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In the Spotlight

POPULATION OF GERMANY TODAY AND TOMORROW

Federal Statistical Office of Germany

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Preface

An ageing society, a low birth rate, a falling population size and a shrinking working-age population – future demographic developments in Germany can be summed up in these terms. For many years, demographers have been warning of the consequences of this demographic trend. The current discussions in the German political arena concerning restructuring of old-age pensions show that the topic of demographic development has now really become a focus of attention. Here, the changes in population structure and size have had a considerable effect not only on future old-age pensions and the labour market, but also on almost all other areas of our society. Here, for instance, we should mention education and training, housing construction and healthcare. A sustainable structure in our future society will depend on how we deal with the impact of demographic trends.

Orientation of our social welfare state in terms of the principle of sustainability as it concerns care for present and future generations is based on sound knowledge of future demographic trends in Germany. This new In the Spotlight volume from my Office provides a contribution towards this knowledge. It presents future demographic trends up to 2050. The projection is founded upon the population of Germany at the end of 2001. It is based on the course of demographic trends to date, and takes account of hypotheses on future social changes which may be recognisable from today's point of view. The assumptions made here are presented in the first part of the volume. Their combination reveals a variety of scenarios for future demographic trends. The second part of the volume presents trends in the population size and structure of Germany up to 2050 and clarifies the degree to which changes in life expectancy or migration conduct may influence these various scenarios.

To everyone who has made this publication possible, I would like to offer my most heartfelt thanks, and I wish the new In the Spotlight great success and a wide readership.

Johann Hahlen

President of the Federal Statistical Office

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Abbreviations

Units of measurement

% = per cent

mn = million

Other abbreviations

EU = European Union

Explanation of Symbols

· = information not available

x = cell blocked for logical reasons

Summary

The 10th coordinated population projection until 2050 at federal level was implemented on the basis of the 31 December 2001 population. The goal of the projection is to quantify the changes in the size and, above all, in the age structure of the population of Germany based on assumptions which are realistic from today's point of view. The assumptions were made giving consideration to the most important components of demographic trends: fertility and life expectancy, as well as external migration. The overview below summarises the assumptions and main results of the population projection.

The following assumptions have been made for demographic trends from the present day until 2050:

In the former territory of the Federal Republic, fertility will remain at the low level of 1.4 children per woman. For the New Länder, a gradual increase in the (still low) fertility is assumed to reach the level of the former territory of the Federal Republic by 2010. From 2011 onwards, a constant fertility of 1.4 children per woman throughout Germany is assumed until 2050.

Life expectancy will continue to rise. A total of three assumptions were made for 2050 as to the development dynamics of life expectancy. According to the medium assumption life expectancy of new-born boys in 2050 will be 81.1 years and of girls 86.6 years, that is roughly six years more than now. The minimum assumed increase is among boys two and among girls one year less. With the maximum assumed increase, the life expectancy of both genders would be roughly 1.5 years higher than in the medium assumption.

For 60-year-olds, in the medium assumption for 2050 a life expectancy of another 23.7 years for men and 28.2 years for women is estimated. Hence, in 2050, 60-year-old men may expect to reach the age of approximately 84 and women of the same age that of roughly 88. The high increase in life expectancy assumes a life expectancy which is a good year higher.

For trends in the New Länder, it was assumed that the lower life expectancy (at present) will rise faster in the next twenty years than in the former territory of the Federal Republic, and that from 2020 it will no longer be different to life expectancy in the former territory of the Federal Republic.

External migration distinguishes between Germans and non-Germans since different determining factors apply to both groups. Three assumptions are made as to the migration conduct of the foreign population: The first two assumptions are based on an annual migration surplus of 100 000 and 200 000 persons respectively from 2003 onwards. This range depicts the long-term average of external migration of non-Germans. Since however in future there could be even higher migration gains, a third assumption is made. This assumes an increase in the annual migration balance from 200 000 to 300 000 non-Germans from 2011 onwards. In all three cases, the assumed migration balances are regarded only as a long-term average. Immigration by Germans is given the same estimate in all three variants; it is gradually falling.

Differences in comparison with the previous 9th coordinated population projection, which was based on the population at 1 January 1998, result above all in the assumptions as to life expectancy: In the 9th coordinated population projection, the maximum assumed life expectancy for boys was 80.1 and for girls 86.4 years. These values correspond almost exactly to the medium life expectancy assumption of the new calculation. The current population projection however bases the maximum assumption on an even higher increase in life expectancy which might take place primarily because of better chances of survival at advanced age.

As to external migration, the 9th coordinated population projection only contained two variants (long-term annual balances of 100 000 and 200 000 respectively); however, the 8th coordinated popula-

tion projection had already covered a migration variant with a balance of 300 000. The 10th coordinated population projection now assumes fertility to be slightly higher than in the last one.

The demographic structure will develop as follows until 2050:

The low fertility will result in the number of potential mothers becoming smaller and smaller. In the variant with the medium increase in life expectancy and the medium migration balance, the number of women of child-bearing age (15 to 49) falls from almost 20 million in 2001 to almost 14 million in 2050. This will also result in a rapid decrease in the number of children being born.

The transition of the years with the largest amount of births into high age groups leads to an increase in deaths per year in the next fifty years.

Since the number of deaths will exceed the number of births by an ever greater proportion in future, the population size will shrink. Migration alleviates the negative population growth, but is unable to compensate in the long term for the growing birth deficit, even with the highest assumed migration balance. Depending on the variant of the projection, the population size will be between 67 and 81 million by 2050.

The proportion of young people under 20 among the population will shrink from roughly one-fifth in 2001 to one-sixth in 2050. By contrast, the proportion of the over-60s will increase in the same period from roughly one-quarter to more than one-third. The proportion of 80-year-olds and older will almost triple, and could be around 12 % in 2050.

The ratio of the working-age population to elderly citizens, the so-called old-age dependency ratio, will change accordingly. Taking the minimum assumption of ageing, low growth in life expectancy and a high migration balance, 60-year-olds and older people will be in a ratio of 71 to 100 in 2050 in comparison with 20- to-59-year-olds. This corresponds to an old-age dependency ratio of 71. The old-age dependency ratio in 2001 was only 44.

If the transition between working and pensionable ages was not at 60, but at 65, the ratio between 20- and 64-year-olds and 65-year-olds and older is between 49 and 62 in 2050, depending on the variant. For 100 people of working age, there would hence be more than 20 persons fewer of pensionable age than if retirement was at 60.

Immigration cannot prevent ageing, but can help slow it. This is also reflected in the level of the old-age dependency ratio: With medium life expectancy, low immigration of roughly 100 000 persons per year, and a retirement age of 65, an old-age dependency ratio of 59 is revealed for 2050. If 100 000 more persons immigrate per year, the old-age dependency ratio is 55. If immigration from 2011 onwards is again 100 000 persons higher per year, the old-age dependency ratio falls to 51.

The changes in the age structure also impact the working-age population. Above all, the medium age group of 35- to 49-year-olds will decrease significantly: by 31 % up to 2050. The younger group of 20- to 35-year-olds is likely to include 24 % fewer persons in 2050 than at present. By contrast, only roughly 3 % fewer 50- to 64-year-olds will be alive in 2050. This means that the share of the elderly within the group of persons of working age will increase considerably.

Zusammenfassung

Die 10. koordinierte Bevölkerungsvorausberechnung bis zum Jahr 2050 auf Bundesebene wurde auf Basis des Bevölkerungsstandes zum 31. Dezember 2001 durchgeführt. Ziel der Vorausberechnung ist es, die Veränderungen in der Größe und – vor allem – im Altersaufbau der Bevölkerung Deutschlands unter aus heutiger Sicht realistischen Annahmen zu quantifizieren. Die Annahmen wurden hinsichtlich der wichtigsten Komponenten der Bevölkerungsentwicklung getroffen: der Geburtenhäufigkeit, der Lebenserwartung sowie der Außenwanderungen. Im folgenden Überblick werden die Annahmen und wichtige Ergebnisse der Bevölkerungsvorausberechnung zusammengefasst.

Folgende Annahmen werden für die zukünftige Bevölkerungsentwicklung bis 2050 getroffen:

Die Geburtenhäufigkeit bleibt im früheren Bundesgebiet auf einem niedrigen Niveau von 1,4 Kindern pro Frau. Für die neuen Länder wird von einem allmählichen Anstieg der dort zurzeit noch niedrigeren Geburtenhäufigkeit auf das Niveau des früheren Bundesgebiets bis 2010 ausgegangen. Ab 2011 wird eine Konstanz der Geburtenhäufigkeit für Gesamtdeutschland bei 1,4 Kindern pro Frau bis zum Jahr 2050 angenommen.

Die Lebenserwartung nimmt weiter zu. Für das Jahr 2050 wurden insgesamt drei Annahmen über die Entwicklungsdynamik der Lebenserwartung getroffen. Nach der mittleren Annahme wird die Lebenserwartung neugeborener Jungen im Jahr 2050 81,1 Jahre und die von Mädchen 86,6 Jahre betragen, d. h. rund 6 Jahre mehr als heute. Der minimal angenommene Anstieg fällt bei Jungen um zwei und bei Mädchen um ein Jahr geringer aus. Bei der maximal angenommenen Zunahme würde die Lebenserwartung für beide Geschlechter etwa 1,5 Jahre höher liegen als in der mittleren Annahme.

Für 60-Jährige wird in der mittleren Annahme für das Jahr 2050 eine fernere Lebenserwartung von weiteren 23,7 Jahren bei Männern und 28,2 Jahren bei Frauen angesetzt. Damit würden im Jahr 2050 60-jährige Männer mit einer gesamten Lebenserwartung von etwa 84 Jahren und gleichaltrige Frauen von etwa 88 Jahren rechnen können. Die hohe Lebenserwartungsannahme geht von einer noch gut ein Jahr höheren ferneren Lebenserwartung aus.

Für die Entwicklung in den neuen Ländern wurde angenommen, dass die zurzeit noch niedrigere Lebenserwartung in den nächsten zwanzig Jahren schneller ansteigen wird als im früheren Bundesgebiet und sich ab 2020 nicht mehr von der Lebenserwartung im früheren Bundesgebiet unterscheidet.

Bei der Außenwanderung wird nach deutschen und ausländischen Personen unterschieden, da für beide Gruppen unterschiedliche Bestimmungsfaktoren gelten. Zum Wanderungsverhalten der ausländischen Bevölkerung werden drei Annahmen gemacht: In den beiden ersten Annahmen wird von einem jährlichen Wanderungsüberschuss von 100 000 bzw. 200 000 Personen ab 2003 ausgegangen. Mit dieser Spanne ist der langjährige Durchschnitt der Außenwanderungen ausländischer Personen abgebildet. Da es aber in Zukunft zu noch höheren Wanderungsgewinnen kommen könnte, wird eine dritte Annahme getroffen. Diese geht von einer Erhöhung des jährlichen Wanderungssaldos von 200 000 auf 300 000 Ausländerinnen und Ausländer ab dem Jahr 2011 aus. Die angenommenen Wanderungssalden werden in allen drei Fällen nur als langfristiger Durchschnitt angesehen. Die Zuwanderung Deutscher wird in allen drei Varianten gleich angesetzt, sie geht allmählich zurück.

Die Unterschiede zur vorherigen 9. koordinierten Bevölkerungsvorausberechnung, die auf dem Bevölkerungsstand zum 1. Januar 1998 basierte, bestehen vor allem in den Annahmen zur Lebenserwartung: Bei der 9. koordinierten Bevölkerungsvorausberechnung betrug die maximal angenommene Lebenserwartung für Jungen 80,1 und für Mädchen 86,4 Jahre. Diese Werte entsprechen fast der mittleren Annahme der neuen Rechnung. Die aktuelle Bevölkerungsvorausberechnung geht jedoch in der hohen Lebenserwartungsnnahme von einem noch höheren Anstieg

der Lebenserwartung aus, der vorrangig auf Grund der besseren Überlebenschancen im höheren Alter erfolgen könnte.

Zur Außenwanderung enthielt die 9. koordinierte Bevölkerungsvorausberechnung nur zwei Varianten (langfristige jährliche Salden von 100 000 bzw. 200 000); allerdings hatte die 8. koordinierte Bevölkerungsvorausberechnung bereits eine Wanderungsvariante mit einem Saldo von 300 000 umfasst. Die Geburtenhäufigkeit wird in der 10. koordinierten Bevölkerungsvorausberechnung nun geringfügig höher als in der letzten angenommen.

Bis 2050 wird sich die Bevölkerungsstruktur wie folgt entwickeln:

Die niedrige Geburtenhäufigkeit führt dazu, dass die Anzahl der potenziellen Mütter immer kleiner wird. Bei der Variante mit der mittleren Zunahme an Lebenserwartung und dem mittleren Zuwanderungssaldo sinkt die Anzahl der Frauen im geburtenfähigen Alter von 15 bis 49 Jahren von knapp 20 Millionen im Jahr 2001 auf gut 14 Millionen im Jahr 2050. Dies führt dazu, dass die Zahl der geborenen Kinder ebenfalls rapide abnehmen wird.

Das Hineinwachsen der geburtenstarken Jahrgänge in hohe Altersgruppen führt in den kommenden fünfzig Jahren zu einer Zunahme der jährlichen Sterbefälle.

Da die Zahl der Gestorbenen die Zahl der Geborenen künftig immer mehr übersteigt, wird die Bevölkerungszahl schrumpfen. Die Zuwanderung mildert das negative Bevölkerungswachstum, kann jedoch das entstehende Geburtendefizit – auch bei dem höchsten angenommenen Wanderungssaldo – langfristig nicht kompensieren. Je nach Variante der Vorausberechnung wird die Bevölkerungszahl zum Jahr 2050 zwischen 67 und 81 Millionen betragen.

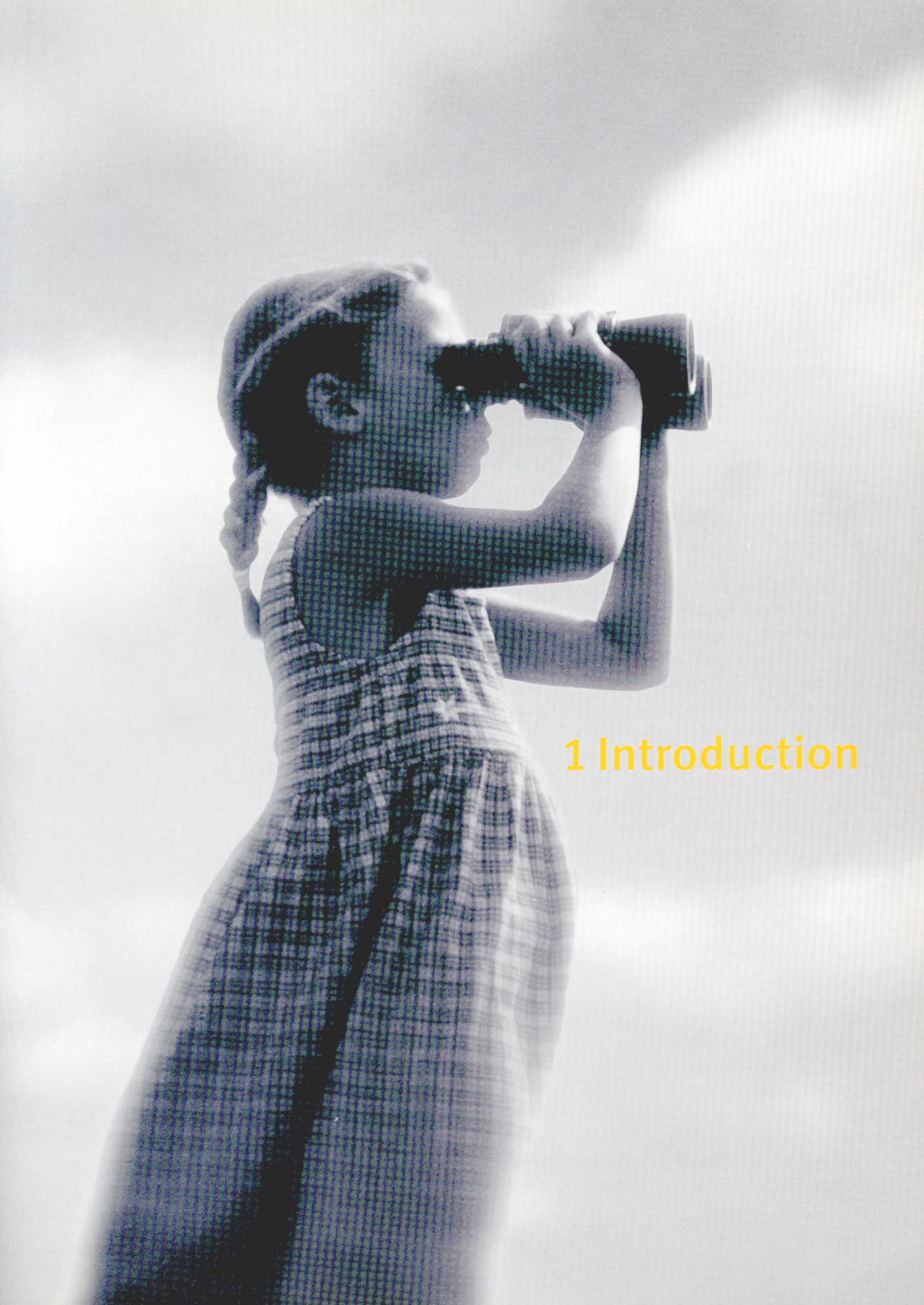
Der Anteil der jungen Menschen unter 20 Jahren an der Bevölkerung wird von rund einem Fünftel im Jahr 2001 auf ein Sechstel im Jahr 2050 sinken. Dagegen steigt der Anteil der über Sechzigjährigen im gleichen Zeitraum von etwa einem Viertel auf mehr als ein Drittel. Der Anteil der 80-Jährigen und älteren wird sich fast verdreifachen und könnte im Jahr 2050 bei ca. 12 % liegen.

