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**Civil servant pensions in National Accounts – Methodology and preliminary results
(Draft)**

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Civil servants' pensions in National Accounts – Methodology and preliminary results

1. Background

Demographic change and its impact are considered as an important issue for the sustainable development of a society.¹ Sustainable development was defined as a “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” by the so-called Brundtland-Commission in 1987.² The sustainability of old-age insurance is a commonly mentioned topic in this context. Facing the perspective of an ageing and shrinking society, citizens' claims on future payments from the various pension and social insurance schemes are increasingly becoming the subject of an intensive debate. In Germany, as in some other European countries, old-age insurance is predominantly financed on a pay-as-you-go basis, that is the present working population pays for the pension benefits of the current generation of retirees. The sustainability of a pension system on a pay-as-you-go basis is sometimes questioned for ageing societies, that is when the ratio of contributors to beneficiaries deteriorates. The same is true for civil servants in Germany, whose pensions are wholly funded by tax money.

The question of sustainability of the systems of old-age insurance is relevant as well for the budget monitoring according to the European stability and growth³ pact (SGP) which focuses on the budget deficit and debt of general government. For instance, in some member states old-age insurance for the whole population is fully financed from tax money, whereas in other countries the social contributions of the employees are supplemented by a government grant. Furthermore, civil servants pensions are often completely financed from tax money. These differences question the comparability of the national accounts data (according to the European system of national accounts 1995 (ESA 95)) for the purpose of the SGP.

As a response to the growing information demand, a new and more comprehensive treatment of old-age insurance on a comparable basis is being developed in national accounts. The paper covers the background, describes the new concepts and presents first results for the pension entitlements of federal government civil servants in Germany on an actuarial basis. The paper presents an estimation model and shows how changes in assumptions on mortality, discount rate and the economic framework affect the magnitude of entitlements. Furthermore, alternative specifications of entitlements as accumulated benefit obligation (ABO) and projected benefit obligation (PBO) are subject of the analysis.

¹The Federal Government of Germany (2002): Perspectives for Germany - Our Strategy for Sustainable Development, p. 5
http://www.nachhaltigkeitsrat.de/fileadmin/user_upload/English/pdf/Perspectives_for_Germany.pdf

² UN World Commission on Environment and Development (1998): Our Common Future/Brundtland-Report.

³ The European Stability and Growth Pact consists of the council's decision on the stability and growth pact from 17th June 1997 cf. Official Journal of the European Communities C 236 dated 2nd of August 1997, p.1 ff) as well as regulations no. 1466/97 and 1467/97 of the council of the European Union (cf. Official Journal of the European Communities L 209 dated 2nd of August 1997, p.1 ff).

2. Conceptual treatment of pension systems in national accounts

2.1 The present treatment in the SNA-93 und ESA-95

In present national accounts, future entitlements to the statutory pension insurance (financed on a pay-as-you-go basis), and the future entitlements of civil servants are not accounted for. According to ESA 95, these are considered as contingent claims and liabilities, which are not to be registered. In current national accounts, pay-as-you-go financed systems of old-age insurance are reflected by social contributions (actual and imputed) and benefits. For the civil servants pension scheme, which in Germany is funded predominantly by tax money, imputed social contributions on the basis of the actual rate of contribution of the statutory pension insurance are compiled.

Funded pension systems however are treated completely different, according to ESA 95. First, payments into funded systems increase households savings of the respective period. Second, the financial claims of households increase. Therefore, over time the pension reserves of the households increase, which is usually reinforced by accumulation of interest. From retirement on, the capital stock is then subsequently reduced by pension payments, the remaining capital still being paid interest on. The buildup of the capital stock for old-age insurance is reported as financial claims according to ESA 95 and increases households' financial assets. Inversely, the payment of pensions reduce financial claims and assets.

From the perspective of sustainability and comparability, particularly the following aspects are being criticised in the current treatment of the systems of old-age insurance in the national accounts:

- Costs resulting from foreseeable demographic changes (e.g. increase in life expectancy, decrease in the birth rate) are realised in pay-as-you-go systems of old-age insurance only in future years. Likewise, offsets from reforms of the system of old-age insurance already passed only take effect in the future, either.
- Funded systems of old-age insurance often suffer from underfunding. Any occurrence of underfunding however is not shown in the current system of national accounts.
- International comparison is outmost difficult, as in some countries funded systems are prevalent, while in other countries systems of old-age insurance financed on a pay-as-you-go basis dominate.

These areas of concern have been picked up during the current revision of the world-wide system of national accounts, the SNA 1993.

2.2 The revised treatment in the future SNA and ESA

The system of national accounts in Germany is based on definitions and concepts of the international systems of national accounts. First of all to mention is the world-wide system of national accounts, the SNA 93, from which the European system of national accounts (ESA) 1995 is derived. The ESA however contains usually more precise rules than the SNA. One reason is the more homogeneous state of economic development within the European Union (EU). A further reason is probably the use of national accounts data for administrative purposes, as the financing of the budget of the European Union or the country budget monitoring by the European commission to avoid an excessive deficit.

In March 2003, the United Nations Statistical Commission (UNSC) initiated the revision of the SNA93. Yet at that time, the treatment of pension entitlements in national accounts was on the schedule for revision, and from the beginning, it was widely discussed. On the one hand, it is a matter of if and how the relevance and comparability of national accounts can be improved through the inclusion of pension entitlements and which data is required for the sustainability analysis. On the other hand, it was asked if, and to which extent the accuracy and reliability of national accounts could be affected through the inclusion of model-based estimates using simplifying assumptions and methods. These considerations relate especially to the mentioned administrative usage of national accounts data in Europe.

At the end of 2003, a report was issued in the electronic discussion group on the treatment of pension entitlements in national accounts, which was initiated by the International Monetary Fund (IMF), that proposed a modification of posting rules in the SNA93. All claims and liabilities respectively from systems of old-age insurance that are financed by the employer (that is including civil servant pensions) should be covered by the corresponding aggregates of the national accounts. This proposition started an intense and controversial debate. Only in autumn 2006 an internationally accepted solution came into reach, which was accepted by UNSC in the beginning of 2007. The resulting compromise, which was developed by an European Task Force, comprises the following aspects:

- All funded systems of old-age insurance, as well as the unfunded schemes of private employers, will be recorded in the core system of the national accounts and affect the national account aggregates. For unfunded schemes, an actuarial estimate has to be compiled.
- The stock and flow figures of all systems of old-age insurance will be represented in a supplementary table as a (compulsory) satellite account.
- Actuarial estimates for systems of social security will exclusively be displayed in the supplementary table.
- Systems of old-age insurance of the government that are financed on a pay-as-you-go basis can be displayed in the core-accounts or solely in the supplementary table. This flexibility in

the treatment of government schemes is due to significant differences in their legal setup on a world-wide scale; however the choice has to be rationally explained.

