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Abstract

In this paper, we employ generational accounting to analyse the inter-temporal stance of Austrian public finance in 1998 as well as the inter-temporal fiscal impact of immigration to Austria. Immigrants affect inter-temporal fiscal balance in essentially two ways. Firstly, they have a demographic effect in enlarging the population (and thus the tax base) and in altering its age- (and gender-) composition. Secondly, they change the fiscal characteristics of age cohorts due to a representative immigrant exhibiting higher or lower tax and transfer payments than a representative native of the same age and gender. The overall fiscal effect of immigration is found positive, under the assumption that the age and fiscal characteristics of future immigrants resemble those of the current immigrant population in Austria. This is due to a favourable age composition and lower per capita net transfer receipts during retirement age, which compensates for lower per capita net tax payments during working age. However, immigration is not likely to achieve inter-temporal fiscal balance, even if immigration increases or migrants are screened by skill or age.

Key words: immigration; generational accounting; fiscal imbalance.

JEL codes: F22, H61, E66.

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1 Introduction

In the discussion on the fiscal costs and benefits of immigration for the host country, the burden that immigrants allegedly pose on social welfare systems has featured most prominently. Lately, however, immigration has been proposed as a means to alleviate the fiscal burdens associated with aging populations. It has been recognised years ago that demographic trends in most developed countries will not allow sustaining their current pension and health systems and will pose serious burdens on their public finances. Attempts to estimate fiscal contributions of immigrants usually take a cross-sectional perspective.[1] For a meaningful evaluation of immigrants' fiscal impact, however, an inter-temporal analysis is necessary. Such a framework allows to incorporate changes in fiscal payments and benefits over time due to the aging of populations. In the following, we will apply the method of generational accounting in order to evaluate the fiscal impact of immigrants in Austria. The method has been developed by Auerbach et al. (1991, 1994) in order to provide an indicator for the amount of intergenerational redistribution implied by a given fiscal policy. At the same time, it enables to measure the 'true' level of public debt as opposed to conventional records of the budget deficit and public debt, which are only of limited significance in the light of future public spending and tax revenues that are set by current fiscal policy. In generational accounting, not only the tax receipts and public expenditures of a given fiscal year are considered, but also expected future public revenues and expenditures related to currently living as well as future generations. Fiscal sustainability prevails, if the so-called inter-temporal budget constraint is satisfied - that is, if current public debt does not exceed the present value of future revenues minus spending. The degree of intergenerational redistribution is measured by the generational accounts of the current newborn and the next, future generation, that is, the present value of their taxes paid less their benefits received over their lifetime. For previous applications of generational accounting on the estimation of immigrants' fiscal impacts see Auerbach and Oreopoulos (2000) and Smith and Edmonston (1997) for the U.S. and Bonin et al. (2000) for Germany. Storesletten (2000) has used a calibrated general equilibrium overlapping generations model to estimate the long-term fiscal impact of immigrants in Sweden. Findings generally are that the fiscal impact of immigration on the host country is positive, depending on the age and skill composition of immigrants.

The paper is organised as follows: the next section gives an overview of the method of generational accounting. Section 3 gives an overview of the macroeconomic and fiscal background in Austria in the year 1998. Section 4 describes the demographic and fiscal micro-data underlying the derivation of generational accounts. Section 5 presents the results and the ensuing inter-temporal state of Austrian public finances in the base year. In Section 6, we focus on the fiscal contribution of immigrants and calculate the effects of various immigration policies on total public debt. Section 7 provides a review of related literature, and Section 8 concludes.

[1] See for example Simon (1984) for the U.S., Akbari (1989) for Canada, Ulrich (1992) for Germany and Gustaffson and Osterberg (2001) for Sweden. A survey on the literature is given in Poschner (1996).

2 The methodology of generational accounting

The method of generational accounting was developed by Auerbach et al. (1991, 1992, 1994) as a response to the shortcomings of conventional periodical budget accounting that does not consider the long-term revenue and expenditure implications of present fiscal policy. While yearly budget accounts cannot provide an indicator of intergenerational redistribution due to fiscal policy, generational accounts can. In the following, we will give a brief description of the method employed, as it can be found in more detail for example in Bonin (2001), Kotlikoff (1993, 2001) and Raffelhüschen (1999b).

2.1 The government's inter-temporal budget constraint

At the core of generational accounting is the inter-temporal budget constraint of the government (e.g. the entire public sector), which requires that the present value of prospective net tax payments to the public sector, imposed on either living or future born agents, must be sufficient to finance the present value of aggregate net debt. It is expressed in terms of the generational accounts $N_{t,k}$ of current and future generations (in present value terms of a base year t):

$$B_t = \sum_{s=0}^{d} N_{t,t-s} + \sum_{s=1}^{\infty} N_{t,t+s} \tag{1}$$

On the left-hand side of (1), B_t denotes the base year stock of government's explicit net debt (financial liabilities minus the sum of financial assets). It represents the sum of real government deficits (or surpluses) in the past, mirroring the spending and revenue history of the public sector. On the right-hand side, $N_{t,k}$ represents the present value as of year t of net tax payments (taxes paid minus transfers received) made by all members of a generation born in year k over the remaining life cycle: for generations currently alive, $N_{t,k}$ denotes remaining lifetime net taxes, for generations not yet born, $N_{t,k}$ refers to lifetime net taxes, discounted to the current year t. d defines the maximum age.

In testing for generational balance, generational accounting empirically evaluates whether current fiscal policy is consistent with the inter-temporal budget constraint of the public sector. If it is not, the adjustment of fiscal parameters in the budget constraint becomes necessary, either now or in the future. In the case that adjustment is carried out via future net taxes only, generational accounts would increase for future generations, implying fiscal redistribution between generations.

2.2 Generational accounts

In short, the generational account of a certain gender and age (and nativity) cohort is just the sum of discounted net tax payments that an individual of this specific gender and age (and

nativity) cohort faces over its remaining life-span. The method of generational accounting is strictly forward-looking in the way that for each age cohort alive it only computes the aggregate net tax burden of a representative cohort member from a present base period on over its remaining life-time. The aggregate remaining lifetime net tax payments of a cohort born in period k, denoted $N_{t,k}$, is defined as

$$N_{t,k} = \sum_{s=\kappa}^{k+d} T_{s,k} P_{s,k} (1+r)^{-(s-t)} \quad with\ \kappa = max(t,k). \tag{2}$$

For currently living cohorts born in year k with $t-d \leq k \leq t, \kappa = t$; for future cohorts born in year $k > t, \kappa = k$. $T_{s,k}$ stands for the projected average net tax payments to the government in year s paid by a representative member of the generation born in year k. $P_{s,k}$ is the population of cohort k alive at time s. r represents the supposedly constant pre-tax interest rate applied to discount future payments back to the base period. The computation of the generational accounts therefore requires a demographic projection, taking account of fertility, mortality and migration trends, as well as a projection of the age-specific net tax payments by cohort, $T_{s,k}$. In combining projected age profiles with the projected population structure, one derives the rest-of-life net tax burden of living generations.

For living generations born in year k, the generational accounts in the base year t are just the aggregate remaining lifetime net tax payments divided by the number of cohort members alive in the base year:

$$GA_{t,k} = \frac{N_{t,k}}{P_{t,k}}. \tag{3}$$

Aggregate per capita net tax payments $T_{s,k}$ are found by summing up single per capita tax and transfer payments:

$$T_{s,k} = \sum_i t^i_{s,k}, \tag{4}$$

where $t^i_{s,k}$ indicates the average tax or transfer of type i paid or received by a representative k-born individual in period $s \geq t$, hence of age $s-k$. By convention, $t^i > 0$ defines a tax payment from the private to the public sector, and $t^i < 0$ defines a transfer payment from the public to the private sector.

For future generations, age-specific taxes and transfers are computed by simply projecting fiscal profiles of the base period using a constant productivity growth rate.[2] Fiscal profiles become

$$t^i_{t+j,k} = (1+g)^j t^i_{t,k-j}. \tag{5}$$

Equation (5) assigns to each agent of age $t+j-k$ in year $t+j$ the tax and transfer payment observed for agents of the same age in year t, adjusted for gains in productivity.

[2]It is therefore assumed that base year fiscal policy is maintained. See Bonin (2001, pp.25) on further details regarding the assumption of constant economic growth.

The base year cross-section of age-specific tax and transfer payments per capita is generally determined in two steps. First, the tax and transfer payments $\tau^i_{t,k}$ of a representative member of each age cohort are estimated from micro-data. In a second step, to overcome data deficiencies on the micro level, the individual age-specific taxes and transfers, summed up over all cohorts and weighted by the respective cohort number, are re-evaluated proportionally to fit the observed macroeconomic tax or transfer aggregate T^i_t by the application of a proportional, non-age-specific adjustment factor θ^i:

$$\theta^i = \frac{T^i_t}{\sum_{k=t-d}^{t} \tau^i_{t,k} P_{t,k}}. \tag{6}$$

From there, we derive adjusted per capita tax and transfer payments $t^i_{t,k}$ in the following way:

$$t^i_{t,k} = \theta^i \tau^i_{t,k}. \tag{7}$$

2.3 Determining future generational accounts and assessing fiscal imbalance

Within the method of generational accounting, there are different ways to construct the generational accounts for future generations and to assess the intergenerational stance of fiscal policy. First, one can proceed using (5) above, assuming that future generational accounts are equal to the one of the generation born in the base year, corrected only by the economic growth factor, as shown in (8) for the generation born one year after the base year:

$$GA_{t+1,t+1} = GA_{t,t}(1+g). \tag{8}$$

Then, from the inter-temporal budget constraint, one computes the inter-temporal public liabilities IPL_t of the base year as the difference between current debt and the aggregate net tax payments of living and future generations:

$$IPL_t = B_t - \sum_{k=t-d}^{\infty} N_{t,k}. \tag{9}$$

Inter-temporal public liabilities entail a revision of initial fiscal policy at some point in time - if they are positive (negative), a rise (decline) in net taxes is necessary eventually. Only if inter-temporal public liabilities are zero, fiscal policy is sustainable, since it does not violate the inter-temporal budget constraint of the government. The required policy adjustment can be undertaken in various ways. The conventional approach is to assign the uncovered liabilities in their entirety to future generations. Aggregate future net taxes then equal the difference between given current debt and the aggregate net tax payments of living generations, in order to ensure that the budget constraint holds. The generational accounts for all future generations are derived under the proposition that the government distributes the aggregate financing need

evenly across future generations, assuming that generational accounts stay identical except for income growth. Depending on the choice of the specific future fiscal policy that is to correct the fiscal imbalance, the adjustment can be undertaken via a change in any of the given tax or transfer parameters $t^i_{s,k}$. For example, the factor determining the proportional rate of adjustment that is to be applied to all net tax payments of future born generations in order to raise additional net revenue to the extent of the inter-temporal public liabilities is equal to

