DEMOGRAPHIC CHANGE AND FEDERAL SYSTEMS: SOME PRELIMINARY RESULTS FOR GERMANY [1]

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Abstract

The paper examines the impact of demographic change on federal, state and local government expenditures in Germany. Public spending is broken down into almost 30 categories (functions) and simple estimates of age cost profiles are derived. Using population forecasts and assuming time-invariant age cost profiles we estimate the effects of the ageing of the Germany society on the level and structure of expenditures at the three layers of governments. Our results show that subnational governments - state and local governments - can expect demographic savings whereas the federal government will live to see a worsening of its fiscal stance. Thus one should expect that significant vertical expenditure imbalances will arise that - if institutional settings are left unchanged - will ask for an adjustment of revenue distribution within the federation.

JEL classification: J1,H1,H7.

1. INTRODUCTION

Germany, as well as most other industrialized countries faces pronounced demographic challenges in the next decades: An ageing society, a low fertility rate, a declining population and workforce as well as significant redistributions of population within and across regions. These demographic changes will have considerable effects on the economy and virtually all policy areas. In recent years, a substantial body of "demo-economics" literature has developed and addresses issues such as the construction of a sustainable old-age pension system[2], the impact of ageing on health expenditures, the labour market[3] (productivity, labour market participation etc.) and economic growth as well as public sector budgets in general.

The present paper is devoted to an examination of the fiscal consequences of demographic changes in federal systems, a subject that has been rarely discussed.[4] Notable exceptions are the studies by Lazar/St-Hilaire/Tremblay (2003), Matier/Wu/Jackson (2001), Ruggeri (2001), the Conference Board of Canada (2002) and the theoretical work of Echevarría (1995). Most studies that address fiscal issues examine the budget of the central government or the total government sector. However, in federal systems repercussions of demographics on public expenditures and revenues can differ significantly across levels of governments. In addition, at the subnational government level, the regional dimension of demographic change has to be taken into account. However, the latter subject is not touched upon in the subsequent discussion and we confine our examination to the central government level as well as the aggregate state and local government level. Contrary to OECD practice the social security system is *not* included in our definition of the public sector.

The purpose of the paper is to present preliminary results on the impact of demographic change upon the level and structure of expenditures by level of government as well as potential vertical fiscal imbalances across the different layers of government in Germany. Our results are preliminary because we do not take into account the revenue side and

[1] The present paper has been prepared within the research project DFG-Schwerpunktprogramm 1142 "Institutionelle Gestaltung föderaler Systeme: Theorie und Empirie" financed by the German Research Foundation.

[2] See for example Börsch-Supan (1999), Dang (2001) or Turner et al. (1998).

[3] See for example Börsch-Supan (1996), Faruqee (2002) or Leibfritz et al. (1995).

[4] However, Färber (1988) presented a discussion of the budgetary impact of demographic changes for the former West Germany already 20 years ago.

the evidence presented rests upon rather simplifying assumptions.[5] We start in section 2 with a brief discussion of the most important demographic facts in Germany. Section 3 outlines the fiscal federalism system in Germany and methodical issues are discussed in section 4. In section 5 we construct very simple age cost profiles by government functions and develop estimates of potential vertical fiscal expenditure imbalances induced by demographic changes. A final section summarizes our results and outlines prospects for further research.

2. DEMOGRAPHIC CHANGE IN GERMANY

Looking at demographics in Germany one observes marked differences between East and West Germany. There are two main reasons for the east-west differential: After the fall of the iron curtain in 1989 the birth rate in East Germany dropped to a dramatically low rate of about 0.75 in the early nineties. In recent years fertility has started to converge around the West German average of about 1.45. In addition, due to the poor economic performance of the East German economy there are rather strong east-west migration-flows. Hence, the East German population declined by about 7.5% in the period 1991 - 2003 whereas the population size in West Germany increased by about 5.9%. Low birth rates and high out-migration especially of younger persons considerably speed up the ageing process in East Germany. Consequently, the average age of the East German population will exceed that in West Germany by about 5 years in 2030.

According to the population forecast[6] of the Federal Statistical Office of Germany the total population in Germany will decline by about 4% in the period 2002 - 2030, see **figure 1**. In West Germany (excluding Berlin), a more or less stable population is expected in this period and until the year 2020 there will even be a slight increase. However, for the period after 2030 the population size in West Germany is forecasted to drop significantly. In East Germany (excluding Berlin), the population size will decline by more than 10% until 2020 and in the year 2030 the population size will be almost 20% lower than in 2002. In the next step we look at the three most important age cohorts: The young generation, 5-29, the elderly, 65+, and the work force, 15-65. The share of the age cohort 5-29 which demands the services of the education system (schools and universities) will decrease from about 26% in 2002 to about 18% in East Germany and to about 24% in West Germany in 2020 (**figure 2**). However, in the years after 2020 there will be an east-west convergence process and the share of this age group will approach a level of about 21% in both parts of the country.

The share of the elderly, 65+, is currently about 17% in East and West Germany. For the reasons mentioned above, the share of the elderly will increase considerably stronger in East Germany than in West Germany. In 2030 about 33% of the East German and about 27% of the West German population will at least be 65 years old, see **figure 3**. The most dramatic changes will be observed for the very old (80+), whose share will increase from about 3.9% in 2002 to 7.3% in 2030 and to about 12.1% in 2050. There are also marked differences between East and West Germany with respect to the working age cohort, 15-65. Currently, in East Germany this age group amounts to a share of about 70% of the total population and slightly exceeds that in West Germany (67%). Up to the year 2030 this share will decline to about 56% in East Germany and to about 61% in West Germany, see **figure 4**.[7] The main reasons for

[5] Recently we started a research project on the issues discussed in this paper and future research will relax many of our simplifying assumptions.

[6] The data on future demographic developments used in this report are derived from the "10th Coordinated Population Projection" (variant 5) of the Federal Statistical Office of Germany.

[7] As a matter of course, both the share of the elderly, 65+, as well as the share of the labor force, depend upon the working or retirement age. One should expect that in the next decades the retirement age will increase significantly. In addition, one has to consider that the age cohort 15-65 is not a good estimator of the active labor force because of changes in the unemployment rate. (Female) labor market participation rate as well as changes in the length of

the demographic developments in Germany sketched above are the low total fertility rate, defined as the average number of children per women, and the increase in life expectancy. The total fertility rate declined from about 2.3 in the 60ties to about 1.45 at the turn of the century. In the EU, only Spain, Greece and Italy have lower fertility rates. On the other hand, life expectancy (of new-borns) in Germany is forecasted to increase from 74.8/80.8 (male/female) in 2000 to about 80/85 (male/female) in 2030.[8]

