

The Fiscal Outlook in Austria – An Evaluation with Generational Accounts^{*}

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Abstract

During the next few decades the populations of most developed countries will grow older and older as a result of the low fertility rates since the 1970s and/or the continuously increasing life expectancy. Generational Accounting which was introduced in the early nineties, can illustrate the effects of this ageing process on a country's fiscal situation. We quantify for Austria how unsustainable its public finances are due to the demographic development. We show that despite recent reforms of the pension and health systems the demographic development produces a major problem for Austria's coffers. Furthermore we compare our results to similar calculations for Germany and Switzerland.

JEL Classification: H50, J10, H30

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1. Introduction

Austria was one of the flagships of the European Union until the current financial crisis. Blessed with a sound economy, a relatively high growth rate and a formidable low unemployment rate, it was long-term praised as an example, especially for its bigger brother – the former sick man of Europe – Germany. However, as in the majority of OECD countries, Austria's population is ageing and its pay-as-you-go pension scheme as well as its generous social health insurance will get under pressure.

Although the discussion in Austria is as controversial as in any country, its government is already taken measures against these future financial problems of its social security system. In the last five years Austria's parliament passed two pension reform proposals, one in 2003 and one in 2004. The latter one caused an outcry by several groups and policy makers and led to the first national strike since the Second World War. Furthermore, the increasing public health expenditure caused the government to adopt also a reform act in the health sector in 2005. The question is now if all these reform acts are enough to get the Austrian fiscal system in balance. This study wants to quantify the prior outlined problems and compare our results between the three neighbor and German-speaking countries Austria, Germany and Switzerland. All three countries share similar traditions but their social nets differ in quite a few ways. A comparison can be useful to evaluate different approaches coping with the problems of ageing societies.

The paper is structured as follows: Section 2 describes briefly the method of Generational Accounting and the calculation of the sustainability indicators used. Section 3 then reports the sources of our data for the analysis of Austria's fiscal system. To estimate the implicit debt of public coffers in the long-run Generational Accounting needs four kinds of data, a population projection, age- and sex-specific profiles, a general government budget of a certain base year and global parameters (i.e. growth and discount rates). In section 4 we describe Austria's pension and health care system briefly and report the first findings of the sustainability of its fiscal policy. We show the Generational Accounts of the system and discuss them in detail together with our sustainability indicators introduced in section 2. In section 5 we compare our results with findings from Germany and Switzerland taken from Hagist et al. (2008). Furthermore we give possible explanations for the differences of the countries' sustainability. Section 6 summarizes and concludes the paper.

2. The Methodology of Generational Accounting

To measure the sustainability of a country's public sector we use the method of Generational Accounting developed by Auerbach, Gokhale and Kotlikoff (1991, 1992 and 1994).¹ In contrast to traditional budget indicators which are based on annual cash flow budgets, Generational Accounting is founded on the intertemporal budget constraint and therefore the long-term implications of a current policy can be computed.

2.1 Methodology

The intertemporal budget constraint of the public sector, expressed in present value terms of a base-year b is:

$$(1) \quad B_b = \sum_{k=b}^{b-D} N_{b,k} + \sum_{k=b+1}^{\infty} N_{b,k} .$$

Let D denote agents' maximum age and $N_{b,k}$ the present value of year b 's net tax payments, i.e., taxes paid net of transfers received, made by all members of a generation born in year k over the remaining lifecycle. Then, the first right-hand term of equation (1) represents the aggregate net taxes of all generations alive in the base-year b . The second term aggregates the net tax payments made by future generations born in year $b+1$ or later. Together this is equal to the left-hand side of equation (1), B_b , which stands for the net debt in year b . That means if the

sum of all living generations' net taxes, $\sum_{k=b}^{b-D} N_{b,k}$, is negative (i.e. if they receive a net transfer) and the net debt, B_b , positive, the sum of future generations' net taxes has to be positive to balance the government's intertemporal budget i.e. in a long-term perspective net transfers received by living generations plus the net debt of the base-year have to be financed by net taxes paid by future generations.

To calculate generations' aggregated lifecycle net tax payments, the net payment terms in equation (1) are decomposed into:

$$(2) \quad N_{b,k} = \sum_{s=\max\{b,k\}}^{k+D} T_{s,k} P_{s,k} (1+r)^{b-s} .$$

¹ The further description of the methodology of *Generational Accounting* is mainly based on Raffelhüschen (1999) and Bonin (2001). For an analytical derivation of the intertemporal budget constraint see Benz and Fetzer (2006) or Fetzer (2006). Hagist (2008) gives an overview about the empirical studies with generational accounting along with a discussion concerning critical points in theoretical as well as empirical terms.

In equation (2), $T_{s,k}$ denotes the average net tax paid in year s by a representative member of the generation born in year k , whereas $P_{s,k}$ stands for the number of members of a generation born in year k who survive until year s . To compute the remaining lifetime net payments of living generations, the future demographic structure is specified conducting long-term population forecasts.

Typically, Generational Accountants disaggregate equation (2) even further. To incorporate gender-specific differences in average tax payments and transfer receipts by age, separate aggregation of the average net taxes paid by male and female cohort members is required. The products aggregated in equation (2) represent the net taxes paid by all members of generation k in year s . For generations born prior to the base-year the summation starts from year b , while for future born cohorts, the summation starts in year $k > b$. Irrespective of the year of birth, all payments are discounted back to the base-year b by application of a real interest rate r .

The age-specific net tax payment in year s of agents born in year k can be decomposed as

$$(3) \quad T_{s,k} = \sum_i h_{s,k,i} .$$

$h_{s,k,i}$ stands for the average tax or transfer of type i paid or received in year s by agents born in year k , thus of age $s-k$.² In equation (3), $h > 0$ indicates a tax payment, whereas $h < 0$ defines a transfer.

Applying the method of Generational Accounting it is conventionally assumed that initial fiscal policy and economic behavior are constant over time. Under this condition it is possible to project future average tax payments and transfer receipts per capita from the base-year age profile of payments according to

$$(4) \quad h_{s,k,i} = h_{b,b-(s-k),i} (1+g)^{s-b} .$$

where g represents the annual rate of productivity growth. Equation (4) assigns to each agent of age $s-k$ in year s the tax and transfer payment observed for agents of the same age in base-year b , uprated for gains in productivity. The base-year cross section of age-specific tax and transfer payments per capita is generally determined in two steps. First, the relative position of age cohorts between themselves in the tax and transfer system is estimated from micro-data

² In case of an isolated analysis of public subsystems like health care or public pension as conducted in the following chapters, i is just chosen so that all relevant payment streams are included in the analysis.

profiles. In a second step the relative age profiles are re-evaluated proportionally to fit the expenditure and tax revenues of the base-year.

For living and future generations, division of the aggregate remaining lifetime net tax payments by the number of cohort members alive in year s defines the cohort's Generational Account in year s :

$$(5) \quad GA_{s,k} = \frac{N_{s,k}}{P_{s,k}} .$$

Generational Accounts are constructed in a purely forward-looking manner, only the taxes paid and the transfers received in or after the base-year are considered. As a consequence, Generational Accounts cannot be compared across living generations because they incorporate effects of differential lifetime. One may compare, however, the Generational Accounts of base-year and future born agents, who are observed over their entire lifecycle.

2.2 Fiscal Gap

To illustrate the fiscal burden of current fiscal policy we use seven sustainability indicators:³ The starting point for the first indicators are the intertemporal public liabilities which can be computed by the assumption that the intertemporal budget constraint of the public sector (1) is violated:

$$(6) \quad IPL_b = B_b - \sum_{k=b-D}^{\infty} N_{b,k} .$$

The amount of intertemporal public liabilities measures aggregate unfunded claims on future budgets, assuming that the present policy will hold for the future. The first sustainability indicator, the fiscal gap (FG_b), can be derived if the intertemporal public liabilities are set in relation to base-year's GDP (GDP_b). This indicator is akin to the debt quota well known since the Maastricht treaty but it addresses the debt which will occur in the future and in the past:

$$(7) \quad FG_b = \frac{IPL_b}{GDP_b} .$$

³ For a discussion of measuring fiscal sustainability and the development of sustainability indicators, see Raffelhüschen (1999) and Benz and Fetzter (2006).