$$\mu = \frac{IPL_t}{\sum_{k=t+1}^{\infty} P_{k,k} \overline{N}_{k,k} (1+r)^{t-k}}, \tag{10}$$

with $\overline{N}_{k,k}$ representing the present value lifetime net tax payments of a representative individual born in period $k > t$. This way, we can derive the new generational accounts of future born generations that guarantee fiscal sustainability under current tax and transfer policies. Accordingly, we can choose $\overline{N}_{k,k}$ to contain the present value of lifetime taxes or transfers only, or specific categories of each, to determine the necessary rate of adjustment of the chosen tax or transfer categories. Alternatively, the uniform adjustment factor can be applied to the present value life cycle taxes and/or transfers of both living and future generations - in this case, it would be assumed that government immediately switches to a sustainable path of fiscal policy, adjusting base year tax and/or transfer levels once and for all. Now, the degree of inter-temporal fiscal imbalance can be measured by the resulting difference in lifetime net tax payments between base year and future-born individuals. Selecting the cohort born immediately after the base year as representative for future generations, a second indicator for inter-temporal fiscal imbalance is the relative change in generational accounts between the generation born in the base year and in the year after:

$$\pi = \frac{GA_{t+1,t+1}}{GA_{t,t}(1+g)}. \tag{11}$$

Alternatively, one could measure the absolute change in the lifetime net tax payments of agents born in period t and $t+1$ that satisfies the inter-temporal budget constraint of the government. Fiscal policy is sustainable only if the thus derived future generational accounts are equal to the (growth-adjusted) generational account of the current new-born, that is, if π is equal to 1.

2.4 Generational accounting and immigration

Taking separate account of natives and immigrants as two subpopulations requires certain changes to the equations introduced above. The inter-temporal budget constraint in (1) is extended to incorporate the net taxes of current and future immigrants:

$$B_t = \sum_{s=0}^{d} (N_{t,t-s} + F_{t,t-s}) + \sum_{s=1}^{\infty} (N_{t,t+s} + F_{t,t+s}). \tag{12}$$

Foreign aggregate cohort net tax payments $F_{t,k}$ are derived in analogy to those of natives presented in (2) above:

$$F_{t,k} = \sum_{s=\kappa}^{k+d} T^*_{s,k} P^*_{s,k} (1+r)^{-(s-t)} \quad with\ \kappa = max(t,k). \tag{13}$$

The evolution of the foreign population $P^*_{s,k}$ over time will reflect not only fertility and mortality of immigrants, but also additional immigration as well as out-migration of previous immigrants (net migration). Per capita net tax payments of foreigners $T^*_{s,k}$ will typically differ from those of natives due to different economic characteristics of immigrants. Analogously to (4), aggregate foreign net tax payments are the sum of individual age-specific cohort profiles $\tau^{i*}_{t,k}$, respectively. These are re-evaluated again according to macroeconomic data by using the adjustment parameter θ^i, so that, given N different subpopulations, the following restriction is fulfilled:

$$T^i_t = \sum_n \sum_{k=t-d}^{t} t^{i,n}_{t,k} P^n_{t,k} = \theta^i \sum_n \sum_{k=t-d}^{t} \tau^{i,n}_{t,k} P^n_{t,k}. \tag{14}$$

Generational accounts of foreigners are determined analogously to those of natives in (3) above:

$$GA^*_{t,k} = \frac{F_{t,k}}{P^*_{t,k}}. \tag{15}$$

The generational accounts obtained will give an unambiguous indication of the fiscal burdens and contributions of immigrants and natives of all age-groups - given current fiscal policy, current macroeconomic conditions, and current demographic characteristics of natives and immigrants.[3] Therefore, even if absolute numbers are to be interpreted with caution, the generational accounting exercise holds valuable information concerning the relative fiscal stance of immigrants and natives as well as of current and future generations. More importantly still, generational accounts can be obtained for any specified scenario deviating from the status quo - and will yield important information concerning its consequences for inter-temporal fiscal balance and fiscal incidence among generations and subpopulations. Generational accounting can thus be used as a method for determining the net fiscal impact not only of immigration as it is, but also changes in immigration policy like changes in immigration quota or the immigration mix (e.g. the educational status of the immigrant population). Inter-temporal fiscal (im)balance will be affected by immigration in essentially two ways: firstly, they will have a demographic effect in enlarging the population (and thus the tax base) and in altering its age- (and possibly gender-) composition[4]; secondly, they will probably change the fiscal characteristics of age cohorts due to a representative immigrant having higher or lower tax and transfer payments than a representative native of the same age and gender.

[3] Future changes in either of these parameters, such as a change in the educational characteristics of future immigrants, cannot be taken into account, unless they are deliberately examined in a simulation exercise, which gives a valid result in the sense of a 'what-would-be-if' case when compared to the basic scenario.

[4] The demographic characteristics of immigrants usually affect fiscal imbalance in a positive way, due to a favourable average working age of immigrants. For details on the demographic data see Section 4.1.

3 The macroeconomic and fiscal situation in Austria in the base year 1998

Since for the computation of generational accounts, the pattern of public revenues and expenditures specific to the base year is projected into the future and thus assumed to stay constant, some knowledge about the macroeconomic and fiscal environment in that year is helpful for an interpretation of the results.[5] The macroeconomic situation in 1998 was, with a real growth rate of 3.3 percent, a rather favourable one. However, this was not reflected much on the labour market or on fiscal parameters such as tax revenues and social spending, as these effects are commonly lagging behind the development of the growth rate. The fiscal situation in that year was predominately determined by previous efforts to fulfil the Maastricht deficit criterion for participation in the European Economic and Monetary Union (EMU). In order to bring down the budget deficit from its 5.1 percent of GDP in 1995 to a level below 3 percent, fiscal consolidation packages were enacted in 1996 and 1997. As mentioned in Keuschnigg et al. (2000), they consisted to the larger part of a cut in expenditures such as salaries and employment of civil servants and general administration, unemployment benefits and early retirement pensions. To a lesser part, revenues were increased via the wage and personal income taxes, as well as corporate and interest income taxes, an energy tax and a variety of indirect taxes. In 1997, the deficit rate decreased to 1.9 percent, with another increase in 1998 to 2.4 percent. Public debt decreased from around 70 percent of GDP in 1995 to 64.9 percent in 1998.[6] In order to get a clearer picture of the composition of these aggregate budget figures, we will now have a closer look at the public expenditures and revenues in 1998.

Public expenditures decreased from 57.2 percent of GDP in 1995 to 53.9 percent in 1997 and increased to 54.2 percent in 1998.[7] While the share of transfers in GDP in 1998 decreased relative to the previous year, expenditures from the statutory pension insurance, the most substantial transfer category of all, increased by about 4.2 percent relative to 1997.[8] In the long run, it is indeed the expected stark increase in pension outlays, due to increasing life expectancy and decreasing fertility under the current pay-as-you-go pension scheme, which puts perhaps the most important strain on the public budget. While the pension reform of November 1997 reduced the generosity of early retirement pensions and tightened eligibility criteria, the measures were judged not to reach far enough.[9] Similarly, spending pressures are present in the health care system. They were addressed by cost-reducing measures in the 1996 and 1997 budgets, including measures to increase the revenues of the health funds and to bring hospital financing together under one institution for each federal state, to help rationalise decisions. There is evidence that the diagnostics-based reimbursement scheme that displaced the former per-diem reimbursement scheme helped to curb public outlays for the

[5] Lehner (1999).
[6] WIFO (2003).
[7] Statistik Austria (2001a,b).
[8] Lehner (1999).
[9] OECD (1999, p.47).

provision of health services to some extent. However, a large potential for cost-cutting in the health sector remained.[10] Finally, expenditure on interest payments increased by 5.2 percent in 1998, which was solely due to the increase in public debt, since the average interest rate on public debt decreased relative to 1997.[11]

As to the public revenues, the share of taxes in GDP increased significantly from 24.8 percent of GDP in 1997 to 25.6 percent in 1998. In particular, revenue from the corporate, income and labour tax increased, mainly due to the legislative measures taken in the 1996 tax reform package *(Strukturanpassungsgesetz 1996)* including the abolition of preferential tax treatments as well as an increase in tax pre-payments.[12]

Table 1 below shows the data for the consolidated budget in Austria in the base year 1998, as they were used for the benchmarking of aggregated micro-data. The macroeconomic data on revenues were taken from national accounts data in Statistik Austria (2001a) and data from the Association of Austrian Social Insurance Institutions *(Hauptverband der österreichischen Sozialversicherungsträger)* (1999). Aggregate data on expenditures were taken from the report on social expenditure by the Federal Ministry of Social Security and Generations (*Bundesministerium für soziale Sicherheit und Generationen)* (1999). As these aggregate data on public revenues and expenditures need to correspond to the respective microeconomic survey data, single budget items were regrouped and summed up as described in the next section below. Intergovernmental grants and transfers were cancelled out.[13] Thus, we derive aggregate revenues and expenditures of 1036.199 billion (bn.) ATS each. It can be seen that most of the revenue in that year was generated by social security contributions, followed by the value added tax and the labour income tax. On the expenditure side, government consumption and pensions were the biggest items, followed by education, interest payments and health expenditures.

4 Empirical derivation of generational accounts

The method of generational accounting was developed by Auerbach et al. (1991, 1992, 1994) as a response to the shortcomings of conventional periodical budget accounting that does not consider the long-term revenue and expenditure implications of present fiscal policy. While yearly budget accounts cannot provide an indicator of intergenerational redistribution due to fiscal policy, generational accounts can. Detailed descriptions of the method can be found for example in Bonin (2001), Kotlikoff (1993, 2001) and Raffelhüschen (1999b). The construction of generational accounts for living and future generations requires data on current and future populations as well as net tax payments by cohorts. In the following, we will describe the data sources and assumptions used for 1) the population projections and 2) the disaggregating of the Austrian budget in 1998 into tax and transfer profiles according to age, sex and nativity.

[10] OECD (1999, p.48).
[11] Lehner (1999).
[12] Lehner (1999, p.370), OECD (1999, p.40).
[13] Compare Keuschnigg et al. (2000).

Table 1: Consolidated budget in Austria (1998).

RECEIPTS		EXPENDITURES	
Personal income tax	44.124	Pensions	258.142
Labour income tax	201.979	Old age care	21.297
Social security contributions	397.498	Health	95.691
Capital income taxes	20.014	Unemployment	23.467
Value added tax	215.838	Family-related benefits	53.126
Other indirect taxes	92.446	Social assistance	3.721
Public deficit	64.300	Education grants	1.589
		Education	158.187
		Government consumption	322.479
		Interest payments	98.500
Total	1.036.199	Total	1.036.199

Note: In bn. ATS.
Source: BMSG (1999), Hauptverband der österreichischen Sozialversicherungsträger (1999), OENB (2000), Statistik Austria (2001a).