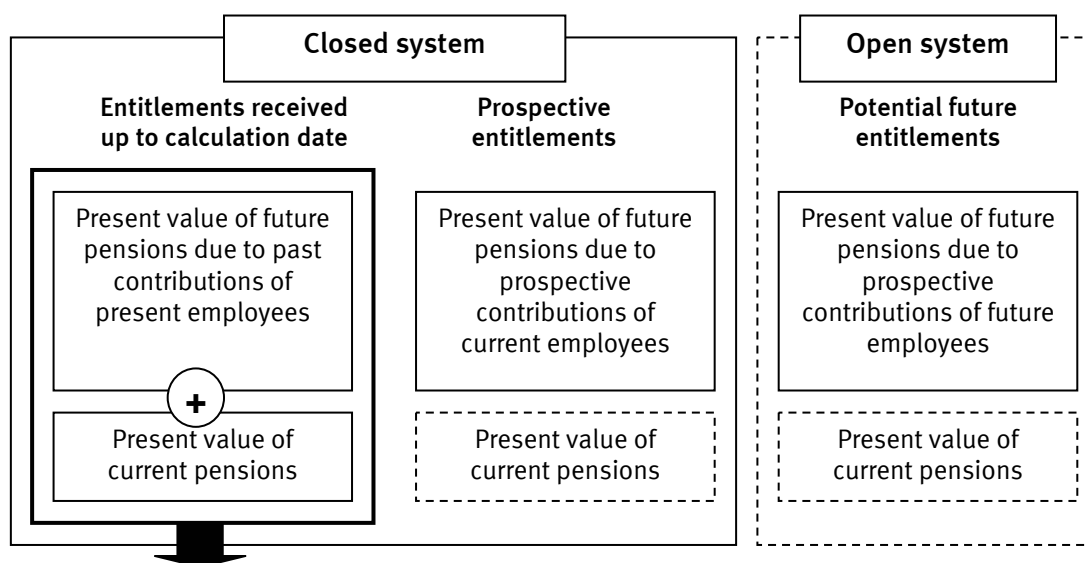
On the one hand, this compromise solution could refute worries that the possible inclusion of the civil servants pension scheme will in the future distort data used in the evaluation of the European stability and growth pact (that is the the annual budget deficit and the national debt) and affects its informational value. On the other hand, the supplementary table will provide the possibility to derive better internationally comparable national accounts aggregates and in addition provides a sound basis for sustainability analyses.

3. Modelling of pension entitlements in national accounts

3.1. Basic choices

The compromise solution provides for a compulsory supplementary table including the entitlements of all systems of old-age insurance for the member states of the European Union. The table describes how pension entitlements are accumulated by the insurants and the total amount of pension entitlements acquired so far. The size of the entitlements is determined to a significant extent by the concept of how the entitlements are defined. The most comprehensive definition of entitlements includes all future payments (open system liabilities). However, if new entrants to the system are excluded, the system is called a closed system. If in a next step the entitlements are limited to the entitlements based on past years of service, the result is merely retrospective. Only the entitlements that are derived from fulfilled working periods or paid contributions are accounted for.

Chart 1: Entitlements in the closed and open system



Accounting of entitlements is limited exclusively to the accrued entitlements of current employees (and pensioners) due to past times of service

Source: Based on Holzmann (1998): Financing the Transition, Washington

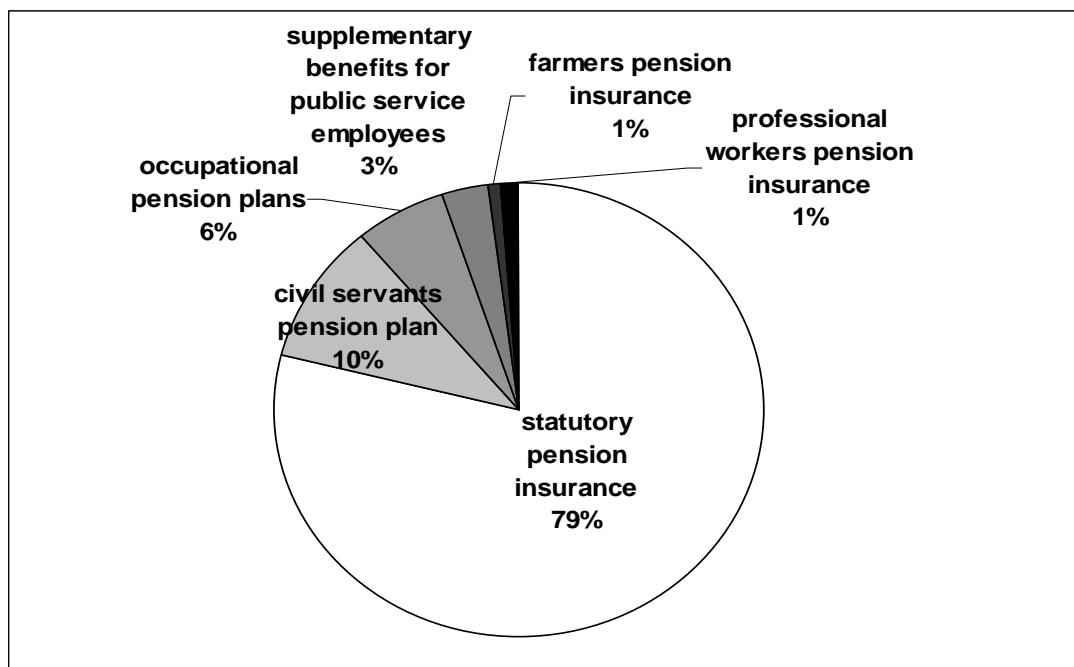
This perspective corresponds with the principles of national accounts. In the system of national accounts, only claims based on entitlements acquired so far are accounted for. Future contributions or periods of service from present or future insureds are irrelevant.

Usually an employee acquires a further (partial) claim on his future pension payment each year through his own or his employers contributions. The present value of this entitlement depends on factors such as life expectancy or the future wage trend. The former determines how long the pension payments run, the latter has a significant influence on the indexation of the pension payments. If these payments are discounted towards the reporting date, and summed up for all insureds, one gets the present value of the future pension payments, the so-called pension wealth. Such actuarial methods are widely used in the field of company accounting. In national accounts such an approach is already used to compile the claims against occupational pension plans.⁴ In the following section, a comparable approach is illustrated for the civil servants pension scheme.

3.2. A model for the civil servants pension scheme

The civil servants pension scheme provides old-age benefits for 2 million active and 1.5 million retired civil servants. The civil servant pension scheme is the second largest system of old-age insurance in Germany, with the statutory pension insurance (52.0 million active insureds and 24.2 million retirees) being the largest.⁵

Chart 2: Survey of the systems of old-age insurance in Germany



Source: Alterssicherungsbericht ("Ergänzender Bericht der Bundesregierung zum Rentenversicherungsbericht 2005 gemäß §154 Abs. 2 SGB VI", Bundesministerium für Arbeit und Soziales, März 2006, Berlin); „Old-age insurance report – Supplementary report of the Federal Government as a follow-up to the report of the statutory pension insurance report 2005“, March 2006, Berlin (translated title)

⁴ That applies as well to entitlements from the additional, state-subsidized system of old-age insurance.