2.3 Future Generations' Burden

How the policy adjustment required to redeem intertemporal public liabilities will affect generations' fiscal burdens is upon the policies addressing this burden. For illustrative purposes, Generational Accounting typically assigns the entire adjustment to future generations which is equivalent to $k > b$. All tax payments made by members of future born cohorts are adjusted proportionally with the help of a uniform scaling factor θ . The factor θ is set to ensure balance of the intertemporal public budget defined in equation (1):

$$(8) \quad h_{s,k,i} = \theta \times h_{b,b-(s-k),i} (1+g)^{s-b}$$

for and instead of equation (4). Computing the average age-specific net taxes paid by representative future born agents, the burden for future generations can be illustrated as an absolute difference between the Generational Account of the base-year agent and the Generational Account of the one year after base-year born agent. This is our second sustainability indicator, the future generations' burden:

$$(9) \quad FGB = GA_{b,b} - GA_{b,b+1}^\theta$$

2.4 Revenue and Transfer Gap

The third indicator that illustrates the burden of current fiscal policy is the revenue gap. In this case the scaling factor $\theta = \theta_{rev}$ reflects the enhancement of age-specific revenues in per cent for all generations which is necessary to close the intertemporal public budget constraint. It can also be interpreted as the ratio of the intertemporal public liabilities to the present value of all age-specific revenues of the fiscal system :

$$(10) \quad \theta_{rev} = \frac{IPL_b}{\sum_{s=b}^{\infty} Rev_s \cdot \frac{1}{(1+r)^{(s-b)}}$$

with Rev_s referring to the sum of revenues in year s by all living generations in year s . Analogous to the revenue gap, we compute also the so-called transfer gap. In this case the scaling factor $\theta = \theta_{trf}$ reflects the necessary decrement of age-specific public transfers (Trf) like health benefits in per cent for all generations that is necessary to close the intertemporal public budget constraint. Constructing the revenue and transfer gap, we implicitly assume that the government is able to enforce an immediate adjustment of all taxes and contributions or transfers respectively.

As Benz and Fetzner (2006) have shown all the used indicators are computed with an infinite time horizon. In the practical calculation all relevant variables like population or cohorts' tax payments are projected for 300 years from the base-year on. Afterwards a geometrical series is used to determine the remaining net tax payments. The choice of 300 periods is nearly completely arbitrary and just reflects a good approximation point for our analysis.

3. Data and Assumptions

To compute Generational Accounts and to calculate the stated indicators, we require a population projection, the expenditures and revenues of the public sector like stated in Austria's national accounts in the base year 2004, age-sex-profiles for the different expenditure and revenue types and a growth rate of the productivity as well as a discount rate. Due to the delay of internationally comparable statistics, we choose the year 2004 as our base year. Therefore all numbers and values are in present value terms of the year 2004 if not stated otherwise. The population projection is calculated with a demographic program developed by Bonin (2001).

3.1 Population Projection

Generational Accounting requires detailed population projections. We distinguish in the forthcoming between four possible scenarios titled Eurostat, medium variant, high variant and low variant. Based on different assumptions about the three parameters life expectancy, fertility and migration it is possible to derive a population projection for each of the demographic scenarios. Own calculations are necessary for the reason of Generational Accounting's assumed infinite time horizon: The official projections end in 2050 (in 2060 in the case of the projection of Eurostat) while we need a 300 years projection period.⁴ In these calculations we use the parameters of the year 2004 reported by Statistik Austria. The projected parameters until year 2050 (2060) in the different scenarios originate from the assumptions made by Statistik Austria (2007, 2008) and the website of Eurostat. Table 1 shows those central assumptions of the four scenarios:

⁴ The choice of 300 periods is in certain boundaries arbitrary and just reflects a good approximation point for our analysis.

Table 1: Central Assumptions of Population Projections for Austria

Parameter	Year	Scenario			
		Eurostat ⁵	Medium Variant	High Variant	Low Variant
Total Fertility Rate	2004	1.41	1.41	1.41	1.41
	2050	1.57	1.50	1.90	1.10
Life Expectancy at birth for females/males in years	2004	82.1/76.4	82.1/76.4	82.1/76.4	82.1/76.4
	2050	89.2/84.9	90.0/86.0	92.5/89.0	87.0/82.4
Net migration	2004	33,081	33,081	33,081	33,081
	2050	22,347	18,381	42,745	-6,634

Source: Statistik Austria (2007,2008), Website of Eurostat

Using these demographic assumptions the future size and structure of the Austrian population can be anticipated for all four different demographic scenarios. The outcomes of these projections are shown in table 2. Compared to the official calculations of the Eurostat projection we underestimate the Austrian population by about 0.4 million in 2060, thus between the two calculations the maximal deviation is 4.4 per cent. In the Eurostat variant, the Austrian population increases until 2037 and then decreases at an approximately constant rate over the projected horizon. In 2082 the base-year's population of 8.1 million is almost reached and by 2100 the Austrian population has been reduced by approximately 0.4 million inhabitants. Contrarily in case of the high variant the population increases constantly. After this scenario Austria has 13.4 million inhabitants in 2100. Although the low variant is the one with the lowest assumptions regarding the central parameters, the population still slightly grows over the next two years due to the increasing life expectancy of both men and women. From 2021 onwards the Austrian population declines steadily losing nearly 70 per cent compared to the number of inhabitants in the base-year. For the following analysis we take the Eurostat projection as our standard scenario if not stated differently. Outcomes for the three other scenarios can be found in the appendix.

Table 2: Different projections of the Austrian population until 2100

	Eurostat		Medium variant		High Variant		Low Variant	
	Popul in Mio	Old-Age in %	Popul in Mio	Old-Age in %	Popul in Mio	Old-Age in %	Popul in Mio	Old-Age in %
2004	8.14	25.0	8.14	25.0	8.14	25.0	8.14	25.0
2025	8.80	36.7	8.79	37.9	9.17	38.0	8.44	37.3
2050	8.86	56.3	8.93	60.6	10.87	55.6	7.27	64.7
2075	8.32	61.0	8.08	65.8	12.04	54.5	4.90	90.7
2100	7.76	58.9	7.22	64.8	13.44	51.4	2.75	116.2

Source: Own calculations

⁵ For the Eurostat scenario the parameters are stated until 2060 not 2050.

3.2 Public Budget

According to Eurostat's website, the public debt of Austria in 2004 was 146.7 billion Euros or 62.8 per cent of the GDP of 2004 which was 232.8 billion Euros. Aggregates for revenues and expenditure are taken from OECD (2007a, 2008) and are based on detailed statistics about tax and social contribution receipts as well as the government expenditure by function according to the classification of the functions of government (COFOG), the harmonized classification on the international level. Intergovernmental grants and transfers have been cancelled out. Revenues include taxes on labor and capital incomes, value added tax (VAT), property taxes and social insurance contributions.

Table 3: Budget of the Austrian General Government in 2004

Public Expenses (billion Euros)		Public Revenues (billion Euros)	
Government Consumption	9.7	Interest and Tenure	8.0
Defense	2.1	Income Tax	24.3
Public Order and Safety	3.4	Social Security Contributions	37.9
Economic Affairs	12.2	Payroll Tax	7.0
Environment Protection	0.8	Capital Income Tax	6.0
Housing/Communities Amenities	1.1	Value Added Tax	27.3
Recreation, culture and religion	2.3	Other Taxes	5.0
Education	13.4		
Health Administration	2.0		
Inpatient medical services	6.9		
Outpatient medical services	4.2		
Pharmaceutical services	2.5		
Other health-related expenses	1.3		
Long-term care expenses	4.3		
Old Age Public Pension	30.4		
Other Public Pension	0.9		
Incapacity Benefits	1.7		
Sickness Benefits	0.4		
Family Policy	6.9		
Active Labor Policy	0.0		
Unemployment Benefits	3.4		
Social Housing	0.2	Deficit	3.00
Other Social Expenses	1.5		
Interest payments	7.0		
Total	118.6	Total	118.6

Source: Own calculations based on OECD (2007a, 2007b, 2008)

Expenditure encompass in expenses for general public services, defense, public order and safety, economic affairs and environmental protection, education, housing and cultural activities. The

entry "Social Protection" which is as such reported in OECD (2008) is divided into nine subcategories such as old age pension or family policy after OECD (2007b). Health expenditure on which this paper focuses are divided into five subcategories, namely the in- and outpatient sector, drug expenses, long-term care and miscellaneous expenditure. Altogether 31 entries of revenues and expenditure are distinguished. Our resulting budget is shown in table 3. In total, revenues were 115.6 billion Euros while public expenditure altogether made 118.6 billion Euros. This results in a deficit of 3.00 billion Euros. This deficit minus interest payments on the Austrian gross financial liabilities which lay around 7.0 billion Euros led to a primary deficit (surplus) equal to 3.9 billion Euros.

