

References

- Ghosh, S.R. and A.R. Ghosh, 1999, "East Asia in the Aftermath: Was There a Crunch?," IMF Working Paper 99/38 (Washington: International Monetary Fund).
- Guiso, Luigi, Anil K. Kashyap, Fabio Panetta, Daniele Terlizzese, 2002, "How Interest Sensitive is Investment? Very (when the data are well measured)," Working Paper, University of Chicago, (Chicago, Illinois).
- Laffont, J.-J. and R. Garcia, 1977, "Disequilibrium Econometrics for Business Loans," *Econometrica*, Vol. 45, No. 5, pp. 1187-1204.
- Pazarbaşıoğlu, Ceyla, 1997, "A Credit Crunch? Finland in the Aftermath of the Banking Crisis," *Staff Papers*, International Monetary Fund, Vol. 44, No. 3, pp. 315-327.
- "Wirtschaftslage und Finanzierung im Mittelstand," *Creditreform*, Spring 2002, (Neuss, Germany).
- Woo, David, 1999, "In Search of "Capital Crunch": Supply Factors Behind the Credit Slowdown in Japan," IMF Working Paper 99/3 (Washington: International Monetary Fund).

IV. THE FISCAL CHALLENGE OF AGING: WHAT NEEDS TO BE DONE⁶³

A. Introduction and Results

105. **Demographic aging is increasingly being recognized as the major long-term policy challenge** (Gruber, 2001 and Pfeiffer, 1999). Attempts to quantify the fiscal ramifications and possible policy responses in a comprehensive and coherent way, however, remain sparse. This chapter tries to put a price tag on all age-related public spending items and to project against this background the evolution of government finances over the next fifty years under present policies and alternative scenarios. Unsurprisingly, aging is found to put severe pressure on public finances, adding an estimated 6.7 percent of GDP to expenditure. Present consolidation efforts under the Stability Program and beyond help to mitigate the strains but would be both insufficient in the long run and difficult to implement in the nearer term unless they involve reform of entitlement and age-related spending programs.

106. **Despite several studies on the aging problem it remains difficult to get a quantitative sense of the size of the fiscal challenge ahead.** Quantifications on the part of the OECD (Dang et al., 2001), the Economic Policy Committee (2001), and the European Commission (2001) are not truly comprehensive: they consider only certain, but not all, age-related spending items and they do not integrate the analysis into a broader long-term fiscal outlook. Other studies stick to a mainly qualitative assessment, such as the final report of the Enquête Commission of Germany's lower house of parliament (2002). There appears to be no study that accounts for all spending items that are severely affected by aging, incorporates recent policy commitments to fiscal consolidation over the next couple of years, and assesses the evolution of public deficits and debt in light of the constraints imposed by the Stability and Growth Pact (SGP). A recent Bundesbank working paper comes closest (Manzke, 2002). It utilizes generation accounting techniques to calculate the so-called sustainability gap, i.e., the amount of sustained fiscal adjustment needed now for the government's intertemporal budget constraint to hold.

107. **This chapter attempts to fill the analytical gap by constructing very long-term fiscal projections to get a practical sense for the size of the problem and to evaluate policy options.** Fiscal developments in the near term are mainly driven by the government's consolidation effort; developments in the outer years are dominated by demographics. The approach dissects expenditure into age-related spending, i.e., items that are highly sensitive to demographic change, interest payments, support for the unemployed, and all other expenditure. Age-related spending comprises (i) public pensions; (ii) civil service pensions; (iii) health care expenditure; (iv) long-term care for the elderly; and (v) child-related expenditure.

⁶³ Prepared by Christoph Klingen.

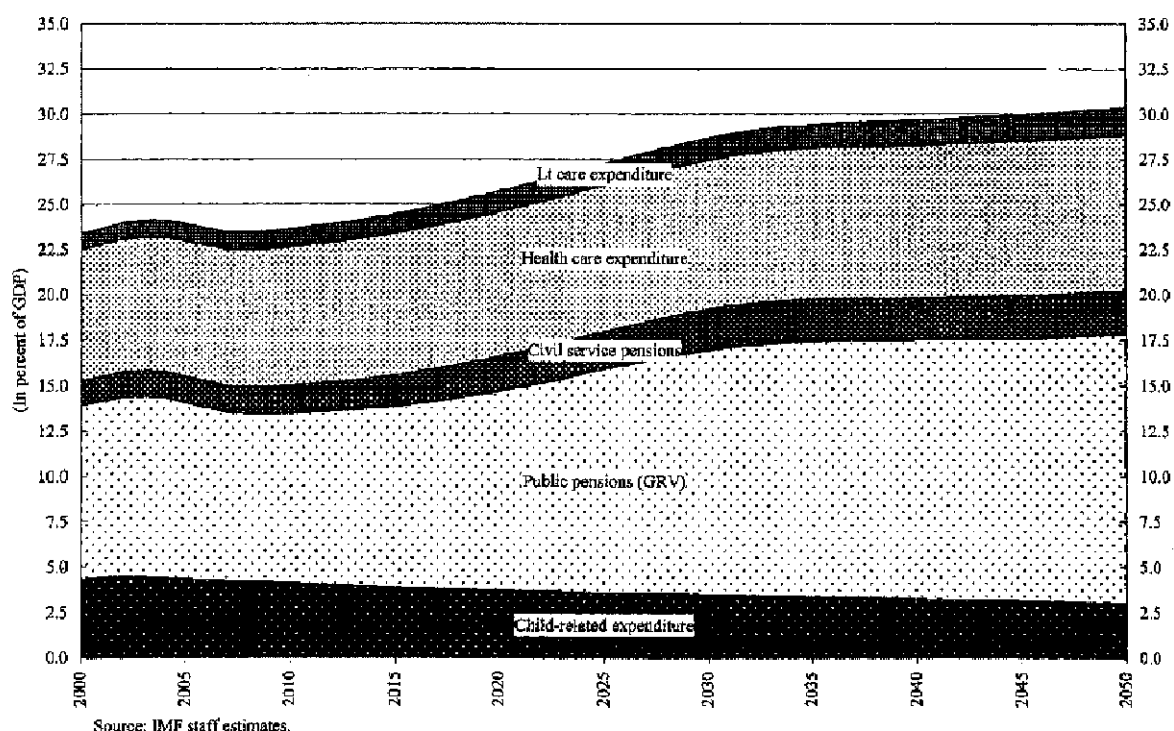
108. The long-run challenge notwithstanding, demographics are unlikely to make themselves very much felt over the next 10 to 15 years. Through 2015 the total dependency ratio, i.e., the number of the elderly and the young relative to the population at economically active age, will rise only mildly, to 63 percent compared to 61 percent in 2000.

109. Age-related spending is likely to increase relative to GDP by 6.7 percentage points over the next fifty years on account of demographic factors (Figure IV-1). Such spending accounted for 23.7 percent of GDP in 2001. Under present policies it is projected to remain roughly at this level through 2015, experience a steep increase between 2015 and 2030, and to level off at 30.4 percent of GDP in 2050. The bulk of the strain comes from the public and civil service pension systems, which add 5.1 percent of GDP and 1.0 percent of GDP, respectively, to expenditure. The projected increase in pension spending includes the effect of the recent pension reform, which provides some relief to benefit growth mainly in 2002-09. Health care and long-term care for the elderly contribute 1.3 percentage points and 0.7 percentage points, respectively. Child-related expenditure provides relief equivalent to 1.4 percent of GDP.

110. Factors other than demographic ones might further augment the increase of age-related spending. This is particularly true of health care expenditure where technological change in medicine might very well add to cost pressures. The calculations of this chapter do not account for such effects and focus more narrowly on demographically induced expenditure increases. Besides, it would be very difficult to estimate the quantitative impact of technical change, even if the direction of the effect is quite clear. In the event, the overall increase of age-related spending would likely be higher than 6.7 percent of GDP if all factors were taken into account and not just demographic ones.

111. The fiscal challenge of aging should be addressed as soon as possible even if the main demographic onslaught on public finances is not yet imminent. First, it would be prudent to enter the hot phase of demographic transition with room for budget deficits and public debt to grow rather than with the back against the wall of SGP limits. This would avoid the need for drastic corrective measures and send a timely signal to financial markets that society has recognized the problem and is dealing with it. Second, implementing substantial reform requires significant lead time. Socio-political consensus must be forged and households need to be given time to adjust to new realities. This is especially true for pension benefits, on which people base long-run economic plans and decisions. Third, the economy's potential growth should be higher in the next 10 to 15 years before demographics inevitably slows it down. Implementing fiscal consolidation in the relatively fat years rather than the relatively lean years should be less difficult.

Figure IV-1. Germany: Development of Age-Related Public Expenditure, 2000-50



112. If policy makers fail to deliver front-loaded expenditure restraint or entitlement reform, public finances could spin out of control very quickly unless social security contribution rates are raised to unacceptable levels. Public debt and deficits would escalate if the government adopted a neutral stance, i.e., if it (i) simply held constant the ratio to GDP of all expenditure other than age-related spending, unemployment support, and the interest bill; (ii) absorbed the cost of already approved tax cuts; (iii) did not reform age-related spending programs further; and (iv) refrained from tax increases (see “non-consolidation scenario” in Table IV-1 and Figures IV-2 and IV-3). Indeed, to offset the deterioration of public finances one would need to raise social security contribution rates to almost 65 percent by 2050, from 41.3 percent currently.⁶⁴ Such rates would probably be close to confiscatory given that income taxes would come on top.

113. Strong consolidation efforts over the next few years, as envisaged by the authorities’ Stability Program, create room to accommodate future demographic spending pressures, but are insufficient to safeguard public finances in the long run. In

⁶⁴ More concretely, the increase of social security contribution rates in this and subsequent scenarios is calibrated so that deficit and public debt comply with SGP limits throughout the projection period and the deficit is contained at 1½ percent of GDP in 2050, thus ensuring a reasonable safety margin to the three-percent-of-GDP deficit limit.

line with current commitments, the “stability program scenario” assumes that the general government deficit is reduced to close to balance in 2004 in structural terms – the headline deficit approaches balance only by 2007 when the output gap will have closed according to the macroframework used here. Consolidation is brought about entirely by permanent retrenchments in other expenditure,⁶⁵ which declines to 16.7 percent of GDP from 20 percent of GDP at present. While this ensures compliance with the 3-percent-of-GDP deficit ceiling through 2020, social security contribution rates would still need to be hiked to 56 percent to stabilize public finances through 2050 (see “stability program scenario” in Table IV-1 and Figures IV-2 and IV-3).

