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Abstract

A wide variety of tax regimes for (occupational) private pension saving are in place around the world. Generally, pension saving is taxed at a relatively low rate, although the revenue loss due to tax facilities for pension savings and/or pension tax expenditures may differ across countries. A strong fiscal stimulus to build up pension capital will support funding. However, these tax facilities may become an expensive business for governments. This paper investigates the ex ante budgetary effects of a cash-flow tax regime for pension savings by full present-value calculations.

The fiscal subsidy on pension savings in several (European) countries is often associated with the application of the cash-flow treatment of pensions under the personal income tax: pension contributions are tax exempt, capital income of pension funds is tax-exempt, and pension benefits are taxed, but usually the elderly aged 65 years and over are taxed at a relatively low rate. This form can be described as EET, with E denoting an exemption or relief from tax and T denoting a point at which tax is payable. Indeed, tax treatment of pension saving can have other forms as well. We consider a specified form of a comprehensive income tax system (TTE) as an appropriate benchmark.

Using the TTE-benchmark, the ex ante budgetary cost of the current tax treatment of pension saving in countries can be quantified. We employ an empirical analysis for the Netherlands, because this country belongs, with its three pension pillars and its sound funding, to the leading group of countries in Europe with a solid pension system. Our calculations, using Income Panel Data from Statistics Netherlands for the years 1990-2003, show that current taxation on a cash-flow basis means on balance a major loss to the Treasury (compared to the benchmark). For the year 2003 we estimate a fiscal subsidy associated with the current Dutch tax rule of 1.2 to 1.5 percent of GDP, depending on the assumed rate of return on pension capital.

JEL-classification: H24, H30, H55, and J32

Keywords: pensions and annuities, tax treatment of pension savings, revenue loss to the Treasury

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1. Introduction

In many countries pensions are the subject of great interest. Various studies have reviewed the ability of the pension system to survive in view of the increasing aging of the population (Wise, 2005, CPB, 2000, and Gruber and Wise, 1999).[1] In this context, the financing of pensions is important. Funded (private) pension systems are generally found to be less vulnerable to demographic shocks than public pay-as-you-go systems. This is the reason underlying recent pension reforms in for example Sweden and Germany (Sinn, 2005). These countries try to partially switch to funded pensions. A number of other countries already have substantial funded pension programs, such as the Unites States, Japan, the United Kingdom, Denmark, and the Netherlands. In many countries pension funding is stimulated trough a favorable tax treatment of pension savings. A wide variety of tax regimes for occupational private pension saving are in place around the world. Generally, pension saving is taxed at a relatively low rate, although the revenue loss due to tax facilities for pension savings and/or pension tax expenditures may differ across countries. A strong fiscal stimulus to build up pension capital will support funding. However, these tax facilities may become an expensive business for governments. This paper investigates the ex ante budgetary effects of a cash-flow tax regime for pension savings by full present-value calculations.

The purpose of this paper is to provide an indication of the ex ante budgetary cost implications of the different pension tax treatments. It should be noted that the theoretical literature does not point at an appropriate tax treatment for pension savings (benchmark). So, given the lack of any economic coherence, the only way the budgetary costs of different tax regimes can be compared, is by full present-value or accumulated-value calculations (cf. Booth and Cooper, 2002, p. 84). We consider a specified form of a comprehensive income tax system as an appropriate benchmark (see section 2). Using this benchmark, the ex ante budgetary cost of the current tax treatment of pension saving in countries can be quantified. We employ an empirical analysis for the Netherlands, because this country belongs, with its three pension pillars and its sound funding, to the leading group of countries in Europe with a solid pension system.[2]

The paper is organized as follows. In section 2, we present an overview of the tax treatment of pensions in OECD countries. In section 3, we model the ex ante budgetary cost implications of the various tax treatments of pension savings. For the empirical analysis in sections 4 to 6 we use Income Panel Data from Statistics Netherlands for the years 1990-2003. We simulate the ex ante budgetary cost associated with the current Dutch tax rule on pension saving for the year 2000 (section 4). Next, we employ a time-series analysis for the period 1990-2003 which includes a major tax reform (section 5). Finally, we simulate the no-fiscal subsidy case, i.e the tax rates on pension benefits necessary to fade away the current fiscal subsidy on pension savings (section 6). Section 7 concludes the paper.

