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10   Public Debt, Welfare Reforms, and Intergenerational Distribution of Tax Burdens in Denmark

Svend E. Hougaard Jensen and Bernd Raffelhüschen

10.1   Introduction

Denmark is an archetype of a Scandinavian welfare state. Although the government plays virtually no direct role in the business sector, the public sector is large. An ambition of guaranteeing all residents a respectable living standard has been put into practice by providing collective insurance against temporary or permanent income losses. As a result, the public sector has a near monopoly in the production of children's day care, health care, and education. Old-age provision is also mainly in the hands of the public welfare system. A large number of transfer payments are offered without means testing, and benefits are in many cases unrelated to past contributions. Furthermore, taxes are only to a minor extent earmarked for any specific purpose.

Such large-scale involvement of the public sector has recently come under attack from different angles (Drèze and Malinvaud 1994; Lindbeck et al. 1994). It has been argued that welfare programs may (1) undermine the incentives to work and thereby give rise to rigidities in the functioning of labor markets; (2) increase the size of government and thereby raise the level of distortionary taxation, in turn constituting obstacles to economic efficiency and growth; and (3) lead to cumulative deficits and mounting public debts, thereby passing tax burdens onto future generations that, eventually, may threaten the fiscal sustainability of the welfare state.[1] This paper concentrates on the third issue: for

1. Although Atkinson (1995) finds no clear-cut aggregate empirical evidence in support of these charges leveled against the welfare state, these charges may be more serious in the Scandinavian

Denmark, we examine both the generational stance of current fiscal policy and the generational impact of various policy reforms.

As in most other Organization for Economic Cooperation and Development (OECD) countries, the (gross) public debt-to-GDP ratio in Denmark has risen quite dramatically over the past couple of decades, from about 5 percent in the early 1970s to about 72 percent in 1995. In addition, due to rising life expectancy and declining fertility, the Danish population is aging rapidly, as indicated by the projected rise of nearly 30 percent in the ratio of elderly to working-age people from 1995 to 2030. Therefore, future generations of taxpayers may not only be burdened by the costs of providing for an increasing number of elderly, they may also have to service a public debt that meanwhile might have grown large.

In our discussion of these issues we focus on the generational impact of a set of policies that are on the forefront of debate of fiscal policy in Denmark. These fall in three broad categories, namely, (1) a labor market reform with strong fiscal ingredients, aiming at bringing structural unemployment down; (2) a program of public debt reduction, designed in line with official medium- to long-term targets of fiscal policy; and (3) an increase in the (effective) retirement age, aiming at tempering the effects of population aging. As a benchmark for these appraisals we first compute the intergenerational distribution of tax burdens in a baseline scenario in which fiscal policy remains unchanged.

From here we proceed as follows. Section 10.2 offers a brief introduction to the Danish tax and transfer system, and section 10.3 reflects on some topical themes in the debate on fiscal policy in Denmark. Section 10.4 presents our empirical base. The generational stance of current fiscal policy is reported in section 10.5, while section 10.6 evaluates the generational impact of the above-mentioned policy reforms. Finally, section 10.7 provides a brief summary and conclusions of the study.

10.2   The Tax and Transfer System in Denmark

The large involvement of the public sector in the Danish economy has led to a high level of taxation. The ratio of total tax revenue to GDP is around 50 percent, among the highest in the European Union. However, it should be kept in mind that unlike Denmark, most EU countries pay transfers on a net-of-tax basis. Also, in some European countries household subsidies are given in the form of deductions from the tax base rather than through direct transfer payments. For example, these factors have been found to account for almost 5

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countries where the welfare state has been carried further than in most other countries in Western Europe. See Hagen et al. (1998) for a comparison of the fiscal systems in Scandinavia with those of other Western European countries.

percentage points of the difference in gross tax rates between Denmark and Germany in 1991 (Ministry of Finance 1994a).

The Danish tax structure differs from that in most other European countries. In particular, there are two notable differences. First, the contributions of employers and employees count relatively more in the other European countries, and second, personal income taxes make up a significantly larger part of tax revenue in Denmark than in Europe in general. Indeed, while the revenue from personal income taxes constitutes about half of total tax revenue in Denmark, the corresponding figure for the European Union as a whole is only about a quarter. On the other hand, while social security taxes (paid by employees and employers) only count for about 4 percent of total taxes in Denmark, the EU average is more than a quarter. The revenue collected from indirect taxes has in recent years converged on the European average, with indirect taxes constituting about a third of total tax revenue. The value-added tax is by far the most important indirect tax, accounting for more than 50 percent of total indirect tax revenue.