114. Even extending the fiscal effort so as to reach a surplus equivalent to 1 percent of GDP by 2009, as envisaged in the Government’s Fiscal Guidelines (Federal Ministry of Finance, 2000), would not stabilize public finances over the projection horizon. Other expenditure would then need to be compressed to around 15 percent of GDP, from 20 percent of GDP at present. This would keep the deficit ratio below 3 percent of GDP well into the 2030s, but a modest increase of social security contribution rates would still be needed to contain the deficit ratio through 2050 (see “fiscal guidelines scenario” in Table IV-1 and Figures IV-2 and 3). Indeed, it would take an augmentation of surpluses to almost 2 percent of GDP by 2012 to avoid additional social security contribution hikes altogether. This in turn would require a reduction of other expenditure to some 14 percent of GDP (see “enhanced fiscal guidelines scenario” in Table IV-1 and Figures IV-2 and 3).

115. The effectiveness of front-loaded consolidation hinges primarily on the permanency of the underlying savings measures rather than the up-front reduction of public debt. True, in the “enhanced fiscal guidelines scenario” public debt declines substantially (to 43 percent of GDP by 2012 from around 60 percent of GDP presently) and this relieves the interest bill, which falls to 2.4 percent of GDP from 3.2 percent of GDP in 2001. But such interest savings are a drop in the bucket compared to the rise of age-related spending by 6.7 percent of GDP. Moreover, interest savings are only partly available for accommodating other spending – were they spent in full, debt would build up again and interest savings would wither away. The “transitory consolidation scenario,” illustrates that a strategy that targets surpluses with less than fully sustainable savings measures can provide only false comfort. As the “enhanced guidelines scenario” it achieves a budget surplus of 1.9 percent of GDP by 2012 through curtailment of other expenditure to 14.3 percent of GDP. Thereafter, however, savings partly unravel and other expenditure creeps back to 17.2 percent of GDP. Public finances become unsustainable and it would take a hike of social

⁶⁵ The government has yet to decide which expenditure programs to scale back under the Stability Program. However, retrenchments in the area of age-related spending seem not be on the agenda, with the possible exception of health care. But even there reform efforts are primarily about avoiding a further escalation of the expenditure ratio rather than unearthing a contribution to fiscal consolidation under the Stability Program.

security contribution rates to 57 percent to rein in the deficit (see “transitory consolidation scenario” in Table IV-1 and Figures IV-2 and IV-3).

Table IV-1. Germany: General Government Operations, 2001-50

Non-consolidation Scenario					
	2001	2005	2015	2030	2050
(In percent of GDP)					
Revenue	46.7	45.7	43.8	45.0	45.1
Expenditure	48.3	48.9	50.9	61.7	80.9
Age related	23.7	23.9	24.5	28.7	30.4
Unemployment support 1/	1.4	1.4	1.2	1.2	1.2
Interest	3.2	3.3	5.0	11.5	29.1
Other	20.0	20.4	20.3	20.3	20.3
Balance	-1.7	-3.2	-7.1	-16.7	-35.8
Public debt	59.5	62.3	94.9	220.5	554.0

Sources: German authorities; IMF staff estimates.

1/ Unemployment support, unemployment assistance, estimated other payments to the unemployed, all excluding social security contributions.

Stability Program Scenario					
	2001	2005	2015	2030	2050
(In percent of GDP)					
Revenue	45.5	44.2	43.8	45.0	45.1
Expenditure	48.3	45.8	45.0	50.8	59.1
Age related	23.7	23.9	24.5	28.7	30.4
Unemployment support 1/	1.4	1.4	1.2	1.2	1.2
Interest	3.2	3.2	2.8	4.3	10.9
Other	20.0	17.3	16.7	16.7	16.7
Balance	-2.8	-1.6	-1.2	-5.8	-14.0
Public debt	59.5	59.9	51.4	81.5	208.4

Sources: German authorities; IMF staff estimates.

1/ Unemployment support, unemployment assistance, estimated other payments to the unemployed, all excluding social security contributions.

Fiscal Guidelines Scenario					
	2001	2005	2015	2030	2050
(In percent of GDP)					
Revenue	45.5	44.2	43.8	45.0	45.1
Expenditure	48.3	45.8	42.9	46.8	51.0
Age related	23.7	23.9	24.5	28.7	30.4
Unemployment support 1/	1.4	1.4	1.2	1.2	1.2
Interest	3.2	3.2	2.1	1.7	4.3
Other	20.0	17.3	15.2	15.2	15.2
Balance	-2.8	-1.6	0.9	-1.7	-5.9
Public debt	59.5	59.9	38.3	32.8	81.6

Sources: German authorities; IMF staff estimates.

1/ Unemployment support, unemployment assistance, estimated other payments to the unemployed, all excluding social security contributions.

Enhanced Fiscal Guidelines Scenario					
	2001	2005	2015	2030	2050
(In percent of GDP)					
Revenue	45.5	44.3	43.8	45.0	45.1
Expenditure	48.3	45.8	41.8	44.6	46.6
Age related	23.7	23.9	24.5	28.7	30.4
Unemployment support 1/	1.4	1.4	1.2	1.2	1.2
Interest	3.2	3.2	1.9	0.5	0.8
Other	20.0	17.3	14.3	14.3	14.3
Balance	-2.8	-1.5	2.0	0.4	-1.5
Public debt	59.5	59.8	33.9	8.4	14.7

Sources: German authorities; IMF staff estimates.

1/ Unemployment support, unemployment assistance, estimated other payments to the unemployed, all excluding social security contributions.

Transitory Consolidation Scenario					
	2001	2005	2015	2030	2050
(In percent of GDP)					
Revenue	45.5	44.2	43.8	45.0	45.1
Expenditure	48.3	45.8	45.0	51.0	59.9
Age related	23.7	23.9	24.5	28.7	30.4
Unemployment support 1/	1.4	1.4	1.2	1.2	1.2
Interest	3.2	3.2	2.1	3.9	11.1
Other	20.0	17.3	17.2	17.2	17.2
Balance	-2.8	-1.6	-1.2	-6.0	-14.8
Public debt	59.5	59.9	40.3	75.0	212.6

Sources: German authorities; IMF staff estimates.

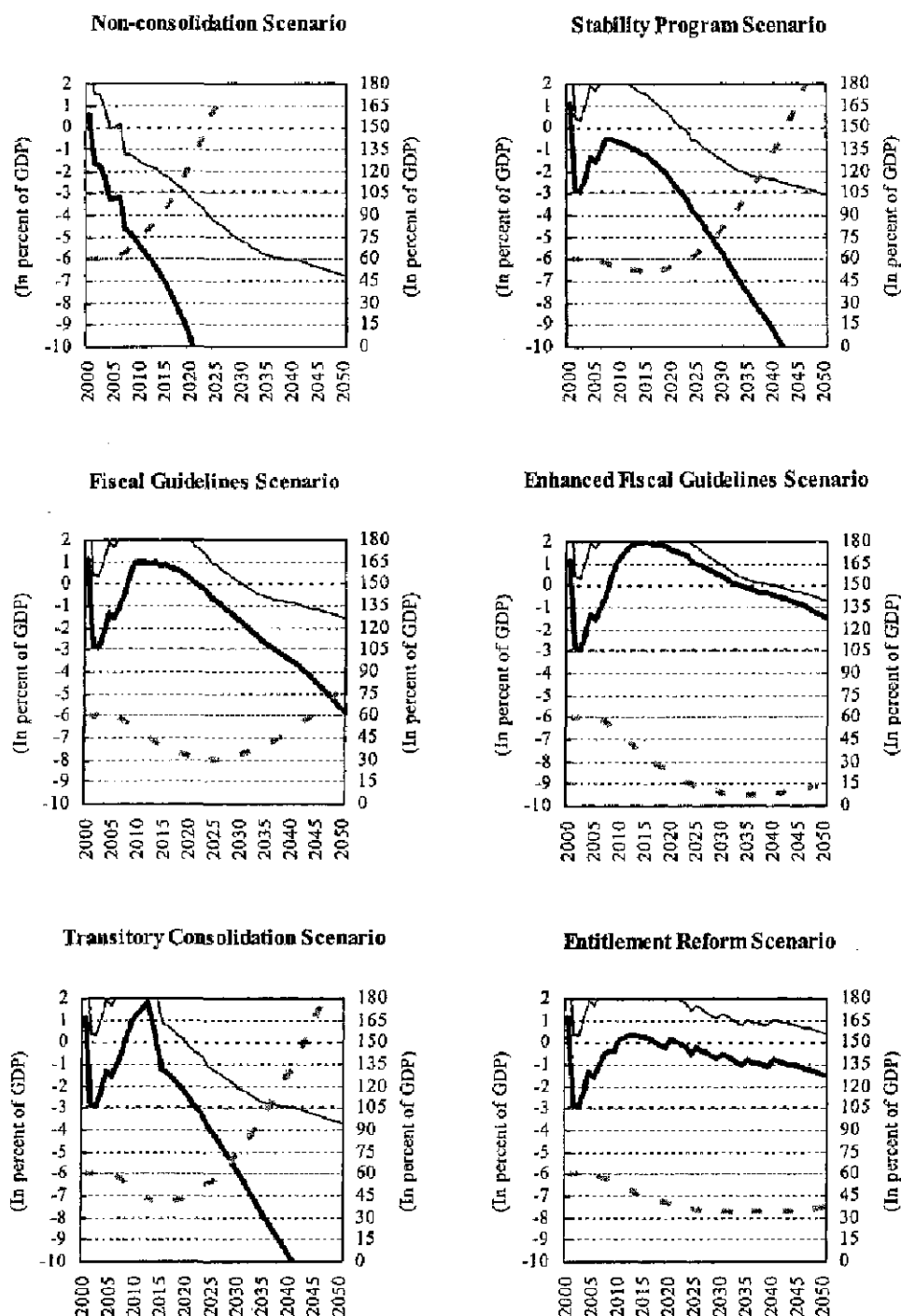
1/ Unemployment support, unemployment assistance, estimated other payments to the unemployed, all excluding social security contributions.

