8	336.9	-0.1	373.3	373.3	377.2
DET	297.9	298.0	-0.1	314.1	314.2	322.2
ARN	566.5	566.7	-0.2	604.9	605.1	614.3
DAR	526.0	525.9	0.1	562.1	562.0	554.5
GIE	149.5	149.4	0.1	158.3	158.3	162.0
KAS	205.1	205.0	0.1	213.6	213.5	217.7
KOB	228.5	228.5	0.0	242.1	242.1	249.4
TRI	77.2	77.2	0.0	83.3	83.2	84.9
RHE	280.8	280.7	0.1	303.0	302.9	306.9
STU	507.5	507.5	-0.0	550.6	550.6	549.8
KAR	369.4	369.3	0.1	395.8	395.7	400.4
FRE	283.6	283.6	-0.0	306.2	306.2	310.0
TUB	219.2	219.2	-0.0	238.0	238.0	239.6
OBA	553.8	553.8	0.0	592.9	592.9	585.6
NBA	154.8	154.8	0.0	165.9	165.9	170.4
OPF	142.8	142.8	-0.0	153.8	153.8	157.0
OFR	171.5	171.3	0.1	180.2	180.1	182.5
MFR	244.2	244.1	0.1	256.3	256.2	259.4
UFR	182.4	182.3	0.1	196.7	196.7	199.8
SCW	248.0	247.9	0.1	258.9	258.9	265.2
SAA	165.0	165.0	-0.0	176.4	176.4	178.5
SAC	755.3	754.3	1.0	740.9	739.9	757.7
DESS	86.5	86.6	-0.1	86.4	86.5	88.3
HALL	146.7	146.7	0.0	151.3	151.3	141.4
MAGD	172.6	172.6	0.0	174.1	174.1	185.5
AMT	70.4	72.0	-1.6	79.8	81.4	86.2
KMA	193.2	193.3	-0.1	233.1	233.2	239.4
DMA	35.5	37.7	-2.2	43.5	45.6	45.8
THE	98.0	103.4	-5.4	110.7	116.1	119.1
IPE	57.5	52.9	4.6	61.9	57.3	62.4
ION	38.8	34.8	4.0	40.2	36.2	38.1
DEL	102.1	101.4	0.7	107.4	106.7	114.2
SEL	96.7	87.5	9.2	107.0	97.9	105.1
PEL	117.0	108.0	9.0	121.2	112.1	125.0
ATT	424.2	439.4	-15.2	501.5	516.7	503.2
VAI	39.5	40.3	-0.8	38.7	39.5	41.4
NAI	38.2	33.6	4.6	42.7	38.1	37.1
KRI	88.0	80.7	7.3	97.9	90.7	88.6

Table 5.14 Continued

Age Region	Population as on 1.1.1990 in thousands 1990 population projection base year data	 Regio data for 1990	 Difference	Projected populations 1995	Corrected projected populations 1995	Observed populations 1995
PIE	732.1	726.8	5.3	794.2	788.9	801.6
VDA	17.2	17.7	-0.5	19.6	20.1	20.4
LIG	356.4	353.3	3.1	376.4	373.3	379.8
LOM	1254.7	1228.5	26.2	1422.0	1395.8	1407.6
TRE	124.2	125.1	-0.9	137.6	138.5	142.4
VEN	628.9	635.0	-6.1	706.2	712.3	727.1
FVG	221.3	225.4	-4.1	229.9	234.0	240.5
EMI	723.9	732.8	-8.9	796.9	805.9	817.9
TOS	655.4	664.9	-9.5	712.0	721.5	726.8
UMB	145.0	148.9	-3.9	162.6	166.5	169.3
MAR	245.7	251.0	-5.3	275.1	280.4	285.5
LAZ	688.7	686.8	1.9	799.5	797.7	798.7
ABR	196.1	201.1	-5.0	220.0	225.0	227.3
MOL	54.4	55.6	-1.2	59.5	60.7	61.6
CAM	613.2	590.6	22.6	709.2	686.7	693.6
PUG	469.1	469.7	-0.6	536.4	537.0	545.2
BAS	85.4	82.8	2.6	95.8	93.2	95.4
CAL	270.2	263.2	7.0	299.4	292.4	300.2
SIC	657.8	655.7	2.1	727.6	725.4	736.6
SAR	196.0	197.7	-1.7	219.6	221.2	223.5
GRON	79.5	79.5	-0.0	80.4	80.4	80.3
FRIE	82.6	82.7	-0.1	84.4	84.5	85.8
DREN	60.1	60.1	-0.0	64.6	64.7	65.9
OVER	127.9	128.0	-0.1	137.1	137.2	137.6
GELD	226.0	225.9	0.1	242.9	242.8	243.8
FLEV	17.9	17.9	-0.0	23.3	23.3	23.7
UTRE	122.3	122.2	0.1	131.4	131.3	131.2
N-HO	321.2	321.2	0.0	335.3	335.3	331.8
Z-HO	441.0	440.9	0.1	459.5	459.4	457.0
ZEEL	55.7	55.7	-0.0	57.1	57.1	58.5
N-BR	236.7	236.7	0.0	267.2	267.2	267.3
LIMB	134.8	134.9	-0.1	150.0	150.1	150.5
GAL	437.4	437.4	-0.0	472.3	472.4	483.9
AST	176.6	176.5	0.1	197.4	197.4	199.6
CAB	76.2	76.3	-0.1	85.0	85.1	88.5
PAV	248.3	248.4	-0.1	295.7	295.7	302.5
NAV	74.9	74.8	0.1	83.8	83.8	86.7
RIO	40.4	40.4	0.0	44.7	44.7	46.6
ARA	207.8	207.7	0.1	229.6	229.5	230.6
MAD	568.1	568.1	0.0	670.6	670.6	666.7
CYL	442.9	442.9	-0.0	491.6	491.6	492.0
CMA	269.8	269.8	-0.0	297.2	297.2	301.5
EXT	163.8	163.9	-0.1	179.1	179.1	176.3
CAT	823.7	823.7	-0.0	935.8	935.8	950.0
VAL	488.2	488.2	-0.0	543.6	543.6	573.9
BAL	98.0	98.0	0.0	103.8	103.8	107.1
AND	781.0	781.0	0.0	876.9	876.9	897.3
MUR	115.1	115.1	0.0	132.4	132.4	138.2
CAN	136.6	136.6	0.0	155.7	155.7	160.4

Table 5.14 Continued

Age Region	Population as on 1.1.1990 in thousands 1990 population projection base year data	Regio data for 1990	Difference	Projected populations 1995	Corrected projected populations 1995	Observed populations 1995
CLE	168.2	168.3	-0.1	174.0	174.1	176.8
CUM	82.5	82.7	-0.2	83.4	83.5	86.5
NTW	229.8	229.9	-0.1	230.4	230.5	235.2
HUM	135.5	136.0	-0.5	139.3	139.8	143.6
NYO	121.0	121.2	-0.2	122.2	122.5	129.7
SYO	203.5	203.6	-0.1	205.9	206.0	208.8
WYO	314.6	314.9	-0.3	316.0	316.3	315.1
DNO	300.4	300.8	-0.4	309.6	310.0	316.1
LEN	212.9	213.2	-0.3	221.7	222.0	221.1
LIN	97.6	97.8	-0.2	100.6	100.8	112.9
EAN	343.1	343.8	-0.7	353.4	354.1	363.7
BHE	214.0	213.9	0.1	228.0	227.9	217.5
BBO	253.2	253.3	-0.1	274.2	274.3	260.8
SES	475.2	475.5	-0.3	468.7	469.0	479.0
ESS	246.2	246.5	-0.3	252.1	252.4	255.5
GLO	1009.2	1010.1	-0.9	1017.6	1018.6	945.0
HIW	261.2	261.4	-0.2	271.0	271.2	277.5
KEN	249.1	249.2	-0.1	249.8	249.9	256.0
AGW	332.3	332.6	-0.3	342.5	342.8	345.0
CDE	290.7	291.1	-0.4	288.9	289.3	307.0
DSO	227.7	227.6	0.1	227.9	227.8	242.6
HWW	174.7	174.9	-0.2	181.5	181.7	193.4
SST	207.8	208.2	-0.4	216.5	216.9	223.2
WMI	396.0	395.3	0.7	405.3	404.6	404.6
CHE	137.5	137.8	-0.3	142.7	143.1	147.6
GMA	386.9	386.9	-0.0	385.5	385.6	384.2
LAN	230.1	230.1	-0.0	225.4	225.4	237.6
MER	229.7	229.9	-0.2	228.3	228.5	229.9
CDG	199.9	200.3	-0.4	201.5	201.9	213.7
GMG	278.1	278.2	-0.1	284.6	284.6	290.6
BOR	288.7	289.0	-0.3	295.8	296.0	293.6
DUM	358.7	358.8	-0.1	367.4	367.6	365.0
HIG	41.5	41.7	-0.2	41.8	42.0	43.1
GRA	71.5	71.6	-0.1	73.9	74.0	73.9
NIR	198.8	194.7	4.1	204.0	199.9	209.9
	Total	Total	Total	Total	Total	Total
BRABANT	2243.0	2243.1	-0.1	2246.7	2246.7	2283.2
ANT	1597.3	1597.4	-0.1	1615.9	1616.0	1629.0
BLI	745.0	745.1	-0.1	763.8	763.8	771.7
OOS	1331.6	1331.7	-0.1	1345.0	1345.1	1349.5
WES	1102.5	1102.5	0.0	1117.1	1117.1	1121.2
HAI	1278.0	1278.0	0.0	1284.0	1284.0	1286.6
LIE	998.2	998.1	0.1	1007.6	1007.5	1015.0
BLU	230.8	230.9	-0.1	239.6	239.7	240.1
NAM	421.2	421.2	0.0	431.1	431.1	434.6

Table 5.14 Continued

Age / Region	Population as on 1.1.1990 in thousands: 1990 population projection base year data	Regio data for 1990	Difference	Projected populations 1995	Corrected projected populations 1995	Observed populations 1995
IDF	10649.6	10651.4	-1.8	10942.3	10944.1	10977.7
CAR	1348.2	1348.5	-0.3	1347.7	1347.9	1352.5
PIC	1809.4	1809.8	-0.4	1855.3	1855.7	1855.3
HNO	1736.1	1736.4	-0.3	1781.4	1781.7	1776.7
CEN	2369.0	2370.3	-1.3	2434.3	2435.6	2433.1
BNO	1391.1	1391.4	-0.3	1414.6	1414.9	1412.6
BOU	1609.8	1610.3	-0.5	1615.7	1616.2	1623.9
NPC	3966.6	3967.0	-0.4	3983.9	3984.3	3994.8
LOR	2307.0	2307.6	-0.6	2292.2	2292.8	2311.7
ALS	1623.6	1624.0	-0.4	1661.8	1662.2	1689.7
FRC	1097.5	1097.8	-0.3	1104.7	1105.0	1113.3
PDL	3057.2	3058.2	-1.0	3128.4	3129.4	3140.0
BRE	2794.7	2795.2	-0.5	2846.9	2847.4	2846.8
PCH	1594.8	1595.6	-0.8	1606.2	1607.0	1619.2
AQU	2793.5	2794.5	-1.0	2870.1	2871.1	2866.2
MPY	2428.8	2429.9	-1.1	2493.4	2494.5	2494.3
LMO	723.4	723.6	-0.2	713.4	713.6	718.9
RHA	5345.3	5346.7	-1.4	5553.2	5554.6	5569.1
AUV	1322.0	1322.4	-0.4	1314.8	1315.2	1315.5
LNR	2111.3	2112.2	-0.9	2221.1	2222.1	2221.5
PAC	4252.9	4254.7	-1.8	4423.4	4425.2	4428.3
COR	249.6	249.6	-0.0	256.6	256.6	259.8

Table 5.14 Continued

Age / Region	Population as on 1.1.1990 in thousands: 1990 population projection base year data	Regio data for 1990	Difference	Projected populations 1995	Corrected projected populations 1995	Observed populations 1995
SHH	2594.6	2594.6	0.0	2646.2	2646.2	2706.8
HAM	1626.2	1626.2	0.0	1669.7	1669.7	1704.5
BRS	1614.2	1614.2	0.0	1642.7	1642.7	1677.7
HAN	2032.4	2032.4	0.0	2060.2	2060.2	2129.2
LUN	1467.4	1467.4	0.0	1483.5	1483.5	1580.2
WES	2169.8	2169.8	-0.0	2220.7	2220.8	2324.1
BRM	673.7	673.7	-0.0	689.7	689.7	679.4
DUS	5167.7	5167.7	-0.0	5200.2	5200.2	5284.0
KOL	3963.1	3963.1	0.0	4057.1	4057.1	4159.7
MUN	2437.8	2437.8	-0.0	2476.4	2476.4	2557.1
DET	1849.7	1849.7	0.0	1880.0	1879.9	1989.9
ARN	3685.2	3685.2	0.0	3651.6	3651.6	3815.1
DAR	3491.4	3491.4	0.0	3608.7	3608.7	3667.9
GIE	981.5	981.5	-0.0	988.9	988.9	1048.5
KAS	1187.7	1187.7	-0.0	1216.1	1216.1	1260.8
KOB	1377.0	1377.0	0.0	1393.3	1393.3	1476.1
TRI	478.0	478.0	-0.0	485.1	485.1	502.3
RHE	1846.7	1846.7	-0.0	1897.6	1897.6	1971.0
STU	3610.0	3610.0	-0.0	3753.0	3753.1	3839.6
KAR	2484.0	2484.0	0.0	2581.8	2581.7	2643.6
FRE	1934.8	1934.8	-0.0	2014.2	2014.2	2069.7
TUB	1589.9	1589.9	0.0	1665.9	1665.9	1713.5
OBA	3721.3	3721.3	0.0	3940.1	3940.0	3957.5
NBA	1057.4	1057.4	0.0	1083.5	1083.4	1131.0
OPF	991.3	991.3	0.0	1007.7	1007.7	1046.8
OFR	1055.8	1055.8	0.0	1068.3	1068.3	1103.9
MFR	1566.1	1566.1	-0.0	1620.7	1620.7	1659.2
UFR	1234.9	1234.9	0.0	1279.7	1279.7	1307.5
SCW	1593.9	1593.9	-0.0	1649.5	1649.5	1710.1
SAA	1064.9	1064.9	0.0	1061.8	1061.8	1083.7
SAC	4900.7	4899.6	1.1	4821.4	4820.3	4581.7
DESS	618.7	618.6	0.1	605.7	605.6	577.0
HALL	1058.0	1058.1	-0.1	1046.4	1046.5	916.9
MAGD	1288.3	1288.3	0.0	1283.8	1283.8	1264.2
AMT	572.5	556.7	15.8	572.6	556.8	562.4
KMA	1722.7	1684.3	38.4	1724.8	1686.4	1763.0
DMA	293.9	288.5	5.4	306.1	300.7	302.2
THE	730.7	728.7	2.0	715.5	713.5	742.2
IPE	339.6	329.3	10.3	326.4	316.1	362.1
ION	193.7	187.1	6.6	186.7	180.1	197.4
DEL	703.6	697.8	5.8	703.6	697.8	727.9
SEL	577.2	557.5	19.7	582.6	562.9	642.8
PEL	604.3	587.3	17.0	584.1	567.2	655.1
ATT	3479.2	3530.4	-51.2	3611.3	3662.5	3485.5
VAI	198.6	192.0	6.6	190.1	183.4	187.0
NAI	255.3	249.7	5.6	256.9	251.3	263.6
KRI	533.1	532.9	0.2	543.2	543.0	552.5

Table 5.14 Continued

Age Region	Population as on 1.1.1990 in thousands 1990 population projection base year data	 Regio data for 1990	 Difference	Projected populations 1995	Corrected projected populations 1995	Observed populations 1995
PIE	4357.6	4325.0	32.6	4291.9	4259.4	4298.0
VDA	115.3	114.2	1.1	118.2	117.1	118.4
LIG	1727.2	1694.5	32.7	1689.7	1657.0	1663.8
LOM	8912.0	8839.4	72.6	8965.9	8893.3	8910.3
TRE	886.7	883.5	3.2	899.5	896.3	908.9
VEN	4385.0	4365.2	19.8	4418.8	4399.0	4422.1
FVG	1202.9	1200.0	2.9	1187.1	1184.2	1191.3
EMI	3921.6	3901.9	19.7	3909.7	3890.0	3922.5
TOS	3560.6	3533.9	26.7	3546.1	3519.5	3526.2
UMB	820.3	809.7	10.6	826.4	815.8	822.6
MAR	1430.7	1423.0	7.7	1439.1	1431.4	1441.0
LAZ	5170.7	5115.5	55.2	5269.2	5214.0	5193.2
ABR	781.7	1243.2	-461.5	777.9	1239.4	1267.7
MOL	2995.1	330.4	2664.7	3191.4	526.6	332.3
CAM	3633.7	5605.5	-1971.8	3639.1	5610.8	5745.6
PUG	4069.4	4014.3	55.1	4168.4	4113.4	4075.9
BAS	623.2	610.9	12.3	630.9	618.7	610.7
CAL	2152.5	2078.7	73.8	2167.7	2093.8	2076.0
SIC	5172.8	4968.1	204.7	5200.3	4995.6	5082.8
SAR	1657.6	1638.3	19.3	1674.7	1655.4	1659.7
GRON	553.9	553.9	0.0	553.5	553.5	557.9
FRIE	599.2	599.4	-0.2	604.1	604.3	609.4
DREN	441.1	441.2	-0.1	454.2	454.4	454.7
OVER	1020.5	1020.4	0.1	1052.6	1052.5	1050.3
GELD	1804.4	1804.1	0.3	1863.8	1863.5	1864.6
FLEV	211.5	211.5	0.0	257.8	257.8	262.4
UTRE	1015.6	1015.4	0.2	1069.6	1069.4	1063.5
N-HO	2376.3	2376.0	0.3	2443.6	2443.3	2463.8
Z-HO	3220.2	3219.8	0.4	3307.5	3307.0	3325.0
ZEEL	356.0	356.0	-0.0	360.6	360.6	365.9
N-BR	2189.7	2189.6	0.1	2280.5	2280.4	2276.3
LIMB	1104.1	1104.2	-0.1	1124.5	1124.7	1130.0
GAL	2806.5	2806.4	0.1	2786.3	2786.2	2728.1
AST	1127.5	1127.6	-0.1	1111.3	1111.4	1079.2
CAB	527.1	527.2	-0.1	527.5	527.5	526.9
PAV	2128.6	2128.7	-0.1	2136.6	2136.7	2079.7
NAV	521.1	521.0	0.1	524.3	524.2	524.8
RIO	261.0	261.0	-0.0	260.6	260.6	261.0
ARA	1213.9	1214.0	-0.1	1204.3	1204.4	1183.3
MAD	4868.9	4869.0	-0.1	4956.6	4956.7	5004.4
CYL	2627.8	2627.9	-0.1	2608.8	2609.0	2519.0
CMA	1713.0	1712.9	0.1	1724.2	1724.1	1683.1
EXT	1127.2	1127.6	-0.4	1130.4	1130.8	1070.9
CAT	6004.9	6004.9	-0.0	6034.4	6034.5	6068.0
VAL	3783.3	3783.4	-0.1	3834.7	3834.8	3898.2
BAL	681.6	681.8	-0.2	677.9	678.1	723.7
AND	6902.9	6903.0	-0.1	7093.8	7093.9	7080.0
MUR	1023.9	1023.9	-0.0	1059.2	1059.2	1074.1
CAN	1480.4	1480.3	0.1	1523.6	1523.6	1542.4

Table 5.14 Continued

Age / Region	Population as on 1.1.1990 in thousands: 1990 population projection base year data	Regio data for 1990	Difference	Projected populations 1995	Corrected projected populations 1995	Observed populations 1995
CLE	1150.5	1150.6	-0.1	1161.0	1161.0	1167.4
CUM	491.5	491.9	-0.4	488.1	488.4	490.1
NTW	1431.6	1431.7	-0.1	1423.1	1423.2	1440.0
HUM	857.6	857.7	-0.1	859.3	859.3	889.3
NYO	724.3	724.4	-0.1	747.2	747.2	728.3
SYO	1295.7	1295.7	0.0	1298.4	1298.4	1304.6
WYO	2068.1	2068.4	-0.3	2075.9	2076.2	2104.8
DNO	1946.7	1947.0	-0.3	1999.1	1999.4	1987.3
LEN	1472.7	1472.9	-0.2	1527.6	1527.8	1516.9
LIN	588.9	589.0	-0.1	610.5	610.6	608.8
EAN	2051.4	2051.8	-0.4	2120.4	2120.8	2113.8
BHE	1521.2	1521.4	-0.2	1547.6	1547.8	1552.5
BBO	1972.0	1971.9	0.1	2039.2	2039.1	2032.6
SES	2418.1	2418.4	-0.3	2457.0	2457.3	2498.3
ESS	1532.5	1532.8	-0.3	1513.1	1513.4	1573.8
GLO	6774.9	6775.4	-0.5	6839.5	6840.0	6987.4
HIW	1676.7	1676.6	0.1	1701.2	1701.2	1736.1
KEN	1524.2	1524.6	-0.4	1500.1	1500.5	1548.8
AGW	2043.1	2043.1	0.0	2101.2	2101.1	2120.0
CDE	1495.8	1495.9	-0.1	1493.6	1493.8	1537.4
DSO	1120.1	1120.4	-0.3	1166.8	1167.1	1155.4
HWW	1158.5	1158.6	-0.1	1173.0	1173.1	1194.9
SST	1443.8	1444.1	-0.3	1458.5	1458.8	1473.6
WMI	2618.1	2615.0	3.1	2604.7	2601.6	2632.5
CHE	958.5	958.8	-0.3	969.6	969.9	976.9
GMA	2586.5	2586.5	-0.0	2607.7	2607.7	2578.0
LAN	1393.1	1393.0	0.1	1379.1	1379.0	1425.0
MER	1445.8	1445.8	0.0	1405.7	1405.7	1430.8
CDG	1122.7	1122.8	-0.1	1143.7	1143.8	1131.6
GMG	1754.4	1754.5	-0.1	1776.1	1776.2	1783.2
BOR	1859.6	1859.7	-0.1	1950.8	1950.9	1888.4
DUM	2456.5	2456.6	-0.1	2474.4	2474.5	2433.6
HIG	275.3	275.4	-0.1	276.4	276.4	279.9
GRA	504.7	504.8	-0.1	515.8	515.9	532.7
NIR	1577.8	1586.3	-8.5	1632.9	1641.4	1645.5

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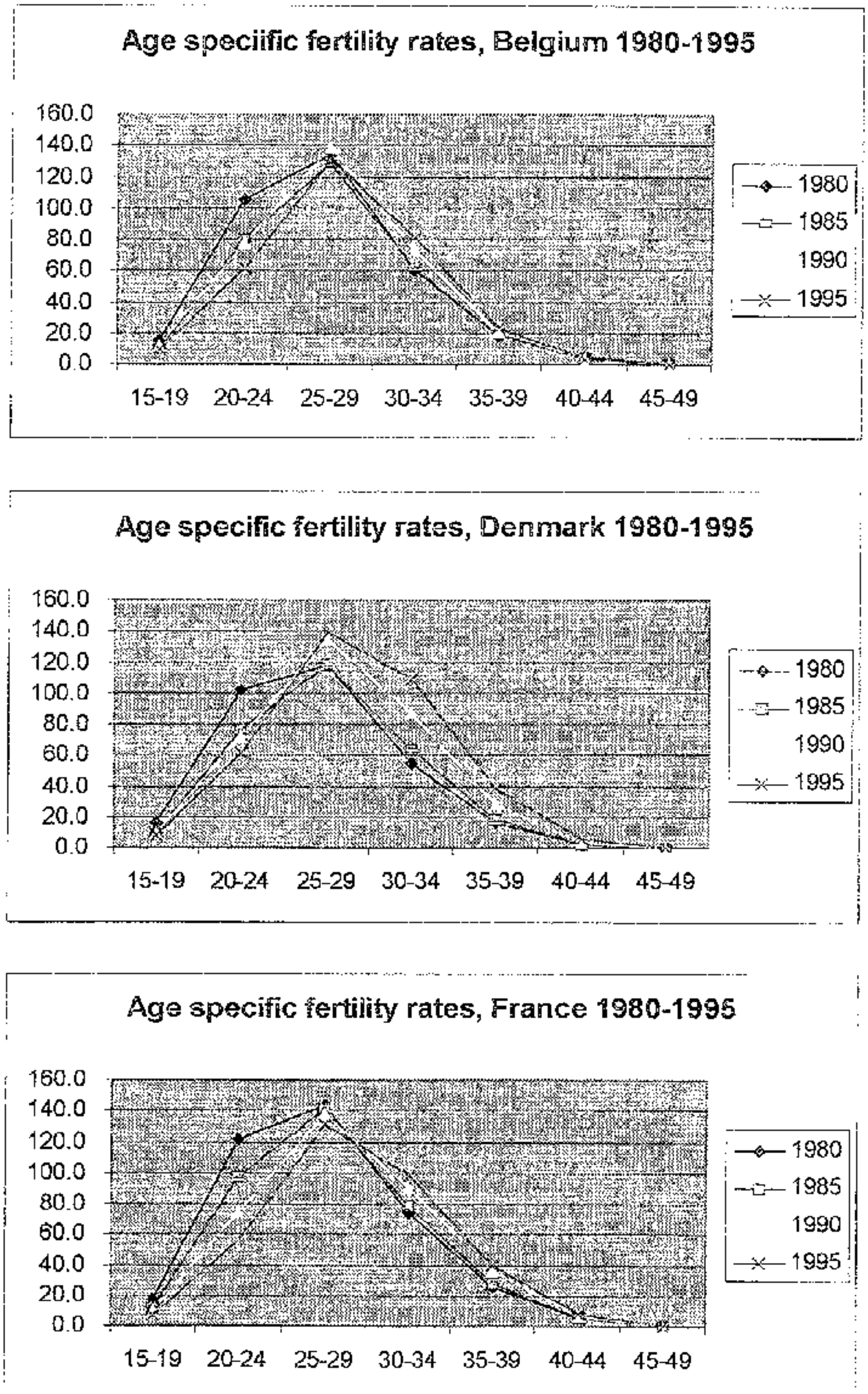
Table 5.15: The value of the dissimilarity index D by country and age group 1980 projection

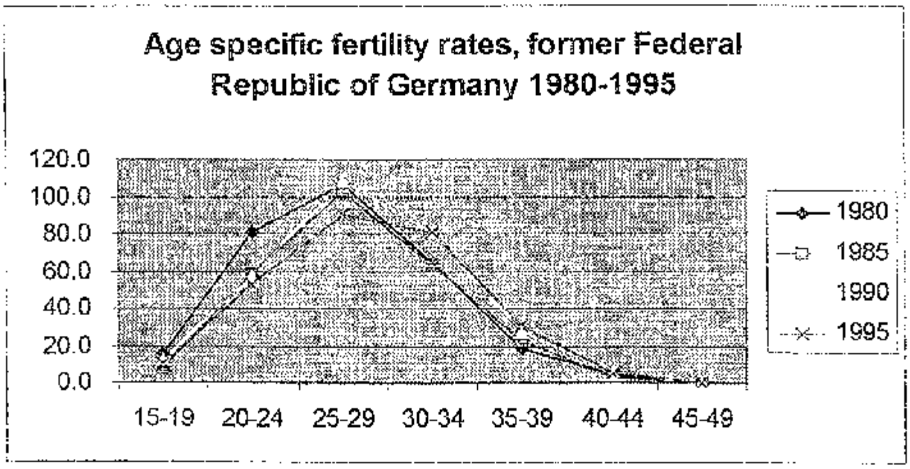
Year	1985			
Age	Total	0-14	15-59	60+
Belgium	0.36	1.16	0.51	0.52
Germany	0.93	1.32	0.97	0.95
Italy	1.03	1.34	1.19	1.24
Netherlands	0.55	0.89	0.62	1.17
Year	1990			
Age	Total	0-14	15-59	60+
Belgium	0.93	4.38	0.98	1.56
Germany	1.02	2.16	1.37	1.78
Italy	2.6	4.2	2.48	1.76
Netherlands	1.2	2.24	1.68	2.77
Year	1995			
Age	Total	0-14	15-59	60+
Belgium	1.56	6.44	1.48	2.6
Germany	2.03	4.08	2.41	2.84
Italy	4.36	7.84	3.88	1.96
Netherlands	2.07	5.14	2.64	3.93

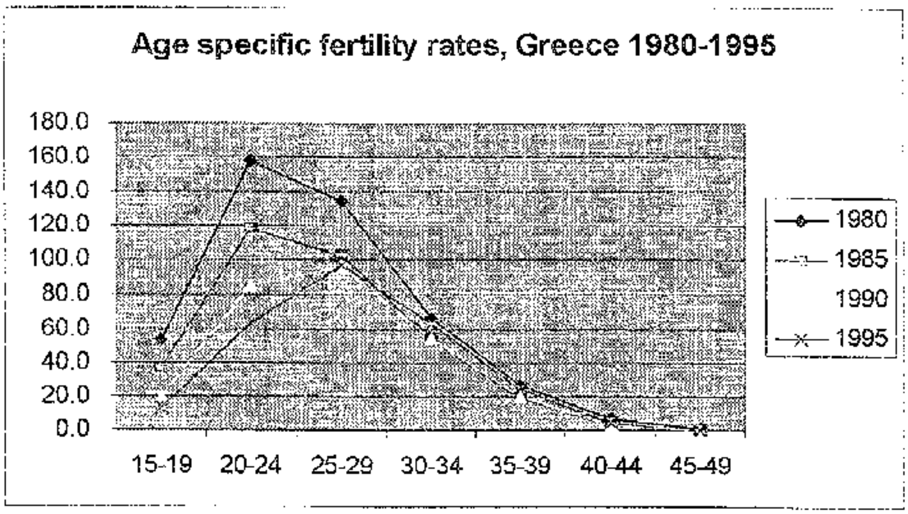
Table 5.16: The value of the dissimilarity index D by country and age group 1990 projection

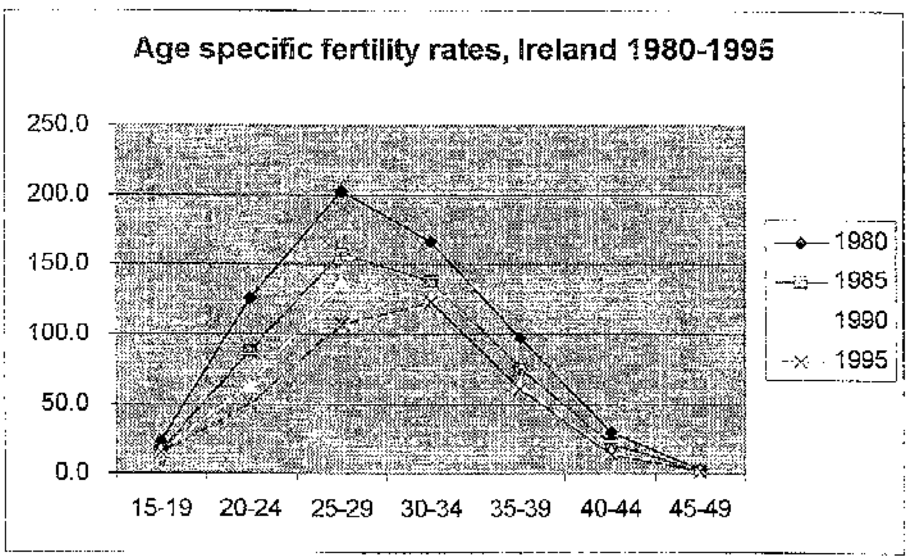
	1995				
Age	Total	0-14	15-24	25-64	65+
Belgium	0.48	0.79	1.03	0.62	0.43
France	0.34	0.78	3.91	0.63	1.51
Germany	2.06	5.13	3.09	1.45	1.21
Greece	5.35	5.75	4.68	6.78	3.91
Italy	1.17	1.41	1.26	0.54	0.53
Netherlands	0.49	0.88	3.61	0.69	0.60
Spain	1.70	1.72	1.53	2.22	1.34
UK	1.49	2.02	4.07	2.06	2.93

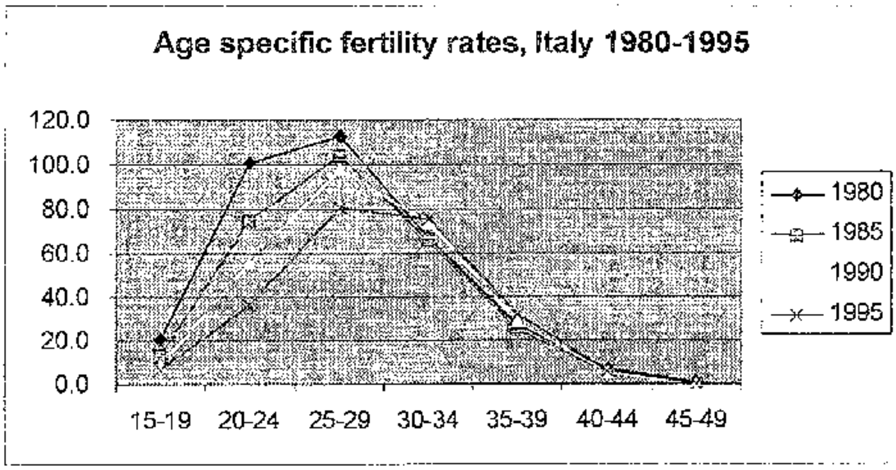
Figure 3.1: Age specific fertility rates, 1980-1995

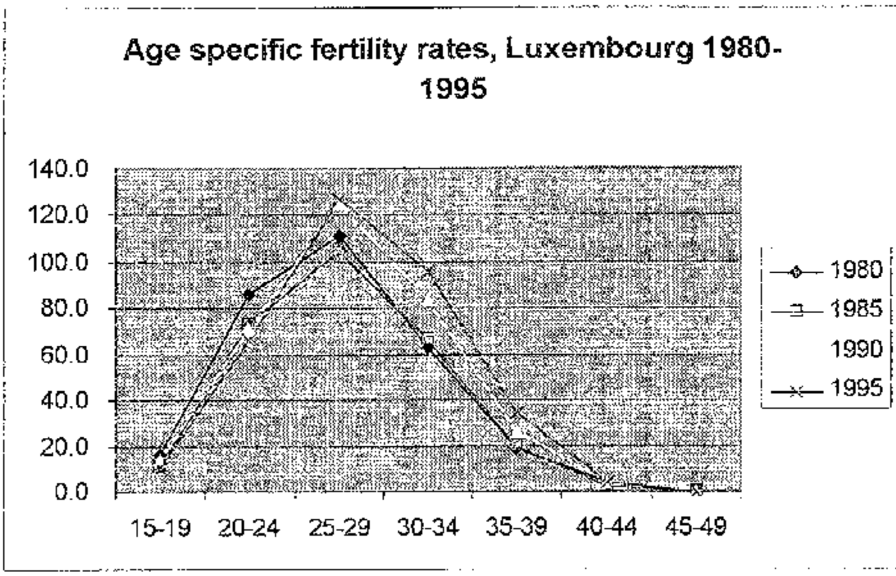


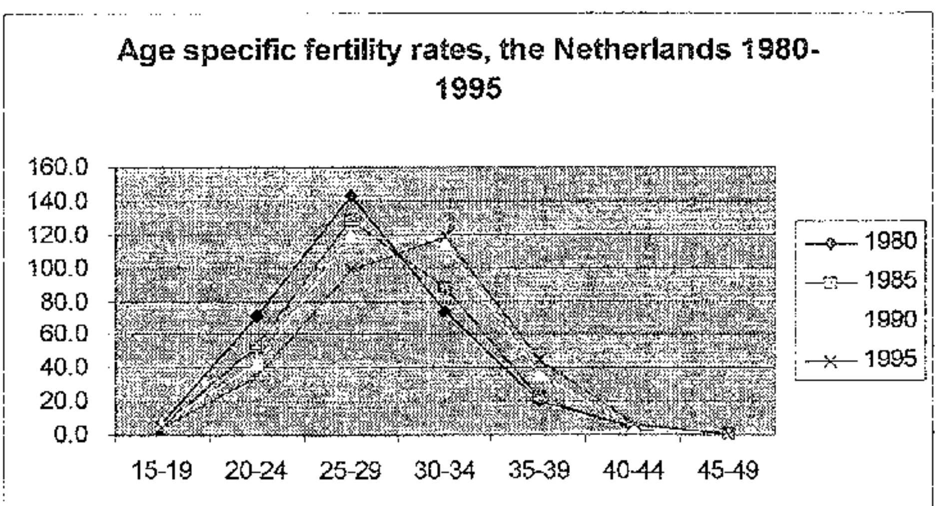

Age specific fertility rates, former Federal Republic of Germany 1980-1995
120.0
100.0
80.0
60.0
40.0
20.0
0.0
15-19
20-24
25-29
30-34
35-39
40-44
45-49
1980
1985
1990
1995