Denmark was the first Nordic country to move away from the system of *global* income taxation, wherein a single progressive tax schedule is applied to the sum of the taxpayer's income from all sources, toward a system of so-called *dual* income taxation, wherein the taxation of capital income is separated from the taxation of other sources of income (Sørensen 1994). Since much of private sector interest income benefits from special tax concessions, while interest payments are fully deductible from taxable income, the capital income tax in Denmark yields a negative net revenue.

On the expenditure side of public activity, the share of the core expenditures in the welfare state, such as education, health, and social security, account for about three-quarters of all expenditures. It is notable that the share of public expenditures allocated to education and health has gone down over the past decades, while social security expenditures constitute a larger share, reflecting the rise in unemployment and a tendency toward earlier retirement over the period.

The redistributive capacity of the Danish tax and transfer system is quite significant. Although the distribution of incomes between "rich" and "poor" is not particularly even *before* taxes and transfers, the distribution of *disposable* incomes is much more equal (Förster 1994). The redistributive effects of taxes and transfers are enhanced by the provision of public services, such as education and subsidized child care (OECD 1996).

10.3   Current Debates on Fiscal Policy

Tax reform was a key ingredient in a new policy package introduced in January 1993. The reform was designed in the same spirit as most other recent tax reforms in the OECD area. It thus involved cuts in marginal income tax rates,

financed by various measures to broaden the tax base and to close existing loopholes. Furthermore, the fall in personal income tax rates was to a large extent financed by increases in energy taxes levied on the household sector and by the introduction of new taxes on refuse, water use, and sewage. From 1996 these initiatives were supported by taxes on the emission of carbon dioxides and sulfur dioxides from the business sector. The reform thus marked an important step toward a so-called green tax reform.

A big theme in the current debate on fiscal policy involves the extent to which wage taxes can be further replaced by green taxes. In particular, would it be possible to reap a "double dividend" in the form of improvements to both the environment and employment? Recent academic research suggests such a switch may lower the efficiency of the tax system as a revenue-raising device. Also, the (intended) substitution of labor for polluting inputs may lower labor productivity. With rigid real wage adjustments, this may lead to higher unemployment. A further concern relates to the fact that so far only a few countries in the world impose green taxes on the business sector. Hence, there is a lively debate in Denmark on what impact these taxes would have on Danish companies exposed to international competition (Koch 1996).

Since the Maastricht Treaty was signed, fiscal policy in Denmark has to a large extent been conducted in accordance with the so-called convergence criteria. At first sight this may appear surprising since Denmark has already announced that it will not participate in the final stage of Economic and Monetary Union in Europe. Nevertheless, the Danish government remains committed to the principles of nominal convergence and fiscal discipline. Indeed, these objectives have been quite successfully accomplished, as witnessed by the fact that Denmark now satisfies all the convergence criteria.

In spite of the recent success of fiscal policy in Denmark, there are some longer term challenges raised by the Danish welfare provisions. The most important challenge relates to the rather sharp increase that has been observed over the past couple of decades in the number of working-age people more or less dependent on public transfer payments. Not only has the number of unemployed increased, but there has also been a rising number of recipients of (1) early retirement pension, available to persons who for health or social reasons are unable to participate in the labor market; (2) early retirement benefits, available to persons aged 60 or older; and (3) cash benefits, available to uninsured unemployed persons from households with income and wealth below a certain threshold.

Altogether, in 1995 around 10 percent of the labor force (2.8 million) were registered as unemployed, and about 18 percent of the total number of working-age people (3.4 million) received some sort of income-compensating public transfer other than unemployment benefits. Hereof, about a third were recipients due to disabilities of various kinds, and a sixth were students. Hence, about 21 percent of the labor force (or 18 percent of all working-age people) were out of work but should in principle have had the ability to work. With the

corresponding number in the early 1970s being almost negligible, two tendencies can thus be identified: the work force is retiring earlier, and a larger number of low-skilled workers have been expelled from the labor market. While most analysts would agree that these tendencies are serious, there are different views of their significance.

"Optimists" hold that rather than being associated with a dramatic increase in de facto unemployment, the enormous rise in the number of recipients of public transfers simply reflects a change in political priorities in favor of granting public benefits to people who previously would have been provided for by family or other "local" safety nets, if provided for at all. Thus, although the rise in the number of working-age people receiving transfer payments should not be overlooked, the problem should not be overstressed either. Furthermore, along with expansion of welfare programs, optimists often refer to the fact that it has been possible to keep the employment rate fairly constant at 72 to 75 percent (Callesen 1995).