It should be noted here that we will use a rather simple methodology. Ideally, an intertemporal computable general equilibrium model with overlapping generations should be used. However, we choose for a partial equilibrium approach, so behavioral effects of implementing the benchmark tax rule, and tax base effects, will not be taken into account in our analysis. The paper concentrates explicitly on the numerical analysis and institutional setting in the Netherlands. No large-scale model is required to arrive to the implications involved. Moreover, our methodology is easily accessible to practitioners.

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1 For a very detailed comparison of pension systems in Europe please refer to the joint report of the Commission and the Council of the European Communities (2002).

2 In the Annex we discuss a number of features of the Dutch pension system in international perspective and of the tax treatment of pension savings in the Netherlands. Also, we quantify the amount of the deductions of pension contributions and we estimate the size of the direct revenue loss through these deductions.

2. Tax treatment of private pensions in OECD countries

The fiscal stimulus of pension saving in several (European) countries is associated with the application of the cash-flow treatment of pensions under the personal income tax (pension contributions are tax exempt, capital income of pension funds is tax-exempt, and pension benefits are taxed). This form can be described as EET, with E denoting an exemption or relief from tax and T denoting a point at which tax is payable. The tax treatment of pension saving can have other forms as well. Contributions can be exempted, while the withdrawals and the accrual return on accumulated funds are taxed (ETT). Under a comprehensive income tax system (TTE) all income is taxed when it is received, so saving is from taxed income, interest income from savings is taxed, but proceeds of savings do not suffer further tax. Yoo and de Serres (2004) have presented an overview of the practice of taxation of private pension plans in OECD countries; see Table 1.

Table 1 Tax treatment of private pensions in 2003 [a]

	Contributions [b]	Fund	Pension payments [c]
Australia [d]	T	pT	T/PE
Austria [d]	T (PE)	E	T/PE
Belgium [d]	E (TC)	E	T/PE
Canada	E	E	T
Czech Republic [d]	(T (S)	E	T/PE
Denmark	E	pT (15%)	T
Finland	E	E	T
France	E	E	T/PE
Germany	E	E	T/PE
Greece	E	E	T
Hungary [d, e]	T	E	E
Iceland	E	E	T
Ireland	E	E	T/PE
Italy	E	pT (12.5%)	T/PE
Japan	E	E	T/PE
Korea	E	E	T/PE
Luxembourg [d]	E	E	T
Mexico	E	E	T/PE
Netherlands	E	E	T
New Zealand [d]	T	T	E
Norway	E	E	T
Poland	E	E	T
Portugal [d]	E (TC)	E	T/PE
Slovak Republic	E	E	T (15%)
Spain	E	E	T
Sweden	E	pT (15%)	T
Switzerland	E	E	T
Turkey	E	E	E
United Kingdom	E	E	T
United States	E	E	T

Note: E = exempt; T = taxed under personal income tax; TC = tax credit; PE = partial exemption or deduction from taxation; S = state subsidy; pT = partial taxation.

a. Private pension refers to mandatory or voluntary funded privately managed pension schemes.
b. Tax-deductible contributions are subject to a certain limit in most countries.
c. This generally concerns the tax treatment in the case of annuities. Many countries allow pension benefits to be withdrawn in the form of lump sums, in which case a partial exemption is granted so as to preserve tax neutrality with annuities.
d. The tax treatment of the employer's contribution is different from that of the employee's.
e. Mandatory contributions are fully taxed, but voluntary contributions receive tax credits.

Sources: Antolin et al (2004, p.29) and Yoo and de Serres (2004, p.80)

Twelve OECD countries (Canada, Finland, Greece, Iceland, Luxembourg, the Netherlands, Norway, Poland, Spain, Switzerland, United Kingdom and the United States) apply the EET regime in which withdrawals are subject to the progressive income tax rates. Another ten countries (Austria, Belgium, France, Germany, Ireland, Japan, Korea, Mexico, Portugal and the Slovac Republic) also apply an EET regime, but in these countries withdrawals are taxed more leniently than in the first group (for example through partial tax free withdrawal) or contributions are granted a tax credit rather than a full deduction. In Italy, Denmark and Sweden, taxation on contributions is also deferred, but accrued income from fund investment is taxed, albeit at preferential rates (ETT). In Australia, Austria, Czech Republic and New Zealand contributions are taxed. New Zealand comes close to a pure comprehensive income tax regime (TTE), while Australia is characterized as a TTT regime, but contributions can be partially exempted and investments earnings and benefits are taxed at a preferential rate.