3.3 Micro-Profiles

Entries like defense or homeland security which are not paid or consumed in an age-specific way are distributed with a flat per capita profile. Age- and (where applicable) sex-specific micro-profiles stem from various sources: Health expenditure profiles are taken from Hofmarcher, Riedel and Röhrling (2002). Income and capital income tax profiles as well as the age-specific structure of social security contributions are calculated using data from Statistik Austria (2005a). Data to calculate the VAT profile is available upon request from Statistik Austria's (2002) consumer survey. Profiles related to public pension payments and incapacity benefits stem from Pensionsversicherungsanstalt (2005). Furthermore, unemployment benefits (AMS (2005)), social housing (Synthesis (2005)) and education (Statistik Austria (2005b)) are also distributed in an age-specific way. All profiles are plotted in the appendix in table A-1. For the budget item "Family Policy" due to missing data we assume that the incidence of the payments depends on the children which we define equal from an age of 0 to 20 years. We know that this is a crucial assumption as often younger children get higher benefits and the incidence could also depend on the parents (e.g. maternity leave). However, we think that it is a reasonable and transparent assumptions and should bias our results only slightly as family policy accounts only for about six percent of the budget.

3.4 Growth and discount rate

According to own calculations based on OECD (2006a, 2006b) average growth of GDP per capita over the last 15 years was around 1.9 per cent while the average long-term interest rate (measured by the ten-year Austrian government bond) lay around 4.3 per cent. For reasons of comparison with the other countries discussed later we opt in our standard setting for a growth rate of 1.5 per cent (g) and a discount rate of 3.0 per cent (r). To cover the differences between the actual development and our standard scenario, a sensitivity analysis is undertaken in the appendix and discussed in one of the later sections. Differing growth paths and interest rates

between the countries are generally not considered but can be examined as well via a sensitivity analysis.

3.5 Fiscal Policy and Business Cycle

Our analysis reflects the fiscal policy which is represent in the public budget shown in table 3. Except for the three public pension reform measures of 2002, 2003 and 2004 as well as the health reform of 2005 we do not include any long-term effects of recent reforms (as for example the tax reform of 2004 and 2005) or changes of the Austrian fiscal policy. Furthermore we do not account for business cycle effects in the public budget which surely bias our outcomes. However, as Benz and Hagist (2008) have shown at least for Germany business cycle effects are negligible. As Austria has similar automatic stabilizers as Germany we think that also in the Austrian case business cycle effects should be only small. A simple accounting of business cycle effects as in Ministry of Finance Norway (2008) is not leading to the desired results as we want to show which are the major drivers of the fiscal gap and how much is the primary surplus responsible.

4. The sustainability of Austria's fiscal system

4.1 Current Reforms of the Social Insurance System

Austria's social system was founded already during the times of the K&K-monarchy at the end of the 19th century. Then as today it shows similarities to the Bismarckian system of Germany. One cornerstone of the system is the principle of corporatism that leads to complex systems of control and supervision in the selected branches of the social system.

4.1.1 Austria's Public Pension System

The Austrian public pay as you go-pension system is mandatory for every worker except for a small group of self-employed and persons with no or a very low income. Revenues are financed by three sources: Firstly, contributions by the insured which are wage-based, secondly transfers by other social security branches (for example unemployment insurance) and thirdly an allowance by the central government out of its general budget to cover the gap between revenues and expenditure.⁶ In 2005, pension related expenditure relative to GDP lay around 10.1 per cent. Without reform this ratio is expected to rise to 12.5 per cent until 2050.⁷ This is why the Austrian government introduced pension reform measures in three acts between 2000 and 2005. These laws included some highly controversial discussed measures as reductions for early retirement and the stepwise equalization of the statutory retirement age for men and women.

⁶ For a general overview of Austria's public pension system, see Buczolic et. al (2003) and OECD (2007c).

⁷ See Stefanits and Königsreiter (2005).

Although Austria still has a relatively high pension level, the last reform proposal caused the first national strike since World War II. In our analysis with Generational Accounts in the forthcoming sections we include the following measures in our scenarios: Firstly, we assume actuarially fair discounts for early retirement as in the reform of 2000, secondly we model the change of the assessment period from the best 15 years to the best 40 years which was included in the 2003 reform and thirdly we model the cuts in the accrual rates as in the reform of 2004. Furthermore we take into account the two-step harmonization of the retirement age for men and women and the new indexation of pension benefits according to the consumer inflation rate. To do that we manipulate the profiles according to the reform-measures. For example the change of the assessment period is modeled via an income profile which was the base for the income tax profile. For the indexation of benefits to inflation, we manipulated the growth rate g accordingly. The retirement age is also modeled via a manipulation of profiles. Knell et al. (2006) and Knell (2005) give good overviews over the detailed measures taken in the pension reforms of 2000, 2003 and 2004.

4.1.2 Austria's Social Health Insurance System

Austria's social health insurance system covers over 99 percent of its population and thus can be classified as one with universal coverage. Like in most continental European systems, providers of treatment are accredited by the authorities but can operate as private entities especially in the case of outpatient care. Prices are regulated or negotiated with the corresponding governmental bodies. The system is financed by contributions and taxes. Two thirds of the 14.9 billion Euro expenditure in 2004 are accommodated by the social health insurance, the remaining third by the states and the central government.

As in the case of its public pension system, Austria's government introduced a health reform proposal that already became law in 2005. The health care reform 2005 increased revenues and tried to lower expenditure by certain measures that are illustrated in table 3.⁸ We implemented the certain instruments directly in the budget of the year 2005 and the forthcoming years in purchasing power of our base year. In sum the reform has a yearly net effect of about one billion Euro. Table 4 also shows the different categories/entries that are affected by the reform. As we have no information how for example the rise of co-payments for pharmaceuticals will affect the age- and sex-specific consumption of pharmaceuticals we assume that they will do so in an average way i.e. we just lower the scaled micro-profiles in relatively equal amounts (by the same percentage). This assumes that the rationing will affect every cohort male and female in the relative same amount. Furthermore we hold the modeled effects constant over the years. This may seem as rather strong assumptions however with no more detailed information at hand the

⁸ A good overview about the certain measures of the health care reform can be found in Hofmarcher (2005).

first one seems hardly to handle otherwise while the latter could be seen as a policy scenario as the estimations of the overall effects in table 4 are. One could also argue that the effects diminish after a certain amount of time, however, our assumption seems plausible in almost the same manner.

Table 4: Austria's Health Care Reform 2005

Revenues Enhancement/Expenditure Cut	Amount in Mio. Euros	Budget Position	Source
Rise of wage-based contribution rate	120	Social Security Contributions	Hofmarcher (2005)
Rise of assessment threshold	30	Social Security Contributions	Hofmarcher (2005)
Rise of tobacco tax	90	Value Added Tax	Hofmarcher (2005)
Rise of co-payments for pharmaceuticals	18	Pharmaceutical services	Own calculations based on Hofmarcher (2005) and Hofmarcher, Riedel and Röhrling (2005)
Rise of co-payments for inpatient treatment	7	Inpatient medical services	
Cutting payments for eyeglasses	35	Other health-related expenses	Hofmarcher (2005)
Rise of contributions for elderly	125	Social Security Contributions	Hofmarcher (2005)
Cutting general expenditure	300	Outpatient, inpatient and pharmaceutical medical services; other health-related&long-term expenses	Nationalrat (2005)
Cutting spending for pharmaceuticals	262	Pharmaceutical services	Rauch-Kallat (2005)