"Pessimists," on the other hand, tend to claim that not only has the rise in expenditures allocated to public transfers led to higher (marginal) tax rates, but it has also led to cuts in the proportion of expenditures allocated to public consumption and provision of various services. While high marginal tax rates are well known to have distortionary effects, a continuous fall in the share of expenditures to public service production and infrastructure relative to public transfer payments to persons out of employment may in the longer term threaten the legitimacy of the welfare state. For example, middle-class people may perceive their "return" from contributing to large-scale transfer payments as too low; a dissatisfaction that subsequently may translate into increased support for political forces completely opposed to the fundamental structures of the welfare state (Ingerslev and Ploug 1996).

The ongoing process of population aging has also reached the policy agenda (Jensen and Nielsen 1995). Unlike most other OECD countries, Denmark seems to be offered demographic "breathing space": over the next 10 years or so the ratio of elderly (age 65+) to working-age people (ages 20–64) is falling, whereupon it increases rather dramatically. While the generational aspects of this phenomenon are widely recognized, there are different views on what should be done. Optimists argue that the problem will only show up far in the future, and that a successful economic policy in the meantime may reverse the current tendency to early retirement. Pessimists, on the other hand, have emphasized the need for a strong commitment to eliminate the public sector's debt during the breathing space and argue that the population should be more directly confronted with the need for a higher retirement age in the future.

After this brief review of the state of play of fiscal policy in Denmark, we next study the generational impact of alternative policies that may be adopted in the near future. As a benchmark we first present generational accounts in the case where fiscal policy remains unchanged.

Table 10.1   Public Receipts and Expenditures in Denmark, 1995 (millions of dollars)

Receipts		Expenditures	
Labor income taxes	54,286	Social security	18,653
Capital income taxes	−5,896	Health insurance	10,362
Value-added taxes	17,000	Unemployment insurance	5,293
Alcohol and tobacco tax	1,995	Welfare and housing	5,016
Gasoline tax	1,318	Child and youth support	5,402
Vehicle tax	786	Education	10,267
Property and wealth tax	1,994	Long-term care	5,594
Unemployment insurance	2,770	Other transfers	9,580
Other taxes	15,305	Net investments	1,421
Other revenues	5,532	Subsidies	5,072
Public deficit	2,832	Net interest payments	5,335
		Government consumption	15,924
Total	97,920	Total	97,919

Sources: Danmarks Statistik (1996) and data provided by the Danish Ministry of Finance.

10.4   Data

The calculation of generational accounts for current and future generations requires (1) a long-term gender-specific population projection, (2) an aggregate government budget in a base year, (3) microprofiles (age and gender specific) of net taxes to be paid over remaining lifetimes, and (4) an estimate of the government's initial net debt position. Finally, assumptions about exogenous parameters, including the GDP growth rate and the real interest rate, are needed (Auerbach, Gokhale, and Kotlikoff 1991).

The population projections start in 1995. We have retained all assumptions about fertility, mortality, and net immigration made in the official Danish population projections. While the end year of the official projections is 2040, our projections run through year 2200. During the first five years of the projection period, the total fertility rate is assumed to increase from 1.8 to 1.9, and it remains constant at that level from year 2000 onward. Since for females (males) younger than age 50 (65), the mortality rates are assumed to fall during the first 10 years of the projection period, life expectancy at birth rises from 77.9 years (72.7) to 78.1 (73.0) for females (males). Finally, as to the immigration numbers, the official assumptions imply an annual net inflow of 13,500 persons, about 0.25 percent of the base-year population.

The aggregates of taxes and transfers are taken from the official statistics on Danish national income and product accounts (Danmarks Statistik 1996; Ministry of Finance 1996). Table 10.1 summarizes the overall public budget of the base year 1995 in detail. The entire budget includes expenditures and receipts of the federal and local governments as well as public enterprises. All intergovernmental payments have been canceled out.

Public revenues include taxes on labor income, capital income, property, wealth, vehicles, alcohol, tobacco, and gasoline, employees' unemployment

contributions, the value-added tax, and other taxes or general revenues.[2] Note that capital income taxes are significantly negative, mainly due to a generous system of tax deductions on owner-occupied housing expenditures. Table 10.1 also lists various transfer payments, including transfers for social security, health care, unemployment insurance, welfare and housing benefits, child and youth support payments, education, and long-term care expenditures as well as other transfers to households and subsidies.

Each aggregate for taxes and transfers is allocated to the representative male and female individuals of each living generation with the help of relative age-gender profiles. Age-specific profiles originate from various Danish microdata surveys. Those taxes and transfers that have not been distributed by age and gender are summarized under other taxes, revenues, or transfers. This is also true for the specific parts of taxes not being entirely distributed due to standard incidence assumptions.[3]

According to official Danish statistics, the government's net financial debt amounts to $61.7 billion.[4] To this number we add a real debt of $33.5 billion, resulting from a present value calculation of deficits from publicly owned enterprises, land, and so forth. Note that this approach excludes public infrastructure, which is provided without user fees. Our estimate of the government's net wealth is thus −$95.2 billion.