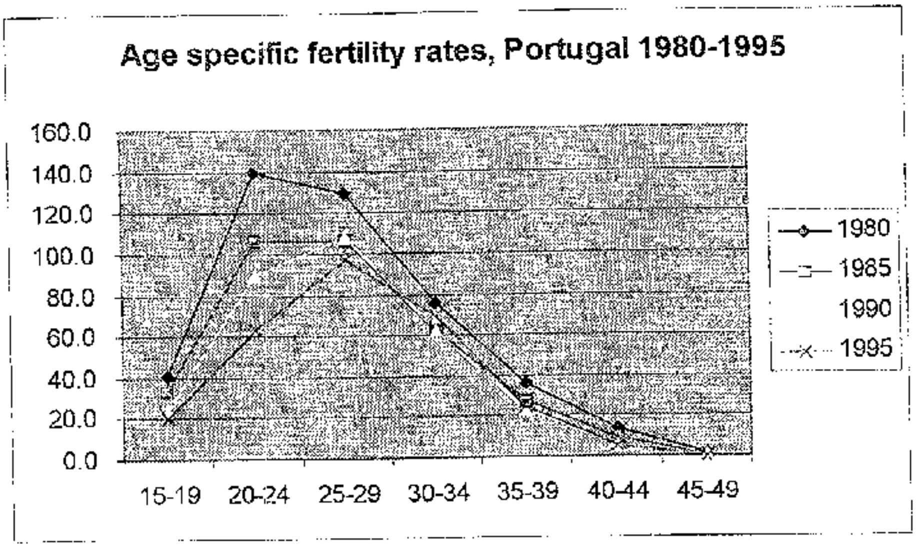

Age specific fertility rates, Greece 1980-1995
180.0
160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
15-19
20-24
25-29
30-34
35-39
40-44
45-49
1980
1985
1990
1995

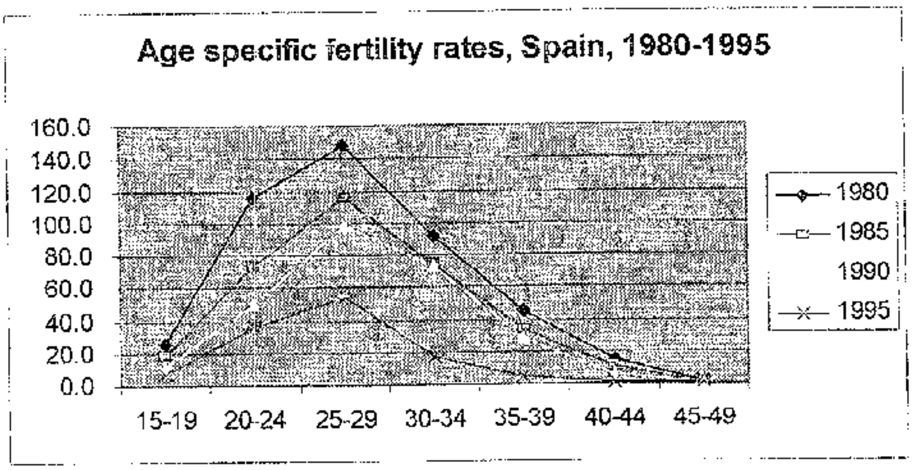

Age specific fertility rates, Ireland 1980-1995
250.0
200.0
150.0
100.0
50.0
0.0
15-19
20-24
25-29
30-34
35-39
40-44
45-49
1980
1985
1990
1995

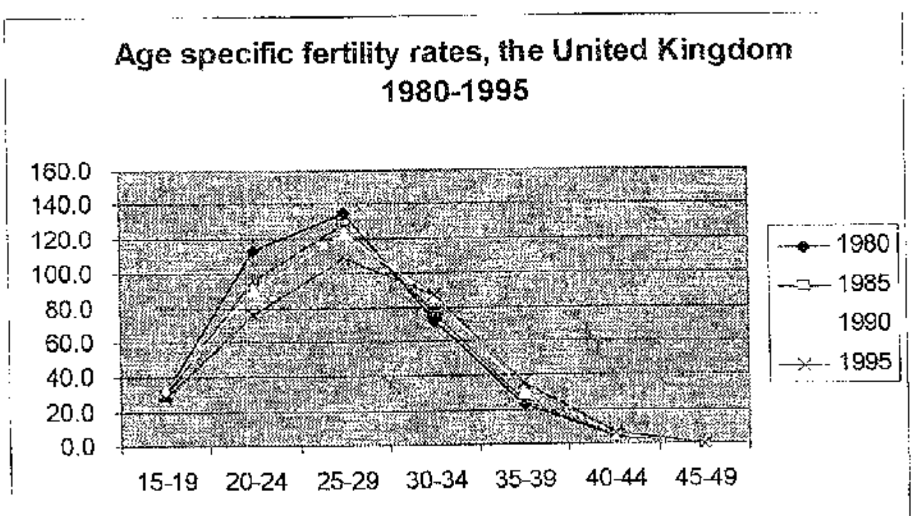

Age specific fertility rates, Italy 1980-1995
120.0
100.0
80.0
60.0
40.0
20.0
0.0
15-19
20-24
25-29
30-34
35-39
40-44
45-49
1980
1985
1990
1995


Age specific fertility rates, Luxembourg 1980-1995
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
15-19
20-24
25-29
30-34
35-39
40-44
45-49
1980
1985
1990
1995


Age specific fertility rates, the Netherlands 1980-1995
160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
15-19
20-24
25-29
30-34
35-39
40-44
45-49
1980
1985
1990
1995







Source: Council of Europe 1995, 1998

Figure 3.2: Total fertility rate, EUR12, 1960-1996
Source: Council of Europe 1995, 1998

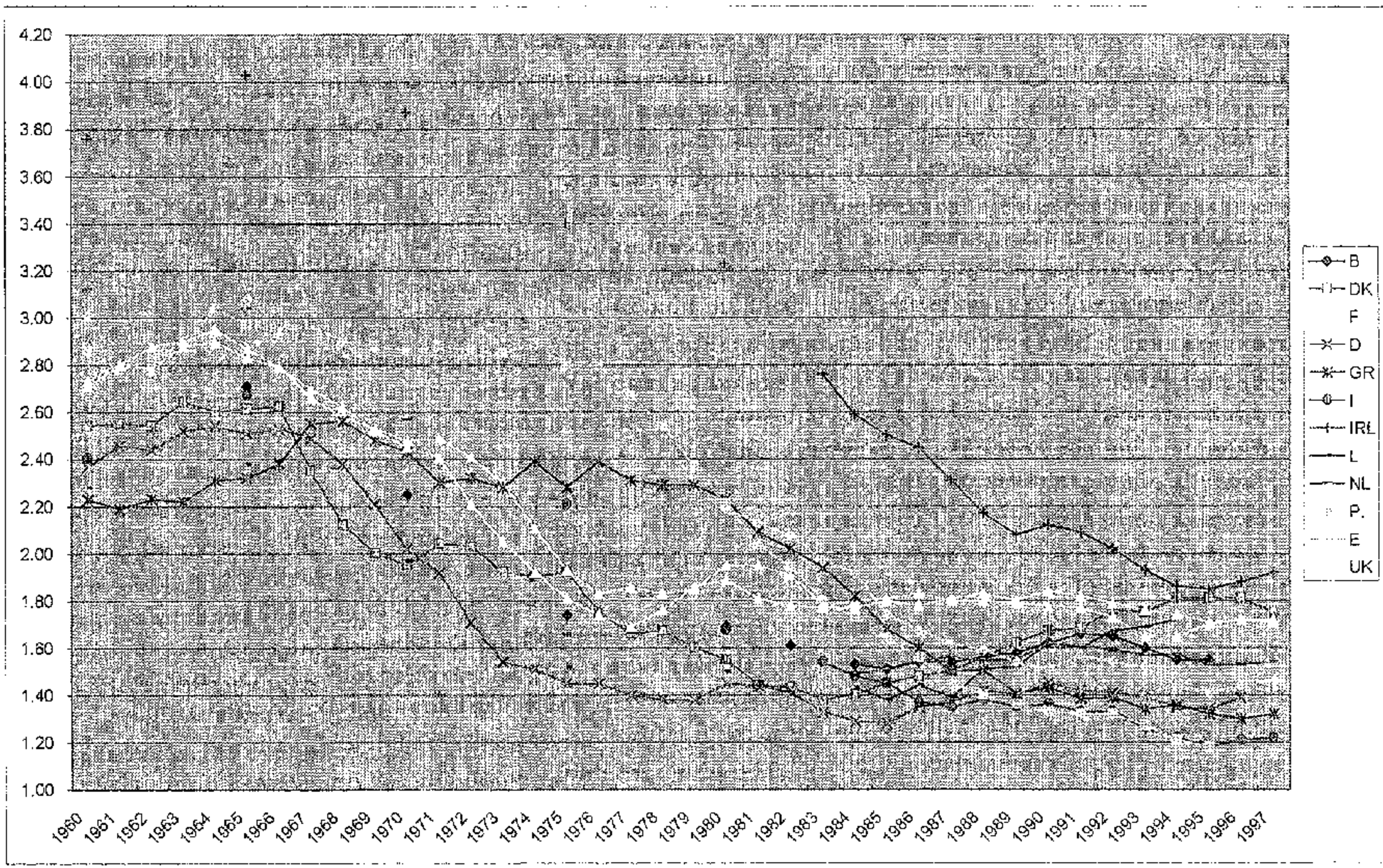


Figure 3.3: Regional age specific fertility rates standardised to national values, Germany 1984

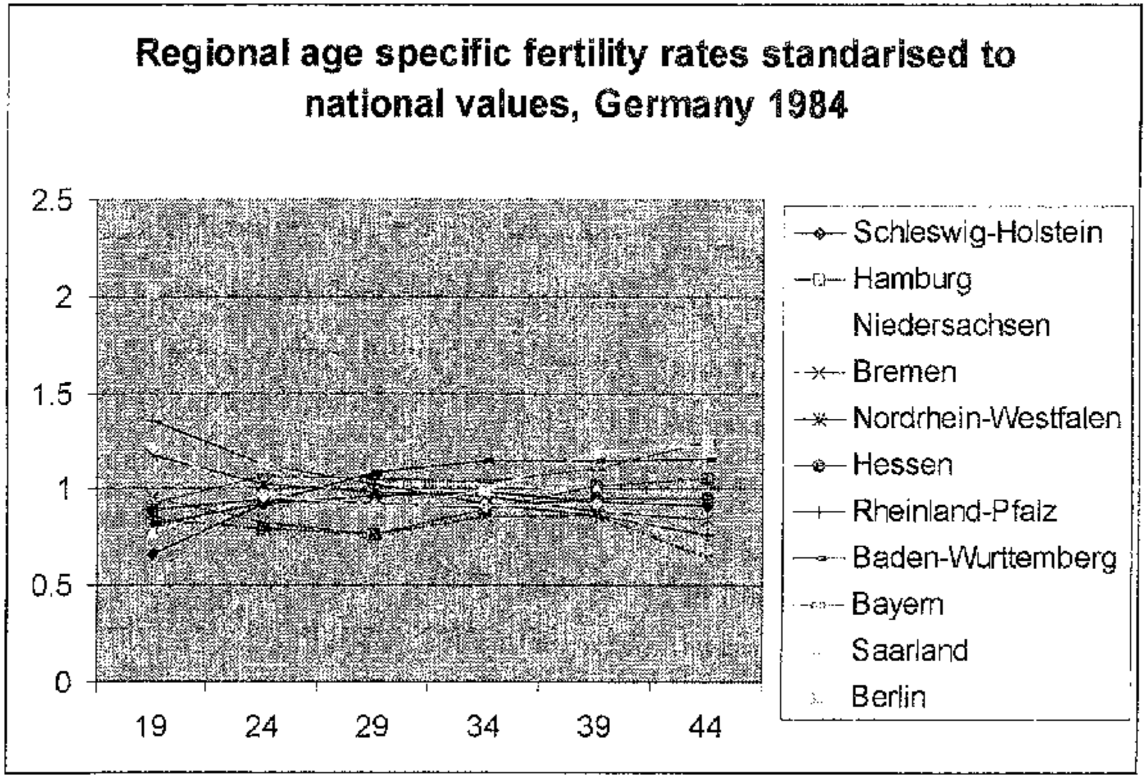


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Figure 3.4: Regional age specific death rates standardised to national values, Germany 1984

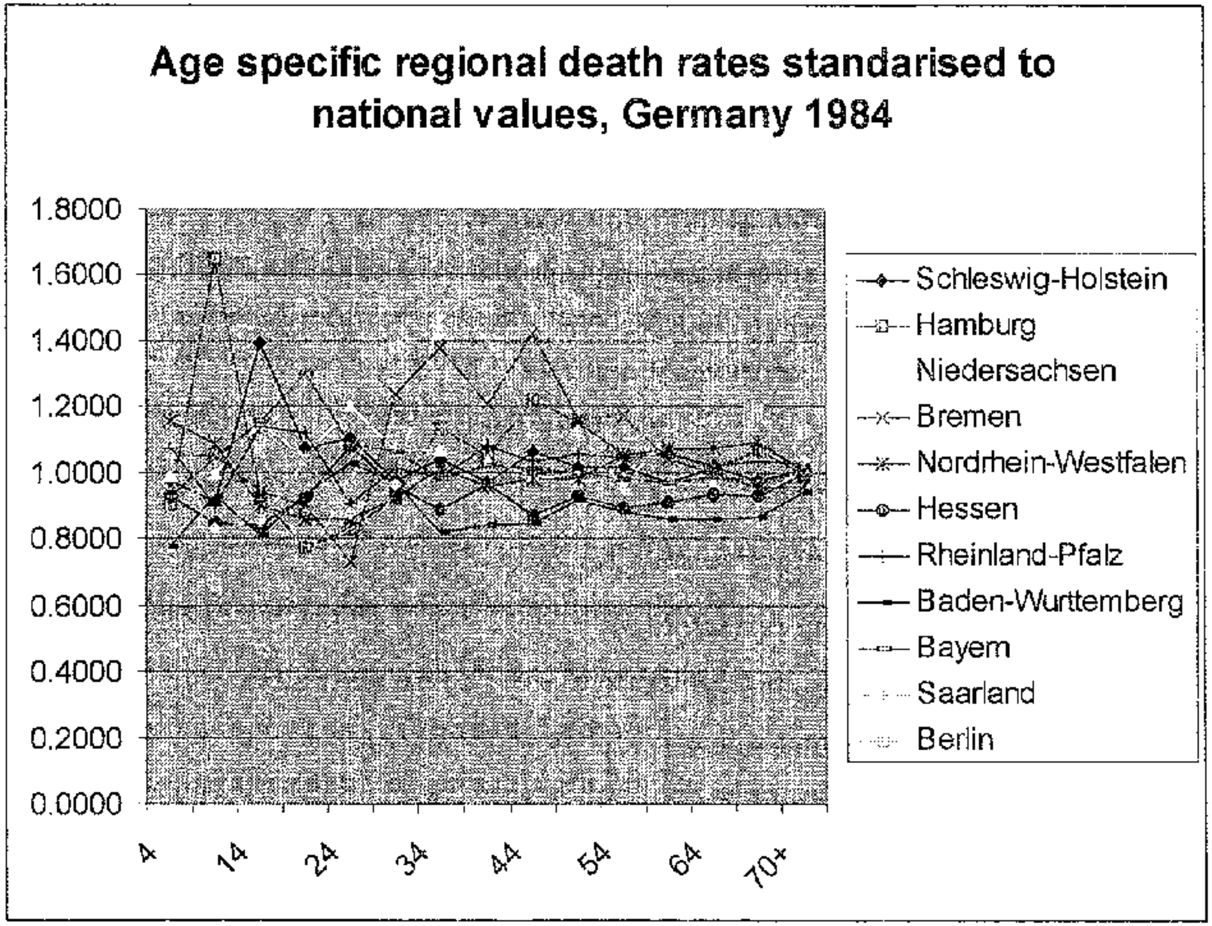

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Figure 4.1a: Comparison of projection results for total population: Belgium

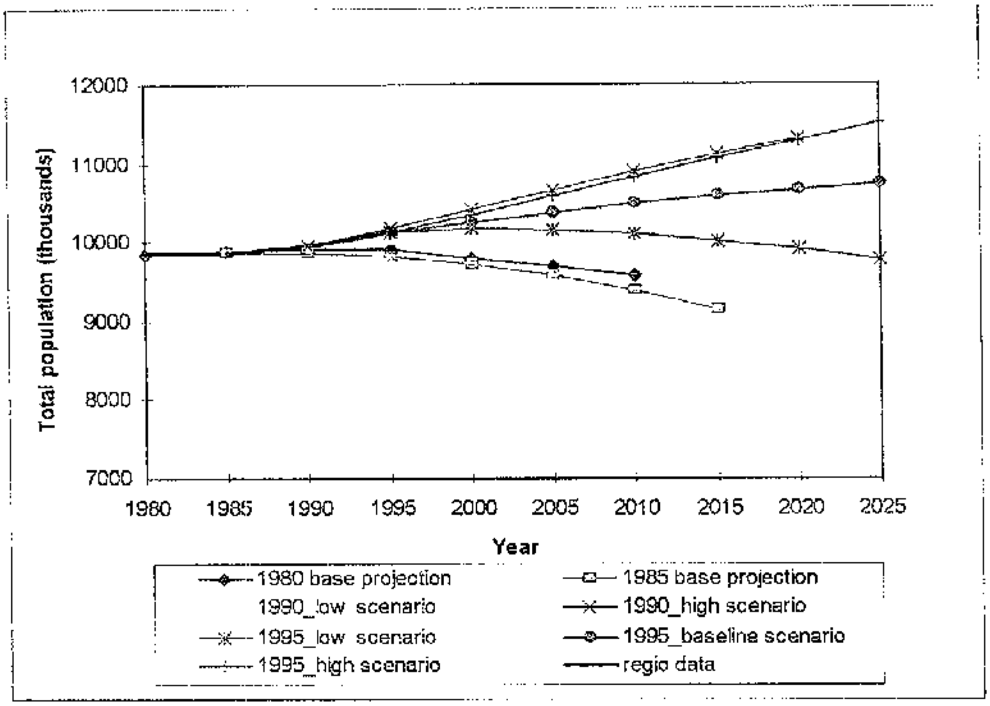

Figure 4.1b: Comparison of projection results for population aged 0-14: Belgium

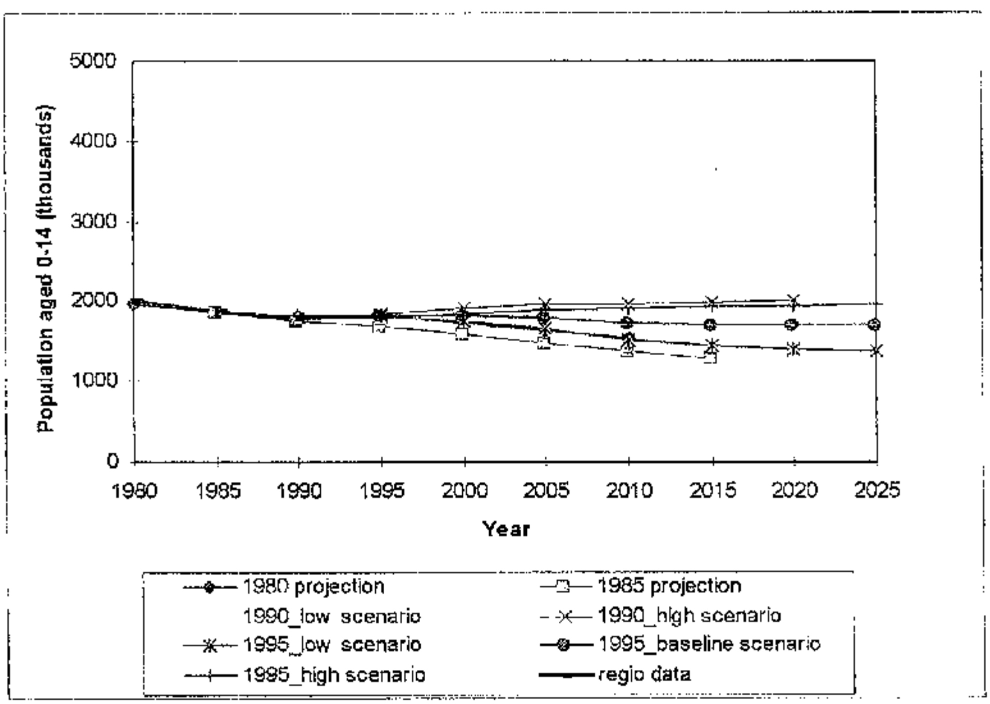

Figure 4.1c: Comparison of projection results for population aged 15-59: Belgium

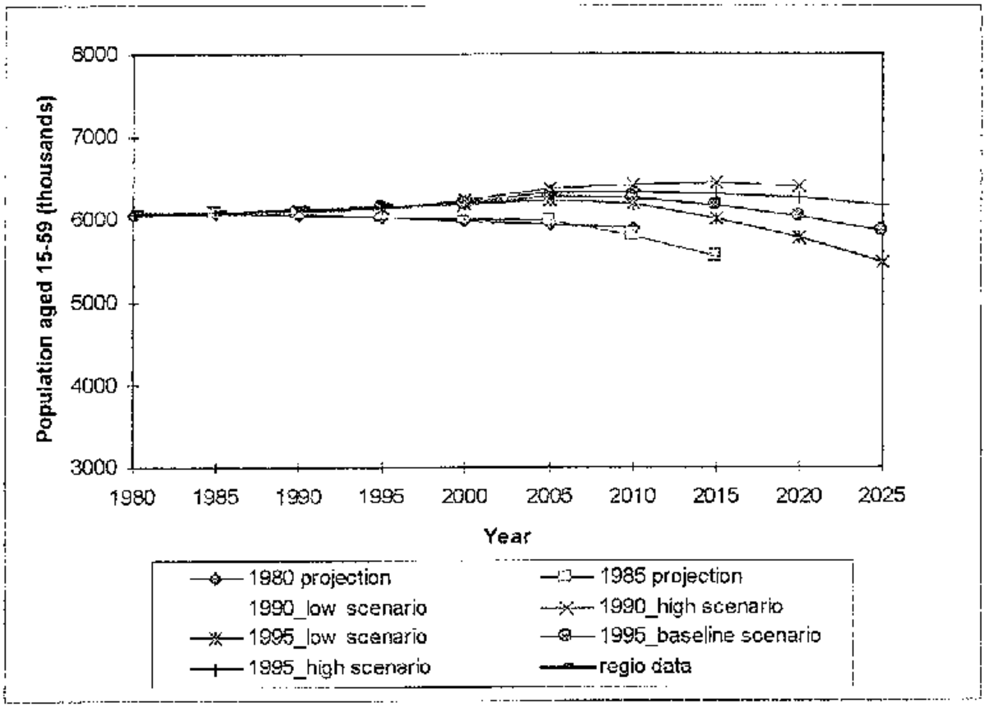

Figure 4.1d: Comparison of projection results for population aged 60+: Belgium

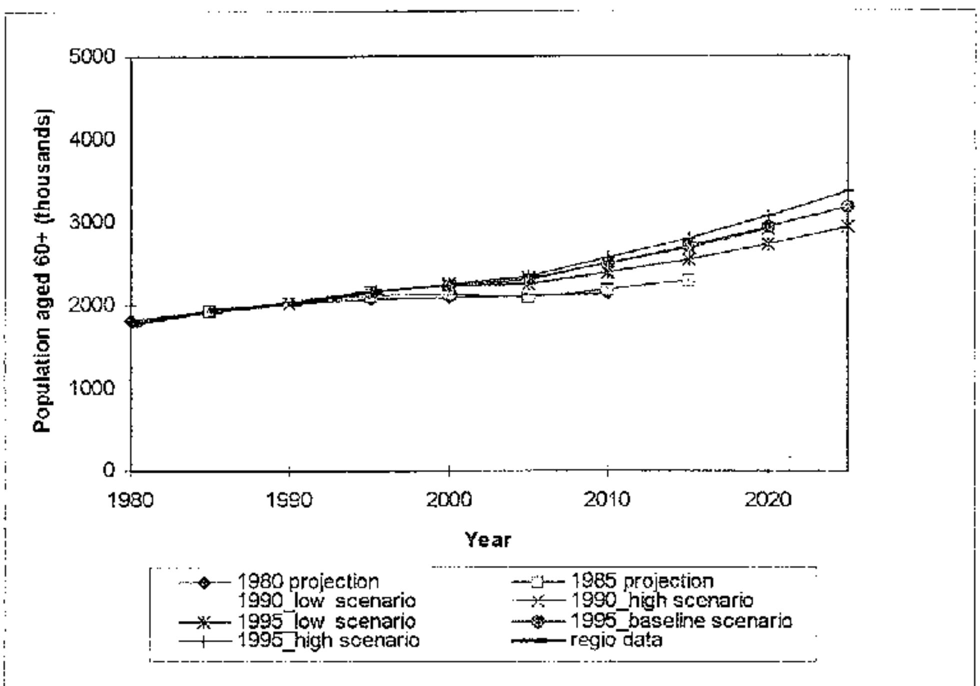

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Figure 4.2a: Comparison of projection results for total population : Denmark

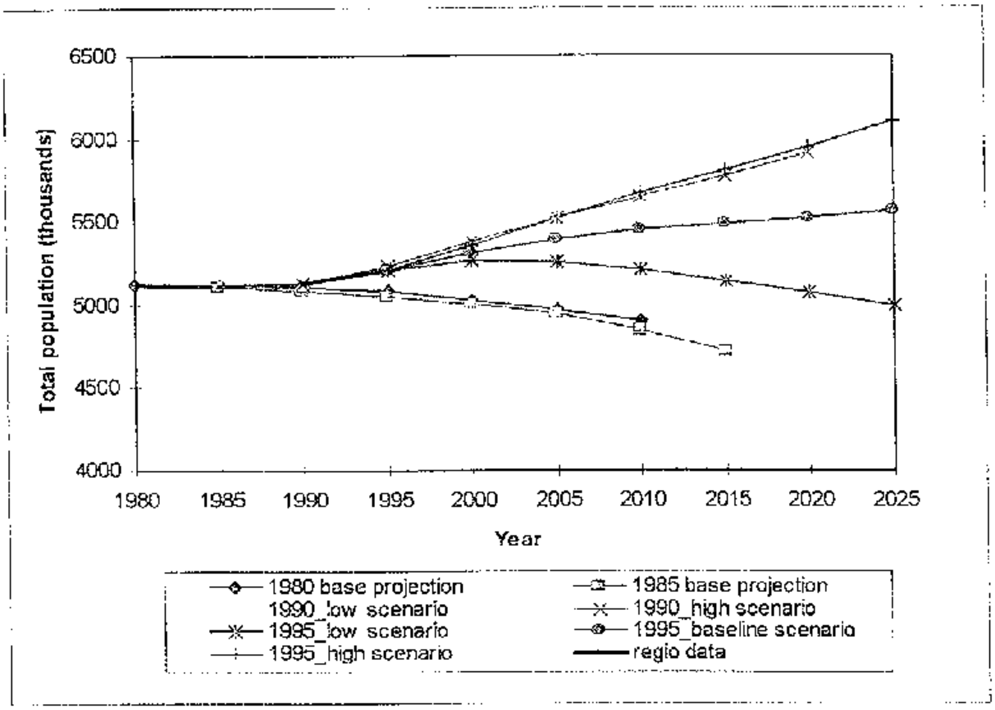

Figure 4.2b: Comparison of projection results for population aged 0-14: Denmark

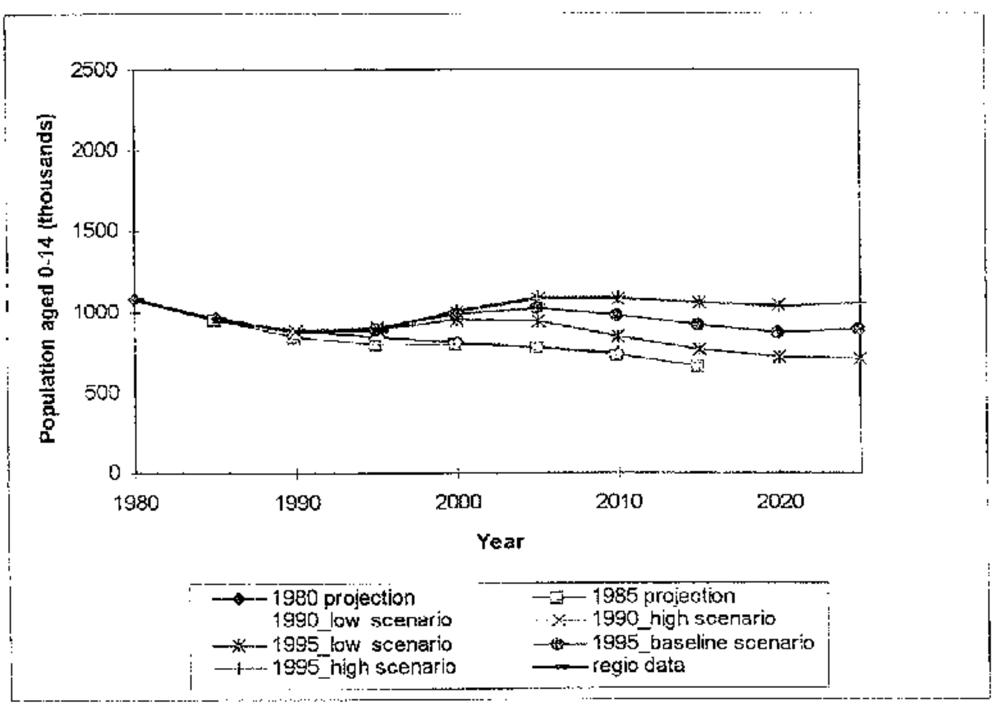

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Figure 4.2c: Comparison of projection results for population aged 15-59: Denmark

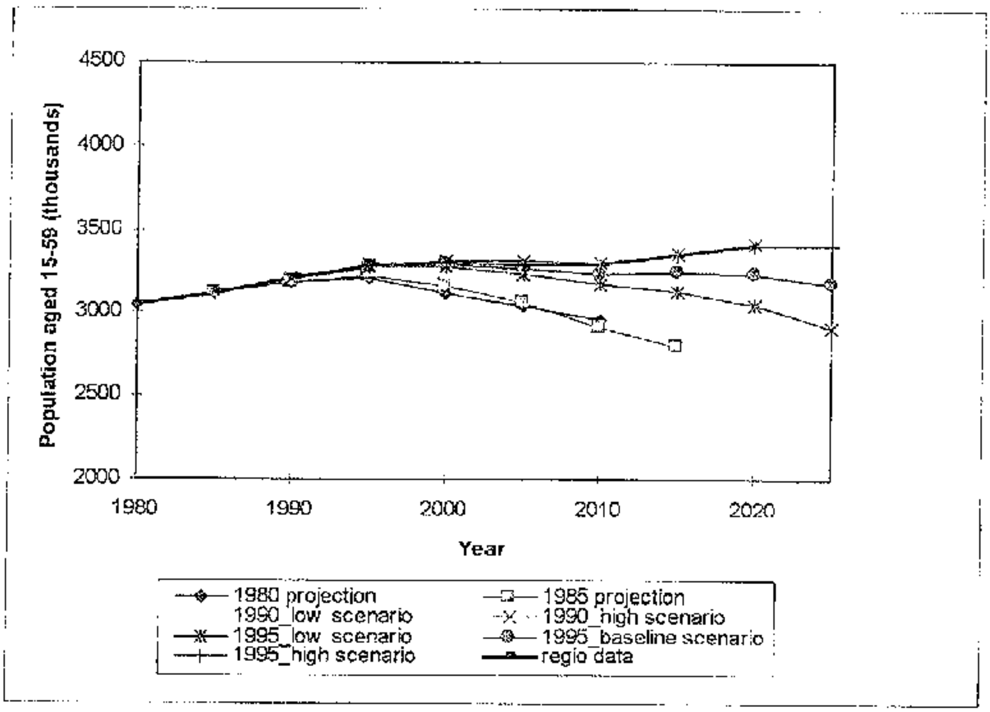

Figure 4.2d: Comparison of projection results for population aged 60+: Denmark

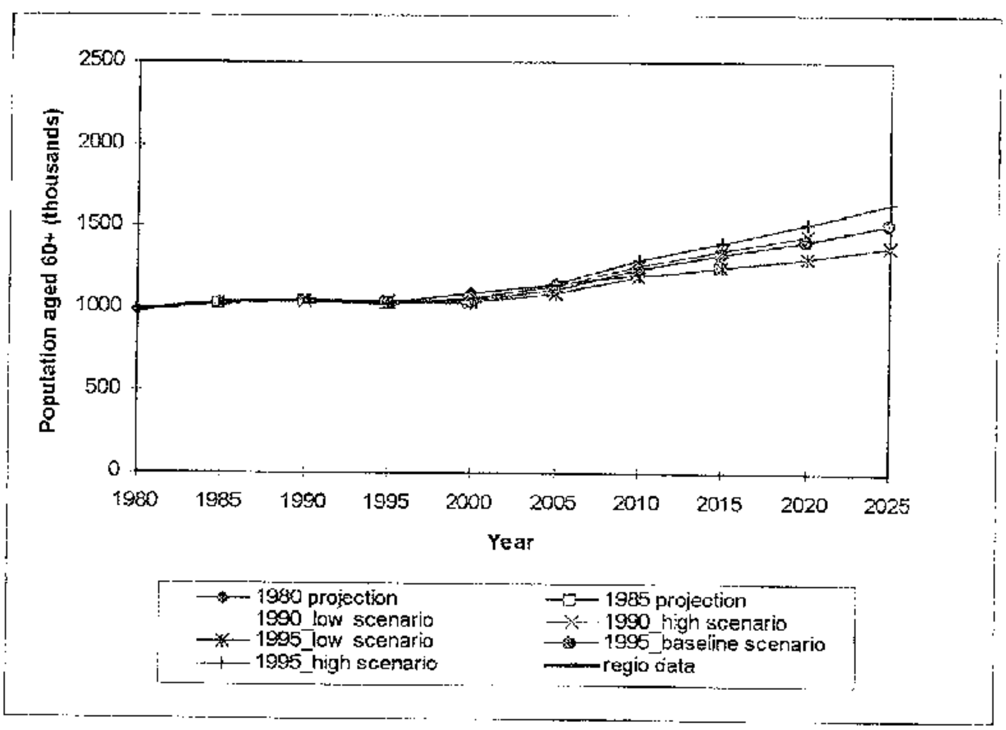

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Figure 4.3a: Comparison of projection results for total population: Germany

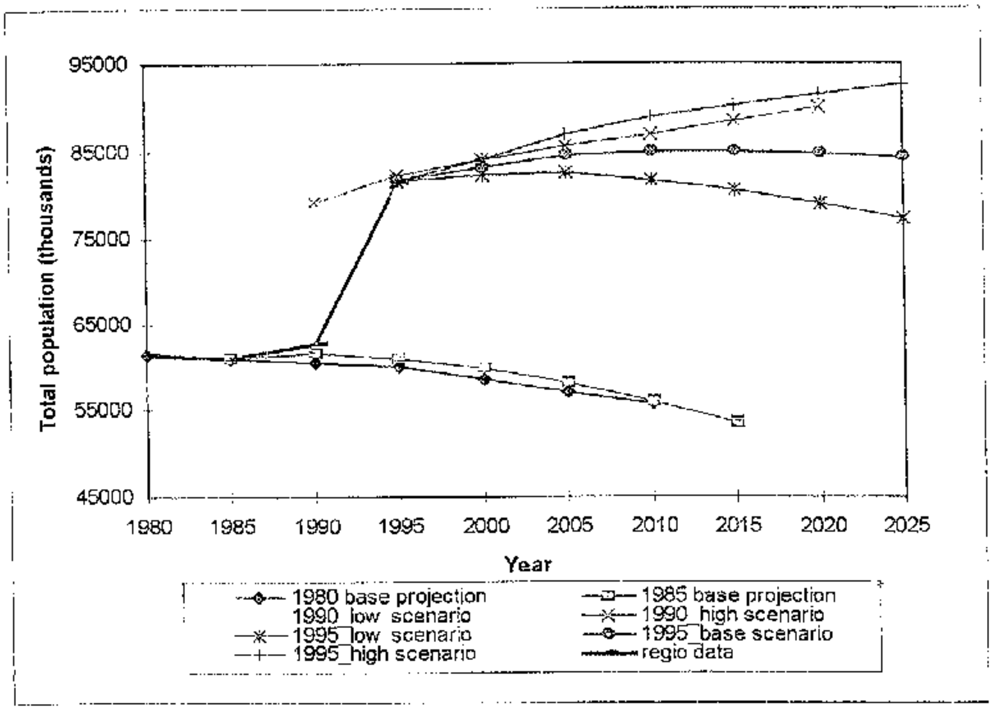

Figure 4.3b: Comparison of projection results for population aged 0-14: Germany

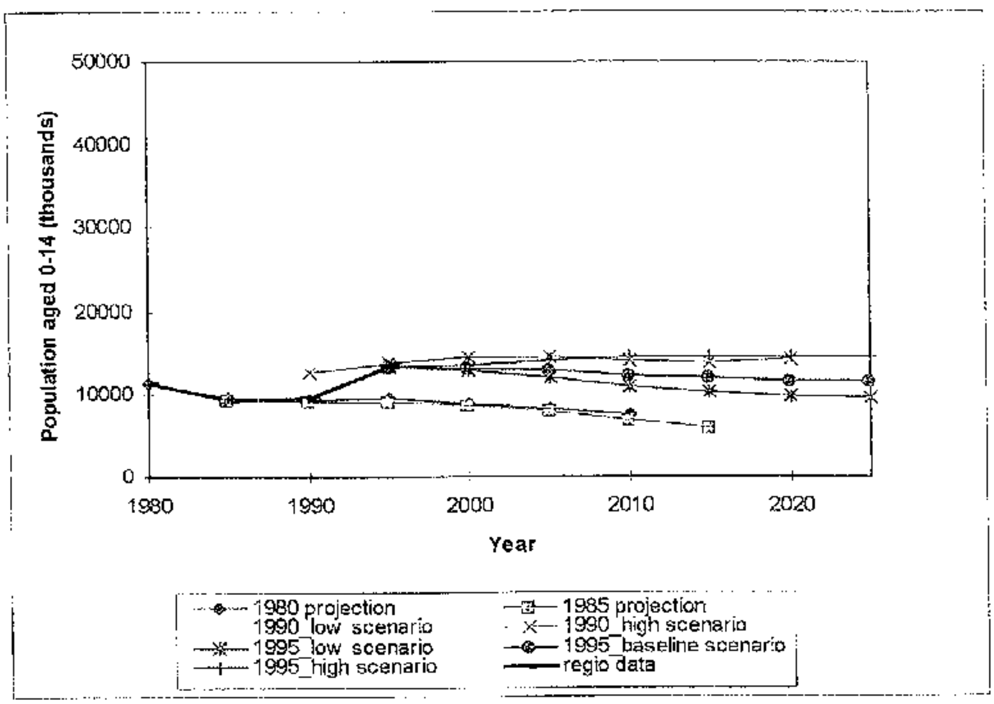

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Figure 4.3c: Comparison of projection results for population 15-59: Germany