Along with the majority of other generational accounting studies[14], we group generations into 5-year age cohorts.[15] We have four subpopulations: native men, native women, foreign men and foreign women. The reason for choosing 1998 as the base year instead of a more recent year lies in the availability of the required data. More exactly, most of the micro-data on taxes and transfers by nativity are only available from the European Community Household Panel (ECHP), the most recent wave of which (1999)[16] is referring to labour and income tax data of the year 1998, as will be discussed in detail below.

4.1 Demographic scenarios

For the population data of living and future generations by age, sex and nativity, we refer to Statistik Austria population projections based on the latest population census from 2001.[17] While the projections of the population data are modelled explicitly by age and sex, they

[14] See for example Bonin (2001) and European Commission (1999).

[15] This aggregation does not represent too much of a distortion as long as there are no large single age groups within those cohorts that exhibit a distinctly different pattern of tax payments and transfer benefits. For example, an increase in the number of oldest old would make the exact distribution of net taxes among this population group more important (see Bonin (2001, p.108).

[16] At the time that the study was undertaken.

[17] Data were obtained from Gustav Lebhart, Statistik Austria.

do not account separately for natives and foreigners. Thus, in order to derive the required population projections for natives as well as foreigners, we resort to the assumption that the proportion of foreigners in Austria is constant and equal to their average population share during the three latest years available: 2000, 2001 and 2002.

The population projections used rely on the following assumptions regarding mortality, fertility and migration. The fertility rate is assumed to stay at a new long-term level of 1.4 from 2002 onwards. Life expectancy at birth is assumed to increase by 7.2 years for men and 6.3 years for women in 2002 to 83.0 and 88.0 in 2050, respectively, and to remain constant thereafter. 60-year-old men are expected to reach an average age of more than 85 after 2050, 60-year-old women an average age of more than 89. The decreasing number of births and the increasing number of deaths would lead to a decrease in the population from around 2050 by 0.5 percent per year without migration. Due to immigration, Austria's population is expected to increase from 8.05 million in 2002 to 8.43 million in 2027. Net immigration data have been corrected upwards since the last official forecast and are assumed to increase from 17300 in 2001 to around 29000 in 2006 due to the expansion of the European Union in 2004, but to decrease from then onwards to 22500 in 2050. From 2028 onwards, net immigration is expected to stay below the birth deficit and thus lead to a decrease in the total population that is to reach about 20000 people per year by 2050. In our sensitivity analysis in Section 5.3, we test for the effects of higher as well as lower net immigration and fertility on generational accounts and fiscal imbalance.

4.2 Fiscal scenarios

Next, we need to specify the age-, sex- and nativity-specific personal tax and transfer payments, the so-called cohort profiles. For this, we first determine the base year per capita tax and transfer payments of the various age cohorts in each of our subpopulations, distinguished by nativity and sex: native men, native women, foreign men and foreign women. The personal and household micro data used to construct the cohort profiles and the generational accounts presented in this study were mainly taken from survey data in the European Community Household Panel (ECHP), years 1998 and 1999. The ECHP provides a large sample consisting of about 60000 households with about 130000 individuals in Europe, which are surveyed through 15 years. In Austria, about 3000 households are participating, with about 7000 individuals. The data are available on the household as well as the individual level. Following Bonin (2001), we assign most individual tax and transfer data directly, in the year when the tax or transfer payment is reported to have occurred. Even though this incidence assumption may not always accurately reflect the actual fiscal benefits and burdens of an individual, we stick to it as a feasible second-best solution.[18] Fiscal data that are only available at the household level in the ECHP (that is, in our case, housing and social assistance benefits), are allocated to individuals by assuming that the total amount reported is distributed evenly among all household members. This assignment is also likely to be misrepresentative of the

[18] See Bonin (2001, pp.107) for possible flaws and a justification of this incidence approach.

actual incidence of tax and transfer payments within the household - however, as before, it seems reasonable for payments depending on the socio-economic composition of households, which stay representative as long as household composition does not change. The ECHP survey data are complemented by micro data provided by the Austrian Statistical Office as well as the Upper Austrian Health Insurance Administration *(Gebietskrankenkasse Oberösterreich)*. In a second step, the age profiles are benchmarked against the respective overall public budget data as presented in Table 1 by application of the adjustment factor. Those data were then smoothed by building moving averages among cohort values. In doing so, we hope to ameliorate variances in the data that are due to small sample sizes and retain representative cohort profiles. In addition, we are enlarging the sample size by drawing on both the survey results of 1998 and 1999. We now turn to explain the data sources and specific assumptions employed for arriving at the individual cohort profiles for each of our tax and transfer categories.

4.2.1 Tax and contribution payments

Labour income tax data and social insurance contributions data are not available by nativity from national statistical sources. The *Lohnsteuerstatistik* published by Statistik Austria[19] does not account separately for native Austrians and immigrants. For the same reason, it was not possible to resort to data from the Association of Austrian Social Insurance Institutions for age-gender-nativity profiles of social security contributions. The ECHP's detailed data on gross and net labour income by age, gender and nativity were therefore used to estimate individual average wage taxes plus social security contributions.[20] Thus, payroll contributions to the state-organized, pay-as-you-go financed social insurance are regarded as an integral part of gross wages and are assigned fully to workers. Due to data limitations it was not possible to construct separate profiles for wage taxes on the one hand, and the different contributions to social security (that is, contributions to the public pension scheme, statutory health and accident insurance and unemployment insurance) on the other hand. Tax payments and social security contributions from the usual two-months extra pay that is not included in the gross and net income data were derived from given yearly gross income data by subjecting taxable additional income to the tax tariff applicable. Filed personal income taxes *(veranlagte Einkommensteuer)* were obtained directly from the ECHP, together with any reimbursements or additional payments in the following year, which were deducted or added to the income tax data to obtain the final values. From the social security contributions of the self-employed, only contributions to the public pension scheme are available directly. Contributions to the statutory health and accident insurance of the self-employed, not surveyed by the ECHP, are allocated along their contributions to pensions, since health insurance contributions are a fixed percentage of gross earnings as well, subject to the same contribution threshold. Contributions

[19] That was used for the first generational evaluation of Austrian public finances by Keuschnigg et al. (1998).

[20] The fact that variables of the ECHP are not imputed, poses the problem of a bias due to missing values in cases where an answer was refused. However, because of the small frequency of such cases (a maximum of 11 percent of total), the bias is likely to be small.

of pensioners to the statutory health scheme, which are strictly proportional to pension income, are assigned with the relative distribution of pension benefits by age, sex and nativity.[21] Tax payments on pension income were calculated from given net pension income, by taking account of the income tax tariff and applicable deductions. The tax burden on private capital income, which is strictly proportional, is allocated according to the capital income profiles generated from the ECHP data on net of tax revenue from interest and dividends. Taxes on business like the corporate tax as well as other, minor taxes like the tax on business capital income are assumed to be borne by business capital and are not assigned to the household sector. This means that they are distributed uniformly among cohorts as part of the residual in public revenues that are not age-specific and therefore not allocated directly to individuals.[22] [23] Indirect tax payments (value-added tax and other indirect taxes) are not surveyed in the ECHP and had to be inferred from consumption expenditure data for adult equivalents[24] in the Statistik Austria's consumption survey *(Konsumerhebung)* 1999/2000 by 5-year age cohorts[25] of household heads and 12 consumption categories[26]. Separate tax profiles were computed for each consumption category, since the share of the different consumption goods in total purchases varies with age, and so do tax payments, therefore. The tax rates to be applied were computed as the means of tax rates applicable to the different consumption good COICOP subcategories[27] and can differ from the formal value-added tax rates of 10 percent and 20 percent on goods for basic needs and other goods, respectively, depending on the composition of consumption goods in the various categories. Except for one-person households, the consumption survey does not distinguish between household heads by sex, and male and female consumption tax payments therefore had to be assumed to be equal. Also, due to the lack in data, consumption patterns were not available separately for natives and foreigners. Therefore, foreign tax payments had to be distributed in proportion to the relative average consumption expenditure level of foreigners, assuming an identical consumption pattern of foreigners and natives. As with labour and capital income taxes and social security contributions, incidence is assumed to lie with the taxpayers, that is, in this case, the household heads. Dependent children are assumed not to bear any tax burden themselves.[28] Among other indi-

[21] So are pension insurance contributions by retired civil servants, due to the lack of a more appropriate assignment mechanism.

[22] See Garvey and Espenshade (1996) and Clune (1997). Alternatively, one could assign those taxes to private individuals according to their annual revenue from private capital income (compare Bonin (2001, p.109)). However, since it is difficult to determine the true incidence of such taxes, we go for the most general option.

[23] Similarly, no 'inflation tax' or minor taxes on private capital like the private wealth tax or the property tax are assigned to individuals according to their interest and dividend income (see Bonin (2001, pp.110)).

[24] Household expenditure adjusted according to the size and type of household.

[25] From 24 and younger to 75 and older.

[26] As listed in COICOP (Classification of the Individual Consumption Expenditures by Purpose).

[27] Provided by Bernhard Mazegger (Statistik Austria) on request.

[28] Data limitations in the consumption survey regarding the composition of households by age of household head prevents us from following a common procedure of distributing part of the indirect tax burden among infant household members by certain consumption weights. In the approach use, children are treated as a 'consumption good whose quality, which is related to their commodity consumption, enters the parents' utility function, but is a substitute for parents' own consumption of commodities' (Razin and Sadka (1995, p.14)

rect taxes, some of the most important ones are the taxes on stimulants (mainly alcohol and tobacco) and beverages, excise duties on energy and mineral oil, the *Normverbrauchsabgabe (Nova)* and the insurance tax, which together make up about 89 percent of total revenue from other indirect taxes on goods and services.[29] These tax payments are distributed in proportion to the amount of average cohort expenditure subject to the respective tax.