Net investment amounts to $1.42 billion. Hence, in the base year, the residual of total government revenues minus expenditures on transfers, subsidies, and net investments—that is, government consumption—amounts to $15.9 billion. However, this number is not used in the calculations. There we constructed a gross figure by including non-age-specific distributed taxes, revenues and transfers, subsidies, net investments, and transfers to the rest of the world. This number is projected to grow in line with GDP, and it is adjusted for the demographic transition in a per capita manner.

10.5 Basic Findings

Table 10.2 reports generational accounts for cohorts ranging in age from 0 to 90 in the base year 1995. The accounts are shown both for the case in which educational expenditures are allocated as a transfer payment on age groups and

2. The aggregate for labor income taxes includes income of the self-employed. The aggregate of unemployment insurance covers both employers' and employees' contributions.

3. In particular, this concerns about a quarter of gasoline and vehicle taxes, which are allocated to the firm sector. Income of the self-employed is not divided into hypothetical shares of labor and capital income. Although this is in contrast to standard incidence, the splitting would be meaningless in the light of the capital income profile, which is dominated by tax deductions for owner-occupied housing. Corporate taxes are distributed uniformly across age and gender. This is due to the lack of true information about the incidence of corporate taxes in Denmark.

4. Although future generations should only be burdened by the service payments, and not be made responsible for the principal, a present value approach focusing exclusively on the debt service flow would lead to similar results given the long time horizon used in the calculations.

Table 10.2   **Generational Accounts of Current and Future Generations: Baseline
(thousands of U.S. dollars)**

Generation's Age in 1995	Education as Transfers			Education as Government Consumption		
	Average	Male	Female	Average	Male	Female
0	−18	35	−73	84	135	31
5	14	77	−52	134	194	70
10	79	154	1	178	250	103
15	143	229	52	211	294	124
20	209	304	110	243	337	145
25	232	330	128	251	349	148
30	225	321	123	238	333	136
35	202	297	104	214	308	116
40	157	249	62	166	258	72
45	91	172	9	99	179	16
50	9	78	−63	14	84	−57
55	−64	0	−128	−61	2	−125
60	−143	−93	−190	−143	−93	−190
65	−172	−134	−207	−172	−134	−207
70	−186	−151	−214	−186	−151	−214
75	−194	−155	−224	−194	−155	−224
80	−202	−173	−219	−202	−173	−219
85	−202	−169	−218	−202	−169	−218
90	−49	−44	−51	−49	−44	−51
Future generations	26	−53	110	124	198	45
$GA_{t,t+1}(1+r)/GA_{t,t}(1+g)$	−1.53	−1.56	−1.56	1.52	1.52	1.52

the case in which education is treated as a form of government consumption. Furthermore, the accounts are presented for males and females combined and for males and females separately. The results refer to baseline assumptions, including an annual real GDP growth rate of 1.5 percent and an exogenous real interest rate of 5 percent.

The first remarkable result is that if education is counted as a transfer, the generational account of a current newborn is negative. Since net payments to the government are strictly negative throughout childhood and youth, the accounts steadily increase until a peak is reached at age 25. Over the years of active labor market participation, the generational accounts are positive but falling, before turning negative as individuals approach retirement. Retirees obviously have negative accounts since they pay low income taxes and receive public pensions and other old-age services.

The accounts also reveal big gender-specific differences underlying the average figures. Indeed, while newborn males have a generational account of $35,000, that of a newborn female is negative (−$73,000). To understand this difference between the two sexes—a remarkable one by international standards—we have to look at the more detailed specifications of the net payments.

First, a newborn male in 1995 would over his entire life span contribute about 40 percent more in labor income taxes than his female counterpart. The reason for this is that in spite of their relatively high labor market participation rate, Danish women are mostly recruited to low-wage and part-time jobs. Second, women receive more old-age pensions than men. Since the benefit rate is unrelated to gender, this clearly reflects the fact that women have, on average, longer lifetimes than men. For the same reason the present value of women's transfers in the form of old-age care is higher than the corresponding number for men. Third, as a consequence of the fact that women are more exposed to unemployment than men, they receive relatively more unemployment and cash benefits. Fourth, women's receipts of health insurance and other welfare services by far dominate what men receive.

These patterns are modified considerably if expenditures on education are treated as government consumption. In general, this would increase the generational accounts of current newborns and future generations; indeed, current newborns and future generations would have their accounts increased by the same amount (when adjusted for productivity growth). Since education is concentrated on children and youth, and only differs marginally across gender, this alternative accounting would leave the older generations unaffected. However, massive changes are observed for younger people (ages 0–15). In particular, the generational accounts of current newborns (of both sexes) now become positive.