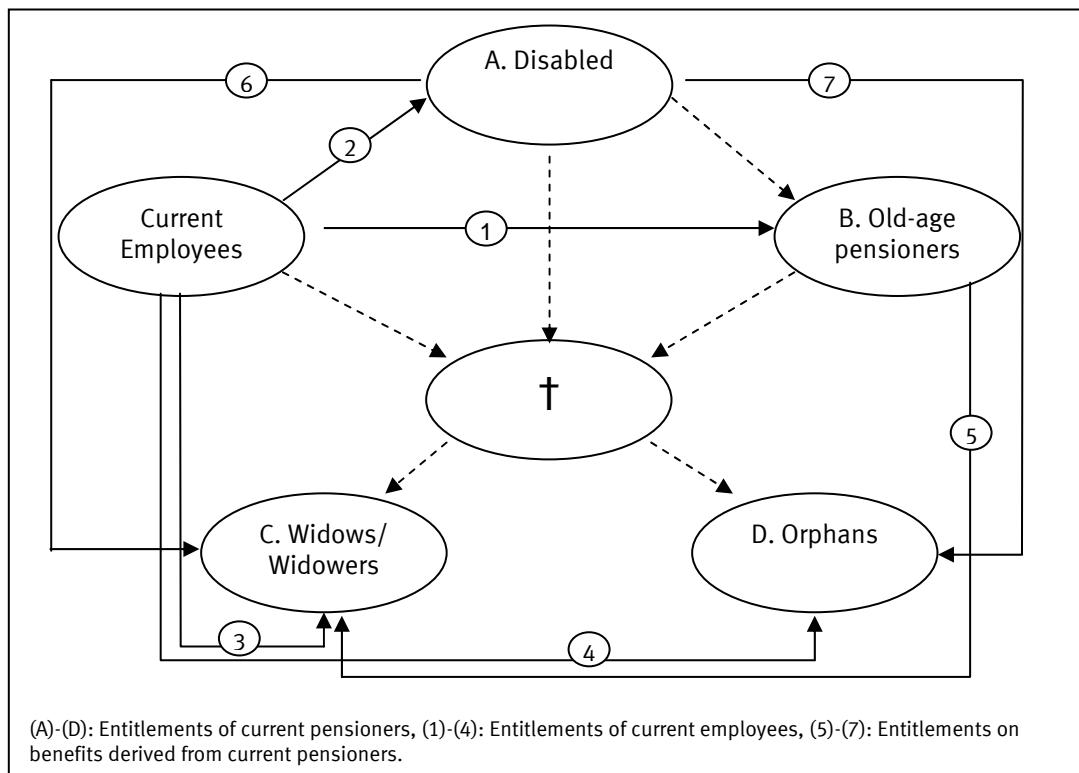
⁵ As of 3rd of December 2007; Statistik der Deutschen Rentenversicherung – Aktuelle Daten 2008; Deutsche Rentenversicherung Bund, Berlin 2008; „Statistics of the German statutory pension insurance – Recent data 2008“ (translated title)

Further systems of old-age insurance with minor significance (in number of insurants) are the supplementary benefits for public service employees, the professional workers pension insurance and the farmers pension insurance.

The financing of the civil servants pension scheme is in a state of change. While in some Federal States reserves are being set aside for newly employed civil servants from 1996 on, at the central government level a pension fund for newly employed civil servants has only been set up in 2007. By contrast, the pensions of civil servants in the unemployment social insurance are fully funded since the beginning of 2008. However legally, civil servants pension claims are always directed against the employer. The level of funding does not influence the employers' obligation to provide pensions benefits.

Pension entitlements are acquired in terms of percentage shares of the final salary reached until the date of retirement. For each year of service in full time employment, an insurant obtains 1,875% of final salary, up to a maximum of 75%, which is equivalent to 40 years of service. As a consequence of the "pension reform act 2001" (*Versorgungsänderungsgesetz 2001*)⁶ both the annual share acquired, as well as the maximum level are subsequently reduced with each rise in pay, amounting to a total reduction of 4.33% until 2012. Early (deferred) retirement is penalized (rewarded) with a reduction (increase) in pension entitlements of 0.3 (0.5) percentage points for each month. Beside the regular old-age insurance, the survivor and disability pensions are covered as well in the calculation results presented below.

Chart 3: Flow of stock of insurants and pensioners and their derived entitlements



⁶ Versorgungsänderungsgesetz 2001, 20th of December 2001 (BGBl. I S. 3926)

The calculation of pension entitlements are carried out in a multiple-stage approach: In a first step, based on the current stock of current active civil servants and the stock of pensioners, projections are made for each subsequent year using corresponding mortality tables. The relevant groups in this context are shown in chart 3 (page 7).

The calculations are carried out separately for each gender and each career path (*Laufbahn*). For the group of active civil servants, future retirements are calculated based on empirically observed retirement behaviour. Entry towards disability pensions is determined by age-specific probabilities of becoming disabled, while survivor pensions arise from the conditional probability of deceased civil servants being married and leaving behind a widow/widower, taking into account the average age difference of married couples.

In a second step, the amounts payable are calculated for each subgroup and each year. These are derived from a projection of a typical distribution of entitlements over time for each group, accounting for the distribution of entry dates, part-time quotas, share of suspended servants, and pension-enhancing times. The distribution of entitlements is described as a percentage value of final salary for each age, which increases from entry date to the date of retirement. While a civil servant can acquire 1.875% of final salary for a year of full time service, the total group covered will accrue less, due to periods of part time work and suspensions. Furthermore, gender- and career-specific attribution times for vocational training, child care, military service and periods of employment in the public sector before employment as a civil servant are considered.

In addition, projections are made for the final salary by comparing the current distribution of active civil servants by income groups with the distribution of pensioners by income. Adjustments are being made for distributions shifting over time. As a result, one obtains the calculated pension entitlement in nominal terms by multiplying the projected final salary with the age-specific percentage share representing past service times at the date of calculation. In a further step, the nominal pension entitlement is indexed by annual rates of wage growth to obtain the actual pension payable in each year for each group.

In a third step, the gradual shift from active service to retired pensioners is incorporated into the model by applying empirically observed retirement rates, accounting for early retirement penalties/late retirement rewards as well.

In the last step, the present value of entitlements is determined by calculating the amount payable for each age cohort and each year, discounting those payments to the calculation date and summing up all discounted payment streams.

The calculations are based on age-cohort specific statistics on stocks of active civil servants and pensioners, pension payments and a complex modelling of entitlements and retirement entry differentiated by age, gender and career path, as well as assumptions on mortality, wage trends and discount rates. The prospective entry behaviour is determined by the current behaviour.

3.3. Model parameters and assumptions

On one hand, the calculation of pension entitlements is determined by factors that are known at the time of calculation.⁷ Furthermore, the size of entitlements is determined to a large extent by the assumptions on the future development of certain key parameters. Those parameters are affected by the demographic and economic development as well as by changes in the legal framework. The entitlements are therefore affected to a varying extent by the modification of a parameter. If several parameters are changed at the same time, the spectrum of possible results is extended even further. The most significant parameters are described in the following. Thereafter, a basic scenario is introduced that incorporates the most likely occurrences of each parameter. These results are then subsequently compared to the results of a sensitivity analysis, that is based on an array of different choices of parameter developments.

3.3.1. Discount rate

The magnitude of pension entitlements is to a large extent affected by the discounting of future payment streams, i.e. the calculation of the entitlements present value. While the concept of discounting the pension entitlements to incorporate the time value of money into the calculation is undisputed, the choice of an adequate discount rate is more difficult. The most prominent alternatives are:

- The yield on government bonds. Following IPSAS 25⁸, the market yields of government bonds will provide the best approximation of the time value of money, at least if the market for government bonds is deep enough.
- The rate of return on high quality corporate bonds.⁹ This is in accordance with the rate that is used in the calculation of employee entitlements from occupational pension plans of private companies according to international reporting standards.