3. THE FISCAL FEDERALISM SYSTEM IN GERMANY IN A NUTSHELL

For our subsequent investigation some knowledge about fiscal federalism in Germany is necessary. The Federal Republic of Germany (FRG) consists of three levels of government: federal (Bund), state (Laender) and local (Gemeindeebene). The German constitution (Grundgesetz) defines the responsibilities of the different levels of government. Local governments are responsible in particular for local utilities and services such as water supply, sewage and waste disposal, the construction and maintenance of local roads, etc. As to education the local government sector is completely responsible for pre-primary education (kindergarten) and the construction as well as maintenance of school infrastructure (school buildings). In addition, local governments provide supplementary welfare benefits, especially social assistance benefits. These expenditures have increased considerably over the past 25 years. However, in 2005 a labour market reform was implemented ("Hartz IV") which decreases local social assistance expenditures significantly because supplementary benefits to the unemployed - financed by the federal government - as well as social assistance benefits for persons at working age - financed up to 2004 by local governments - are consolidated in a new tax financed welfare system at the federal level. The constitution guarantees communities the right to manage their own affairs independently. However, in practice this independence is quite restricted because the local governments rely heavily on grant financing from state governments and the vast majority of expenditures is mandatory and regulated by standards. The states are responsible for cultural affairs, school education (teachers), university education, the administration of justice as well as police. In housing and health services, both subnational government levels are involved. The federal government is responsible for foreign affairs, defence and supplementary benefits to unemployed persons. Moreover, the federal government provides considerable amounts of conditional as well as unconditional grants and transfers to the state level.

The main characteristics of the fiscal federalism structure in Germany can be summarized as follows:

- Joint taxes predominance. In 2003 about 68% of all tax revenues belonged to this type of taxes. About 20% of tax revenues accrued to the federal government only, about 4% to state government and about 8% to the local government sector.
- Subnational governments have a rather low power to set taxes. State governments are even more restricted than local governments. However, the federal government has to pass a law by voting in the Upper Chamber (Bundesrat) if it intends to change tax rates of joint taxes or tax rates of taxes that are earmarked to the states and the states participate in the legislation process. Thus, the states can jointly influence tax policy but none of the states can fix tax rates individually. In addition, the states and the federal government negotiate the distribution of tax revenues out of shared taxes between levels of government.
- At the state level there is a pronounced fiscal equalization system in which financially strong states make equalization payments to financially weak states. The federal government provides complementary federal grants (Bundesergänzungszuweisungen) to

the education period affect the potential labor force estimates.

[8] For more details on population forecasts in Germany see: Federal Statistical Office of Germany (2003).

financially weak states. The strong equalization system brings about a rather weak correlation between state economic performance and per capita state revenues.
- Intergovernmental transfers are of considerable importance both between the federal and state government sector as well as between state governments and the local government sector. The rather high transfer intensity in Germany results in a severe loss of transparency of the flow of public resources.
- Finally, co-financing of tasks is quite common in Germany and consequently there is no clear division of (political and financial) responsibilities of the different layers of government.

Table 1 presents data on the transfer system in Germany for the year 2001. Contrary to our definition of the government sector - federal, state and local government sector - we also include the social security system in the table because of its significant dependency on federal transfers. At the state level, about 16% of all expenditures are financed by other levels of governments, of which the federal government is the most important donor. In East Germany this share is close to 40% and in West Germany about 12%. Local governments cover about 34% of their expenditures out of grants (from state governments) and here too we observe marked differences between East (almost 60%) and West (about 28%) Germany. About 17% of expenditures of the social security system are transfers from the federal budget.

Table 4 also reports the share of expenditures at the various levels of government that are spent as transfers to other levels of government. The federal government's share is almost 50%, the bulk of which are transfers to the social security system (about 55%) and to the state governments (about 30%). In West Germany about 20% of state expenditures are intergovernmental transfers, in East Germany this share amounts to about 35%, most of which are targeted towards the local government sector. In part B of the table we show the most important sources of revenues: Taxes and social security contributions (B.1) and transfers from other levels of governments (B.2). At the federal government level almost 90% of all revenues come out of taxes. At the state level this ratio is about 76% in West Germany and less than 50% in East Germany. Local governments in West Germany collect about 38% of their revenues out of taxes, whereas in East Germany this share is well below 20%.

Thus, the figures in table 1 reveal the close fiscal interrelations between the different layers of governments at both the revenue and expenditure side of the budget. It is not difficult to imagine that these strong interdependencies make the political system in Germany rather sensitive to log-rolling and pork-barrel policies, create inefficiencies and inflexibilities. In addition, the properties of the fiscal federalism system in Germany have important implications for the discussion of the impact of demographic change:
- On the revenue side the predominance of shared taxes and the strong fiscal equalization system result in a "smoothing effect", i.e. differences in tax revenue capacity induced by demographics are smoothed away at.
- The strong financial interrelations between the different levels of governments on the expenditure side contribute to some "risk sharing" of the effects of demographic changes, too. However, the smoothing effect is considerably lower than on the revenue side.

We finally take a short look at the distribution of expenditures across levels of governments. Because of the importance of intergovernmental transfers the expenditures of the various government levels cannot simply be added. Therefore, we use *net expenditures ("Nettoausgaben")* defined as total expenditures minus transfers received from other levels of governments. Thus, we can aggregate spending across the different layers of government. **Figure 5** presents data on the (net) expenditure shares[9] of the three layers of government[10] in

[9] In 1997 there was a change in the statistical report on government expenditures in Germany. Until 1997 (public) hospitals were included in the fiscal data

Germany before and after unification. The federal government sector accounts for about 50% of total net government expenditures. This share has not changed systematically since 1975. Expenditures of state governments amount to about 35% of total expenditures. In the 1990s there was an upward trend of this share whereas the share of local government expenditures slightly decreased. The main reason for this decline of local government's share of expenditures is the strong drop in infrastructure spending in recent years. The increase of the share of spending at the state level is mainly due to the rise in pension payments for retired public servants and interest payments.

In **Table 2** we report the importance of the different functions for public spending at the federal, state and local government sector. At the federal level the two most important spending categories are welfare (38%) and transfers to other levels of government (30%). The next important government function is defence (10%). Only about 4% of federal expenditures are spent on education. At the state level, spending on education has the highest share (about 30%) and the second most important spending category are transfers to local governments (about 28%). Public order (police) as well as social welfare account for about 10% of state expenditures. Public administration (esp. state ministries) consumes about 6% of total expenditures. All other government functions are of rather small importance. At the local level, spending on social welfare amounts to about 30% of expenditures. Most of these expenditures are means-tested social assistance benefits. About 20% of local government resources are spent on community development and housing as well as education.

It should be noted that spending on health out of public budgets is of only minor importance at the federal, state and local public sector in Germany.[11] Public health expenditures are financed out of social security contributes. However, at the state and local government sector health related expenditures arise due to the public sector providing investment grants for hospital buildings and homes for the elderly and the disabled. In addition, there are means-tested social assistance benefits for handicapped and elderly persons ("Hilfe zur Pflege").[12]

Table 3 reports the distribution of net expenditures by function across the three layers of government. We will only comment on the most notable facts. In public order and safety, the bulk of expenditures accrues at the state government level. In the education system, spending by the federal government is of only minor importance whereas the states account for about 70% of education expenditures. 2/3 of welfare spending are borne the federal government which provides massive transfers to support the unemployed as well as the public pension system. Thus, from table 3 we can conclude that subnational governments are in charge of public services targeted to the younger generation (education) whereas expenditures of the federal government are biased towards the elderly. Consequently, one should expect that the demographic changes will increase the fiscal burden of the federal government whereas the subnational government sector might benefit from the declining share of the younger generation.