Das Verhältnis zwischen der Bevölkerung im erwerbsfähigen Alter und den Senioren, der so genannte Altenquotient, wird sich entsprechend verändern. Bei minimal angenommener Alterung – bei einem niedrigen Zuwachs an Lebenserwartung und einem hohen Wanderungssaldo – werden sich im Jahr 2050 die 60-Jährigen und älteren Menschen den 20- bis 59-Jährigen im Verhältnis 71 zu 100 gegenüberstehen. Dies entspricht einem Altenquotienten von 71. 2001 betrug der Altenquotient lediglich 44.

Läge der Übergang zwischen Erwerbs- und Rentenalter nicht bei 60, sondern bei 65 Jahren, bewegt sich die Relation zwischen den 20- bis 64-Jährigen und den 65-Jährigen und älteren – je nach Variante – im Jahr 2050 zwischen 49 und 62. Auf 100 Menschen im Erwerbsalter entfielen somit mehr als 20 Personen weniger im Rentenalter als bei einem Renteneintritt bei 60 Jahren.

Zuwanderungen können die Alterung nicht verhindern, aber dazu beitragen, dass die Alterung langsamer voranschreitet. Dies spiegelt sich auch im Niveau des Altenquotienten wider: Bei mittlerer Lebenserwartungszunahme und niedriger Zuwanderung von etwa 100 000 Personen pro Jahr ergibt sich 2050 bei einem Renteneintrittsalter von 65 Jahren ein Altenquotient von 59. Wandern jährlich 100 000 Personen mehr zu, beträgt der Altenquotient 55. Fällt die Zuwanderung ab 2011 jährlich um nochmals 100 000 Personen höher aus, sinkt der Altenquotient auf 51.

Die Veränderungen in der Altersstruktur wirken sich auch auf die Bevölkerung im Erwerbsalter aus. Vor allem die mittlere Altersgruppe der 35- bis 49-Jährigen wird deutlich abnehmen: bis 2050 um 31 %. Zur jüngeren Gruppe der 20- bis 35-Jährigen dürften 2050 24 % weniger Personen gehören als heute. Demgegenüber werden im Jahr 2050 nur etwa 3 % weniger 50- bis 64-Jährige leben. Damit steigt der Anteil der Älteren innerhalb der Gruppe der Personen im erwerbsfähigen Alter erheblich an.



1 Introduction

1 Introduction

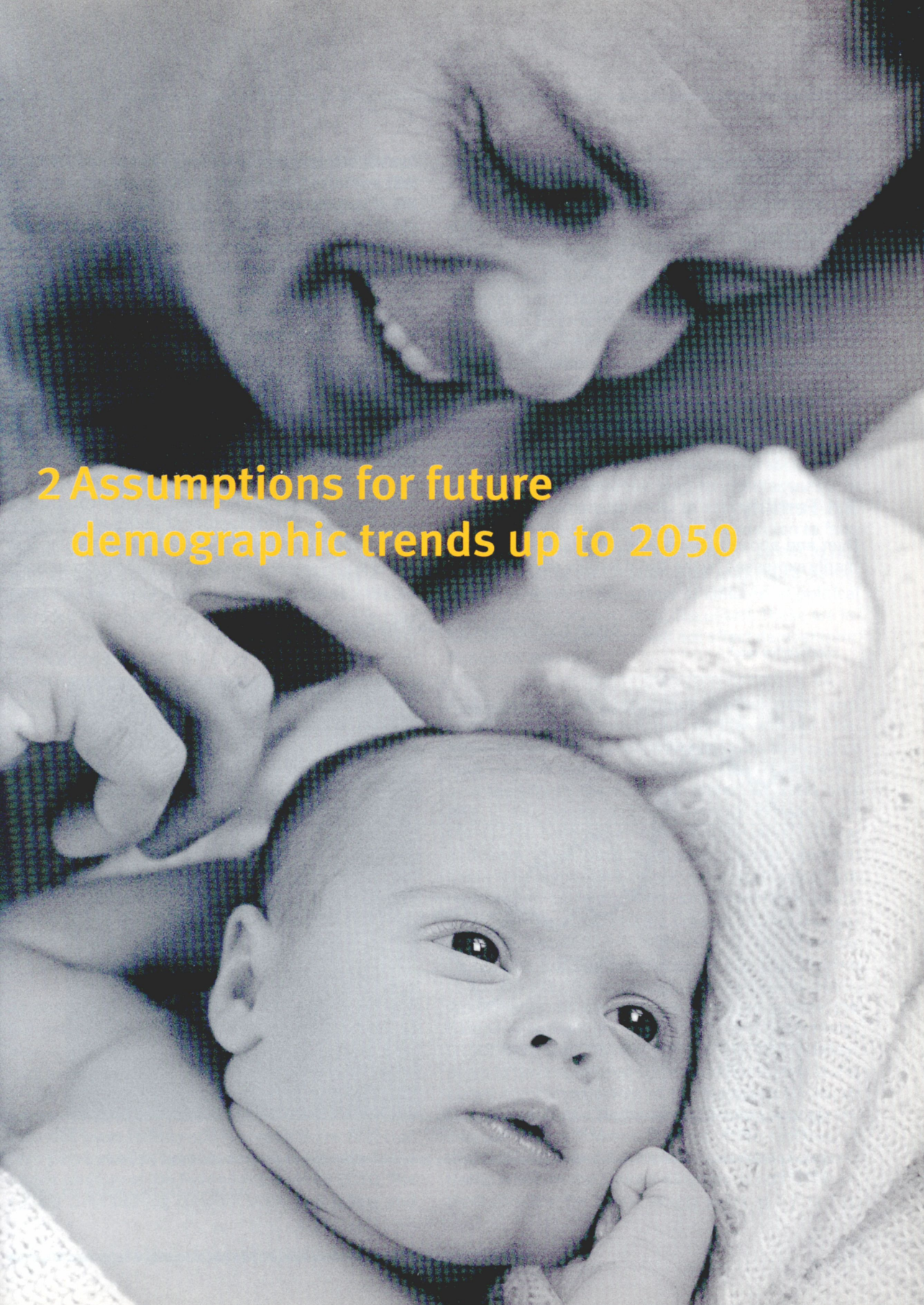
Processes that are of demographic relevance take place very gradually. Changes in the major components of demographic trends – fertility, mortality and migration – as a rule do not have their full impact on the demographic situation for many decades. Long-term population projections initially show almost imperceptible but "pre-programmed" future changes. They reveal whether and how the structures and changes that we can make out today will continue. Population projections hence provide important early indicators for politicians and the business community. They offer indispensable basic information with a future orientation for political decision-making processes, such as the reform of the social security systems.

The population projections are not prognoses predicting the future. Their aim is to use extrapolation procedures to show how the size and structure of the population would develop, subject to specific assumptions. Since the development of the relevant influencing factors becomes increasingly difficult to foresee as one travels further from the basic point in time, such long-term calculations serve as a model.

The assumptions made in population projections as to fertility, mortality and migration are based on surveys of the course of these components in a time and country comparison, as well as on hypotheses regarding the social and political changes and tendencies that can be identified from today's point of view. The assumptions are displayed in detail in Chapter 2.

The Federal Statistical Office has been carrying out coordinated population projections for almost 40 years. A "coordinated" projection provides results on demographic trends based on coordinated assumptions and identical calculation methods, both for Germany as a whole and for individual federal states (Länder). This publication shows the results of the 10th coordinated population projection for Germany. The calculation shown is based on the status of the population as on 31 December 2001.

In evaluating the results of current population projections in Germany, the intention in addition to the assumptions used was always to take account of the fact that the original data on the size of the population become increasingly imprecise during the period from one census to the next. The most recent censuses took place on the former federal territory in 1987 and in the former GDR in 1981. Since then, the population numbers have been updated on the basis of reports on births and deaths, as well as on arrivals and departures of migrating persons. These population numbers can only be re-adjusted on the basis of a new stock-take for the united Germany. Until then, information on the size of the population as a starting point for population projections has an additional uncertainty factor.



2 Assumptions for future demographic trends up to 2050

2 Assumptions of the 10th coordinated population projection

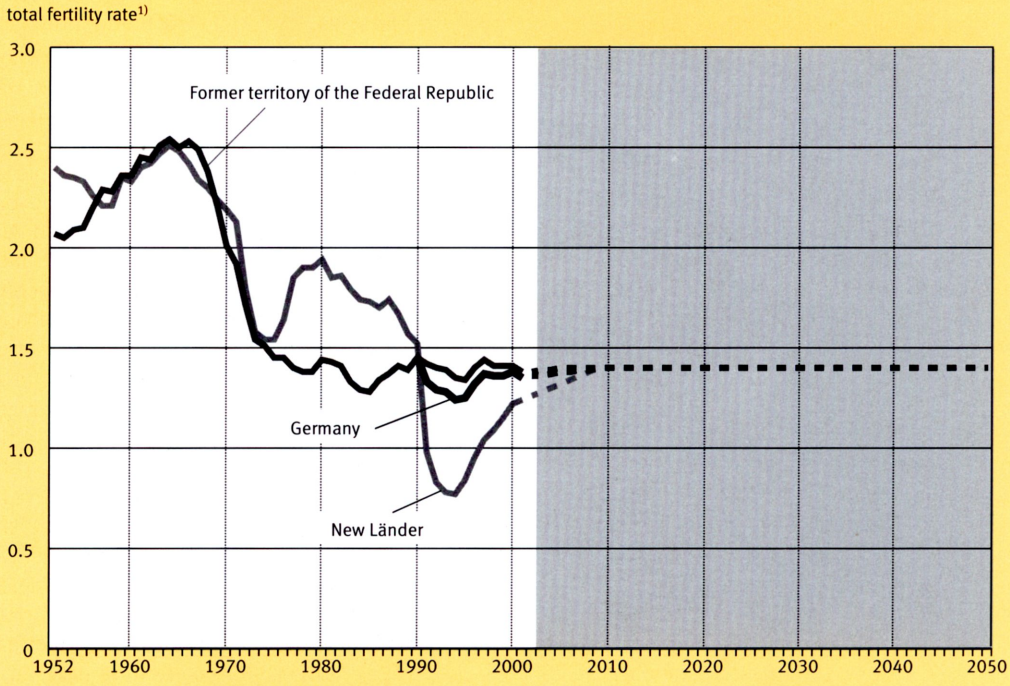
The following sections of Chapter 2 present the assumptions used in the 10th coordinated population projection. The portrayal starts with the assumptions on fertility. The next section explains the assumptions on trends in the life expectancy of new-borns and elderly people. This chapter then closes by clarifying the assumptions on the migration balance. All assumptions of the population projection are reasoned amongst other things both on the basis of differences in development within Germany, and on the basis of international trends.

2.1 Fertility

Over and above the absolute figures, fertility is primarily expressed by the "total fertility rate". The total fertility rate states the average number of children that a woman would have in the course of her life if the circumstances of the year under observation applied from age 15 to age 49. This value has a hypothetical character since it portrays the fertility not of a specific, but of a modelled generation of women. Their advantage however consists of the measurement of the level of births independently of the respective age structure of the population.

The assumption of child-bearing conduct that is largely constant is above all based on empirical data on trends in births. Graph 2.1 illustrates trends in birth conduct since 1952. Trends in fertility in the former territory of the Federal Republic and in the former GDR were largely parallel from the mid-50s onwards. Both parts of Germany underwent a short-term increase in the number of births at the beginning of the sixties, with the highest total fertility rate of the post-war period being 2.5 children per woman.

Graph 2.1: Trends in Total Fertility Rate[1] since 1952[2]



1) Average hypothetical number of live-born children per woman. – 2) From 2002 onwards assumptions in the 10th coordinated population projection.

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The children born at that time now form the numerically strong years in their mid- to late-thirties. The subsequent rapid fall in the birth rate began in the former GDR in 1964, and the birth figures have fallen continually in the former territory of the Federal Republic too since 1967. By 1975, the total fertility rate had fallen to 1.45 in the former territory of the Federal Republic and to 1.54 in the former GDR.

Trends in births in the two parts of Germany have been very different since the mid-seventies. The fall in the number of births continued in the former territory of the Federal Republic, reaching a trough in the mid-eighties with fewer than 1.3 children per woman. Fertility subsequently rose to reach a value of 1.45 in 1990, and since then has been fluctuating slightly – with the exception of 1994 and 1995 – around 1.4 children per woman. In the former GDR, significant state promotion measures for families with children countered a further reduction in the birth rate from the mid-seventies onwards. This indeed led to a short-lived increase in the total fertility rate in 1980 to 1.94 children per woman. Then, here too fertility gradually fell once more. As a result of the economic and social transformation taking place in the New Länder resulting from the Reunification of Germany, a considerable fall in the birth rate took place: From 1990 to 1994, the number of live births fell from 178 000 to 79 000 per year; in the same period the total fertility rate fell from 1.52 to 0.77. With this trend in births in the nineties, an adjustment in the conduct of the population occurred in the New Länder to match that of the population in the former territory of the Federal Republic. Women did not have their children until they were older. Now, fertility in the New Länder has increased once more and is gradually approaching the level in the former territory of the Federal Republic.

As already emerged in the 9th coordinated population projection from 2000, the present projection also assumes largely constant child-bearing conduct in Germany. It is supposed that the total fertility rate will remain at its low level of 1.4 children per woman. It is assumed that the New Länder will move from the lower fertility still recorded there (1.2 children per woman) to approximate to the fertility in the former territory of the Federal Republic by 2010. The current child-bearing conduct leads to a falling and ageing population since the total fertility rate of 1.4 children per woman means that only two-thirds of each generation of parents is replaced by children. In order to maintain the current population size, something more than two children would have to be born on average to each parent couple (total fertility rate of 2.1 per woman). On reaching adulthood, these children would have to have at least two children of their own in turn, thereby replacing the preceding generations.

A whole series of economic, social and psychological factors are responsible for the stabilisation of fertility at the low level of roughly 1.4 children per woman. These factors have become elements of social life in Germany, and frequently lead to childlessness. In the political debate, in order to achieve a long-term increase in the total fertility rate, in addition to family-promoting measures which make it easier to reconcile bringing up children and working, a fundamental re-think of the status of children at political and individual level is being discussed. These are laborious processes which will not affect demographic trends for decades.

A comparison with birth trends in other states also justifies the assumption that fertility will not continue to fall. Today, Germany already scores low marks on the worldwide fertility scale (cf. Table 2.1 on page 16). In the European Union, in 2000 only Italy (1.24), Spain (1.23), Greece (1.29) and Austria (1.34) have lower total fertility rates. Similar and even lower birth rates are currently observable in only eight other states in the world which are undergoing economic and social transformation: the Czech Republic (1.18), Estonia (1.28), Hungary (1.38), Latvia (1.17), Lithuania (1.38), Romania (1.32), the Russian Federation (1.25) and Ukraine (1.25) (source: World Development Indicators 2002, World Bank). Of the developed nations outside the European Union only Japan (1.41) and Switzerland (1.50) have similarly low fertility. The birth rate appears to have stabilised since the mid-nineties in the above mentioned states of the European Union. In France and in the Netherlands, fertility actually increased slightly towards the end of the nineties, at the level of 1.9 and 1.7 children per woman respectively, while in the United Kingdom it has been almost constant for nearly twenty years at 1.7 to 1.8.