4.2.2 Transfer receipts

Expenditure profiles are also to a large part constructed by making use of the ECHP's detailed survey of benefit recipiency, which is, at the same time, the only source for determining transfers within Austria's social security system by nativity. Cohort-specific individual receipts of pension benefits, monetary health care benefits, unemployment benefits, family-related benefits, old-age care, social assistance and education grants are derived from the respective average transfer receipts of individuals in the ECHP. Cohort profiles for pension benefits include public pension income of all sorts - that is primarily old-age pensions, early retirement pensions, survivors' pensions and invalidity pensions. In the original cross-section, average pension receipts of natives decline with the age of pensioners, reflecting past differences in working careers. In order to avoid projecting this implausible lifetime pattern of pension payments into the future, we follow the procedure described in Bonin (2001, pp.112) and design maturation effects in the following way: for native male cohorts older than 70 and native female cohorts older than 80, we assume that average pension receipts in the initial cross-section remain constant over the remaining life cycle (apart from productivity growth). For younger base year cohorts and all future cohorts, we hold the received pension amount constant from the age of 70 (80), when average per capita pension receipts are at or close to the maximum in the base year. Profiles on health care benefits comprise monetary benefits derived from the ECHP as well as health care related in-kind benefits[30], which were available by 5-year age groups, sex and nativity from the Upper Austrian Health Insurance Administration[31] [32]. With family-related benefits[33], incidence is assumed not to lie with transfer recipients but with the children who are the cause for the transfer to take place. Allocating family-related benefits to those household members who are classified as dependent children justifies assuming that the

in: Bonin (2001, p.111)). An advantage of this perspective is that both the level as well as the relative age distribution of consumption do not necessarily vary in line with fertility, and the assumption of constant tax profiles in the light of demographic change is justified (Bonin (2001, p.111)).

[29] Statistische Nachrichten (2001a, pp.875).

[30] Comprising *Arztkosten, Krankenhauskosten, Medikamentenkosten, Heilbehelfe- und Hilfsmittelkosten, Fahrtspesen, Transportkosten.*

[31] Provided by Jürgen Himmelbauer (*Oberösterreichische Gebietskrankenkasse, Gesundheitsberichterstattung*) on request.

[32] The Upper Austrian data seem to represent the national data pretty well, as is revealed in a comparison with health care benefit profiles using data on Austrian health care cost patterns ('acute health care costs' containing *Arzt-, Krankenhaus-, Medikamentekosten*) from Riedel and Hofmarcher (2001).

[33] Comprising *Familienbeihilfe, Wochengeld und Karenzgeld, Geburtenbeihilfe und sonstige Familienleistungen.*

initial profile of adults stays unchanged when fertility changes and, for example, the average number of children per household falls.[34] As in the case of family-related benefits, household (instead of individual) data are used for constructing age profiles for public housing support[35] and social assistance *(Sozialhilfe der Länder und Gemeinden in Form von Geldleistungen)*. Here, too, transfer recipiency does not mainly depend on individual characteristics but on characteristics of the household. Therefore, in order to set up transfer profiles which are more likely to stay representative in the course of demographic transition, housing support and social assistance benefits are distributed evenly among all household members. Unemployment insurance benefits[36], emergency welfare benefits *(Notstandshilfe)*[37], old-age transfers[38] and education grants[39] again are derived from individual transfer receipts surveyed in the ECHP. Finally, in-kind education expenditure[40] is assigned explicitly to the receiving age cohorts, since it also represents government expenditure that is dependent on age. Future education expenditure is assumed to develop proportionally to the fraction of an age cohort enrolled in the educational system. Per capita educational expenditure is again assumed to stay constant apart from productivity growth. In using Statistik Austria[41] educational expenditure data by school type[42] together with pre-school and school enrolment statistics[43], age profiles are constructed for pre-schools *(Krippen, Kindergärten, Horte)*, primary education, lower secondary education, higher secondary and vocational education and tertiary education (comprising universities, *Kunsthochschulen* and *Fachhochschulen*). The rest of net government expenditure, which does not display a specific age-gender-nativity pattern, is allocated lump sum to all cohorts.

In establishing age-gender-nativity profiles for the tax and transfer categories listed above, (the major part in) public revenues and expenditures are traced down with respect to individual characteristics of taxpayers and transfer recipients. The distribution of taxes and transfers that results from both legal regulations as well as individual economic circumstances is analysed. Age will doubtlessly make a difference, as well as gender - as for nativity, it is often claimed to be the case. Here, however, evidence from the exercise above will have to be examined in detail yet.

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[34] See Bonin (2001, p.116).

[35] Comprising *Wohnbeihilfe, Mietzinsbeihilfe, Mietbeihilfe vom Sozialamt, sonstige Wohnungsunterstützungen, Annuitätenzuschüsse*.

[36] *Arbeitslosengeld, Beihilfen aus der Arbeitsmarktverwaltung und Sonderunterstützung*.

[37] A specific welfare benefit for the unemployed who do not receive unemployment benefits any longer.

[38] Old-age transfers include payments received of any public institution and therefore take account of both the Austrian federal old-age care (*Bundespflegegeld aus der Pensions- und Unfallversicherung*) as well as the *Länder* transfers.

[39] *Unterstützung für Schul-/Berufsausbildung und/oder Studium, sonstige ausbildungsbezogene Unterstützungen*.

[40] *Personalaufwand, Sachaufwand und Investitionen*.

[41] Statistik Austria (2002).

[42] According to the International Standard Classification of Education 1997.

[43] Provided by Wolfgang Pauli (Statistik Austria, *Direktion Bevölkerung*) and Sabine Martinschitz (Statistik Austria, *Direktion Volkswirtschaft*) on request.

4.2.3 Empirical results of the cross-section 1998

In order to ensure that aggregate per capita tax and transfer payments of cohorts correspond to their respective public sector budget values in the year surveyed, the micro data profiles described above are re-evaluated by an adjustment factor in order to comply with macroeconomic aggregates. The public sector budget underlying the generational accounts is displayed in Table 1. Tax and transfer payments are included irrespective of the federal level of government, also including the parafiscal social insurance institutions, in order to reflect the public sector net payments of generations as comprehensively as possible. Reported government purchases were derived as the net value of the public sector receipts and expenditures that were taken account of, and reflect public spending that cannot be assigned reliably to specific age groups, such as government consumption of goods and services, public subsidies and public sector personnel spending. Figures 1, 2 and 3 below display the absolute per capita tax and transfer payments of representative cohort members in 1998 obtained by benchmarking the surveyed micro profiles against the base year budget.[44]

Figure 1: Cohort-specific tax payments. Cross section of the year 1998.

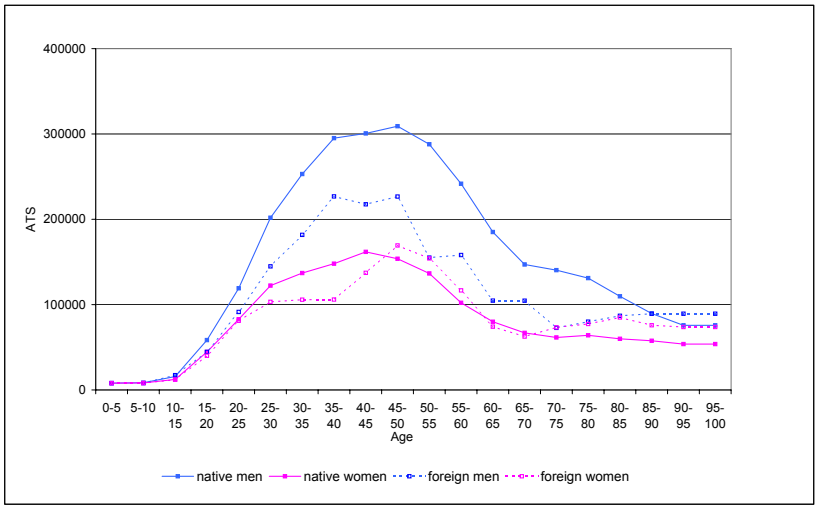
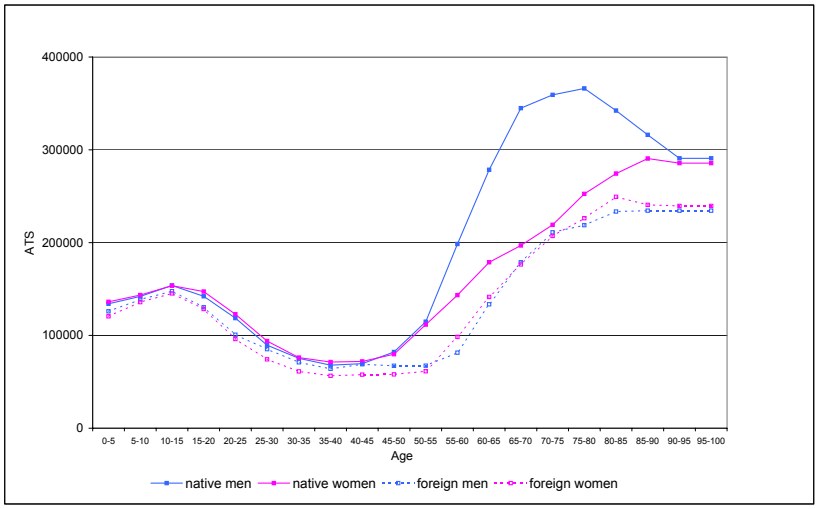


Figure 3 shows the cohort-specific net tax burdens in 1998, that is, their average annual tax payments less transfer receipts. We can see that while native men are net contributors to the public system during the age of 20 to 60, net tax payments of women are only positive during the age of 25 to 55, and they are smaller. In their youth as well as during retirement

[44]Displayed values were also smoothed by calculating moving averages across age cohorts as described above.

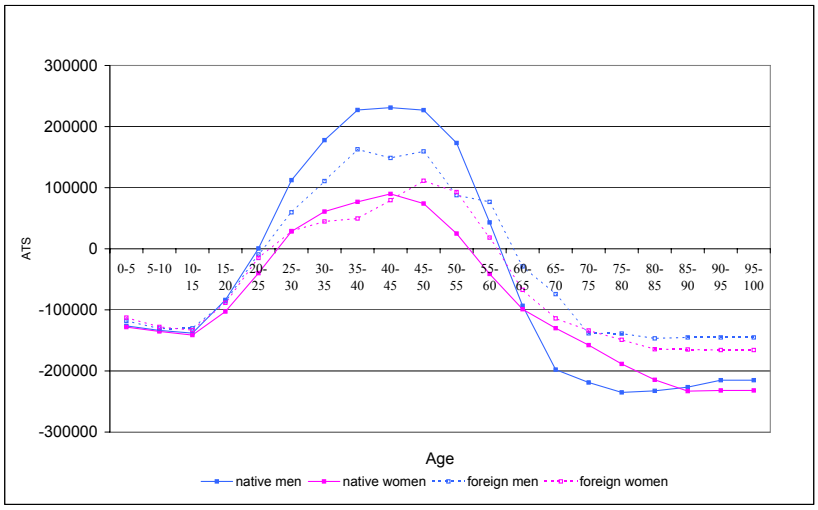
Figure 2: Cohort-specific transfers. Cross section of the year 1998.



age, individuals are net beneficiaries from the public tax and transfer system. The pattern of foreign male and female net payments is similar to that of natives, though the absolute amount paid is smaller for a large part of the life-cycle, respectively, most distinctively so for men. Net payments of foreign women exceed those of native women from the age of 45. Also, they turn negative later in life for both foreign men and women in comparison to their native counterparts. As to the extent of redistribution between generations, genders and natives and foreigners, no final conclusions can be drawn from this cross-sectional survey. For a valid evaluation of absolute and relative net tax burdens of cohorts, we need to take demographic parameters, such as population size and mortality, into account. This is done within the generational accounting framework, which uses population projections to determine the present value of rest-of-life net tax payments of cohorts, while assuming that the base year amounts of revenue and spending stay constant except for productivity growth. For the long-term productivity growth rate, we use 1.5 percent in the base case scenario, in accordance with the generational accounting studies collected by the European Commission (1999). As discussed in Bonin (2001, pp.130), the discount rate used for calculating the present value of future payments in generational accounting studies usually ranges above the average rate of return on risk-free government bonds to incorporate the premium paid for risk, but below the return on private sector capital, which tends to be more volatile than public payments streams. We use a discount rate of 5 percent for the base case, again to render results comparable with European Commission (1999) studies. However, we will also carry out sensitivity tests in

order to test for the effect that the assumption of a different discount rate has on our results. Thus, in Section 5.3.2 we compute generational accounts based on discount rates of four and six percent, assuming that risk aversion or uncertainty of future net tax payments is lower or higher than in the base case, respectively. The following section presents the calculated generational accounts for natives as well as foreigners in Austria in 1998 and analyses the according inter-temporal sustainability of Austrian public finances.