Source: See column four

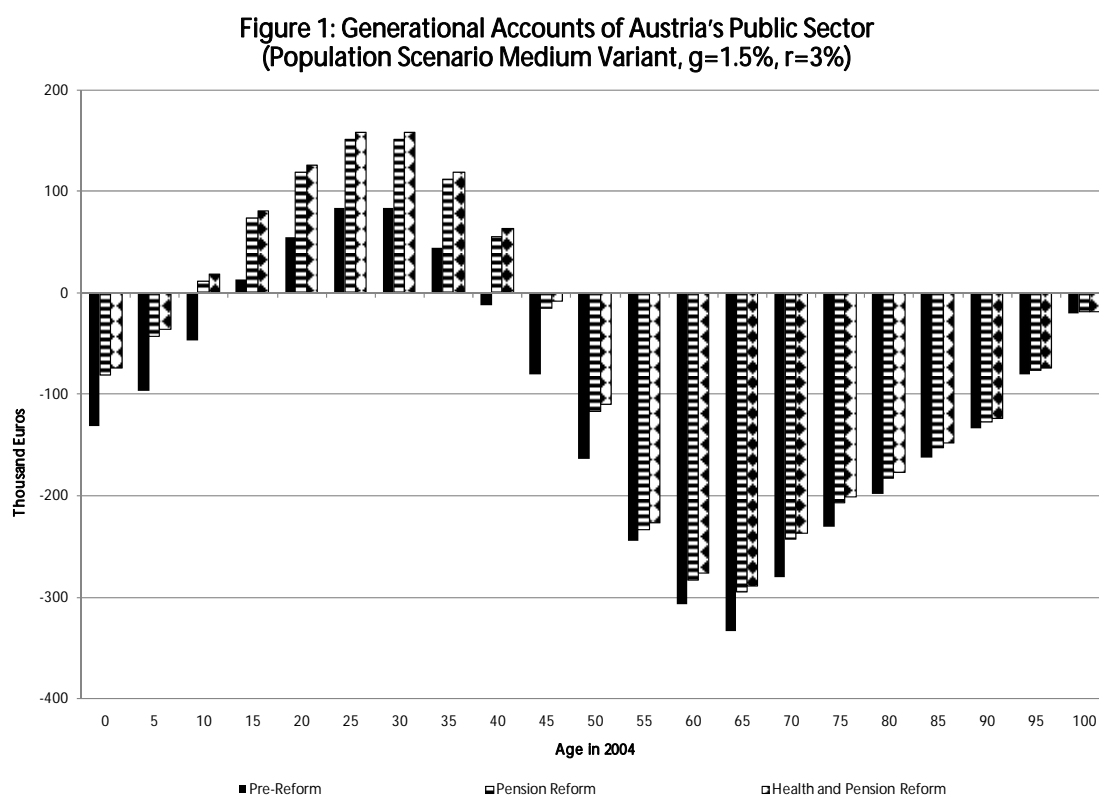
4.2 Sustainability Analysis

In this section we want to present the intergenerational redistribution through the Austrian fiscal policy per se and the changes due to the presented reform measures. Furthermore we want to discuss how the reforms will affect Austria's fiscal sustainability along our presented sustainability indicators i.e. the fiscal gap, the revenue and transfer gaps and the future generations' burden.

4.2.1 Generational Accounts pre- and after reforms

Figure 1 shows the Austrian Generational Accounts for three different scenarios. First, we present the pre-reform accounts, than the accounts including the pension reforms described above and finally the accounts with both reform measures i.e. health and pension reforms. All

three scenarios plotted in figure 1 look like the usual sinus-shaped pattern.⁹ Young generations except the ones very close to their birth have to pay a relatively high amount of net taxes over their remaining lifecycle.



Source: Own calculations

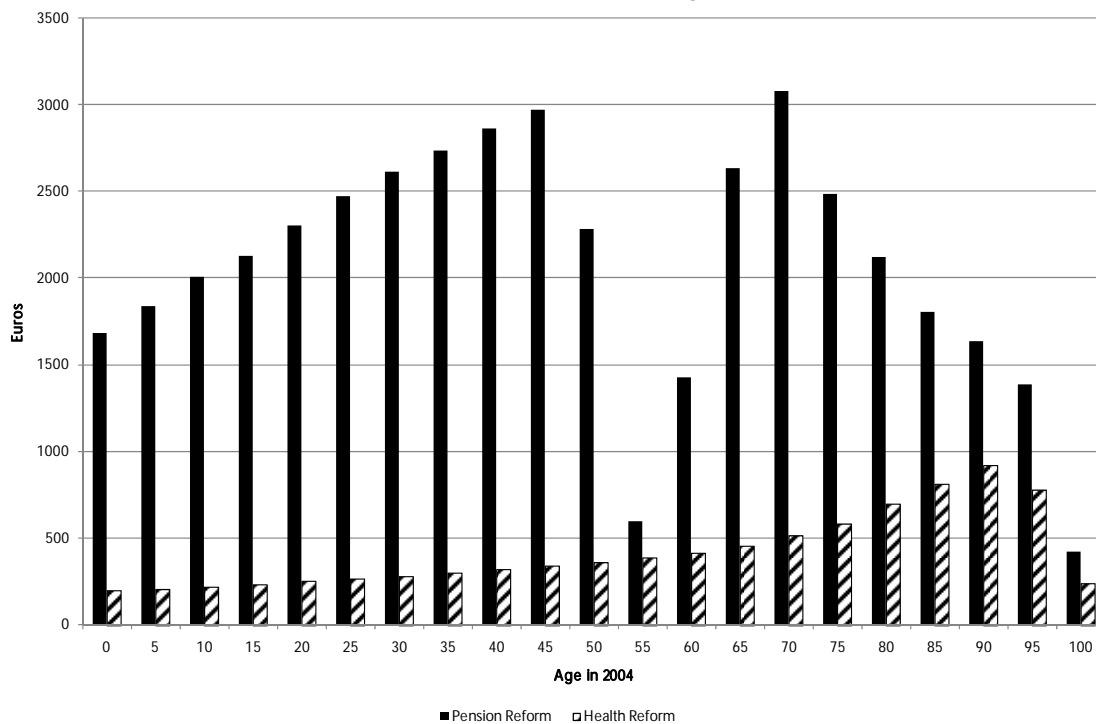
It is the cohort of 28-year-olds who has to remit the maximum net payment in every scenario. The main beneficiary generation is the 65-year-old. As one can see, every representative newborn receives over at least 74,000 Euros more over his/her lifecycle than he/she has to contribute to the public budgets. Alone from this fact it can be stated that a higher fertility rate per se will not cure Austria's coffers but rather will hurt it. However, the pension and health reform have reduced the net transfers of all living generations significantly. The question now is if all generations are affected in the same way or which generations are mostly affected by the reform measures. As one cannot compare generational accounts between living generations as only the remaining life-cycle is considered we have computed annuities out of the differences between pre- and post-reform generational accounts to derive which generations are affected in which way by both pension and health reform (figure 2).

The annuities in figure 2 show a very interesting pattern. The black columns are the surplus load of generations induced by the pension reform while the shaded columns stand for the surplus

⁹ The sinus-shaped characteristics of the *Generational Accounts* can be explained by the age-specific economic activity and by the discounting of payments/benefits. The discounting is also responsible for the decreasing benefits after 65 years. P.a. older generations receive more but not over the remaining lifecycle.

loads induced by the health reform. While the surplus loads increase in the case of the health reform from the present newborn until the generation of 90 years olds and decreases due to the rapidly falling life expectancy afterwards, the pension reform obviously has no clear pattern which generations are hurt more than others. Indeed the generations less hurt are the ones very close to retirement while the generations/cohorts which have just filed for retirement are the ones with the largest surplus load. This is due to the change of indexation from productivity to price inflation and that the generations around 65 and 70 years receive the absolute highest pensions. Also relatively highly hurt are the cohorts from 45 years and less, however, the same clear pattern as for the health reform can be observed. As retirement is closer, the discounting of benefits and so reform outcome is less large than for younger cohorts. The cohorts between 55 and 59 years are the least hurt ones. This is because most reform measures i.e. the increase in the statutory retirement age will take effect after these cohorts claimed pension benefits and because most parts of the 2004 reform are only designed for cohorts born 1955 and later. In total one could say that the surplus load for all cohorts are severe especially the ones induced by the pension reform. But are they enough to make Austria's fiscal policy sustainable?