Table 2.1: Trends in Total Fertility Rate [1] in Selected States

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
European Union (15 States)	1.57	1.53	1.51	1.47	1.44	1.42	1.44	1.45	1.45	1.45	1.48
Belgium	1.62	1.66	1.65	1.61	1.56	1.55	1.55	1.55	1.53	1.61	1.66
Denmark	1.67	1.68	1.76	1.75	1.81	1.80	1.75	1.75	1.72	1.73	1.77
Germany	1.45	1.33	1.30	1.28	1.24	1.25	1.32	1.37	1.36	1.36	1.38
Finland	1.78	1.79	1.85	1.81	1.85	1.81	1.76	1.75	1.70	1.74	1.73
France	1.78	1.77	1.73	1.65	1.66	1.70	1.72	1.71	1.75	1.79	1.88
Greece	1.39	1.38	1.38	1.34	1.35	1.32	1.30	1.31	1.29	1.28	1.29
Ireland	2.11	2.08	1.99	1.90	1.85	1.84	1.89	1.92	1.93	1.88	1.89
Italy	1.33	1.31	1.31	1.25	1.21	1.18	1.20	1.22	1.19	1.23	1.24
Luxembourg	1.61	1.60	1.64	1.70	1.72	1.69	1.76	1.71	1.68	1.73	1.80
Netherlands	1.62	1.61	1.59	1.57	1.57	1.53	1.53	1.56	1.63	1.65	1.72
Austria	1.45	1.49	1.49	1.48	1.44	1.40	1.42	1.37	1.34	1.32	1.34
Portugal	1.57	1.57	1.54	1.52	1.44	1.40	1.43	1.46	1.46	1.49	1.52
Sweden	2.13	2.11	2.09	1.99	1.88	1.73	1.60	1.52	1.50	1.50	1.54
Spain	1.36	1.33	1.32	1.27	1.21	1.18	1.17	1.19	1.15	1.20	1.23
United Kingdom	1.83	1.81	1.79	1.75	1.74	1.71	1.72	1.72	1.71	1.68	1.64
Iceland	2.30	2.18	2.21	2.22	2.14	2.08	2.12	2.04	2.05	1.99	2.10
Japan	1.54	1.53	1.50	1.46	1.50	1.42	1.44	1.44	.	1.40	1.41
Norway	1.93	1.92	1.88	1.86	1.86	1.87	1.89	1.86	1.81	1.84	1.85
Switzerland	1.59	1.60	1.58	1.51	1.49	1.48	1.50	1.51	1.46	1.48	1.50
United States	2.08	2.07	2.07	2.05	2.04	2.02	2.04	2.06	.	2.05	2.06

1) Average hypothetical number of live-born children per woman.

Sources: Eurostat, Federal Statistical Office.

A trough of 1.7 was reached in the United States in total fertility rates as far back as the mid-seventies, after which it increased continually and has been fluctuating between 2.0 and 2.1 since 1989.

In their latest population projection of February 2003, the United Nations assume a continuous increase in fertility in the states with currently a very low birth rate, including Germany. Their medium projection variant provides for Germany a – presumably much too optimistic – total fertility rate of 1.85 as an objective for 2050. This UN projection fortifies the assumption used here that there will at least be no further drop in fertility in Germany.

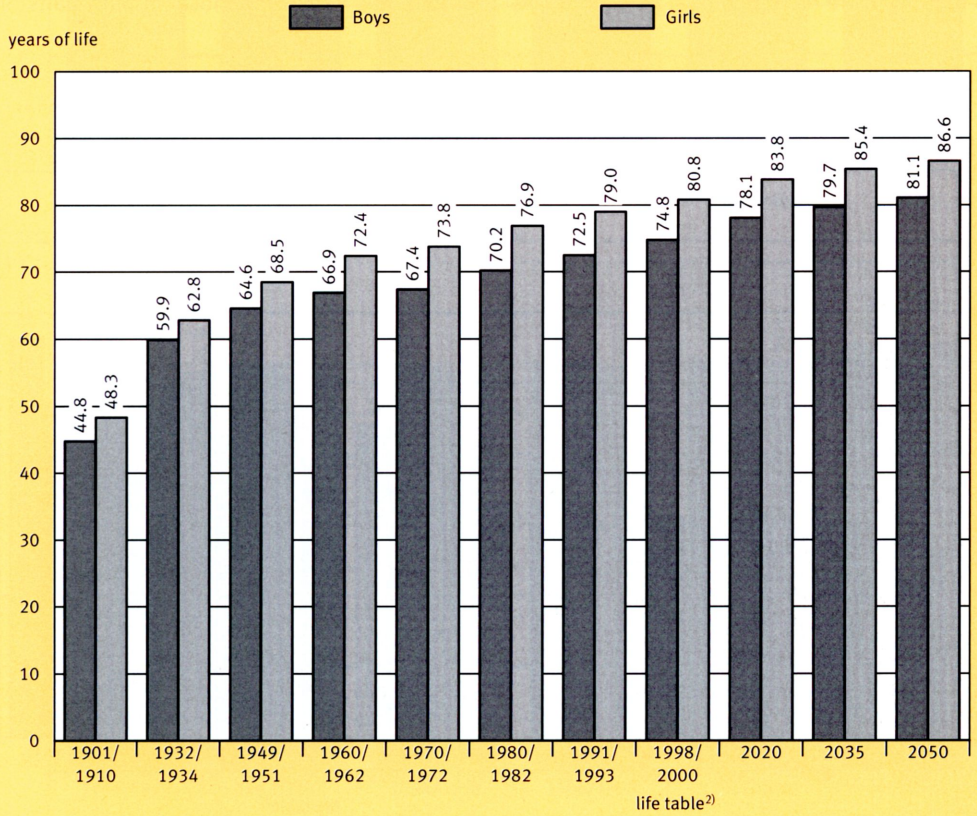
2.2 Life expectancy

The mortality of people in Germany has fallen noticeably in the last hundred years as a result of progress in healthcare, hygiene, food, housing and working conditions, as well as of increases in material prosperity. Above all infant and child mortality has fallen considerably since the end of the 19th Century: Today, only four out of 1 000 live-born children die in the first year of life, whilst 100 years ago the figure was 200, and as high as 21 only 30 years ago. Probability of death has fallen continually in other age groups too. The mortality of elderly people fell considerably in the second half of the last century: Since the end of the eighties, as shown by the life table of the Federal Statistical Office of Germany, at least one out of two men and seven out of ten women will reach the age of 75. In the 1970/72 life table this only applied to 39 % of all men and 60 % of all women.

Overall, it can be observed that people in Germany live much longer. The life lived by a human being is as a rule portrayed using life expectancy at birth. It shows how many years of life a new-born child may expect if the current death risk of the population were to remain constant in the individual age years over its whole life. For persons who have already reached a specific age the number of further years of life is expressed using life expectancy at certain ages.

Trends in life expectancy during the last century, as well as the assumptions on future trends, are portrayed in Graph 2.2. The life expectancy of new-born children has increased by roughly 30 years since the beginning of the 20th Century: A boy born in 1910 had an average of 47 and a girl an average of 51 years of life ahead of them. Boys and girls born between 1998 and 2000, by contrast, can expect to live 75 and 81 years respectively. Life expectancy has not changed constantly. The rapid increase in the first half of the century – the life expectancy of new-born boys increased by 13 years and that of new-born girls by 12 years in the 22 years from 1910 to 1932 – slowed considerably in the fifties and sixties: In the 20 years from 1950 to 1970, life expectancy only increased by three years for boys and by five years for girls. This was a result of the fact that infant mortality fell much more quickly in the first decades of the 20th Century than in the subsequent decades. In 1970, mortality increased temporarily as a result of the 1969/70 influenza epidemic. Health damage resulting from the Second World War probably also had an impact and led to higher mortality in particular among men. This led to another increase in the distance between the life expectancy of women and men from roughly 1960 onwards. Life expectancy in Germany has been increasing at a relatively constant rate since the seventies, if not as quickly as in the

Graph 2.2: Trends in Life Expectancy of New-borns since 1901[1)]



1) The values are listed for the following territories: 1901/10 to 1932/34 German Reich; 1949/51 to 1980/82 former territory of the Federal Republic; from 1991/93 Germany. From 2020 onwards assumptions in the 10th coordinated population projection (medium life expectancy assumption). –
2) The values given in the diagram are averages of the periods shown.

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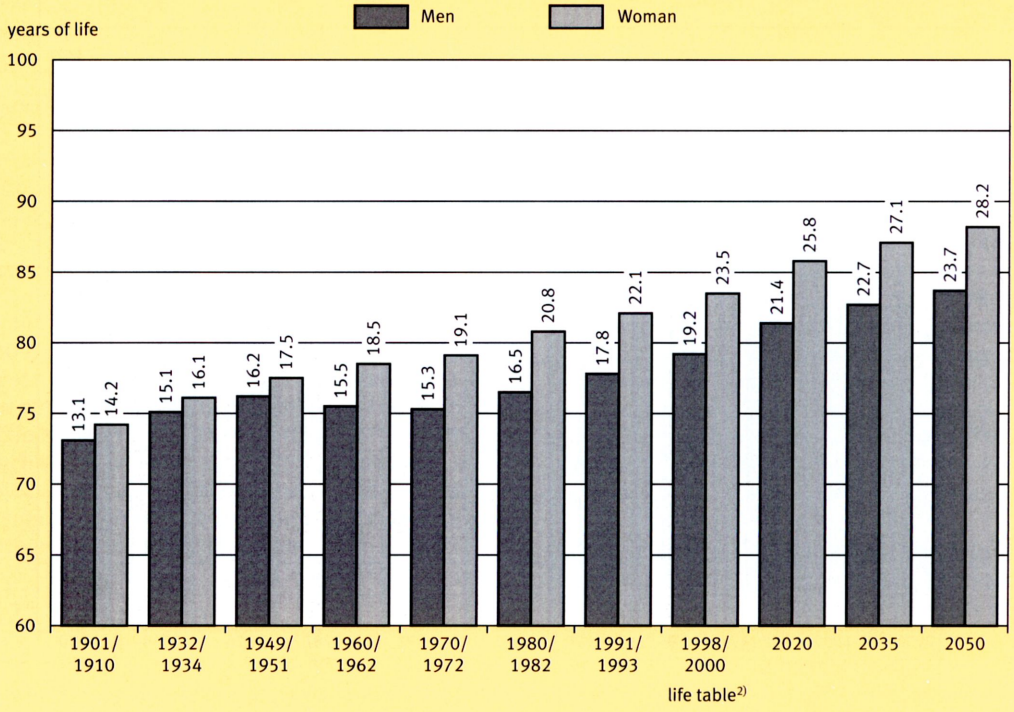
first half of the century. It reached 74.8 years for boys and 80.8 years for girls when expressed as an average of the years from 1998 to 2000.

For the elderly population in Germany, as well, life expectancy has become longer (cf. Graph 2.3). Today, a 60-year-old man on average may expect to live roughly another 19 years. One hundred years ago, he would have had a life expectancy that was roughly six years shorter and in 1970 almost four years shorter. A woman who is now 60 may expect to live another 23 years. One hundred years ago, the life expectancy of a 60-year-old woman was only 14 years, and in 1970 it was 19 years.

The increase in the life expectancy of elderly people has a major impact on old-age pensions. The elderly generation is numerically larger than before. This means that there are more potential pensioners. At the same time, people are retired for longer. According to the information provided by the Federation of German Pension Insurance Institutes, the average length of time that people drew pensions in the former territory of the Federal Republic in 1965 was almost 11 years and more than 16 years in 2001. Within a generation, therefore, the length of time that people drew pensions has become 5.5 years longer. However, in addition to higher life expectancy, earlier retirement has also contributed to this lengthening of the duration of retirement.

Trends in life expectancy in the former GDR until the mid-seventies were similar to those in the former territory of the Federal Republic. In the first half of the seventies, the life expectancy at birth of boys in the former GDR was higher than in the former territory of the Federal Republic, and the life expectancy at birth of girls was virtually identical in both parts of Ger-

Graph 2.3: Trends in Life Expectancy for Persons aged 60 since 1901[1)]



1) The values are listed for the following territories: 1901/10 to 1932/34 German Reich; 1949/51 to 1980/82 former territory of the Federal Republic; from 1991/93 Germany. From 2020 assumptions in the 10th coordinated population projection (medium life expectancy assumption). – 2) The values given in the diagram are averages of the periods shown.

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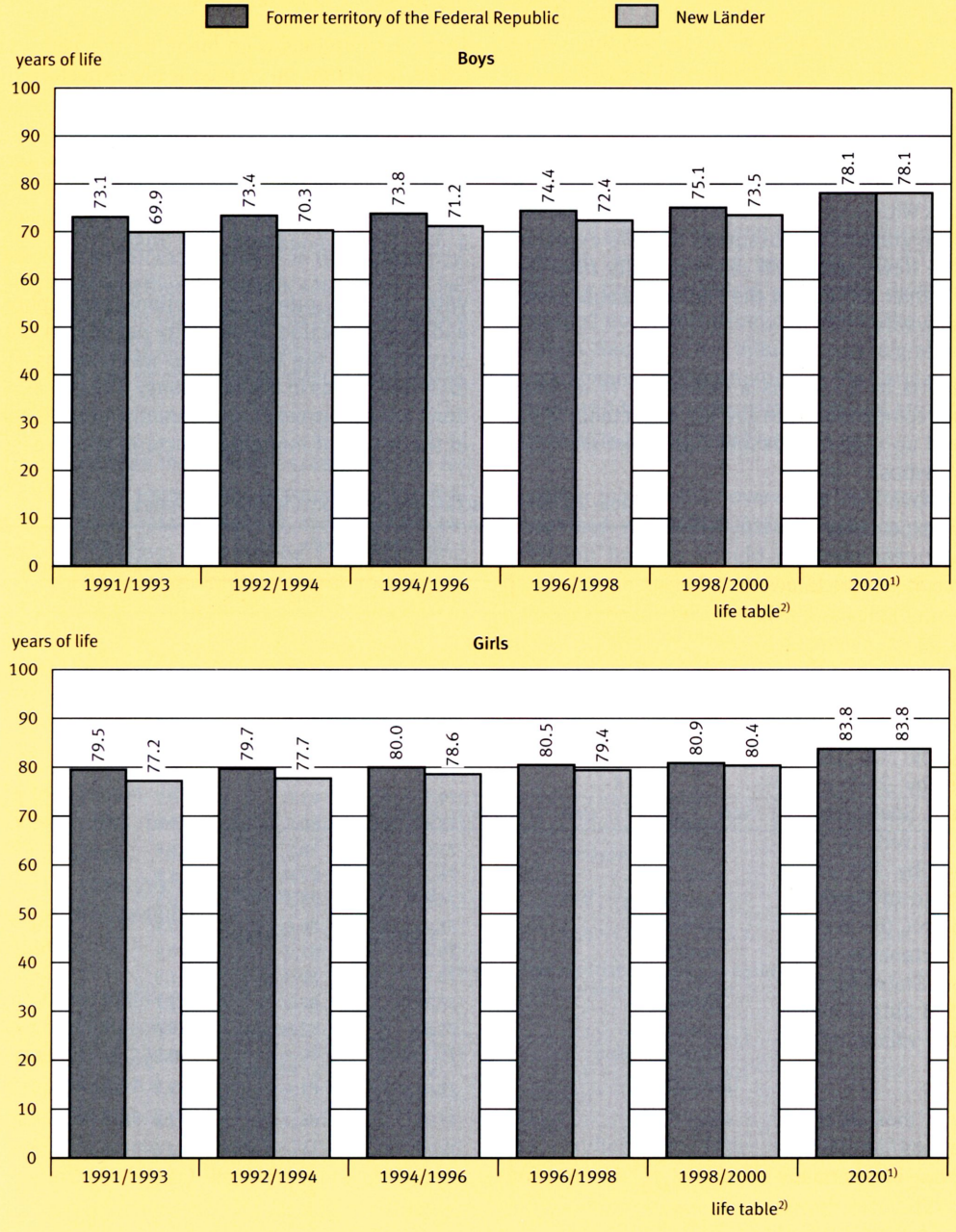
Graph 2.4: Life Expectancy of New-borns in the Former Territory of the Federal Republic and in the New Länder since 1991



1) 10th coordinated population projection, medium life expectancy assumption. – 2) The values given in the diagram are averages of the periods shown.

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many. After 1977, life expectancy stagnated in the former GDR and increased much more slowly until the end of the eighties than in the former territory of the Federal Republic. In 1991 to 1993, life expectancy at birth in the New Länder was three years shorter than in the former territory of the Federal Republic (cf. Graph 2.4 on page 19). Life expectancy in the New Länder has increased in the past decade, so that the difference between the New Länder and the former territory of the Federal Republic fell to 1.6 years with boys and 0.5 years with girls according to the graphic. It is assumed that life expectancy in the New Länder will cease to differ from that in the former territory of the Federal Republic from 2020 onwards.

Germany is by no means a forerunner in an international comparison with the life expectancy it has achieved up until the present day. There are many states whose inhabitants have a higher life expectancy (cf. Table 2.2). For boys, for instance, it is more than two years higher in Iceland, Japan, Sweden and in Switzerland than in Germany. With the life expectancy of girls, Japan (by 3.4 years), France (by 2.2 years), Italy and Spain (by 2.1 years) as well as Switzerland (by 2.0 years) are ahead of Germany. In addition, the average life expectancy in the EU Member States for both boys and girls is higher than the values in Germany.

Taking a look at previous trends in life expectancy in Germany and in other developed states of the world, it may be assumed that further improvements in the medical and social care of the population and healthier lifestyles in Germany will lead in future to a further increase in life expectancy.

Three assumptions were made for the 10th coordinated projection on trends in life expectancy until 2050 (cf. Table 2.3). For assumption 1 for each individual year the lowest international probabilities of death (already attained) are set as a goal for Germany in 2035. The trend emerging from this in the development of life expectancy is then extrapolated in a slightly weakened form until 2050.