From the OECD countries, the Netherlands has the highest relative amount of assets in tax-favoured retirement saving plans: total assets represent more than 110 percent of GDP (Antolin et al, p.30). In addition, participation in supplementary private pension plans and the share of these plans in total retirement income are high. Therefore, it can be expected that the tax treatment of these pensions has a relatively high significance in terms of net fiscal revenues. We analyse the case of the Netherlands as a typical example of an EET regime. However, it is not a pure EET regime, because withdrawals are taxed at a lower rate, because pension benefit recipients over 65 do not pay any contributions for the basic public old age pension scheme. In addition, marginal income tax rates on withdrawals are often lower than marginal rates on contributions because of rate progression; this is shown in section 4 of the paper.

3. Revenue effects under different tax regimes [3]

Economists often distinguish between two types of tax system – a comprehensive income tax and an expenditure tax. In a tax system that is neither progressive nor regressive, an expenditure tax produces an equivalent outcome to a comprehensive income tax, although the timing and the pattern of tax payments differ between the two. Tax treatment therefore implies individual fiscal benefits in case the elderly aged 65 and over are taxed at a relatively low tax rate. Moreover, additional fiscal benefits are involved in case governments delay the collection of the income tax until retirement age.

In this section we try to give an indication of the ex ante budgetary cost implication of different tax treatments of pension savings. It should be noted that theoretical literature does not point at an appropriate tax system for pension savings. We consider a specified form of a comprehensive income tax system (see below) as an appropriate benchmark (cf. Booth and Cooper, 2002, p. 84).[4] The tax due will be defined when applying the benchmark rule and when using an alternative tax rule EET. The structural budgetary effect can be calculated in terms of net present value for application of the EET-rule and of the benchmark rule. The difference between the tax yield when using the benchmark rule and when using the EET-rule is called the *'fiscal subsidy'* associated with the EET-rule. Next to this present value approach, a cash flow approach can be used. In the latter approach, budgetary costs are measured as the net amount of revenues foregone on contributions and accrued investment income and

3 No distinction is made with respect to the legal entity which offers the annuity policies (pension funds or insurance companies). The analysis is consequently limited to income tax; corporation tax has not been taken into account.

4 The United Kingdom's Inland Revenue states TTE as an appropriate benchmark for the calculation of tax expenditures; see Booth and Cooper (2002, p. 84).

the revenues collected on withdrawals in the same year (corresponding to contributions made in previous years). As Yoo and de Serres (2004, p.81) argue, the present value approach has the advantage that is not influenced by the history of past contributions or by demographic changes. Because this method takes into account the intertemporal shift in tax revenues, it provides a more accurate picture of the budgetary costs of tax-favoured pension schemes.

The model

Tax rule TTE (benchmark)

We compare the costs of a cash flow tax treatment of pension savings with a specific comprehensive income tax, in which no relief is given for the investment, and the proceeds of the investment are taxed, but pension benefits are exempt from tax. Pension benefits are based on the pension capital V_t which is accumulated from time t=0 to t=N. In the benchmark case the pension saving investment before tax, C_o, proceeds at rate r. During the accumulation period the annual return on the investment is taxed at rate τ_g. The accruing process of the value of the pension capital V_t (after tax) can be written as:

$$
\begin{aligned}
V_0 &= C_0 \\
V_1 &= C_0 \cdot (1+r) - r \cdot \tau_g \cdot C_0 = C_0 \cdot (1 + r \cdot (1-\tau_g)) \\
V_2 &= V_1 \cdot (1 + r \cdot (1-\tau_g)) \\
V_t &= C_0 \cdot (1 + r \cdot (1-\tau_g))^t
\end{aligned}
\qquad (1)
$$

So, the net present value of pension capital build-up under the benchmark tax rule amounts

$$V_{TTE,0} = C_0 \cdot \frac{(1 + r \cdot (1-\tau_g))^N}{(1+\delta)^N}, \qquad (2)$$

where the discount rate is denoted by δ.