Entitlement Reform Scenario					
	2001	2005	2015	2030	2050
(In percent of GDP)					
Revenue	45.5	44.2	43.8	45.0	45.1
Expenditure	48.3	45.8	43.5	45.5	46.6
Age related	23.7	23.1	23.1	25.7	26.7
Unemployment support 1/	1.4	0.9	0.8	0.8	0.8
Interest	3.2	3.2	2.4	1.8	2.0
Other	20.0	18.5	17.2	17.2	17.2
Balance	-2.8	-1.6	0.3	-0.5	-1.5
Public debt	59.5	59.9	44.0	34.0	36.7

Sources: German authorities; IMF staff estimates.

1/ Unemployment support, unemployment assistance, estimated other payments to the unemployed, all excluding social security contributions.

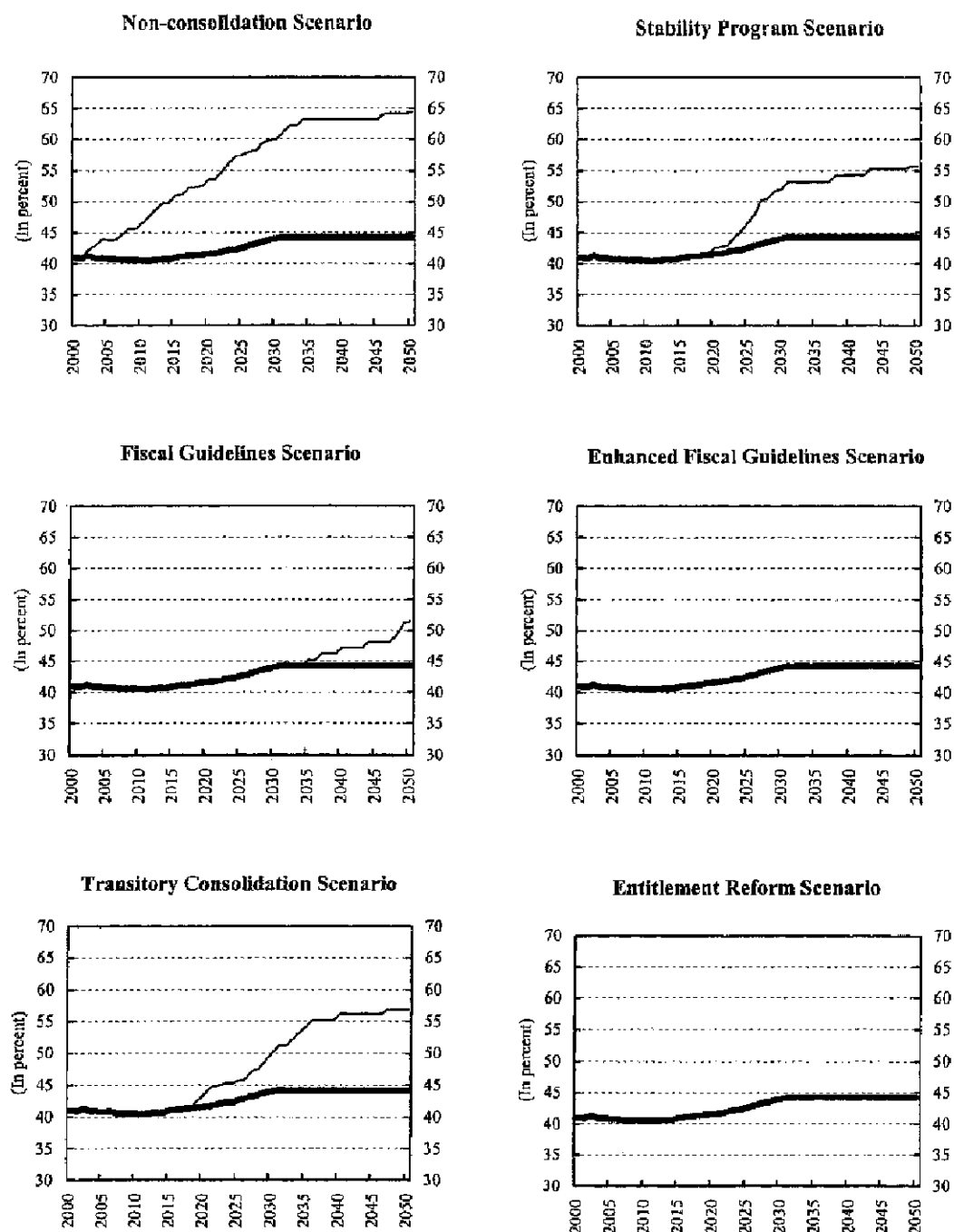
Figure VI-2. Germany: Evolution of Fiscal Deficits and Public Debt, 2000-50



bold black line – fiscal balance (left scale)
 black line – primary fiscal balance (left scale)
 dashed grey line – public debt (right scale)

Source: IMF staff estimates.

Figure IV-3. Germany: Evolution of Baseline and Required Social Security Contribution Rates, 2000-50 1/



bold line – baseline social security contribution rate
fine line – required social security contribution rate

Source: IMF staff estimates.

1/ Rate required for deficit at 1.5 percent of GDP in 2050 and debt below 60 percent of GDP.

116. The critical importance of permanent savings measures underscores the need for entitlement reform. It is unlikely that other expenditure, i.e., spending other than age-related expenditure, unemployment support and the interest bill, can alone shoulder the entire adjustment need. A lasting reduction of the spending ratio by close to 30 percent, as would be required under the “enhanced guidelines scenario,” appears out of reach. Even the retrenchment required in the “stability program scenario” is a formidable challenge. Quantitatively it corresponds to eliminating all public investment and the entire defense budget.

117. Entitlement reform combined with more modest cutbacks in other expenditure thus offers the best hope for complying with Stability Program commitments, ensuring that savings measures are permanent, and managing the long-term fiscal pressures from demographic aging. The “entitlement reform scenario” (see Table IV-1 and Figures IV-2 and IV-3) involves a more reasonable permanent reduction of other expenditure to 17.2 percent of GDP from 20 percent of GDP presently. The following entitlement reforms provide the core of the consolidation effort and ensure sustainable public finances through 2050:

- a reduction of public pension benefits by 5 percent in 2010 and another 5 percent in 2020. This would generate savings of up to 1.7 percent of GDP per year if matched by a commensurate cut for retired public sector employees. It would leave the 2050 replacement ratio at 60 percent compared to 66.6 under current arrangements. The reduction could either take the form of a proportional cut for all pensioners or a differentiated cut, with deeper reductions for pensioners without children and milder reductions for pensioners who have shouldered the private costs of raising children. The differentiated cut would emphasize intragenerational equity and ability-to-pay considerations thus going beyond the traditional intergenerational considerations. Significant reductions would need to be announced well ahead of time to give households time to build up compensating private savings. But it is important to note that, given productivity growth in the economy, a cut in the replacement ratio would not require cuts in real pension benefits. To the contrary, even with a 10 percent cut in the replacement ratio, real pension benefits in 2050 would be about twice as high as they are today;
- an increase of private households’ share in health care financing to 20 percent, from around 10 percent presently, as of 2003. This would generate savings of up to 0.8 percent of GDP. Budgetary savings could be larger if higher patient co-payments reduced health care demand;
- reform of financial support for the unemployed, so as to reduce average benefit levels by a cumulative 30 percent over the next three years. It would generate direct savings of 0.4 percent of GDP. Cuts could be across the board, take the form of limits on duration of support, or be built into a merger of unemployment and social assistance. Total savings could be significantly larger once the formerly unemployed take up work. If the natural rate of unemployment fell by 1 percentage point, savings would rise to 0.6 percent of GDP, but only over time;

- an increase of the statutory retirement age for those covered by the public and civil service pension schemes by a total of two years (½ year in 2025, 2030, 2035, and 2040). This would generate long-run savings of 1 percent of GDP. This quantification assumes an unchanged pension formula and, as a result of expanding employment histories, replacement ratios would actually increase. Simultaneous modification of the pension formula so as to keep replacement ratios constant, would augment savings to 1.7 percent of GDP. Note that retirement periods would still lengthen as the four-year rise of life expectancy outstrips the two-year rise of the retirement age;
- a reduction of the time young people spend in education before joining the labor force by one year. It would generate long-run savings of 0.2 percent of GDP, assuming the demand for labor rose commensurately. No savings would be available on impact, though, as it would take time before the first cohort under the new education regime graduated. Note that the baseline labor force participation rates have built in a further lengthening of time spent in education so that this measure would not mean an actual shortening of current education periods.

118. **The window of opportunity to prepare for the strains of demographic aging is closing rapidly.** The longer that consolidation is postponed, or the more it relies on unsustainable deficit reduction methods, the more drastic measures will need to be in the longer term to restore healthy public finances. Moreover, it would be very difficult to engineer sufficient front-loaded adjustment without reforming entitlement programs. And, in the long run it would be next to impossible to eschew entitlement reform if public finances are to remain sound.

119. The remainder of this chapter discusses the demographic and macroeconomic assumptions underpinning the projections. It describes in detail the likely evolution of each age-related spending item and how the quantifications here differ from those provided by others. Detailed tables are provided in the Appendix.

B. Assumptions

120. **Expenditure projections for pensions, health, and long-term care funds build on common demographic and macroeconomic assumptions, which also underlie all other expenditure and revenue forecasts.** Demographic and macroeconomic projections are integrated. Aging thus affects the fiscal accounts not only directly through increased spending on pensions and health care for the elderly but also indirectly through the effect of a shrinking workforce on economic activity. Projections through 2007 are consistent with the IMF staff's Fall 2002 World Economic Outlook.