Figure 2: Reform-induced burden as annuities
(Population Scenario Medium Variant, $g=1.5\%$, $r=3\%$)

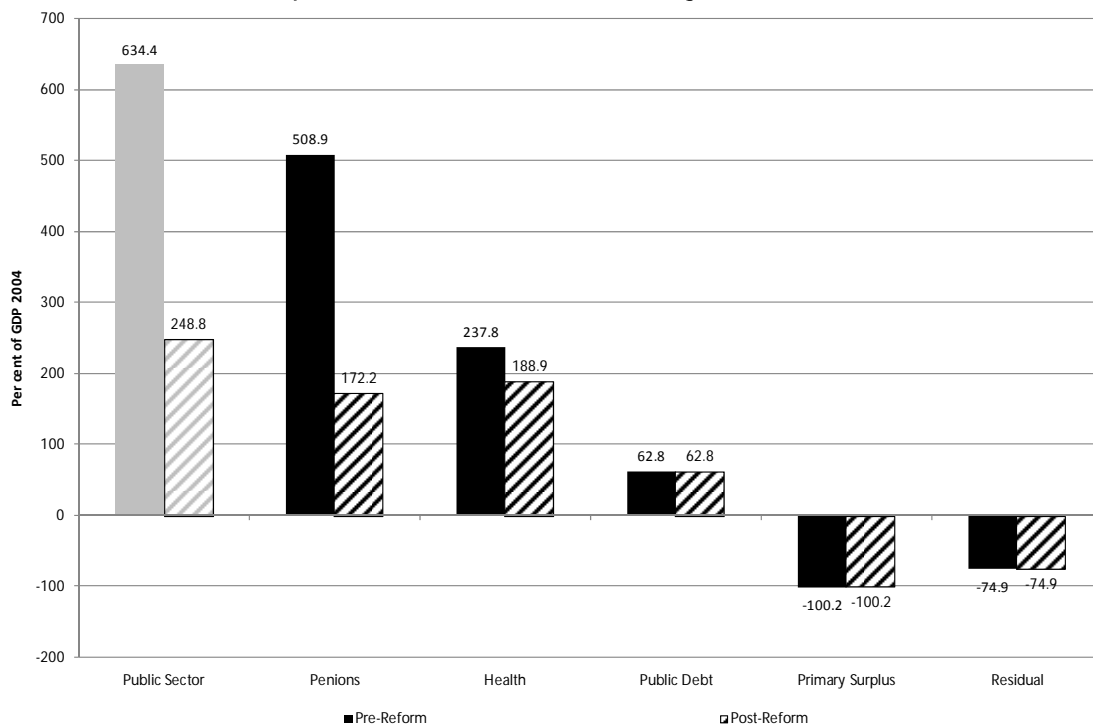


Source: Own calculations

4.2.2 Fiscal Gaps and Sustainability Indicators

Weighting the generational accounts of living and future generations with the expected cohort size and summing all up given the growth and discount rate leads us to our first sustainability indicator, the fiscal gap plotted in figure 3.

**Figure 3: Sustainability of Subsystems in Austria
(Population Scenario Medium Variant, $g=1.5\%$, $r=3\%$)**



Source: Own calculations

The value of the fiscal gap for the whole public sector pre-reform is 634.4 per cent of base year's GDP which can be divided into the following: explicit debt of 62.8 per cent of GDP, health-associated¹⁰ debt with 237.8 per cent of GDP and 508.9 per cent of GDP associated with the public pension scheme. Adding the intertemporal assets of 100.2 per cent of GDP which are caused by the primary surplus (see table 2) leaves necessary intertemporal assets of 74.9 to balance our calculations. This is a remarkable result. Evidently Austria's public finances excluding health and public pensions are overfunded. If one includes both reform measures (the current status quo) the implicit debt of the health sector shrinks to 188.9 per cent of GDP and the implicit debt of the public pension scheme to 172.2 per cent. As the intertemporal assets stay the same, the overall fiscal gap is post reform at 248.8 per cent.

Our second indicator is the future generation's burden. To calculate this indicator, the intertemporal public liabilities and the number of people in future generations are set in proportion to each other (equation 9). This indicator implies that the entire adjustment assigns to future generations. The burden for future generations can be illustrated as an absolute difference between the generational account of the base-year and the generational account of the one year after base-year born agent (both not including the public debt). The future born

¹⁰ The public health sector contains in our definition health related administration expenditure, in- and outpatient services, pharmaceuticals, sickness benefits and other health related expenditures. To isolate the health and public pension schemes on the revenue side, we assume that expenditures in the base year are met by revenues. Furthermore revenues are distributed as equal shares of the overall budget, i.e. as the income tax pays 21 per cent of the public activities it also pays 21 per cent of public health expenditure in our assumed scenario.

generation in Austria pay in the post-reform scenario 22,100 Euros per person more in taxes over their entire life-cycle than they will receive in transfers. On the other hand, the base-year born agent gets a net-transfer over his/hers remaining life cycle of about 74,000 Euros. Therefore, the future born agent has to carry a quite large burden compared to the corresponding living generation. This is also reflected in our last two sustainability indicators, the revenue and transfer gap. Austria's government would have to raise all taxes and duties by 7.3 per cent or could decrease all transfers by 6.9 per cent. Table 5 gives an overview about the sustainability indicators pre- and post-reform.

**Table 5: Overview of sustainability indicators
(Population Scenario Eurostat, $g=1.5\%$, $r=3\%$)**

Sustainability Indicator	Pre-Reform	Post-Reform
Fiscal Gap (in % of GDP of 2004)	634.4	248.8
Future Generations' Burden (in Euros)	239,900	74,000
Revenue Gap (in %)	19.5	7.3
Transfer Gap (in %)	15.9	6.9

Source: Own calculations

Former studies of the sustainability of the Austrian fiscal policy conclude the same qualitative results as our analysis. The quantitative results between our study and the work of Keuschnigg et al. (2000, 2001) and Mayr (2005) however differ quite substantially. The discrepancy can be explained by different base years and different assumptions on the growth and discount rate spreads and the development of the Austrian population as well as the missing reform measures. Mayr (2005) reports a fiscal gap of 167.5 per cent of GDP in 1998 given a discount rate of 5 per cent and a growth rate of 1.5 per cent. If we set our parameters equally we derive a fiscal gap of 92.8 per cent (given a different base year). As Mayr (2005) does not include the mentioned reforms we can state that the results are fairly close (as our outcome without reform is a fiscal gap of 217.4 per cent). Keuschnigg et al. (2000, 2001) report with a discount rate of 4.5 per cent and a growth rate of 2 percent a fiscal gap of 276.9 percent of the 1995 GDP.

4.2.2 Sensitivity Analysis

To analyze the sensitivity of our results relating to our exogenous parameters interest and growth rate, r and g , and to our different population projections we calculate 15 different cases. Except our standard scenario in the post-reform version, we test four more different settings around this combination: $g = 1.5$ vs. $r = 2.5$ per cent, $g = 1.5$ vs. $r = 3.5$ per cent, $g = 2.0$ vs. $r = 3.0$ per cent and $g = 2.0$ vs. $r = 4.0$ per cent. Furthermore, we distinguish, how discussed above, between four possible population scenarios namely Eurostat, medium, high and low

variant. Table 6 shows the fiscal gap for all possible population scenarios combined with the described growth and interest rate settings. How can be easily seen, the extent of the fiscal gap and in the case of Austria depends on the difference between the growth and interest rate. As the spread widens the fiscal gap decrease, i.e. is better, in all of the four scenarios. Due to the pension reform and the indexing of pension benefits to prices, also the absolute value of the growth rate is relevant. Therefore a higher growth rate induces a lower fiscal gap.¹¹

**Table 6: Sensitivity Analysis of the Fiscal Gap
(in % of GDP of 2004)**

	Eurostat	Medium Variant	High Variant	Low Variant
g=1.5% r=2.5%	386.0	434.7	888.2	264.3
g=1.5% r=3.5%	178.7	208.7	316.5	147.1
g=1.5% r=3.0%	248.8	287.6	485.9	193.2
g=2.0% r=3.0%	296.7	346.0	737.5	210.3
g=2.0% r=4.0%	135.7	164.5	259.6	112.5

Source: Own calculations

Regarding our four population projections there is no clear picture. Regarding the fiscal gap it can be stated that the low variant is in all cases superior to the other three, however, this is not very meaningful as with different demographic developments the numerator of the fiscal gap is affected but not the denominator (see also section 5).¹² That is why the other indicators show different pictures but it is not clear cut. However, the scenarios with Eurostat are always superior given every indicator apart from the fiscal gap. This is very interesting as the Eurostat projection is a middle ground between the high and low projection and relatively close to the medium variant. A sensitivity analysis given all indicators can be found in the appendix table A-2.

5. A comparison with Germany and Switzerland

Austria's problems concerning ageing and fiscal sustainability are quite similar to the ones of other countries. The relevant research question is if there are quantitative differences between countries, and if how large they are and why they occur. We try to answer the first two questions and want to discuss the latter. Our choice for comparison, Germany and Switzerland, is based on the fact that all three countries have similar cultural and economical backgrounds and

¹¹ In our framework an indexing of pension benefits to prices is equal with a pension-specific growth rate of zero. As the overall growth rate g is higher in absolute terms, the growth spread between revenues and pensions is widened which causes smaller fiscal gaps.