4. SOME METHODICAL ISSUES

whereas after 1997 hospitals have been taken out of the public budgets. Only transfer payments to hospitals - most of which are earmarked to investment expenditures and some transfers to university hospitals – have been included in the data since 1998. We estimated state and local government sector spending before the year 1997 excluding hospitals in order to make the time series comparable.

[10] The federal government share also includes transfers to the EU as well as various special funds. The local government sector also includes special purpose local governments most of which are responsible for providing general community services such as waste disposal etc.

[11] In 2001 total health expenditures in Germany amounted to about 227 bn Euro (about 11% of GDP). The bulk of these expenditures were covered out of social security contributions whereas only about 8.1% of total health expenditures were financed out of the budgets of federal, state and local governments.

[12] However, these expenditures are covered in item 6 in table 2 (social welfare).

Before we turn to our empirical investigation we examine some methodical issues that arise if the effects of demographic change on public budgets are examined. Total public expenditures can be written as:

$$(1) \qquad E_t = \sum_{j=1}^{J} E_{j,t} \, .$$

$E_{j,t}$ denotes expenditures in spending category j in period t. A decomposition of expenditures by age groups can be achieved by using the *age cost profile* concept and rewriting public expenditures as:

$$(2) \qquad E_t = \sum_{j=1}^{J} \sum_{x=1}^{\bar{x}} N(x,t) e(x,j,t) \, .$$

N(x,t) denotes the population of the age x ($\bar{x}$ is the maximum age) in period t und $N_t = \Sigma_x N(x)$ total population. The variable e(x,j,t) is the age cost profile which provides information on per capita spending on citizens aged x for the public good j (such as education, health, etc.) in period t. If the public good j is not age-specific (such as defence) the entries in e(x,j,t) are identical across all age groups. A corresponding *age revenue profile* can be constructed for taxes, user fees, social security contributions etc. In addition, one can also add other socio-demographic dimensions or construct multi-dimensional categorizations such as age and gender cohorts, membership to different ethnic groups (natives vs. immigrants), or types of households etc. If we had information about the age cost profiles of the various public sector spending categories as well as population forecasts - differentiated by age – we would be able to forecast the impact of demographic change on public expenditures. This would be a very simple exercise if we assumed that the age cost profile were time-invariant, that is $e(x,j,t) = e(x,j,t+\tau) = e(x,j)$, for $\tau > 0$.

As a matter of course, one should expect that age cost profiles differ considerably across various spending categories (functions). Spending on education for example is primarily targeted at the young whereas health expenditures are higher for the elderly than for the young. In some categories a clear differentiation according to age groups might be very difficult or even impossible, as for instance in general public service provision or in public order and safety. In addition, the cost of providing services to a specific age group is affected by the behaviour of other age groups. Kindergarten services are a good example for the latter. The "demand" for kindergarten services does not only depend on the number and age structure of the kids but also on social norms in societies, the female labour market participation rate etc. This means that the cost of providing kindergarten services can increase despite a drop in birth rates if for example female labour participation rates increase.[13] As a matter of course, numerous other factors affect age cost profiles. Thus for example, the efficiency of the public sector as well as input prices are important determinants of the cost of public service provision. Finally, one has to take into account that age cost profiles are hard to compare across different countries because public and private service provisions differ considerably. In Germany private universities as well as private schools are still of minor importance whereas in other countries, such as the US, private institutions in the education system are of far greater importance. Even stronger distinctions can be observed with respect to the financing of health care and the pension systems across countries.

In federal systems different layers of government perform different tasks and therefore the aggregate age cost profiles vary across the layers of government. Consequently, spending of the different levels of government should have a quite varying sensitivity with respect to demographic change. **Figure 6** presents stylized age cost profiles aggregated across all spending categories for the three layers of government taking into account the division of tasks in Germany. State and local government age cost profiles are expected to

[13] In fact, the demand for kindergarten services should be considered a "derived" demand.

have a peak for younger cohorts due to the responsibility for education whereas the age cost profile of the federal government is expected to be biased towards the elderly.

We already mentioned that in Germany 2/3 of tax revenues come out of taxes and thus, the corresponding age revenue profiles should not be that much different across the layers of government in Germany. In addition, the fiscal equalization systems at the state and local government level as well as the high volume of interjurisdictional fiscal transfers should work towards a marked convergence of age revenue profiles across the three levels of governments. For the latter reason we restrain from considering age revenue profiles in this study.

A final issue that has to be discussed is the stability of age cost and revenue profiles across time. One should not expect that these are time-invariant.[14] Thus for example, in the past we observed health care price indices to rise considerably faster than the average price level. This tendency - despite many policy actions to curb costs in the health sector - might well continue in the future resulting in a relative increase of the cost of servicing the elderly. In addition, the resources devoted to specific age groups (public education, cultural activities etc.) are decided upon in a political process of voting and the ageing process can result in a shift of political majorities that ask for different bundles of public goods. Finally, cohort behaviour changes over time, that means, that identical age cohorts at different times have different demands for public goods. Education is an good example: 20 years ago a smaller share of the young population attended universities and thus the demand for education of this cohort for this type of public services has been significantly lower than for the current living cohort in this age group. However, none of these and related issues are addressed in the present paper.

5. SOME PRELIMINARY ESTIMATES ON THE EFFECTS OF DEMOGRAPHIC CHANGE ON PUBLIC EXPENDITURES BY LEVEL OF GOVERNMENT IN GERMANY

In this section we use a simple simulation technique to derive estimates of the effects of demographic change on public expenditures at the various levels of government in Germany subject to the following assumptions:

1. The population is divided into six age groups.
2. Age cost profiles are assumed not to change in the period 2001 to 2030.
3. The public expenditure structure is perfectly and instantly adjusted[15] to changes in the age composition as well as the size of the population.
4. Price effects (wage and price inflation) as well as real growth are disregarded.
5. "Estimates" of age cost profiles are derived from data for the fiscal year 2001 as explained below.
6. We assume that the distribution of tasks between the different levels of governments as well as the legal and institutional settings do not change in the period 2001 to 2030.

In the education system, assumption 3 implies for example that the total volume of education expenditures is adjusted proportionally to any change in the number of school-aged person leaving per capita spending for the relevant age group unchanged. Disregarding price and real growth effects (assumption 4) means that our estimates compare the level and structure of public expenditures in the year 2001 to that level and structure of public expenditures that would prevail if the number and age structure of the population in 2001 were identical to that forecasted for the year 2030. Thus, we conduct a comparative static experiment isolating the effects of demographic change. Under this set of simplifying assumptions it is rather easy to

[14] See Franco and Munzi (1997).