Demographic developments

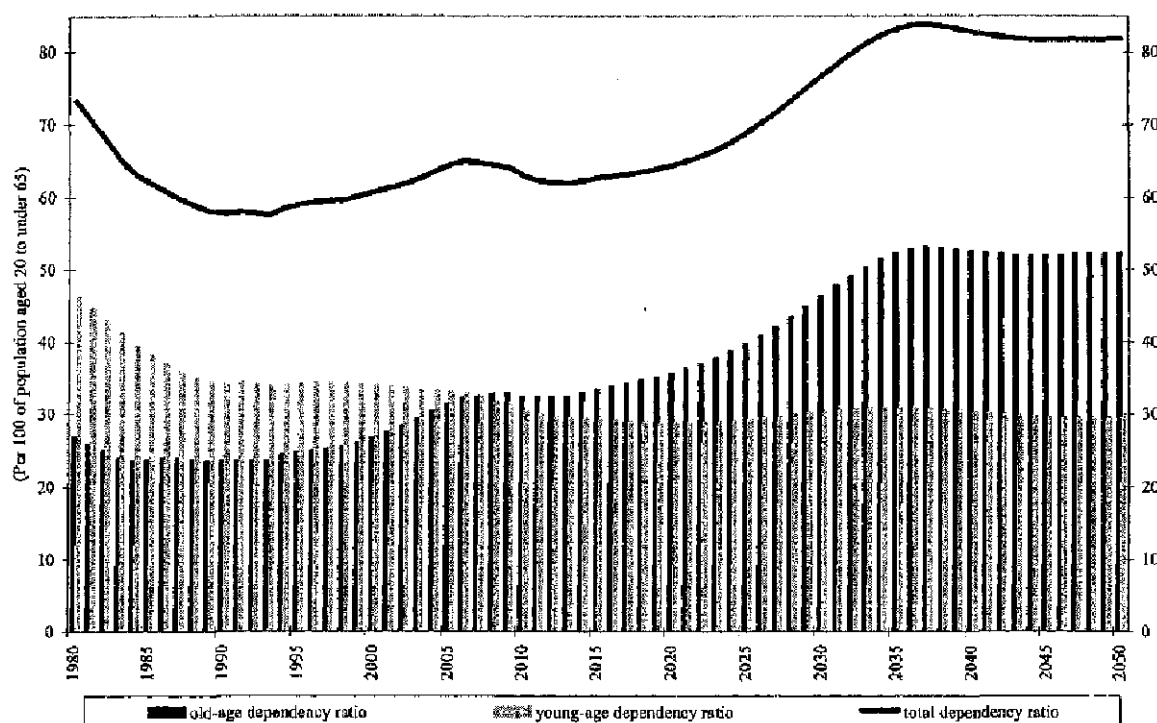
121. **Population projections follow the 9th coordinated population forecast of the German Federal Statistical Office.** The central scenario predicts the German population to shrink to 70 million by 2050, from 82 million in 2000, assuming immigration of some

200,000 persons per year. It uses a crude birth rate of 1,400 per 1,000 women, roughly the level now prevailing in western Germany and significantly more than in eastern Germany (800). Life expectancy at birth is predicted to rise by roughly four years until 2050. It will then be 78.1 years for men and 84.5 years for women.

122. **Old-age dependency increases strongly, as the effects of rising longevity, low fertility, and retiring baby boomers compound.** While there are currently about 28 elderly (persons aged 65 and above) for every 100 persons aged 20 to 64, there will be an estimated 52 of them in 2050. Young-age dependency is set to drop. Persons under 20 will decline from 34 currently to 30 for every 100 persons aged 20 to 64.

123. **Despite some relief from young-age dependency, total dependency is projected to rise relentlessly.** The bulk of the increase will occur between 2010 and 2030. At the peak in 2037, there will be 84 persons at economically inactive age for every 100 persons at economically active age, compared to 61 currently (Figure IV-4). Note that total dependency was on the decline through 1993, a period that in the development-country literature is referred to as a demographic window of opportunity (Merrick, 2002).

Figure IV-4. Germany: Population Dependency Ratios, 1980-2050



124. **Population projections of the Federal Statistical Office are in between those prepared by other institutions.** On the back of more pessimistic fertility assumptions, the World Bank projects that the population could shrink to 66 million in 2050. Eurostat on the other hand sees the population in 2050 at 76 million in its central scenario. As fertility rates

and life expectancy change only slowly over time and affect dependency ratios only with lags of up to several decades, the key uncertainty attaches to immigration assumptions. Immigration of 200,000 persons per year is slightly above Germany's historical average, although yearly numbers fluctuated strongly from as low as -200,000 to as high as 800,000 persons.

Macroeconomic environment

125. **Macroeconomic developments over the next five years are assumed to be characterized by economic recovery.** After a still weak 2002 performance, growth is projected to accelerate, lifting the 2002-07 average above 2 percent annually. At the same time, unemployment would gradually recede from just over 8 percent on an EU-standardized measure to less than 7 percent. Total factor productivity growth would experience a cyclical boost (Table IV-2).

Table IV-2. Germany: Summary of Macroeconomic Developments, 2001-07

	2001	2007	average annual change
			(In percent)
Nominal GDP (billions of Euros)	2,071	2,546	3.5
Real GDP (billions of Euros)	1,981	2,248	2.1
GDP deflator (1995 =100)	105	113	1.3
Total factor productivity	...	...	1.2
Employment (millions)	38,917	39,653	0.3
Unemployment rate (percent) 1/	8	7	...
Population (millions)	82,220	81,949	-0.1
Labor force participation (percent) 2/	84	87	...
Labor productivity	...	...	1.8
Compensation per employee	...	...	2.5

Source: IMF staff projections.

1/ On EU-standardized measure.

2/ Employment divided by population aged 20 to under 65.

126. **For the period after 2007, cyclical effects are assumed to have run their course and demographic effects make their mark.** As of 2010 employment starts to shrink thus turning into a drag on growth. The capital stock is assumed to continue to grow at an annual rate of 2½ percent, slightly faster than its historical pace. Total factor productivity growth is pegged at 1 percent, somewhat lower than Germany's long-run performance, but significantly better than in the recent past. As a result of these assumptions, real GDP growth decelerates markedly after 2010 to about 1¼ percent on average. Labor productivity growth hovers around 2 percent throughout the projection period.

127. **The labor share of income is assumed to remain constant from 2007, after a slight reduction during 2001-2007.** While this appears an innocuous enough assumption, it has important implications for the projected increase of age-related spending: if the labor share of income remains constant and employment falls, wage growth outpaces GDP growth and so does pension benefit growth because pensions are indexed to wages. Consequently, pension expenditure expressed as a percent of GDP goes up. Nonetheless, it appears reasonable to have wage growth accelerate as labor becomes scarcer. Moreover, as far as the overall fiscal position is concerned, assuming a shrinking labor share of income instead

would not necessarily be helpful: true it would relieve public pension expenditure, but at the same time it would erode public revenues as long as labor is taxed more heavily than capital. Carey and Robeson (2002) provide evidence that average effective tax rates on capital are indeed lower than those on labor.

128. Given population projections, labor force participation and unemployment drive the evolution of employment. By international standards, labor force participation rates in Germany are already high, around 83 percent in 2000, so that room for further increases is probably limited. The calculations here utilize age-group and sex-specific labor force participation rate series provided by the ifo-Institute. They imply a further increase of overall participation to 86 percent in 2035; thereafter the changing age profile of the population reduces the aggregate participation rate back to 84 percent by 2050. Changes in age-group specific participation rates have little impact on overall male labor force participation. Higher rates for older men are offset by lower rates for younger men, reflecting the trend to higher education attainments (Table IV-3). For women, shifts in age-group specific participation rates increase the female labor force by almost 10 percent. Participation rates rise for all age-groups, except for younger women, again reflecting rising educational attainment levels.

Table IV-3. Germany: Labor Force Participation Rates

Age group	Participation Rates (in percent)					
	Male			Female		
	2000	2050	Change	2000	2050	Change
15-20	35.0	30.0	-5.0	28.4	23.0	-5.4
20-25	76.3	71.3	-5.0	67.6	63.6	-4.0
25-30	87.8	86.3	-1.5	74.3	76.8	2.5
30-35	95.8	95.9	0.1	74.6	80.3	5.7
35-40	96.8	97.2	0.4	75.7	82.7	7.0
40-45	96.3	96.8	0.5	77.9	86.7	8.8
45-50	95.0	95.4	0.4	77.1	85.4	8.3
50-55	91.5	91.3	-0.2	69.2	85.1	15.9
55-60	77.9	84.1	6.2	53.5	65.2	11.7
60-65	33.2	39.6	6.4	14.9	16.9	2.0
Total 1/	80.4	80.7	0.3	62.3	67.8	5.6

Sources: Ifo-Institute and IMF staff projections.

1/ Using year 2000 age-group weights.

129. Although results depend on the underlying set of macroeconomic assumptions, they appear relatively robust. For example, if the exercise of this chapter was instead based on the labor force participation rates projected by the IAB, a research institute attached to the Federal Labor Office, the deterioration of the primary fiscal balance would be a mere 0.1 percent of GDP smaller over the entire fifty year projection horizon. Likewise, a brisker pace of total factor productivity growth or capital accumulation would do little to the fiscal strains from demographic aging. It would simply increase most age-related spending by the same factor as GDP, reflecting the indexing of pension benefits to wages and an income

elasticity of health care demand pegged at unity. Nonetheless, it would certainly make the necessary fiscal consolidation easier to bear.

C. The Outlook in Detail

130. The main demographically induced fiscal pressures will emerge in the areas of the public pension fund, civil service pensions, health care, and long-term care for the elderly. As opposed to many other studies, this section focuses on the expenditure side on these sub-systems, and only on that part that represents expenditure of the consolidated general government. This approach rules out spurious solutions, like keeping the public pension fund solvent through growing transfers from the federal budget, which merely shifts the fiscal strain between levels of government without reducing it. It also allows adding up expenditure of the sub-systems without double-counting because financial flows between them, like the health care contributions paid by the public pension fund, are ignored from the outset.