Figure 3: Cohort-specific net tax payments. Cross section of the year 1998.



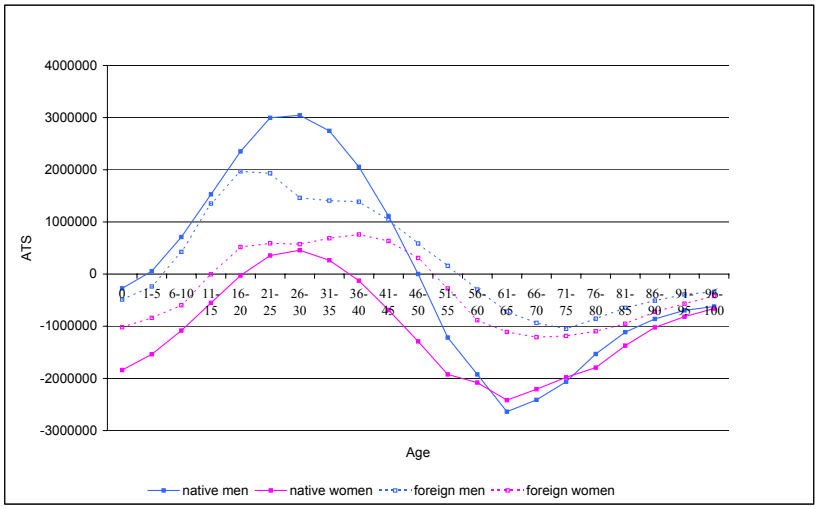
5 Generational redistribution in Austria

5.1 Generational accounts of present generations

In Figure 4, we see the gender- and nationality-specific generational accounts for generations living in the base year. Since generational accounts represent the present values of rest-of-life net tax payments of generations, they are not comparable across age groups. We can, however, still compare the intra-generational differences in net tax burdens between our fiscally distinct subpopulations of native men, native women, foreign men and foreign women.

The generational accounts display the characteristic lifetime pattern of net tax payments independent of gender and nationality. During youth, rest-of-life net payments gradually increase because youth-specific transfers disappear and high tax payments during working age

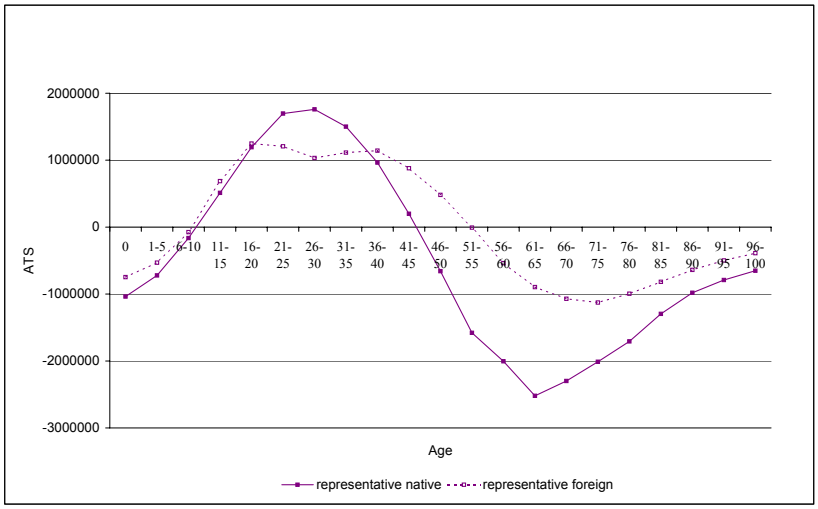
Figure 4: Generational accounts for living generations by gender and nationality. Base year 1998. Growth rate 1.5 percent, discount rate 5 percent.



are discounted less and thus gain in weight. Among cohorts born in the year 1998, lifetime net taxes are negative and thus constitute net transfers. A comparison of generational accounts of natives and foreigners in Figure 5 shows that, generally, a representative native individual receives slightly more net transfers over the rest of his or her life than a representative foreign individual until the age of 20, and pays more in net taxes over the rest of his or her life during working age until the age of 35. For cohorts older than 35, the picture looks different, and foreigners' rest-of-life net tax payments are higher than those of natives. This is explained by the fact that, on the one hand, foreign men and women become net transfer recipients later in life in comparison to native men and women, respectively, as can also be seen in Figure 3. On the other hand, net transfers to be received during the rest of their lives are significantly smaller in comparison to natives.

We can track the sources of nationality- and gender-specific redistribution by disaggregating the generational accounts into our various categories of taxes and transfers. Tables 6, 7, 8 and 9 in the Appendix provide such a decomposition of generational accounts for native men, native women, foreign men and foreign women, respectively. In comparing Tables 6 and 7, we find, as expected, that differences in the generational accounts of native men and native women primarily come from higher labour income taxes and social security contributions of men. The present value of these payments during the life-time of base-year male newborns, for example, is almost 2.5 times that of female newborns. Gender differentials in rest-of-life

Figure 5: Generational accounts for living generations by nationality. Base year 1998. Growth rate 1.5 percent, discount rate 5 percent.



labour taxes and social security contributions are highest for cohorts at or near their retirement age. Similarly, we find that native men pay higher capital income taxes, and receive higher pensions and unemployment benefits during the rest of their lives than native women. There are no significant differences as far as VAT and excise tax payments, health and family-related benefits, housing benefits, social assistance benefits or education are concerned. Here, in general, present values for female cohorts slightly exceed those for male cohorts - an exception are social assistance payments, which are higher for men until the age of 65, but fall below those for women for older cohorts. This is to be explained by higher social assistance payments to women among the oldest old on the one hand, and the higher life expectancy of women on the other. This effect is even more pronounced in the case of old-age care benefits, where women are expected to receive about two to three times the amount of men during the rest of their lives. In total, native men born in the base year are expected to receive about the same amount as women in transfers (ATS 2967000 versus ATS 2797000), whereas their expected tax payments are nearly two times higher (ATS 3769000 versus ATS 2078000)[45]. When looking at gender-specific differences in generational accounts among foreigners (Tables 8 and 9), we get similar results. Notable exceptions are old-age care benefits, which are higher for male than for female foreigners, and social assistance benefits, from which female foreigners benefit more than male foreigners over the rest of their lifetime. When comparing rest-of-life taxes and

[45] Adding up single rest-of-life tax payments and transfer receipts of new-borns in Tables 6 and 7.

transfers between natives and foreigners, we notice that in most cohorts, natives pay higher rest-of-life taxes and also receive higher rest-of-life transfers in return. This effect is especially pronounced in the case of labour income taxes and social security contributions, as well as pension and old-age care benefits, but also health and housing benefits and, among men, social assistance benefits. One noteworthy exception is unemployment benefits, where rest-of-life payments are higher for foreign men than native men up to the age of 35. For newborns in the base year, the value of expected tax payments for native men throughout their life is two times that for foreign men (ATS 3769000 versus ATS 1844000), whereas expected transfer benefits exceed those of foreign men to a slightly lesser extent (ATS 2967000 versus ATS 1573000). For female newborns, the respective values are similar, with ATS 2073000 versus ATS 1128000 of expected life-time tax payments, and ATS 2797000 versus ATS 1441000 of expected transfer benefits for native and foreign women, respectively.

Finally, one should remember that there are certain limitations for using absolute generational accounts for an interpretation of redistribution between natives and foreigners as well as genders.[46] As mentioned above, results are valid only given the underlying incidence assumptions. Thus, for example, generational accounts do not consider intra-household distribution. On the other hand, generational accounts do not say anything about redistribution relative to pre-tax resources. As shown in Bonin (2001), differences in fiscal burdens can appear considerably smaller when taking into account the life cycle income positions of subpopulations.

5.2 Inter-temporal fiscal imbalance

In order to determine the long-term fiscal sustainability of Austrian public finances in 1998, we compute the size of inter-temporal public liabilities, or the so-called 'true public debt', which is the difference between the nominal value of public debt at the beginning of the base year and aggregate present value net tax payments for living as well as future generations, extended out to infinity. Therefore, we subtract from the officially recorded financial liabilities equal to 61.4 percent of the base year GDP the sum of the generational accounts of all subpopulations, multiplied by the respective projected cohort sizes, which is equal to -106.1 percent of GDP. As a result, we obtain inter-temporal public liabilities amounting to 167.5 percent of GDP (see Table 2). This indicator is more accurate than common measures of fiscal soundness in that it comprises not only the official debt, but also future public liabilities and assets that are implied by present fiscal policy. The state of fiscal policy in Austria in 1998 was therefore unsustainable, since aggregate present and future expected net tax payments did not only not serve to cover existing debt, but were negative and thus expanded the gap in public finances even more.

For a base year newborn native, age-specific rest-of-life net tax payments are positive, while they are negative for a base year newborn foreigner. Both, however, are exceeded by far by

[46] See Bonin (2001, p.137).

Table 2: The state of inter-temporal fiscal balance in Austria (1998).