¹² As the absolute value of GDP in the future is dependent on the size of the population, a comparison with a constant value as GDP in the base year would bias the conclusions.

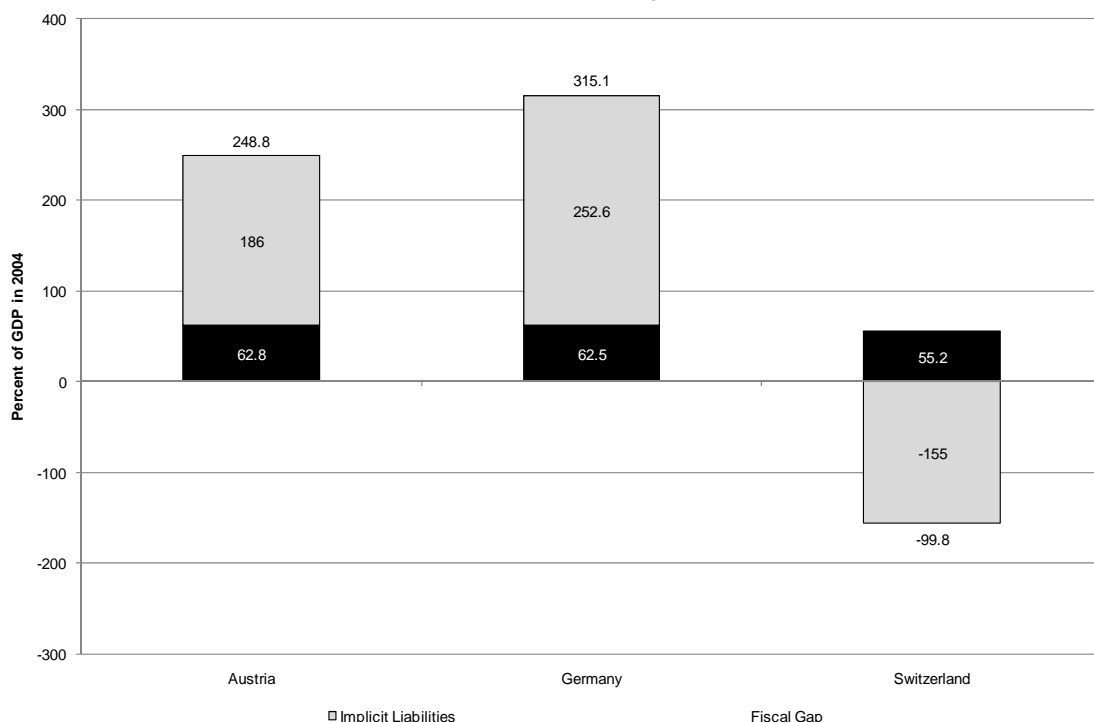
comparable welfare and income levels. Outcomes for Germany and Switzerland are taken by Hagist et al. (2008). This study is also based on the public budgets of the year 2004 and only includes pension as well as health reforms.

5.1 Indicators and Analysis

Figure 4 shows the fiscal gaps for the three countries. According to the comparison of this indicator, Austria lies between Germany and Switzerland. Austria is clearly better off than Germany with a fiscal gap of about three times their GDP. Switzerland's however has even a long-term surplus with nearly 100 per cent of GDP.

However, there are flaws in this analysis, especially if you compare between the countries which is our stated goal. For an international comparison the fiscal gap might not be appropriate for several reasons. Firstly, it is an indicator that reacts wildly for changes of the parameters growth and discount rate or more precisely to the growth and discount spread.¹³ Secondly, all of the three countries have different demographic developments which will determine their future economic power and so their ability to pay their debts. With a stagnating population, the economic power of Austria will differ in the future compared to Germany's where the population will shrink not only in size but even more in its workforce which co-determines GDP. An appropriate indicator for an international comparison should take these facts into account.

Figure 4: Sustainable gaps in comparison
(Medium Population Scenarios, $g=1.5\%$, $r=3\%$)

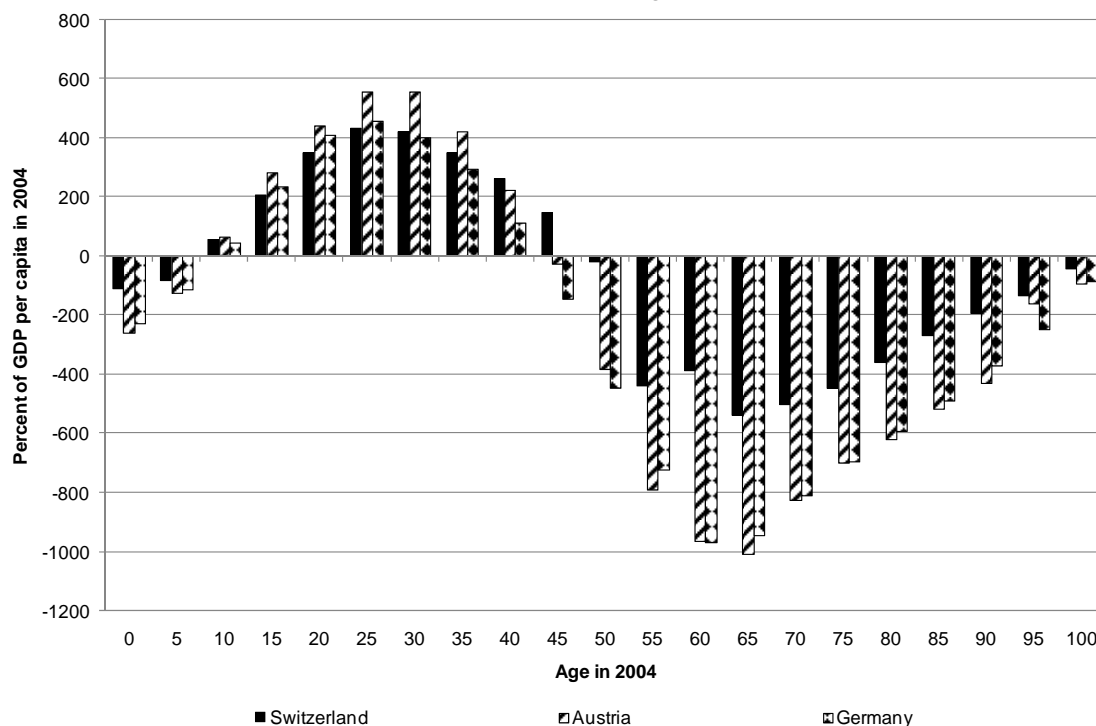


Source: Own calculations

¹³ One could solve this problem by a thorough sensitivity analysis but it still would be nice to have a robust indicator for comparison. We think that the fiscal gap for one country alone and for political work is a valuable indicator since it is easy to understand and related to other fiscal indicators like the debt quota.

Our second indicator, the future generations' burden, overcomes at least the second flaw of the fiscal gap. Now two dynamic values, the intertemporal public liabilities and the number of people in future generations, are set in proportion to each other. This ratio accounts for the differences in the demographic development. Table 7 shows the results for the future generations' burden for our different scenarios and countries. As one can see, this analysis revises the picture of the fiscal gap. Due to its demographic development, Austria burdens its future citizens with the highest debt. Every newborn after 2004 would have to bring 2.6 times the GDP per capita of 2004 (28,846 Euros) with them to stabilize the current fiscal policy. Secondly Germany comes with over 2.3 times its GDP per capita of 2004 (26,757 Euros). As its fiscal gap already hinted, Swiss future generations face overbalanced net transfers of 1.1 GDPs per capita (60,521 CHF or ca. 40.000 Euros) compared to their living counterparts.

Figure 5: Generational Accounts in comparison
(Medium Population Scenarios, $g=1.5\%$, $r=3\%$)



Source: Own calculations

As the position of Switzerland is relatively clear, one wonders why Germany and Austria given their fiscal gaps and demographic developments (Austria with a rising, Germany with a declining population) change places with the future generations' burden. The explanation is in the Generational Accounts plotted in figure 5. Although Austria has a lower fiscal gap overall, it transfer more resources over the remaining life-cycle to its youngest generations while it tax its working generations harder than Germany. Middle- and old age generations however receive relatively equal transfer in both countries which suggests that Germany's social security systems are not as balanced as Austria's but that Austria's rising population contributes more to the fiscal

sustainability problem than it resolves. That is also why the future generations' burden is higher in Austria than in Germany as future generations would have to give up already larger transfers in the first country. Switzerland is in every respect far more balanced than both its neighbors with relatively low net transfers to newborns (and so future generations) and relatively high net taxes of working generations, however all quite low on an absolute level given its economic strength (i.e. its GDP per capita).