With the two other assumptions (assumptions 2 and 3), a reduction in mortality per year in the last 30 years since the 1970 census was taken as a basis for future trends in life expectancy. The two assumptions are extrapolated at differently reduced speeds in the resultant mortality structure. Whilst assump-

Table 2.2: Life Expectancy of New-borns in Selected States in 2001

	Life expectancy of a new-born		Derogations as against Germany	
	Boys	Girls	Boys	Girls
European Union (15 States) [1]	75.3	81.4	0.5	0.6
Belgium [1]	74.6	80.8	– 0.2	0.0
Denmark	74.3	79.0	– 0.5	– 1.8
Germany [1]	74.8	80.8	0.0	0.0
Finland	74.6	81.5	– 0.2	0.7
France	75.5	83.0	0.7	2.2
Greece	75.4	80.7	0.6	– 0.1
Ireland	73.0	78.5	– 1.8	– 2.3
Italy	76.7	82.9	1.9	2.1
Luxembourg [1]	74.9	81.3	0.1	0.5
Netherlands	75.7	80.6	0.9	– 0.2
Austria [1]	75.4	81.2	0.6	0.4
Portugal	73.5	80.3	– 1.3	– 0.5
Sweden	77.5	82.1	2.7	1.3
Spain	75.6	82.9	0.8	2.1
United Kingdom	75.7	80.4	0.9	– 0.4
Iceland [1]	78.0	81.4	3.2	0.6
Japan	77.6	84.2	2.8	3.4
Norway [1]	76.0	81.4	1.2	0.6
Switzerland	77.2	82.8	2.4	2.0
United States	74.4	80.0	– 0.4	– 0.8

1) As in 2000.

Sources: Eurostat, Federal Statistical Office.

tion 3 assumes that the increase in life expectancy will continue only a little more slowly than in the past 30 years, a more rapid deceleration of life expectancy is anticipated in assumption 2.

A slow increase in life expectancy is suggested by the fact that in some years the improvement potential has been almost exhausted and no major changes are anticipated in future. For instance, infant mortality in Germany is already at a very low level. The improvement potential that may still be at hand here will not have a noticeable impact on life expectancy. It is also open whether the factors which had an impact on mortality in the past will continue to reduce in future as rapidly as was previously the case, or whether they will be replaced by effects with a similar impact.

Table 2.3 illustrates the various assumptions on future trends in life expectancy. According to the medium assumption (assumption 2), the 2050 life expectancy of new-born boys will be 81.1 years and that of girls 86.6 years, in other words roughly six years more than now. According to assumption 1, the increase is less rapid, among boys by two years and among girls by one year. According to assumption 3, by contrast, life expectancy for both genders would be roughly 1.5 years higher than in the medium assumption.

For 2050, an additional life expectancy was estimated for 60-year-olds in assumption 2 at 23.7 years for men and 28.2 years for women. Hence, in 2050 60-year-old men would have a total life expectancy of roughly 84 years and same-age women of roughly 88 years. The high assumption of life expectancy (assumption 3) assumes an additional life expectancy which is a good year longer.

Table 2.3: Assumptions on Future Trends in Life Expectancy

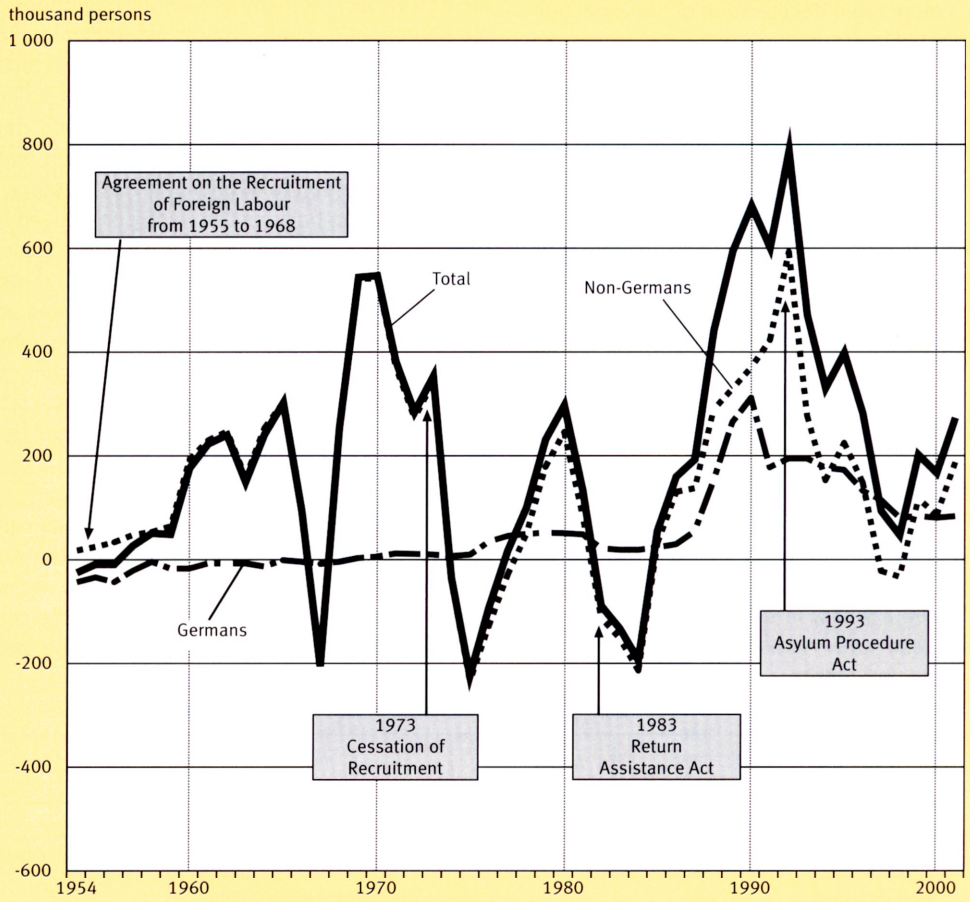
	Average from 1998 to 2000		Assumptions for 2050					
			1		2		3	
	Male	Female	Male	Female	Male	Female	Male	Female
	Life expectancy							
New-borns	74.8	80.8	78.9	85.7	81.1	86.6	82.6	88.1
Aged 60	19.2	23.5	22.0	27.7	23.7	28.2	24.9	29.4
	Increase in life expectancy in years as against the average from 1998 to 2000							
New-borns	x	x	4.1	4.9	6.3	5.8	7.8	7.3
Aged 60	x	x	2.8	4.2	4.5	4.7	5.7	5.9

2.3 Migration

Taking a view of Germany as a whole, migrations over the borders of Germany, that is external migrations, are of primary significance. For the future population size and the age structure, the migration balance, that is the difference between arrivals and departures of migrating persons, is an important matter. In contradistinction to fertility or life expectancy, the future migration balance can hardly be derived from a trend of past developments. The balance depends firstly on the migration potential, which is determined in turn by political, economic, demographic or indeed ecological developments in the countries of origin. Secondly, it is influenced by migration policy in Germany, by the situation on the German labour market and by the economic and social attraction of Germany as a destination country.

In earlier migrations, however, a few trends can be recognised with which assumptions on the future migration balance should be taken into account. Graph 2.5 on page 22 shows trends in the migration balance in the past fifty years. Foreign labour was recruited in the fifties and sixties. The growing problems on the labour market at the beginning of the seventies, however, resulted in the cessation of recruitment in 1973. As a result of this, the positive migration balance fell more and more rapidly, and indeed the balance was negative for a number

Graph 2.5: Trends in the Migration Balance over the Borders of Germany since 1954[1)]



1) Information on migration until and including 1990 for the former territory of the Federal Republic; migrations between the former territory of the Federal Republic and the former GDR are not included.

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of years. After the end of recruitment, family reunification of the foreign labour force living in Germany ensured that there was a positive migration balance. It fell in the eighties as the difficulties on the labour market continued, and reached a new low one year after the so-called 1983 Return Assistance Act (Rückkehrhilfegesetz). The Return Assistance Act provided financial support to encourage foreign workers to return to their countries of origin. The migration balance for non-Germans had fallen to a low point once again, and went into the red for the third time in twenty years (-214 000 in 1984). In the eighties and nineties, political developments determined the migration balance, as shown by the considerable immigration by ethnic German repatriates from Eastern Europe and the successor states of the Soviet Union, the inflow of people requesting asylum, and immigration by refugees from civil wars.

Immigration in Germany reached a historic peak in 1992 with 780 000 persons. After this, the migration balance fell once more, not least as a result of the entry into force of the Asylum Procedure Act (Asylverfahrensgesetz) in 1993, which governs the recog-

nition procedure for asylum-seekers seeking protection as victims of political persecution. In 1997 and 1998, there were indeed more departures than arrivals among the non-German population, including for example as a result of the return of refugees from civil wars, which led to a negative migration balance. The migration balance of the population as a whole was less than 50 000 in 1998, and in 1999 rose to about 200 000, as a result of the once more positive migration balance among the non-German population.

From these migrations, the following major indications emerge for the 10th coordinated population projection:

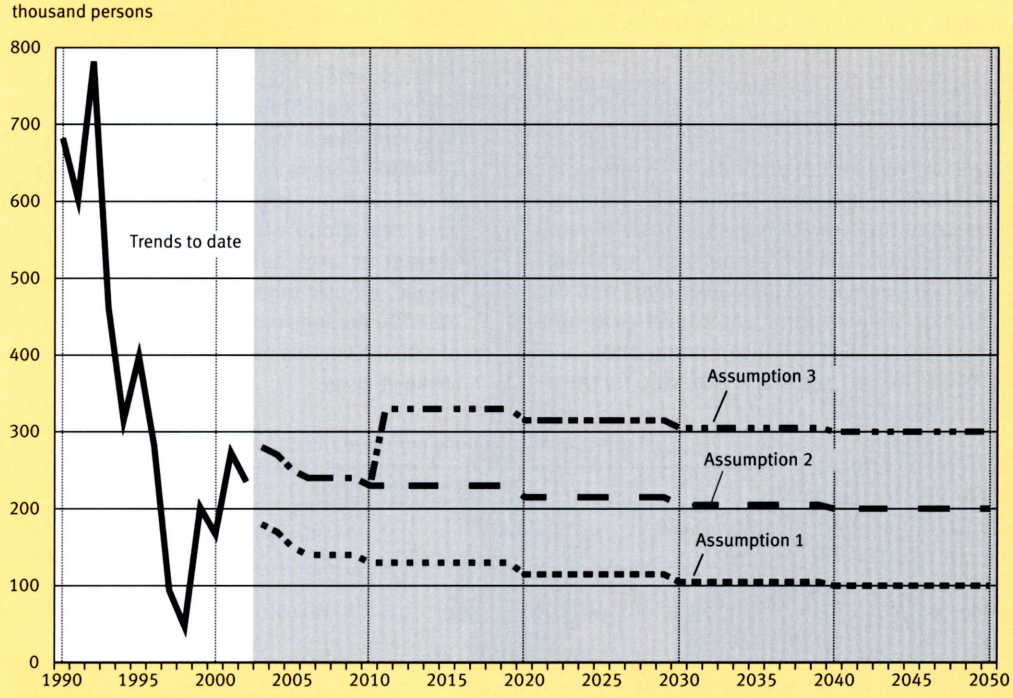
- The external migration balance was largely positive in the past fifty years, and the annual average was almost 200 000, of which the share of foreigners on average was roughly three-quarters (150 000).

- The migration surplus was made up of the (ethnic) German and non-German population moving to Germany. Its amount and course were primarily determined by migrations of non-Germans.

- The foreign persons moving to Germany are on average younger than the foreigners moving away. The foreign population remaining in Germany thus undergoes a "rejuvenation effect".

- The migration gain of the German population was determined by arrivals of repatriates from Central and Eastern Europe, as well as from the successor states of the Soviet Union. These arrivals have been reducing continuously since their peak at the start of the nineties.

Graph 2.6: Assumptions on Trends in the Migration Balance over the Borders of Germany until 2050[1)]



1) From 2002 onwards assumptions in the 10th coordinated population projection.

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Assumptions

With the future trends in external migration, furthermore, the following needed to be taken into account:

- There is still a demographic and economic gap between Germany and the typical countries of origin of persons arriving. This gap must not necessarily lead to immigration, but does give rise to a potential for migration. On the other hand, the number of people of working age in Germany is falling in the long term, so that demand for foreign labour may arise once more.
- Political crises, wars and civil wars, as well as ethnic persecution in other regions, may cause new waves of refugees and asylum-seekers.
- The agreed enlargement of the European Union is likely to entail complete freedom of movement for workers from the accession countries from 2011.
- Against this background, it makes sense to make separate assumptions on future trends in migration for German and foreign persons. The results are however only calculated and presented for the population of Germany.

As regards arrivals and departures by Germans, it is assumed that the migration surplus will continue to fall because of the reduction in the inflow of repatriates. The annual balance currently lying at roughly 80 000 is expected to reduce over time, and Germans arriving and departing will cancel each other out from 2040 onwards. Hence, immigration totalling 860 000 German persons is expected for the period of 2003 to 2039.

With arrivals and departures of non-Germans, three assumptions are juxtaposed and the impact shown in a variety of scenarios. The two first assumptions are based on an annual migration surplus of 100 000 (assumption 1) and 200 000 persons (assumption 2) respectively from 2003 onwards. This range covers the long-term average of external migration of foreigners. Since however in future there could be higher migration balances, a third assumption is made which assumes an increase in the annual migration balance from 200 000 to 300 000 foreign persons from 2011 onwards. All three migration balances can be regarded only as a long-term average.

The total number of immigrants in the period from 2003 to 2050 is roughly 5.7 million according to assumption 1, roughly 10.5 million according to assumption 2 and roughly 14.5 million people (cf. Table 2.4) according to assumption 3. Graph 2.6 on page 23, shows both the previous migration balances and the assumptions on further trends in external migrations for Germans and non-Germans as a whole.

The empirical values of arrivals and departures in 1999 to 2001 are used as a basis for the gender and age structure of the migration balance. In order to account for the above mentioned "rejuvenation effect" (cf. page 23) resulting from migration by non-Germans in the future population structure, basic migration is assumed. The assumption here is that each year a certain number of non-Germans leave Germany and are replaced by a new group of persons moving to Germany at least as large but on average younger. For instance, a basic migration of 400 000 means that 400 000 persons move away. A migration balance of 100 000 in this case requires 500 000 persons to move away.

Table 2.4: Assumptions on Future Trends in External Migration

Migration assumption	Annual migration balance		Cumulated migration gain up to 2050 (Germans and non-Germans)
	Germans	non-Germans	
1	reduction of migration	100 000	5 660 000
2	gain of 80 000 per year down to	200 000	10 460 000
3	zero in 2040	200 000, from 2011 300 000	14 460 000

3 Future demographic trends up to 2050

3 Future demographic trends up to 2050

This chapter presents the results of the 10th coordinated population projection. Firstly, an explanation is provided for the different variants on demographic trends combined from the assumptions on trends in life expectancy and the migration balance explained in Chapter 2. The next section presents the possible developments in the population size until 2050, taking into account the different variants. The last section illuminates the age structure of Germany, and in doing so describes in greater detail trends in the old-age dependency ratio and changes in the age structure of the working-age population.

3.1 Population projection scenarios

The combination of the assumptions described in Chapter 2 produced a total of nine scenarios on future demographic trends from 2002 to 2050, whereby fertility in all variants is assumed to be constant during the entire projection period at an average of 1.4 children per woman (cf. Table 3.1). The maximum range of the projection population size emerges from Variants 1 and 9, which show the population with the lowest and highest assumptions for immigration and life expectancy.

The range of possible changes in the age structure of the population can be portrayed most comprehensibly using Variants 3 and 7: Variant 7 reflects a low level of immigration with high life expectancy, leading to a particularly elderly population in relation to the other combinations of assumptions. Variant 3 assumes high immigration and lower life expectancy, and leads to a relatively young population. Variant 5 reflects the changes in the population size and structure with medium assumptions as to the increase in life expectancy and migration, and is referred to as the medium variant. Variants 4 and 6 show how the population size and structure change when the (medium) increase in life expectancy remains constant, depending on the size of the migration surpluses. Variants 2 and 8 make clear by contrast the effect on the population size and structure resulting from differing increases in life expectancy with the same (medium) migration surplus.