[15] In a short-run or medium-run perspective the assumption of immediate adjustment is rather unrealistic because of indivisibilities as well as resistance to adjustment by public servants and other interest groups. For empirical evidence in the education system see Poterba (1998), Baum and Seitz (2003), Kempkes and Seitz (2004).

compare the structure and the volume of public expenditures by level of government in the year 2030 to that of 2001 and to examine the question whether vertical fiscal expenditure imbalances arise out of demographic changes.

After discussing our assumptions we now turn to the derivation of highly stylized age cost profiles. All relevant assumptions about the "demand" for public services by the various age groups are reported in **table 4**. The entries in the table constitute a matrix of age-cost profile *indicators* which can be written as I(j,x). The index j = 1, ..J (J = 29) denotes the government function and the index x = 1, ..X (X = 6) is the age category. *Per capita* expenditure on a representative member of age group x in function j at the government level f is calculated as:

$$e(x,j,f) = \frac{E_j^f}{\sum_{x=1}^{6} I(j,x)N(x)} I(j,x). \qquad (3)$$

E_j^f denotes expenditure of the government level f (f = federal, state, local) in government function j in fiscal year 2001. A "0" entry in table 4 means that the specific age group does not consume the public good provided within the specific government function. The entries in table 4 have been derived by examining the public services provided in the various age groups and are based upon "subjective" judgements as well as empirical facts[16]. Note that the matrix I(j,x) is identical across government levels but age cost profiles differ because the government sectors spend different amounts of money in the various categories. In a second step we calculate *aggregate age expenditure shares* for the different levels of government, f:

$$\varepsilon(x,f) = \frac{\sum_{j=1}^{J} e(x,j,f)N(x)}{\sum_{j=1}^{J} E_j^f}. \qquad (4)$$

ε(x,f) denotes the share of expenditures at government level f[17] devoted to age group x.[18] It is important to note the differences between age cost profiles and age expenditure shares. Whereas age cost profiles provide information about per capita spending per person at some specific age, the age expenditure shares provide information about the share of public expenditures spent on a specific age group.[19]

Figure 7 presents estimates of per capita spending on each age group aggregated across all government functions by level of government in 2001 in Germany.[20] The highest per capita expenditures we get at the the federal level for the elderly due to the massive transfer payments of the federal government to the public pension system. State and local government spending on the other side is biased towards the younger generation. The main reason for this is the fact that responsibility for the education system - including kindergarten - rests upon states and local governments.[21]

[16] For instance, we collected data on the age structure of students, social assistance recipients, people imprisoned, etc. See Seitz (2004) for detailed evidence. In our future work we will discuss the rationale of the entries in table 4 in more detail.

[17] By construction expenditure shares within *each* spending categories are identical across the three layers of government.

[18] In equation (3) and (4) we suppressed the time index t for the sake of convenience.

[19] Recall, that in our definition the social security system is not part of the government sector and therefore social security spending is not included in the list of functions covered in table 4.

[20] By assumption, these are identical to the age cost profiles in 2030!

[21] At the current stage of our research we implicitly assume that the retirement behaviour of public servants is identical to that of the total population. In future research we will refine our method by looking at the age structure of public servants more precisely (see for example Fester and Thum, 2003). Pensions to public servants are of considerable importance in Germany and amounted to about 2.1% of spending at the federal level, 7.4% at the state level and 4.0% at the local government sector in 2001.

In a next step we forecast expenditures in 2030 at each level of government using the age cost profiles derived above and population forecasts. The resulting age expenditure shares are presented in **figure 8a** (federal), **8b** (state) and **8c** (local). We can see that the share of expenditures devoted to the younger generation drops significantly for all levels of government whereas spending shares on the elderly increase. Taking into account our discussion above as well as the trend towards the ageing of the society this result is as a matter of course no surprise. However, the crucial questions are, whether these changes result in an increase in total expenditures and whether this process is accompanied by vertical fiscal expenditure imbalances.

Therefore, in a final step we calculate the impact of demographic change on expenditures by level of government in the period 2001-2030. The results are reported in **table 5**. The *level* of total government expenditure is likely to increase by about 2.7% with rather dramatic differences across government levels. Whereas total federal expenditures will increase by about 11%, state and local level expenditures will decline by 3.7% and 6.7% respectively. Because the population declines in the period 2001 to 2030, per capita spending of the federal government will grow even slightly stronger and per capita spending at the subnational level will decline by less than the volume of expenditure.

As a matter of course, the different expenditure growth rates reported in table 5 have considerable effects upon the distribution of expenditures across the three levels of government, see **Table 6**. In the year 2001 the federal government accounted for about 45.7% of total public net expenditures. This share will increase to about 49.6% in 2030. In the same period, the state expenditure share will decrease by about 2.2 percentage points and by about 1.5 percentage points at the local level. The reason for the strong negative impact on state government spending is the drop in both the share and the number of younger people that demand (expensive) education services, which are mainly accounted for by the state government sector. On the other hand, the federal budget seems to bear the main fiscal burden of demographic change and will get under fiscal pressure as the number and share of the elderly increases. The reason for this is the fact that in the future - taking the current legal and institutional framework as given - larger amounts of federal money will have to be spent on supplementary transfers to the public pension system.

Thus, our simulation results suggest that demographic change will result in significant vertical fiscal imbalances in Germany "favouring" the subnational government sector. As there are no "automatic" adjustment mechanisms that bring about a corresponding change in the distribution of tax revenues across the three layers of government, the federal budget will live to see a deterioration of its fiscal stance as a result of the ageing process in Germany.

6. CONCLUSIONS AND PROSPECTS FOR FURTHER RESEARCH

The paper discussed the fiscal consequences of demographic change in a federal system taking Germany as an example. Using a very simple technique we derived estimates of the likely impact of the ageing of the society on federal, state and local government expenditures. The revenue side has been completely disregarded because of the peculiarities of the German system of revenue distribution across the various levels of government. Our preliminary results suggest that the federal government will have to bear the main fiscal burden of demographic change whereas subnational governments can realize demographic savings, if expenditures are adjusted to the changing size and age structure of the population. Most of the savings arise in the education system because of the decline of the relevant age group. This result is in sharp contrast to a recent study of the EU Economic Policy Committee (2003). The reason for these different results is the fact that the EU-study assumes an increase in per pupil/student expenditure in Germany due to an increasing share of young people attending university in the

next decades.[22] In addition our results suggest that in the near future significant vertical imbalances will occur in Germany. These imbalances ask - if our estimates are at least qualitatively correct - for an adjustment of revenue distribution in the federal system or stiff policy measures to curb the impact of the costs of ageing upon the federal budget. It is interesting to note, that a recent study for Canada, see Conference Board of Canada (2002), arrived at quite different conclusions. This study predicts that ageing will put pressure on provinces and will contribute to an improvement of the fiscal stance of the federal government. The main reason for the differences between Canada and Germany seems to be that the Canadian Provinces are responsible for providing tax financed health care. Thus the federal distribution of the fiscal burden of demographic change can be quite different across federal countries due to varying institutional frameworks.