Again the problem with the indicator future generations' burden is that it is, like the fiscal gap, very volatile to changes of the growth-discount-spread. That is why we report two more indicators, the so called revenue and transfer gap, which are both very well comparable between the countries because they are sensitive to the different demographic developments and so on the differences in future economic power and because they are not sensitive to changes of the growth and discount rate. The revenue gap states how taxes and duties would have to rise immediately for living and future generations to bring the current fiscal policy right on a sustainable track. Analogous, the transfer gap reports the proportion of which benefits and statutory transfers would have to be cut back immediately to reach a sustainable level. Results for all indicators are shown in table 7 together with the initial tax and transfer quotas:¹⁴

**Table 7: Sustainability indicators of six OECD countries
(Eurostat Population Projections, $g=1.5\%$, $r=3\%$)**

Indicator	Switzerland	Austria	Germany
Future generations' burden (in GDP per capita 2004)	-1.1	2.6	2.3
Tax quota in 2004 (in per cent of GDP)	34.8	49.6	43.4
Revenue Gap (necessary enhancement in per cent)	-3.6	7.3	14.6
New resulting tax quota 2004 (in per cent of GDP)	33.5	53.3	49.7
Transfer quota in 2004 (in per cent of GDP)	35.9	51.0	47.1
Transfer Gap (necessary reduction in per cent)	-3.9	6.9	12.4
New resulting transfer quota 2004 (in per cent of GDP)	37.3	47.4	41.3

Source: Own calculations

All indicators show that relatively spoken Germany faces the biggest demographic challenge, not only because of its demographic development but rather due to the design of its social security system. Revenues must rise about 14.6 per cent from their current level which would lead to a new tax quota of 49.7 per cent of GDP (compared to 43.4 without this uprating).¹⁵

¹⁴ Note that the initial transfer quota is calculated excluding interest payments.

¹⁵ This demonstrates also why the results of the *revenue and transfer gap* have to be seen in a relative way because Austria already has a tax quota of 49.7 per cent of GDP without any augmentation of the tax level. For large and middle-sized economic powers like Germany such rises in the level of taxation would also probably result in changes in relative factor prices (depending on which taxes would be increased). Generational Accounting cannot catch these effects. For small open economies like Austria and Switzerland, factor prices would probably not change and so our results could be taken as given. For an analysis of Generational Accounting in General Equilibrium, see Fehr and Kotlikoff (1996), Raffelhüschen and Risa (1997) and Börstinghaus and Hirte (2001).

Transfer cuts turn out not to be as large as revenue increases because of their demographic profile. While taxes and duties are mostly paid by the working generations, the transfers are mainly received by the elderly to whom the so called baby boomer generations will also belong in a few years. Due to this demographic leverage effect, transfer cuts do not have to be as large as revenue increases. Austria comes in second with revenue increases of 7.3 per cent. The tax quota would then be around 53.3 per cent of GDP and so even higher than in Germany. Again, transfer cuts would not have to be as large as the tax changes but the difference between revenue increases and transfer cuts is not as large as in case of Germany. Switzerland remains in its relative sustainable position and could even cut taxes about 3.6 per cent or increase its spending of about 3.9 per cent.

5.2 Discussion

As one can see the sustainability parameters differ quite substantially between the three analyzed countries. One cause for this which cannot be seen in the above analysis is that in the case of Switzerland, only investment in the health infrastructure and subsidies for health premiums of low-income households are considered as public health expenditure in the international statistics we use. As Hagist (2008) shows, if one considers the mandatory health sector as part of the Swiss public system, the fiscal gap increases from intertemporal assets to nearly zero. However, as it is not clear how one should handle the Swiss health sector, we decided to go with the measurement presented in the OECD statistics.

Another difference between the countries which lead to differences in the sustainability is clearly the different demographic developments. Switzerland may be the oldest economy of the three in 2004, however with a relative high net migration in Switzerland and a rather low one in Germany, the latter will take over. Austria is in the middle with also a relatively high net migration. Furthermore it seems that both Switzerland and Austria tax younger generations between 20 and 40 years relative more than it is the case in Germany. This is very interesting and probably the main cause for lower fiscal gaps, at least in the comparison of Germany and Austria. Switzerland is so sustainable due to its pension benefits which are indexed only to the half of productivity growth which is in contrast to both other countries where beneficiaries nearly get the full productivity growth rate.

The most missing part in Generational Accounting and especially in an international comparison is the aspect of quality. Austria may look more sustainable than Germany but it has also already a higher expenditure and tax ratio than the bigger neighbor. The relevant question would be if Austrians given their higher taxes are getting better services and living standards than their German counterparts. This is especially relevant if one compares the sustainable levels of taxes

or public expenditure. Unfortunately this question remains unsolved and one could only state that Austria is more sustainable than Germany, however, for already higher prices.

6. Summary and Conclusion

The Austrian population will pass through an ageing process during the next decades which causes that the old-age-dependency ratio rises from currently 27 per cent up to 58 per cent in 2060. This ageing population induces increasing expenditures on old-age and disability pensions together with health and long-term care benefits while the public revenues from wage taxes and social contributions will decrease. At the moment Austria's budget is in (primary) surplus but given the developments described above one wonders if such budget surplus could still be seen in the future? One tool to answer such questions is Generational Accounting which was set up in the early 1990s to evaluate if a country's fiscal policy is sustainable over the long-run. To be fair, Austria's politicians have already addressed the problems of ageing with three reform measures for the public pension system in 2001, 2003 and 2004 and one health reform in 2005. However, even while these reform measures reduce the burden on future generations significantly, Austria finds itself still with a fiscal gap of nearly 2.6 times its GDP of 2004. This is mainly due to two factors: Firstly, despite its pension and health reforms Austrian baby-boomers will still get high net transfers over their remaining life-cycle and secondly present and future newborns burden the fiscal system with quite significant net transfers over their life. These outcomes may differ in quantity given different set of parameters but are not challenged qualitatively.

In comparison with its two German-speaking neighbors, Germany and Switzerland, Austria gets the silver medal when it comes to sustainability. Switzerland is far ahead facing intertemporal assets rather than accumulating debt. This is due to the accounting of public health expenditure and the Swiss pension system, which only gives half the productivity growth to its beneficiaries. However, Austria is still slightly better off than Germany given the reform measures described above but for the price of higher tax rates. As Generational Accounting does not cover any growth effects of higher taxes or net spending on education (one cause for the only minor difference between Austria and Germany with Austria outspending the bigger neighbor by nearly 1.5 times), it remains for future research if really Austria or Germany are better off in the long-run given their current fiscal policy.