In the benchmark case no tax relief is given for the pension investment C_0 at time t=0; the pension saving investment C_o is out of disposable income (i.e. after tax τ_c). We denote the tax revenue under the benchmark rule in net present values at t=0 as

$$T_{TTE,0} = \tau_c \cdot C_0 + \tau_g \cdot r \cdot \left[\sum_{t=1}^{N} \frac{C_o \cdot (1 + r \cdot (1-\tau_g))^t}{(1+\delta)^t} \right] \qquad (3)$$

It should be noted that we assume a fixed level of (net) pension saving investment irrespective whether the TTE-rule or EET-rule would be applied. This level of the pension investment does not alter because behavioral effects of implementing the benchmark tax rule, and tax base effects, will not be taken into account in our analysis. As a result our model generates different levels of net pension capital and net pension benefits when the TTE-rule and the EET-rule will be compared. Alternatively, one could argue that a model with a fixed amount of net pension capital and net pension benefits is more appropriate. However, in such a model it is overlooked that an EET-tax code stimulates the build-up of pension capital, and is therefore likely to yield a higher level of pension benefits.

Tax rule EET

The favorable tax treatment of pension savings in several countries is associated with the application of the cash-flow treatment of pensions under the personal income tax (pension contributions are tax

exempt, capital income of pension funds is tax-exempt, and pension benefits are taxed). We analyse the case for the Netherlands; see Bovenberg (2003).

During the accumulation period no annual return tax is levied (τ_g=0), so the pension capital build-up accrues by rate r each period: $V_t = (1+r)\cdot V_{t-1}$. Pension capital will generate the amount available for benefits at t=N. The net present value of pension capital build-up under the cash-flow treatment of pension under the personal income tax can be written as:

$$V_{EET,0} = C_0 \cdot \frac{(1+r)^N}{(1+\delta)^N} \tag{4}$$

We denote the tax revenue of the cash flow treatment of pensions under the personal income tax in net present values at t=0 as

$$T_{EET,0} = \tau_b \cdot C_0 \cdot \frac{(1+r)^N}{(1+\delta)^N} \tag{5}$$

where τ_b is the tax rate on pension benefits from retirement age.

Fiscal subsidy on pension savings

The pension capital build-up consists of two components: the pension contribution payments and the capital growth. When the benchmark rule applies, each of these two components would be taxed at the time of the build-up. When the EET-rule is applied, the levy only takes place on the pension benefit payments which in many cases starts at the age of over 65. So, the fiscal subsidy on pension savings in net present values can be denoted as

$$S = T_{TTE,0} - T_{EET,0} = \tau_c \cdot C_0 + \tau_g \cdot r \cdot \left[\sum_{t=1}^{N} \frac{C_0 \cdot (1+r\cdot(1-\tau_g))^t}{(1+\delta)^t} \right] - \tau_b \cdot C_0 \cdot \frac{(1+r)^N}{(1+\delta)^N} \tag{6}$$

This means that there are several aspects to the tax advantage of using the current Dutch tax rule compared to the benchmark rule:

(a) the difference in the marginal tax rates due to rate progression and because over-65s do not pay any OAP contributions under the income tax (τ_c and/or τ_g versus τ_b);

(b) the effect of not collecting any annual return tax on pension capital during the build-up period, in combination with the later moment in time of the tax payment.

These partial effects of the fiscal advantage of using tax rule EET can be disentangled as follows.
S = S(a) + S(b).

S(a) The partial effect of deferral tax payment, S(a), is the combined effect of *not* collecting any annual return tax on pension capital, and the later moment in time of the tax payment. This partial effect, S(a), ignores rate progression, i.e. we calculate the fiscal subsidy for $\tau = \tau_c = \tau_g = \tau_b$.

$$S(a) = \tau \cdot C_0 + \tau \cdot r \cdot \left[\sum_{t=1}^{N} \frac{C_0 \cdot (1+r\cdot(1-\tau))^t}{(1+\delta)^t} \right] - \tau \cdot C_0 \cdot \frac{(1+r)^N}{(1+\delta)^N} \tag{7}$$