Our procedure rests upon rather mechanical forecasts of the effect of demographic change on public spending. Future research has to develop more refined methods. Accounting for cohort effects appears to be one of the most important factors in our opinion. Future cohorts might have different preferences than cohorts currently living (see for example the increase in the demand for education) and the size of the cohorts might affect cohort behaviour. An increase in the share of the elderly for example increases the per capita cost of providing services to the elderly for the working-age cohort which might result in downward pressure on the supply of per capita public services for the elderly. For education the reverse effect should apply. In addition, public choice aspects have to be incorporated. One should expect that intergenerational conflicts might arise because the political power of the elderly increases relatively to that of younger cohorts and this should have an impact on the provision of public services. Endogenous policy responses should also be modelled. Fiscal pressure created by demographic change will induce changes in policy such as reducing service levels, increasing private contributions to cover cost, changing the financing of the social welfare system, etc. Finally, all feedback-effects of changing demographics upon the economy (prices, employment, growth, etc.) have been completely neglected by us. Thus, a lot of important issues remain for further research.

Without doubt, our very simple simulation model has considerable deficiencies. Due to rather restrictive and simplifying assumptions our results should be considered as preliminary estimates of the likely effects of demographic change on spending in the German federal system. However, due to the division of tasks among the different layers of government one should expect that at least the qualitative main conclusion - increased spending pressure at the federal level and the possibility to achieve expenditure savings at the subnational level - should hold even under a set of more realistic assumptions.

[22] However, the arguments in this study are by no means convincing because the well developed vocational training system in Germany is not properly taken into account.

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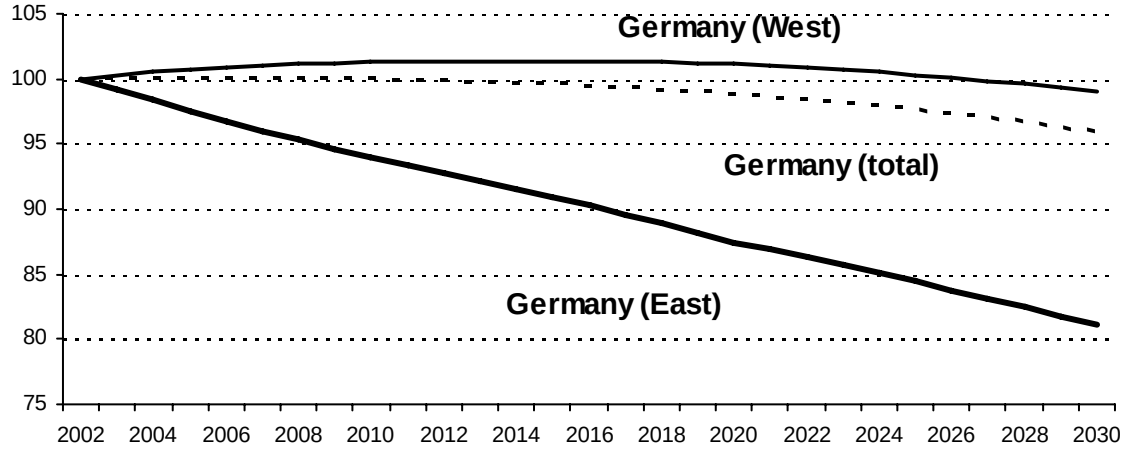
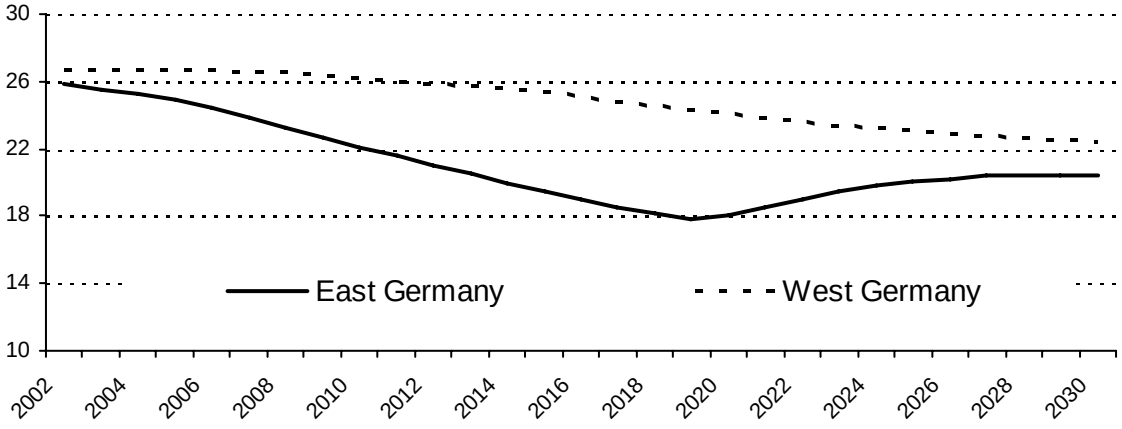
FIGURES AND TABLES

Figure 1: Population size in Germany 2002 - 2030: Normalized series: 2002 = 100



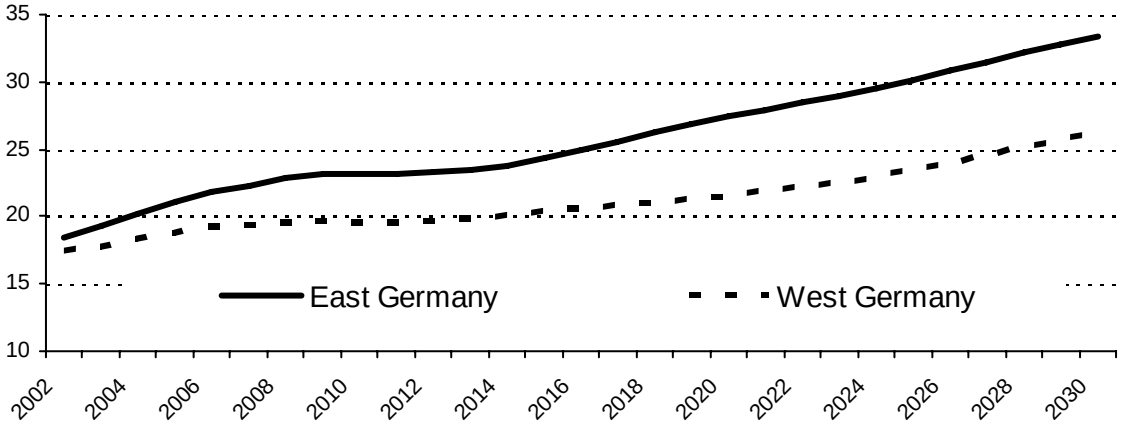
Source: Calculated from data supplied by the Federal Statistical Office of Germany.