3.2 Population size

The population size of a country is primarily an economical and geographical value. From a demographic point of view, it is an indicator demonstrating the impact of processes that are of demographic relevance. This is significant above all when we look at the size and potential of a state in comparison with

Table 3.1: Variants of the 10th Coordinated Population Projection [1)]

Assumption on long-term external migration balance to 2050			Assumption on life expectancy of new-borns (and aged 60) in 2050		
			Male: 78.9 (aged 60: 22.0)	Male: 81.1 (aged 60: 23.7)	Male: 82.6 (aged 60: 24.9)
			Female: 85.7 (aged 60: 27.7)	Female: 86.6 (aged 60: 28.2)	Female: 88.1 (aged 60: 29.4)
Germans	non-Germans		1	2	3
reduction of migration	100 000	1	Variant 1 (smallest population size)	Variant 4	Variant 7 ("relatively old" population)
gain of 80 000 per year down to zero in 2040	200 000	2	Variant 2	Variant 5 ("medium" population)	Variant 8
	200 000, from 2011 300 000	3	Variant 3 ("relatively young" population)	Variant 6	Variant 9 (largest population size)

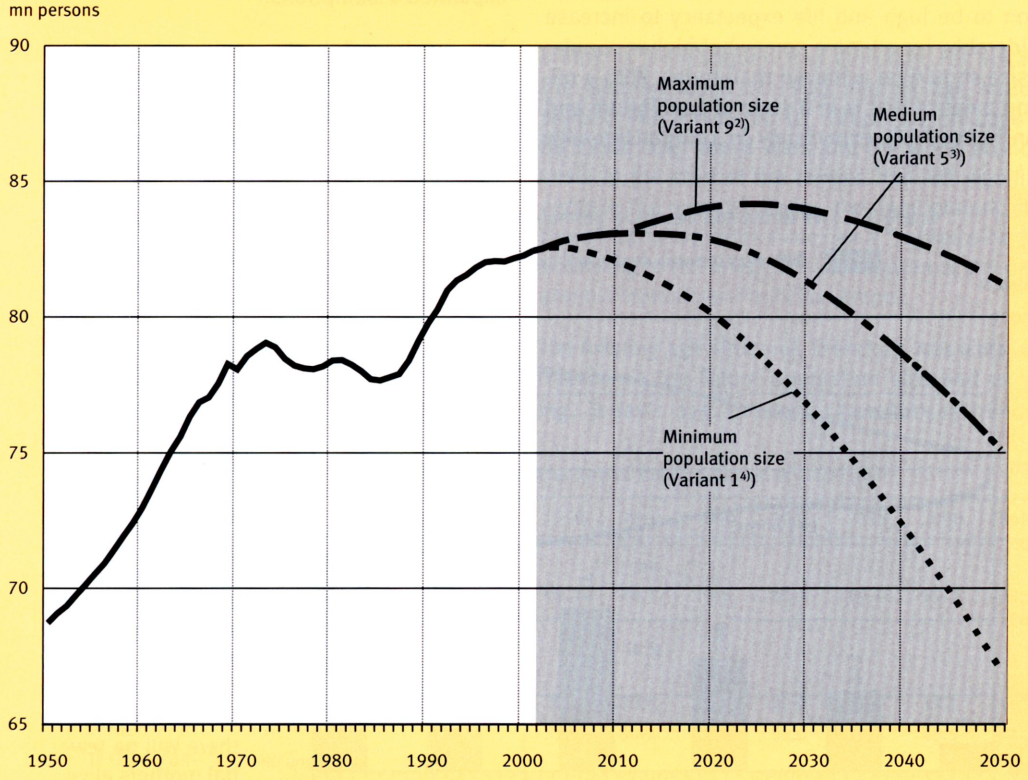
1) In all variants fertility is assumed to be constant during the entire projection period (average 1.4 children per woman).

other states in the world, or for instance the distribution of national per capita income.

Developments to date in the size of the population in Germany have been positive in the long term. Despite a phase with a fall in the population size in the seventies and eighties, the population has grown since 1950 by 14 million, or roughly 20%, to reach its current level of 82.5 million inhabitants. All variants of the 10th coordinated population projection show that this trend will change in the future and that the population will become smaller in the long term (cf. Graph 3.1 and for more detailed information Table 3.11 in the Annex).

A population shrinks if the number of deaths exceeds the number of births and the deficit in births cannot be compensated for by immigration. After the Second World War, the birth surplus in Germany was replaced for the first time in 1972 by a death surplus. The clear fall in fertility at the beginning of the seventies was responsible for this (cf. section 2.1). The cessation of recruitment of foreign labour in 1973 prevented compensation for the birth deficit in the short term by immigration. The consequence was slower growth and partly indeed a fall in the population size between 1974 and 1985. This trend was replaced in the mid-eighties by new immigration and a new population increase.

Graph 3.1: Trends in Population Size in Germany since 1950[1)]



1) From 2002 onwards estimates of the 10th coordinated population projection (absolute values are listed in Annex, Table A 4.11). – 2) Variant 9: High migration assumption (annual balance of at least 300 000 persons) and high life expectancy assumption (average life expectancy in 2050 at 83 for boys and 88 for girls respectively). – 3) Variant 5: Medium migration assumption (annual balance of at least 200 000 persons) and medium life expectancy assumption (average life expectancy in 2050 at 81 for boys and 87 for girls respectively). – 4) Variant 1: Low migration assumption (annual balance of at least 100 000 persons) and low life expectancy assumption (average life expectancy in 2050 at 79 for boys and 86 for girls respectively).

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The course of births and deaths extrapolated until 2050 (cf. Graph 3.2) shows an ever widening gap between the number of new-borns and deaths, whilst this births deficit will become much wider in future. Immigration reduces the fall in the population caused thereby, but is not able to completely compensate for it. This is made clearer by Table 3.2. The medium variant (Variant 5) still shows 75 million inhabitants in 2050. If immigration is lower (Variant 4) the population shrinks to about 69 million, while with higher immigration (Variant 6) it is likely to be 80 million. The smallest population of 67 million (Variant 1) emerges if one assumes low migration and a slow rise in life expectancy, and the largest population of 81 million with high migration and high life expectancy assumptions, in other words almost as high as now (Variant 9). Indeed, were immigration to be high and life expectancy to increase considerably, for a time a somewhat higher population size should be achieved than today. With a migration balance that is in a state of equilibrium and an unchanged life expectancy in comparison with the present, by contrast, only around 54 million people would live in Germany in 2050.

3.3 Age structure of the population

The assumptions relating to trends in fertility and life expectancy appear to contradict Graph 3.2:

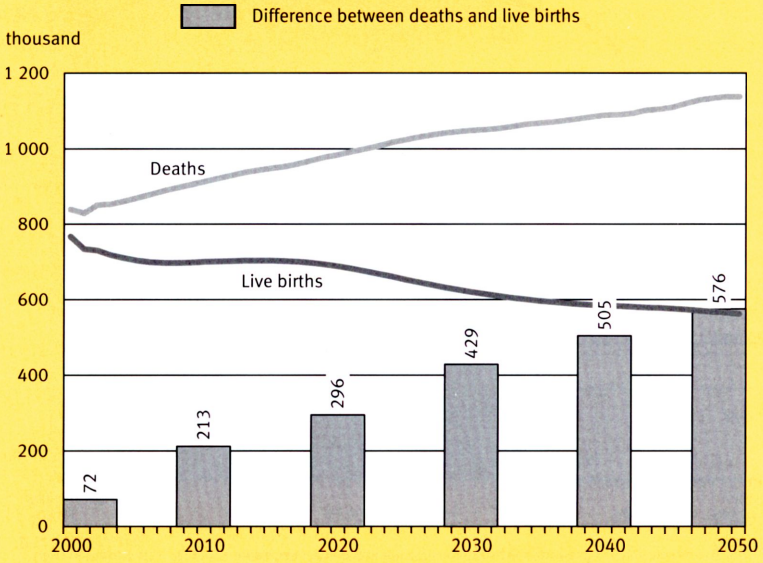
- Why does the number of births fall if an unchanged total fertility rate is assumed for the whole period until 2050?
- Why does the number of deaths increase if people's life expectancy increases?

The answers to these questions are found in the age structure which changes over time as a result of the explained assumptions.

The number of births could only remain at the present level with constant fertility if each following generation of mothers was at least not smaller than the previous one. This however is not the case with an average fertility of 1.4 children: Today's women around 30 will bear far fewer children during their child-bearing years (30 to 49) than would be necessary to replace their generation numerically, since the replacement level is around 2.1 children per woman (cf. Chapter 2.1). Girls born now are hence less numerous than their mothers. Once these girls have reached adulthood and also have an average of 1.4 children, the future number of children will continue to fall because then too there will be fewer potential mothers alive.

Graph 3.4 on page 31 shows how the numbers of the women aged from 15 to 49 – in other words

Graph 3.2: Live Births and Deaths in Germany until 2050[1)]



1) From 2002 onwards estimates of the 10th coordinated population projection, Variant 5 "Medium" population: Medium migration assumption (annual balance of at least 200 000 persons) and medium life expectancy assumption (average life expectancy 2050 at 81 for boys and 87 for girls respectively).

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Table 3.2: Population Size in Germany, 2050, for the different Variants of the 10th Coordinated Population Projection [1)]

Assumption on long-term external migration balance to 2050			Assumption on life expectancy of new-borns (and aged 60) in 2050		
			Male: 78.9 (aged 60: 22.0)	Male: 81.1 (aged 60: 23.7)	Male: 82.6 (aged 60: 24.9)
			Female: 85.7 (aged 60: 27.7)	Female: 86.6 (aged 60: 28.2)	Female: 88.1 (aged 60: 29.4)
			1	2	3
Germans	non-Germans		mn		
reduction of migration	100 000	1	Variant 1 67.0	Variant 4 68.4	Variant 7 69.6
gain of 80 000 per year down to zero in 2040	200 000	2	Variant 2 73.6	Variant 5 75.1	Variant 8 76.3
	200 000, from 2011 300 000	3	Variant 3 78.5	Variant 6 80.0	Variant 9 81.2

1) In all variants fertility is assumed to be constant during the entire projection period (average 1.4 children per woman).

the respective potential mother generation – are falling. This trend leads to the fall portrayed in Graph 3.2 on page 28 in the absolute birth rate since smaller and smaller generations of mothers with a constant fertility rate below the replacement level bear correspondingly fewer children than the previous ones.

The increase in the number of deaths is due to the fact that the numerically relatively strong years of those who are now 30 to 40 will progress during the projection period into high age groups with a correspondingly higher probability of death. As life expectancy increases, deaths within these numerically strong years would emerge several years later than would be the case were life expectancy to be lower.

The current demographic structure has long deviated from the ideal picture which can be portrayed in the shape of the classical demographic pyramid: Children make up the most plentiful years, and the subsequent years gradually shrink as a consequence of mortality. For instance, the German Reich of 1910 had an age structure shaped like a pyramid (cf. Graph 3.3 on page 30). By 1950, both World Wars and the world economic crisis at the start of the thirties had left significant dents in the pyramid. Today, the demographic structure of Germany looks more like a "ruffled pine tree" according to the insightful observation of the demographic statistician Paul Flaskämper.

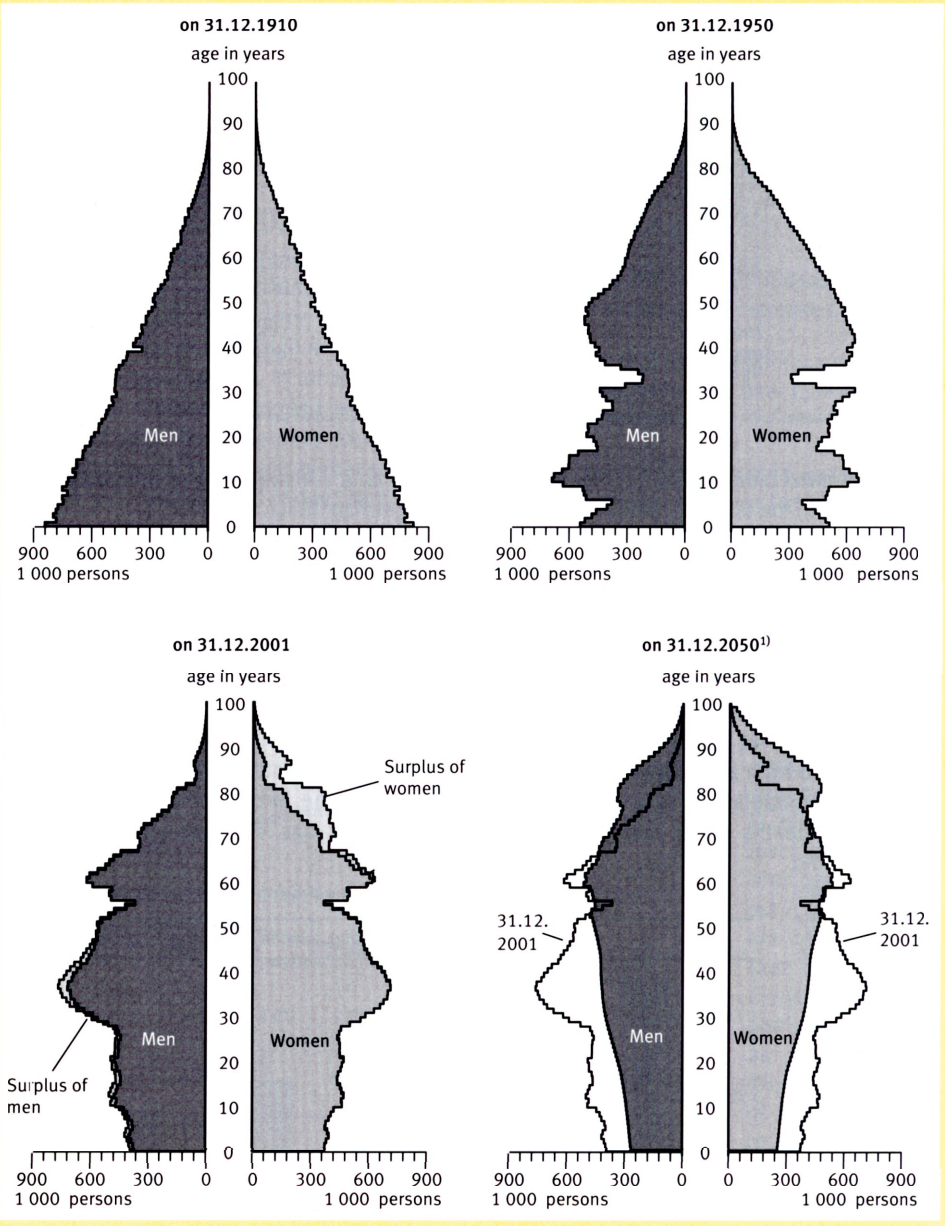
The existing age structure, therefore, has a major influence on the future population size and on ageing. Today's age structure characterises trends in

Table 3.3: Age Structure of the Population of Germany [1)]

	1950	1970	1990	2001	2010	2030	2050
			mn				
Total at year-end	69.3	78.1	79.8	82.4	83.1	81.2	75.1
			in %				
Of whom aged from ... to ...							
below 20	30,4	30.0	21.7	20.9	18.7	17.1	16.1
20 – 59	55.0	50.1	57.9	55.0	55.7	48.5	47.2
60 and older							
total	14.6	19.9	20.4	24.1	25.6	34.4	36.7
80 and older	1.0	2.0	3.8	3.9	5.0	7.3	12.1

1) From 2010 onwards estimates of the 10th coordinated population projection, "Medium" population (Variant 5): Medium migration assumption (annual balance 200 000 persons) and medium life expectancy assumption (average life expectancy 2050 at 81 for boys and 87 for girls respectively).

Graph 3.3: Age Structure of the Population in Germany



1) For 2050 estimates of the 10th coordinated population projection, Variant 5 "Medium" population: Medium migration assumption (annual balance of at least 200 000 persons) and medium life expectancy assumption (average life expectancy 2050 at 81 for boys and 87 for girls respectively).

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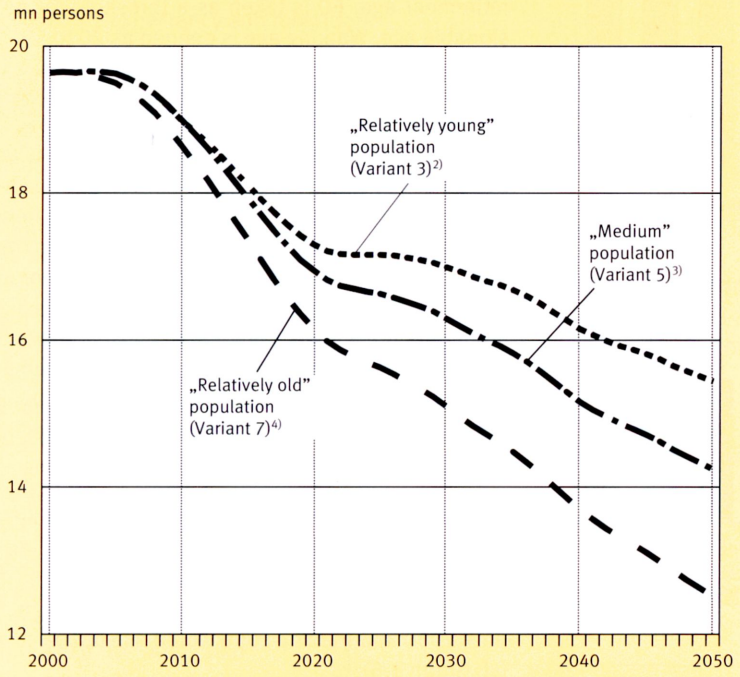
the next decades: Both strong and weak years advance in age. Today's 35- to 40-year-olds, who belong to the numerically strongest years, will gradually progress into the elderly age group from 2020 onwards. Hence, the share of the elderly among the population will increase. In 2050, today's 12-year-olds, who will then be around 60, will be the most numerous age group. Among the under 50s, by contrast, the individual years are all smaller the younger they are. According to the medium variant (Variant 5) the number of children born in 2050 will be roughly half as large (52 %) as that of 60-year-olds. The absolute number of the under 20s will fall from its current figure of 17 million to 12 million in 2050.