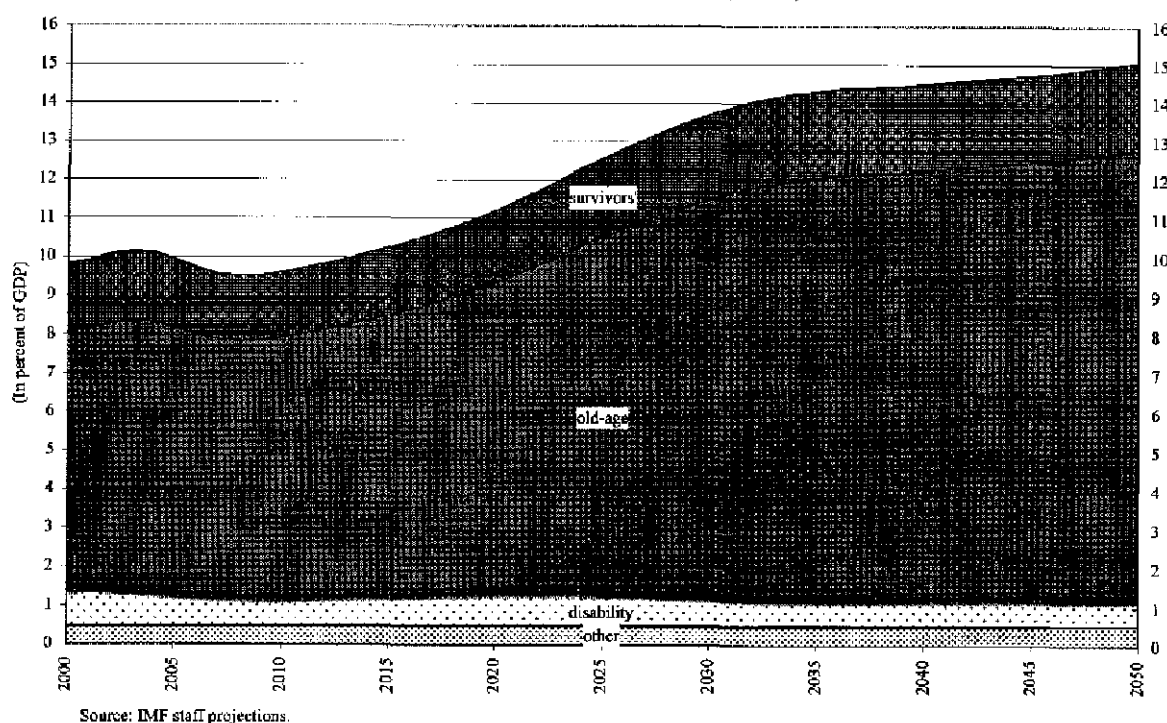
Public pensions

131. The public pension fund is the sub-system most severely affected by aging (Figure IV-5). Its expenditure, excluding the health care contributions on behalf on pensioners, is projected to increase relative to GDP by 5.1 percentage points, from 9.7 percent in 2001 to 14.8 percent in 2050. A slight decline over the next few years, reflecting the recently reformed formula for old-age pension adjustment, gives way to a steep increase during the period 2010-30 when the population ages rapidly. Expenditure keeps rising somewhat thereafter as an increasingly large share of newly retiring cohorts becomes entitled to benefits mainly as a result of rising female employment. As old-age, survivor, and disability pensions are subject to quite different dynamics they are projected separately.

132. Old-age pensions account for the bulk of the expenditure increase, 4.8 percent of GDP. The German pension formula that came into force with the 2001 Pension Reform Act ties pension benefits to the evolution of modified gross wages. Modified gross wages are gross wages minus contribution rates to the first pillar of the pension system and the cap on subsidized contribution rates to the second-pillar. In addition, as of 2011 further increases of contribution rates reduce pensions slightly more than proportionately.⁶⁶ In sum, pegging to modified gross wages reduces pension expenditure by about 9 percent compared to an outright link to gross wages, assuming the officially projected trajectory of contribution rates. The growing number of elderly increases pension expenditure by about a third. Rising pension entitlements in the wake of expanding female employment add another 15 percent.

⁶⁶ For more details see Sachverständigenrat (2001).

Figure IV-5. Germany: Public Pension Fund Expenditure, 2000-2050
(Excl. health care contributions and rehabilitation expenditure)



133. As a result of a recent overhaul of disability pensions, expenditure in this category is projected to fall by 0.3 percent of GDP until 2050. Disability pensions are not subject to much demographic pressure as they are paid exclusively to persons who have not yet reached the statutory retirement age. Developments are therefore dominated by reform efforts since 1996, which reduced the generosity of support, some recent back tracking notwithstanding. The quantifications of the associated savings are taken from a study prepared by the ifo-Institute for the Ministry of Finance (Werding and Blau, 2001).

134. Survivors' pension expenditure grows some 25 percent less than outlays for old-age pensions and adds 0.6 percent of GDP over the next fifty years. In principle survivors' pensions are subject to the same demographic pressures as old-age pensions. But expanding female employment means that widows will increasingly have pensions of their own, which reduces their entitlements under the survivors' pension system. Other recent reforms such as the lowering of the replacement ratio of survivors with dependent children and the introduction of pension rights for time spent bringing up children are not taken into account here. Quantitatively they should be of minor importance and they are at least partially offsetting.

135. Pension expenditure projections are in the ballpark of estimates by others. The projected increase of 5.3 percent of GDP compares to a somewhat higher estimate by Rother et al. (2002) and 4.3 percent by the ifo-Institute (Werding and Blau, 2001). The ifo-Institute projections are also used in the work of the Economic Policy Committee (2001) and the work of the OECD (Dang, Antolin, and Oxley, 2001). Without publishing projections for

individual countries, the European Commission (2001) reckons that public pension expenditure in the European Union would increase relative to GDP by 7 percentage points if no increase in labor force participation rates occurred. IMF (2000) argued that the pension reform proposal of 2000 would probably not go far enough to ensure contribution rates below the government's target level of 22 percent by 2030.

Civil service pensions

136. Expenditure for pensions of government employees are projected to increase relative to GDP by one percentage point, from 1.4 percent currently to 2.4 percent in 2050. As with other pensions, the bulk of the increase takes place between 2010 and 2030. The 2001 civil service pension reform (Zypries, 2002) scales back the generosity of the benefit formula beginning in 2003 and seeks to match the retrenchments in the public pension system. Nonetheless, the expenditure ratio keeps rising all through the implementation phase as the saving effect is swamped by the rapidly growing number of retired civil servants. Retirement benefits for civil servants are paid from territorial governments' budgets and account for most of the expenditure considered here.

137. Supplementary retirement systems for government employees without civil service status also need to be considered (VBL and AKA). These schemes are mostly pay-as-you-go, although some modest funded elements are also present. Strictly speaking they are classified outside the general government, as they are entities of private law rather than public law. However, the government as the employer is currently responsible for around 85 percent of the contributions - this fraction of supplementary pension expenditure is thus considered public age-related spending here. Benefits under the supplementary systems are laid down in collective bargaining agreements between the government and government employees' unions. In light of already emerging strains, the supplementary systems were fundamentally overhauled in the context of the 2001 wage round (Stephan, 2002a and Stephan, 2002b).

138. The calculations at hand build on the official projections regarding the number of future beneficiaries, take into account the recent reforms of benefit formulae, and assume that benefits will otherwise be adjusted periodically to reflect wage growth. The Ministry of the Interior (Bundesministerium des Innern, 2001) recently published a comprehensive report on likely future development of beneficiaries and expenditure under the civil service pension funds, including the supplementary schemes. The number of beneficiaries will peak around 2025, when the wave of teachers hired in the 1970s will have retired, and decline slightly thereafter. Adjustments to the civil service pension formula reduces benefit growth by an estimated cumulative 5.6 percentage points during 2000-17. The overhaul of the supplementary pension systems is likely to yield savings of some 20 percent once all transitory arrangements are phased out.

139. This chapter projects more of a fiscal burden from civil service pensions than other studies. The Ministry of the Interior projects an increase relative to GDP by 0.7 percentage points between 2000 and the peak in 2025, and 0.6 percent between 2000 and

2040. The difference is likely due to a more modest benefit adjustment in the Ministry's calculations, which links to civil service wages assumed to grow less than 2½ percent annually. In contrast, the calculations at hand assume civil service wages to grow in lockstep with wages in the private sector, around 3¼ percent a year. Indeed, an annual wage growth differential of over ¾ percent would reduce relative civil service wages by some 30 percent over the projection period. Werding and Blau (2001) put the expenditure increase between 2000 and 2050 at 0.7 percent of GDP. But they exclude the supplementary schemes and their calculations predate the 2001 civil service pension reform. The Sachverständigenrat (2001) also draws attention to the future fiscal burden associated with civil service pension obligations.

Health care expenditure

140. Public health care expenditure, excluding outlays for long-term care for the elderly, are projected to increase relative to GDP by 1.3 percentage points, to 8.6 percent in 2050 from 7.3 percent in 2001. The increase takes place very gradually throughout the entire projection period. Germany's sickness funds, which are part of the social-security system, account for most of the spending, but direct budgetary outlays for hospital investment, prevention, and health care of civil servants are also important. Moreover, some health care expenditure is borne by the pension fund for measures to rehabilitate the disabled. The projections cut across all these categories.

141. The impact of population aging on health care expenditure has been debated extensively in health economics. While the age profile of per capita health care expenditure rises steeply with age (Table IV-4) in all countries, cross-country and panel-data regressions usually fail to find explanatory power in age-related variables (Gerdtham and Jönsson, 2000). Microstudies establish that health care expenditure tends to be highly skewed toward the final years of patients' lives (Zweifel et al., 1999). This helped forge the consensus that a good part of health care expenditure is related primarily to "closeness to death" rather than calendar age. This is good news for advanced economies where aging is driven to a large extent by rising life expectancy. In such circumstances deaths per thousand of population rise more slowly than the population share of those aged 65 and above (Figure IV-6).

142. The approach followed here tries to adequately capture the impact of the shifting demographic composition by accounting for the closeness-to-death effect as well as the calendar-age effect. In a first step, it regresses age-group specific survival probabilities, calendar age, and a dummy variable for the first year of life on age-group specific health care expenditure. The following specification explains over 96 percent of the variation of age-group specific health care expenditure:

$$\text{Log} (HCE_A) = 1.062986 + 0.2279 * A + 1.632731 * (1 - SP_A) + 1.333789 * FYL,$$

where $\text{Log} (HCE_A)$ is the logarithm of health care expenditure at age A ;

A is age;

SP_A is the one-year survival probability at age A ;

and FYL is a dummy variable which is set equal to 1 for the first-year-of-life age group and takes on the value of zero for all other age groups.⁶⁷

In a second step, the above parameters are used to project forward health care expenditure using the projected average age of the population and population-wide survival and birth rates. According to this approach, the demographic composition effects raises health care costs by 18.5 percent over the next 50 years. The increase would have been significantly larger, 28 percent, if health care expenditure had simply been projected by applying the existing age profile of health care expenditure to the future age composition of the population.