Following standard practice, the distribution of net tax burdens between current and future generations is assessed in terms of $\pi \equiv (1 + r)GA_{t,t+1}/(1 + g)GA_{t,t}$, where $GA_{t,t}(GA_{t,t+1})$ is the generational account of current newborns (individuals born in the subsequent year), r is the real interest rate, and g is the real GDP growth rate. Generational balance, in the sense that existing and future generations are burdened equally, is achieved when this indicator equals unity. Similarly, if the indicator is greater (smaller) than unity, future generations have to pay higher (lower) net taxes than current generations.[5]

There are two circumstances in which π does not yield meaningful results. First, as $GA_{t,t}$ approaches zero, π would indicate an infinite redistribution to the advantage of current generations. Such an outcome would clearly be difficult to interpret. Second, problems arise if the accounts of current and future generations display changing signs. However, this is due to the fact that π can be substantially biased by gender-specific redistribution (Raffelhüschen 1995). Both of these problems actually occurred in an earlier study on generational accounting in Denmark (Jensen and Raffelhüschen 1997).

The problem of changing signs depends crucially on how we treat educational expenditures. Table 10.3 reports the baseline findings as well as their sensitivity with respect to realistic parameter variations. Only if education is

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5. $\pi = 1$ is also necessary for maintaining a steady state corresponding to Kotlikoff's (chap. 1 in this volume) fiscal balance rule.

Table 10.3   **Sensitivity Analysis**

	$g = 1$			$g = 1.5$			$g = 2$		
	$r = 3$	$r = 5$	$r = 7$	$r = 3$	$r = 5$	$r = 7$	$r = 3$	$r = 5$	$r = 7$
Generational accounts, education treated as government consumption									
Newborns in base year	156	66	17	183	84	27	211	105	38
Future generations	196	103	49	224	124	61	251	147	75
$GA_{t,t+1}(1+r)/GA_{t,t}(1+g)$	1.28	1.62	2.98	1.24	1.52	2.40	1.21	1.45	2.06
Generational accounts, education treated as transfers									
Newborns in base year	29	−29	−56	46	−18	−51	61	−5	−46
Future generations	74	13	−20	93	26	−13	110	42	−4
Achieving generational balance, education treated as transfers									
Cut in government purchases	29.2	27.3	24.4	29.9	29.0	26.0	30.6	30.7	27.7
Reducing all transfers	4.4	4.2	3.8	4.4	4.5	4.1	4.4	4.7	4.3
Increasing all taxes	4.0	3.8	3.4	4.0	4.0	3.6	4.0	4.2	3.8
Achieving generational balance, education treated as government consumption									
Cut in government purchases	9.6	9.4	8.4	9.3	9.9	8.9	8.5	10.5	9.5

Note: g is productivity growth (percent); r is discount rate (percent).

included in government consumption does π represent an unbiased indicator of intergenerational imbalance. In this case, and under baseline parameterization, our results suggest that the net tax burdens of future generations will be 52 percent higher than for current generations. A lower discount rate and a higher growth rate both serve to reduce this generational imbalance. The quantitative robustness seems to be fairly low, as witnessed by the fact that for combinations of three real interest rates (3, 5, and 7 percent) with three alternative GDP growth rates (1, 1.5, and 2 percent), the intergenerational imbalance ranges between 20 and 200 percent. However, the qualitative finding of an imbalance in favor of currently living generations is robust. Table 10.3 also shows that if educational costs are counted as transfers, π cannot be given a meaningful interpretation.

In view of the fundamental problems with π, we present the magnitude of intergenerational imbalance with the help of an alternative set of indicators. These indicators show how much fiscal policy should be changed in order to eliminate the "excess burden" on future generations. Specifically, we try to estimate the (immediate and permanent) adjustment of (1) all taxes, (2) all transfer payments, and (3) all government purchases of goods and services that would be needed to ensure equality between the net tax payments of future generations and the (growth-adjusted) net tax payments of newborns ($\pi = 1$). The results are found in table 10.3, both for the baseline and for alternative combinations of interest rate and growth rate. The table shows the necessary fiscal adjustments, reported as percentage differences from what the relevant tax revenue or expenditure level would have been in the absence of these adjustments.

Consider first a policy whereby intergenerational balance is restored through higher overall tax revenue collected from living generations. In this case additional revenue equal to 4.0 percent of the existing tax revenue is required. This is a nonnegligible fiscal adjustment. The net tax payments of current newborns and future generations could also be equalized if all transfer payments were reduced by 4.5 percent, or through an across-the-board cut in government expenditures of 29.0 percent.