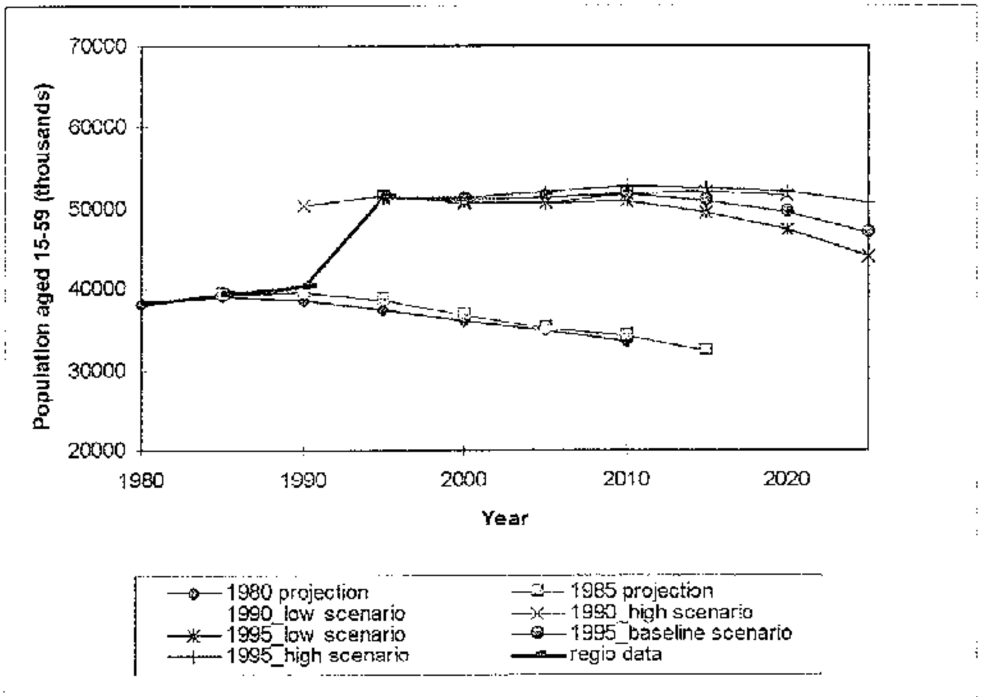

Figure 4.d: Comparison of projection results for population aged 60+: Germany

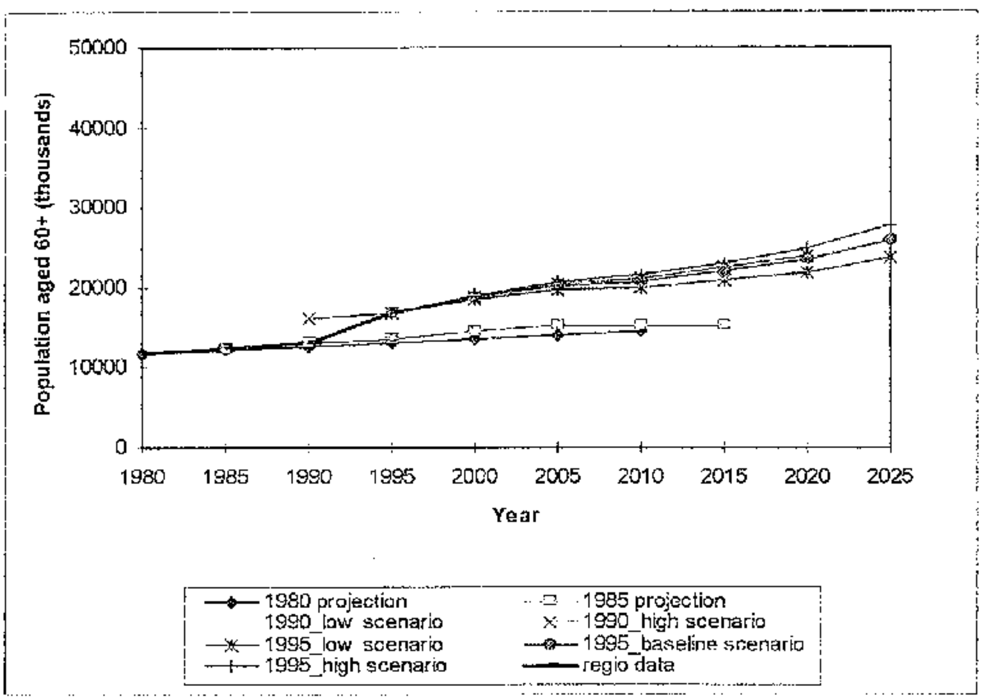

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Figure 4.4a: Comparison of projection results for total population : Greece

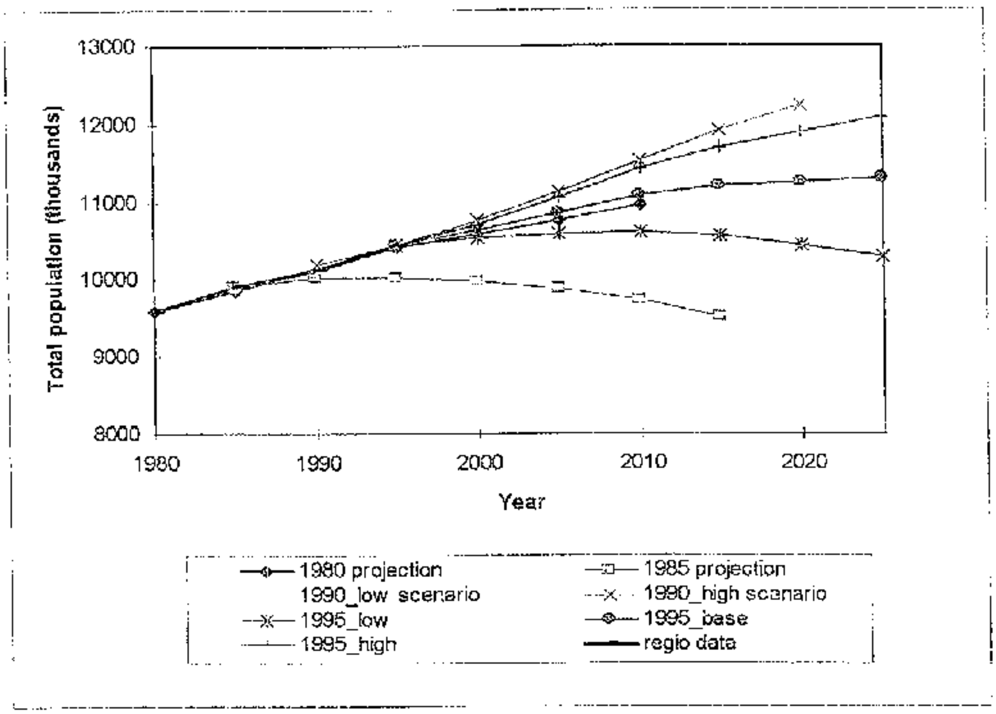

Figure 4.4b: Comparison of projection results for population aged 0-14: Greece

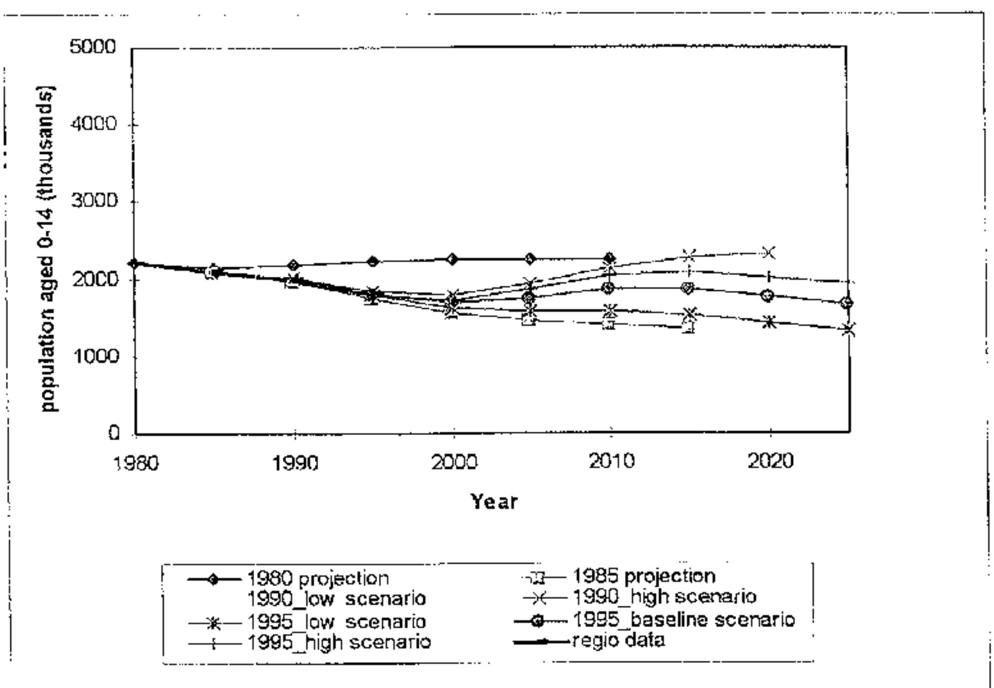

Figure 4.4c: Comparison of projection results for population aged 15-59: Greece

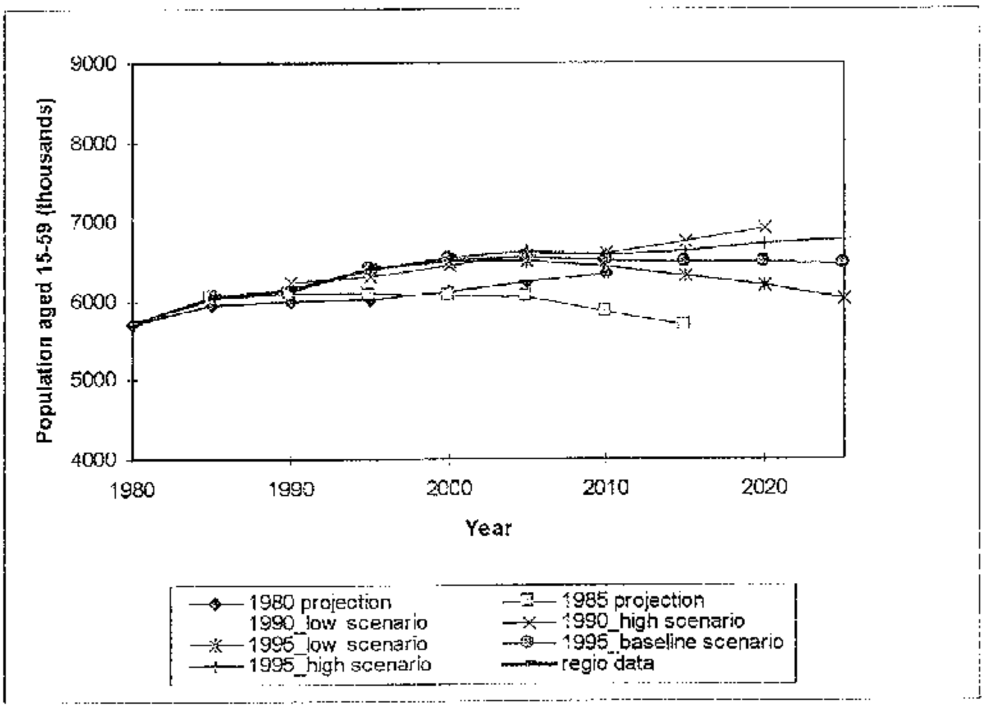

Figure 4.4d: Comparison of projection results for population aged 60+: Greece

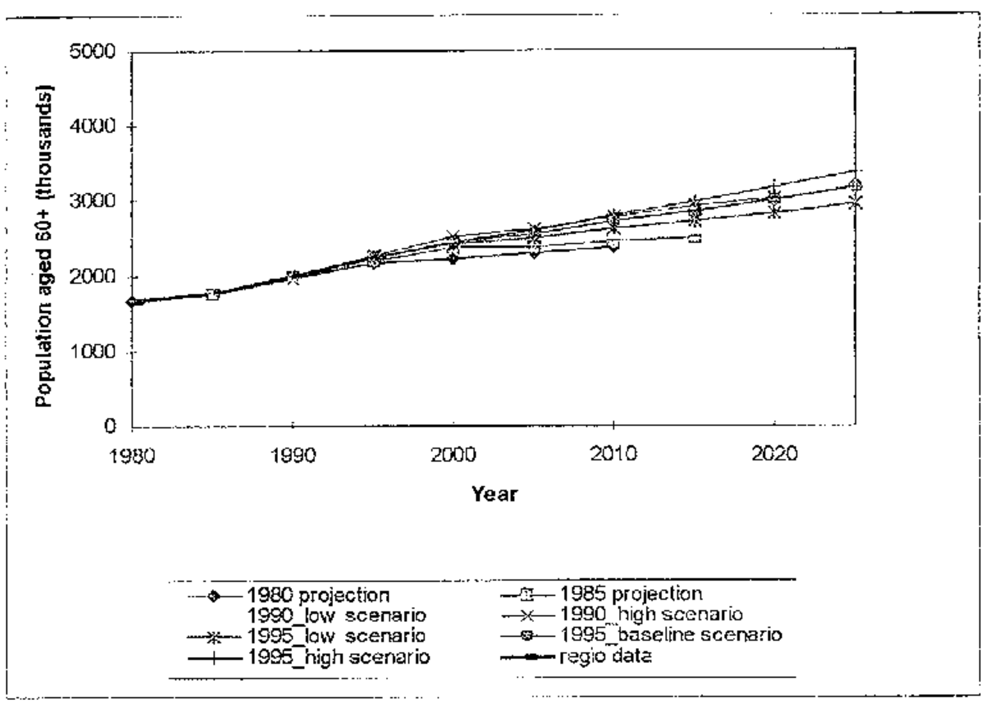

Figure 4.5c: Comparison of projection results for population aged 15-59: Spain

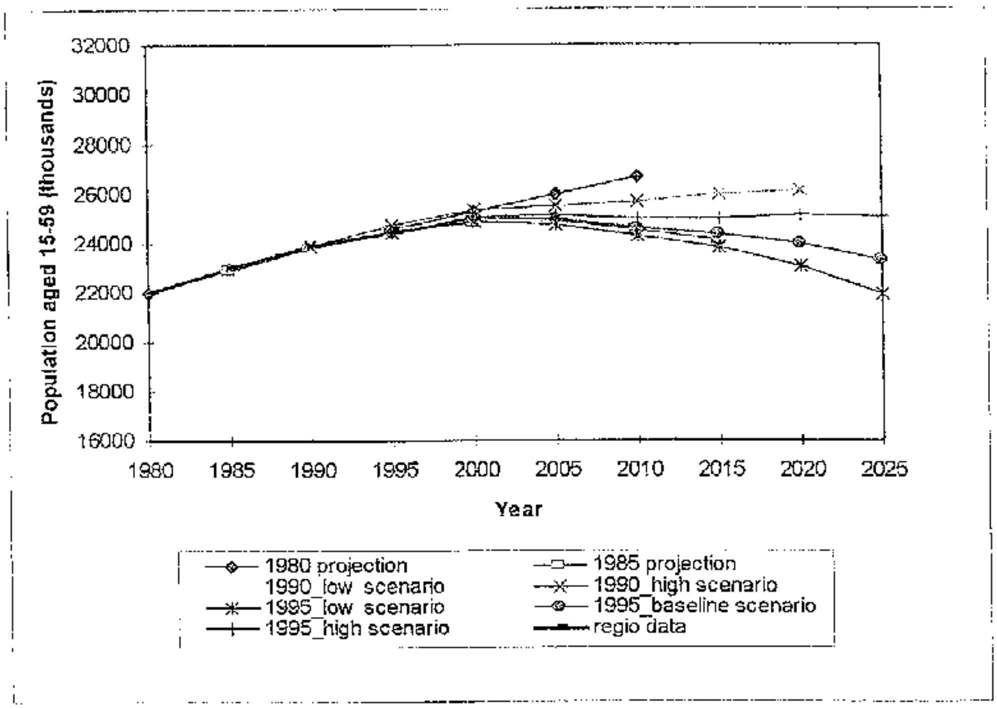

Figure 4.5d: Comparison of projection results for population aged 60+: Spain

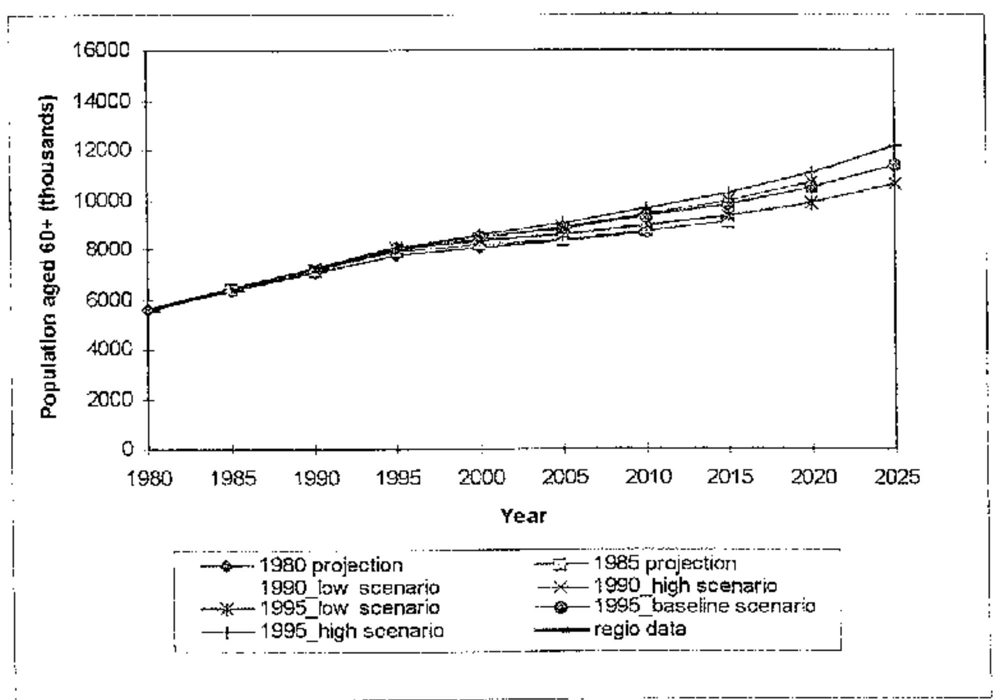

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Figure 4.5a: Comparison of projection results for total population: Spain

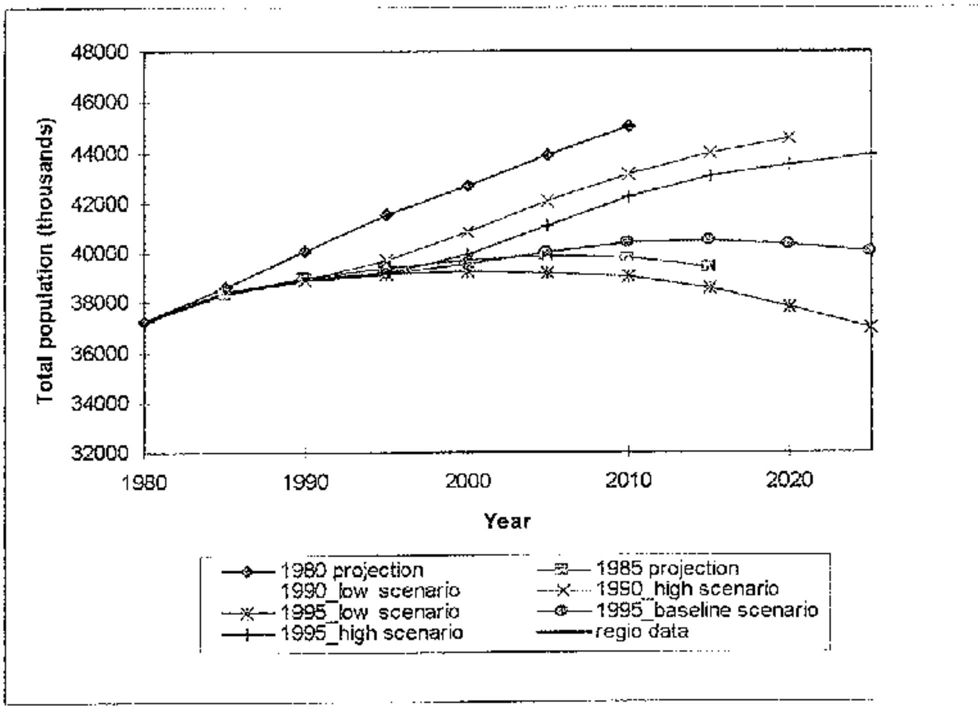

Figure 4.5b: Comparison of projection results for population aged 0-14: Spain

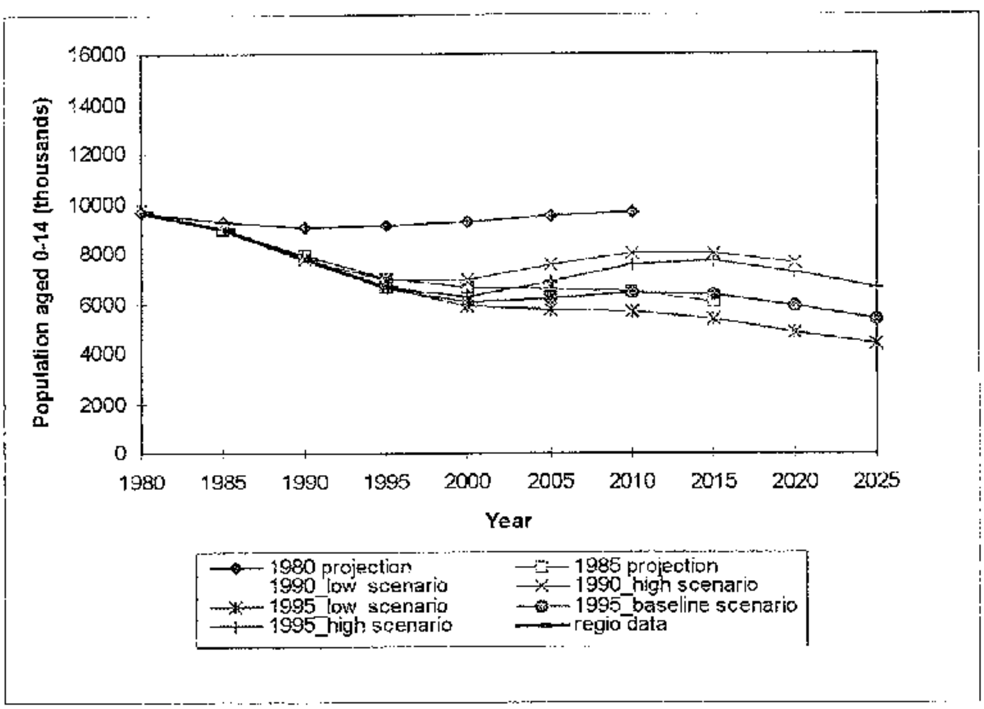

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Figure 4.6a: Comparison of projection results for total population: France

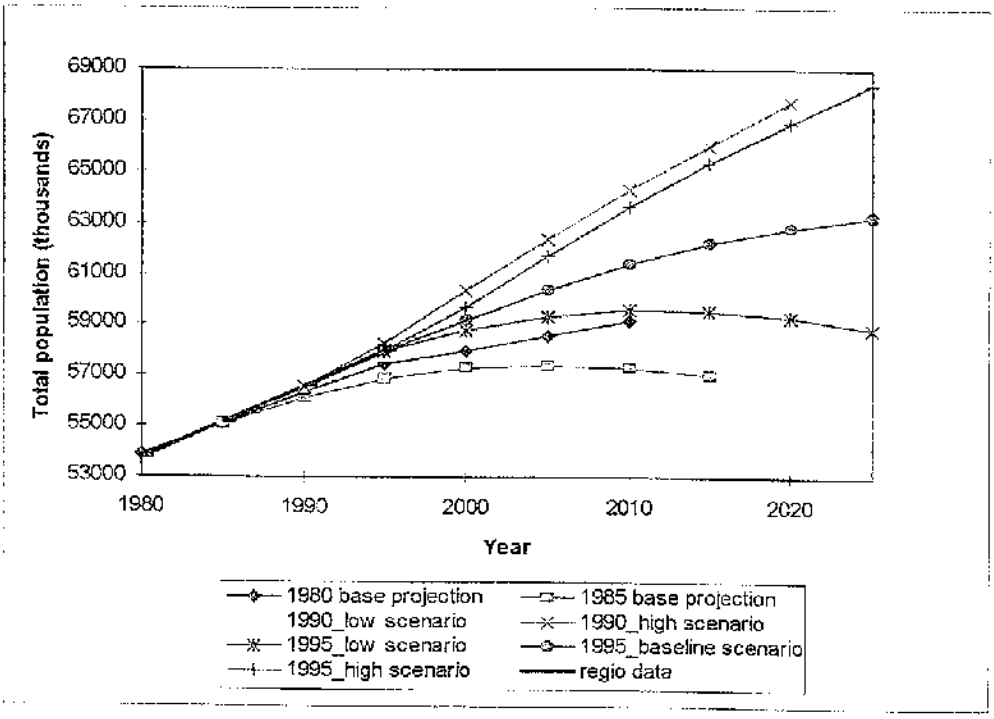

Figure 4.6b: Comparison of projection results for population aged 0-14: France

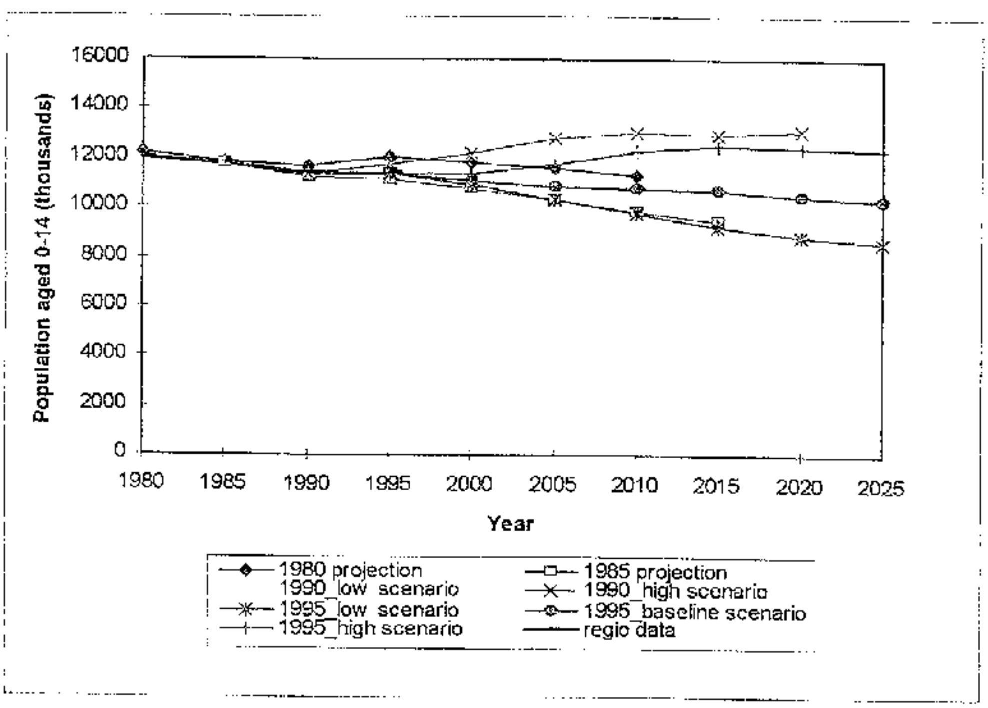

Figure 4.6c: Comparison of projection results for population aged 15-59: France

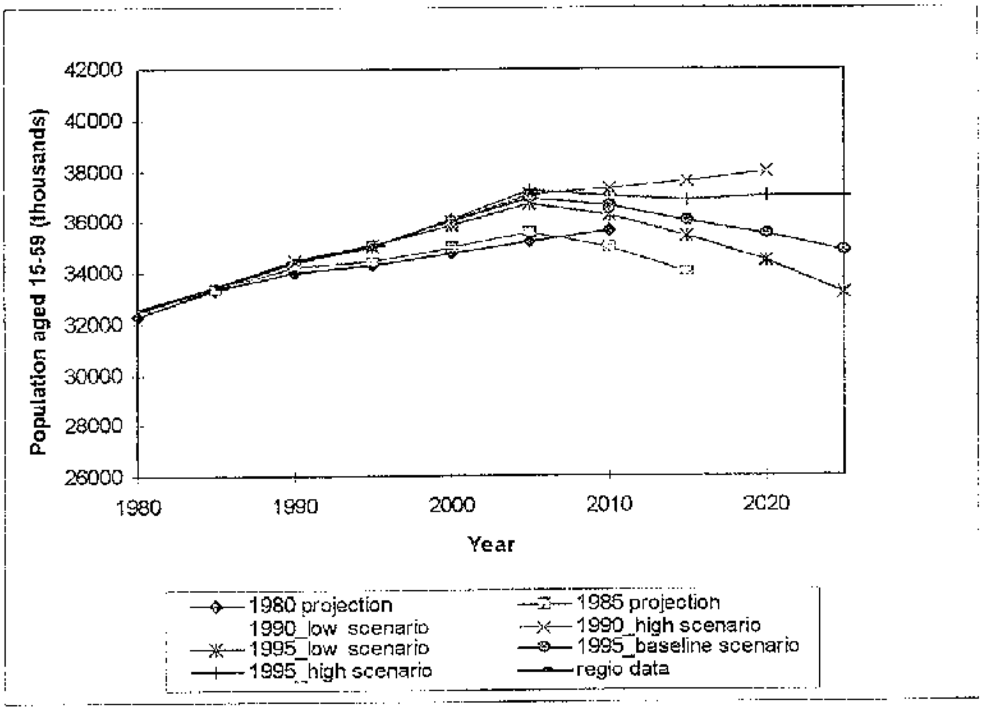

Figure 4.6d: Comparison of projection results for population aged 60+: France

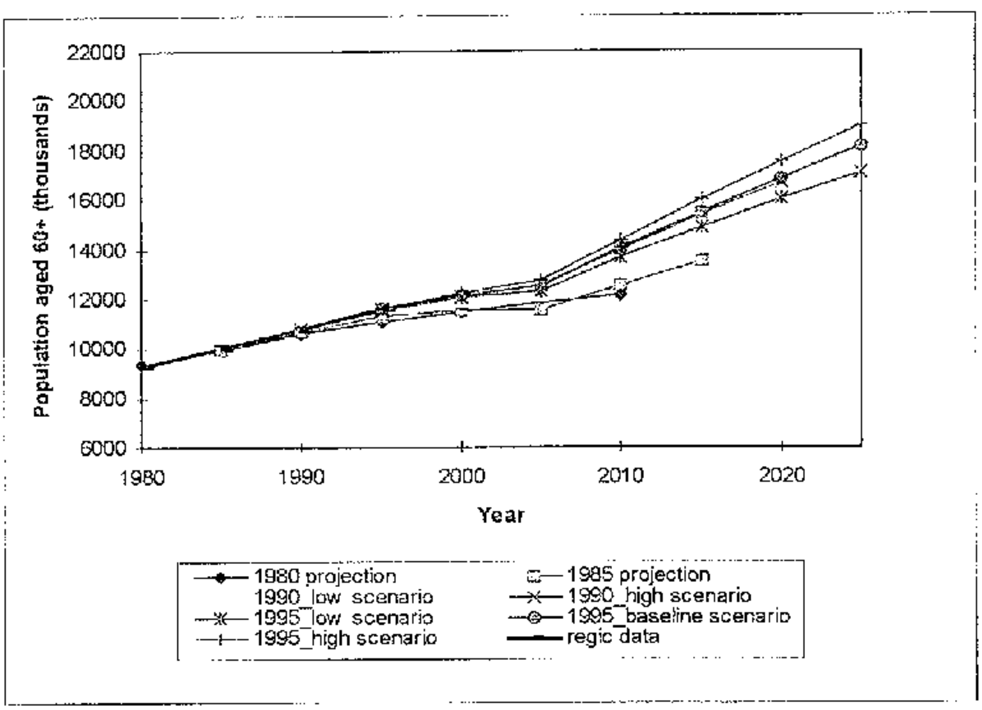

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Figure 4.7a: Comparison of projection results for total population: Ireland

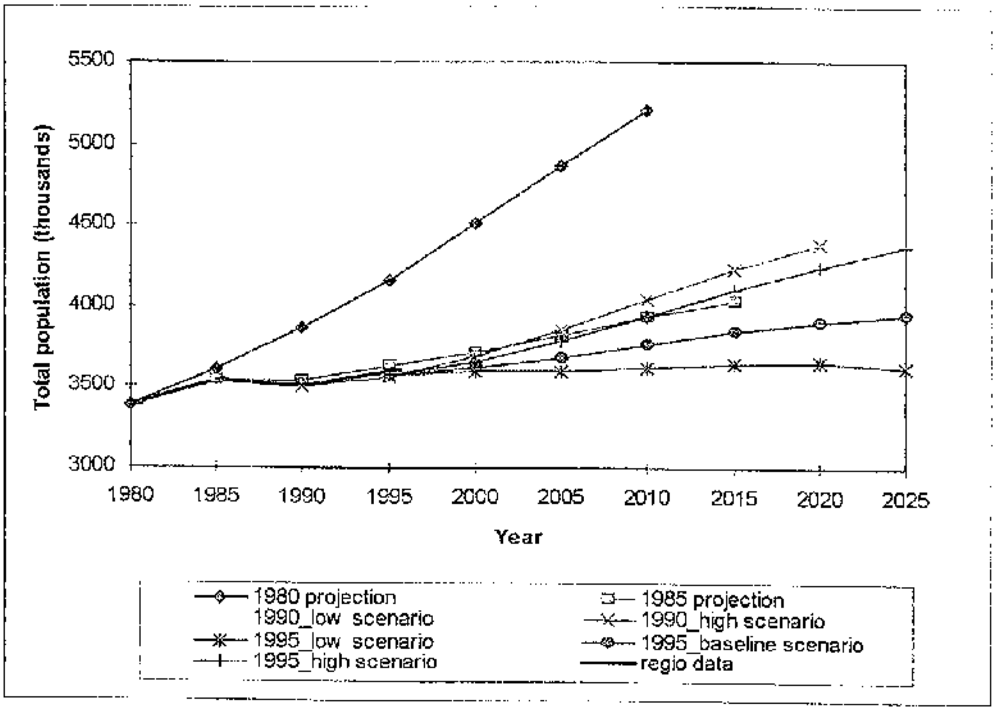

Figure 4.7b: Comparison of projection results for population aged 0-14: Ireland

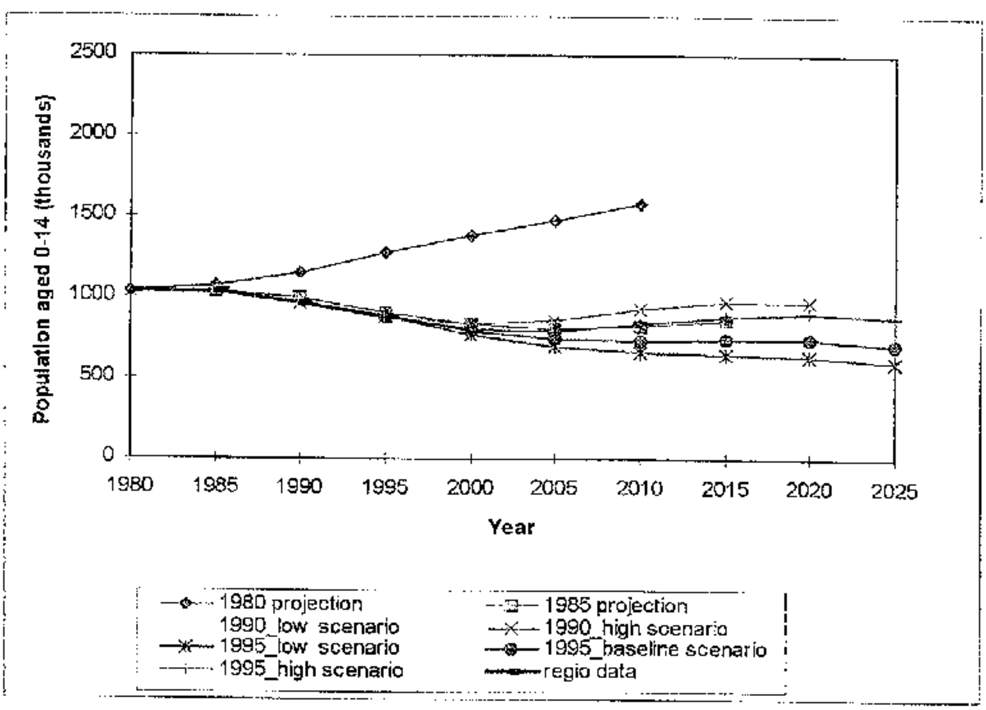

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Figure 4.7c: Comparison of projection results for population aged 15-59: Ireland