In addition, there are two specific (German) alternatives:

- A steady discount rate of 6%. According to the German income tax law, companies are obliged to calculate their pension liabilities at a compulsory discount rate of 6%. In Germany, many companies not oriented towards the capital market at present calculate their pension provisions solely by utilizing the ABO method without future indexation and at a discount rate of 6%.
- The average market interest rate of the past seven years. In the draft of the “Accounting Law Reform Act” (*Bilanzrechtsmodernisierungsgesetz*), market interest rates of adequate duration¹⁰ (average of the past seven accounting years) are utilised¹¹. The German Central

⁷ This includes the stock of pensioners and insureds, paid pensions as well as accrued entitlements of insureds.

⁸ International Public Sector Accounting Standards Board, IPSAS 25, Paragraph 94, February 2008, New York.

⁹ High quality is usually defined in the IAS standards as a rating of AA or better (IAS 19, Employee Benefits, §§ 78-82), International Accounting Standard IAS 19, Official Journal of the European Union, L261/137, 13/10/2003, Office for Official Publications of the European Communities (Publications Office), Luxembourg

¹⁰ Draft of the Accounting Law Reform Act §253 paragraph 2 clause 1, 2008, Berlin. <http://www.bmi.bund.de/files/-/3152/RegE%20BilMoG.pdf>,

Bank is assigned to calculate the applicable interest rates and publish them on a monthly basis. According to a study of Burger et. al.¹² pension provisions are estimated to rise by about 22% due to the Accounting Law Reform Act. Some companies will face a doubling in pension provisions.

Each of these possible choices of a discount rate is backed by a range of arguments. From our point of view, especially two aspects are crucial:

- Comparability comprehends a national and an international dimension. Since all national systems of old-age insurance are to be presented in a supplementary table, a consistent valuation method and criterion for a discount rate should be applied. What is important in the first place is, that comparable systems of old-age insurance are produced at the national level. In Germany these are for instance the civil servants pension scheme and the statutory pension insurance, which should be treated according to the same criteria.
- The discount rate should be an observable market rate. Herewith manipulation or interference will be ruled out.

The Task Force on pensions has proposed to use the rate of return of government bonds as a discount rate, however, the appliance of IAS-standards is considered feasible as well. Our calculations are based on a somewhat simplified approach, using a discount rate of 5% (nominal). The sensitivity analyses provide in addition results for a lower scenario with a discount rate reduced by one percentage point.

3.3.2. Wage trend and pension indexation

In Germany, the indexation of pensions in principal follows the trend in the remuneration of active civil servants. Further elements were implemented in the pension reforms of the years 1998¹³ and 2001¹⁴, which introduced the reduction of future pay raises to finance a pension fund that should partially reduce the burden of pension payments from the year 2020 onwards. So far, payments have been reduced by 0.6%, being further reduced in future years by the reduction of the increase in entitlements for each year of service from 1.875% to 1.79375%, reducing both the entitlements of active civil servants and pensioners as well. Further reforms foreseeable are a reduction in the length of vocational training times being accountable as attribution times, or the increase of the statutory retirement age from 65 to 67 years.

The calculations are based on wage trend projections derived from the annual report of the Federal Government on the statutory pension insurance. Those projections cover the intermediary period until

¹¹ For reasons of simplicity pension entitlements can be discounted at an overall interest rate, that is determined by the market interest rate at a duration of fifteen years.

¹²Burger, Fröhlich, Ulbrich: KoR, 2004, p. 363. <http://www.kor-online.de>

¹³ Pensions reform law 1998 (“Versorgungsreformgesetz 1998”), as of 29th of June 1998, (BGBl. I pages 1666, 3128)

¹⁴ Pension revision law 2001 (“Versorgungsänderungsgesetz 2001”) as of 20th of December 2001, (BGBl. I page 3926)

2020¹⁵ and are assumed to be in line with the requirements defined by the IAS on a consistent set of assumptions.

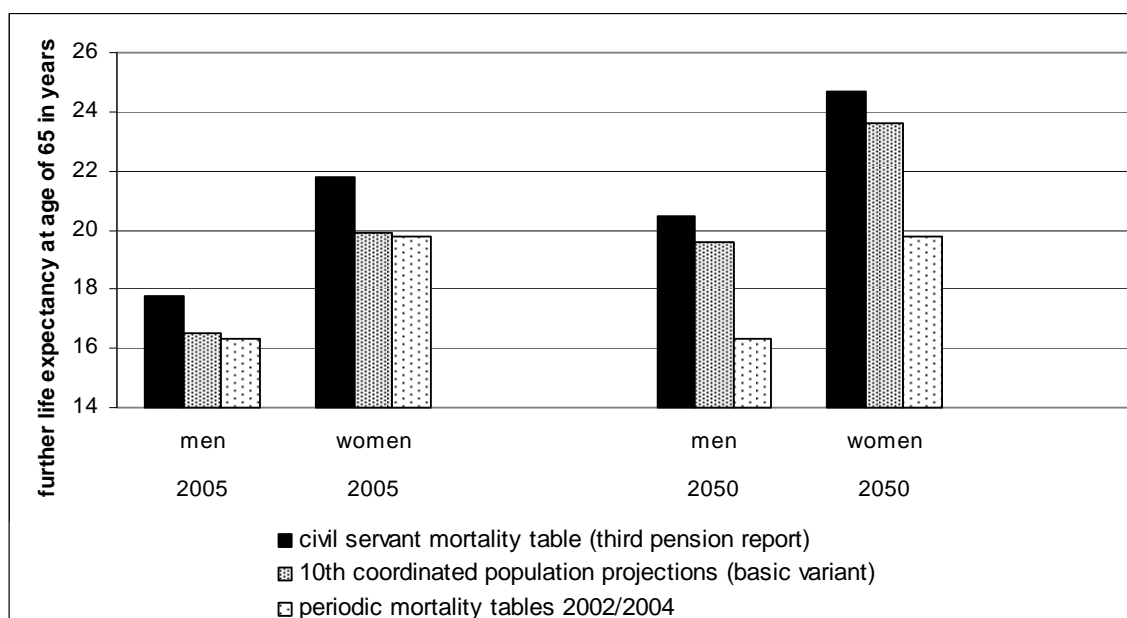
In the framework of the sensitivity analyses, another scenario on the future wage development is analysed: The projections of the annual report on the statutory pension insurance are increased by 20% on top of the basis values. This scenario is considered as an upper boundary in our framework.

3.3.3 Development of mortality

In the past an increase in life expectancy was observed in almost every country. The decrease in age-specific mortality rates as a result of medical progress possibly will lead to a further rise in life expectancy, thus contributing to an increase in accrued pension rights. Our assumptions made in the baseline variant on mortality over time were derived from the official 2003 pension report¹⁶.

In addition to the estimation of specific mortality rates for civil servants, statistical figures from the observation period and the official mortality tables of the Federal Statistical Office, mortality tables published by Eurostat or the United Nations are also available. The use of mortality tables from the pension report bears two important advantages. On one hand, the clearly higher life expectancy of civil servants is covered, which satisfies the principle of calculating the fair value of pension liabilities. On the other hand, the reporting on the matter of civil servants pension provisions in Germany is based on one consistent source.