S(b) The partial effect of low senior tax rates, S(b), will be calculated as: S(b) = S - S(a). So,

$$S(b) = \tau_c \cdot C_0 + \tau_g \cdot r \cdot \left[\sum_{t=1}^{N} \frac{C_0 \cdot (1 + r \cdot (1 - \tau_g))^t}{(1+\delta)^t} \right] - \tau_b \cdot C_0 \cdot \frac{(1+r)^N}{(1+\delta)^N} - S(a) \Rightarrow$$

$$S(b) = (\tau_c - \tau) \cdot C_0 + (\tau_g - \tau) \cdot r \cdot \left[\sum_{t=1}^{N} \frac{C_0 \cdot (1 + r \cdot (1 - \tau_g))^t}{(1+\delta)^t} \right] - (\tau_b - \tau) \cdot C_0 \cdot \frac{(1+r)^N}{(1+\delta)^N} \quad (8)$$

The no-fiscal subsidy case

A fiscal subsidy of the EET-scheme, if any, leads to a lower effective tax burden compared to a comprehensive income tax system (cf. OECD, 1994). Governments could treat pension savings on a cash flow basis to encourage retirement savings. On the other hand, governments may conclude that fiscal support of pension savings has become an expensive business. One could argue in favor of higher tax rates under the EET-rule to diminish the fiscal subsidy on pension savings.

We calculate the level of the tax rate under the current Dutch tax rule that would generate exactly the same amount of tax revenue compared to the benchmark rule. We denote this equivalent tax revenue yielding rate on pension benefits as τ_b*. The fiscal subsidy would disappear for:

$$S = 0 \Rightarrow T_{TTE,0} - T_{EET,0} = 0 \quad \Rightarrow \quad \tau_b^* = \left[\tau_c + \tau_g \cdot r \cdot \sum_{t=1}^{N} \frac{(1 + r \cdot (1 - \tau_g))^t}{(1+\delta)^t} \right] \cdot \left[\frac{(1+\delta)^N}{(1+r)^N} \right] \quad (9)$$

The level of the equivalent pension benefit tax rate depends on the level of the tax rates of the benchmark case, on the level of the annual investment return rate *r*, and on the pension capital build-up period *N*.[5] Note that the equivalent pension benefit tax rate will generally be (significantly) higher compared to the tax rates of the benchmark case.

4. A numerical application for the Netherlands (for the year 2000)

Table 2 summarizes our results of a simulation exercise. The basis is the amount of Dutch pension contributions in 2000 (10.9 billion euros) and of annuity contributions (4.0 billion euros) which were deducted; see Annex for details. The pension contributions and the annuities entered into in 2000 mature for an unknown number of years until they pay out as benefits. We estimate a weighted average duration of capital build-up of around 15 years, which lies below half of the maximum time period people could build up their pension capital (from 20 to 65 years of age).[6] Given this rather low average length of the duration of capital build-up much weight is given to the pension contributions of older employees with on average high incomes. The duration of their capital build-up is rather short compared to the young-age-low-income earners. Moreover, the pension premiums are levied only on wage income above a certain *franchise*. However, the calculations have been carried out using various different durations. It makes, after all, quite a difference if a duration of 10, 15, or 20 years is used for the calculation, because a later moment of tax levy results in an ever-greater interest advantage when the EET-rule is applied.

A number of assumptions have been made. We assume for the sake of simplicity that the build-up capital will be paid from the age of 65 and the build-up capital will be fully available to the premium

5 Note that for $r = \delta \Rightarrow \quad \tau_b^* = \tau_c + \tau_g \cdot r \cdot \sum_{t=1}^{N} \frac{(1 + r \cdot (1 - \tau_g))^t}{(1+\delta)^t}$

6 Boeschoten and Sluimers (2003) illustrated that the build-up duration of ABP in 2003 is 15 years. ABP is a pension fund for employers and employees in service of the Dutch government and the educational sector, with 168 billion euros pension capital.

payers in the form of pension benefits.[7] The average age of death is 77 and benefits start at the age of 65. So, the average number of years during which the pension capital is paid out as benefits is assumed to be 12, equal to the remaining life expectancy duration on the pension age of 65 year.