IPL (% of GDP)		167.5
Official public debt (% of GDP)		61.4
Implicit government debt (% of GDP)		106.1
Percentage change required		
for future cohorts only:		
	all taxes and transfers	43.8
	taxes only	71.2
	transfers only	113.5
for all cohorts:		
	all taxes and transfers	8.2
	taxes only	14.4
	transfers only	18.9

per capita rest-of-life net government purchases, which render generational accounts negative for natives as well as foreigners. When individuals get older, generational accounts rise due to rising present value net tax payments and declining rest-of-life government consumption. Per capita rest-of-life government consumption of foreigners is generally lower than that of natives due to a sharper decline in the foreign population towards old age. In addition, age-specific net payments of foreigners exceed those of natives at age 11-15 and from the age of 41 onwards. As a consequence, foreign generational accounts exceed those of natives from the age of 36 onwards. Since the present value of expected tax payments does not cover the present values of expected transfer payments and consumption spending, and, furthermore, the outstanding government debt of the base year needs to be redeemed, a policy adjustment is necessary.

This adjustment will entail either a rise in tax levels and/or a reduction in government spending levels, either for future generations only, or for both current and future generations, as described in Section 2.3. Comparing the value of total public debt with that found in Keuschnigg et al. (1999), we find that fiscal sustainability has improved during 1995-1998, though a large gap of 167.5 percent of GDP still existed in 1998. Apart from a more favourable projected population structure[47], this might have to do with the fiscal consolidation packages enacted by the Austrian government in 1996 and 1997[48], as well as improved macro-economic conditions (annual real economic growth accelerated from 1.6 percent in 1995 to 3.9 percent in 1998[49]).

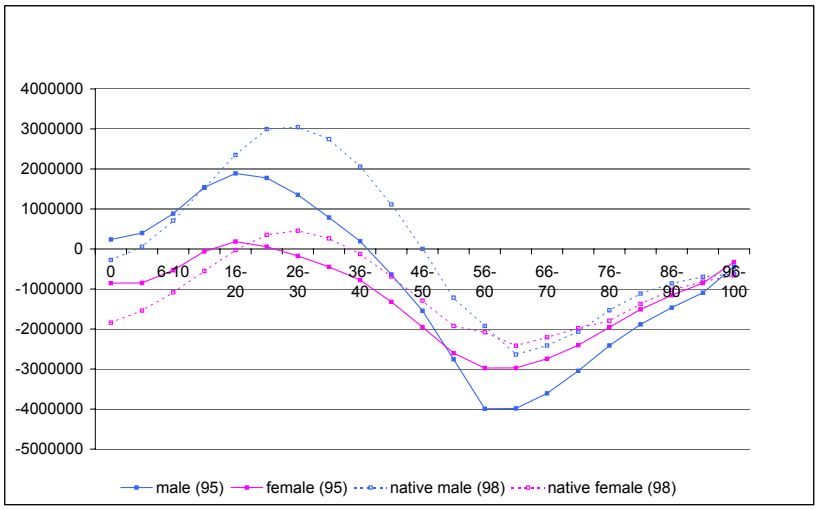
[47] Although in the present study, both fertility as well as mortality is assumed to be lower than in the study by Keuschnigg et al. (1999) and thus rather detrimental to inter-temporal fiscal balance, net immigration is assumed to be higher (compare Section 4.1).

[48] The measures resulted in a decrease in pension and health outlays, most notably (compare Table 1 and Table I in Keuschnigg et al. (2000)).

[49] Statistik Austria (2003b).

Of course, we have to take into account the fact that different microeconomic data sets[50] were used. In addition, unlike in Keuschnigg et al. (1999), we derive generational accounts for foreigners explicitly. Since foreign tax and transfer payments are lower on average than those of natives, fiscal indicators can be expected to deviate. A comparison of generational accounts derived for the two base years (see Figure 6 below) reveals an increase in the generational accounts of most age cohorts over time, most significantly for males of working age, but also for those of retirement age. Since, despite of the pick-up in real growth rates, unemployment even increased slightly during the period[51], labour income taxes are not likely to have increased due to an increase in the tax base. Instead, tax rates were raised as part of the consolidation package, together with reductions on tax allowances and deductions. Besides, eligibility criteria for unemployment benefits were tightened, and public pension transfers were cut, especially by limiting early retirement.[52] A comparison of generational accounts disaggregated into the single tax and transfer categories confirms that the largest increase occurred in per capita labour income taxes and social security contributions, while per capita pension, health and unemployment benefits decreased.

Figure 6: Generational accounts for living generations for the base years 1995 and 1998. Growth rate 1.5 percent, discount rate 5 percent.



[50]Labour income taxes and social security contributions in the present study were derived from the ECHP instead of national statistical sources, education and health care benefits were derived from different sources, as well (see Section 4.2).

[51]From 3.9 percent in 1995 to 4.5 percent in 1998, according to Eurostat definition (Statistik Austria (2003c)).

[52]See Section 3.

Note: 1998 current values. Values for the base year 1995 are from Keuschnigg et al. (1999) and are corrected for real productivity growth.

5.3 Sensitivity analysis

Results presented in the previous sections were derived under certain assumptions regarding the projected population, the interest rate and the growth rate. In order to test for the robustness of the findings against variations in these underlying parameters, we carry out sensitivity tests for each, varying only one parameter at a time, while maintaining the status quo setting for all other variables.

5.3.1 Demographic parameters

In order to test for the sensitivity of fiscal imbalance indicators with regard to the underlying demographic parameters, we conduct the generational accounting analysis for a high as well as a low fertility scenario, and for a high as well as a low migration scenario. Under the high fertility scenario, the fertility rate is assumed to reach 1.7 from 2015 onwards (versus a constant 1.4 in the base case). The low fertility scenario is based on a fertility rate of 1.1, which is to come into effect from 2015 onwards, as well. As to the different migration scenarios, annual net immigration is assumed to increase (decrease) by 10000 relative to base case scenario. Annual net immigration is therefore assumed to fluctuate between 40000 (2006) and 30000 (2041) under the high migration scenario, and between 20000 (2006) and 10000 (2041) under the low migration scenario. Results of the various policy experiments are summed up in Table 3. It can be seen that higher (lower) fertility increases (decreases) inter-temporal fiscal imbalance. Since under base-year fiscal policy, newborns exhibit negative net tax payments over their lifetime, each additional newborn adds to the burden on the inter-temporal public budget. Likewise, the burden on future generations necessary to close the financing gap increases with fertility. While, for a given amount of total public debt, an increase in the cohort size of future generations would lead to a decrease in the per capita burden of future agents (the financing gap can now be distributed among a greater number of agents), the increase in total public debt outweighs this effect here.[53] If the financing gap is distributed both among current and future generations, we see that the respective additional financing need, measured by the lump-sum tax[54], increases as well, in comparison with the base case. Higher (lower) net immigration than in the base case results in slightly lower (higher) inter-temporal public liabilities. Since immigrants typically are of working age at the time of their entry into the country, they enlarge the group of net tax payers and thus reduce the inter-temporal fiscal

[53] In Bonin (2001), pp.153, increased fertility leads to a decrease in the burden on future agents necessary to close the sustainability gap.

[54] The lump-sum tax represents the annual additional average tax payment that each currently living and future individual has got to pay in order to balance the inter-temporal budget constraint. It is derived as the difference between the generational account of base year new-borns and their fictive generational account resulting from an application of the necessary percentage increase in net tax payments (not shown).

burden. Compared to the specified changes in fertility, however, the effect of the specified changes in net immigration on inter-temporal fiscal balance is low. While, in our case, low (high) fertility leads to a decrease (increase) in total public debt by 17.1 (28.3) percentage points, high (low) migration reduces (raises) total public debt by only 3.7 (3.8) percentage points.

5.3.2 Growth and discount rate

The effects of varying growth and discount rate assumptions on fiscal imbalance indicators are displayed in Table 4. Changing the base case assumptions of long-term productivity growth of 1.5 percent to 1 and 2 percent, and the discount rate of 5 percent to 2, 4 and 6 percent, can lead to an maximal increase (decrease) of inter-temporal public liabilities as a share of base year GDP by 184.0 (58.8) percentage points. Thereby, additional per capita net taxes levied on both current and future generations need to increase (decrease) by ATS 657200 (ATS 204100) in order to balance the inter-temporal budget constraint. Per capita net tax payments on members of future generations only are to increase (decrease) by ATS 1327600 (ATS 462400). It can be seen that total public debt increases with an increase in the growth rate, since negative base year net tax payments are magnified. It also increases with a decrease in the discount rate, since long-term cohort deficits due to population aging are given high weight. Accordingly, the additional tax burden on future as well as on current and future generations increases with lower discount and higher growth rates. The sensitivity analysis reveals that the generational account measures are robust at least qualitatively, even if the range of values obtained can be quite large, depending on the actual growth and discount rate values chosen. Even under the most optimistic scenario, assuming a growth rate of 1 percent and a discount rate of 6 percent, true public debt exceeds official public debt, expressed as a share of base year GDP, respectively, by 47.3 percentage points. This indicates that the continuation of current fiscal policy is likely to induce severe fiscal imbalances, and that fundamental policy changes are required.

Table 3: Sensitivity to demographic assumptions.

		Base case	High fertility	Low fertility	High migration	Low migration
IPL (% of GDP)		167.5	195.8	150.4	163.8	171.3
Generational account[a]						
	base year new-born	-1037.1	-1029.6	-1037.1	-994.2	-1080.7
	future new-born[b]	1489.6	1677.1	1441.5	1427.6	1558.4
Percentage change necessary						
for future cohorts only:						
	all taxes and transfers	43.8	47.2	42.9	40.6	47.3
	taxes only	71.2	78.8	67.9	65.6	77.6
	transfers only	113.5	117.7	116.6	106.5	121.1
for all cohorts:						
	all taxes and transfers	8.2	9.4	7.5	7.8	8.6
	taxes only	14.5	16.7	13.1	13.8	15.2
	transfers only	18.9	21.4	17.3	18.2	19.6
Lump-sum tax[a,c]		496.0	559.0	455.4	490.6	501.4

[a] Thousands ATS (base year current values).

[b] In order to render fiscal policy sustainable inter-temporally.

[c] See footnote 70 below.

Note: Generational accounts for natives. Base year 1998. Growth rate 1.5 percent, discount rate 5 percent.

Table 4: Sensitivity to growth and discount rate assumptions.

		Discount rate		
		4 percent	5 percent	6 percent
Growth rate: 1 percent				
IPL (% of GDP)		203.1	140.8	108.7
Generational account[a]				
	base year new-born	-1052.6	-1043.2	-1076.9
	future new-born[b]	1775.6	1280.0	1027.2
Lump-sum tax[a,c]		618.4	400.9	291.9
Growth rate: 1.5 percent				
IPL (% of GDP)		260.1	167.5	123.1
Generational account[a]				
	base year new-born	-1112.5	-1037.1	-1058.1
	future new-born[b]	2188.5	1489.6	1131.2
Lump-sum tax[a,c]		822.8	496.0	343.9
Growth rate: 2 percent				
IPL (% of GDP)		351.5	205.9	142.6
Generational account[a]				
	base year new-born	-1250.6	-1054.6	-1042.3
	future new-born[b]	2817.2	1780.9	1282.2
Lump-sum tax[a,c]		1153.2	632.5	413.3

[a] Thousands ATS (base year current values).
[b] In order to render fiscal policy sustainable inter-temporally.
[c] Annual additional average tax payment per capita of native population balancing the inter-temporal budget constraint.