Chart 4: Development of further life expectancy at the age of 65 in the period 2005-2050



Source: Third pension report of the Federal Government (see footnote 16); 10th coordinated population projections (see footnote 17), ; Periodic mortality tables: „Periodensterbetafeln für Deutschland – Allgemeine und abgekürzte Sterbetafeln – 1871/1881 bis 2003/ 2005“, Statistisches Bundesamt, Wiesbaden, 2006

¹⁵ for subsequent years, a constant rate of pay raises is assumed

¹⁶ “Dritter Versorgungsbericht der Bundesregierung”, Berlin, 25 May 2005, http://www.bmi.bund.de/nn_164578/Internet/Content/Broschueren/2005/Dritter_Versorgungsbericht_der_BReg.html

Chart 4 (page 11) shows that the life expectancy of civil servants is assumed to be in excess of the average life expectancy of the average German population¹⁷ by about two years. The further life expectancy at the age of 65 for civil servants will increase by 2.7 (2.9) years for men (women) between 2005 and 2050, to reach a level of 20.5 (24.7) years, respectively. Compared to the life expectancy of the overall population, which increases by 3.1 (3.7) years until 2050, according to the 10th coordinated population projections, the gap between the life expectancy of civil servants and the overall population is assumed to diminish to some extent. For reasons of comparability, chart 4 also shows the further life expectancy according to the periodic mortality tables 2002/2004. According to the periodic tables life expectancy stays the same in 2050. This can be seen as a rough estimate for the lower boundary.

3.3.4 Retirement behaviour

The level and development over time of accrued pension rights depends also on the retirement age. When examining the total of civil servants, retirement does not always occur at the same age but is distributed over the age period of 60-65 years and sometimes even beyond. Therefore, age specific retirement rates are used, accounting also for deductions for early retirement. For certain groups of civil servants special rulings on the retirement age apply, e.g. soldiers. Retirement behaviour is also influenced by disability, which can occur at an age far below regular retirement age. To compensate for low pension levels due to disability, attribution times are being accounted for.

Retirement rates are presently determined by current retirement behaviour and held constant for future years. If in future legal changes occur, e.g. an increase in the regular retirement age from 65 to 67 years, this changes both current and future retirement behaviour. Changes in the assumptions on retirement behaviour will also apply if persistent changes in the employment behaviour are observed.

4. Data on accrued pension entitlements of federal civil servants

4.1. Estimates for 2002-2003

The accrued pension rights of federal civil servants for 2002-2003 were calculated using the assumptions of the baseline scenario. The baseline scenario is based on the mortality development according to the 2003 pension report, an earnings development according to the assumptions of the 2002/2003 Pension Insurance Reports and a discount rate of 5%.

Under these assumptions, the total of all pension entitlements of civil servants of the Federal Government¹⁸ amounted to EUR 58.9 billion in 2003. For international comparisons, the volume of old-age benefit entitlements is often put in relation to the gross domestic product. EUR 58.9 billion is roughly 3% of the gross domestic product of Germany in 2003.¹⁹ In comparison, the capital funds of

¹⁷ "Bevölkerung Deutschlands bis 2050 - 10. koordinierte Bevölkerungsvorausberechnung", Federal Statistical Office, Wiesbaden, 2003; "11. koordinierte Bevölkerungsvorausberechnung – Annahmen und Ergebnisse", Federal Statistical Office, Wiesbaden, 2006.

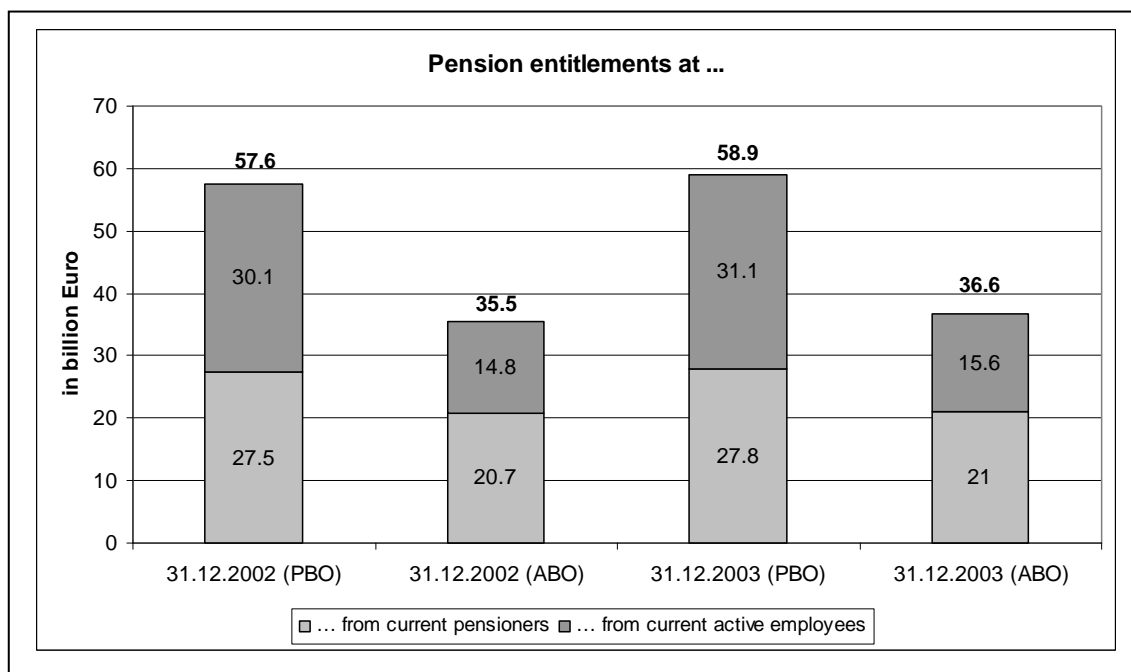
¹⁸ The population covered comprises about 130.000 civil servants and judges and 80.000 pensioners, widows and orphans.

¹⁹ An overview for various OECD countries is contained in Holzmann, Palacios, Zvinie (2004): *Implicit Pension Debt: Issues, Measurement, and Scope in International Perspective*, Washington. The compilation by Holzmann et. al. illustrates that the international comparability is considerably impaired by different definitions and assumptions.

the occupational pension system amount to EUR 500 billion.²⁰ The magnitude of those figures roughly corresponds to their respective shares in the total old-age benefits in Germany.

Within the scope of their tax balance sheets, companies must neither include future wage or salary rises nor future promotions when calculating accrued pension rights. In international accounting that method is referred to as the ABO method (Accumulated Benefit Obligation). If projections of the future career are included, the term Projected Benefit Obligation (PBO) is used. Both methods²¹ have specific advantages and disadvantages and both are mentioned as possible valuation methods in the new SNA 2008. A big advantage of the ABO method is especially its simple approach, which excludes future wage or career developments. Exactly that simplifying character, however, is also an argument against that method. Although it ensures easily understandable results, it systematically seems to underestimate the employees' entitlements because, as far as anyone can judge, general salary rises and individual promotions can be expected also for the future. The accrued pension rights calculated according to ABO and PBO differ considerably²². Entitlements according to ABO can be considered as the lower limit of the employer's actual liability, while including future promotions or salary rises is more in line with the fair value concept.

Chart 5: Comparison between accrued pension rights



It turns out that the accrued pension rights valued according to ABO changed between 2002 and 2003 by EUR 1 billion, whereas the PBO accrued pension rights rose by EUR 1.3 billion. Due to the

²⁰ cf. Deutsche Bundesbank (2007): Investment and financing in 2006, Monthly Report 6/ 2007, Frankfurt am Main. Comparing the entitlements towards the occupational pension system and the pension wealth is possible to a limited extent only, which is due to different discount rates and valuation regulations.