Graph 3.4: Number of Women aged between 15 and 49 until 2050[1)]



1) From 2002 onwards estimates of the 10th coordinated population projection. – 2) Variant 3: High migration assumption (annual balance of at least 300 000 persons) and low life expectancy assumption (average life expectancy 2050 at 79 for boys and 86 for girls respectively). – 3) Variant 5: Medium migration assumption (annual balance of at least 200 000 persons) and medium life expectancy assumption (average life expectancy in 2050 at 81 for boys and 87 for girls respectively). – 4) Variant 7: Low migration assumption (annual balance of at least 100 000 persons) and high life expectancy assumption (average life expectancy in 2050 at 83 for boys and 88 for girls respectively).

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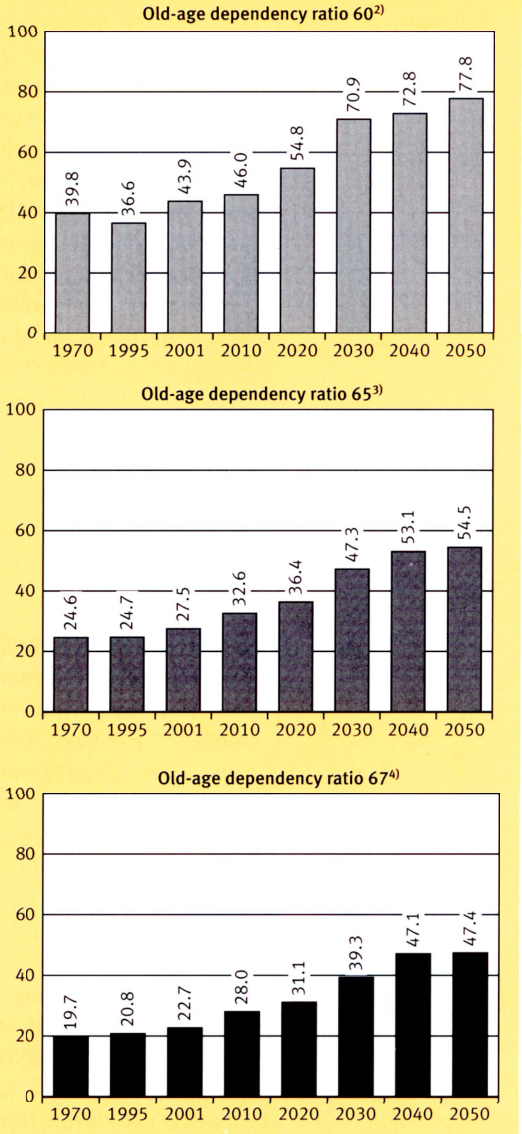
Table A 3.10 on page 47 in the Annex makes this development more clear.

The changes in the age structure can be demonstrated using the percentages of individual generations (cf. Table 3.3 on page 29). Whilst 50 years ago one person in three was a young person under 20, and only one person in seven was older than 59, today only one person in five is under 20, and further, almost one person in four becomes an elderly citizen. In future, this trend will have an even stronger effect: According to the medium variant, only one person in six will be under 20 in 2050, but one person in three will be 60 or older.

As life expectancy rises, the number of 80-year-olds and older will increase. 3.2 million persons in this age group live in Germany today, accounting for almost 4 % of the population. According to the medium variant of the 10th coordinated population projection (Variant 5), there will be roughly 9.1 million persons in this age group in 2050, accounting for 12 % of the population. If life expectancy rises even faster (Variant 8), this number will increase to 9.9 million or 13 %.

Accordingly, the median age which splits the population into two numerically equal parts will also shift: In 2001, it was 40.6 years, whilst in 2050 by contrast, 50 % of the population will be older than 48.

Graph 3.5: Old-age Dependency Ratios with different Age Delimitations[1)]



1) From 2002 onwards estimates of the 10th coordinated population projection, "Medium" population (Variant 5): Medium migration assumption (annual balance of at least 200 000 persons) and medium life expectancy assumption (average life expectancy 2050 at 81 for boys and 87 for girls respectively). — 2) 60-year-olds and older per 100 persons aged 20 to 59. — 3) 65-year-olds and older per 100 persons aged 20 to 64. — 4) 67-year-olds and older per 100 persons aged 20 to 66.

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3.3.1 Old-age dependency ratio

Given that they constitute a group of potential recipients of benefits from pensions insurance or other old-age pensions systems, the ratio of the population that is of pensionable age to the working-age population is relevant to old-age pensions in particular. This ratio is referred to as the old-age dependency ratio. In accordance with the previous average retirement age, 60 is taken as a threshold for pensionable age. Working age is defined as 20 to 59.

The old-age dependency ratio was 44 in 2001, meaning that there were 44 persons of pensionable age for every 100 people of working age. This quotient was still 41 in 1999, and it was 37 in 1995. This considerable increase in the old-age dependency ratio in the short term is a result of the strong birth years in their mid- to late-thirties moving up into the group of 60-year-olds and older, whilst at the same time the less numerous birth years from 1975 onwards move up into working age (cf. age structure on 31 December 2001 in Graph 3.3 on page 30): Thus, fewer young people enter working age than change from the working age group to the group of pensioners.

The long-term view shows a further considerable increase in the old-age dependency ratio. According to the medium variant of the projection (Variant 5) the old-age dependency ratio would rise rapidly to 71 until 2030 and then by 2050 would rise further to 78 (cf. Graph 3.5).

If one sets the limit for the old-age dependency ratio not with 60-year-olds, but with 65-year-olds – the age limit applicable in statutory pensions insurance – a much lower old-age dependency ratio emerges as one transfers the 60- to 65-year-olds from pensionable to working age (Graph 3.5). According to the medium variant (Variant 5) for 2050, an old-age dependency ratio of 55 would then be expected, as against a figure of 78 reached if it the limit is set at 60. Further increasing the age limit to 67 would reduce the old-age dependency ratio all the way down to 47 – a somewhat higher value than today with the age limit of 60. Even with a statutory age limit of 67, a lower average retirement age is conceivable, so that setting the limit at 65 in 2050 could correspond

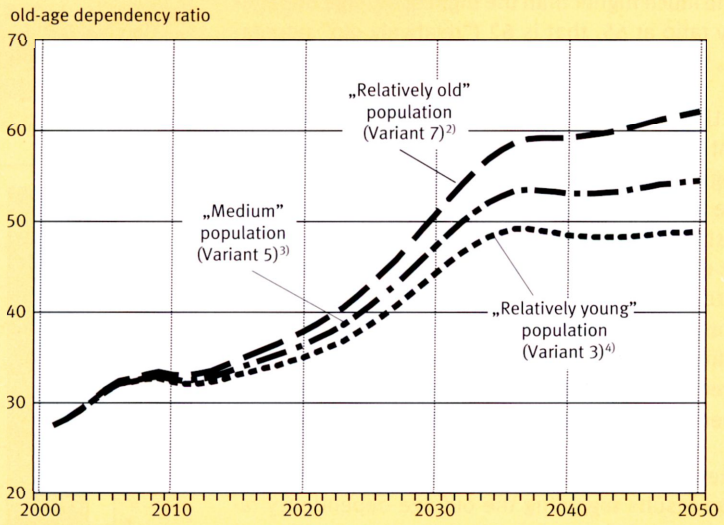
to the actual retirement age at that time. For 60-year-olds the life expectancy according to the medium assumption made here is still roughly 24 for men and 28 for women. For 65-year-olds in 2050 an average of over 19.5 and more than 23.5 years of life would be expected respectively – in other words the number calculated today for 60-year-olds. Shifting the age limit has a far greater influence on the old-age dependency ratio than do the different assumptions on life expectancy and migration.

Graph 3.6 makes it clear that the old-age dependency ratio in the event of a strong increase in life expectancy at the same time as low immigration of roughly 100 000 persons per year (Variant 7) will take on a particularly unfavourable trend. In this situation, the population would age particularly quickly. The old-age dependency ratio for 65 years would increase to 51 in 2030 and further to 62 in 2050, from today's figure of almost 28. With a smaller increase in life expectancy and the highest assumed immigration (Variant 3) the old-age dependency ratio does not increase as rapidly as in Variants 5 and 7, but also in this case reaches a relatively high value at 49 per year in 2050. This is linked with the fact that immigrants according to experience to date also have relatively low fertility, so that in the long term there is fewer offspring in this group too, and correspondingly there are fewer persons of working age. Hence, whilst immigration is able to curtail ageing for a few years, it is not a long-term solution.

This becomes even clearer if one takes a look at the impact of migration while assuming that life expectancy will remain constant (Variants 4, 5 and 6 in Graph 3.7 on page 34). According to the medium variant with the long-term migration balance of 200 000 persons per year, one would have to expect an old-age dependency ratio for 2050 (were the limit to be set at 65) of approximately 55. If 100 000 fewer persons come to Germany each year, the quotient in 2050 would reach the value of 59. If 300 000 persons migrate to Germany annually from 2011 onwards – by 2050 that would be roughly four million people more than in Variant 5, which assumes medium immigration – the old-age dependency ratio at the end of the projection, at 51, is somewhat lower. All variants hence show considerable ageing until 2050, since the old-age dependency ratio only fluctuates between 51 and 55 where life expectancy is assumed to be constant, but assumptions differ as to the migration balance.

Similar effects also occur if one uses a figure of 60 to define the old-age dependency ratio, as shown by the following overview in Table 3.4 on page 34.

Graph 3.6: Trends in Old-age Dependency Ratios 65[1] to 2050 by various Assumptions



1) 65-year-olds and older per 100 persons aged 20 to 64. — 2) Variant 7: Low migration assumption (annual balance of at least 100 000 persons) and high life expectancy assumption (average life expectancy in 2050 at 83 for boys and 88 for girls respectively). — 3) Variant 5: Medium migration assumption (annual balance of at least 200 000 persons) and mediumlife expectancy assumption (average life expectancy in 2050 at 81 for boys and 87 for girls respectively). — 4) Variant 3: High migration assumption (annual balance of at least 300 000 persons) and low life expectancy assumption (average life expectancy 2050 at 79 for boys and 86 for girls respectively).

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Table 3.4: Old-age Dependency Ratio at 60 and 65 Years of Age in 2050

Variant	Old-age dependency ratio	
	Age limit 60	Age limit 65
"Relatively young" population (Variant 3)	71	49
"Relatively old" population (Variant 7)	88	62
Medium life expectancy and		
low migration balance (Variant 4)	85	59
medium migration balance (Variant 5, "medium" population)	78	55
high migration balance (Variant 6)	74	51

It contains the results for the old-age dependency ratios at 65 and at 60 on the above described variants for 2050. In all variants, the old-age dependency ratio for 65 is more than 20 points lower than that for 60. The lowest old-age dependency ratio at 60, that is 71 ("relatively young" population, Variant 3), is still much higher than the highest old-age dependency ratio at 65, that is 62 ("relatively old" population, Variant 7).

The United Nations models on the topic of "Replacement Migration" of March 2000 show amongst other things that more than 3.4 million persons would have to migrate to Germany per year if one wished to constantly maintain the numerical ratio of 15- to 64-year-olds to the over 64s. In the period from 2003 to 2050 this would be almost 175 million immigrants, in other words twice today's population. According to the United Nations study, therefore, the current age structure in Germany cannot be maintained by immigration under realistic conditions.

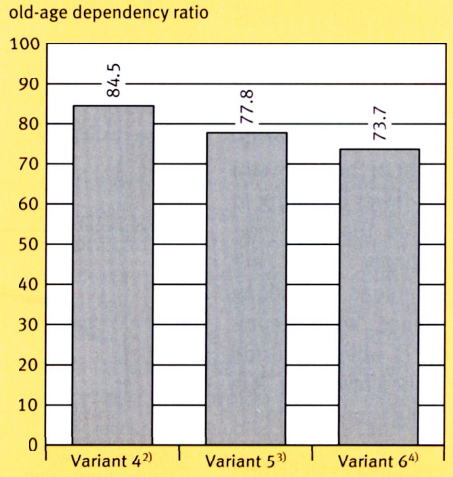
Tables A 3.1 to A 3.9 in the Annex include more detailed results regarding the old-age dependency ratios for the different variants of the 10th coordinated population projection.

3.3.2 Working-age population

Changes in the age structure also reveal themselves among the working-age population, that is those aged 20 to 64. In general, the working-age population will reduce since in future fewer young people enter working age than those retiring from this group (cf. Chapter 3.3.1).

Above all, the medium age group of 35- to 49-year-olds, originally the largest, will reduce considerably. Today, at almost 20 million people, it accounts for almost 40 % of the working-age population (cf. Graph 3.8), but in 2050, it will be by far overtaken by the group of 50- to-64-year-olds. In 2050, this oldest generation of the working-age population in contradistinction to the younger and medium generation will be numerically almost as large as today: Whilst the number of 20- to 34-year-olds will fall from 16 million in 2001 to 12 million in 2050 (– 24 %) and the number of 35- to 49-year-olds shrinks in the same period from 20 to 14 million (– 31 %), the group of 50- to 64-year-olds only falls by roughly 400 000 or 3 %, and in 2050 too accounts for more than 15 million people. For a time, the oldest group will grow to more than 19 million.

Graph 3.7: Old-age Dependency Ratio 65[1] in 2050 with different Migration Assumptions



1) 65-years-old and older per 100 persons aged 20 to 64. Medium life expectancy assumption (average life expectancy in 2050 at 81 for boys and 87 for girls respectively). – 2) Low migration balance of 100 000 persons per year. – 3) Medium migration balance of 200 000 persons per year. – 4) High migration balance of 300 000 persons per year.

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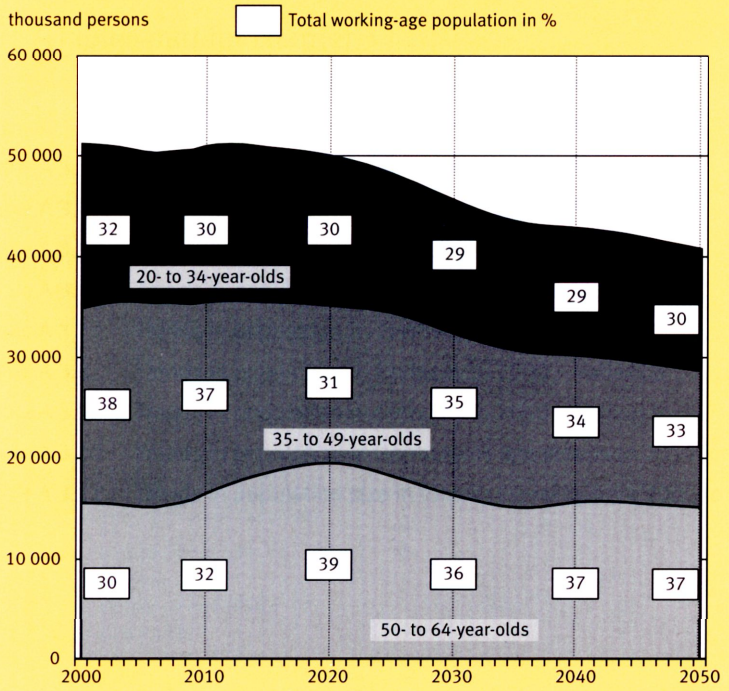
Graph 3.8: Age Structure of the Working-age Population until 2050[1)]



1) From 2002 onwards estimates of the 10th coordinated population projection, "Medium" population (Variant 5): Medium migration assumption (annual balance of at least 200 000 persons) and medium life expectancy assumption (average life expectancy in 2050 81 for boys and 87 for girls respectively).