Table IV-4. Selected OECD Countries: Health Expenditure By Age Group 1/

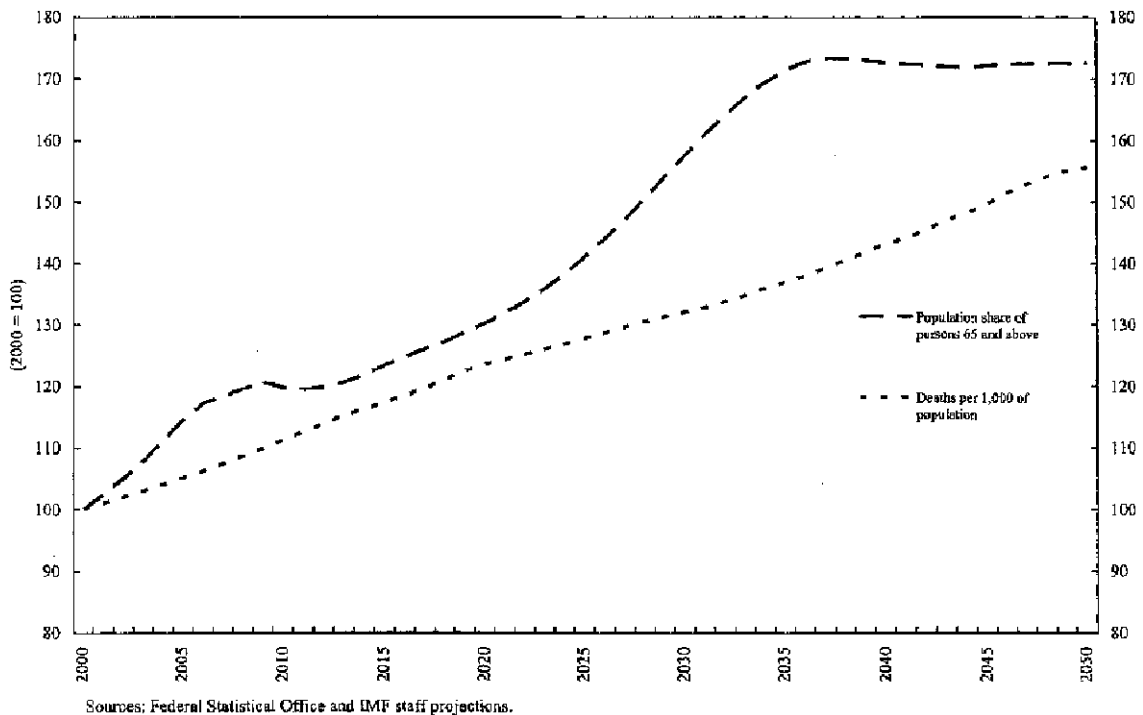
	pop. 65+/pop 0-64	pop. 75+/pop 0-64
Canada	5.6	8.1
Japan	4.9	5.7
United States	4.6	6.4
New Zealand	4.3	6.4
Australia	4.1	5.9
Finland	4.0	5.5
Switzerland	4.0	5.7
United Kingdom	3.4	4.6
France	3.0	3.7
Czech Republic	2.8	3.0
Sweden	2.8	3.4
Germany	2.7	3.2
Korea	2.4	...
Portugal	1.7	...
Average	3.6	5.1

Source: OECD Health Data 2002.

1/ Per capita health care expenditure for population aged 65, or 75, and above as a multiple of per capita health expenditure for population aged less than 65. Latest available data.

⁶⁷ Data on age-group specific health care expenditure refer to expenditure by sickness funds and is compiled by the Federal Insurance Office (Bundesversicherungsamt) for purposes of risk equalization between competing sickness funds (Risikostrukturausgleich). Survival probabilities calculate from population statistics of the Federal Statistical Office on deaths by age and age-group sizes.

Figure IV-6. Germany: Demographic Indicators, 2000-50



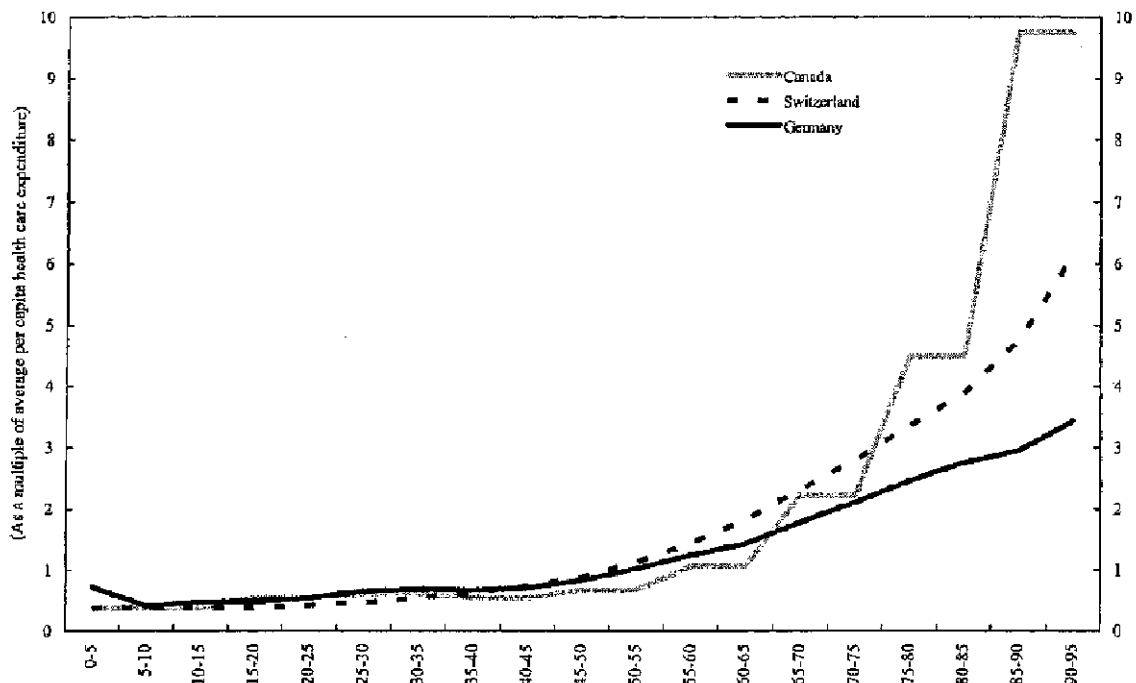
143. **There are several factors that might give rise to an underestimation of future health expenditure costs, but they are all unrelated to population aging.** Accordingly, other studies typically project a larger increase of health care expenditure. The Economic Policy Committee reckons that health care expenditure will rise between 1.4 and 2.1 percent of GDP through 2050. The final report of the Enquête Commission of Germany's lower house of parliament (2002) provides a comprehensive list of papers that project health care expenditure for Germany. They exhibit an enormous variety of results, with the required increase of the contribution rate ranging from as low as 2 percentage points to as high as 20 percentage points, from 14 percent currently. Cost-pushing factors that are not taken into account here include:

- **technological progress in medicine.** While advances in medical technology could in principle be cost reducing as well as cost increasing, in practice they seemed to have been mostly of the latter variety in recent decades. Few would doubt that the wider diffusion of technological advanced invasive treatments has contributed to rising health care costs. In particular, it has been argued that technological progress is responsible for the steepening of the age profile of health care expenditure that has been observed in Germany (Ulrich, 2000);
- **an income elasticity of health care demand greater than one.** The income elasticity of health care demand is another much researched topic in health economics. In cross country data, GDP is generally found to be the single most

important determinant of the health care expenditure ratio. This observation led early research to conclude that the income elasticity exceeded one and that health care was therefore a "luxury good" (Newhouse, 1977). More sophisticated subsequent analysis revealed, however, that previous estimation techniques suffered from omitted variable bias, and that income elasticity was around one when properly estimated (Gerdtham and Jönsson, 1992). But a few recent studies continue to put income elasticity significantly above one (Roberts, 1998). Had the calculations here used an income elasticity of 1.1 instead of one, the increase of health care expenditure over the next fifty years would have been much higher (2.7 percent of GDP rather than 1.3 percent of GDP);

- **a steepening of the age profile of health care expenditure.** Germany's profile appears significantly flatter than in comparable other countries. For example, countries such as Canada and Switzerland both allocate a much larger portion of their health spending toward the elderly (Figure IV-7). If Germany had the spending age profile of these countries, the projected increase of health care expenditure due to aging would be twice as great. It is not quite clear why Germany's age profile looks so relatively benign. It cannot be ruled out that Germany's profile is simply a data fallacy, e.g., other countries might include expenditure for long-term care while Germany is not. But it is also possible that Germany's profile is bound to adjust to the one of most other countries over time.

Figure IV-7. Germany, Canada, Switzerland: Per Capita Health Expenditure by Age Group



Sources: Bundesversicherungsamt, Minister of Public Works and Government Services Canada, Bundesamt für Sozialversicherung Schweiz.

Long-term care insurance

144. Public expenditure on long-term care for the elderly is projected to increase relative to GDP by 0.7 percentage points, from 0.9 percent now to 1.5 percent in 2050. The increase takes place gradually throughout the projection period. Long-term care insurance, which is part of the German social security system, accounts for most of the spending. Some additional spending is footed through social assistance, primarily for the needy in nursing homes.

145. The main factors considered in the projections are the morbidity of the population and the availability of informal care provided by family members. Morbidity is assumed to depend on "closeness to death" rather than calendar age. In other words, increasing longevity is taken to mean that people will be able to enjoy more disability-free years in the future, rather than merely more years in need of care.

146. The pool of potential informal caregivers is bound to shrink. Currently almost 60 percent of the care supported by the long-term care insurance is provided by family members and friends. A large part of these caregivers are children or children-in-law of those in need of care. Declining fertility as well as rising labor force participation of women will limit the scope of such arrangements in the future. Consistent with population and labor force participation projections it is estimated that the share of informal care will decline to 37 percent from 57 percent at present. Informal as well as formal care is covered by the long-term care insurance but formal care is more expensive. In line with the fee schedule of the long-term care insurance it is assumed here that formal care is twice as costly as informal care for cases with the same degree of disability. In the event, the shift toward more formal care raises long-term care expenditure by close to 14 percent over the projection horizon.