²¹ The definition of ABO is closely linked to national legislation. Therefore numerous types of ABO schemes exist. Some legal rules do not include any indexation of entitlements; others are indexed to prices or wages. The same holds for the indexation of pensions.

²² In practical accounting, there are various operationalisations of ABO and PBO. We defined ABO by intertemporally constant pensions and pension entitlements, while according to PBO all accrued pension entitlements of future years were dynamised.

longer period, that effect is stronger for the accrued pension rights of active civil servants than for those already receiving pensions. Changes in the assumptions on mortality, wage expectation or discount rate, which have an impact on the level of the accrued pension rights, are shown as Revaluations or Other Changes in the supplementary table presented below. This allows us to see whether changes in accrued pension rights are due to changes in the structure of insurants/pensioners or to system parameters. If, for reasons of comparability, we assume a civil servants structure with homogeneous age structure and constant recruitment of new officials every year, the accrued pension rights – ceteris paribus - would increase along with the rate of pension increase every year. The old-age pension system would be absolutely stable under those conditions.

Table 1 shows how the entitlements of pensioners and civil servants are distributed over the various pension types. The distinction between current pensions and future payments is important because the calculations on the pension stock are considered quite reliable. They require a markedly smaller number of assumptions than the estimations of pension payments to future pensioners.

Table 1: Pension entitlements for civil servants of the Federal government for the years 2002 and 2003 in the basic scenario

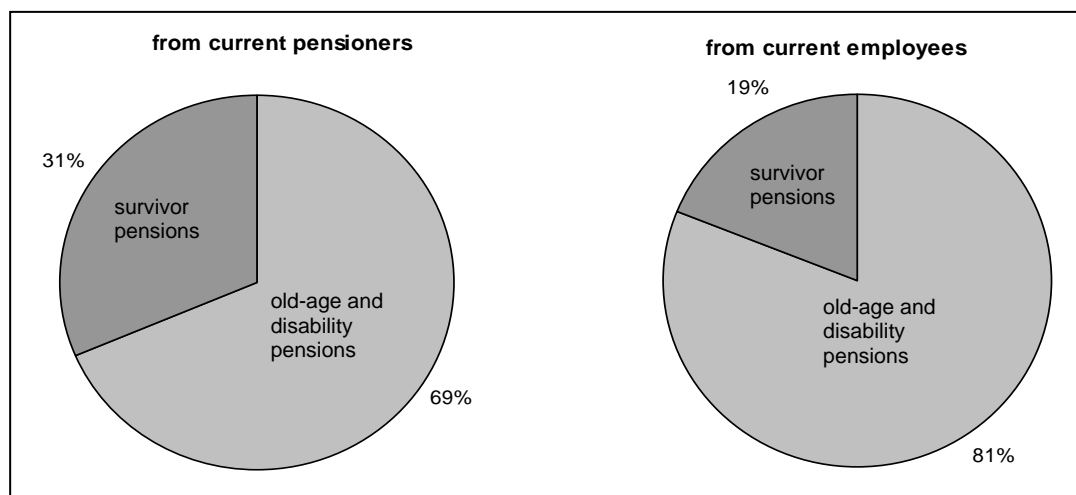
	31.12.2002		31.12.2003	
	PBO	ABO	PBO	ABO
Entitlements in billion Euro				
from current pensioners.....	27.5	20.7	27.8	21.0
thereof:				
from old-age and disability pensions	18.9	14.7	19.1	14.9
from survivor pensions	8.6	6.0	8.7	6.1
from current employees	30.1	14.8	31.1	15.5
thereof:				
from old-age and disability pensions	24.3	12.4	25.2	13.0
from survivor pensions	5.7	2.4	5.9	2.5
Total entitlements.....	57.6	35.5	58.9	36.5

Not including soldiers and civil servants of the German Railways, German Post and indirect public sector.

If we examine the structure of accrued pension claims by pension types (pension after reaching the general age limit or receipt of pension due to disability for service and receipt of widow's/widower's/orphan's pension), different shares of pension types in the total accrued pension claims are detected when comparing current pensions with civil servants' accrued pension entitlements for future pensions, see chart 6 (page 15).

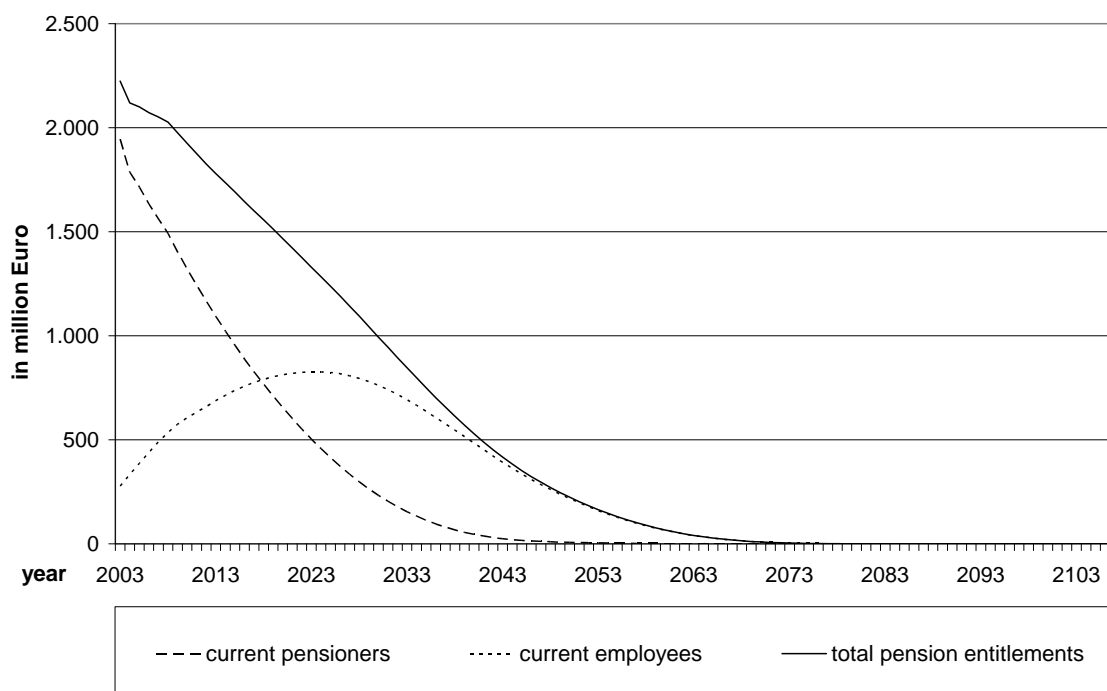
This is due to the difference in timing, i.e. when the pensions are paid. While widow's/widower's pensions have a share of 19% in the accrued pension claims for future pensions, the share in current pensions is 31%. As widow's/widower's pensions occur more often at an older age, the more strongly discounted accrued pension claims (because of the long time horizon) have a smaller weight in future pensions than in current pensions. Consequently, the share of regular pensions in future pensions (81%) is higher than in current pensions (69%) because they are included with their full period of receipt, whereas the current pensions take account of just an average period of receipt of all retired age cohorts.