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4 Annex

4.1 Tables part for chapter 3

Table A 3.1: Trends in Population in Germany to 2050 [1]

Variant 1 [2]

Specification		31.12. of					
		2001	2010	2020	2030	2040	2050
Old-age dependency ratio with age limit 60							
Population size	1 000	82 440.3	82 006.4	80 048.4	76 665.2	72 217.3	67 046.2
	2001 = 100	100	99.5	97.1	93.0	87.6	81.3
under 20	1 000	17 259.5	15 307.9	13 948.0	12 957.3	11 672.1	10 643.4
	%	20.9	18.7	17.4	16.9	16.2	15.9
	2001 = 100	100	88.7	80.8	75.1	67.6	61.7
20 to under 60	1 000	45 309.5	45 576.6	42 451.6	36 731.6	34 393.8	31 174.9
	%	55.0	55.6	53.0	47.9	47.6	46.5
	2001 = 100	100	100.6	93.7	81.1	75.9	68.8
60 and older	1 000	19 871.3	21 121.9	23 648.8	26 976.3	26 151.4	25 228.0
	%	24.1	25.8	29.5	35.2	36.2	37.6
	2001 = 100	100	106.3	119.0	135.8	131.6	127.0
Young-age, old-age, total dependency ratio							
For 100 20- to 60-year-olds there are							
under 20-year-olds (Young-age dependency ratio)		38.1	33.6	32.9	35.3	33.9	34.1
60-year-olds and older (Old-age dependency ratio)		43.9	46.3	55.7	73.4	76.0	80.9
together (Total dependency ratio)		81.9	79.9	88.6	108.7	110.0	115.1
Old-age dependency ratio with age limit 65							
Population size	1 000	82 440.3	82 006.4	80 048.4	76 665.2	72 217.3	67 046.2
	2001 = 100	100	99.5	97.1	93.0	87.6	81.3
under 20	1 000	17 259.5	15 307.9	13 948.0	12 957.3	11 672.1	10 643.4
	%	20.9	18.7	17.4	16.9	16.2	15.9
	2001 = 100	100	88.7	80.8	75.1	67.6	61.7
20 to under 65	1 000	51 115.1	50 241.4	48 334.4	42 905.2	38 987.1	36 054.8
	%	62.0	61.3	60.4	56.0	54.0	53.8
	2001 = 100	100	98.3	94.6	83.9	76.3	70.5
65 and older	1 000	14 065.7	16 457.1	17 766.0	20 802.7	21 558.1	20 348.1
	%	17.1	20.1	22.2	27.1	29.9	30.3
	2001 = 100	100	117.0	126.3	147.9	153.3	144.7
Young-age, old-age, total dependency ratio							
For 100 20- to 65-year-olds there are							
under 20-year-olds (Young-age dependency ratio)		33.8	30.5	28.9	30.2	29.9	29.5
65-year-olds and older (Old-age dependency ratio)		27.5	32.8	36.8	48.5	55.3	56.4
together (Total dependency ratio)		61.3	63.2	65.6	78.7	85.2	86.0

1) From 2010 onwards estimates from the 10th coordinated population projection. – 2) Low life expectancy, low migration balance of at least 100 000 persons.

Table A 3.2: Trends in Population in Germany to 2050 [1]

Variant 2 [2]

Specification		31.12. of					
		2001	2010	2020	2030	2040	2050
Old-age dependency ratio with age limit 60							
Population size	1 000	82 440.3	82 889.9	82 243.8	80 269.4	77 291.8	73 632.5
	2001 = 100	100	100.5	99.8	97.4	93.8	89.3
under 20	1 000	17 259.5	15 519.8	14 535.4	13 897.4	12 836.4	12 048.0
	%	20.9	18.7	17.7	17.3	16.6	16.4
	2001 = 100	100	89.9	84.2	80.5	74.4	69.8
20 to under 60	1 000	45 309.5	46 254.6	44 047.2	39 284.1	37 874.3	35 274.4
	%	55.0	55.8	53.6	48.9	49.0	47.9
	2001 = 100	100	102.1	97.2	86.7	83.6	77.9
60 and older	1 000	19 871.3	21 115.4	23 661.2	27 087.9	26 581.1	26 310.1
	%	24.1	25.5	28.8	33.7	34.4	35.7
	2001 = 100	100	106.3	119.1	136.3	133.8	132.4
Young-age, old-age, total dependency ratio							
For 100 20- to 60-year-olds there are							
under 20-year-olds (Young-age dependency ratio)		38.1	33.6	33.0	35.4	33.9	34.2
60-year-olds and older (Old-age dependency ratio)		43.9	45.7	53.7	69.0	70.2	74.6
together (Total dependency ratio)		81.9	79.2	86.7	104.3	104.1	108.7
Old-age dependency ratio with age limit 65							
Population size	1 000	82 440.3	82 889.9	82 243.8	80 269.4	77 291.8	73 632.5
	2001 = 100	100	100.5	99.8	97.4	93.8	89.3
under 20	1 000	17 259.5	15 519.8	14 535.4	13 897.4	12 836.4	12 048.0
	%	20.9	18.7	17.7	17.3	16.6	16.4
	2001 = 100	100	89.9	84.2	80.5	74.4	69.8
20 to under 65	1 000	51 115.1	50 921.1	49 949.1	45 528.1	42 697.9	40 563.0
	%	62.0	61.4	60.7	56.7	55.2	55.1
	2001 = 100	100	99.6	97.7	89.1	83.5	79.4
65 and older	1 000	14 065.7	16 448.9	17 759.3	20 843.9	21 757.5	21 021.4
	%	17.1	19.8	21.6	26.0	28.1	28.5
	2001 = 100	100	116.9	126.3	148.2	154.7	149.5
Young-age, old-age, total dependency ratio							
For 100 20- to 65-year-olds there are							
under 20-year-olds (Young-age dependency ratio)		33.8	30.5	29.1	30.5	30.1	29.7
65-year-olds and older (Old-age dependency ratio)		27.5	32.3	35.6	45.8	51.0	51.8
together (Total dependency ratio)		61.3	62.8	64.7	76.3	81.0	81.5

1) From 2010 onwards estimates from the 10th coordinated population projection. – 2) Low life expectancy, medium migration balance of at least 200 000 persons.

Table A 3.3: Trends in Population in Germany to 2050 [1]

Variant 3 [2]

Specification		31.12. of					
		2001	2010	2020	2030	2040	2050
Old-age dependency ratio with age limit 60							
Population size	1 000	82 440.3	82 889.9	83 338.3	82 595.5	80 883.8	78 510.5
	2001 = 100	100	100.5	101.1	100.2	98.1	95.2
under 20	1 000	17 259.5	15 519.8	14 759.6	14 432.8	13 620.0	13 010.0
	%	20.9	18.7	17.7	17.5	16.8	16.6
	2001 = 100	100	89.9	85.5	83.6	78.9	75.4
20 to under 60	1 000	45 309.5	46 254.6	44 871.2	40 926.4	40 313.4	38 377.4
	%	55.0	55.8	53.8	49.6	49.8	48.9
	2001 = 100	100	102.1	99.0	90.3	89.0	84.7
60 and older	1 000	19 871.3	21 115.4	23 707.5	27 236.3	26 950.4	27 123.1
	%	24.1	25.5	28.4	33.0	33.3	34.5
	2001 = 100	100	106.3	119.3	137.1	135.6	136.5
Young-age, old-age, total dependency ratio							
For 100 20- to 60-year-olds there are							
under 20-year-olds (Young-age dependency ratio)		38.1	33.6	32.9	35.3	33.8	33.9
60-year-olds and older (Old-age dependency ratio)		43.9	45.7	52.8	66.5	66.9	70.7
together (Total dependency ratio)		81.9	79.2	85.7	101.8	100.6	104.6
Old-age dependency ratio with age limit 65							
Population size	1 000	82 440.3	82 889.9	83 338.3	82 595.5	80 883.8	78 510.5
	2001 = 100	100	100.5	101.1	100.2	98.1	95.2
under 20	1 000	17 259.5	15 519.8	14 759.6	14 432.8	13 620.0	13 010.0
	%	20.9	18.7	17.7	17.5	16.8	16.6
	2001 = 100	100	89.9	85.5	83.6	78.9	75.4
20 to under 65	1 000	51 115.1	50 921.1	50 790.5	47 231.6	45 283.3	43 976.4
	%	62.0	61.4	60.9	57.2	56.0	56.0
	2001 = 100	100	99.6	99.4	92.4	88.6	86.0
65 and older	1 000	14 065.7	16 448.9	17 788.2	20 931.1	21 980.5	21 524.1
	%	17.1	19.8	21.3	25.3	27.2	27.4
	2001 = 100	100	116.9	126.5	148.8	156.3	153.0
Young-age, old-age, total dependency ratio							
For 100 20- to 65-year-olds there are							
under 20-year-olds (Young-age dependency ratio)		33.8	30.5	29.1	30.6	30.1	29.6
65-year-olds and older (Old-age dependency ratio)		27.5	32.3	35.0	44.3	48.5	48.9
together (Total dependency ratio)		61.3	62.8	64.1	74.9	78.6	78.5

1) From 2010 onwards estimates from the 10th coordinated population projection. – 2) Low life expectancy, high migration balance of at least 300 000 persons.

Table A 3.4: Trends in Population in Germany to 2050 [1]

Variant 4 [2]

Specification		31.12. of					
		2001	2010	2020	2030	2040	2050
Old-age dependency ratio with age limit 60							
Population size	1 000	82 440.3	82 182.6	80 624.9	77 609.3	73 446.6	68 488.9
	2001 = 100	100	99.7	97.8	94.1	89.1	83.1
under 20	1 000	17 259.5	15 312.3	13 964.2	12 985.0	11 706.9	10 685.3
	%	20.9	18.6	17.3	16.7	15.9	15.6
	2001 = 100	100	88.7	80.9	75.2	67.8	61.9
20 to under 60	1 000	45 309.5	45 598.9	42 518.8	36 826.8	34 521.2	31 323.9
	%	55.0	55.5	52.7	47.5	47.0	45.7
	2001 = 100	100	100.6	93.8	81.3	76.2	69.1
60 and older	1 000	19 871.3	21 271.4	24 141.8	27 797.4	27 218.5	26 479.8
	%	24.1	25.9	29.9	35.8	37.1	38.7
	2001 = 100	100	107.0	121.5	139.9	137.0	133.3
Young-age, old-age, total dependency ratio							
For 100 20- to 60-year-olds there are							
under 20-year-olds (Young-age dependency ratio)		38.1	33.6	32.8	35.3	33.9	34.1
60-year-olds and older (Old-age dependency ratio)		43.9	46.6	56.8	75.5	78.8	84.5
together (Total dependency ratio)		81.9	80.2	89.6	110.7	112.8	118.6
Old-age dependency ratio with age limit 65							
Population size	1 000	82 440.3	82 182.6	80 624.9	77 609.3	73 446.6	68 488.9
	2001 = 100	100	99.7	97.8	94.1	89.1	83.1
under 20	1 000	17 259.5	15 312.3	13 964.2	12 985.0	11 706.9	10 685.3
	%	20.9	18.6	17.3	16.7	15.9	15.6
	2001 = 100	100	88.7	80.9	75.2	67.8	61.9
20 to under 65	1 000	51 115.1	50 273.5	48 434.7	43 050.4	39 158.3	36 257.7
	%	62.0	61.2	60.1	55.5	53.3	52.9
	2001 = 100	100	98.4	94.8	84.2	76.6	70.9
65 and older	1 000	14 065.7	16 596.9	18 226.0	21 573.8	22 581.4	21 545.9
	%	17.1	20.2	22.6	27.8	30.7	31.5
	2001 = 100	100	118.0	129.6	153.4	160.5	153.2
Young-age, old-age, total dependency ratio							
For 100 20- to 65-year-olds there are							
under 20-year-olds (Young-age dependency ratio)		33.8	30.5	28.8	30.2	29.9	29.5
65-year-olds and older (Old-age dependency ratio)		27.5	33.0	37.6	50.1	57.7	59.4
together (Total dependency ratio)		61.3	63.5	66.5	80.3	87.6	88.9

1) From 2010 onwards estimates from the 10th coordinated population projection. – 2) Medium life expectancy, low migration balance of at least 100 000 persons.

Table A 3.5: Trends in Population in Germany to 2050 [1]

Variant 5 [2]

Specification		31.12. of					
		2001	2010	2020	2030	2040	2050
Old-age dependency ratio with age limit 60							
Population size	1 000	82 440.3	83 066.2	82 822.1	81 220.3	78 539.4	75 117.3
	2001 = 100	100	100.8	100.5	98.5	95.3	91.1
under 20	1 000	17 259.5	15 524.3	14 552.3	13 926.7	12 873.7	12 093.7
	%	20.9	18.7	17.6	17.1	16.4	16.1
	2001 = 100	100	89.9	84.3	80.7	74.6	70.1
20 to under 60	1 000	45 309.5	46 277.2	44 115.9	39 383.7	38 010.7	35 436.5
	%	55.0	55.7	53.3	48.5	48.4	47.2
	2001 = 100	100	102.1	97.4	86.9	83.9	78.2
60 and older	1 000	19 871.3	21 264.8	24 153.9	27 909.9	27 655.0	27 587.0
	%	24.1	25.6	29.2	34.4	35.2	36.7
	2001 = 100	100	107.0	121.6	140.5	139.2	138.8
Young-age, old-age, total dependency ratio							
For 100 20- to 60-year-olds there are							
under 20-year-olds (Young-age dependency ratio)		38.1	33.5	33.0	35.4	33.9	34.1
60-year-olds and older (Old-age dependency ratio)		43.9	46.0	54.8	70.9	72.8	77.8
together (Total dependency ratio)		81.9	79.5	87.7	106.2	106.6	112.0
Old-age dependency ratio with age limit 65							
Population size	1 000	82 440.3	83 066.2	82 822.1	81 220.3	78 539.4	75 117.3
	2001 = 100	100	100.8	100.5	98.5	95.3	91.1
under 20	1 000	17 259.5	15 524.3	14 552.3	13 926.7	12 873.7	12 093.7
	%	20.9	18.7	17.6	17.1	16.4	16.1
	2001 = 100	100	89.9	84.3	80.7	74.6	70.1
20 to under 65	1 000	51 115.1	50 953.3	50 050.8	45 678.2	42 880.1	40 783.3
	%	62.0	61.3	60.4	56.2	54.6	54.3
	2001 = 100	100	99.7	97.9	89.4	83.9	79.8
65 and older	1 000	14 065.7	16 588.7	18 219.0	21 615.4	22 785.6	22 240.2
	%	17.1	20.0	22.0	26.6	29.0	29.6
	2001 = 100	100	117.9	129.5	153.7	162.0	158.1
Young-age, old-age, total dependency ratio							
For 100 20- to 65-year-olds there are							
under 20-year-olds (Young-age dependency ratio)		33.8	30.5	29.1	30.5	30.0	29.7
65-year-olds and older (Old-age dependency ratio)		27.5	32.6	36.4	47.3	53.1	54.5
together (Total dependency ratio)		61.3	63.0	65.5	77.8	83.2	84.2

1) From 2010 onwards estimates from the 10th coordinated population projection. – 2) Medium life expectancy, medium migration balance of at least 200 000 persons.

Table A 3.6: Trends in Population in Germany to 2050 [1]

Variant 6 [2]

Specification		31.12. of					
		2001	2010	2020	2030	2040	2050
Old-age dependency ratio with age limit 60							
Population size	1 000	82 440.3	83 066.2	83 917.6	83 551.7	82 145.7	80 027.9
	2001 = 100	100	100.8	101.8	101.3	99.6	97.1
under 20	1 000	17 259.5	15 524.3	14 776.7	14 462.8	13 658.8	13 058.1
	%	20.9	18.7	17.6	17.3	16.6	16.3
	2001 = 100	100	89.9	85.6	83.8	79.1	75.7
20 to under 60	1 000	45 309.5	46 277.2	44 940.3	41 028.3	40 455.0	38 548.5
	%	55.0	55.7	53.6	49.1	49.2	48.2
	2001 = 100	100	102.1	99.2	90.6	89.3	85.1
60 and older	1 000	19 871.3	21 264.8	24 200.6	28 060.5	28 031.9	28 421.3
	%	24.1	25.6	28.8	33.6	34.1	35.5
	2001 = 100	100	107.0	121.8	141.2	141.1	143.0
Young-age, old-age, total dependency ratio							
For 100 20- to 60-year-olds there are							
under 20-year-olds (Young-age dependency ratio)		38.1	33.5	32.9	35.3	33.8	33.9
60-year-olds and older (Old-age dependency ratio)		43.9	46.0	53.9	68.4	69.3	73.7
together (Total dependency ratio)		81.9	79.5	86.7	103.6	103.1	107.6
Old-age dependency ratio with age limit 65							
Population size	1 000	82 440.3	83 066.2	83 917.6	83 551.7	82 145.7	80 027.9
	2001 = 100	100	100.8	101.8	101.3	99.6	97.1
under 20	1 000	17 259.5	15 524.3	14 776.7	14 462.8	13 658.8	13 058.1
	%	20.9	18.7	17.6	17.3	16.6	16.3
	2001 = 100	100	89.9	85.6	83.8	79.1	75.7
20 to under 65	1 000	51 115.1	50 953.3	50 892.7	47 384.4	45 472.0	44 208.7
	%	62.0	61.3	60.6	56.7	55.4	55.2
	2001 = 100	100	99.7	99.6	92.7	89.0	86.5
65 and older	1 000	14 065.7	16 588.7	18 248.2	21 704.4	23 014.9	22 761.1
	%	17.1	20.0	21.7	26.0	28.0	28.4
	2001 = 100	100	117.9	129.7	154.3	163.6	161.8
Young-age, old-age, total dependency ratio							
For 100 20- to 65-year-olds there are							
under 20-year-olds (Young-age dependency ratio)		33.8	30.5	29.0	30.5	30.0	29.5
65-year-olds and older (Old-age dependency ratio)		27.5	32.6	35.9	45.8	50.6	51.5
together (Total dependency ratio)		61.3	63.0	64.9	76.3	80.7	81.0

1) From 2010 onwards estimates from the 10th coordinated population projection. – 2) Medium life expectancy, high migration balance of at least 300 000 persons.