Note: Generational accounts for natives. Base year 1998. Base case fertility, mortality and immigration.

6 Immigration policy and fiscal sustainability

Immigration is proposed frequently as a means to improve inter-temporal fiscal sustainability[55], because, on the one hand, immigrants typically augment the population share of individuals of working age, who are net contributors to the public budget. This effect is of particular importance in the light of the ongoing demographic aging of native populations. As discussed briefly in Section 4.1, the status quo migration scenario assumes annual net immigration to increase from 17300 in 2001 to around 29000 in 2006, and to decrease from then onwards to 22500 in 2050. Due to a lack in age-specific population projections for immigrants, net immigration is assumed to occur in such a way as to keep the population shares of foreigners in the various age groups constant to the average value of the years 2000-2002 from 2001 onwards. Thus, the favourable age composition of foreigners in these years, with more than 10 percent of age 25 to 35 and less than 0.5 percent of age 75 to 100 is assumed to persist in the future.[56] On the other hand, immigrants alleviate the burden on natives also for a given value of inter-temporal public debt, namely by increasing the number of agents who may share the additional net tax payments required in order to redeem the debt. Consequently, immigration might improve inter-temporal generational imbalance even if immigrant cohorts accumulate generational deficits.

6.1 The sustainability impacts of immigration policies

In the following, we will deal with the question of the extent to which future immigration may alleviate the inter-temporal fiscal burden on the native population in Austria. For this purpose, we compute the previously specified indicators of inter-temporal fiscal imbalance for different migration scenarios. As could be seen in Table 3, higher (lower) immigration than in the base case scenario lowers (raises) the inter-temporal public financing gap. This was to be expected, given the assumption of the constant favourable age distribution of foreigners. Since a representative immigrant to Austria is a net contributor to public finances under status quo conditions, each additional immigrant improves the inter-temporal sustainability of base year tax and transfer levels further.[57] We can also simulate the effect of immigration policies that actively screen immigrants for characteristics that are expected to improve their labour market performance and thus their potential for fiscal contribution. Following Bonin (2001), we assess the effect of immigration policies that select immigrants by skill and age on inter-temporal fiscal imbalance. First, we assume that by screening immigrants by skill, immigration policy effectively raises foreign base year net tax payments to the levels observed for natives.[58] In

[55] See for example Bonin (2001).

[56] A comparison of the foreign age composition in the year 1981 to the average of the years 2000-2002 shows that the age pattern persisted by and large; the relative share of foreigners among the oldest old even decreased.

[57] Still, a considerable financing gap remained even under the high immigration scenario, indicating that by immigration alone it will not be possible to achieve long-term fiscal sustainability.

[58] We can regard this scenario as an upper bound of the impact of screening by skill (compare Bonin (2001), p.186)).

this case, as is shown in Table 5, inter-temporal fiscal liabilities decrease considerably, from 167.5 percent of base year GDP down to 151.68 percent.

Table 5: Screening of immigrants and inter-temporal fiscal imbalance.

		base case	screening	
			by skill	by age
IPL (% of GDP)		167.5	151.7	166.6
Generational account[a]				
	base year new-born	-1037.1	-1037.1	-1037.1
	future new-born[b]	1489.6	1218.1	1476.3
Percentage change necessary				
for future cohorts only:				
	all taxes and transfers	43.8	39.0	43.5
	taxes only	71.2	63.0	70.8
	transfers only	113.5	102.6	113.2
for all cohorts:				
	all taxes and transfers	8.2	7.3	8.2
	taxes only	14.5	12.8	14.4
	transfers only	18.9	16.9	18.8
Lump-sum tax[a]		496.0	444.7	493.8

[a] Thousands ATS (base year current values).
[b] In order to render fiscal policy sustainable inter-temporally.
Note: Generational accounts for natives. Base year 1998. Growth rate 1.5 percent, discount rate 5 percent.

This is the case even though foreigners now not only exhibit higher present value net tax payments during working age, but also higher present value net transfer receipts during retirement age (see Figure 4). A representative foreigner now pays ATS 841610, which is more than twice the average foreign contribution in the base scenario.[59] As a result, the life-time net tax payments of future-born natives that are necessary to render public finances sustainable decrease by ATS 271500. If applied to both currently living and future generations, the necessary lump-sum tax on natives decreases by ATS 51330. Secondly, we assume that potential immigrants are screened by age and that, as a consequence, the fraction of male immigrants aged between 16 and 30 and female immigrants aged between 31 and 45 (females) who exhibit the highest cohort surpluses permanently increases by 20 percent while the absolute immigrant inflow

[59] Not shown in the Table.

stays unchanged.[60] In this case, inter-temporal fiscal imbalance is reduced slightly, with the tax burden on future generations falling by only ATS 13300, while those on both current and future generations falls by only ATS 2200. We can therefore conclude that for an immigration policy that intends to benefit public finances, screening by skill may be better suited than screening by age, due to the already favourable age composition of foreigners in Austria.[61]

7 Related literature

The first generational accounting analysis of Austrian public finances was done for the year 1995 by Keuschnigg et al. (1999, 2000) in the course of a round of studies based on a uniform method, which was initiated by the European Commission in 1998.[62] In comparison, the present generational accounting survey with 1998 as its base year provides an opportunity to assess the effects that fiscal policy measures and macroeconomic changes since 1995 had on Austrian generational accounts and the true public debt. However, it has to be said that direct comparability is limited due to inevitable differences in the microeconomic data sources used, and that one should therefore be cautious in the interpretation of results. Besides, the major aim here was to undertake a study that had not yet been done for Austria: namely, to compute generational accounts separately for natives and foreigners. This approach does not only allow to assess intergenerational but also intragenerational redistribution between natives and foreigners and also promises to contribute an answer to the often raised question about the extent to which immigration can be a solution to impending fiscal and, in particular, pension sustainability problems. Using generational accounting, Auerbach and Oreopoulos (1999) find that new immigrants reduce the fiscal burden borne by natives if the entire fiscal imbalance is placed on future generations. When the fiscal burden is shared by both current and future generations, whether there is a fiscal gain from immigration depends on the extent to which government purchases rise with the immigrant population. The impact of immigration on fiscal balance is found to be very small relative to the size of the overall imbalance itself. Smith and Edmonston (1997) contains another detailed evaluation of the future fiscal impact of immigrants in the US along the lines of the generational accounting method. It distinguishes immigrants not only by age, but also by educational level, immigrant generation and time since arrival, and estimate separate fiscal profiles for each of those immigrant categories. In addition, it computes immigrants' fiscal impact by level of government, i.e. the local, state and federal level. It is found that immigrants contribute positively on the federal level, because the positive effect of their relatively (in comparison to natives) favourable age distribution more than offsets the negative effect of their relatively lower education. The impact on the state and local level, however, is found to be negative, because the benefits (education, in particular) are received earlier in life than those on the federal level (pensions, health care) and are thus less heavily discounted. The total fiscal impact is positive for the average U.S.

[60] The immigrant share of all other age cohorts is reduced proportionately (compare Bonin (2001), p.187).
[61] Compare Bonin (2001) for a similar result.
[62] See Keuschnigg et al. (1999).

resident. Finally, Bonin, Raffelhüschen and Walliser (2000) used generational accounting to assess the fiscal impact of immigrants in Germany. They find the impact to be significantly positive if immigrants resemble current migrant residents in their economic characteristics. It is nevertheless too small to remove inter-temporal fiscal imbalance.

8 Conclusion

In this chapter, we employed generational accounting to analyse the inter-temporal stance of Austrian public finance in 1998 as well as the inter-temporal fiscal impact of immigration to Austria. Immigrants affect inter-temporal fiscal balance in essentially two ways. Firstly, they have a demographic effect in enlarging the population (and thus the tax base) and in altering its age- (and gender-) composition. Secondly, they change the fiscal characteristics of age cohorts due to a representative immigrant exhibiting higher or lower tax and transfer payments than a representative native of the same age and gender. The overall fiscal effect of immigration was found positive, under the assumption that the age and fiscal characteristics of future immigrants resemble those of the current immigrant population in Austria. This is due to a favourable age composition and lower per capita net transfer receipts during retirement age, which compensates for lower per capita net tax payments during working age. However, immigration is not likely to achieve inter-temporal fiscal balance, even if immigration increases or migrants are screened by skill or age.

A The composition of generational accounts.

Table 6: The composition of generational accounts for native men.[a,b]

Generation's age in 1998	Generational account[c]	Tax payments			Transfer receipts							
		Labour income taxes and social security contributions	Capital income taxes	VAT/ excise taxes	Pensions	Health	Family-related benefits	Housing	Old age care	Unemployment	Social assistance	Education
0	-273.6	2890.1	69.0	809.8	918.1	281.3	457.5	12.1	30.7	56.6	12.4	1198.1
5	55.8	2955.4	70.1	826.7	905.9	268.4	385.9	10.6	30.8	58.2	12.3	1111.7
10	709.7	3332.7	78.7	931.3	999.2	270.6	280.7	8.8	34.2	65.7	13.3	989.9
15	1528.7	3875.6	91.4	1087.4	1168.8	289.9	186.3	7.4	38.6	76.3	14.8	791.7
20	2350.8	4416.1	104.6	1239.4	1373.4	317.4	109.9	6.6	42.1	84.5	16.6	525.6
25	2996.3	4902.4	117.0	1353.9	1606.7	348.3	51.0	6.3	45.3	86.6	18.7	293.6
30	3044.0	4768.9	115.0	1287.1	1659.9	343.5	16.5	5.6	42.8	76.2	19.1	133.6
35	2745.6	4608.3	114.8	1226.6	1864.4	358.5	3.0	4.5	46.0	67.0	20.2	60.4
40	2055.9	4234.0	111.3	1143.5	2159.8	377.1	0.0	3.2	51.9	59.9	21.6	27.5
45	1113.0	3820.9	112.3	1074.0	2621.5	406.7	0.0	2.1	62.0	56.8	22.9	16.7
50	1.9	3158.5	108.5	949.1	3006.9	408.7	0.0	1.6	69.5	48.5	20.8	13.0
55	-1216.4	2460.6	104.0	838.5	3477.7	404.3	0.0	1.1	79.1	36.7	16.4	11.8
60	-1924.0	1642.3	85.5	648.8	3357.1	345.1	0.0	0.7	79.7	20.5	10.5	9.4
65	-2637.5	1256.4	81.0	572.9	3618.1	350.0	0.0	0.5	101.8	10.0	8.8	8.8
70	-2411.0	873.8	64.2	418.4	2993.0	297.2	0.0	0.3	106.2	4.1	8.1	6.9
75	-2064.2	681.0	52.0	324.8	2421.6	272.8	0.0	0.2	116.8	1.6	9.7	5.7
80	-1531.6	480.8	34.8	249.4	1696.1	234.6	0.0	0.3	114.5	0.8	11.2	4.6
85	-1113.8	286.0	18.2	179.0	1134.6	180.4	0.0	0.3	93.0	0.0	11.5	3.4
90	-860.2	173.7	7.8	139.1	816.5	141.2	0.0	0.4	74.0	0.0	11.0	2.6
95	-695.7	114.9	3.9	112.9	635.8	113.0	0.0	0.4	56.5	0.0	9.9	2.1
100	-621.8	102.7	3.5	100.9	568.2	101.0	0.0	0.3	50.5	0.0	8.9	1.9

[a] r = 0.05, g = 0.015.