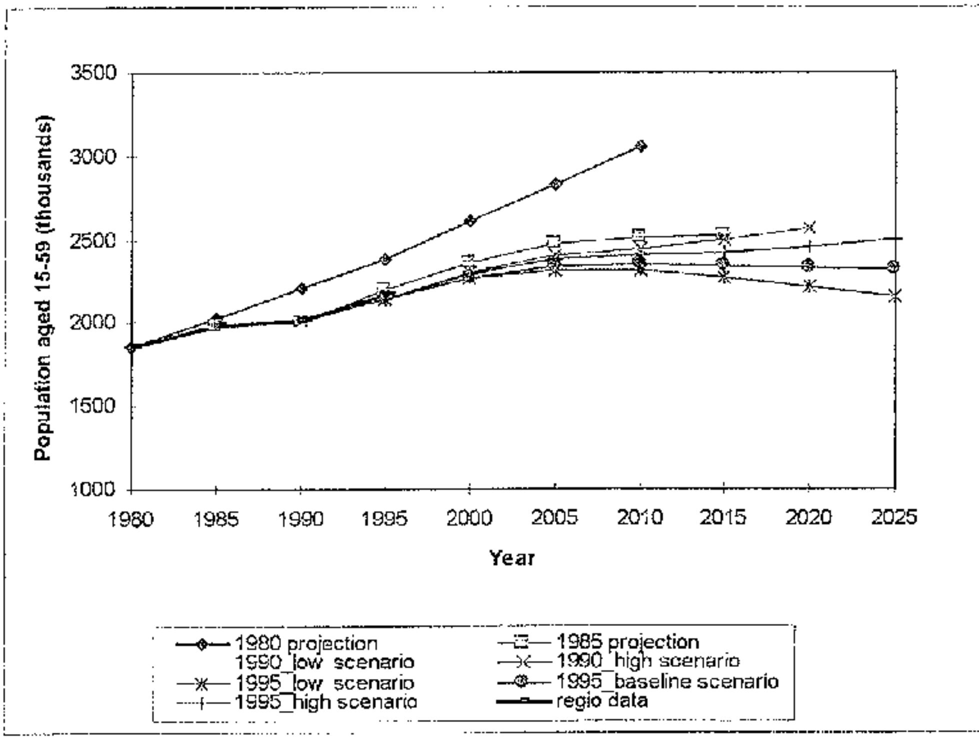

Figure 4.7d: Comparison of projection results for population aged 60+: Ireland

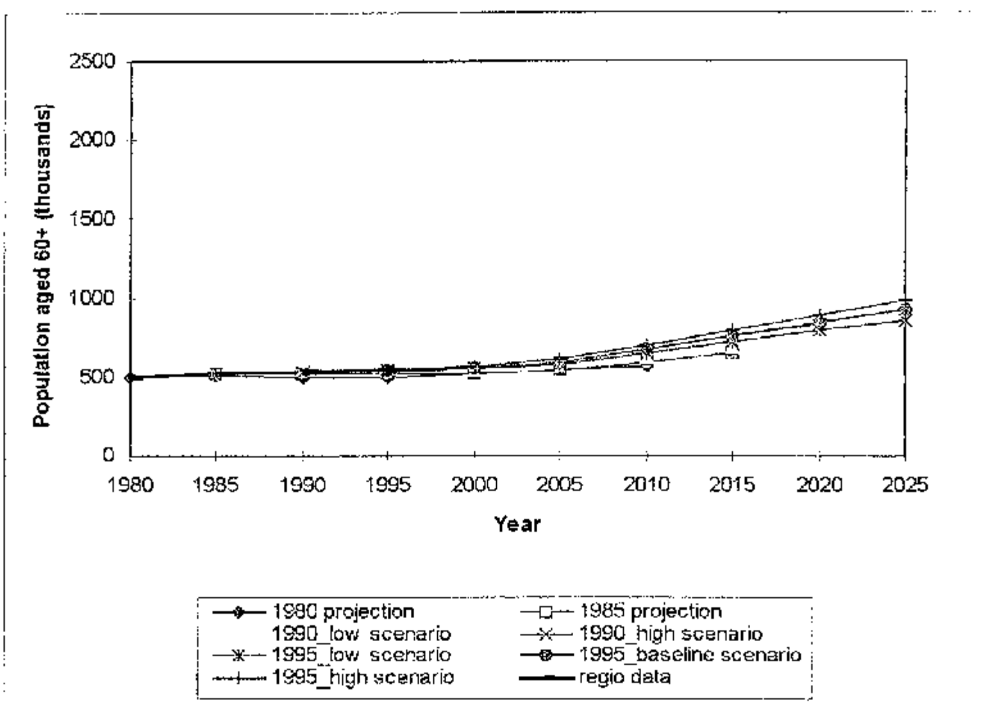

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Figure 4.8a: Comparison of projection results for total population: Italy

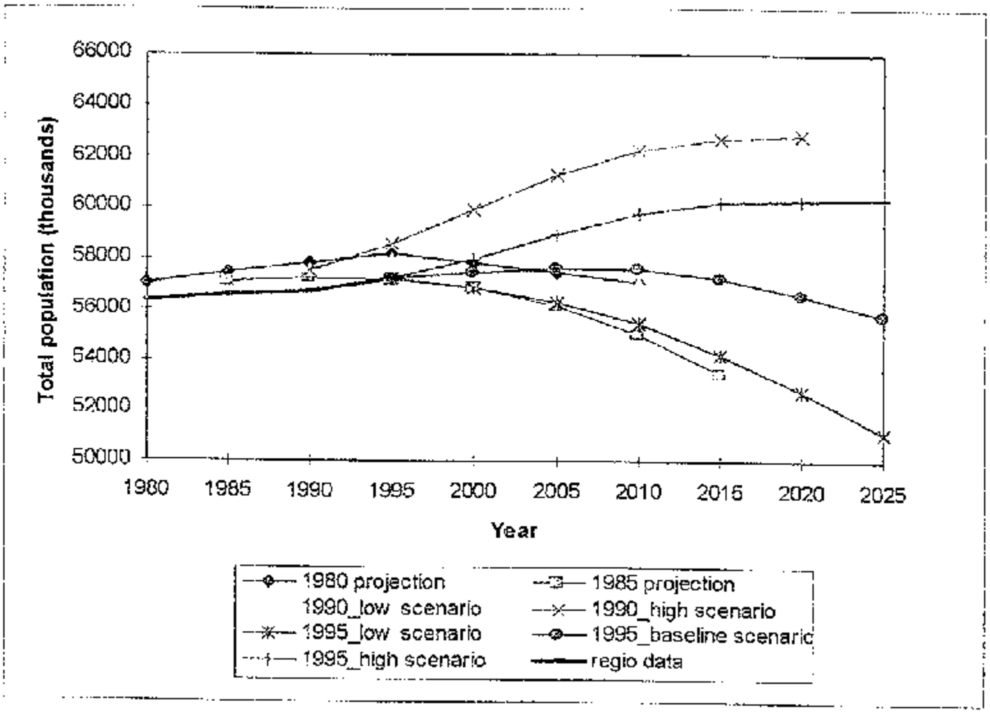

Figure 4.8b: Comparison of projection results for population aged 0-14: Italy

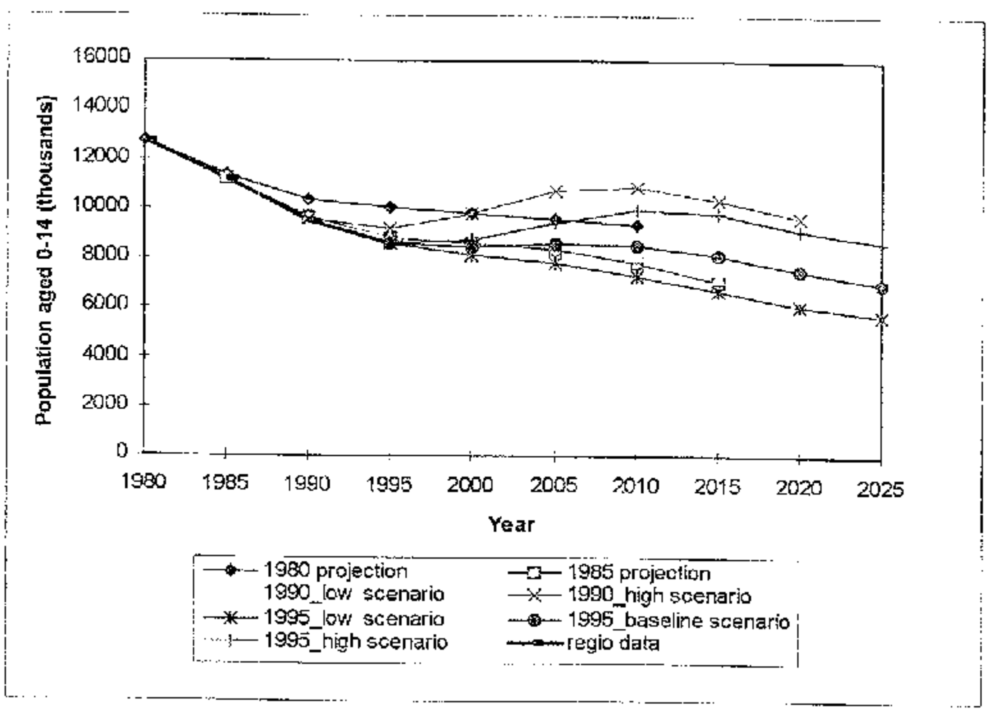

Figure 4.8c: Comparison of projection results for population aged 15-59: Italy

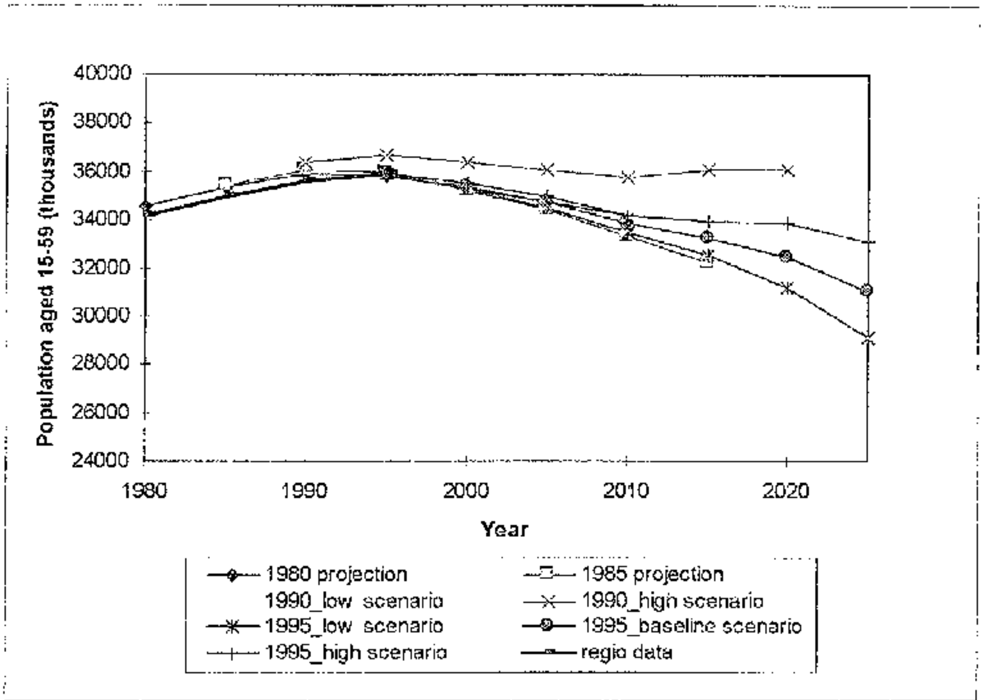

Figure 4.8d: Comparison of projection results for population aged 60+: Italy

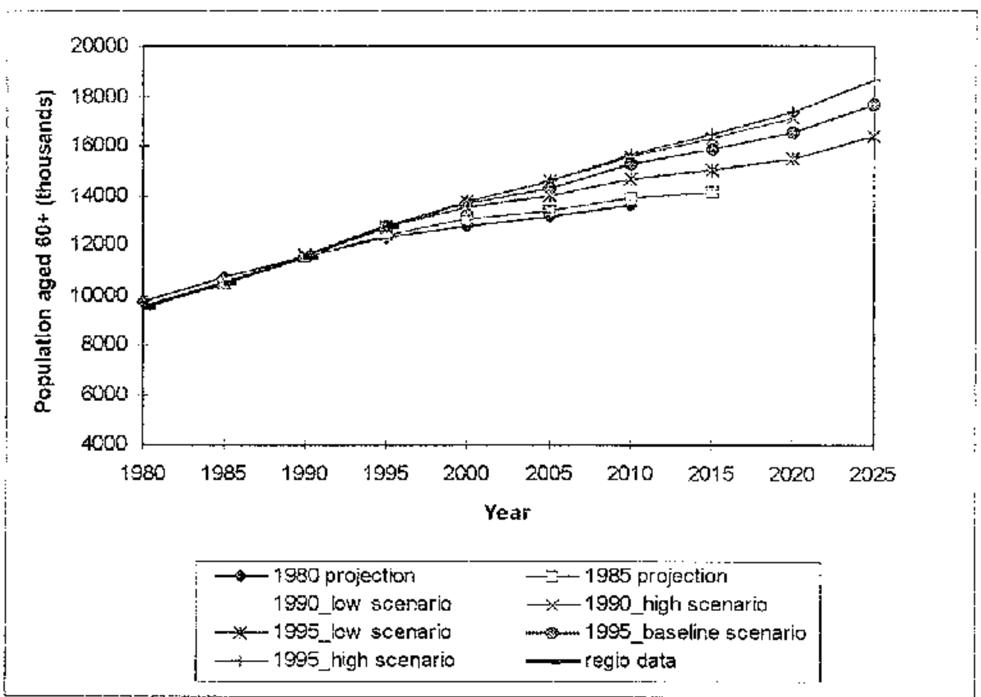

Figure 4.9a: Comparison of projection results for total population: Luxembourg

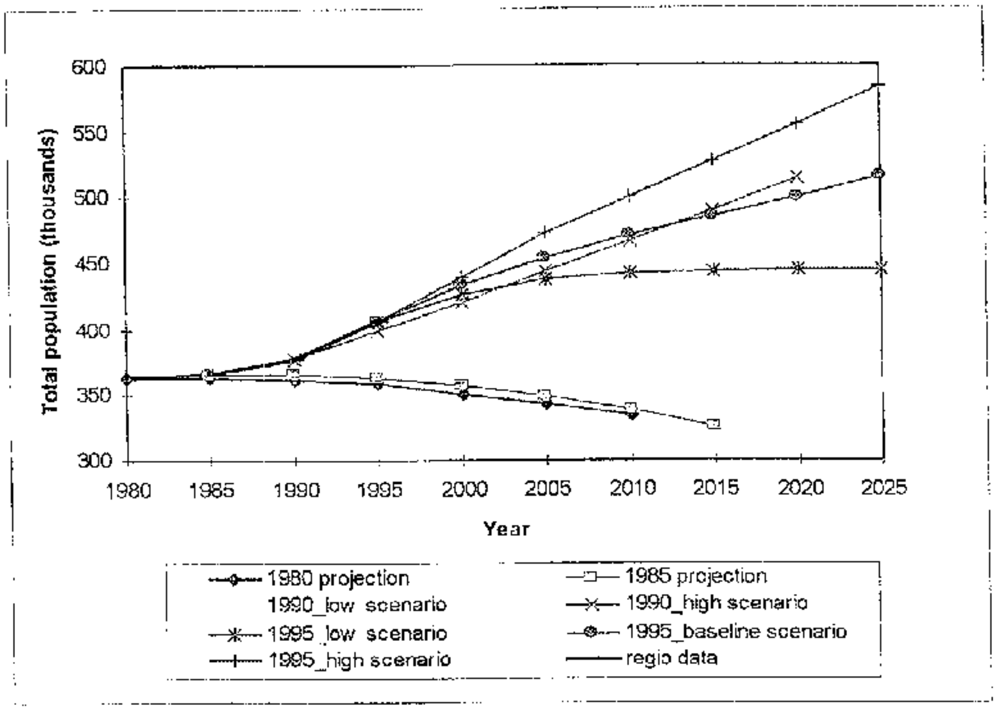

Figure 4.9b: Comparison of projection results for population aged 0-14: Luxembourg

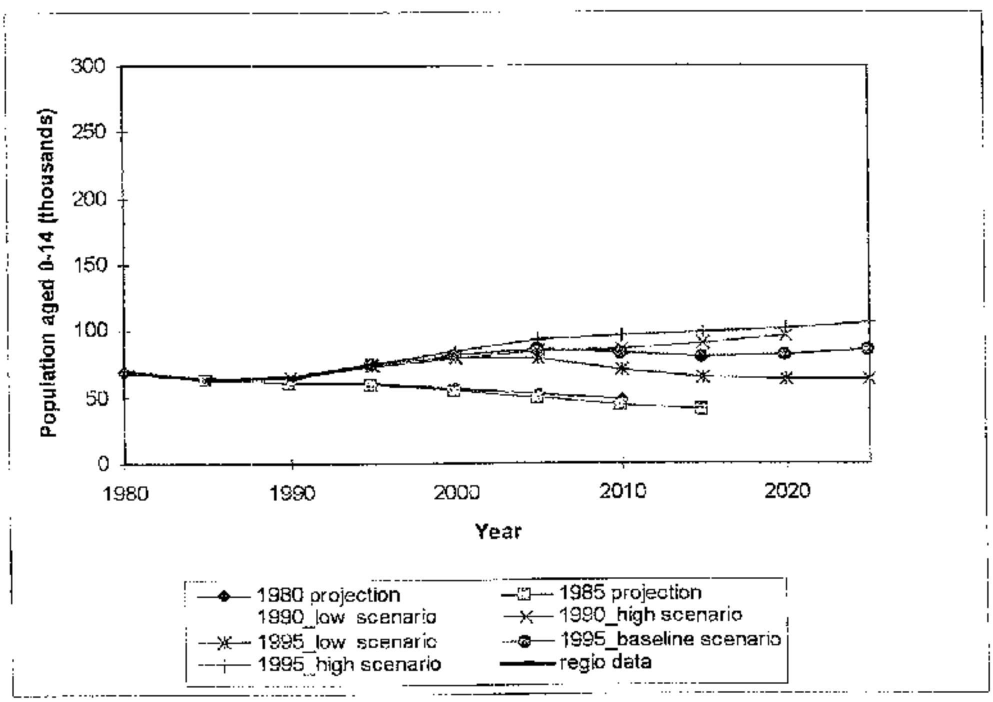

Figure 4.9c: Comparison of projection results for population aged 15-59: Luxembourg

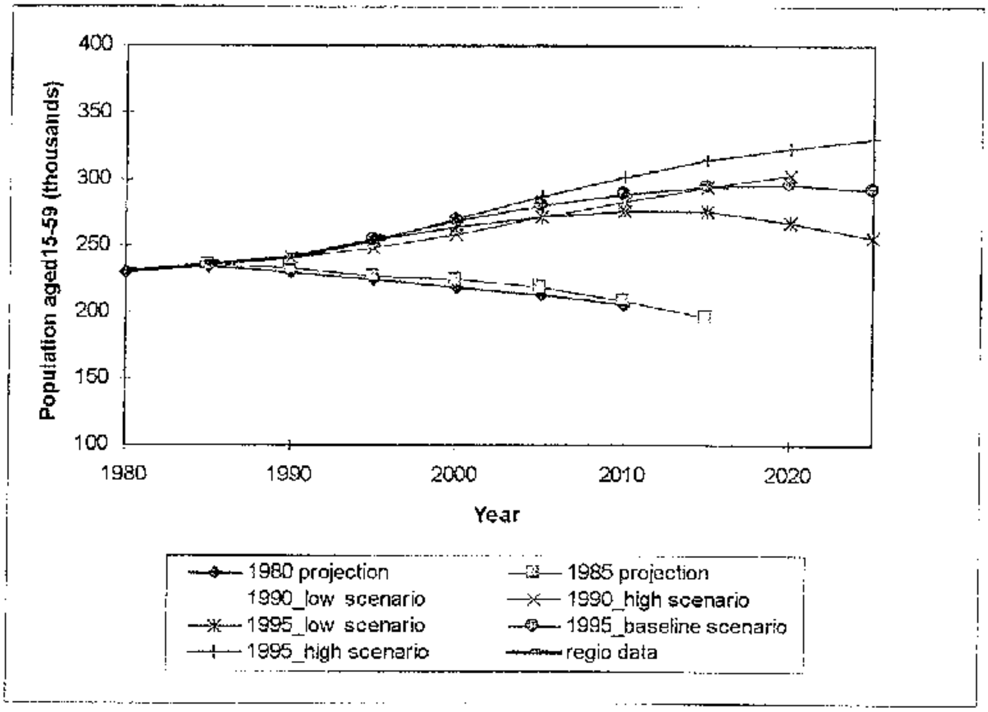

Figure 4.9d: Comparison of projection results for population aged 60+: Luxembourg

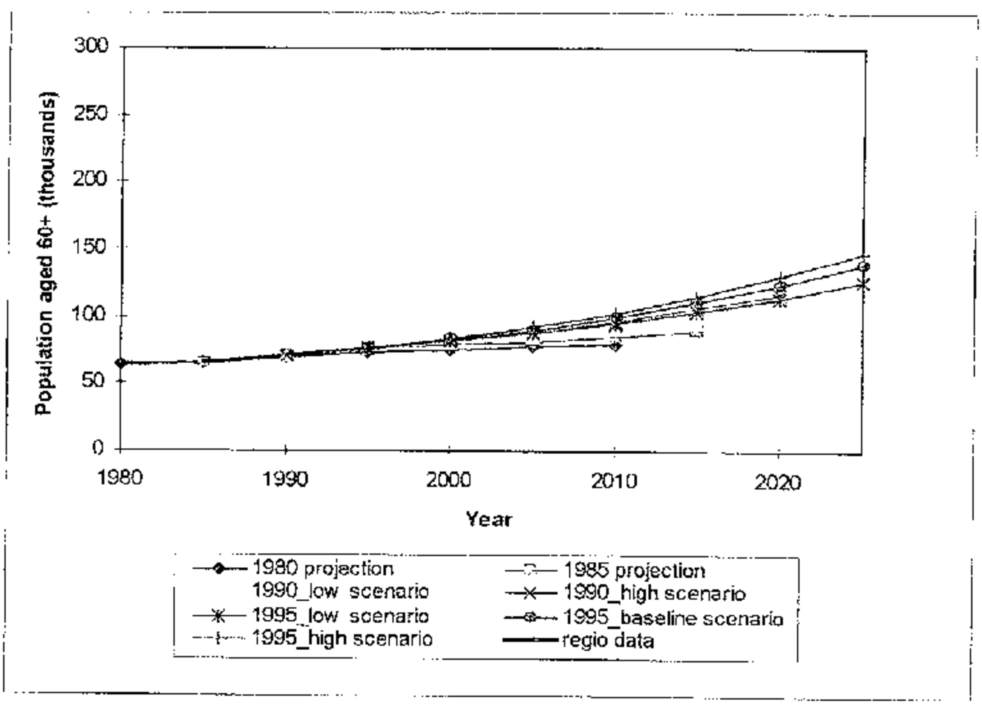

Figure 4.10a: Comparison of projection results for total population: Netherlands

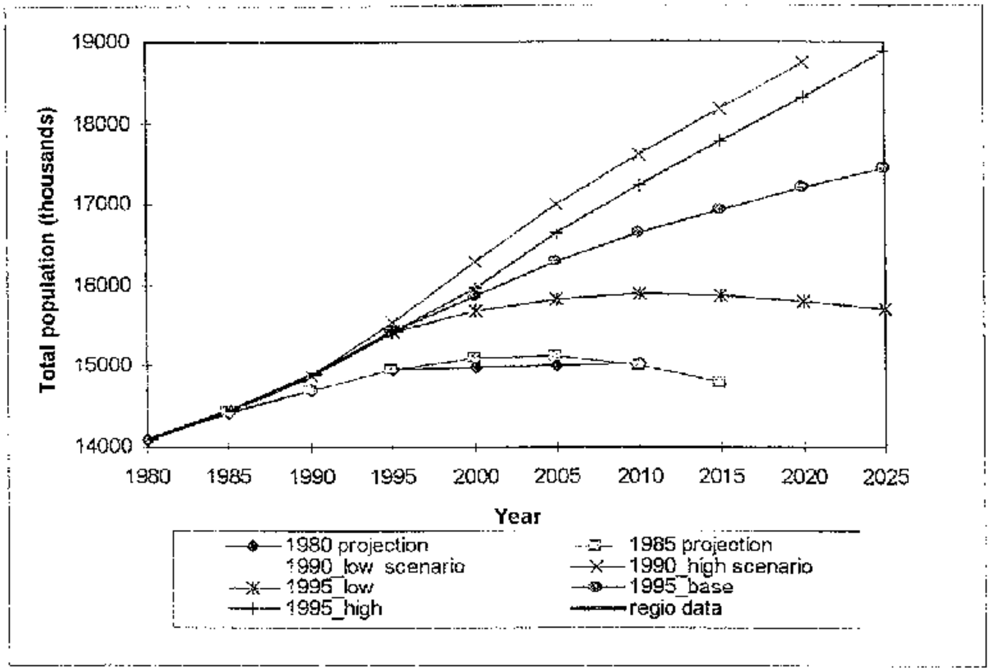

Figure 4.10b: Comparison of projection results for population aged 0-14: Netherlands

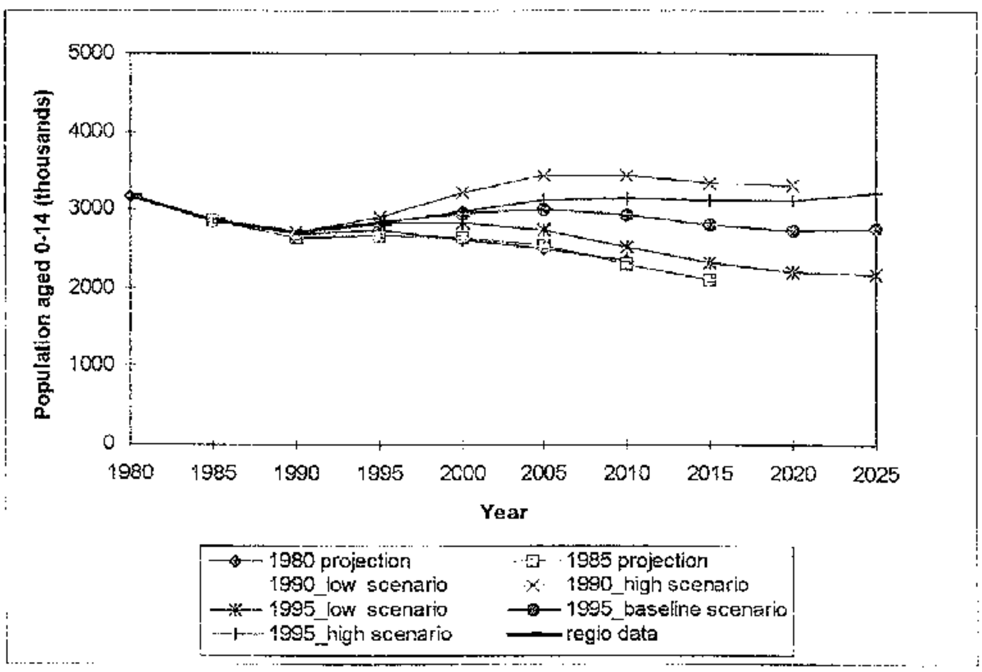

Figure 4.10c: Comparison of projection results for population aged 15-59: Netherlands

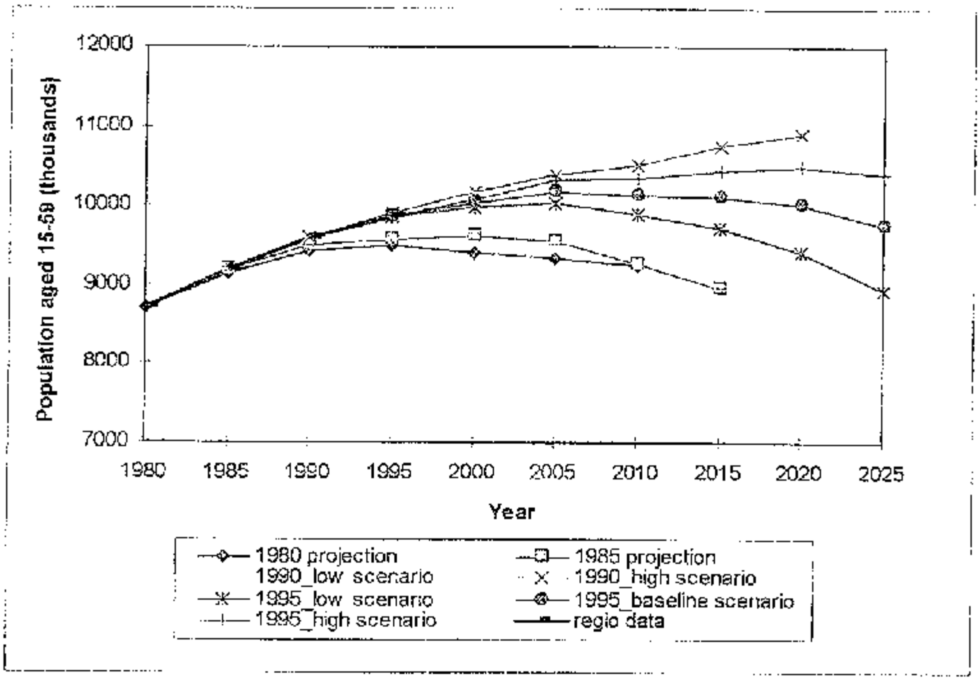

Figure 4.10d: Comparison of projection results for population aged 60+: Netherlands

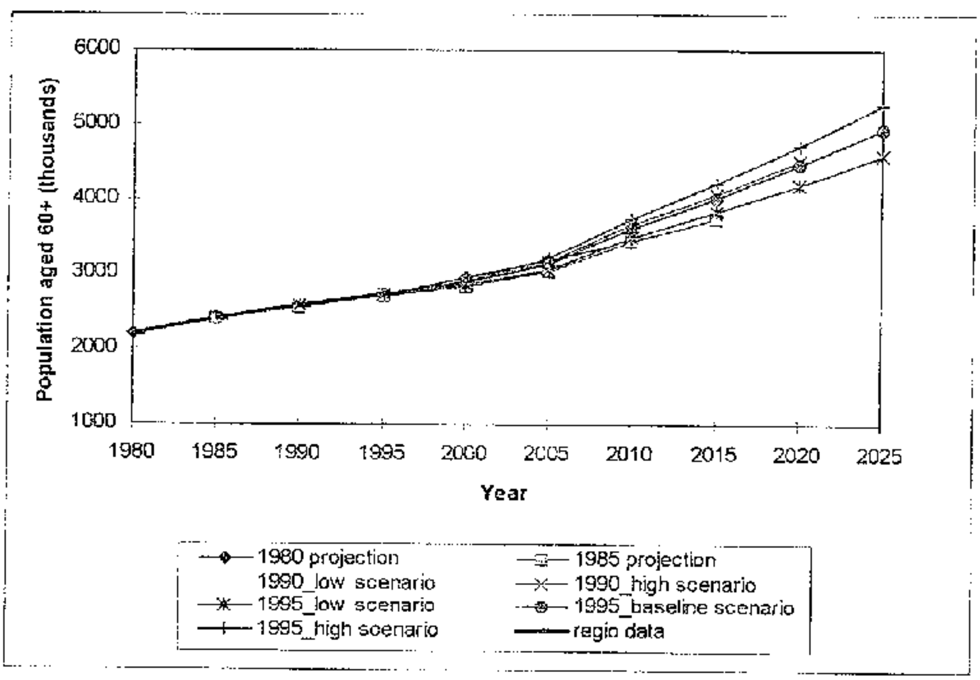

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Figure 4.12a: Comparison of projection results for total population: Austria

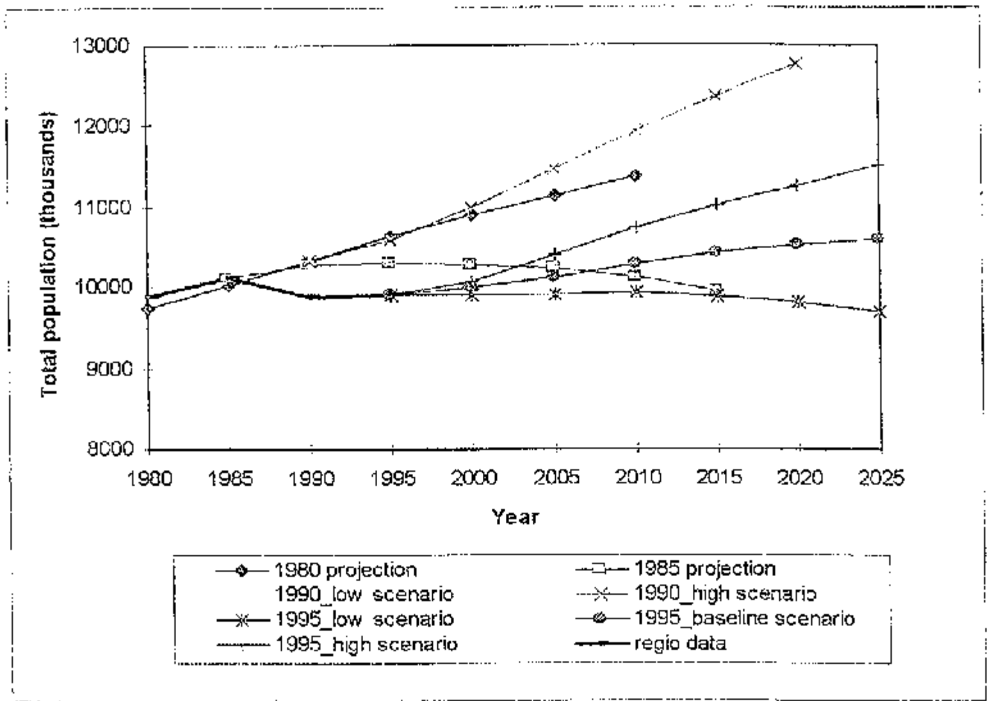

Figure 4.12b: Comparison of projection results for population aged 0-14: Austria

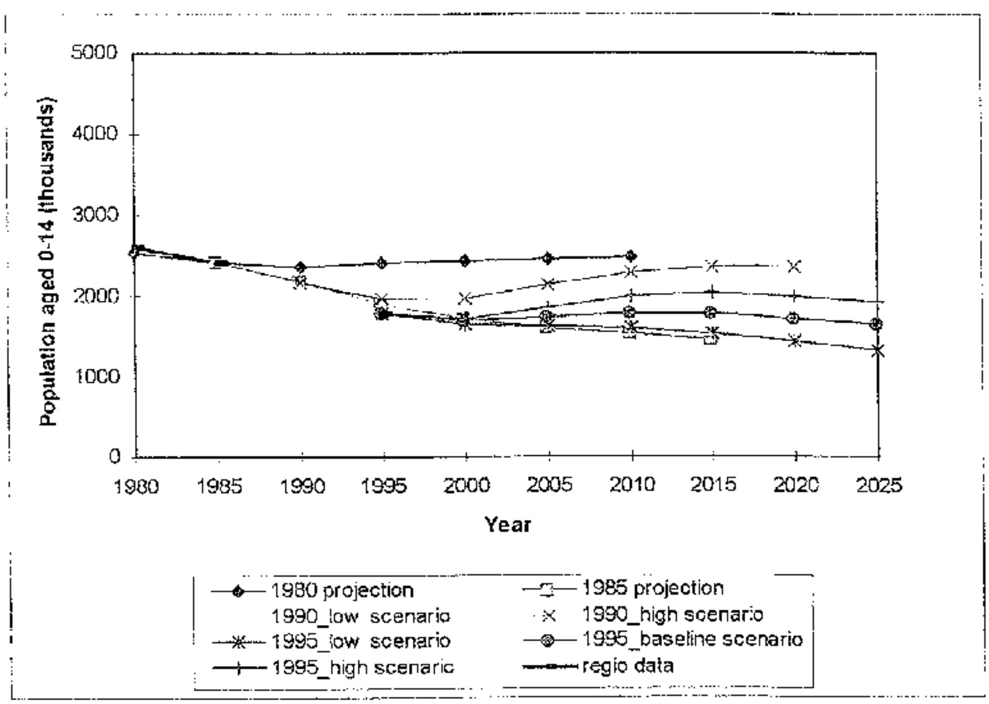

Figure 4.11c: Comparison of projection results for population aged 15-59: Austria