Chart 6: Structure of accrued pension claims by pension type (2003, PBO)



Additional information on the intertemporal distribution of the required government expenditure is given by the development over time of the discounted pension payments, represented as the net present value of the accrued pension entitlements of the respective year, (c.f. chart 7):

Chart 7: Intertemporal distribution of accrued pension claims of 2003 (baseline scenario, PBO)



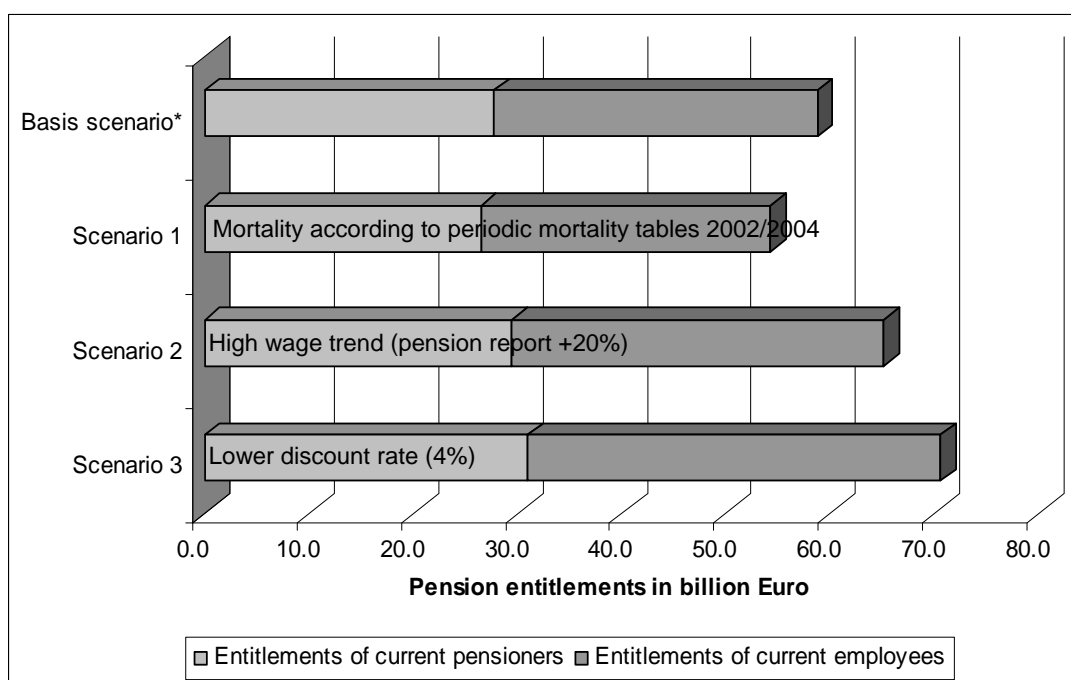
As the focus in this paper is on pension entitlements accrued up to now in a closed system, the amounts of accrued pension claims show a downward trend. The reason is that no new civil servants enter the system, while every subsequent year further persons (civil servants and pensioners) will leave the system through death. Whereas in 2024 accrued pension claims from current pensions will already be down to one quarter of the amount of the initial year 2003, the accrued entitlements to

future pensions will reach its peak in 2024 before decreasing again. This means that at that point in time, the increase in accrued pension entitlements caused by retirement of the remaining civil servants will for the first time be smaller than the cessation of accrued pension claims due to former civil servants dropping out. Furthermore chart 7 shows, that payments that will have to be made far in the future are hardly relevant when calculating the amount of total accrued pension claims in a closed system. The pension claims that will have accrued within 50 years, which is in this case by 2053, account for 98% of the total accrued pension claims. Consequently, long-term forecasts of the framework parameters (life expectancy, wage development) do not have to meet very high standards because the distant future has only a small quantitative impact on today's accrued pension entitlements.

4.2 Sensitivity analyses under alternative assumptions

In addition to the calculations of the baseline scenario, which represents the most plausible assumptions on mortality, wage expectations, discount rate and retirement behaviour according to current knowledge, the accrued pension entitlements of federal civil servants for 2003 referring to alternative assumptions will be shown in the following:

Chart 8: Accrued pension claims of federal civil servants, 2003, under alternative assumptions



Taking as a basis the above baseline variant, one parameter at a time will be modified and the accrued pension claims will be compared with those of the baseline scenario:

- It follows from the results shown in chart 8 that the discount rate variation has by far the largest impact on the level of accrued pension rights. A decrease in the discount rate by one percentage

point to 4% leads to accrued pension rights that are by 19% higher than those of the baseline scenario.

- The second most important factor influencing the accrued pension claims is pension indexation. Comparing the by 20% higher wage trend of scenario 2 with the basis scenario would result in accrued pension claims that are by 9% larger (using the PBO evaluation method).
- In third place are the different assumptions regarding mortality development. Assuming a life expectancy remaining at the level of the initial year (periodic mortality tables) will naturally lead to smaller accrued pension claims, which will be lower by 8% compared to the baseline variant.

4.3. The supplementary table on old-age pensions

The compromise regarding the treatment of pensions in the SNA 2008 includes an additional overview table on old-age benefits with results obtained by actuarial methods for all old-age pension systems²³. This supplementary table systematically shows in the columns the various old-age pension systems. Allocating the old-age pension systems to the core system or to the satellite system must be done according to coherent criteria in accordance with the compromise mentioned above. As the statutory pension insurance is not an old-age pension system of any particular employer, the entitlements calculated by actuarial methods must be shown as satellite accounts in the supplementary table. Similarly, the entitlements of civil servants pensions in Germany are covered by the satellite accounts and not included in the core system. The main reason for this decision is the similarity between civil servants' pensions and the statutory pension insurance. The catalogue of benefits, the redistribution mechanisms and the general inclusion of a person's entire working life are reasons for considering the system as part of the satellite accounts.

The rows of the supplementary table show the developments during a reporting period according to a uniform pattern, the balance sheet framework. The table starts with the opening balance and then shows all payment flows involved in the accrual and reduction of pension entitlements. Valuation changes and other factors are also included. The last element of the supplementary table is the closing balance, which at the same time is the following year's opening balance. The supplementary table shows all pension systems in which entitlements are acquired. Social assistance systems providing benefits without contributions being made by the persons concerned are not included in the table, nor are private systems outside social insurance.

The opening balance lists all entitlements to old-age benefits at the beginning of a year. This includes the value of pensions paid to current pensioners today and in the future and the value of entitlements acquired by the group of civil servants in the past. The value of EUR 57.6 billion was obtained based on the assumptions of the baseline scenario described above. The second part of the supplementary table headlined "Transactions" outlines the economic operations of the current year. First, it is shown how entitlements to future pension payments are accumulated by payments of social contributions.

²³ The general structure of the supplementary table is largely accepted at the international level. However, there are some controversial items left, such as how to classify reforms and how to treat promotions. The progress of the SNA revision can be followed on the United Nations homepage.

Since civil servants are concerned, social contributions belonging to the employment relationship consist only of imputed social contributions.

While pension rights are being accrued, entitlements are as well reduced due to pension payments, which amount to EUR 2.2 billion in the current year. In the supplementary table, the receipts side of the civil servants' pension scheme is not exclusively determined by employers' imputed social contributions. Since the civil servants' pension scheme is treated like a capital-funded system, the persons insured receive interest earnings from their property. The interest rate imputed in the baseline scenario amounts to 5%. Given a capital of EUR 57.6 billion, the property income is calculated at EUR 2.9 billion. Civil servants immediately pay the interest earned back into the account. The interest earned is then shown under the heading "Household social contribution supplements" in the supplementary table.