Pensioners of 65 years and older have 70 percent of their income in the first or second tax bracket, 20 percent in the third tax bracket and the remainder in the highest tax bracket.[8] This gives a weighted seniors tax rate, τ_b, of about 25.5 percent on supplementary pension.[9]

In the benchmark TTE-case the pension saving investment will be out of disposable income (i.e. after tax). We apply a marginal effective rate for the (deducted) contributions based on the rates and tax brackets for the year 2000.[10] During the accumulation period the annual return will be taxed at the same rate, so $\tau_c = \tau_g = 44$ percent.

The tax due is calculated when applying the benchmark rule and when using the current Dutch tax rule. The structural budgetary effect can be calculated in terms of net present value for application of the current Dutch tax rule and of the benchmark rule. No account is taken of the possible behavioral effects of implementing the benchmark rule. The difference between the tax yield when using the benchmark rule and when using the current Dutch tax rule is called the *'fiscal subsidy'* associated with the current Dutch tax rule. Table 2 shows the results of a number of simulations, including a sensitivity analysis.

7 Not all of the contributions paid, by the way, is intended for private pension build-up; part is intended as compensation for costs incurred by the insurer. In addition, when determining the pension payment we assume no further interest accumulation. The reason is that even when the benchmark rule is applied the interest growth after the age of 65 would have to be taxed in some way. The liability for tax of the interest growth after the age of 65 is no different whether the benchmark rule or the current Dutch tax rule is applied.

8 This assumption is based on the current distribution of taxable income over tax brackets.

9 The CPB Netherlands Bureau of Economic Policy Analysis used a tax rate of 25 percent (see Besseling and Bovenberg, 1998, p. 8); for recent data-years a somewhat higher figure of 27 percent can be found (see CPB, 2004, p.58).

10 Table A.1 in Annex contains a summary of the development of the size of the annuity and pension contribution deduction in the period 1990-2000. We used the Dutch Income Statistics which contain extensive information on the distribution of contributions across income groups. This makes it possible to classify holders also by tax brackets.

Table 2 Ex ante budgetary effects of different tax treatments of pension saving
x billion euros in NPV

	Annual investment return 5%			Annual investment return 3%		
	benchmark tax rule TTE (1)	current tax rule EET (2)	difference (1)-(2)	benchmark tax rule TTE (1)	current tax rule EET (2)	difference (1)-(2)
Period of pension capital growth: 20 years						
Tax revenue	12.8	5.6		9.9	3.8	
Fiscal subsidy current tax rule			+7.2			+6.1
(-) partial effect low senior tax rate			+3.2			+3.4
(-) partial effect deferral tax payment			+4.0			+2.7
Build-up capital	14.3	21.9	-7.6	11.5	14.9	-3.4
Period of pension capital growth: 15 years						
Tax revenue	11.3	5.1		9.2	3.8	
Fiscal subsidy current tax rule			+6.2			+5.4
(-) partial effect low senior tax rate			+2.5			+2.6
(-) partial effect deferral tax payment			+3.7			+2.8
Build-up capital	14.5	19.9	-5.4	12.3	14.9	-2.6
Period of pension capital growth: 10 years						
Tax revenue	9.7	4.6		8.4	3.8	
Fiscal subsidy current tax rule			+5.1			+4.6
(-) partial effect low senior tax rate			+1.8			+1.8
(-) partial effect deferral tax payment			+3.3			+2.8
Build-up capital	14.6	18.1	-3.5	13.1	14.9	-1.8

Explanatory note:
C_0=14,9 billion euro; τ_c=44,0 percent, τ_g=44,0 percent; τ_b=25,5 percent; n=10, 15, or 20 years; r=3 or 5 percent, and δ = 3 percent. All amounts x billion euros. Euros in net present value (NPV) so that the amounts relating to the various different years have been made comparable; a discount rate of 3 percent has been used.

Source: own calculations

Investment return and discount rate

At an annual return on the pension capital of 3 percent the tax actually paid - in terms of net present value and measured over a period of 15 years - is, when the current Dutch tax rule is applied, 3.8 billion euros and, when the benchmark rule is applied, 9.2 billion euros. The actual tax paid therefore amounts to only 41 percent of what would be owed if the benchmark rule were to be applied. In other words, application of the current tax rule for pensions and annuities gives a fiscal subsidy of 5.4 billion euros (in terms of net present value).

At a higher investment return the fiscal subsidy would increase further. In the case of an annual 5 percent return on investment, the current tax rule gives a fiscal subsidy of 6.2 billion euros.