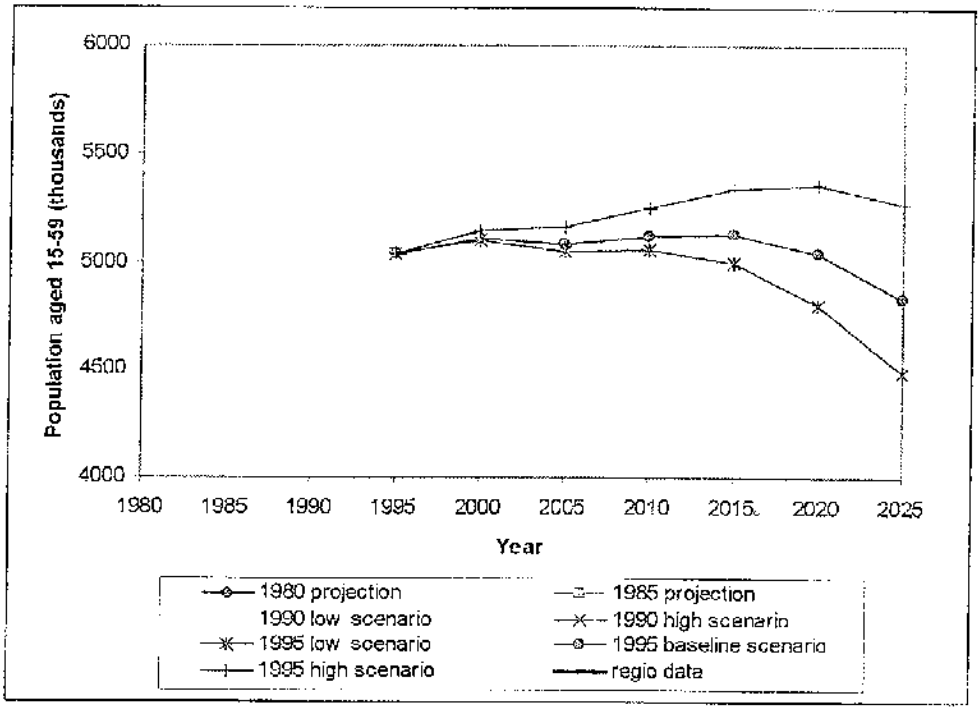

Figure 4.11d: Comparison of projection results for population aged 60+: Austria

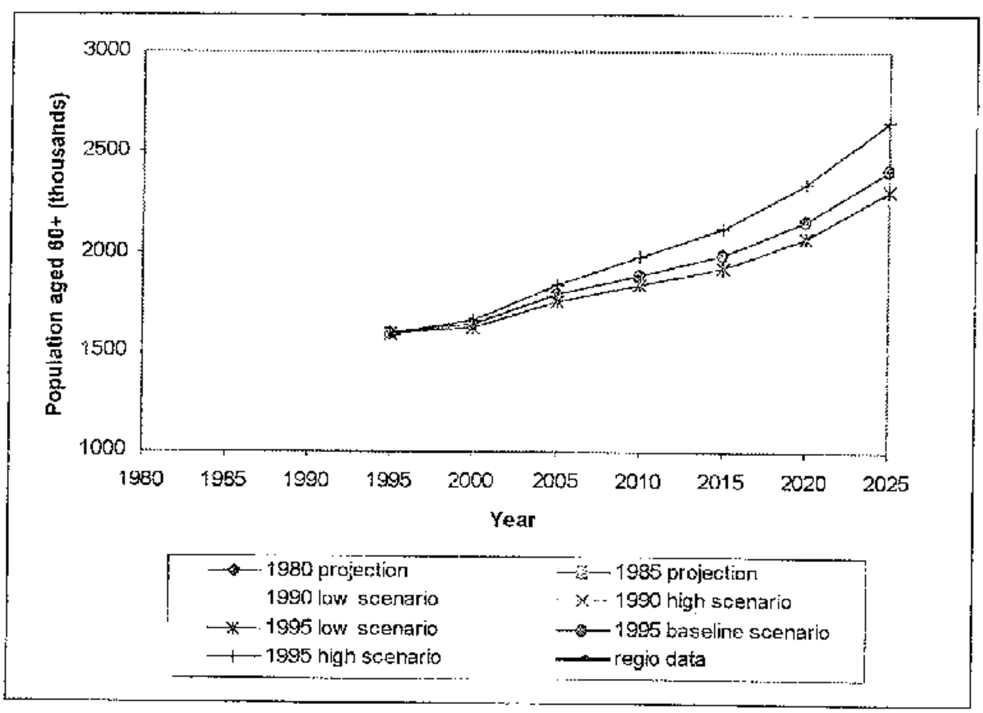

Figure 4.12a: Comparison of projection results for total population: Portugal

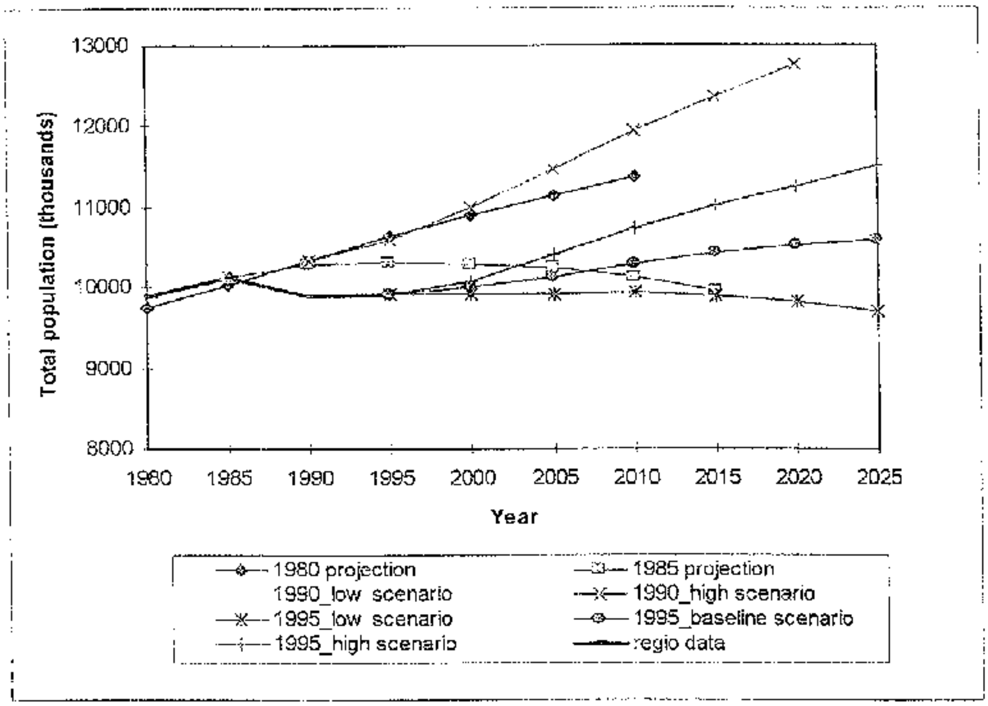

Figure 4.12b: Comparison of projection results for population aged 0-14: Portugal

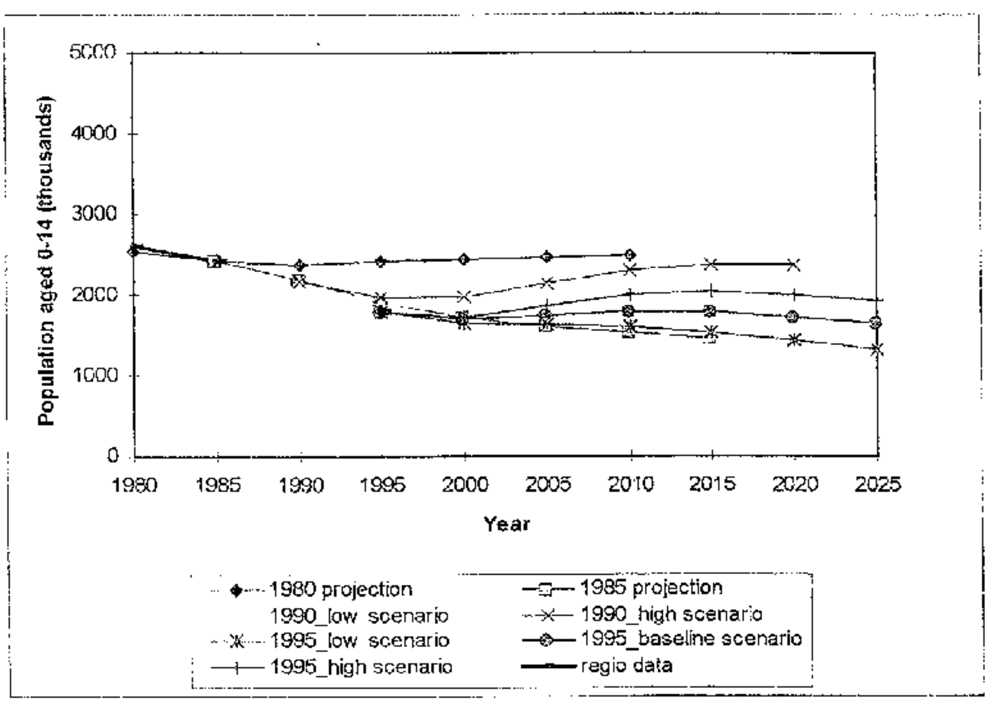

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Figure 4.12c: Comparison of projection results for population aged 15-59: Portugal

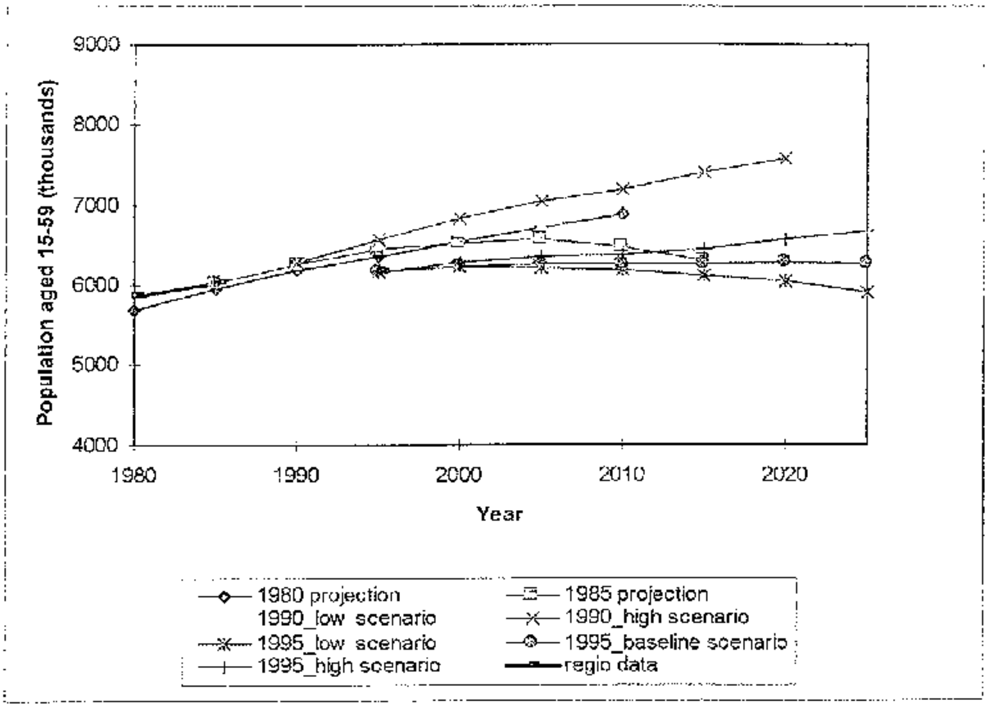

Figure 4.12d: Comparison of projection results for population aged 60+: Portugal

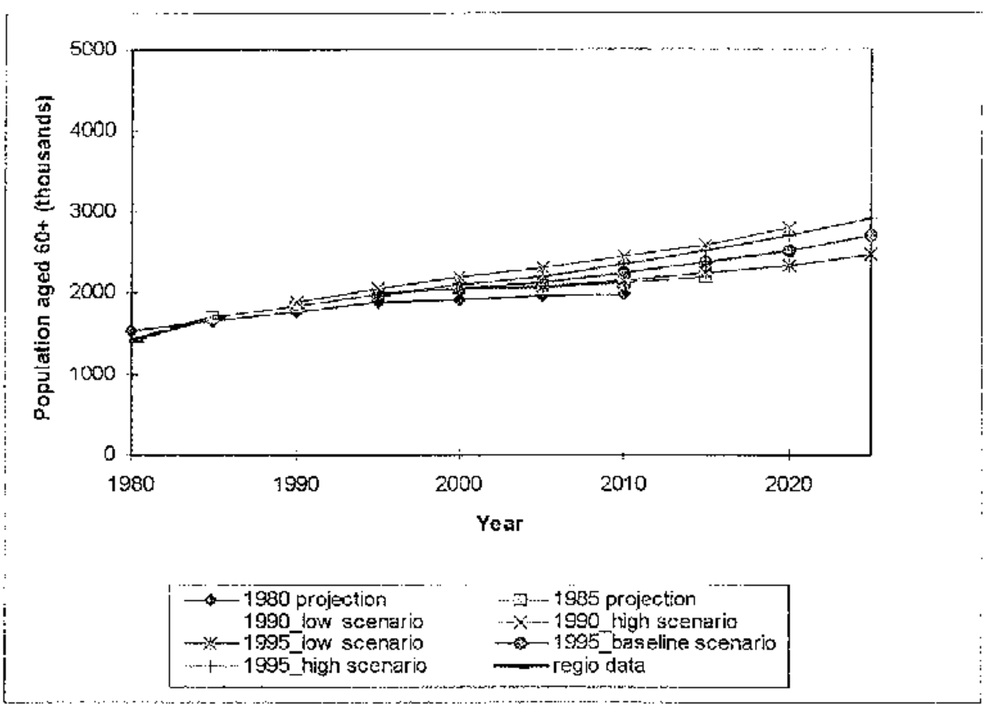

Figure 4.13a: Comparison of projection results for total population: Finland

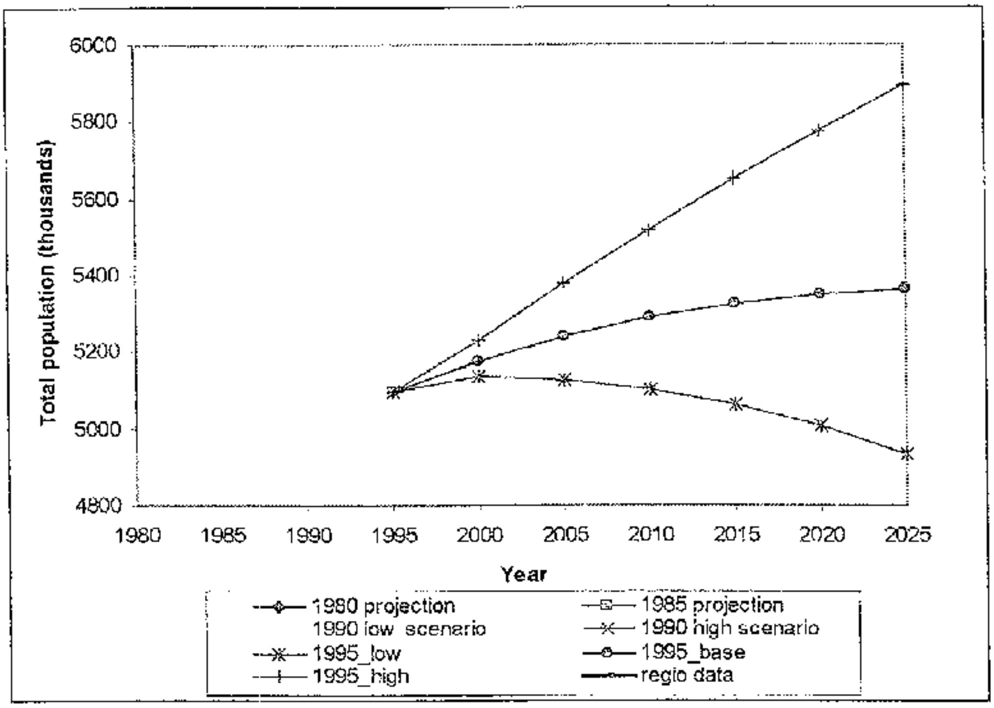

Figure 4.13b: Comparison of projection results for population aged 0-14: Finland

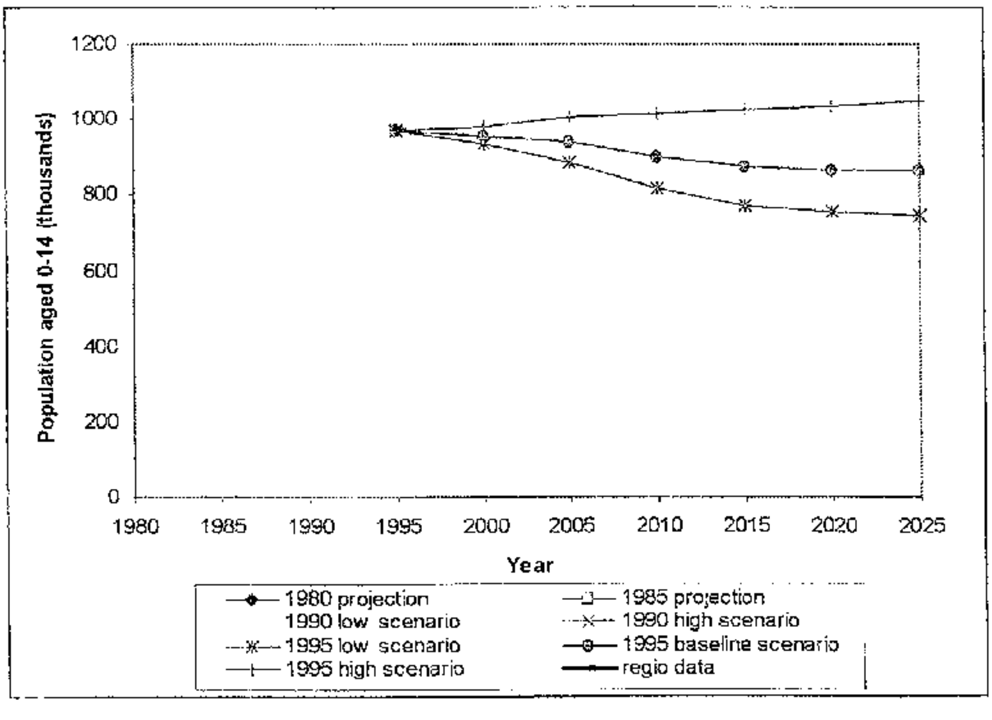

Figure 4.13c: Comparison of projection results for population aged 15-59: Finland

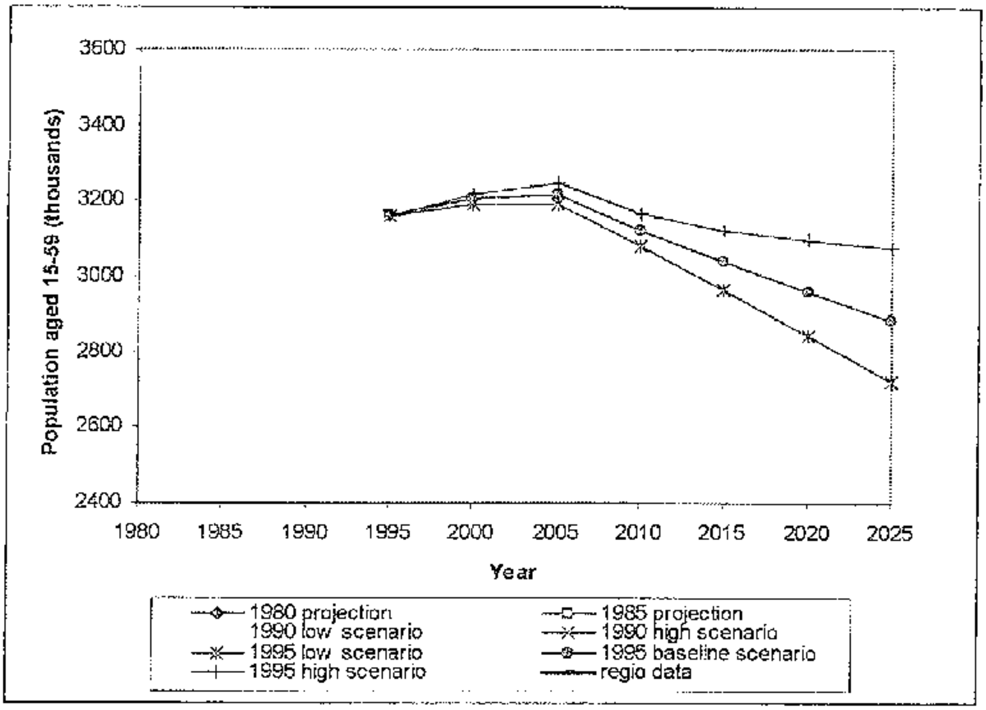

Figure 4.13d: Comparison of projection results for population aged 60+: Finland

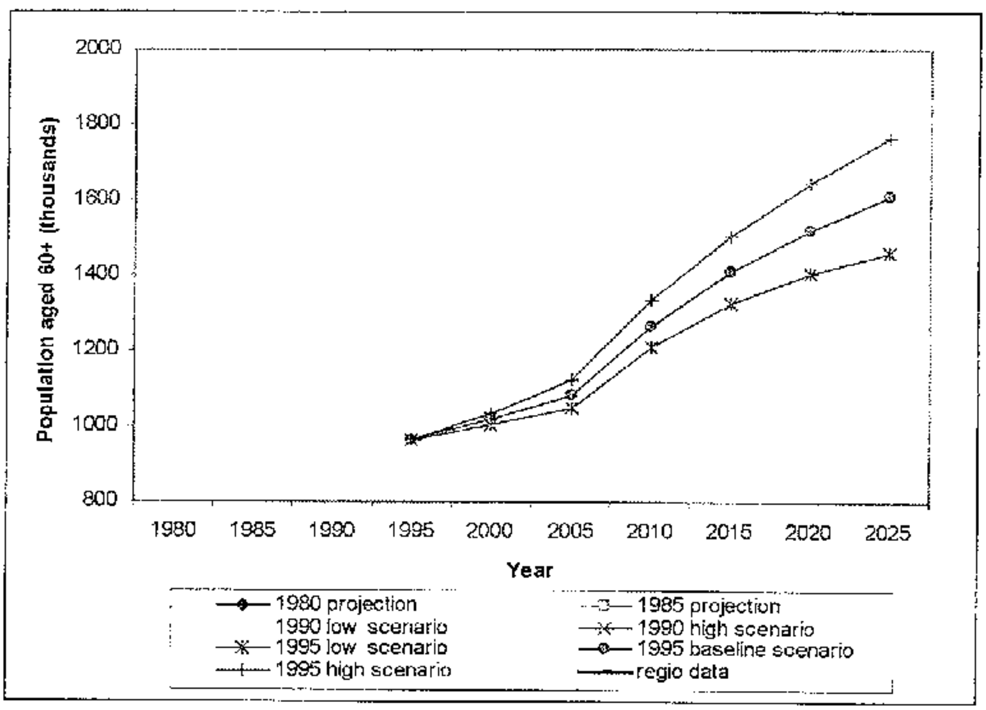

Figure 4.14a: Comparison of projection results for total population: Sweden

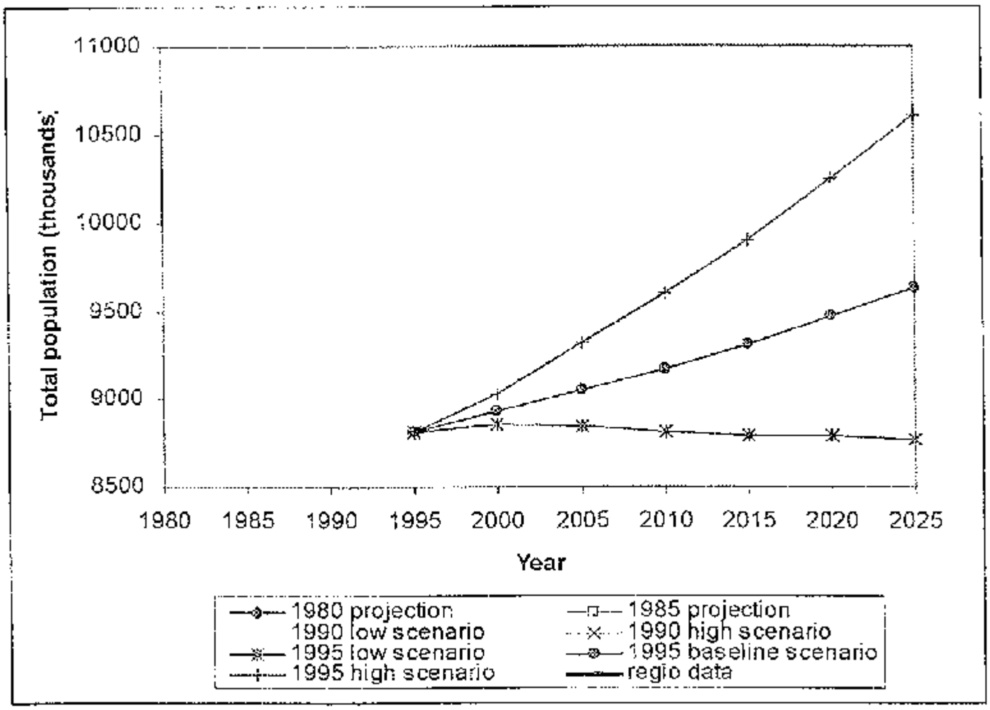

Figure 4.14b: Comparison of projection results for population aged 0-14: Sweden

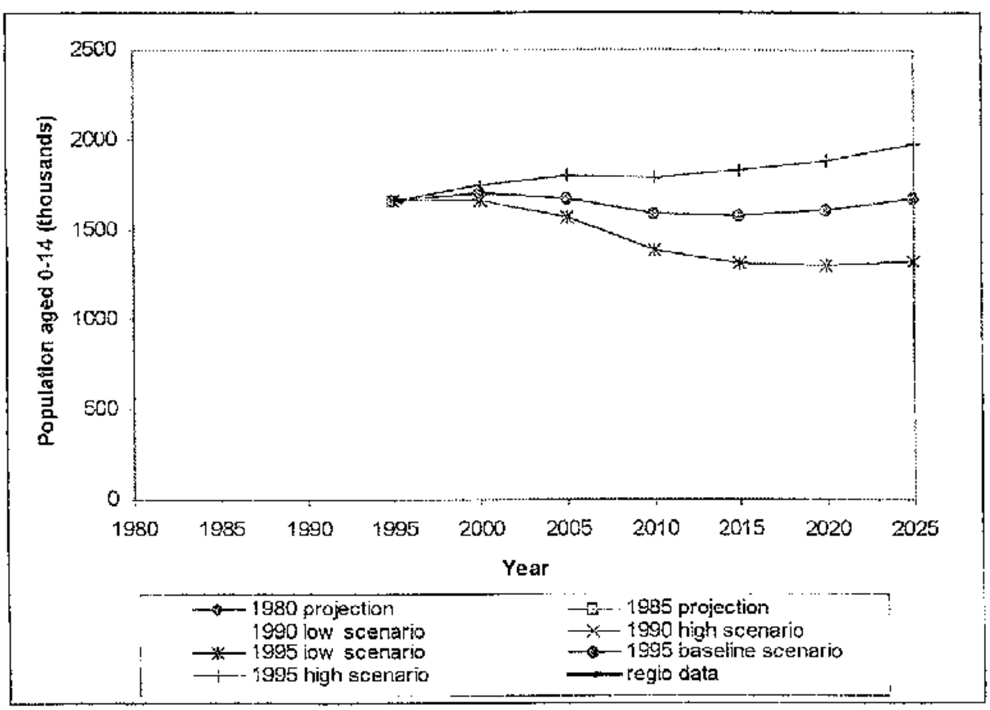

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Figure 4.14c: Comparison of projection results for population aged 15-59: Sweden

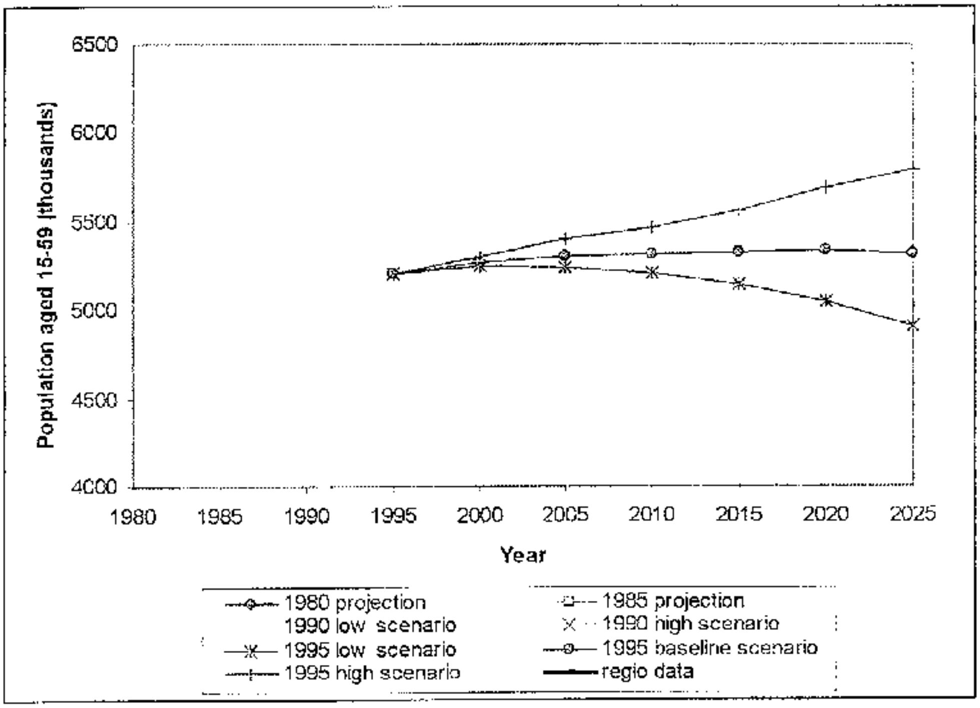

Figure 4.14d: Comparison of projection results for population aged 60+: Sweden

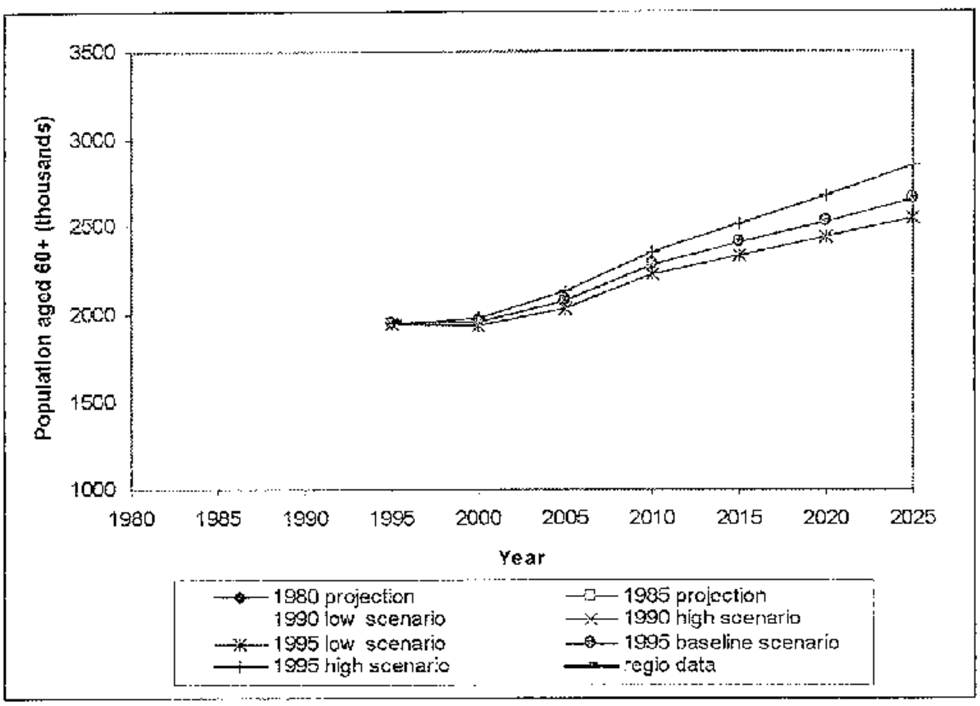

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Figure 4.15a: Comparison of projection results for total population : United Kingdom

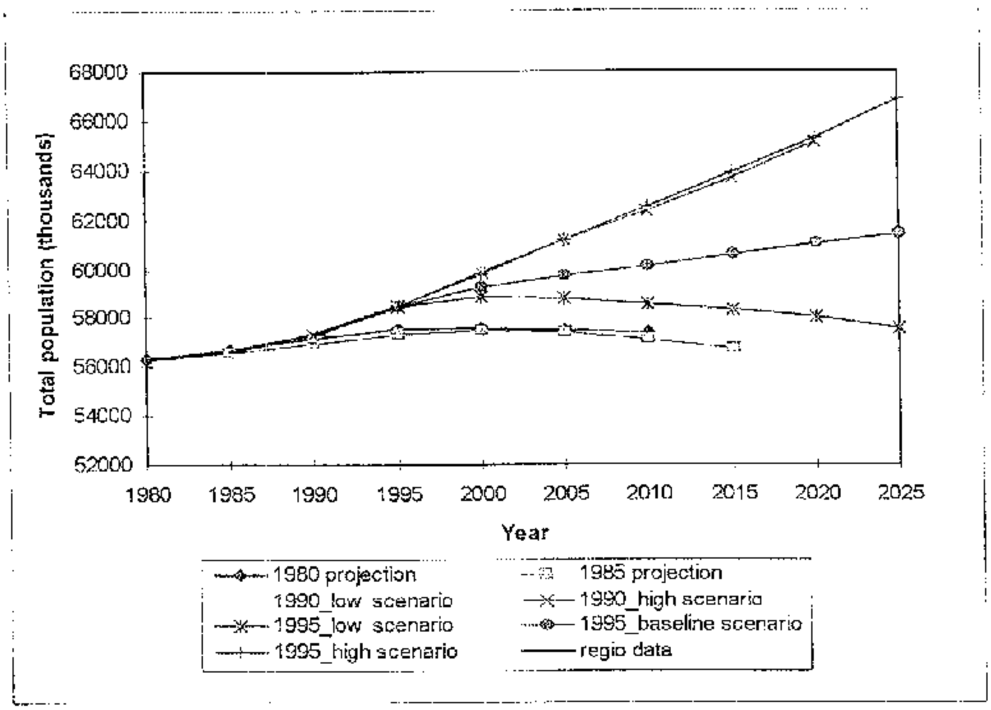

Figure 4.15b: Comparison of projection results for population aged 0-14: United Kingdom

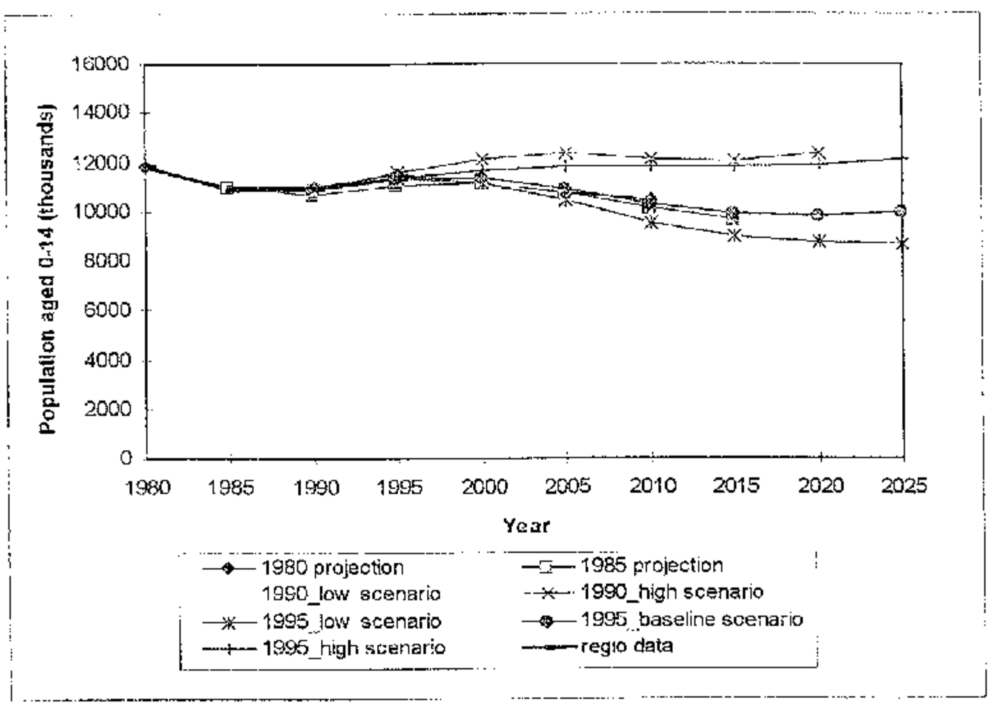

Figure 4.15c: Comparison of projection results for population aged 15-59: United Kingdom