Figure 2: Population aged 5 - 29 in East and West Germany as a share of total population



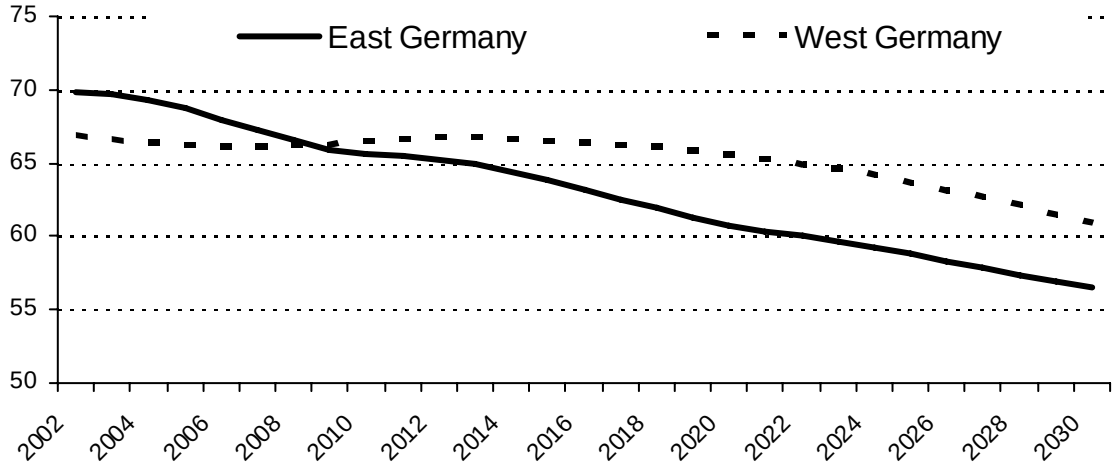
Source: Calculated from data supplied by the Federal Statistical Office of Germany.

Figure 3: Population aged (65+) in East and West Germany as a share of total population



Source: Calculated from data supplied by the Federal Statistical Office of Germany.

Figure 4: Work force (15 - 65) in East and West Germany as a share of total population



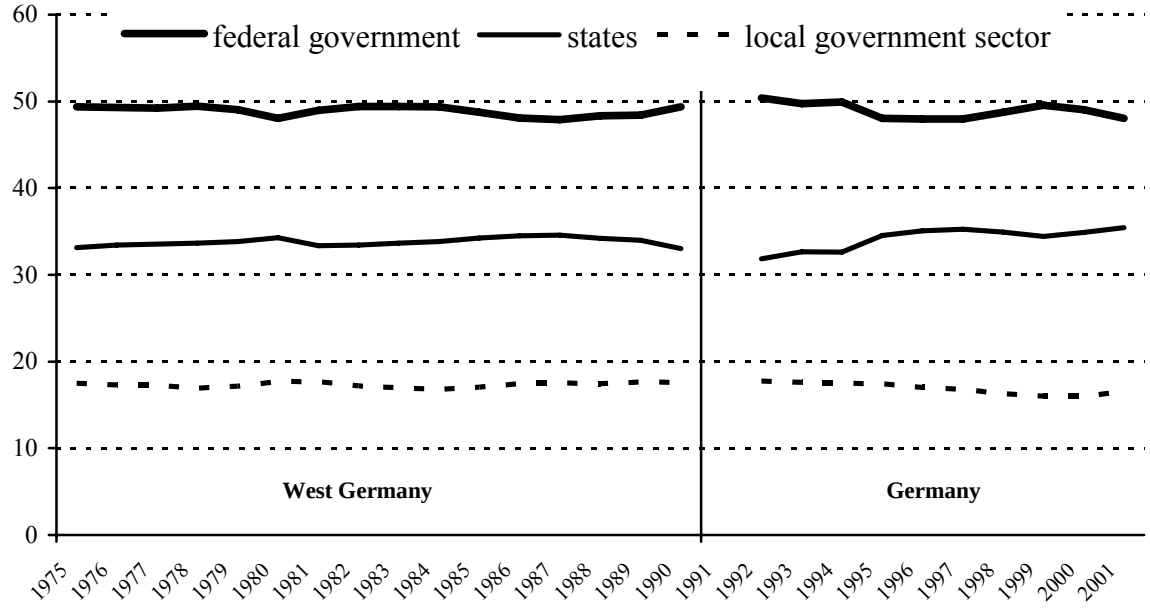
Source: Calculated from data supplied by the Federal Statistical Office of Germany.

Table 1: Key-Data on intergovernmental fiscal relations in Germany in 2001

	Federal	state	local	social sec.
A.1 Share of expenditures financed by transfers from other levels of government				
total	1,4	16,2	33,7	17,1
West Germany		12,0	28,4	
East Germany		39,5	59,4	
A.2 Transfers to other levels of government as a share of total expenditures				
total	47,1	21,6	5,0	0
West Germany		19,7	5,5	
East Germany		35,2	2,3	
B.1 Share of revenues out of taxes, social security contributions etc.				
total	87,1	71,8	34,1	81,3
West Germany		76,4	37,8	
East Germany		49,5	16,1	
B.2 Share of revenues out of transfers from other levels of government				
total	1,5	18,0	34,6	17,2
West Germany		13,4	29,3	
East Germany		41,2	60,3	

Source: Calculated from data supplied by the Federal Statistical Office of Germany.

Figure 5: (Net) spending shares of the federal, state and local government sector in Germany 1975 - 2001



Source: Calculated from data supplied by the Federal Statistical Office of Germany.

Table 2: Net expenditures by category as a share of total net expenditures at the federal, state and local government sector in Germany in fiscal year 2001

		Federal	State	Local
1	General public services/administration	4,7	6,1	15,0
2	Defence	9,2	0,0	0,0
3	Public order & safety	0,9	10,4	6,1
3.1	police, etc.	0,8	5,7	6,1
3.2	jurisdiction, prisons, etc.	0,1	4,7	0,0
4	Education and Research	3,9	29,8	19,6
4.1	schools, etc.	0,0	19,3	16,9
4.2	universities, etc.	0,8	8,1	0,0
4.3	other education	0,5	1,2	2,5
4.4	research outside universities	2,5	1,3	0,2
5	Health and environmental protection	0,3	2,1	2,2
6	Social Security & Welfare	38,2	9,7	30,3
7	Housing & community amenities	0,7	2,4	18,5
8	Recreational, cultural & religious affairs	0,2	2,2	8,9
9	Fuel & energy	4,2	3,4	1,8
10	Agriculture, forestry, fishing & hunting	0,5	1,7	0,2
11	Transportation & communication	3,7	2,8	7,2
12	Other economic affairs	3,6	1,8	5,0
13	Other functions (esp. interjurisdictional transfers)	30,0	27,5	-14,9
	Total	100,0	100,0	100,0