We used a discount rate of 3 percent for the calculations. Further research showed that the result is not very sensitive to the discount rate used. The fiscal subsidy reported in Table 2 increases by a modest 0.26 to 0.39 billion euros in case a discount rate of 4 percent is used, depending on the assumed rate of return on pension capital and on the assumed length of the build-up period. The CPB Dutch Bureau of

Policy Analysis (2000) used in their study on *Ageing in the Netherlands* a discount rate of 4 percent based on the principle that bringing forward tax revenue in time should be discounted by the interest rate on government bonds. In case of a 5 percent discount rate, equal to the annual return rate on the investment in the left columns of Table 2, the fiscal subsidy increases by a fairly small 0.49 to 0.68 billion euros.

Duration

It is not known over which period of time the pension and annuity contributions paid in 2000 will be paid out as benefits. Pension capital can of course be built up over a longer period. This will increase the advantage of tax deference (interest benefit). At an investment return of 3 percent the use of the current Dutch tax rule - measured over a ten year period - 'only' gives a subsidy of 4.6 billion euros (in terms of net present value) compared to the benchmark rule. A doubling of the duration from 10 to 20 years generates a substantially higher subsidy - 4.6 versus 6.1 billion euros - due to the additional capital growth. This capital growth remains untaxed during the build-up period of the pension capital under the current tax regime. In addition, the higher annual pension benefit payments arising from this will only be taxed at a relatively low seniors rate. In other words, the fiscal subsidy on pension savings increases when annuities and pension schemes have a longer duration before they start to pay out pension benefits.

Partial effects of low senior rate and deferral of tax payment

The relatively low tax rate for seniors and the deferral of tax payment together generate the fiscal advantage associated with the current Dutch tax rule. In most simulations reported in Table 2 the partial effect of the deferral of tax payment gives more weight to the total fiscal subsidy than the lower senior rate. The share in the total fiscal subsidy of the low senior rates increases when annuities and pension schemes have a longer duration before they start to pay out pension benefits.

Build-up pension capital

The amount of build-up capital under the benchmark tax code is smaller compared to Dutch tax rule.[11] In view of the fact that pension benefits are based on the amount of pension capital, the annual return tax lowers benefits under the benchmark rule. The Dutch tax code, however, favors the build-up of pension capital, and therefore the level of benefits. This build-up advantage on pension savings increases when annuities and pension schemes have a longer duration before they start to pay out pension benefits. Moreover, at higher annual investment return rates the build-up advantage would increase further.

5. Time-series analysis 1990-2003 and tax reform

Fiscal subsidy 1990-2000

The calculations for the year 2000 show that the current Dutch tax rule means on balance a major revenue loss to the Treasury (compared to the benchmark). Structurally the fiscal subsidy on pension savings at an actual return on the pension capital of 3 percent and a duration of 15 years in net present

11 Note that the amount of pension capital as build-up in N years will always be less under the benchmark tax rule in cases where a tax rate is levied on the proceeds of the investments, i.e. for any annual return tax (τ_g>0).

$$V_{TTE,0} - V_{EET,0} = C_0 \cdot \left[\frac{(1 + r \cdot (1 - \tau_g))^N - (1 + r)^N}{(1 + \delta)^N} \right] \quad so \quad V_{TTE,0} < V_{EET,0} \quad for \quad \tau_g > 0$$

value terms comes to about 5.4 billion euros (1.34 percent GDP). At an annual investment return of 5 percent the fiscal subsidy on pension savings rises further to 6.2 billion euros (1.54 percent GDP).[12]
Figure 1 shows the estimates for all the years in the period 1990-2000 calculated in the same way as explained above for the year 2000.[13] The fiscal subsidy rises in this period by 38 percent. In the case of a 3 percent yield the fiscal subsidy rises from 0.97 to 1.34 percent of GDP; if a yield of 5 percent is used for the calculation then the fiscal benefit rises from 1.12 percent in 1990 to 1.54 percent of GDP in 2000.