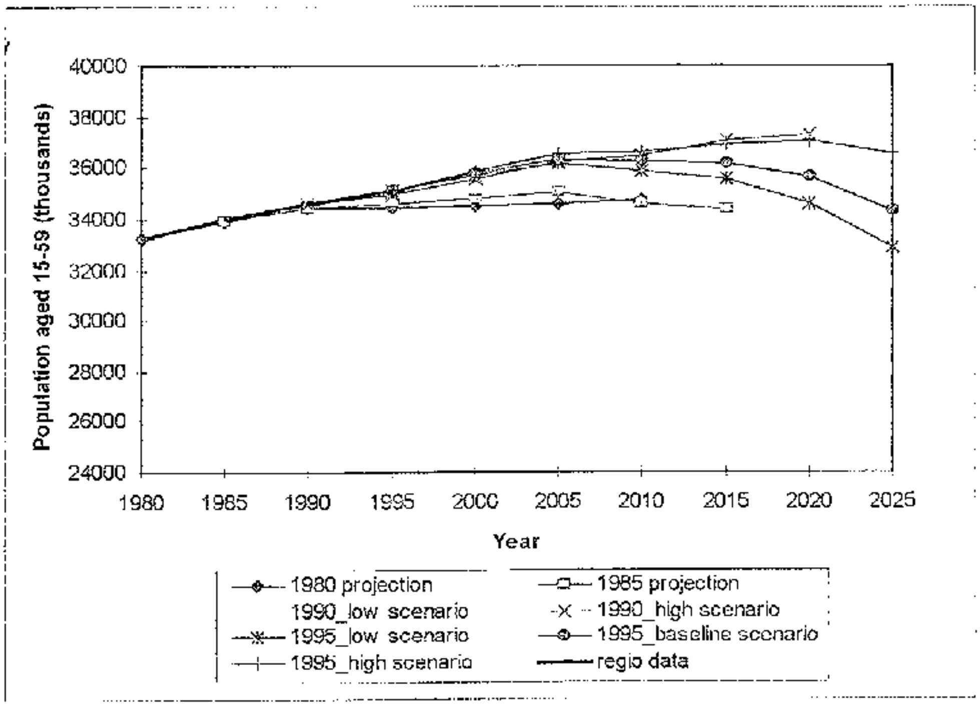

Figure 4.15d: Comparison of projection results for population aged 60+: United Kingdom

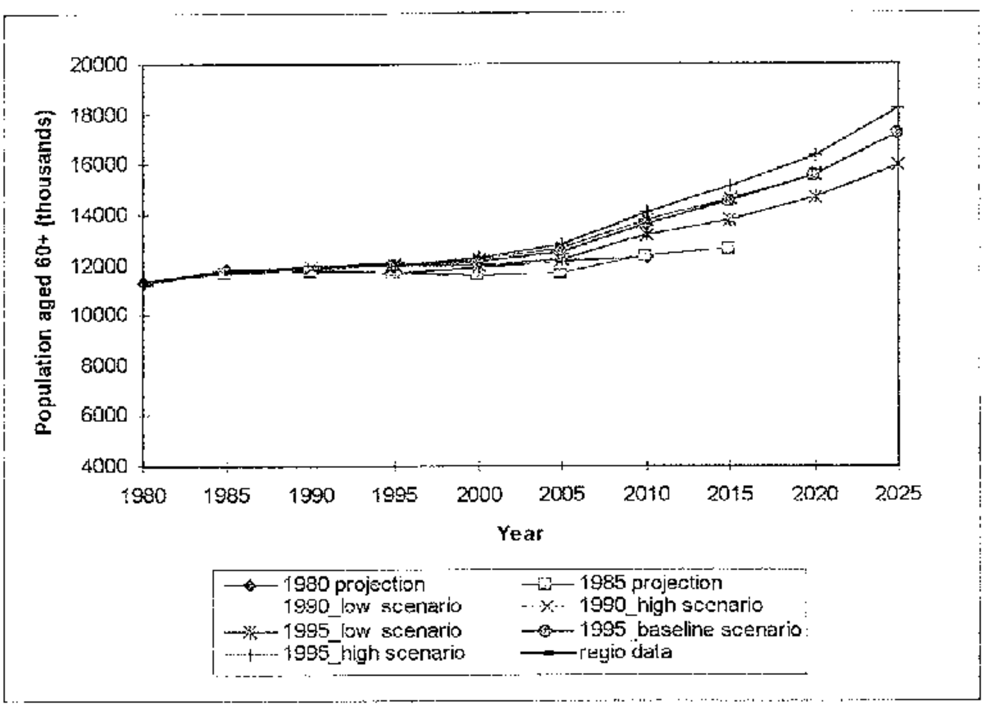

Figure 4.16: Regional population projections, 1980-2025, Belgium

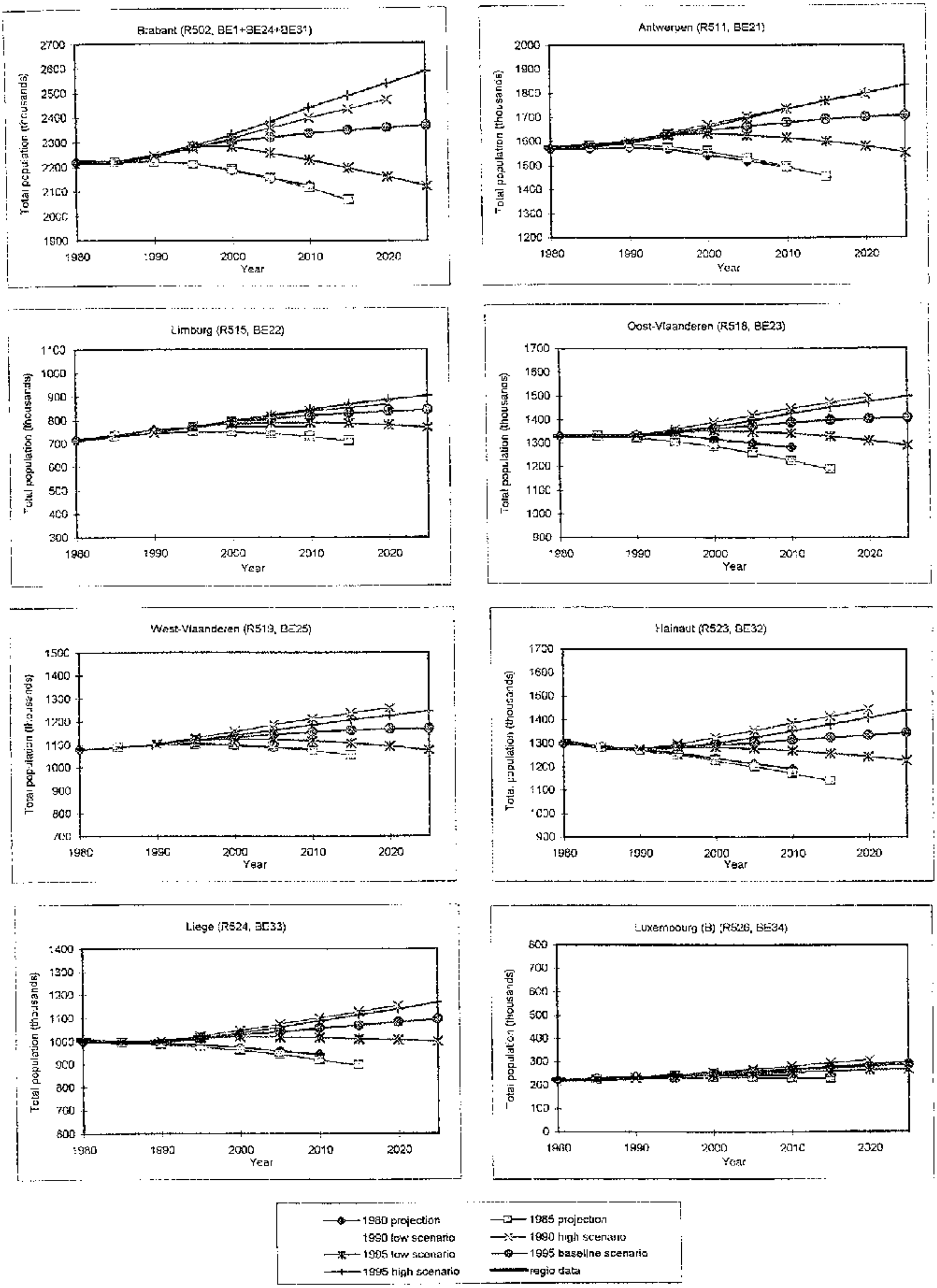

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Figure 4.16 *continued*

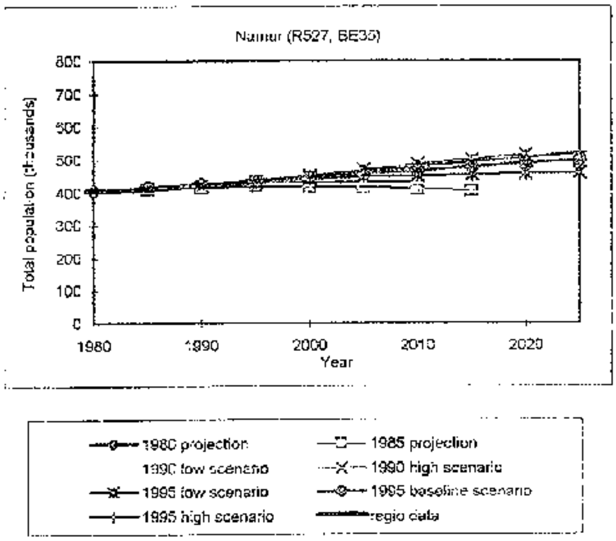

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Figure 4.17: Regional population projections, 1980-2025, Denmark

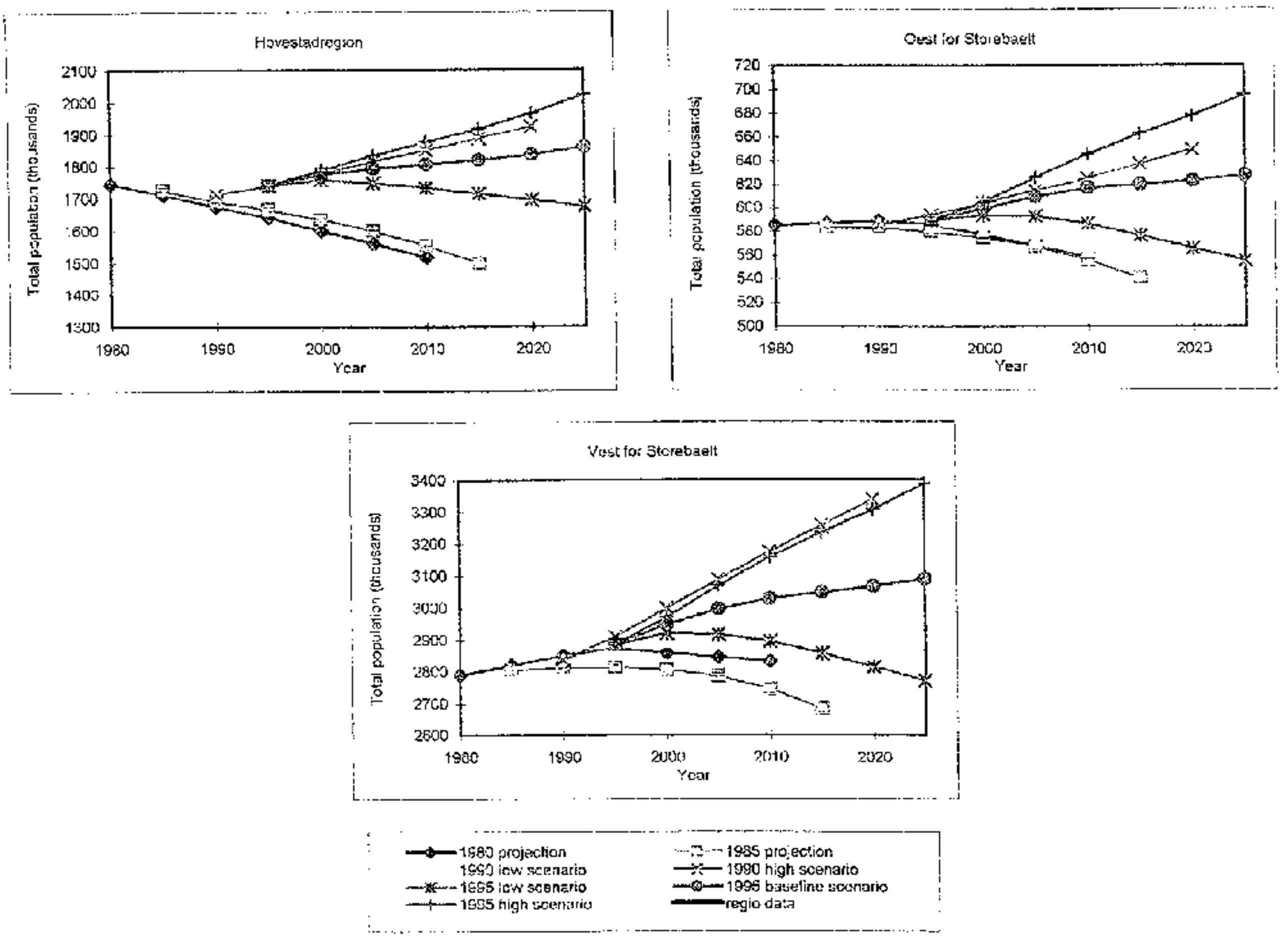

Figure 4.18: Regional population projections, 1980-2025, Germany

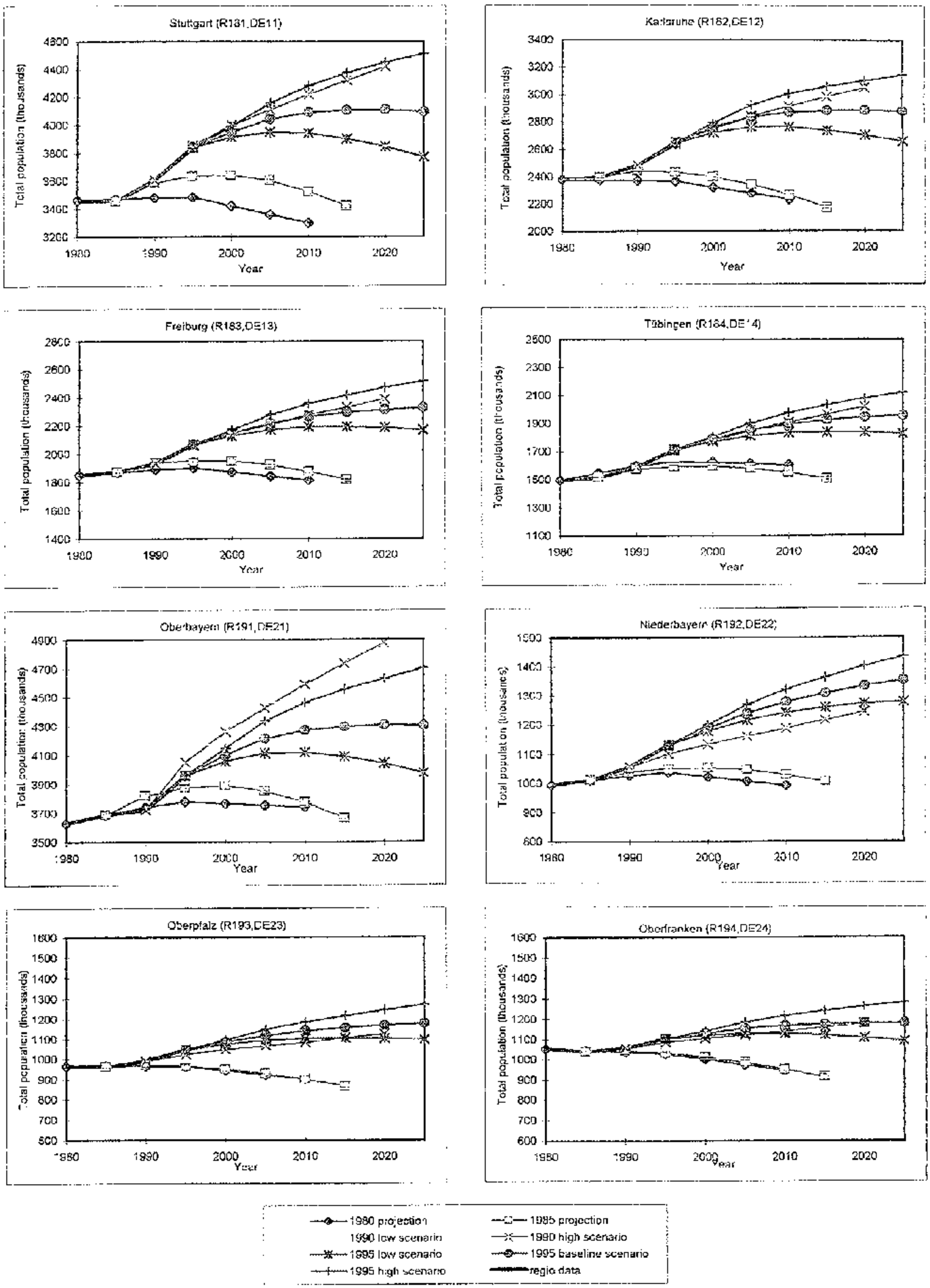

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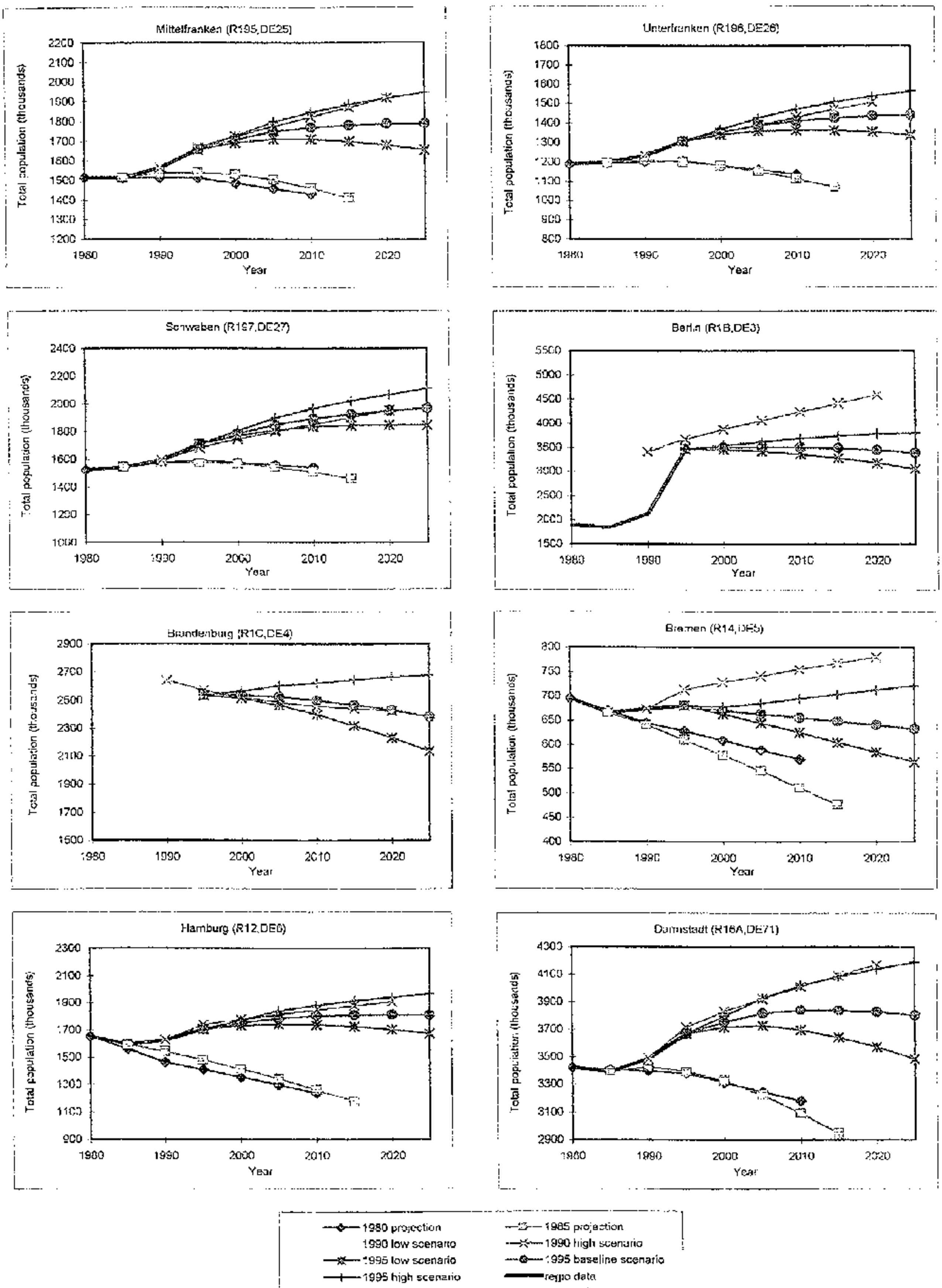
Figure 4.18 *continued*



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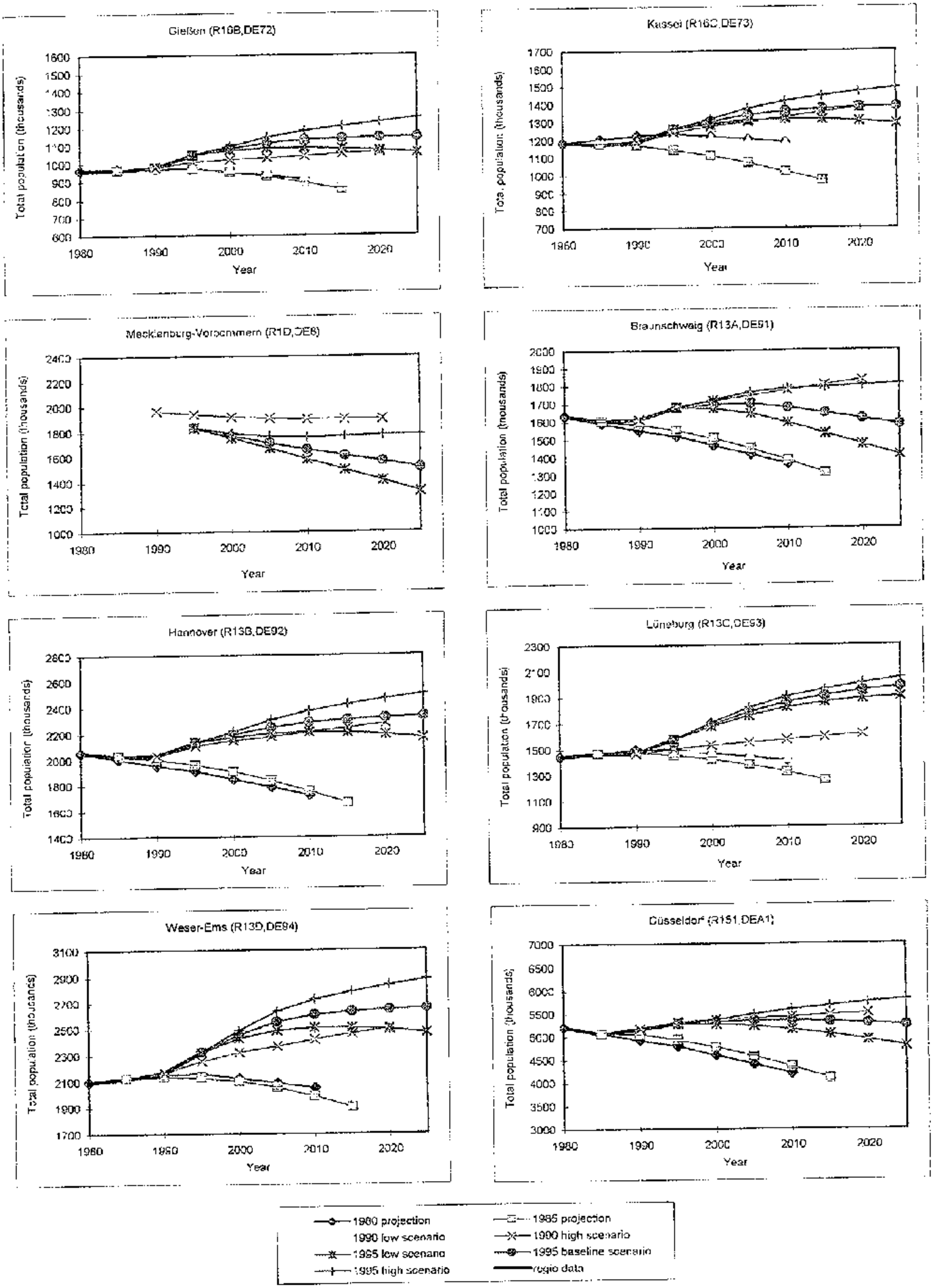

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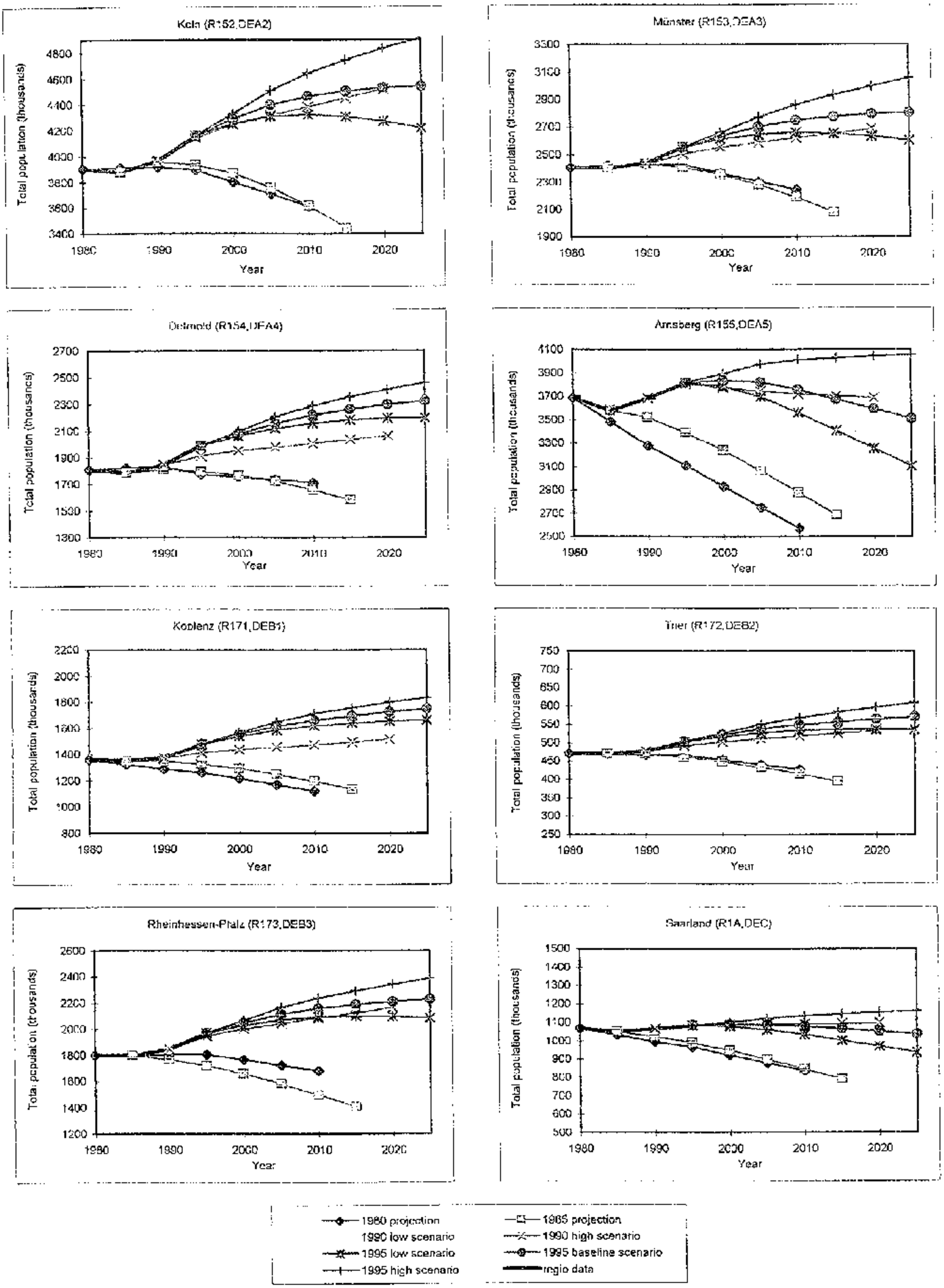

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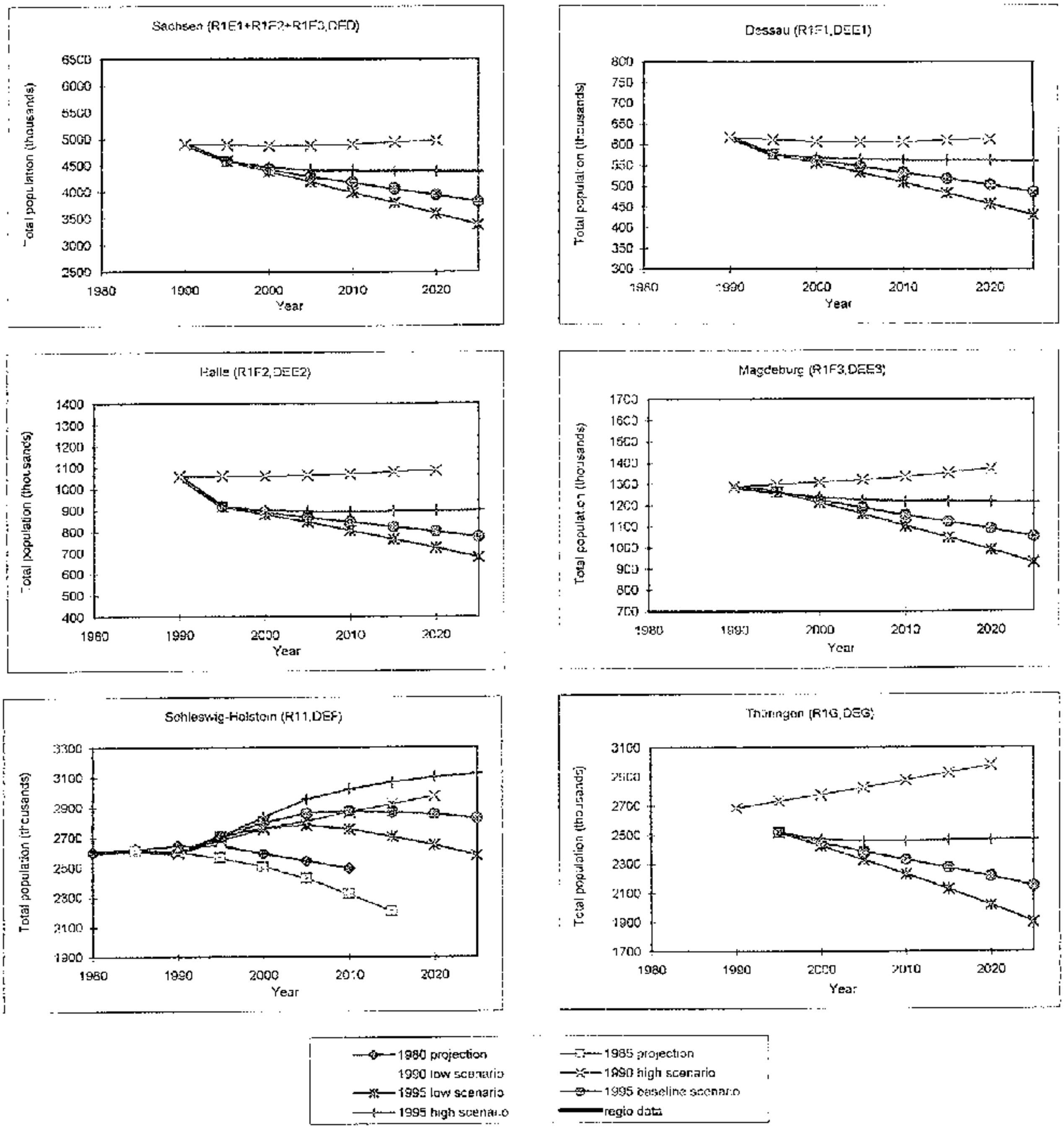


Figure 4.19 Regional population projections, 1980-2025, Greece

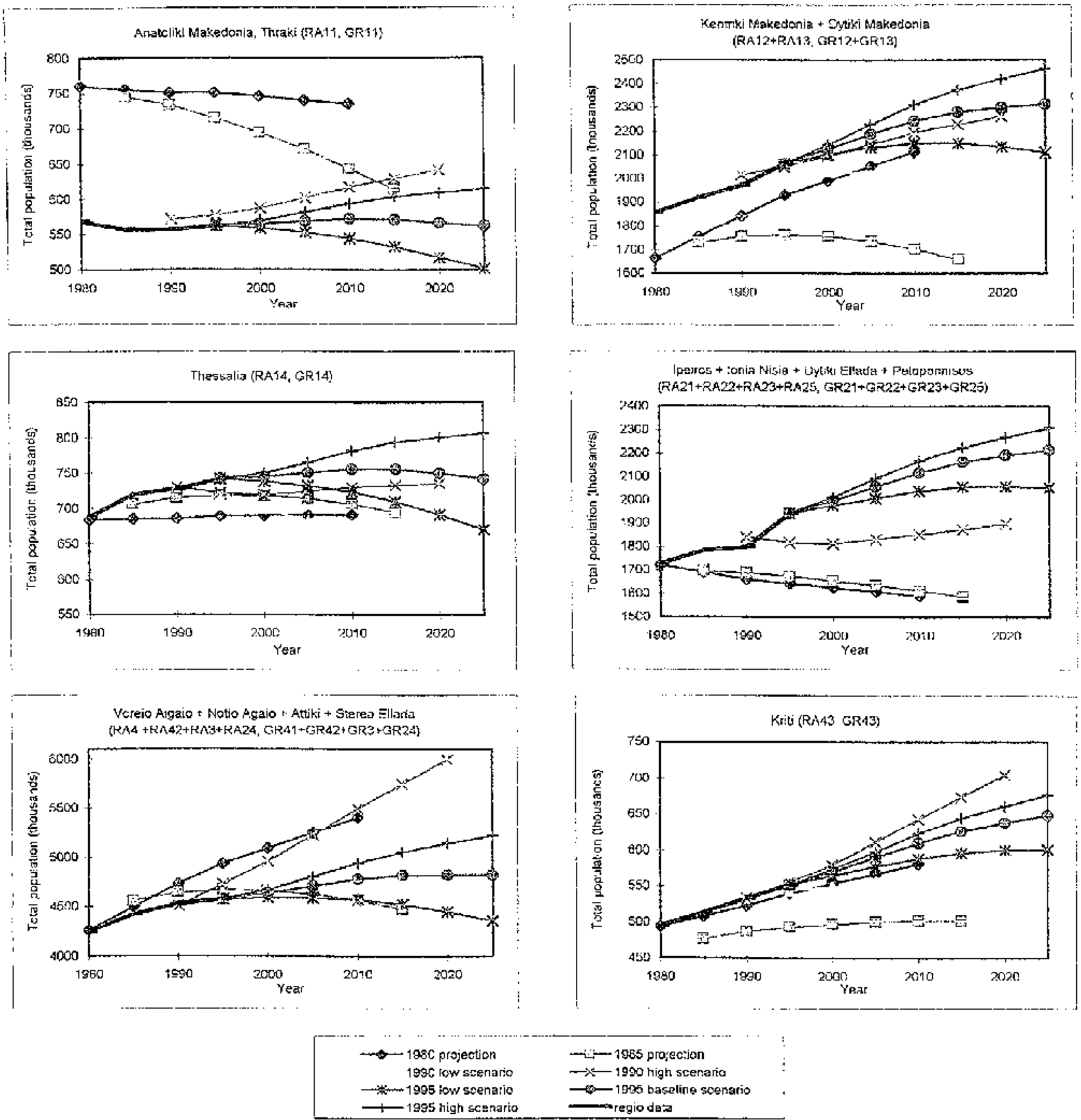
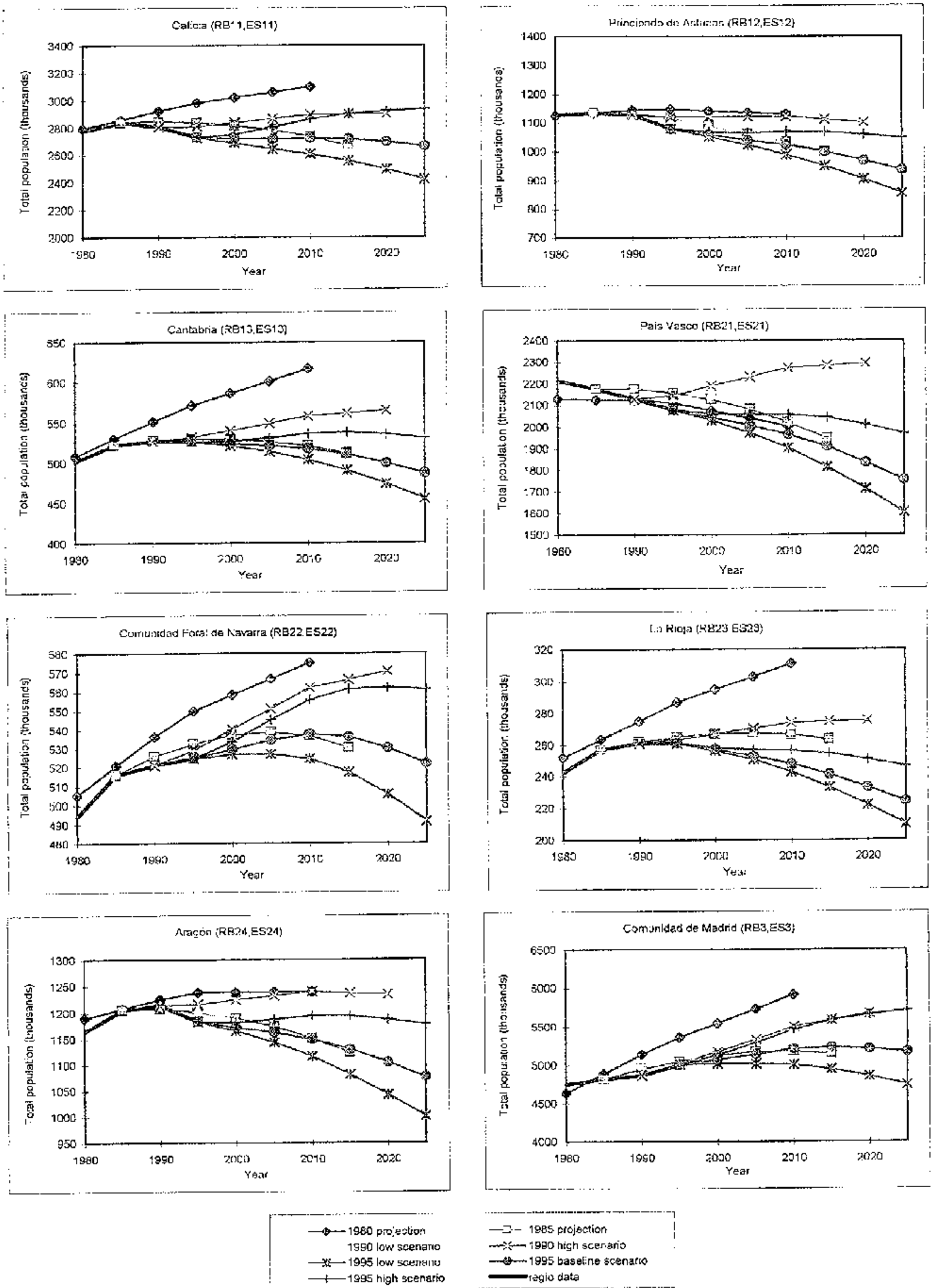