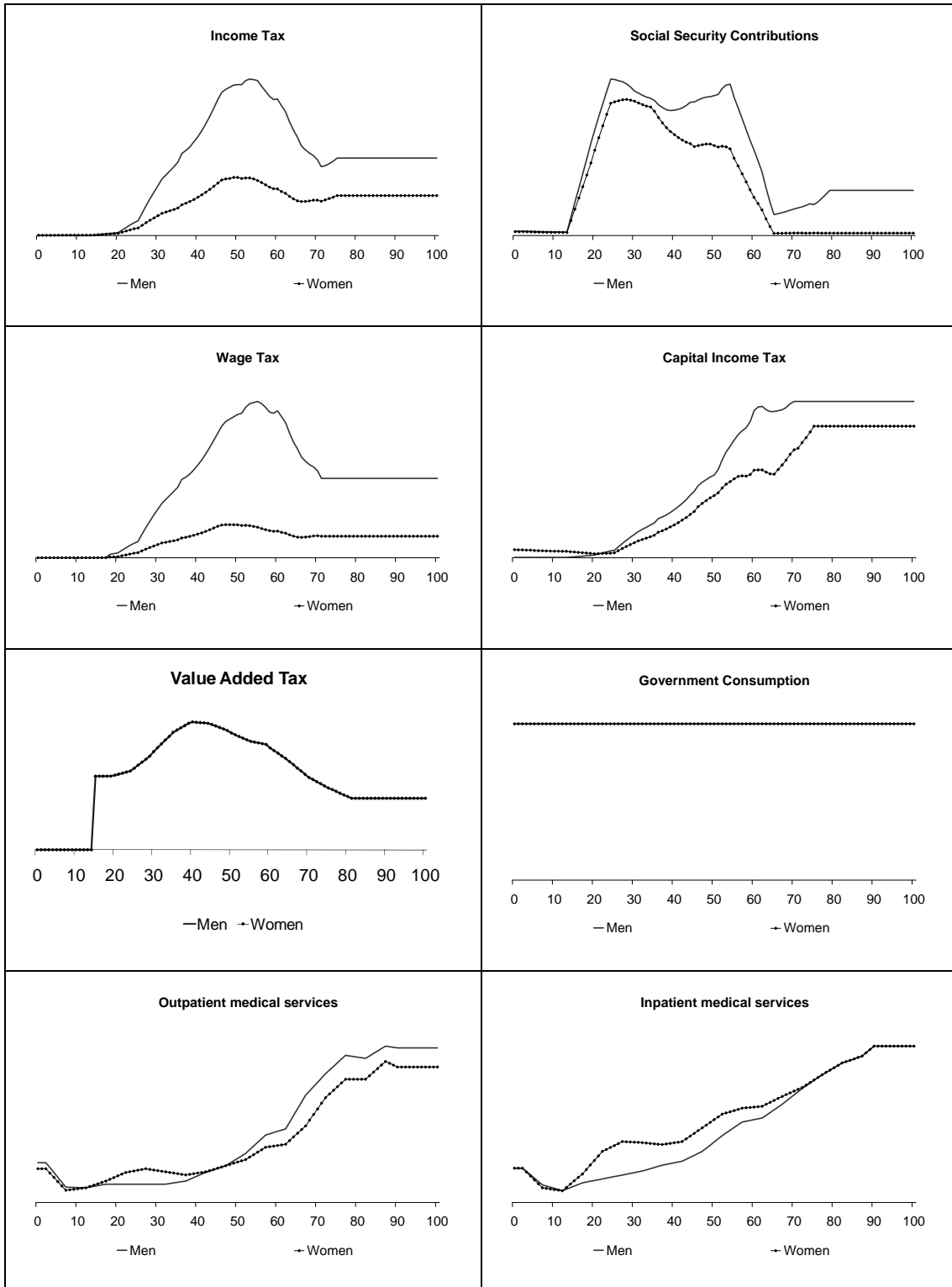
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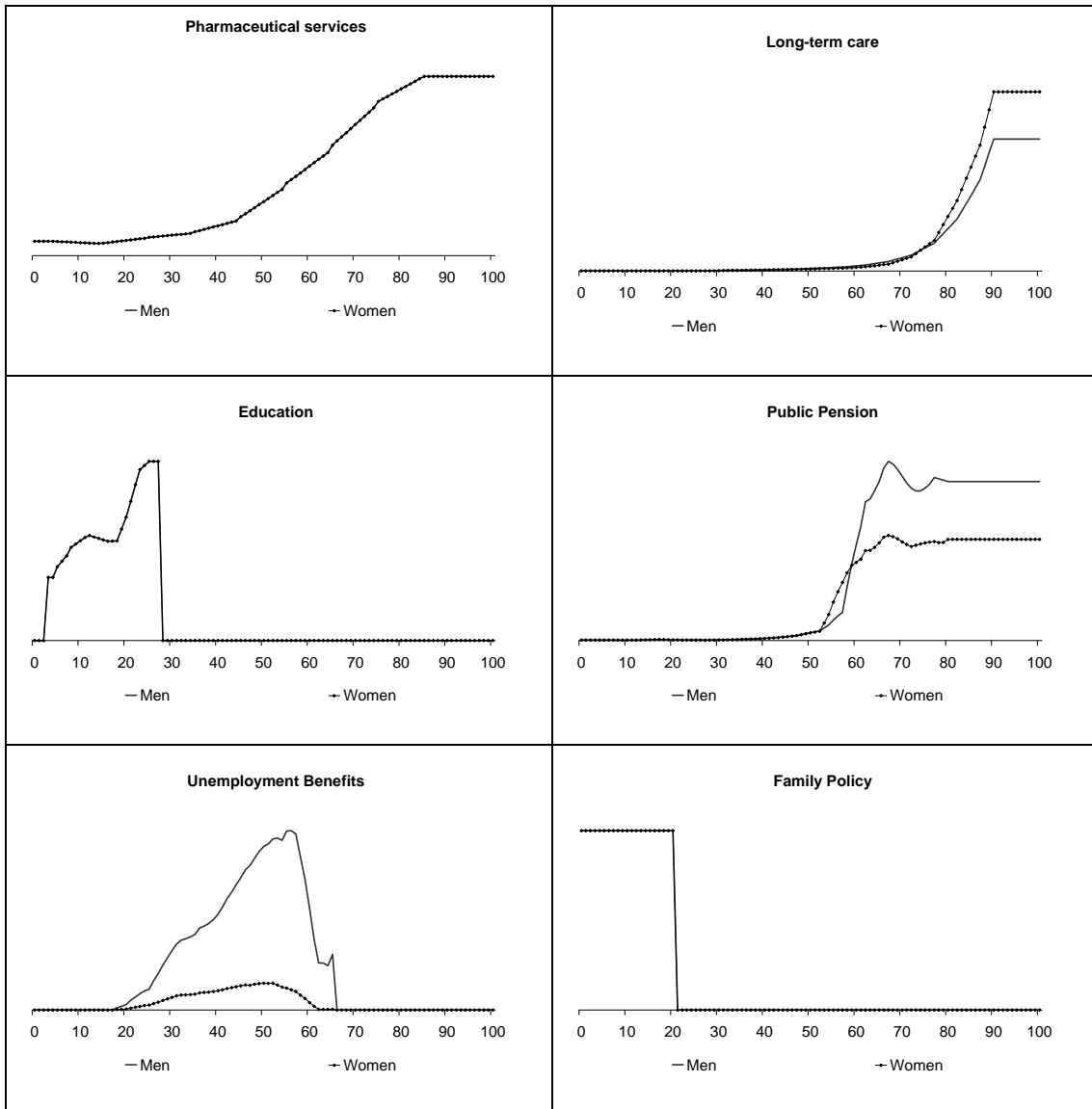
Appendix

Table A-1: Austrian micro-profiles



Source: See section 3.3

Continuation Table A-1



Source: See section 3.3

**Table A-2: Sensitivity Analysis – Austrian Public Sector
Sustainability Indicators**

Spread	Indicators	Population Projection			
		Eurostat	Medium	High	Low
g=1.5% r=2.5%	Fiscal Gap (in % of GDP)	386.0	434.7	888.2	264.3
	Future Generations' Burden (in % of GDP per capita)	102,210	129,890	117,780	254,920
	Revenue Gap (in %)	8.3	9.9	11.8	9.9
	Transfer Gap (in %)	7.4	8.7	10.2	8.8
g=1.5% r=3.5%	Fiscal Gap (in % of GDP)	178.7	208.7	316.5	147.1
	Future Generations' Burden (in % of GDP per capita)	90,328	113,490	98,101	163,110
	Revenue Gap (in %)	7.1	8.5	10.0	7.5
	Transfer Gap (in %)	6.5	7.7	8.5	6.9
g=1.5% r=3.0%	Fiscal Gap (in % of GDP)	248.8	287.6	485.9	193.2
	Future Generations' Burden (in % of GDP per capita)	96,053	121,690	105,890	196,600
	Revenue Gap (in %)	7.6	9.1	10.8	8.4
	Transfer Gap (in %)	6.9	8.2	9.4	7.6
g=2.0% r=3.0%	Fiscal Gap (in % of GDP)	296.7	346.0	737.5	210.3
	Future Generations' Burden (in % of GDP per capita)	78,469	103,130	97,338	203,000
	Revenue Gap (in %)	6.3	7.8	9.7	7.9
	Transfer Gap (in %)	5.8	7.1	8.6	7.2
g=2.0% r=4.0%	Fiscal Gap (in % of GDP)	135.7	164.5	259.6	112.5
	Future Generations' Burden (in % of GDP per capita)	68,525	89,253	80,132	124,750
	Revenue Gap (in %)	5.4	6.7	8.1	5.7
	Transfer Gap (in %)	5.0	6.1	7.3	5.3

Source: Own calculations