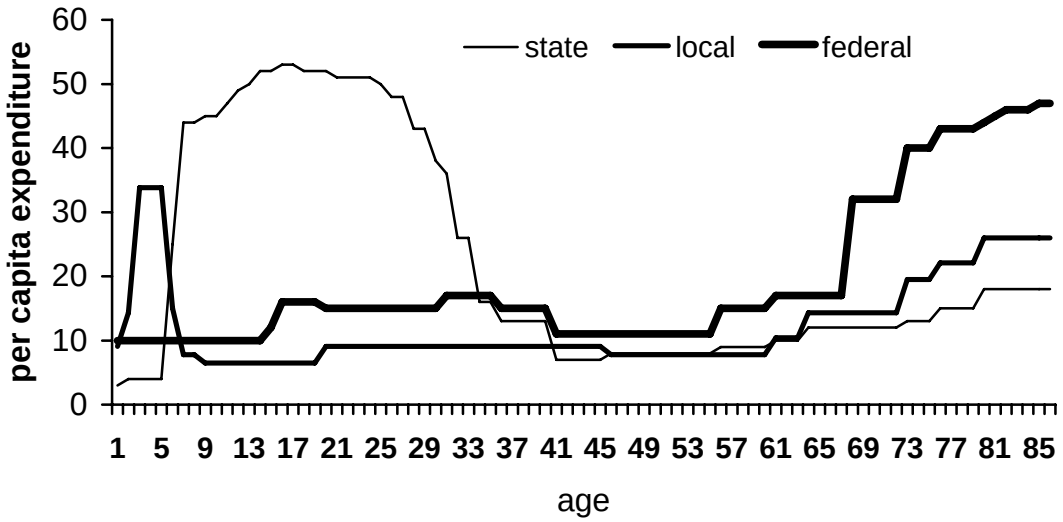
Source: Calculated from data provided by the Federal Statistical Office of Germany.

Table 3: Share of net expenditures by function of the federal, state and local government sector in Germany in fiscal year 2001

		Federal	State	Local
1	General public services/administration	30,6%	32,7%	36,7%
2	Defence	100,0%	0,0%	0,0%
3	Public order & safety	8,0%	72,3%	19,6%
3.1	police, etc.	10,5%	59,9%	29,6%
3.2	jurisdiction, prisons, etc.	3,1%	96,9%	0,0%
4	Education and Research	11,0%	68,4%	20,6%
4.1	schools, etc.	0,2%	71,1%	28,7%
4.2	universities, etc.	10,7%	89,3%	0,0%
4.3	other education	22,2%	39,1%	38,6%
4.4	research outside universities	69,8%	28,2%	2,1%
5	Health and environmental protection	11,0%	59,3%	29,6%
6	Social Security & Welfare	66,6%	13,7%	19,7%
7	Housing & community amenities	7,2%	20,7%	72,2%
8	Recreational, cultural & religious affairs	3,8%	33,6%	62,6%
9	Fuel & energy	54,8%	36,3%	8,9%
10	Agriculture, forestry, fishing & hunting	25,8%	70,4%	3,8%
11	Transportation & communication	42,6%	26,3%	31,0%
12	Other economic affairs	52,1%	20,9%	27,0%
13	Other functions (esp. interjurisdictional transfers)	64,2%	47,7%	-11,9%
	Total	45,8%	37,1%	17,1%

Source: Calculated from data provided by the Federal Statistical Office of Germany.

Figure 6: Stylized age cost profiles: per capita expenditure of the specific age groups across all government functions by level of government for Germany

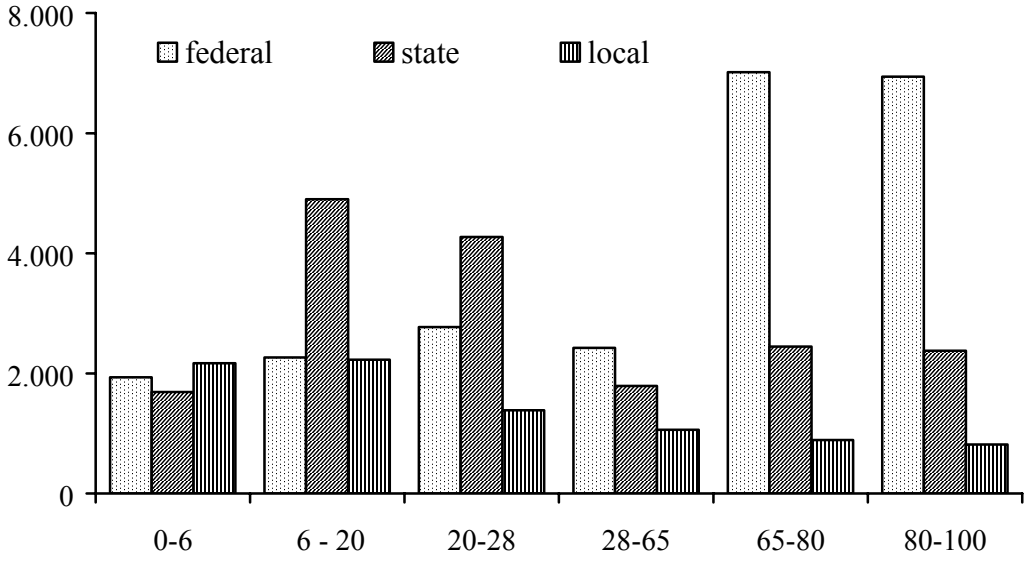


Source: Seitz (2004)

Table 4: Assumptions on age cost profile indicators by government function

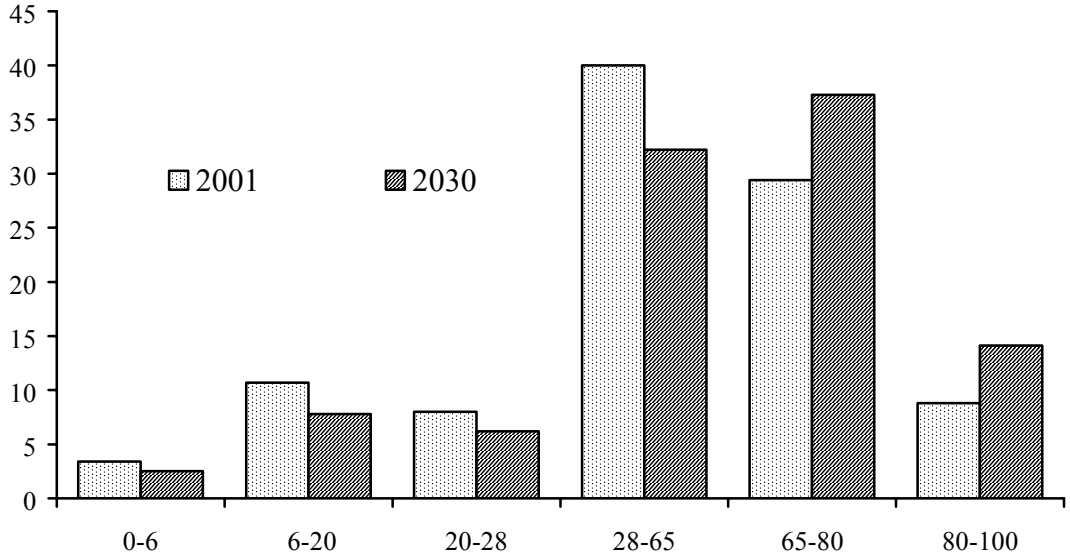
age group Public functions and expenditures	0-6	6-20	20-28	28-65	65-80	80-100
1. General public services/administration	1	1	1	1	1	1
2. Foreign affairs	1	1	1	1	1	1
3. Defence	1	1	1	1	1	1
4. Public order & safety	0	1	1	1	0.5	0.5
5. Jurisdiction & prison	0	1	1	1	0.5	0
6. Schools	0	1	0	0	0	0
7. Kindergarten	1	0	0	0	0	0
8. Universities	0	0	1	0	0	0
9. Financial support to students	0	1	1	0	0	0
10. All other education	0	1	1	0	0	0
11. Research outside universities	0	0	1	1	0	0
12. Culture	0.2	1	1	1	1	0.2
13. Health and environmental protection	0	1	1	1	0.5	0.5
14. Housing & community amenities	0.2	0.2	1	1	0.2	0.2
15. Agriculture, forestry & fishing	0	0	1	1	0	0
16. Fuel & energy & water	0.2	1	1	1	0.2	0.2
17. Transportation & communication	0.5	1	1	1	0.5	0.2
18. Economic enterprises	1	1	1	1	1	1
19. Public property management	1	1	1	1	1	1
20. Intergovernmental transfers etc.	1	1	1	1	1	1
21. Pensions for retired public servants	0	0	0	0	1	1
22. Administration of social welfare	1	1	1	1	1	1
23. Transfers to the pension system	0	0	0	0	1	1
24. Unemployment etc.	0	0	1	1	0.5	0.2
25. Social assistance	1	1	1	1	1	1
26. Youth welfare	0.2	1	0.5	0	0	0
27. Support for mothers	1	1	0	0	0	0
28. Other social welfare	1	1	1	1	1	1
29. Labour market policy and support for the unemployed	0	0	1	1	0	0