It is noteworthy that the required fiscal tightening is fairly robust to parameter variation, ranging within a band of ± 15 percent of the baseline finding. As seen from the last row in table 10.3, the strong sensitivity of measuring imbalance via the indicator π translates into rather robust qualitative findings if we focus on, for example, necessary cuts in government purchases, also for the case of treating education as government consumption. Note that the scale of these cuts differs from those found in the case in which we distributed educational expenditures due to the different denominators referred to in both cases.

An important question is what difference it makes whether generational balance is achieved in one way or another. Indeed, the macroeconomic response to a tax increase may be different from the macroeconomic response to a spending cut. Similarly, if contractionary fiscal actions are implemented

through higher income taxes, the wage and employment effects may differ significantly from the case in which fiscal policy is tightened through higher consumption taxes (Jensen 1997). However, generational accounting fails to capture such differences. Nevertheless, it would be of interest to see how sensitive the generational accounts of existing generations are to the specific way of restoring generational balance. Table 10.4 shows the generational accounts by age for current as well as for future generations under each alternative policy change. For comparison we also show the baseline generational accounts.

Let us first see how sensitive the generational accounts of existing generations are to whether the generational balance is restored through higher taxes or lower transfers. Although almost identical total revenue, measured in present value, has to be raised in the two scenarios, and although *all* living generations have to pay higher net taxes, the distribution of burdens across current generations appears to be quite sensitive to the choice of fiscal instrument. In general, higher tax rates place the fiscal burden on current generations of working age, whereas transfer reductions mainly hit the younger and the older generations. If generational balance is restored through an across-the-board cut in government expenditures, there would only be a direct influence on future generations' net tax payments. However, while the generational accounts of currently living generations are left unaffected, there would be an indirect effect in the sense that the utilities derived from use of infrastructure, defense, policing, and so forth, would fall.

In the light of these findings it would be useful to know the sources of the generational imbalance and their quantitative significance. Two main sources can be identified, namely, demographic changes and preexisting public debt. Suppose education is counted as government consumption. In this case we find that if the age structure could be kept constant, future generations' net payments would be 11 percent less than those of current newborns. Hence, changing demographics have a lot to say. Similarly, in the absence of any public debt in the base year, future generations would only have to bear a 13 percent higher burden than current generations. As compared to the baseline results, we can thus conclude that both sources have more or less the same quantitative impact.

10.6 Generational Impact of Policy Reforms

Given the current debt position and given the underlying demographic projections, current fiscal policy *does* pass burdens onto future generations. However, in the case of no demographic change, that is, if the number of persons in each age group could be kept constant, or the case of no public debt in 1995, there would almost be generational balance. Since neither of these alternatives—keeping the age structure constant or getting rid of public debt in a jiffy—can be readily implemented, it might be of interest to consider some less ambitious policy changes that would mitigate the generational imbalance.

Table 10.4   **Achieving Generational Balance (thousands of U.S. dollars)**

	Education Treated as Transfers				Education Treated as Government Consumption			
	Baseline	All Taxes	All Transfers	Government Consumption	Baseline	All Taxes	All Transfers	Government Consumption
Decrease/increase in expenditure/tax	0.0	4.0	4.5	29.0	0.0	3.4	4.7	9.9
Generation's age in 1995								
0	−18	−7	−5	−18	84	94	93	84
5	14	27	28	14	134	145	142	134
10	79	94	92	79	178	191	187	178
15	143	159	155	143	211	225	220	211
20	209	227	220	209	243	259	253	243
25	232	251	243	232	251	267	261	251
30	225	244	236	225	238	254	249	238
35	202	220	213	202	214	230	225	214
40	157	173	168	157	166	180	177	166
45	91	105	103	91	99	111	111	99
50	9	21	22	9	14	24	27	14
55	−64	−54	−50	−64	−61	−52	−46	−61
60	−143	−136	−128	−143	−143	−137	−128	−143
65	−172	−166	−158	−172	−172	−167	−157	−172
70	−186	−181	−172	−186	−186	−182	−172	−186
75	−194	−191	−182	−194	−194	−191	−181	−194
80	−202	−199	−190	−202	−202	−200	−189	−202
85	−202	−200	−191	−202	−202	−201	−190	−202
90	−49	−49	−47	−49	−49	−49	−47	−49
Future generations	26	−7	−4	−18	124	95	95	86

Three alternative scenarios are considered, each of which is designed with a view to important themes in the current debate on fiscal policy in Denmark.[6]

The first scenario (A) is based on rather optimistic assumptions about the Danish economy. Think of this as a successful outcome of the tax and labor market reforms introduced in recent years. Indeed, these reforms have been motivated by a need for stimulating incentives to work and thereby bringing structural unemployment down. The year 1993 marked the starting point of an expansion in the Danish economy, with rather impressive growth in output and falling rates of unemployment. For example, the registered rate of unemployment has fallen by 3 percentage points since 1994. The question now is whether this is a process likely to continue. It is widely believed that if further underpinned by structural policy adjustments, additional inroads can be made in the number of unemployed.