[b] Thousands ATS (1998 present values).

[c] Per capita shares in public deficit and government consumption included.

Table 7: The composition of generational accounts for native women.[a,b]

Generation's age in 1998	Generational account[c]	Tax payments			Transfer receipts							
		Labour income taxes and social security contributions	Capital income taxes	VAT/ excise taxes	Pensions	Health	Family-related benefits	Housing	Old age care	Unemployment	Social assistance	Education
0	-1840.0	1165.4	45.7	862.3	644.9	310.6	459.7	14.5	74.5	30.3	11.2	1251.1
5	-1537.6	1195.3	46.5	878.3	636.9	299.1	390.1	12.7	73.8	31.2	11.3	1151.6
10	-1083.7	1357.8	52.5	994.1	707.8	308.0	292.3	10.6	82.1	35.5	12.4	1021.5
15	-552.3	1563.1	60.4	1152.4	822.0	329.4	202.0	9.3	95.4	40.6	13.9	815.4
20	-26.6	1765.1	68.8	1321.5	972.2	361.4	125.2	8.9	113.3	44.4	15.6	546.7
25	355.2	1890.7	75.8	1440.3	1123.8	389.3	59.1	8.8	128.3	44.5	17.1	296.9
30	457.2	1749.2	73.2	1357.4	1142.6	371.9	17.9	7.7	121.5	38.1	16.4	123.8
35	264.9	1585.6	69.7	1269.3	1244.5	370.5	2.2	6.2	124.5	31.4	16.0	48.1
40	-126.0	1425.5	65.7	1204.0	1441.0	389.2	0.0	4.7	139.8	27.0	15.6	22.9
45	-687.3	1215.0	62.3	1135.2	1704.8	417.9	0.0	3.7	163.0	24.6	14.5	14.1
50	-1290.4	896.3	57.5	1009.6	1907.3	423.0	0.0	3.2	178.7	20.7	12.3	10.8
55	-1923.8	604.1	55.2	915.7	2161.3	435.3	0.0	3.1	205.6	14.2	10.3	10.1
60	-2080.3	345.1	45.7	725.5	2032.8	388.5	0.0	2.6	205.4	6.3	8.3	8.2
65	-2416.8	250.0	43.1	651.6	2167.2	408.6	0.0	2.4	244.1	1.2	8.9	7.8
70	-2207.2	189.1	34.3	493.8	1872.9	363.1	0.0	1.8	249.5	0.2	9.0	6.3
75	-1979.8	165.4	25.7	372.0	1594.0	319.6	0.0	1.3	274.1	0.0	10.2	5.1
80	-1793.1	142.4	17.8	292.7	1354.8	280.4	0.0	0.8	316.3	0.0	13.0	4.1
85	-1372.4	97.7	8.4	204.8	959.7	211.2	0.0	0.4	295.7	0.0	14.5	3.0
90	-1023.1	67.3	3.2	154.6	659.9	162.3	0.0	0.2	259.1	0.0	14.5	2.2
95	-817.0	47.3	0.6	122.5	514.1	129.2	0.0	0.1	209.9	0.0	13.4	1.8
100	-658.7	38.1	0.5	98.8	414.5	104.2	0.0	0.1	169.3	0.0	10.8	1.4

[a] r = 0.05, g = 0.015.

[b] Thousands ATS (1998 present values).

[c] Per capita shares in public deficit and government consumption included.

Table 8: The composition of generational accounts for foreign men.[a,b]

Generation's age in 1998	Generational account[c]	Tax payments			Transfer receipts							
		Labour income taxes and social security contributions	Capital income taxes	VAT/ excise taxes	Pensions	Health	Family-related benefits	Housing	Old age care	Unemployment	Social assistance	Education
0	-488.7	1257.9	39.9	545.7	111.3	149.0	341.2	8.0	4.3	68.4	12.5	877.9
5	-237.4	1399.5	44.1	606.4	119.8	153.2	304.2	7.0	4.6	76.5	10.0	850.7
10	425.2	2308.2	72.4	999.4	193.8	223.5	316.2	6.9	7.4	126.5	8.1	1029.5
15	1352.1	2983.2	94.1	1299.8	253.0	268.4	260.7	5.6	9.7	163.4	5.7	897.0
20	1969.9	3045.4	98.1	1331.3	267.2	263.0	171.9	4.3	10.2	166.3	4.3	562.8
25	1932.1	2481.9	82.7	1068.5	230.0	208.6	82.3	3.2	8.8	135.3	3.7	252.9
30	1462.1	1717.4	59.5	721.1	171.1	143.5	28.1	2.3	6.6	89.5	2.8	94.1
35	1408.8	1601.0	56.8	650.1	193.6	136.9	7.3	2.2	7.5	65.5	3.2	42.3
40	1388.2	1618.1	56.6	666.4	271.3	151.3	0.0	1.7	10.5	42.7	4.5	23.6
45	1039.0	1315.3	49.5	582.3	317.9	144.9	0.0	0.9	12.8	15.4	5.5	14.2
50	586.3	881.7	39.5	439.4	311.3	118.5	0.0	0.2	14.5	5.1	6.3	9.2
55	157.4	690.7	51.8	452.9	512.7	134.4	0.0	0.1	28.1	0.0	10.1	9.9
60	-296.1	565.8	74.0	440.5	791.6	143.8	0.0	0.1	50.1	0.0	10.7	10.2
65	-718.6	365.1	92.6	366.7	970.3	140.7	0.0	0.0	61.5	0.0	6.6	9.1
70	-936.6	305.8	93.6	314.0	1110.6	144.7	0.0	0.0	46.5	0.0	2.2	8.5
75	-1049.9	260.0	62.8	270.1	1177.7	138.9	0.0	0.0	23.5	0.0	0.0	8.0
80	-855.3	247.5	22.3	207.9	1007.7	107.7	0.0	0.0	0.0	0.0	0.0	6.4
85	-647.7	206.5	0.0	149.2	783.5	73.2	0.0	0.0	0.0	0.0	0.0	4.8
90	-509.6	167.8	0.0	118.0	624.4	55.1	0.0	0.0	0.0	0.0	0.0	3.8
95	-390.6	128.6	0.0	90.4	478.5	42.2	0.0	0.0	0.0	0.0	0.0	2.9
100	-340.4	112.1	0.0	78.8	417.0	36.8	0.0	0.0	0.0	0.0	0.0	2.5

[a] r = 0.05, g = 0.015.

[b] Thousands ATS (1998 present values).

[c] Per capita shares in public deficit and government consumption included.

Table 9: The composition of generational accounts for foreign women.[a,b]

Generation's age in 1998	Generational account[c]	Tax payments			Transfer receipts							
		Labour income taxes and social security contributions	Capital income taxes	VAT/ excise taxes	Pensions	Health	Family-related benefits	Housing	Old age care	Unemployment	Social assistance	Education
0	-1018.6	610.2	5.9	511.7	88.4	165.2	304.2	12.0	0.0	19.2	12.6	839.3
5	-839.2	678.4	6.6	568.1	94.1	171.6	271.2	9.7	0.0	21.5	12.9	810.3
10	-596.9	1117.2	10.7	935.3	151.1	250.3	279.5	8.2	0.0	35.4	18.8	973.9
15	-5.4	1439.4	13.8	1213.0	196.7	293.5	223.2	6.1	0.0	45.1	22.4	851.1
20	518.5	1408.4	13.6	1200.2	201.1	270.2	135.2	4.5	0.0	42.3	20.8	532.1
25	590.4	936.9	9.3	815.9	147.0	173.6	49.7	3.2	0.0	26.0	13.9	209.1
30	574.5	724.9	7.4	652.1	137.3	134.6	15.1	2.7	0.0	18.7	11.9	85.0
35	686.9	833.3	9.3	724.6	208.8	151.5	4.6	2.7	0.0	19.5	15.9	42.2
40	758.8	987.4	12.4	778.3	316.2	174.8	0.0	2.5	0.0	19.1	17.8	24.1
45	633.9	949.3	13.5	673.3	381.0	167.6	0.0	2.1	0.0	15.8	11.5	14.3
50	309.1	723.3	12.1	528.4	443.6	150.5	0.0	2.5	0.0	10.4	4.8	9.7
55	-275.3	556.5	16.6	568.0	825.5	190.3	0.0	4.9	0.0	7.7	0.0	11.0
60	-884.7	319.1	22.5	529.0	1164.5	200.9	0.0	6.0	0.0	3.0	0.0	10.8
65	-1109.0	176.0	24.2	412.1	1222.9	176.7	0.0	4.1	0.0	0.0	0.0	9.0
70	-1208.7	202.9	17.8	347.1	1310.8	173.1	0.0	1.9	0.0	0.0	0.0	8.2
75	-1185.8	254.3	8.3	286.2	1306.2	167.7	0.0	0.0	0.0	0.0	0.0	7.4
80	-1096.5	254.1	0.0	239.4	1205.6	157.1	0.0	0.0	0.0	0.0	0.0	6.4
85	-952.6	218.9	0.0	194.1	1041.5	134.0	0.0	0.0	0.0	0.0	0.0	5.4
90	-724.5	146.2	0.0	147.3	772.4	101.4	0.0	0.0	0.0	0.0	0.0	4.1
95	-567.4	110.2	0.0	115.0	603.0	76.9	0.0	0.0	0.0	0.0	0.0	3.2
100	-420.4	81.6	0.0	85.2	446.8	57.0	0.0	0.0	0.0	0.0	0.0	2.4

[a] r = 0.05, g = 0.015.

[b] Thousands ATS (1998 present values).

[c] Per capita shares in public deficit and government consumption included.

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