Table 2: Supplementary table on pensions: Germany, Federal Government

row	In billion EUR; 2003	Civil servants
	Opening balance sheet	
1	Pension entitlements	57.6
	Transactions	
2	Social contributions relating to pension schemes	4.4
2.1	Employer actual contributions	
2.2	Employer imputed contributions	1.5
2.3	Household actual social contribution	
2.4	Household social contribution supplements	2.9
3	Other accumulation of pension entitlements	
4	Pension benefits	2.2
5 (=2+3-4)	Change in pension entitlements	2.2
6	Changes in entitlements due to transfers of entitlements	
	Other economic flows	
7	Changes in entitlements due to negotiated changes in scheme structure	
8	Revaluations	-0.9
9	Other changes in volume	
	Closing balance sheet	
10 (=1+5+7+8+9)	Pension entitlements	58.9
	Assumptions	
	<i>Discount rate:</i>	5%
	<i>Wage growth:</i>	3%

The complete supplementary table can be found on the United Nations homepage²⁴.

The most interesting quantity of the receipts side - that is employers' imputed social contributions - is calculated as a balance²⁵. The background is the following: The volume of pension rights acquired by

²⁴ cf. <http://unstats.un.org/unsd/nationalaccount/snarev1.asp>

employees forms the hub of the new SNA. The social contributions recorded should exactly coincide with the amount of accrued pension rights. The acquired pension rights are calculated with the help of actuarial procedures. The actual social contributions of employees and employers are deducted from the accrued pension claims. The difference between accrued pension rights and contributions paid is referred to as imputed social contributions. In the context of occupational pension systems, the party responsible for the scheme - usually the employer - has to make up for the difference²⁶. In the supplementary table, this actuarial amount has an impact on net lending/net borrowing of general government.

According to SNA 93 employers' imputed social contributions are determined according to the contribution rate of the statutory pension insurance in the core system of national accounts. In the context of the supplementary table, however, the contributions are determined based on the above mentioned actuarial procedure. In our example the difference between the two approaches amounts to EUR 0.5 billion. The actuarially calculated value exceeds the SNA 93 figure by roughly 40% and the compensation of civil servants²⁷ in general government rises by about 7%.

At this point of the table, changes in pension wealth due to transactions have been completed. In purely mathematical terms, the overall change in wealth is defined as the difference between accrued pension rights and pensions paid. Unless assumptions have to be corrected or changes take effect in the framework conditions of the old-age pension system have to be considered, the volume of pension wealth at the end of the year is thus determined, too. Usually, however, projections are not that perfect and the environment variables as a whole are not that constant. We used the wage assumptions of the 2002 and 2003 Pension insurance reports. The assumptions of the 2003 report were by far lower. Smaller wage increases entail smaller pension adjustments and smaller pension wealth. While the volume of entitlements of civil servants based on contributions and benefits increased by EUR 2.2 billion, the stock of wealth rose only by EUR 1.3 billion. The revaluation of EUR -0.9 billion captures the effect of more pessimistic assumptions on wage growth.

The impact of revaluations on the results shows that a proper distinction between revaluations and transactions is very crucial. In the case of the wage assumptions the distinction is quite simple – if the whole time series is replaced routinely every year. In the case of economic behaviour, like a movement towards higher participation rates for elderly, the distinction is more complex. The correct identification of a new behaviour leads to a revaluation and the (wrong) treatment as random error leads to transactions. It is very important to notice that a revision of the wrong supplementary table is not foreseen. All corrections take place in the section other economic flows of the current year.

The effects of changes in valuation are not negligible in our example. And further and even more considerable changes would be conceivable. Longer life expectancy leads to an increase in the value of (already acquired) pension rights. Though, however, the monthly pension level does not change,

²⁵ In the context of our calculations, this quantity can be determined based on the difference between the opening and the closing balance and the other elements of the supplementary table. Although, however, an independent calculation would be possible, such calculation would be highly complex due to the large variety of factors to be considered.

²⁶ The balance can be either positive or negative. Negative values occur in cases where the discount rate is higher than the internal rate of the pension system. The internal rate is the discount rate at which the cash values of contributions and benefits coincide. A negative balance can hence be regarded as an implicit tax.

²⁷ Output of general government is affected in those areas where production is measured by the sum of inputs.

pensions will be paid over longer periods of time. Our calculations in the context of the baseline variant relied upon the assumptions of the 2003 pension report. Comparative calculations based on static mortality assumptions showed a EUR 4.5 billion decrease in the entitlements of civil servants. Considerably stronger effects are achieved by discounting accrued pension rights with a market interest rate. From 2003 to 2006, the yields of long-term public bonds (15 years) have dropped by one percentage point. Our sensitivity analysis showed that this will lead to a rise in wealth of approximately EUR 12 billion. If the above interest change were considered in the transactions part of the supplementary table, the change in pension entitlements would rise by 36 % and the imputed contributions by 60 %. Therefore the time series of labour cost could be very volatile. And finally, potential changes in wealth due to pension reforms should be noted. In this respect, too, larger effects on pension wealth would be conceivable. To mention just two keywords: a rising retirement age and further modifications in pension adjustments. Hence the time series of the stock of wealth can be subject to strong variations. With the help of the supplementary table, the causes of the variations can be analysed and the relevant development be evaluated. As a matter of fact, an isolated comparison of wealth stocks over time would be hardly informative.

5. Summary

The treatment of pension entitlements in national accounts will change. Whereas in the present SNA-93 and ESA-95 unfunded pension entitlements are not recorded (contingent liabilities/assets), the future SNA and ESA will require to show these items in a supplementary table in a balance sheet framework, broken down by type of pension system.

- The model presented in this paper is based on a accrued-to-date approach, i.e. the present value of future pensions due to past contributions of present employees have to be estimated as well as the present value of current pensions. Important input elements are the stock of active civil servants and of pensioners (broken down by gender and career path) on one hand, and information about the distribution of entry-dates, part-time quotas or suspensions on the other hand. In addition, assumptions are needed for the model parameters like mortality, discount rate, wage trend or retirement behaviour.
- Data have been compiled according to the ABO and the PBO-method, the latter includes projections on the wage trend and the future career. The PBO estimates on the present value of pension entitlements exceed the ABO figures by 60%.
- Sensitivity analyses show that depending on the actual assumptions used in practice, the results may vary considerably. The highest impact is caused by the discount rate: A decrease of one percentage point increases the present value of pension entitlements by almost 20%. Another factor with high influence is the wage trend assumption. Using a 20% higher wage trend would increase the present value by about 10%.
- In addition to providing the stocks of the present value of pension entitlements, the supplementary table records the flows (transactions and other economic flows), connecting the opening and the closing stock. This allows to analyse and to explain the developments.

Furthermore, the data in the supplementary table may be used to include the change in pension entitlements in household saving, if used for international comparisons.

To sum up: Computing the overall pension wealth requires time-consuming model calculations. The results of calculation depend to a great extent on assumptions and are subject to considerable fluctuations. The calculations outlined with respect to the civil servants' pension scheme form the basis for further computations. For this reason, a great effort is still required before the supplementary table will be complete. In addition it should be recalled that the demographic change has an impact also on other issues like the health and education sectors.