Figure 4.20: Regional population projections, 1980-2025, Spain



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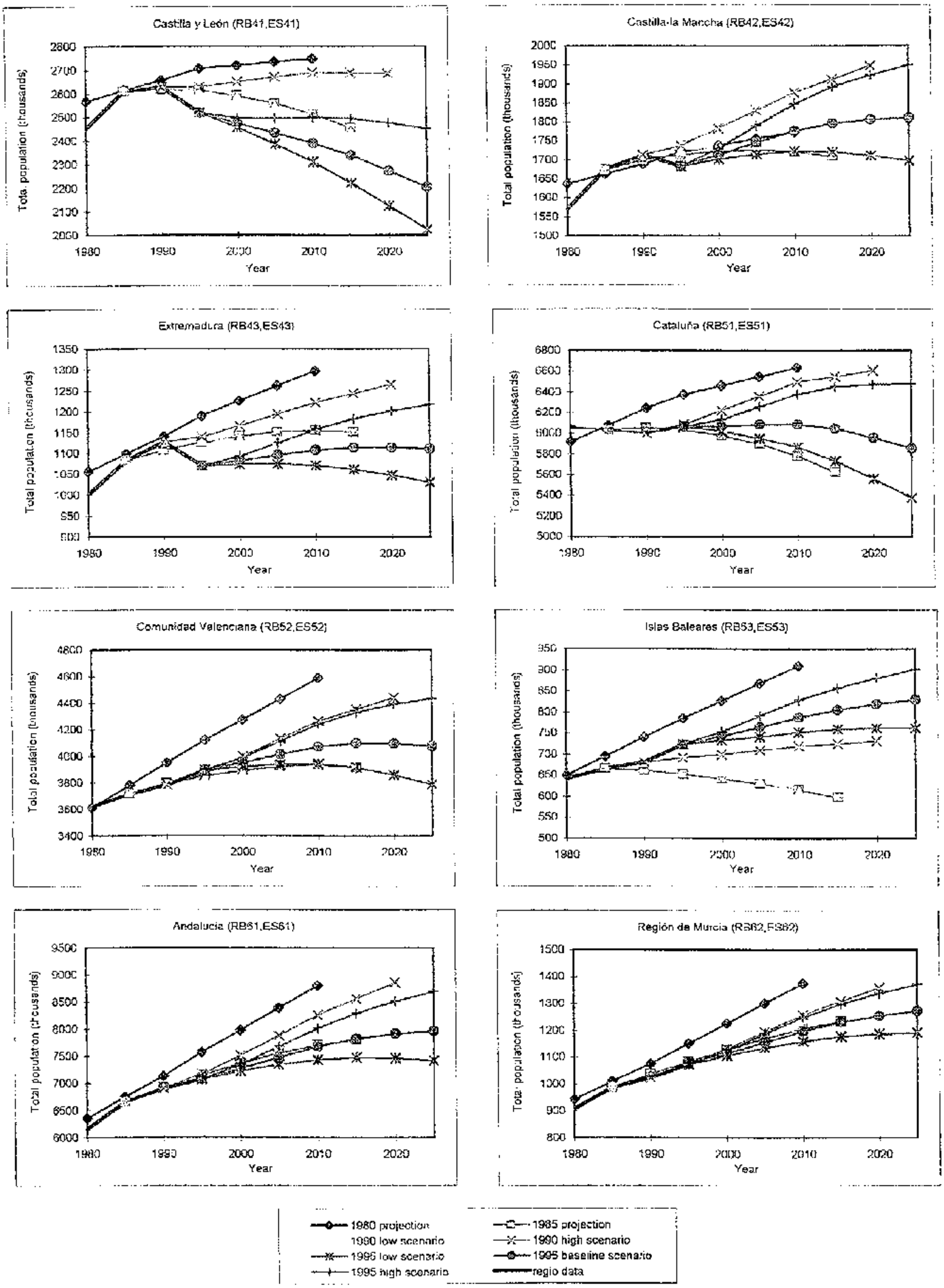

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Figure 4.20 *continued*

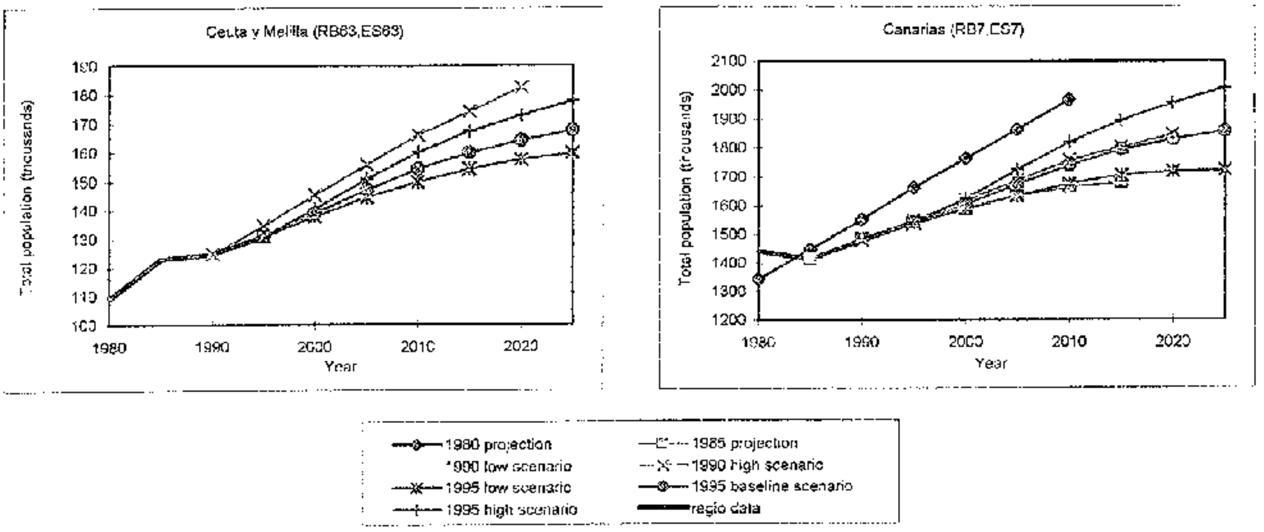
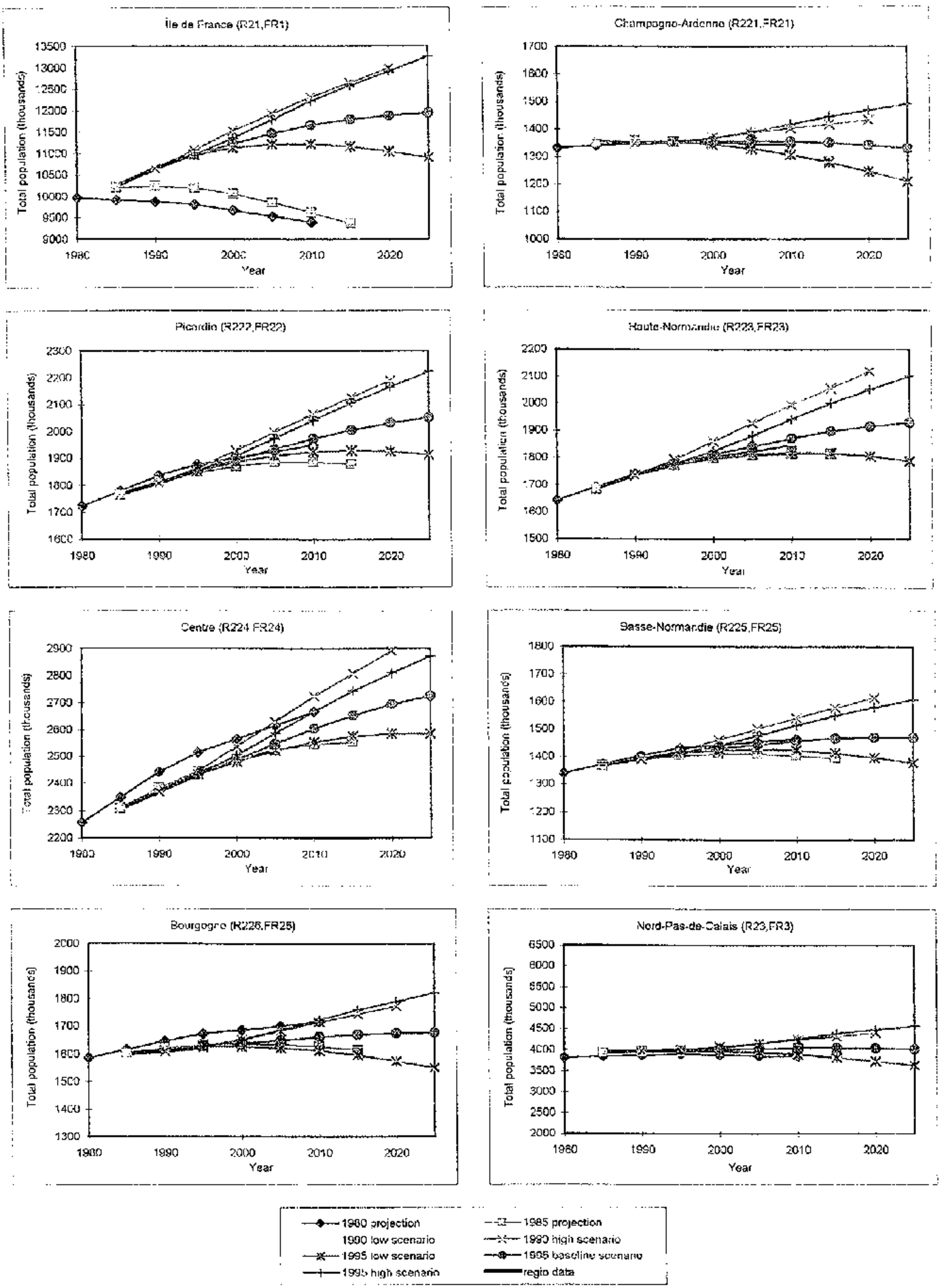


Figure 4.21: Regional population projections, 1980-2025, France



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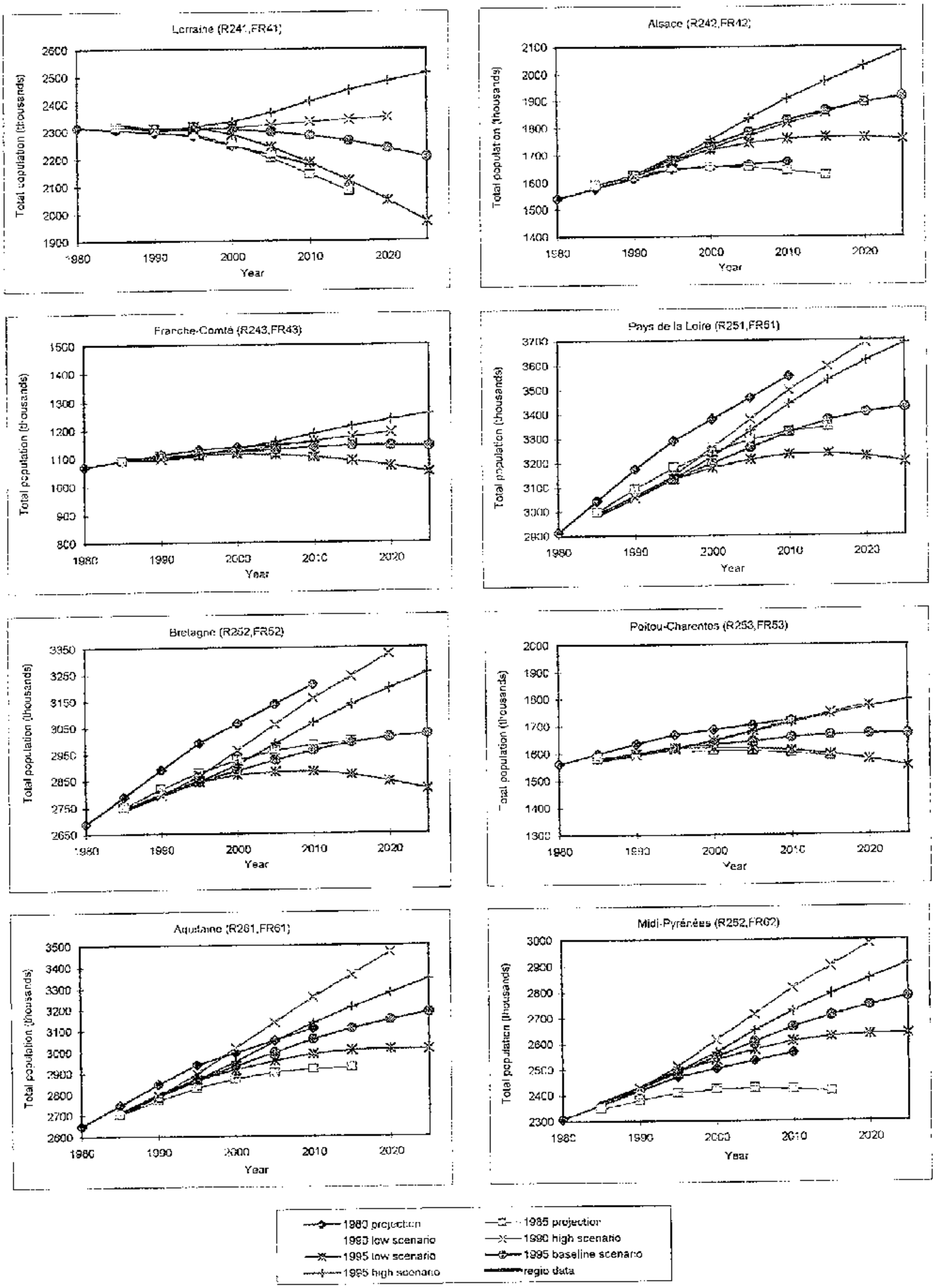

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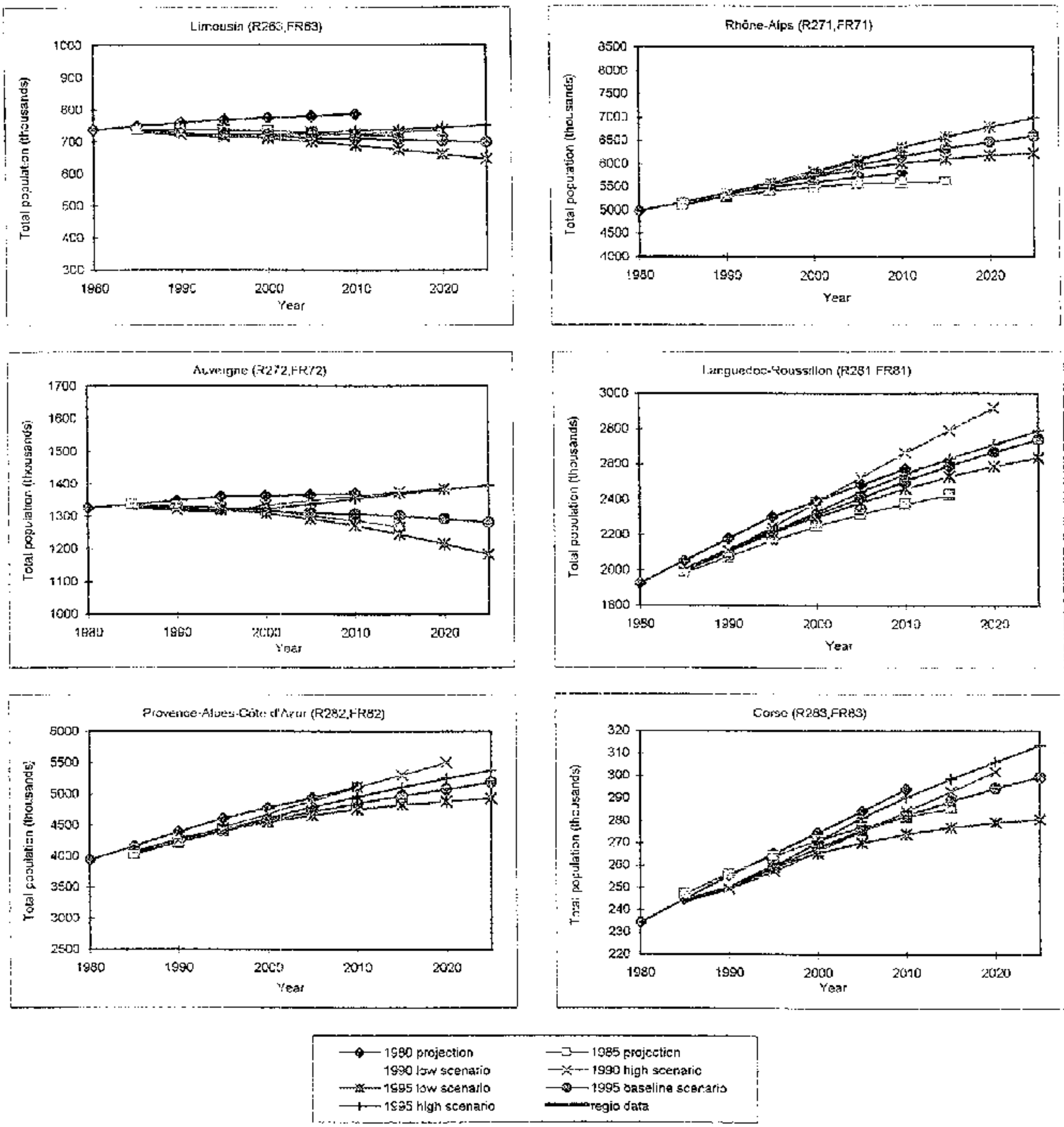
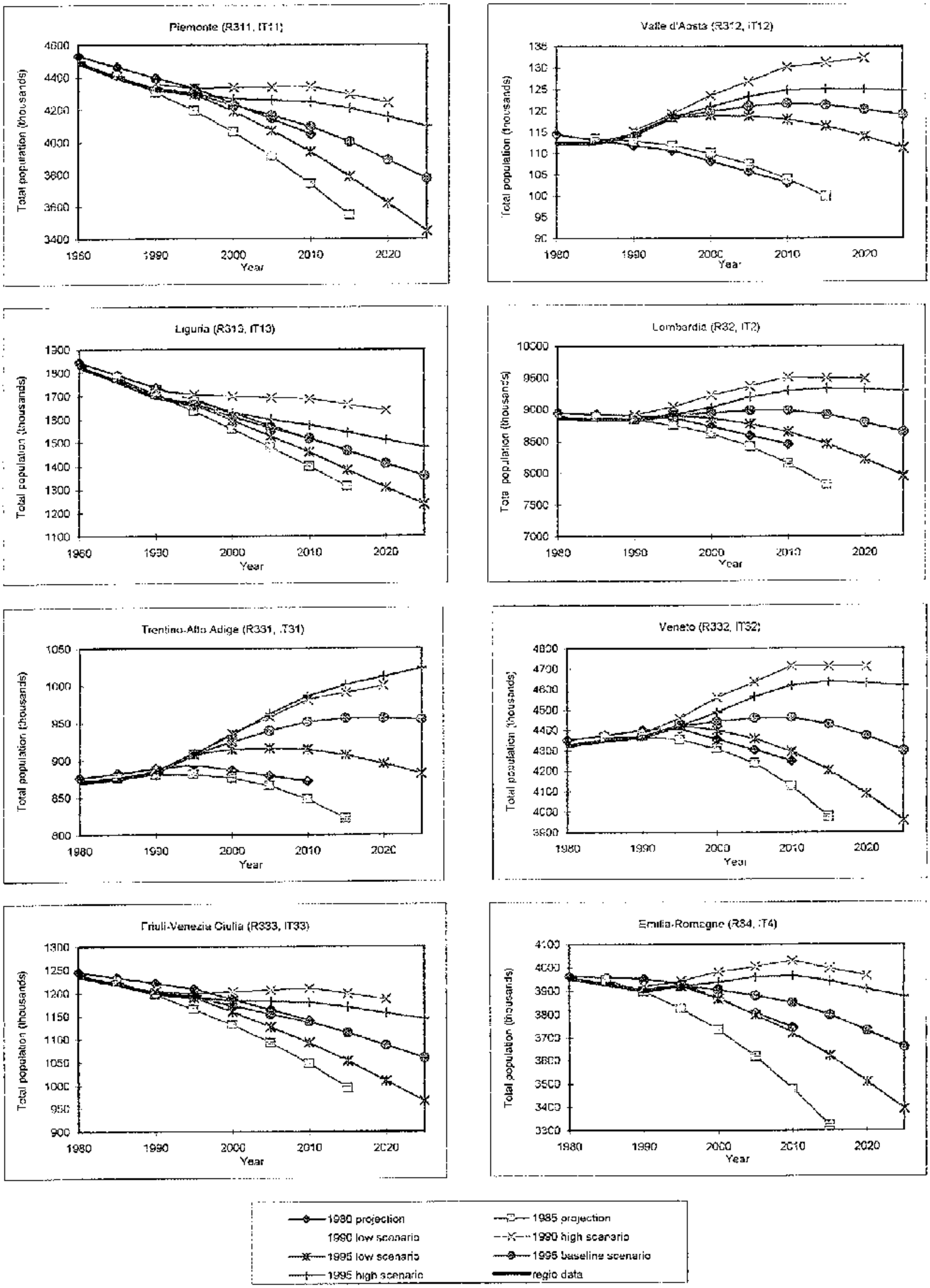


Figure 4.22: Regional population projections, 1980-2025, Italy



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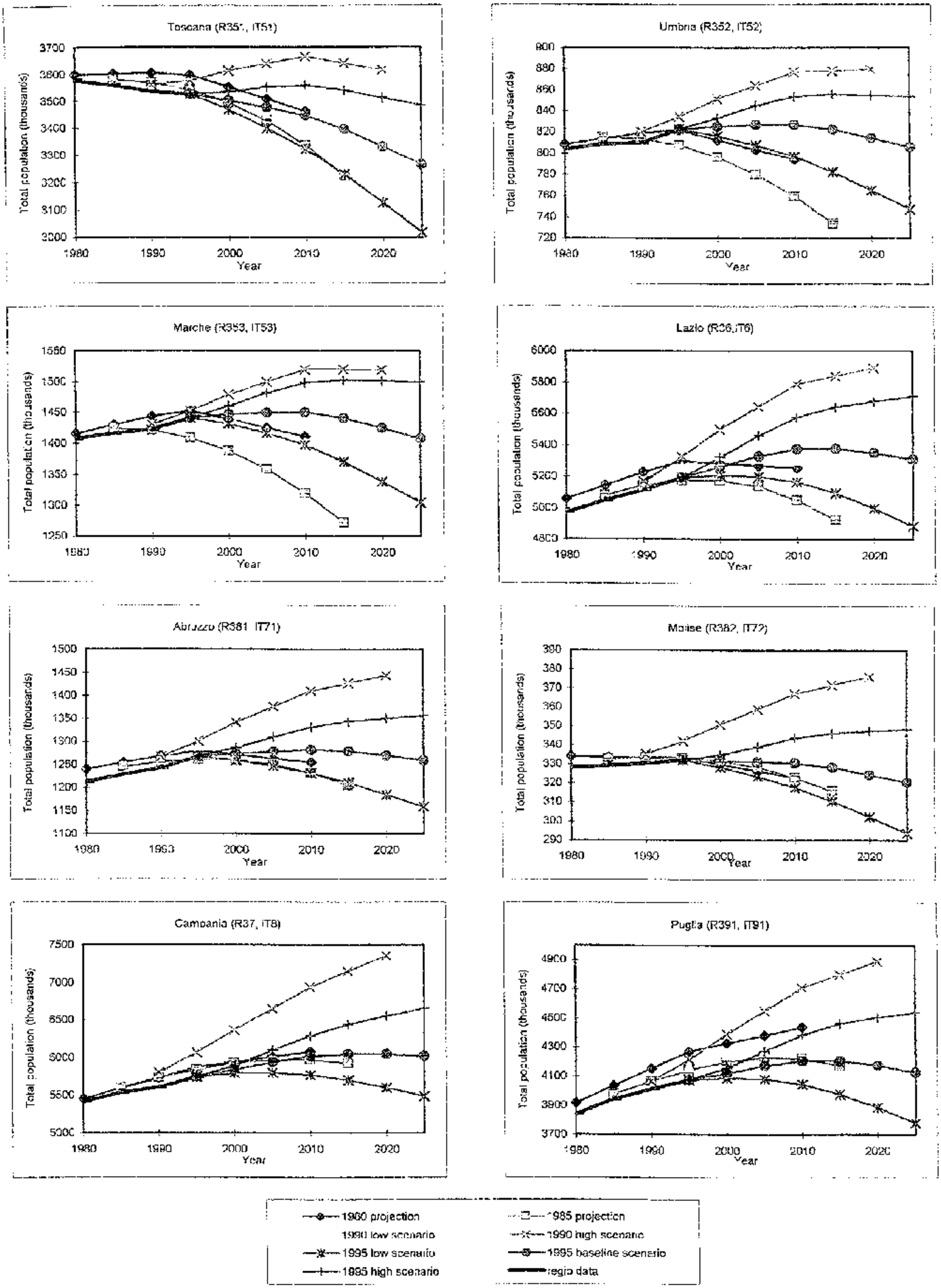

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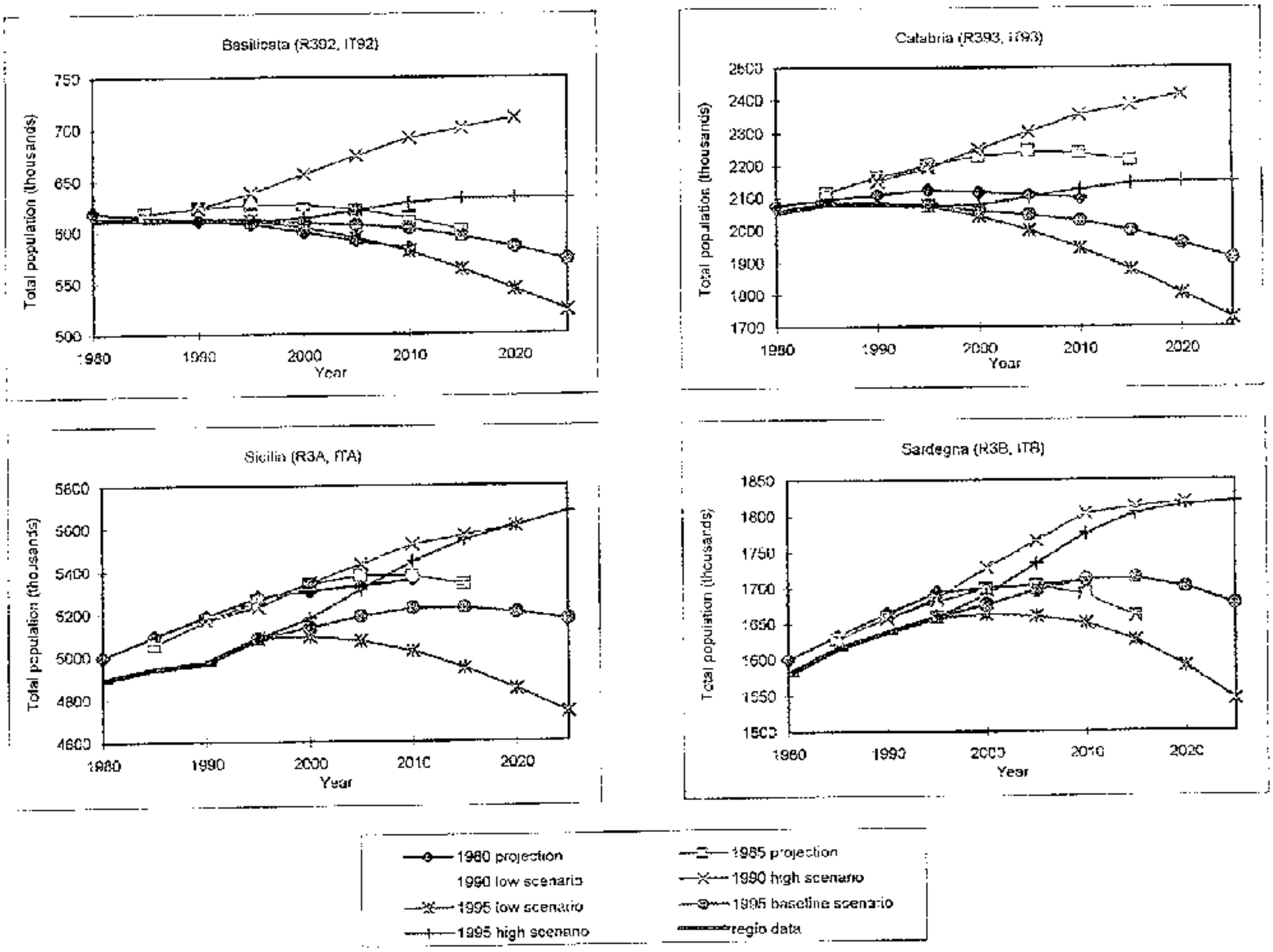
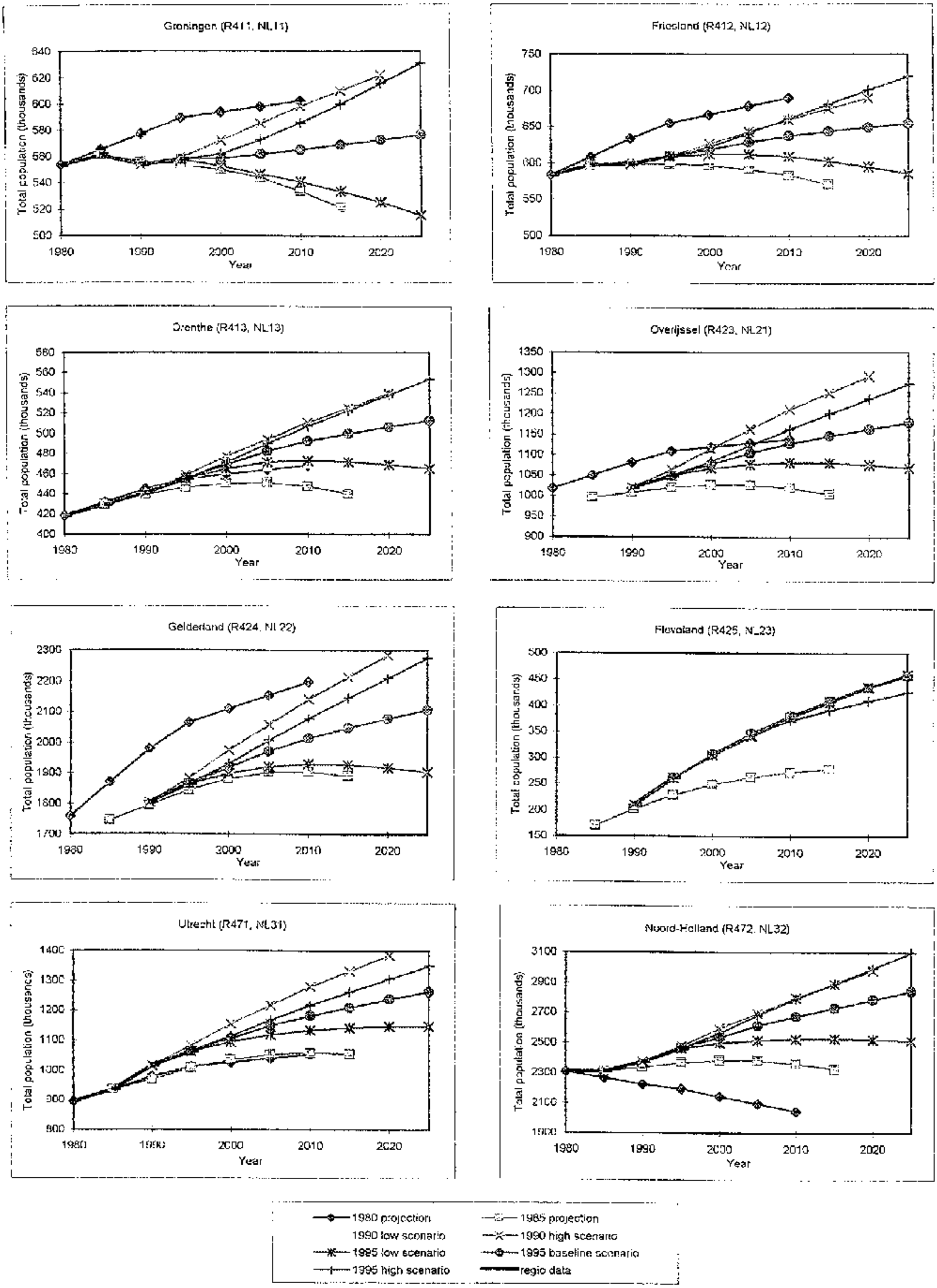