147. The income elasticity of demand for long-term care is also set to unity. Although not much research has been done on this topic, it is appealing to use the same elasticity as in the case of health care. Moreover, unlike in the case of health care, there is a less direct link between demand and public expenditure. The public health care insurance generally covers all medically necessary treatment with no upper limit, so that an increase in demand automatically translates into a proportional increase of public health care expenditure. Not so in the case of the long-term care insurance, which covers expenses only up to a certain monetary limit, graduated according to the severity of the disability. So unless these monetary limits are periodically adjusted, public expenditure on long-term care rises less than proportionately with demand. Basing the calculations on a unitary elasticity assumption is equivalent to assuming that monetary limits are adjusted with per capita GDP and that demand elasticity is at least one.

148. Few studies have thus far attempted to project long-term care expenditure. Indeed, unlike for many other countries, Germany has still to provide its projection in the context of the Economic Policy Committee and OECD aging exercises. Diez (2001), the DIW-Institute (2001), and Rothemberg (2001) have undertaken to project the number of

long-term cases though. Estimates range from a 40 percent to a 210 percent increase. This compares to a 77 percent increase of the expenditure ratio here.

Remaining aspects of public finances

149. **Projections of all remaining budgetary items are kept as simple as possible for the years after 2007.** All revenue grows at the same rate as nominal GDP, except for social security contributions which also reflect scheduled increases of pension contribution rates (from 19.1 percent currently to 22 percent in 2031). Likewise, other expenditure generally grows with nominal GDP. However, the 2008 and 2009 installments of the subsidy for second-pillar pension contributions are factored in separately, costing 0.1 percent of GDP. Moreover, unemployment related expenditure (excluding pension and health care contributions paid by the unemployment fund) also depends on the number of unemployed. The interest bill is determined endogenously as the product of average public debt and the implicit interest rate, which is assumed constant from 2001. Finally, child-related expenditure in the form of child allowances and spending on primary and secondary education, is linked to the number of the under 25-year olds.

150. **Projections for the period 2002 to 2007 are consistent, in the stability program scenario, with IMF staff's current understanding of government policy intentions.** They incorporate strong fiscal consolidation. The budget balance improves by over 2 percent of GDP, despite net tax cuts and second-pillar pension fund subsidies worth about 1 percent of GDP. Some ¾ points of the improvement are probably due to cyclical factors.

Germany: Expenditure of Public Pension Fund (GRV), 2000-2050

	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050	2000-50	2000-30	2030-50
	(In billions of Euros unless otherwise indicated)											(Percent or percentage point change)		
Total expenditure	214.0	251.3	289.2	354.8	441.8	556.8	682.1	808.3	936.4	1083.1	1256.1	487.0	218.8	84.2
Percent of GDP	10.5	10.7	10.3	11.0	12.0	13.5	14.7	15.4	15.6	15.8	16.2	5.7	4.2	1.5
Total expenditure excl. sv contr. & health	195.2	228.5	262.7	322.5	402.1	507.7	622.6	738.2	855.2	989.2	1147.6	487.9	219.0	84.3
Percent of GDP	9.6	9.7	9.4	10.0	11.0	12.3	13.5	14.1	14.2	14.5	14.8	5.2	3.8	1.4
Old-age pensions														
Expenditure	137.7	164.8	192.3	232.3	298.6	383.5	480.3	576.8	670.8	777.7	905.1	557.3	248.8	88.5
Percent of GDP	6.8	7.0	6.9	7.4	8.1	9.3	10.4	11.0	11.2	11.4	11.7	4.9	3.5	1.3
Wage index	100.0	113.3	128.7	150.5	176.9	209.1	247.2	290.8	341.1	400.7	471.8	371.8	147.2	90.9
Index number of elderly outside labor force	100.0	105.4	108.3	112.5	118.8	128.9	137.6	139.3	137.0	134.4	132.5	32.5	37.6	-3.7
Index adjustment factor in pension formula	100.0	98.4	96.3	95.6	94.7	93.3	91.3	91.0	91.0	91.0	91.0	-9.0	-8.7	-0.3
Index increasing I.F. participation	100.0	101.8	104.0	106.4	108.9	110.8	112.3	113.6	114.5	115.2	115.5	15.5	12.3	2.9
Disability pensions														
Expenditure	16.9	16.4	16.2	21.1	26.7	29.9	28.8	29.0	33.8	40.0	45.1	166.3	60.9	56.7
Percent of GDP	0.8	0.7	0.6	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	-0.3	-0.2	0.0
Survivors' pensions														
Expenditure	35.6	41.6	47.2	56.1	67.8	84.2	102.2	119.5	135.8	154.7	178.3	401.3	187.4	74.4
Percent of GDP	1.8	1.8	1.7	1.7	1.8	2.0	2.2	2.3	2.3	2.3	2.3	0.6	0.5	0.1
Index old-age pensions	100.0	119.7	139.7	172.3	216.8	278.5	348.8	418.9	487.1	564.8	657.3	557.3	248.8	88.5
Index of dependency * weight of 1/3	100.0	97.7	95.0	91.6	87.9	85.0	82.4	80.2	78.4	77.0	76.3	-23.7	-17.6	-7.4
Social security contributions														
Expenditure	14.4	17.4	20.0	24.6	30.7	38.9	47.8	56.7	65.7	76.0	88.2	512.9	232.0	84.6
percent of GDP	0.7	0.7	0.7	0.8	0.8	0.9	1.0	1.1	1.1	1.1	1.1	0.4	0.3	0.1
Other														
Expenditure	9.4	11.2	13.5	15.5	18.0	20.4	23.0	26.4	30.3	34.7	39.4	319.5	145.3	71.1
Percent of GDP	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.0	0.0	0.0
Health	4.4	5.4	6.6	7.7	8.9	10.2	11.7	13.4	15.6	17.9	20.4	362.4	164.7	74.7
Other	5.0	5.8	6.9	7.9	9.0	10.1	11.4	12.9	14.8	16.8	19.1	281.7	128.1	67.4
Monetary items														
Nominal GDP	2,030	2,356	2,802	3,224	3,669	4,123	4,628	5,253	6,004	6,837	7,745	281.5	128.0	67.4
Pension contribution rate (in percent) 1/	19.3	18.6	18.3	18.8	19.4	20.4	21.8	22.0	22.0	22.0	22.0	...	...	...
Pension cont. rate to 2nd pillar (in percent) 1/	0.0	2.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	...	...	...
Replacement ratio	...	65.7	64.2	64.1	64.1	64.0	63.9	63.9	63.9	63.9	63.9	-4.9	-4.9	0.0
Replacement ratio adjusted 2/	...	67.0	66.8	66.8	66.7	66.7	66.6	66.5	66.5	66.5	66.5	-2.3	-2.2	0.0
Net wage per employee	17,467	20,591	23,446	27,226	31,727	36,974	42,834	50,271	58,957	69,261	81,556	...	...	...
Index	100	117.9	134.2	155.9	181.6	211.7	245.3	287.8	337.5	396.5	466.9	...	...	...
Index adjusted	100	115.5	129.0	149.7	174.5	203.4	235.7	276.5	324.3	380.9	448.6	...	...	...
Index for wage of typical pensioner	100	111.4	124.0	143.9	167.6	195.1	225.7	264.7	310.5	364.7	429.5	...	...	...

Source: IMF staff projections.

1/ As projected by the Federal Ministry of Labor and Social Affairs.

2/ Includes maximum eligible contributions to second pillar pension funds.

Germany: Expenditure for Civil Service Pensions, 2000-2050

	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050	2000-50	2000-30	2030-50
	(In billions of Euros unless otherwise indicated)											(Percent or percentage point change)		
Total expenditure	27.3	34.4	42.5	55.2	71.3	85.4	106.3	122.4	139.4	161.1	186.7	583.9	289.6	75.5
Percent of GDP	1.3	1.5	1.5	1.7	1.9	2.1	2.3	2.3	2.3	2.4	2.4	1.1	1.0	0.1
Civil service pensions														
Expenditure	21.9	26.8	32.7	42.6	55.3	67.3	81.8	92.8	104.7	120.3	138.6	531.8	273.1	69.3
Percent of GDP	1.1	1.1	1.2	1.3	1.5	1.6	1.8	1.8	1.7	1.8	1.8	0.7	0.7	0.0
Wage index	100.0	113.3	128.7	150.5	176.9	209.1	247.2	290.8	341.1	400.7	471.8	371.8	147.2	90.9
Adjustment factor	100.0	98.1	95.7	94.7	94.4	94.4	94.4	94.4	94.4	94.4	94.4	-5.6	-5.6	0.0
Index number of pensioners	100.0	110.1	121.2	136.3	150.9	153.4	160.0	154.1	148.2	145.0	141.9	41.9	60.0	-11.3
Index increase of statutory retirement age	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	0.0	0.0	0.0
Civil service pensioners														
Federal government	224,000	207,000	193,000	185,000	185,000	187,000	189,000	181,500	174,000	169,693	165,493	-26.1	-15.6	-12.4
States governments	523,000	624,000	729,000	858,000	971,000	995,000	1,019,000	976,000	933,000	909,907	887,386	69.0	94.1	-13.9
Municipalities	103,000	109,000	111,000	121,000	133,000	145,500	158,000	158,500	159,000	159,000	159,000	51.4	50.5	0.6
Total	850,000	940,000	1,035,000	1,164,000	1,289,000	1,327,500	1,366,000	1,316,000	1,266,000	1,238,600	1,211,879	41.9	60.0	-11.3
Supplementary pensions (VBL and AKA)														
Expenditure	5.4	7.6	9.7	12.6	16.0	18.2	24.5	29.6	34.8	40.9	48.1	797.2	357.0	96.3
Percent of GDP	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.6	0.6	0.6	0.6	0.4	0.3	0.1
Wage index	100.0	113.3	128.7	150.5	176.9	209.1	247.2	290.8	341.1	400.7	471.8	371.8	147.2	90.9
Adjustment factor	100.0	95.1	92.1	88.6	85.1	81.6	80.3	80.3	80.3	80.3	80.3	-19.7	-19.7	0.0
Index number of pensioners	100.0	130.8	152.6	175.7	198.3	198.6	230.2	236.7	236.8	236.8	236.8	136.8	130.2	2.9
Index increase of statutory retirement age	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	0.0	0.0	0.0
Beneficiaries														
Total	1,692,077	2,221,252	2,591,987	2,983,455	3,366,927	3,372,992	3,909,312	4,019,013	4,021,060	4,021,060	4,021,060	136.8	130.2	2.9
Memo item:														
GDP	2,030	2,356	2,802	3,224	3,669	4,123	4,628	5,253	6,004	6,837	7,745	281.5	128.0	67.4

Source: IMF staff projections.