Following this line of reasoning, the rate of unemployment is assumed to fall by a total of 3.4 percentage points over the years 1996–99. Due to the operation of built-in fiscal stabilizers, an increase in employment not only reduces expenditures on unemployment and cash benefits, it also leads to higher tax revenues. In our calculations we use official estimates (Ministry of Finance 1994b) of the budgetary effects of a fall in the rate of unemployment. Since a better performance of the economy automatically improves the government budget, the question arises whether the extra revenue should solely be used to reduce public debt, or whether it should also translate into a fall in the tax burden on living generations.

We assume that over a period of 15 years, that is, until the year 2010, the extra revenue is used to reduce the government's financial net debt, and there will be no discretionary fiscal adjustment (such as a cut in tax rates). As a result, the public debt, amounting to $61.7 billion in 1995, would be eliminated by the year 2007. By the end of the year 2010 the government will have accumulated a net financial asset position of $14.7 billion. In view of the strength of public finances in the year 2011, two alternative subscenarios are considered. Scenario A-1 assumes that the process of government financial asset accumulation simply continues, while scenario A-2 assumes that a permanent tax cut is implemented so as to ensure that the level of the government's net financial assets can be kept constant in all future years.

The effects of scenario A are reported in table 10.5. In the absence of any discretionary action (A-1), the generational accounts of living generations are seen to increase relative to the baseline findings. People of working age face the highest increases in tax payments, whereas the effects on the elderly's accounts are relatively minor, due to the adjustment of transfer aggregates. The benefits resulting from a better economic performance accrue to future

6. As mentioned already, it should be stressed that the implementation of reform measures can involve significant macroeconomic feedbacks that are not taken into account (Buiter 1995; Fehr and Kotlikoff, chap. 3 in this volume; Raffelhüschen and Risa 1997).

Table 10.5   Generational Accounts for Alternative Policies (thousands of U.S. dollars)

Generation's Age in 1995	Baseline	Labor Market Reform		Reducing Government Activity		Higher Retirement Age (C)
		Endogenous Debt after 2010 (A-1)	Reduced Income Tax after 2010 (A-2)	Endogenous Debt after 2010 (B-1)	Reduced Income Tax after 2010 (B-2)	
0	−18	1	−11	1	−11	−10
5	14	37	22	32	17	23
10	79	106	89	96	79	90
15	143	173	157	158	141	154
20	209	241	225	224	208	221
25	232	261	247	246	232	245
30	225	251	239	240	228	238
35	202	226	216	218	209	216
40	157	176	169	174	167	170
45	91	108	102	111	106	104
50	9	22	18	31	27	23
55	−64	−54	−57	−39	−42	−48
60	−143	−137	−138	−117	−119	−141
65	−172	−168	−169	−149	−150	−171
70	−186	−182	−183	−164	−164	−185
75	−194	−192	−192	−175	−175	−194
80	−202	−200	−200	−185	−185	−202
85	−202	−201	−201	−188	−188	−202
90	−49	−49	−49	−49	−49	−49
Future generations	26	−20	1	−20	1	2
Change in government purchases to restore generational balance	−29.0	14.2	7.8	14.2	7.8	8.0

generations, which turn out to be even better off than current newborns. In fact, instead of paying $26,000, as in the baseline scenario, they now receive $20,000. Moreover, to restore generational balance it would be necessary to increase government purchases by 14.2 percent, against a cut of 29 percent as in the baseline. Of course, one would also expect that living generations reap some benefits of successful macroeconomic performance. For example, the higher employment rate would undoubtedly be felt as an improvement in living conditions of those previously unemployed.

More balanced generational results would clearly come out if taxes were lowered in 2011 (A-2). In this case some but not the entire benefits of labor market reforms would accrue to future generations. For current generations, the future income tax relief will thus imply that their accounts range about halfway between the baseline and scenario A-1. The same holds true for future generations. Hence, achieving generational balance in scenario A-2 necessitates a moderate cut in government consumption of 7.8 percent.