Figure 7: Net spending per capita of the relevant age group across all government functions in Euro in 2001 by level of government in Germany



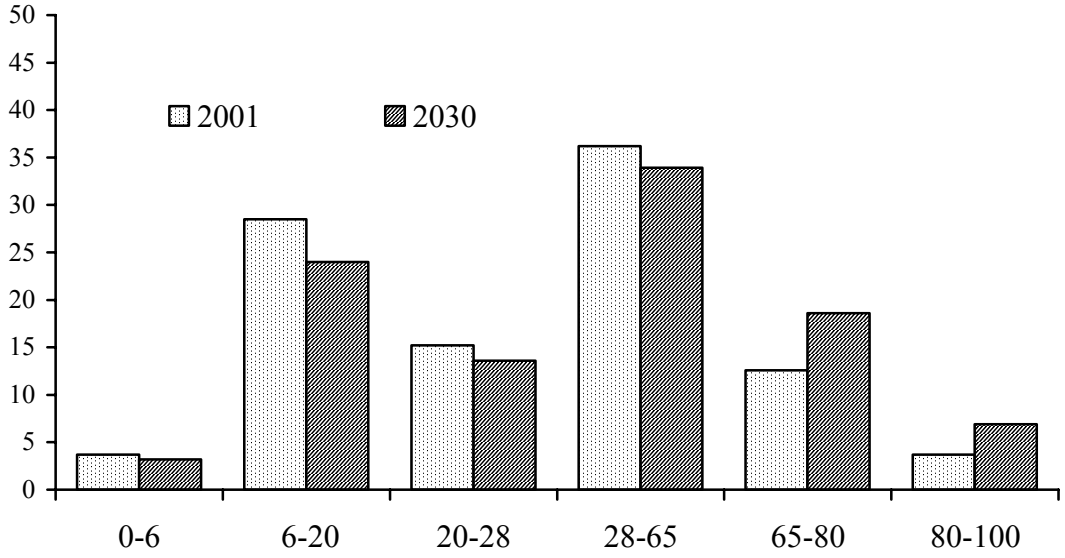
Source: Own calculations based on assumptions as set out in table 4 and data on net expenditures provided by the Federal Statistical Office.

Figure 8a: Age specific expenditure shares across all government functions at the federal government level in 2001 and 2030



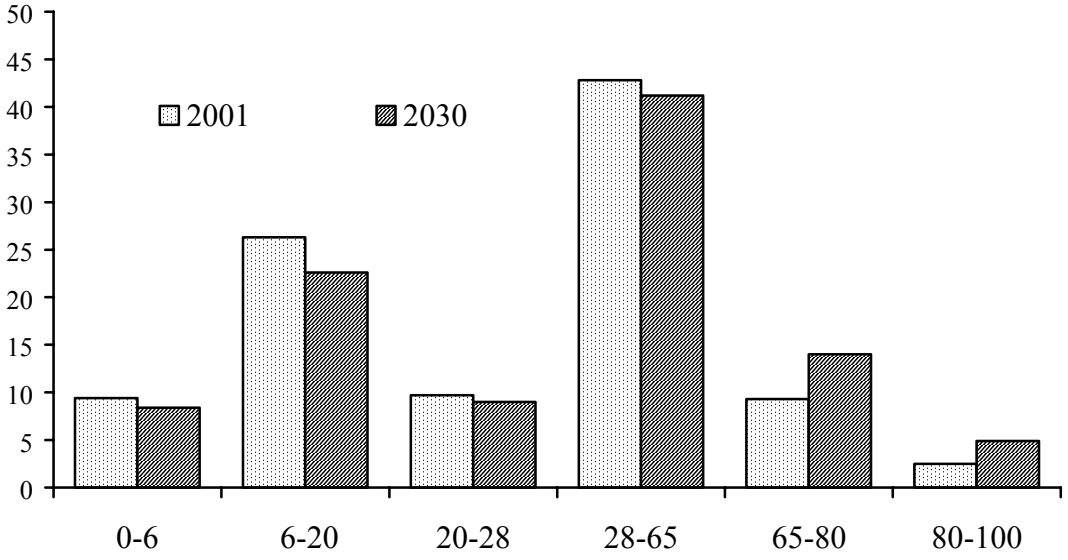
Source: Own calculations based on assumptions as set out in table 4 and data on net expenditures provided by the Federal Statistical Office.

Figure 8b: Age specific expenditure shares across all government functions at the state government level in 2001 and 2030



Source: Own calculations based on assumptions as set out in table 4 and data on net expenditures provided by the Federal Statistical Office.

Figure 8c: Age specific expenditure shares across all government functions at the local government level in 2001 and 2030



Source: Own calculations based on assumptions as set out in table 4 and data on net expenditures provided by the Federal Statistical Office.

Table 5: Changes in expenditures by level of government induced by demographic change in the period 2001 - 2030 assuming time-invariant age cost profiles

	total expenditure growth	total per capita expenditure growth
Federal government	11,41%	13,18%
State Government Sector	-3,65%	-2,12%
Local Government Sector	-6,66%	-4,93%
Total Government Sector (without social security)	2,72%	4,36%

Source: Own calculations based on assumptions as set out in table 4 and data on net expenditures provided by the Federal Statistical Office.

Table 6: Total net expenditure shares in 2001 and 2030 by government level in Germany

	2001	2030
federal government	45,7%	49,6%
state governments	37,0%	34,8%
local governments	17,2%	15,7%

Source: Own calculations based on assumptions as set out in table 4 and data on net expenditures provided by the Federal Statistical Office.