Germany: Health Care Expenditure, 2000-2050

	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050	2000-50	2000-30	2030-50
	(In billions of Euros unless otherwise indicated)											(Percent or percentage point change)		
Public HCE excl. lt-care	147.3	175.7	214.4	232.2	292.5	334.2	381.2	439.4	508.7	585.0	665.8	352.0	158.8	74.7
Percent of GDP	7.3	7.5	7.7	7.8	8.0	8.1	8.2	8.4	8.5	8.6	8.6	1.3	1.0	0.4
Index of demographic composition eff	100.0	102.8	105.5	107.8	109.9	111.7	113.5	115.3	116.8	117.9	118.5	18.5	13.5	4.4
Index of population size	100.0	99.7	99.4	98.8	97.8	96.5	94.8	92.8	90.5	88.1	85.4	-14.6	-5.2	-9.9
Index of income effect	100.0	116.3	138.8	160.8	184.7	210.4	240.4	278.7	326.6	382.4	446.7	346.7	140.4	85.8
<i>Memo items:</i>														
GDP	2,030	2,356	2,802	3,224	3,669	4,123	4,628	5,253	6,004	6,837	7,745	281.5	128.0	67.4
Income elasticity	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0
Number of deaths	870,513	912,532	962,825	1,008,425	1,052,744	1,073,788	1,090,665	1,106,336	1,128,113	1,146,777	1,157,370	33.0	25.3	6.1
Probability to die (percent)	1.1	1.1	1.2	1.2	1.3	1.4	1.4	1.4	1.5	1.6	1.6	55.6	32.1	17.8
Number of births	766,554	698,065	681,341	684,956	674,354	639,778	602,835	573,699	557,948	548,570	535,551	-30.1	-21.4	-11.2
Probability of birth (percent)	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.8	-18.2	-17.1	-1.4
Population (number)	82,259,540	82,044,220	81,784,887	81,252,564	80,485,335	79,383,670	77,993,411	76,370,490	74,484,105	72,452,270	70,265,574	-14.6	-5.2	-9.9
Average population age (years)	40.6	41.8	42.9	43.8	44.6	45.3	46.0	46.6	47.2	47.5	47.7	17.5	13.3	3.7
HCE index	7.5	7.7	7.9	8.1	8.3	8.4	8.5	8.7	8.8	8.9	8.9	18.5	13.5	4.4

Source: IMF staff projections.

Germany: Long-Term Care Expenditure, 2000-2050

	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050	2000-50	2000-30	2030-50
	(In billions of Euros unless otherwise indicated)											(Percent or percentage point change)		
Expenditure	17.6	22.0	27.7	34.5	42.2	49.1	57.4	68.3	82.0	100.1	119.1	575.1	225.4	107.5
percent of GDP	0.9	0.9	1.0	1.1	1.2	1.2	1.2	1.3	1.4	1.5	1.5	0.7	0.4	0.3
Index of demographic composition effect	100.0	105.1	111.2	117.3	123.6	127.8	132.1	136.9	143.1	149.6	155.6	55.6	32.1	17.8
Index of prob. to die effect	100.0	105.1	111.2	117.3	123.6	127.8	132.1	136.9	143.1	149.6	155.6	55.6	32.1	17.8
Index of cost push due to shift to formal care	100.0	102.4	102.1	105.0	107.1	107.3	108.0	109.2	109.9	112.7	113.7	13.7	8.0	5.2
Index of population size	100.0	99.7	99.4	98.8	97.8	96.5	94.8	92.8	90.5	88.1	85.4	-14.6	-5.2	-9.9
Index of income effect (elasticity of 1)	100.0	116.3	138.8	160.8	184.7	210.4	240.4	278.7	326.6	382.4	446.7	346.7	140.4	85.8
Index of extra adjustment	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	0.0	0.0	0.0
<i>Memo items:</i>														
GDP	2,030	2,356	2,802	3,224	3,669	4,123	4,628	5,253	6,004	6,837	7,745	281.5	128.0	67.4
Number of deaths	870,513	912,532	962,825	1,008,425	1,052,744	1,073,788	1,090,665	1,106,336	1,128,113	1,146,777	1,157,370	33.0	25.3	6.1
Probability to die (percent)	1.1	1.1	1.2	1.2	1.3	1.4	1.4	1.4	1.5	1.6	1.6	55.6	32.1	17.8
Population (number)	82,259,540	82,044,220	81,784,887	81,252,564	80,485,335	79,383,670	77,993,411	76,370,490	74,484,105	72,452,270	70,265,574	-14.6	-5.2	-9.9
Index of potential informal care givers	100	88	89	75	64	63	60	54	50	36	31	-68.6	-40.2	-47.6
Share of informal care (percent)	57.0	53.6	54.0	49.9	46.8	46.5	45.5	43.8	41.9	38.9	37.4	-34.3	-20.1	-17.8
By member of same generation	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	0.0	0.0	0.0
By member of next generation	28.5	25.1	25.5	21.4	18.3	18.0	17.0	15.3	14.4	10.4	8.9	-68.6	-40.2	-47.6
Share of formal care (percent)	43.0	46.4	46.0	50.1	53.2	53.5	54.5	56.2	57.1	61.1	62.6	43.5	26.6	14.9
Cost for formal relative to informal care (multiple)	2	2	2	2	2	2	2	2	2	2	2	0.0	0.0	0.0

Source: IMF staff projections.

References

- Carey, David and Josette Rabesona (2002), "Average Effective Tax Rates on Capital, Labor and Consumption," presented to The CESifo Summer Institute, Venice, July 2002, forthcoming as OECD Working Paper.
- Dang, Thai Than, Pablo Antolin and Howard Oxley (2001), "Fiscal Implications of Aging: Projections of Age-Related Spending," ECO/WKP(2001)/31, OECD.
- Enquête Commission of Germany's Lower House of Parliament (2002), "Demographischer Wandel – Herausforderungen unserer älter werdenden Gesellschaft an den Einzelnen und die Politik," Bundestags Drucksache 14/8000.
- Gerdtham, Ulf-G. and Bengt Jönsson (1992), "International Comparisons of Health Care Expenditure: Conversion Factor Instability, Heteroscedasticity, Outliers and Robust Estimators," *Journal of Health Economics* No. 10.
- Gerdtham, Ulf-G. and Bengt Jönsson (2000), "International Comparisons of Health Expenditure: Theory, Data and Econometric Analysis," in: *Handbook of Health Economics*, Volume 1, edited by A.J. Culyer and J.P. Newhouse.
- Gruber, Jonathan and David Wise (2001), "An International Perspective on Policies for an Aging Society," NBER Working Paper 8103.
- DIW (2001), "Wochenbericht des DIW," No 68/5.
- Dietz, B. (2001), "Kosten steigen schneller als erwartet. Entwicklung des Pflegebedarfs bis 2050," *Soziale Sicherheit*, No. 1.
- Economic Policy Committee (2001), "Budgetary Challenges Posed by Aging Societies," ECP/ECFIN/655/01.
- European Commission (2001), "The EU Economy – 2001 Review," *European Economy* No. 73.
- Federal Ministry of Finance (2000), "Guiding Principles of Fiscal Policy," Berlin.
- International Monetary Fund (2000), "Germany: Selected Issues," IMF Staff Country Report No. 00/142 (Washington: International Monetary Fund).
- Manzke, Bernhard (2002), "Zur Tragfähigkeit der öffentlichen Haushalte in Deutschland – eine Analyse anhand der Generationenbilanzierung," *Diskussionspapier 10/02*, Deutsche Bundesbank.

- Merrick, Thomas W. (2002), "Population and Poverty: New Views on an Old Controversy," *International Family Planning Perspectives*, Volume 28, Number 1, March 2002.
- Newhouse, J.P. (1977), "Medical Care Expenditure: a Cross-national Survey," *Journal of Human Resources* No. 12.
- Bundesministerium der Inneren (2001), "Daten und Schlussfolgerungen zum Zweiten Versorgungsbericht der Bundesregierung. Das Wichtigste in Kürze," Berlin, September 2001.
- Pfeiffer, Ulrich (1999), "*Deutschland — Entwicklungspolitik für ein entwickeltes Land*," Europäische Verlagsanstalt/Rothbuch Verlag, Hamburg.
- Roberts (1998), "Sensitivity of Elasticity Estimates for OECD Health Care Spending: Analysis of a Dynamic Heterogeneous Data Field", Paper prepared for the Seventh European Workshop of Econometrics and Health Economics, STAKES, Helsinki, Finland, September 1998.
- Rothemberg, H. (2001), "Finanzwirtschaftliche und strukturelle Entwicklungen in der Pflegeversicherung bis 2040 und mögliche alternative Konzepte," Endbericht zu einer Expertise für die Enquête-Kommission.
- Rother, P.C., M. Catnaro, and G. Schwab (2002), "Aging and Pensions in the Euro Area, Selective Survey and Simulation Results," ECB mimeo.
- Sachverständigenrat zur Begutachtung der gesamtwirtschaftlichen Entwicklung (2001), "Für Stetigkeit – Gegen Aktionismus," Jahresgutachten 2001/02.
- Stephan, Anette (2002a), "Neuordnung der betrieblichen Altersversorgung im öffentlichen Dienst – Teil 1," ZTR 2/2002.
- Stephan, Anette (2002b), "Neuordnung der betrieblichen Altersversorgung im öffentlichen Dienst – Teil 2," ZTR 4/2002.
- Ulrich, Volker (2000), "Medizinisch-technischer Fortschritt, demographische Alterung und Wachstum der Gesundheitsausgaben: Was sind die treibenden Faktoren?," *Gesundheitsökonomie & Gesundheitsmanagement*, 5, 2000.
- Werdinger, Martin and Harald Blau (2001), "Auswirkungen des demographischen Wandels auf die öffentlichen Finanzen: Modellrechnungen für die staatlichen Alterssicherungssysteme," ifo Institut für Wirtschaftsforschung, München, October 2001.
- Zweifel, Peter, Stefan Felderer, and Markus Meiers (1999), "Aging of Population and Health Care Expenditure: A Red Herring?," *Health Economics* No 8.