Figure 4.23: Regional population projections, 1980-2025, The Netherlands



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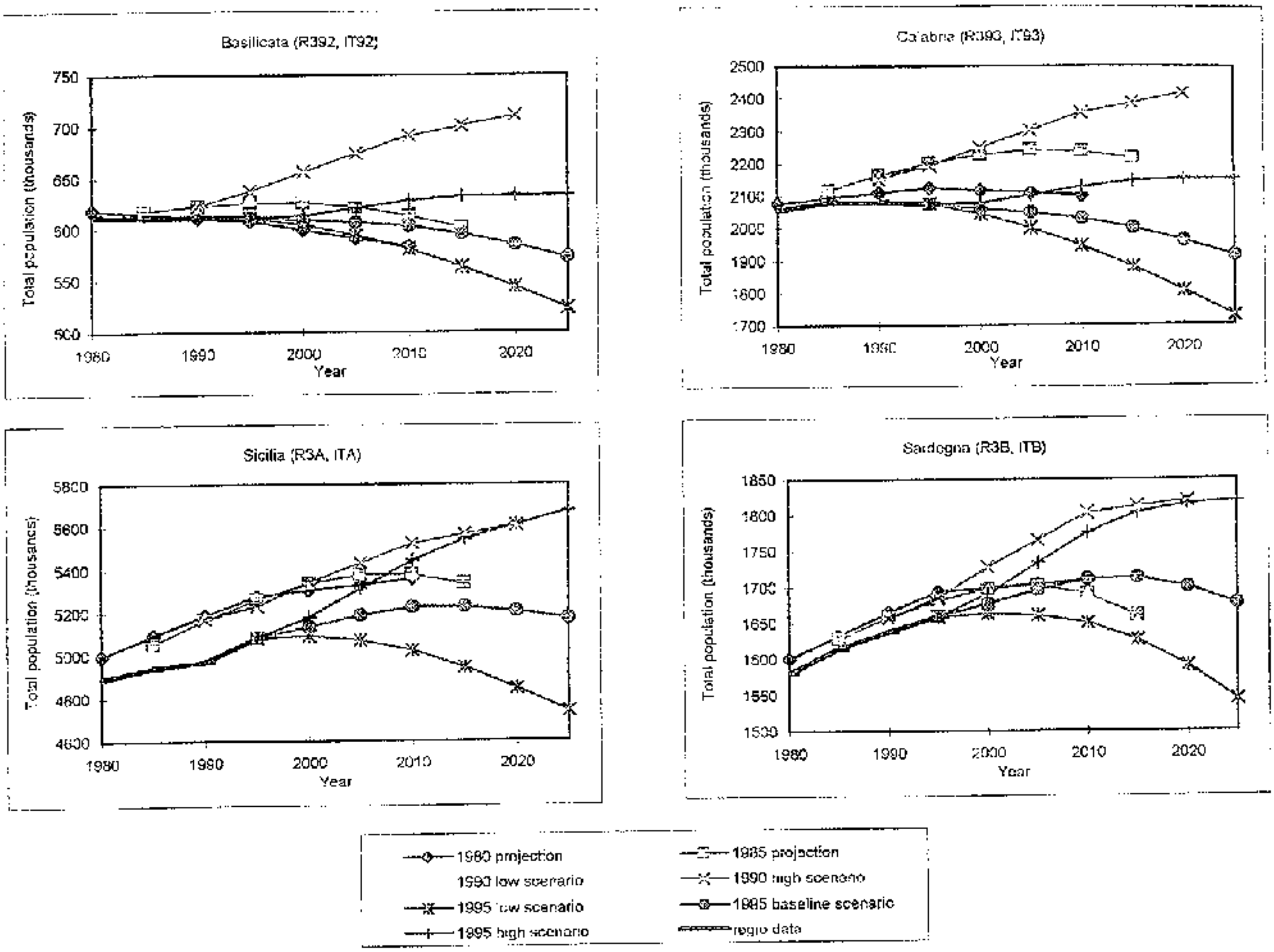
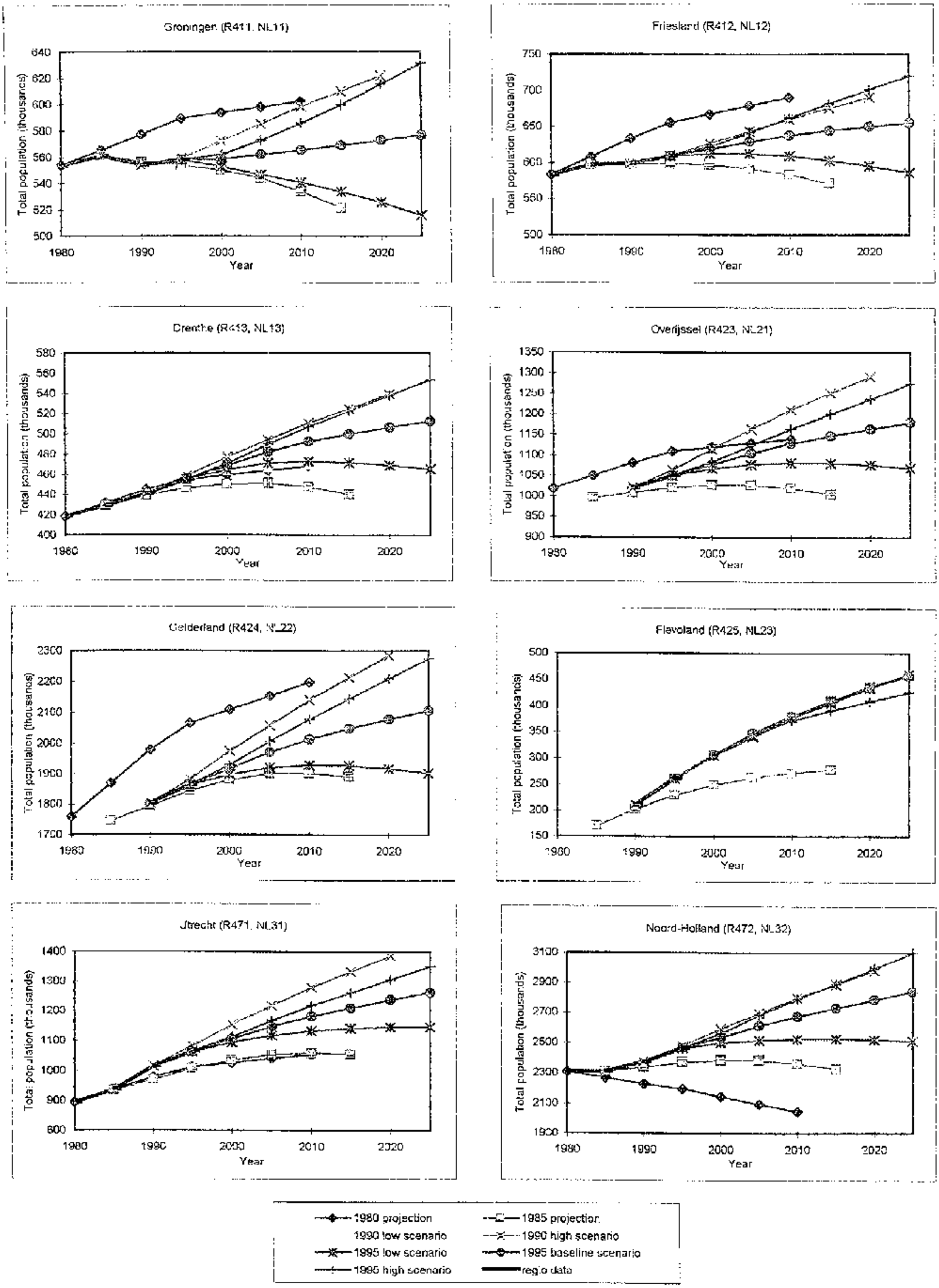


Figure 4.23: Regional population projections, 1980-2025, The Netherlands



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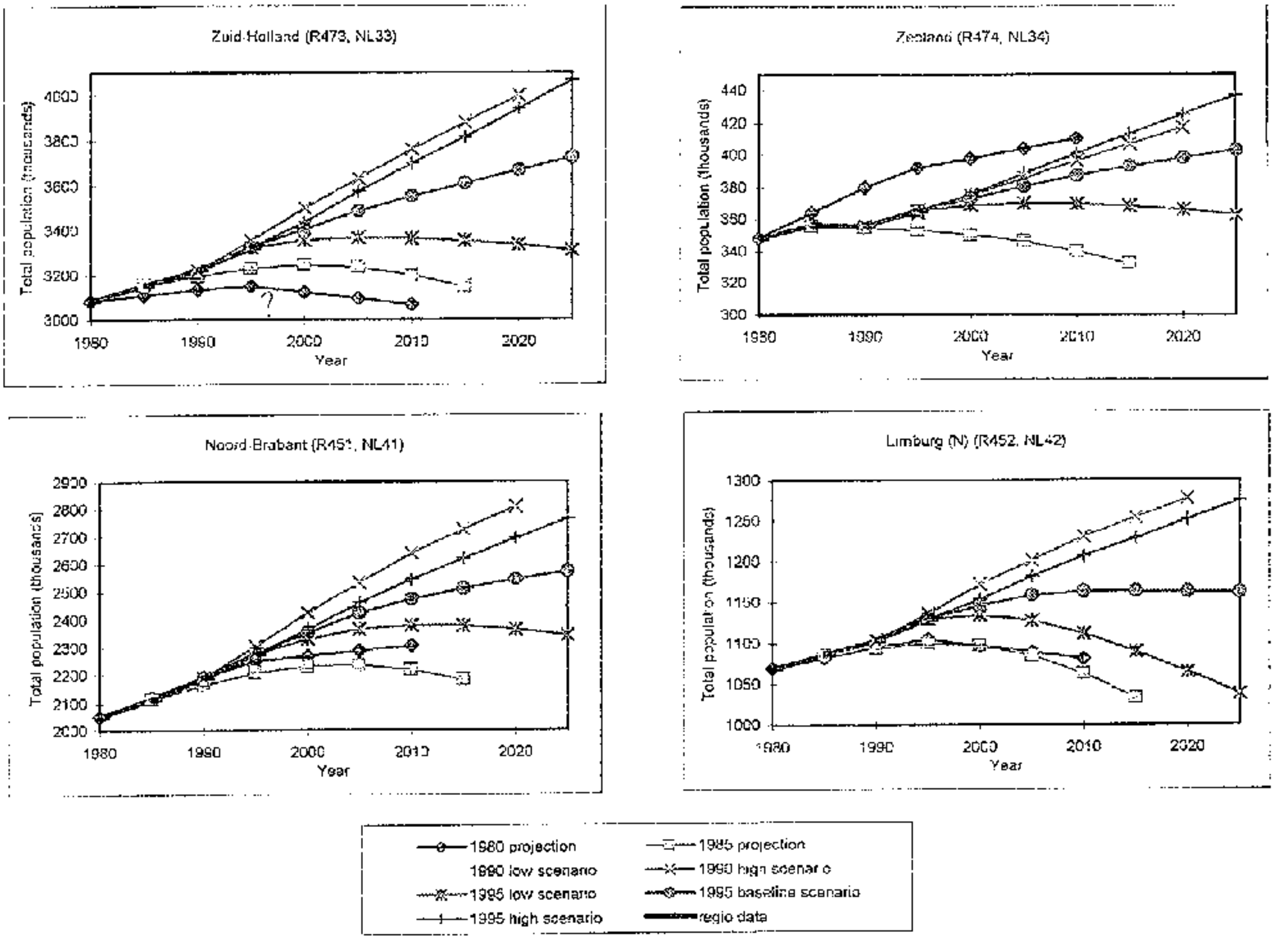

Figure 4.24: Regional population projections, 1980-2025, Austria

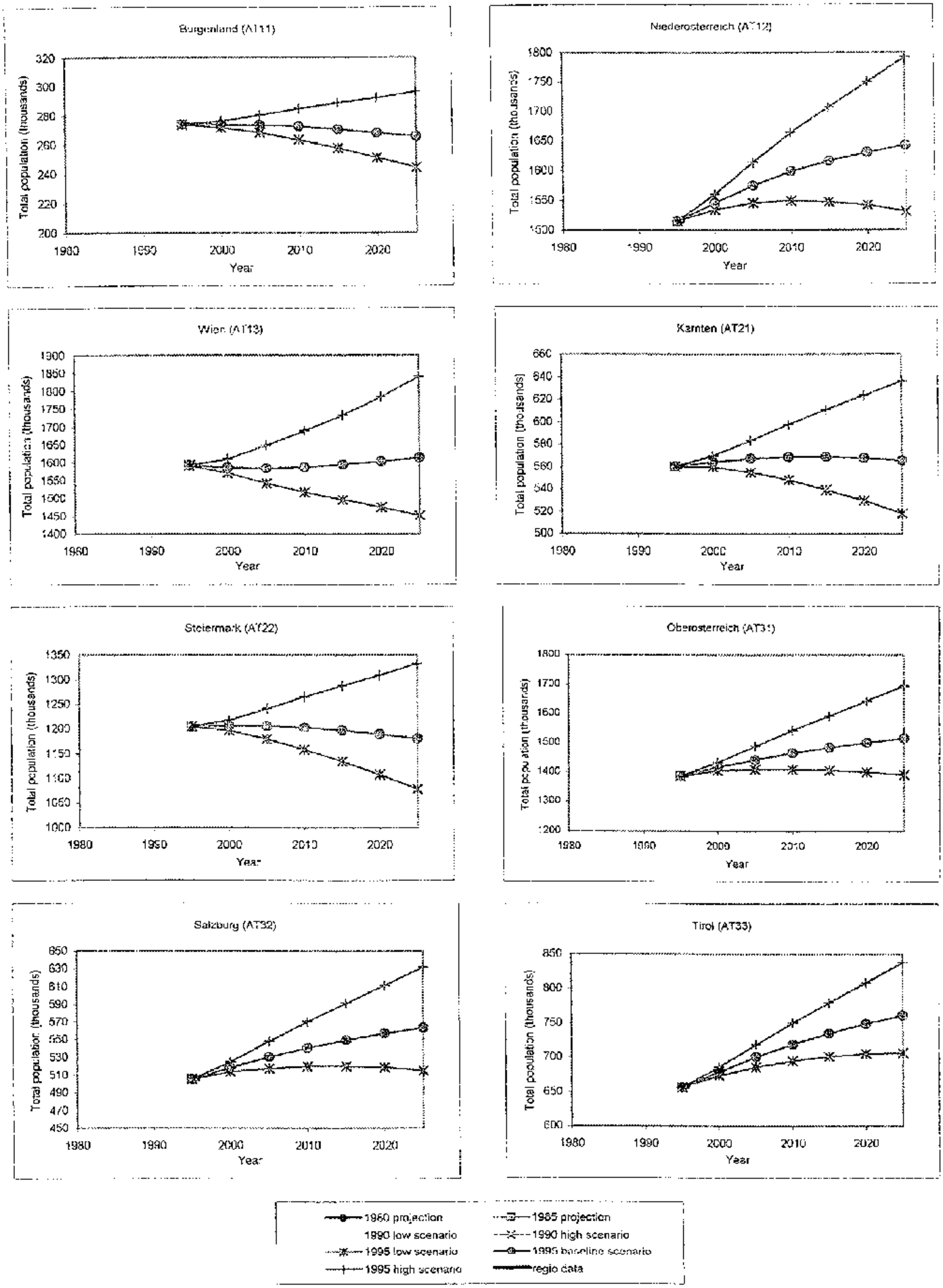

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Figure 4.24 *continued*

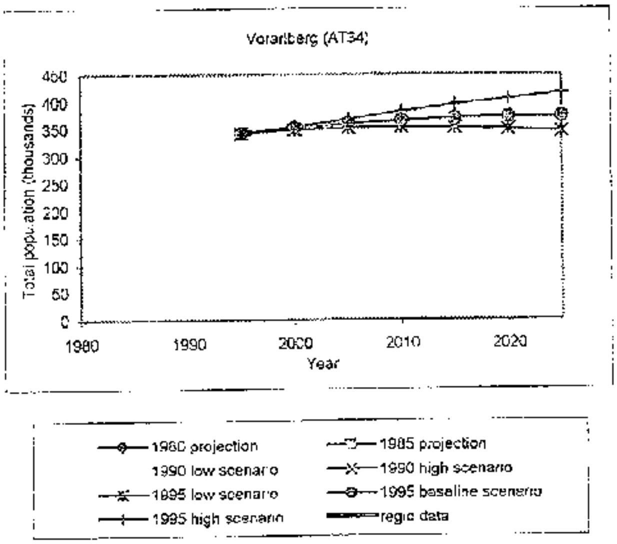

Figure 4.25: Regional population projections, 1980-2025, Portugal

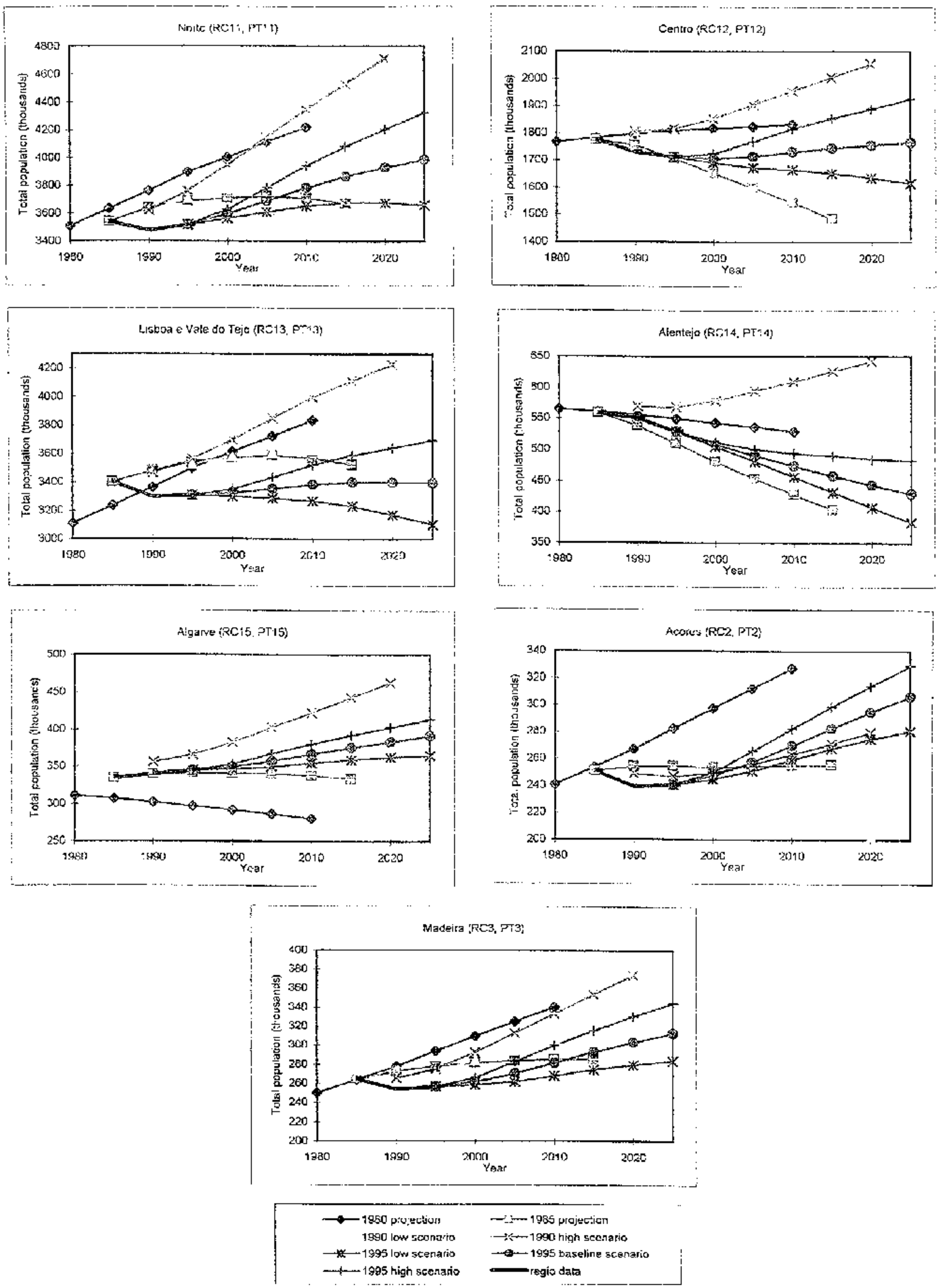

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Figure 4.26: Regional population projections, 1980-2025, Finland

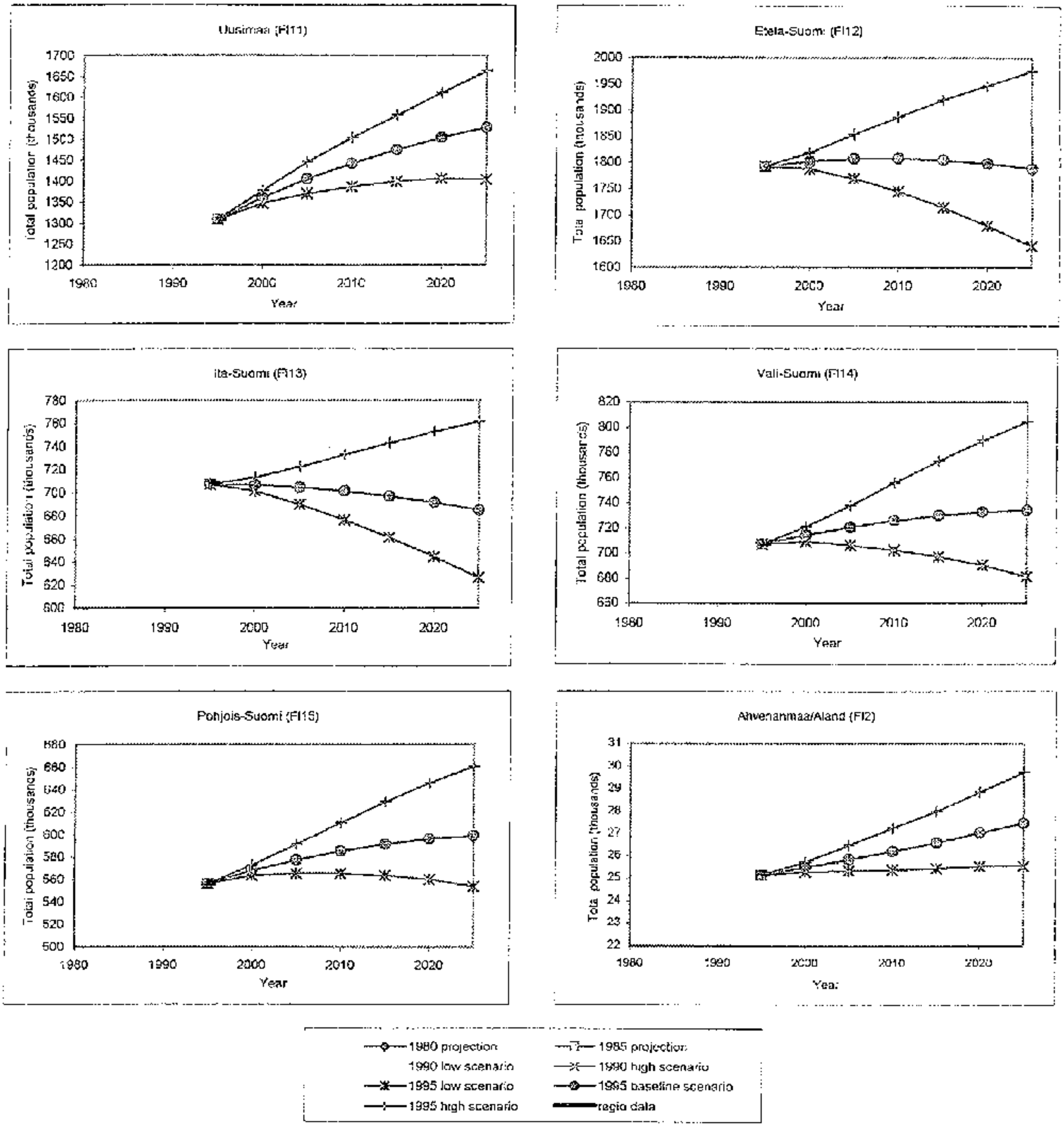


Figure 4.27: Regional population projections, 1980-2025, Sweden

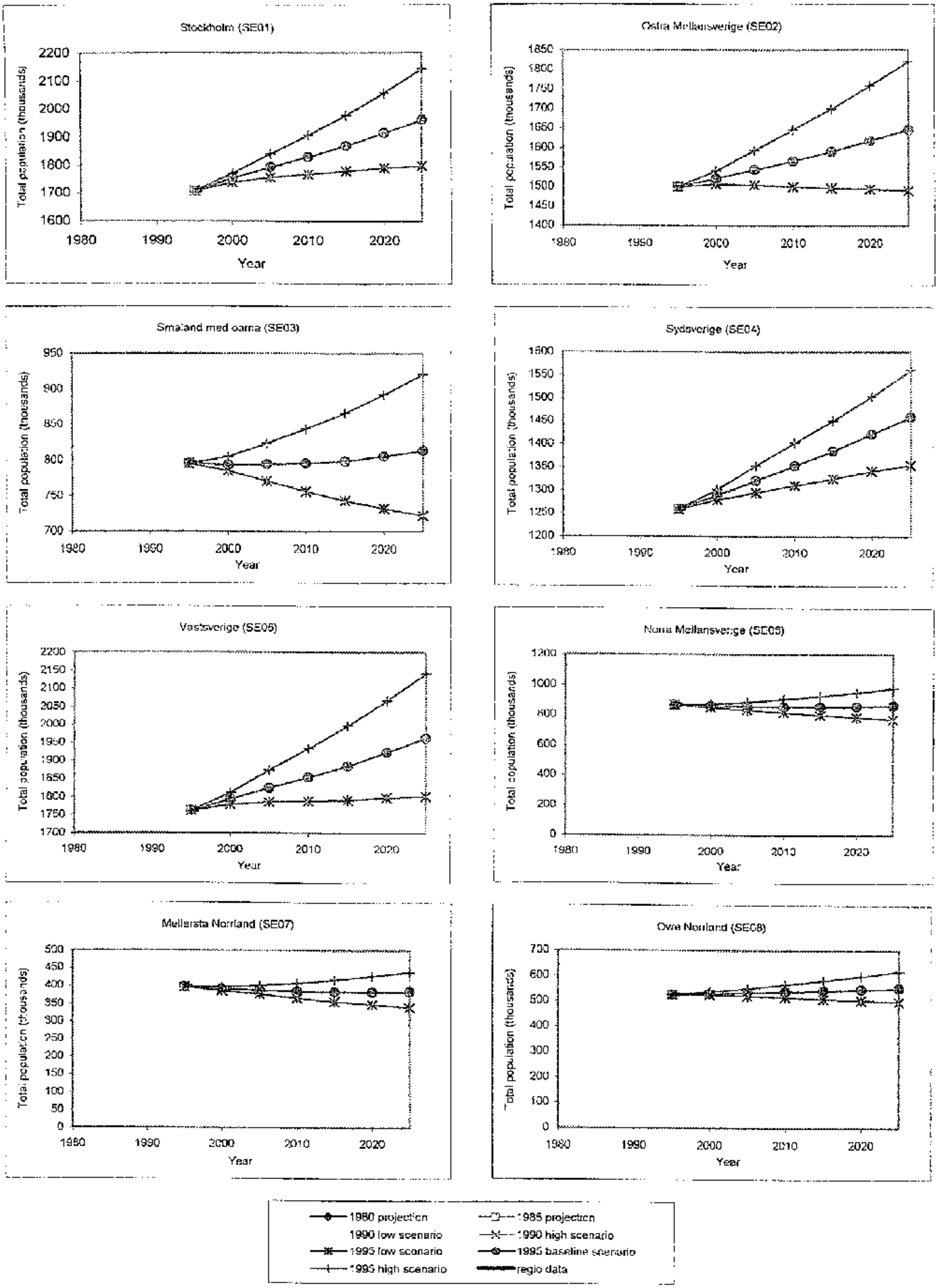
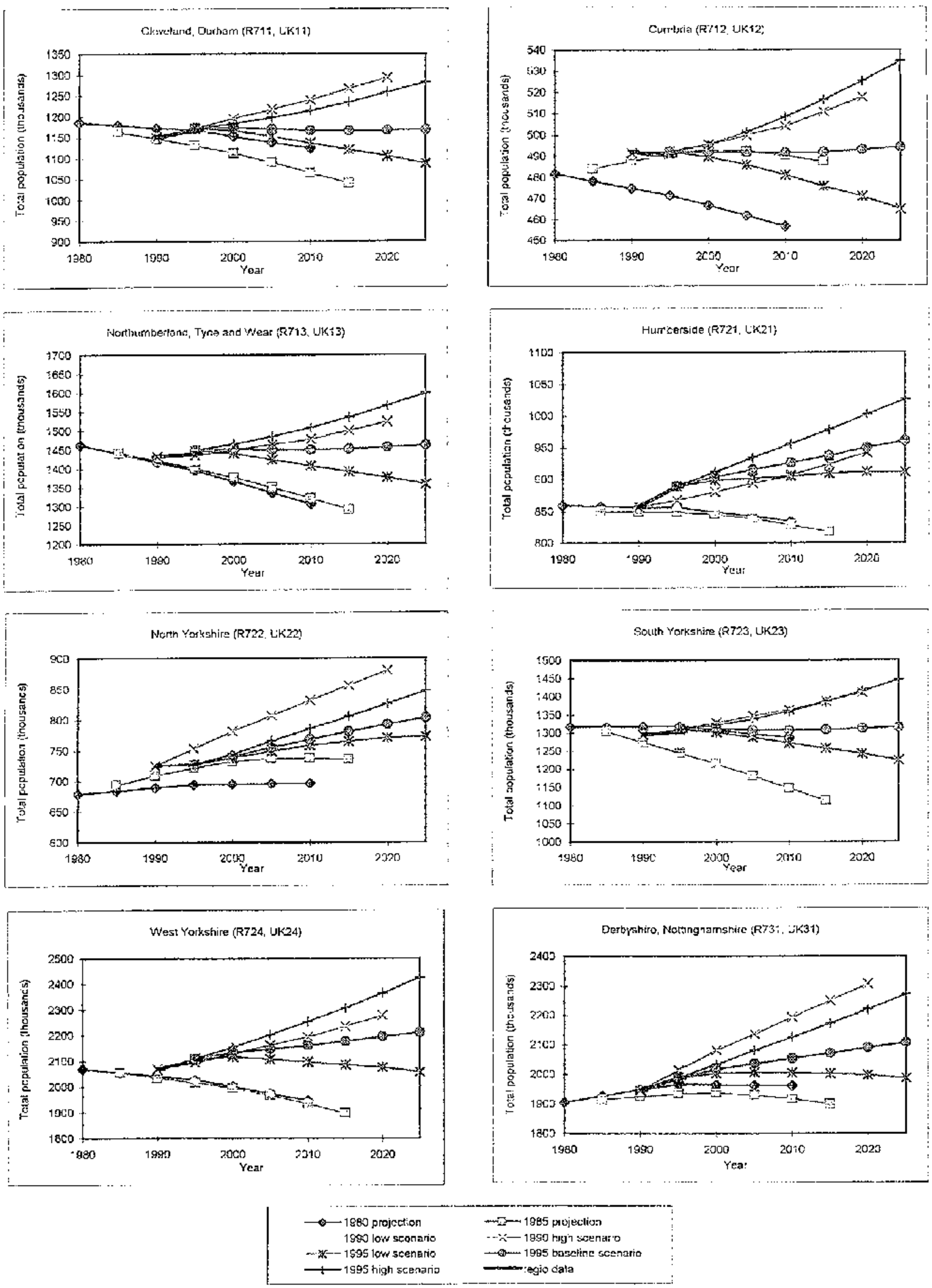


Figure 4.28 Regional population projections, 1980-2025, United Kingdom



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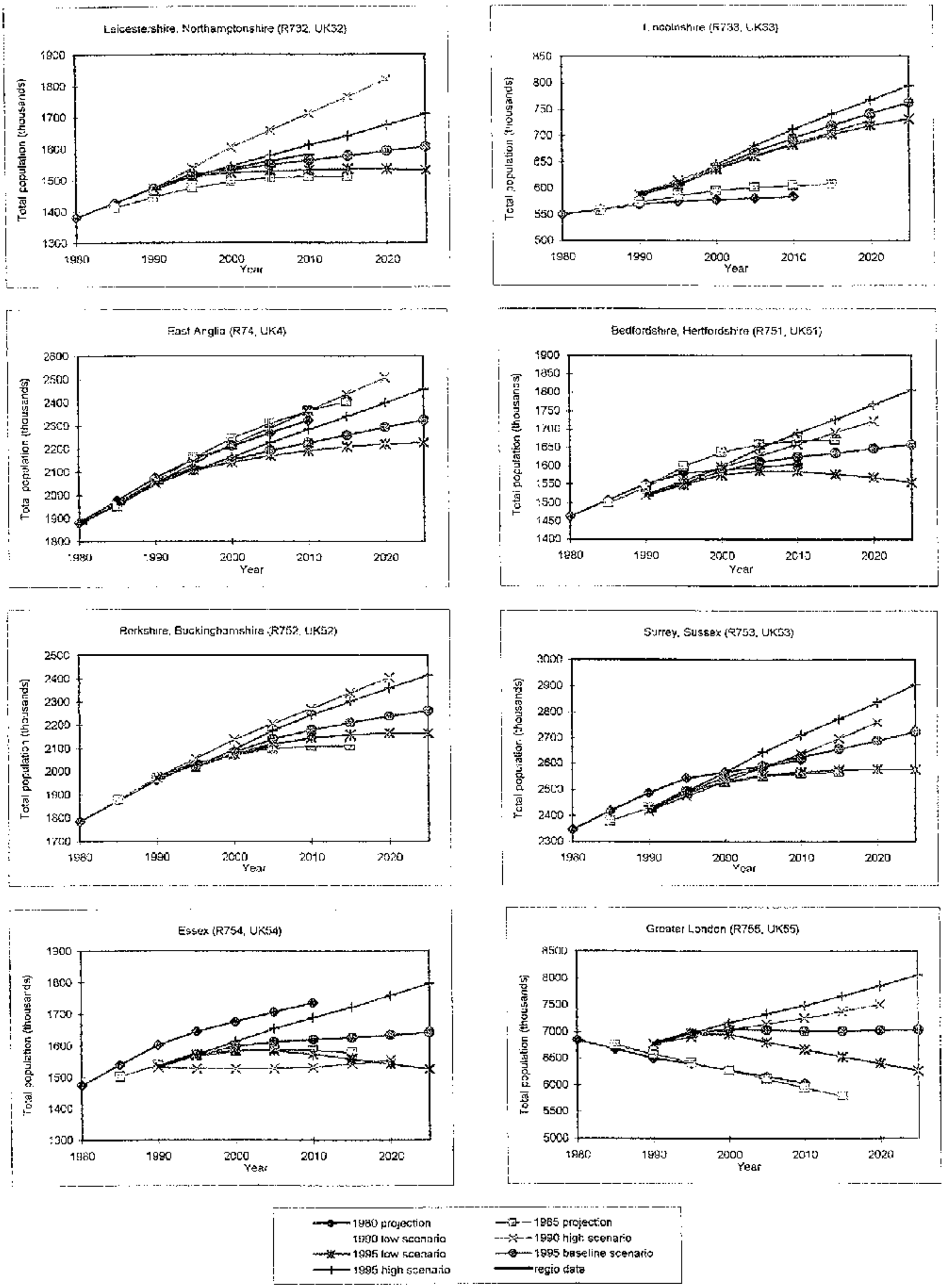

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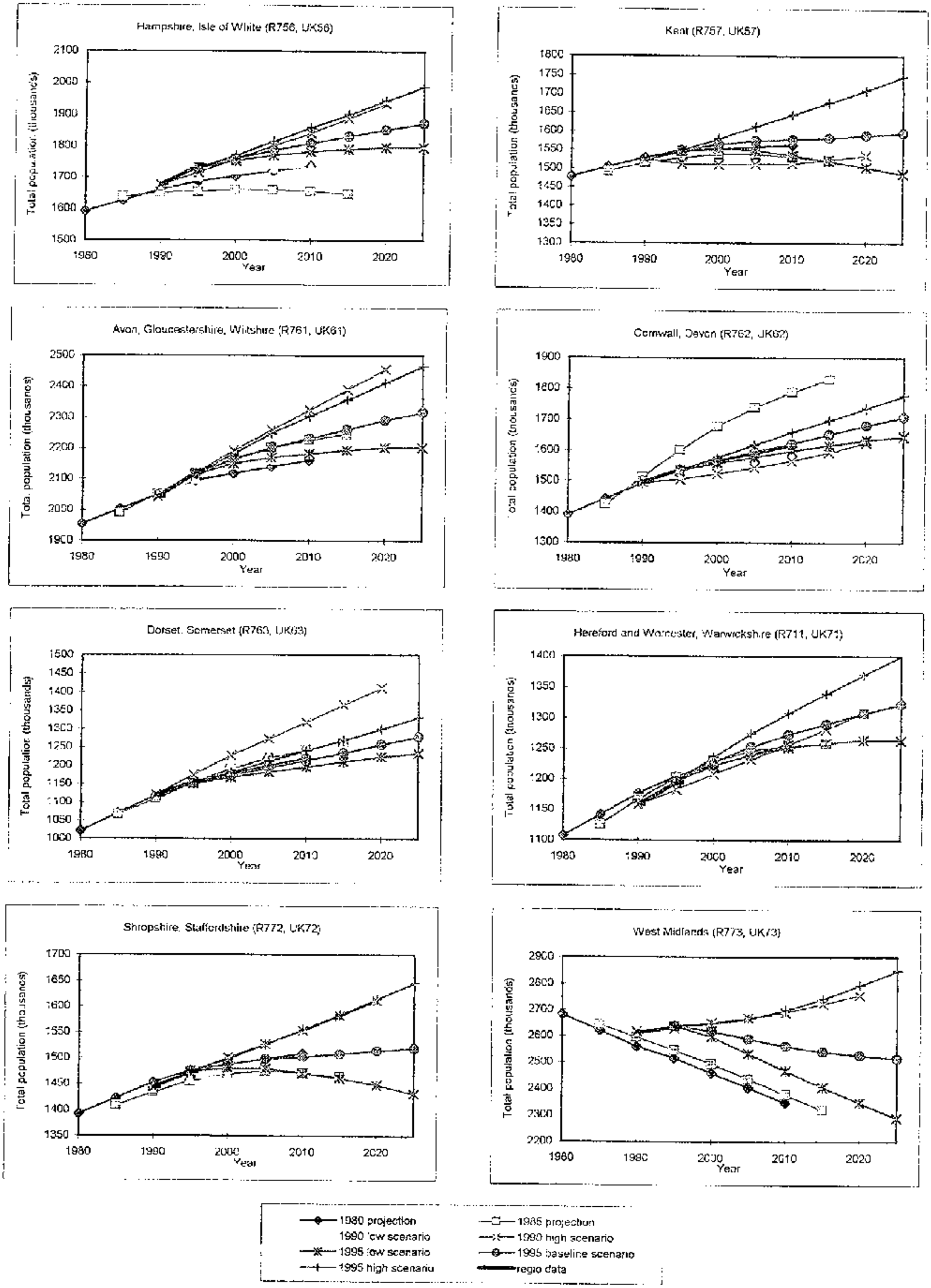

Figure 4.28 *continued*