Scenario B is based on less optimistic assumptions about the effects of structural reforms and the international conjuncture. In particular, the unemployment rate is assumed to remain at its 1995 level. Yet we assume that policymakers have equally ambitious public debt targets. Indeed, the Danish government has taken the official position that that public debt should be eliminated over the next 10 to 15 years (Lykketoft 1995). We now let scenario A constitute a benchmark for the design of fiscal policy in scenario B. However, rather than getting rid of public debt through automatic stabilization, debt reduction now has to be implemented through discretionary fiscal initiatives. We assume this is achieved through (proportional) contributions from all parts making up the government budget. In view of its breathing space, alluded to above, Denmark seems to have a unique opportunity to bring down public debt relatively fast, although a horizon of 15 years may seem a bit too ambitious.

This scenario will necessarily impose significant burdens on current generations. However, as before the distribution of tax burdens between current and future generations depends on what happens when the public debt target has been reached in 2010. In scenario B-1 we assume that the policy of debt reduction (or asset accumulation) is continued after the year 2010. As compared to scenario A-1, we of course find the same net payments for future generations and current newborns as well as the same increase of government purchase necessary to ensure generational balance. Moreover, young working-age cohorts will gain while old working-age and elderly cohorts lose. As compared to our baseline results, all cohorts will realize lower transfer receipts and therefore higher accounts. Clearly, this strategy would be advantageous solely for future generations. Scenario B-2 is designed with the aim of sharing more equally the changes in net tax payments between current and future generations. Hence, we assume that taxes are cut in 2011, with the magnitude being determined such that the debt ratio arrived at in 2010 can be kept constant permanently thereafter.

The results from scenario B-2 are also shown in table 10.5. Again, as compared to scenario A-2 only the accounts of those at least one year old in the base year are affected, and it will be the young who gain. In comparison to scenario B-1 no generation is worse off, while relative to our baseline, every cohort except those aged 15 to 25 in the base year will be worse off. Note that the gaining cohorts suffer transfer losses only for a few years right after 1995 as well as in the far future, while the income tax effect in year 2010 is high in terms of present value.

The third strategy (C) relates to initiatives to avert the old-age crisis. While the need for debt reduction is well perceived across a broad political spectrum in Denmark (although its specific form of implementation remains controversial), views certainly differ as to whether debt reduction is enough to combat the underlying pressure on public finances due to population aging. Against this background a strategy is considered with the purpose of reversing the strong tendency toward early retirement. This strategy is designed as a reform of the early retirement scheme, currently allowing members of the workforce to retire at age 60. Instead, we examine the generational impact of raising that age stepwise to 63 through the years 2000–2002. Clearly, this announced reform would yield a "double dividend": not only would the workforce be expanded, there would also be a fall in the large number of recipients of public transfer payments.

Table 10.5 reports the generational impacts of scenario C while adjusting solely early retirement benefits and income tax revenues. As compared to the baseline findings, the burden of current generations will rise with age while the current elderly remain basically unaffected. With respect to intergenerational redistribution, we find a significantly reduced burden on future generations. This holds for both absolute net payments amounting to $2,000 instead of $26,000 and for the 8 percent cut in government purchases necessary to ensure generational balance. In fact, reducing the retirement age is a very effective and adequate way of achieving generational balance under the given demographic pressure. One should keep in mind, though, that it will predominantly burden older and therefore—in terms of life cycle planning—not very flexible cohorts. Hence, a fair and longsighted announcement has to be part of that type of reform.

10.7 Conclusion

Using the device of generational accounting, we find that there actually is a generational imbalance associated with current fiscal policy in Denmark. Therefore, current generations would have to face tighter fiscal policies if the generational distribution of net tax burdens were to be more equal. For example, generational balance could be achieved through an increase in income tax revenue of almost 4.0 percent or a cut in transfer payments of around 4.5 percent. Treating educational expenditures as government consumption, our

results suggest that the (growth-adjusted) lifetime net tax payments of a representative member of future generations will be around 50 percent higher than those faced by current newborns.

We also assess the generational impact of a number of other policies that are important on the policy agenda in Denmark. In particular, the prospects of future generations would look much lighter if public debt were reduced in line with official declarations of intent, implying that public debt would be eliminated over the next 10 to 15 years. Also, initiatives to expand the workforce, including steps to bring down the large number of recipients of early retirement benefits, could add a significant contribution to restoring generational equity. Furthermore, a fall in structural unemployment, as accomplished through, say, tax and labor market reforms, would not only be good for the unemployed but would also benefit future generations significantly.

Another notable finding of the paper is that not only do men contribute a much larger share of their lifetime incomes to the government than women, womens' net payments are even negative. There are several reasons for this result, unique by international standards. For example, Danish women are mainly recruited to low-paid jobs with higher risks of unemployment; a number of services provided by the Danish welfare system are mainly utilized by women; and Danish women have a greater longevity than men, which implies that they receive public pensions and other old-age benefits for a longer period than men. This bias is aggravated by the flat-rate nature of the Danish pension scheme.

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