Table A 3.7: Trends in Population in Germany to 2050 [1]

Variant 7 [2]

Specification		31.12. of					
		2001	2010	2020	2030	2040	2050
Old-age dependency ratio with age limit 60							
Population size	1 000	82 440.3	82 208.3	80 776.9	78 003.2	74 184.9	69 665.4
	2001 = 100	100	99.7	98.0	94.6	90.0	84.5
under 20	1 000	17 259.5	15 312.6	13 966.0	12 989.1	11 713.2	10 694.3
	%	20.9	18.6	17.3	16.7	15.8	15.4
	2001 = 100	100	88.7	80.9	75.3	67.9	62.0
20 to under 60	1 000	45 309.5	45 601.9	42 534.2	36 855.6	34 569.9	31 389.1
	%	55.0	55.5	52.7	47.2	46.6	45.1
	2001 = 100	100	100.6	93.9	81.3	76.3	69.3
60 and older	1 000	19 871.3	21 293.8	24 276.7	28 158.6	27 901.8	27 582.1
	%	24.1	25.9	30.1	36.1	37.6	39.6
	2001 = 100	100	107.2	122.2	141.7	140.4	138.8
Young-age, old-age, total dependency ratio							
For 100 20- to 60-year-olds there are							
under 20-year-olds (Young-age dependency ratio)		38.1	33.6	32.8	35.2	33.9	34.1
60-year-olds and older (Old-age dependency ratio)		43.9	46.7	57.1	76.4	80.7	87.9
together (Total dependency ratio)		81.9	80.3	89.9	111.6	114.6	121.9
Old-age dependency ratio with age limit 65							
Population size	1 000	82 440.3	82 208.3	80 776.9	78 003.2	74 184.9	69 665.4
	2001 = 100	100	99.7	98.0	94.6	90.0	84.5
under 20	1 000	17 259.5	15 312.6	13 966.0	12 989.1	11 713.2	10 694.3
	%	20.9	18.6	17.3	16.7	15.8	15.4
	2001 = 100	100	88.7	80.9	75.3	67.9	62.0
20 to under 65	1 000	51 115.1	50 277.8	48 458.3	43 099.2	39 231.9	36 361.5
	%	62.0	61.2	60.0	55.3	52.9	52.2
	2001 = 100	100	98.4	94.8	84.3	76.8	71.1
65 and older	1 000	14 065.7	16 617.9	18 352.6	21 915.0	23 239.8	22 609.7
	%	17.1	20.2	22.7	28.1	31.3	32.5
	2001 = 100	100	118.1	130.5	155.8	165.2	160.7
Young-age, old-age, total dependency ratio							
For 100 20- to 65-year-olds there are							
under 20-year-olds (Young-age dependency ratio)		33.8	30.5	28.8	30.1	29.9	29.4
65-year-olds and older (Old-age dependency ratio)		27.5	33.1	37.9	50.8	59.2	62.2
together (Total dependency ratio)		61.3	63.5	66.7	81.0	89.1	91.6

1) From 2010 onwards estimates from the 10th coordinated population projection. – 2) High life expectancy, low migration balance of at least 100 000 persons.

Table A 3.8: Trends in Population in Germany to 2050 [1]

Variant 8 [2]

Specification		31.12. of					
		2001	2010	2020	2030	2040	2050
Old-age dependency ratio with age limit 60							
Population size	1 000	82 440.3	83 091.9	82 974.4	81 616.2	79 285.8	76 319.8
	2001 = 100	100	100.8	100.6	99.0	96.2	92.6
under 20	1 000	17 259.5	15 524.6	14 554.1	13 931.0	12 880.6	12 103.7
	%	20.9	18.7	17.5	17.1	16.2	15.9
	2001 = 100	100	89.9	84.3	80.7	74.6	70.1
20 to under 60	1 000	45 309.5	46 280.1	44 131.5	39 413.8	38 063.1	35 508.3
	%	55.0	55.7	53.2	48.3	48.0	46.5
	2001 = 100	100	102.1	97.4	87.0	84.0	78.4
60 and older	1 000	19 871.3	21 287.2	24 288.8	28 271.4	28 342.1	28 707.8
	%	24.1	25.6	29.3	34.6	35.7	37.6
	2001 = 100	100	107.1	122.2	142.3	142.6	144.5
Young-age, old-age, total dependency ratio							
For 100 20- to 60-year-olds there are							
under 20-year-olds (Young-age dependency ratio)		38.1	33.5	33.0	35.3	33.8	34.1
60-year-olds and older (Old-age dependency ratio)		43.9	46.0	55.0	71.7	74.5	80.8
together (Total dependency ratio)		81.9	79.5	88.0	107.1	108.3	114.9
Old-age dependency ratio with age limit 65							
Population size	1 000	82 440.3	83 091.9	82 974.4	81 616.2	79 285.8	76 319.8
	2001 = 100	100	100.8	100.6	99.0	96.2	92.6
under 20	1 000	17 259.5	15 524.6	14 554.1	13 931.0	12 880.6	12 103.7
	%	20.9	18.7	17.5	17.1	16.2	15.9
	2001 = 100	100	89.9	84.3	80.7	74.6	70.1
20 to under 65	1 000	51 115.1	50 957.6	50 074.8	45 728.5	42 958.7	40 896.8
	%	62.0	61.3	60.3	56.0	54.2	53.6
	2001 = 100	100	99.7	98.0	89.5	84.0	80.0
65 and older	1 000	14 065.7	16 609.7	18 345.5	21 956.6	23 446.6	23 319.3
	%	17.1	20.0	22.1	26.9	29.6	30.6
	2001 = 100	100	118.1	130.4	156.1	166.7	165.8
Young-age, old-age, total dependency ratio							
For 100 20- to 65-year-olds there are							
under 20-year-olds (Young-age dependency ratio)		33.8	30.5	29.1	30.5	30.0	29.6
65-year-olds and older (Old-age dependency ratio)		27.5	32.6	36.6	48.0	54.6	57.0
together (Total dependency ratio)		61.3	63.1	65.7	78.5	84.6	86.6

1) From 2010 onwards estimates from the 10th coordinated population projection. – 2) High life expectancy, medium migration balance of at least 200 000 persons.

Table A 3.9: Trends in Population in Germany to 2050 [1]

Variant 9 [2]

Specification		31.12. of					
		2001	2010	2020	2030	2040	2050
Old-age dependency ratio with age limit 60							
Population size	1 000	82 440.3	83 091.9	84 070.2	83 949.4	82 899.6	81 252.5
	2001 = 100	100	100.8	102.0	101.8	100.6	98.6
under 20	1 000	17 259.5	15 524.6	14 778.6	14 467.2	13 666.0	13 068.6
	%	20.9	18.7	17.6	17.2	16.5	16.1
	2001 = 100	100	89.9	85.6	83.8	79.2	75.7
20 to under 60	1 000	45 309.5	46 280.1	44 956.0	41 059.1	40 509.9	38 625.4
	%	55.0	55.7	53.5	48.9	48.9	47.5
	2001 = 100	100	102.1	99.2	90.6	89.4	85.2
60 and older	1 000	19 871.3	21 287.2	24 335.6	28 423.1	28 723.7	29 558.6
	%	24.1	25.6	28.9	33.9	34.6	36.4
	2001 = 100	100	107.1	122.5	143.0	144.5	148.7
Young-age, old-age, total dependency ratio							
For 100 20- to 60-year-olds there are							
under 20-year-olds (Young-age dependency ratio)		38.1	33.5	32.9	35.2	33.7	33.8
60-year-olds and older (Old-age dependency ratio)		43.9	46.0	54.1	69.2	70.9	76.5
together (Total dependency ratio)		81.9	79.5	87.0	104.5	104.6	110.4
Old-age dependency ratio with age limit 65							
Population size	1 000	82 440.3	83 091.9	84 070.2	83 949.4	82 899.6	81 252.5
	2001 = 100	100	100.8	102.0	101.8	100.6	98.6
under 20	1 000	17 259.5	15 524.6	14 778.6	14 467.2	13 666.0	13 068.6
	%	20.9	18.7	17.6	17.2	16.5	16.1
	2001 = 100	100	89.9	85.6	83.8	79.2	75.7
20 to under 65	1 000	51 115.1	50 957.6	50 916.8	47 435.7	45 553.8	44 329.6
	%	62.0	61.3	60.6	56.5	55.0	54.6
	2001 = 100	100	99.7	99.6	92.8	89.1	86.7
65 and older	1 000	14 065.7	16 609.7	18 374.8	22 046.5	23 679.8	23 854.4
	%	17.1	20.0	21.9	26.3	28.6	29.4
	2001 = 100	100	118.1	130.6	156.7	168.4	169.6
Young-age, old-age, total dependency ratio							
For 100 20- to 65-year-olds there are							
under 20-year-olds (Young-age dependency ratio)		33.8	30.5	29.0	30.5	30.0	29.5
65-year-olds and older (Old-age dependency ratio)		27.5	32.6	36.1	46.5	52.0	53.8
together (Total dependency ratio)		61.3	63.1	65.1	77.0	82.0	83.3

1) From 2010 onwards estimates from the 10th coordinated population projection. – 2) High life expectancy, high migration balance of at least 300 000 persons.

Table A 3.10: Trends in Population in Germany by Age Groups to 2050 for Variant 5 [1)]

Age from ... to fewer than ... years	31.12. of					
	2001	2010	2020	2030	2040	2050
Total	82 440	83 066	82 822	81 220	78 539	75 117
under 20	17 259	15 524	14 552	13 927	12 874	12 094
20 – 35	15 925	15 445	14 860	13 254	12 639	12 086
35 – 50	19 647	19 060	15 691	16 064	14 569	13 574
50 – 65	15 543	16 448	19 500	16 361	15 672	15 123
65 and older	14 066	16 589	18 219	21 615	22 786	22 240
20 – 65 together	51 115	50 953	50 051	45 678	42 880	40 783

1) From 2010 onwards estimates of the 10th coordinated population projection, "Medium" population (Variant 5): Medium migration assumption (annual balance 200 000 persons) and medium life expectancy assumption (average life expectancy 2050 at 81 for boys and 87 for girls respectively).

Table A 3.11: Trends in Population Size in Total in Germany from 2002 to 2050 [1]

in 1 000s of persons

Year (31.12. of ...)	Variant 1 [2] (minimum population size)	Variant 5 [3] ("medium" population)	Variant 9 [4] (maximum population size)
2002	82 522.3	82 522.3	82 522.3
2003	82 560.7	82 667.6	82 668.3
2004	82 564.1	82 786.2	82 788.1
2005	82 523.9	82 869.2	82 873.0
2006	82 451.9	82 928.5	82 934.7
2007	82 360.4	82 976.3	82 985.5
2008	82 256.6	83 016.2	83 029.7
2009	82 141.6	83 049.2	83 068.1
2010	82 006.4	83 066.2	83 091.9
2011	81 860.1	83 076.2	83 210.6
2012	81 702.9	83 079.2	83 325.5
2013	81 535.3	83 075.4	83 436.5
2014	81 358.5	83 066.0	83 545.0
2015	81 173.3	83 051.5	83 651.5
2016	80 978.0	83 030.1	83 754.3
2017	80 770.9	82 999.9	83 851.0
2018	80 549.6	82 957.9	83 938.8
2019	80 312.9	82 902.8	84 016.1
2020	80 048.4	82 822.1	84 070.2
2021	79 770.4	82 727.1	84 113.1
2022	79 478.9	82 617.6	84 144.5
2023	79 173.1	82 492.7	84 163.0
2024	78 852.7	82 351.8	84 167.9
2025	78 518.6	82 196.0	84 160.0
2026	78 172.2	82 026.5	84 140.5

1) From 2010 onwards estimates of the 10th coordinated population projection (Basis: 31.12.2001). – 2) Variant 1: Low migration assumption (annual balance of at least 100 000 persons) and low life expectancy assumption (average life expectancy in 2050 at 79 for boys and 86 for girls respectively). – 3) Variant 5: Medium migration assumption (annual balance of at least 200 000 persons) and medium life expectancy assumption (average life expectancy in 2050 at 81 for boys and 87 for girls respectively). – 4) Variant 9: High migration assumption (annual balance of at least 300 000 persons) and high life expectancy assumption (average life expectancy in 2050 at 83 for boys and 88 for girls respectively).

Table A 3.11: Trends in Population Size in Total in Germany from 2002 to 2050 [1] (continued)

in 1 000s of persons

Year (31.12. of ...)	Variant 1 [2] (minimum population size)	Variant 5 [3] ("medium" population)	Variant 9 [4] (maximum population size)
2027	77 813.5	81 843.8	84 109.3
2028	77 443.7	81 649.2	84 067.8
2029	77 063.8	81 444.1	84 017.3
2030	76 665.2	81 220.3	83 949.4
2031	76 258.7	80 988.9	83 875.3
2032	75 844.1	80 749.7	83 794.8
2033	75 419.6	80 500.5	83 705.3
2034	74 985.1	80 241.5	83 607.0
2035	74 543.2	79 975.7	83 503.2
2036	74 094.4	79 703.8	83 394.8
2037	73 638.1	79 425.0	83 280.9
2038	73 173.4	79 138.1	83 160.5
2039	72 700.8	78 843.9	83 034.2
2040	72 217.3	78 539.4	82 899.6
2041	71 730.4	78 232.2	82 764.9
2042	71 237.7	77 919.3	82 626.7
2043	70 736.2	77 596.9	82 480.4
2044	70 230.4	77 270.0	82 331.6
2045	69 718.5	76 936.0	82 177.4
2046	69 196.1	76 589.1	82 009.9
2047	68 665.5	76 231.7	81 831.7
2048	68 128.9	75 865.9	81 644.7
2049	67 588.1	75 493.3	81 450.5
2050	67 046.2	75 117.3	81 252.5

1) From 2010 onwards estimates of the 10th coordinated population projection (Basis: 31.12.2001). – 2) Variant 1: Low migration assumption (annual balance of at least 100 000 persons) and low life expectancy assumption (average life expectancy in 2050 at 79 for boys and 86 for girls respectively). – 3) Variant 5: Medium migration assumption (annual balance of at least 200 000 persons) and medium life expectancy assumption (average life expectancy in 2050 at 81 for boys and 87 for girls respectively). – 4) Variant 9: High migration assumption (annual balance of at least 300 000 persons) and high life expectancy assumption (average life expectancy in 2050 at 83 for boys and 88 for girls respectively).

4.2 Glossary

Basic migration

Basic migration is conditional on a certain number of persons moving abroad. For a balance that is positive or in equilibrium, in consequence, the same or a higher number of people moving into the country is required. This takes account of the fact that non-Germans moving to Germany are younger than those moving away, and a certain "rejuvenation effect" emerges even if the balance is in a state of equilibrium.

Life expectancy

Life expectancy is the average number of additional years that a person of a specific age presumably could live according to the mortality rates applying at the current time. It is calculated using the life table of the Federal Statistical Office of Germany, in which the current probabilities of death at a specific age are shown. This is a hypothetical value since the death circumstances may change as life advances. Life expectancy is shown sub-divided by gender.

Life expectancy at birth (i.e. age 0) and the life expectancy at certain ages, for instance age 60 or 65, is referred to. The total of the age reached and further life expectancy or the total years of life to be expected increase with advancing age. For instance, a one-year-old child today has a higher life expectancy than a new-born infant because he/she has overcome the risks of dying in the first months of his/her life. Hence, he/she has better chances of reaching more advanced ages.

Migration balance

The difference between arrivals in Germany and persons moving abroad.

Migration surplus

A migration surplus or a positive migration balance occurs when the number of arrivals is greater than the number of persons moving away.

Mortality

Mortality is one of the two main elements of natural demographic movement. In this situation, mortality is understood to be the number of deaths during a period related to the population. For instance, total deaths or deaths sub-divided by age or gender may be regarded in relation to the respective population group.

Old-age dependency ratio

The old-age dependency ratio is the ratio of persons of pensionable age (as a rule aged between 60 or 65 and older) to 100 persons of working age (as a rule from 20 to 59 or 64).

Repatriates and resettler

Repatriates and resettler, their spouses and offspring are persons who have obtained German citizenship, given up their territories of origin in the states of Eastern Europe and in the successor states of the Soviet Union, and have established a new domicile in the area of application of the Basic Law (Grundgesetz).

Replacement level

In order to maintain the current population size, a little more than two children would have to be born on average per parent couple (total fertility rate of 2.1 per woman). On reaching adulthood, these children would themselves have to have at least two children, thereby replacing the previous generations.

Total fertility rate

The total fertility rate states the average number of children that a woman would have in the course of her life if the circumstances of the year under observation applied from age 15 to age 49. This value has a hypothetical character since it portrays the fertility not of a concrete, but of a modelled generation of women. Its advantage is however that the level of births is measured independently of the respective age structure of the population.

Young-age dependency ratio

The young-age dependency ratio is the ratio of persons aged from 0 to 19 to 100 persons of working age (as a rule from 20 to 59 or 64).