Estimates fiscal subsidy for 2001 - 2003

The analysis so far refers to the situation for the year 2000. Under the new Income Tax Act 2001 accumulation of capital – if the benchmark rule would be applied – should be taxed at a lower rate than was the case in 2000. Also, the other relevant tax rates have been reduced. This has consequences for our calculations of the benchmark case. The accumulation of capital should be taxed at a lower rate, and as a consequence the new tax regime has partially brought about a decrease in the fiscal subsidy on pension savings. A special feature in the new legislation is a 30 percent tax to be levied on income from net assets, based on the assumption that a taxable return of 4 percent is made on net assets, irrespective of the actual returns. So, under the benchmark rule a 1.2 percent tax should be levied on the accumulated pension savings, irrespective of the actual returns.[14] Additional returns above 4 percent will not be taxed - if the benchmark is applied - and therefore fade away the fiscal subsidy.
On the other hand, the amount of contributions for pensions and annuities has risen sharply since 2000. Although the tax concession on pension savings can on balance only be calculated if the realization figures for the years from 2001 onwards are available, a global estimate of the tax concession on pension savings under the new fiscal regime can be made.
Figure 1 shows the estimates for the period 2001-2003, calculated in the same way as explained above for the year 2000. The (one-time) effect of lower rates under the Income Tax 2001 diminished the fiscal subsidy on pension savings, but this is counterbalanced by the trend effect of the higher contribution input for pensions in recent years. In 2003 the fiscal subsidy on pension savings under the current Dutch tax rule amount to 7.0 billion euros (1.49 percent GDP). At an annual investment return of 5 percent the amount declines to 5.5 billion euros (1.17 percent of GDP). Note that due to the tax reform in 2001 annual returns on net assets above 4 percent are not taxed if the benchmark is applied; this explains the remarkable drop in 2001 of the fiscal subsidy in case of the simulated annual return of 5 percent. See Figure 1, panel (a).

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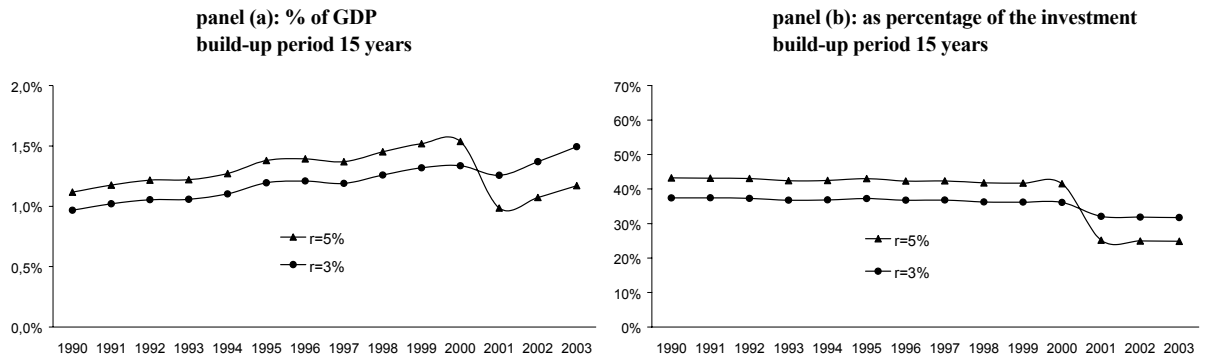
12 Yoo and de Serres (2004) also estimated the net tax cost of pension savings in the Netherlands, using the present-value approach. They find that overall cost arising from contributions made in 2000 are almost 1.2 percent of GDP (p.94), which result is very similar to ours. Earlier, Besseling and Bovenberg (1998, p. 14) analysed the budgetary cost of tax incentives to pension savings, but they used a different method of calculation. They calculate a fiscal subsidy of 12 billion guilders (5.4 billion euros). As rule of thumb they indicate that the fiscal subsidy roughly corresponds to the direct tax benefit of the premium deduction. In other words, the tax claim on the benefits payments is neutralized by *not* taxing the yield. Our calculation of the fiscal subsidy also indicate that the fiscal subsidy corresponds to the direct tax benefit of the premium deduction (5.4 respectively 6.2 billion euros against 6.6 billion euros), but that result is particularly dependent on the tax rates and the supposed yields and duration.

13 The amount of fiscal subsidy for recent years is lower compared to previous work (Caminada and Goudswaard, 2004) due to several more realistic assumptions made and due to improved data. Especially, our figures for the effective deduction rates of pension contribution are now in line with calculations of CPB Netherlands Bureau of Economic Policy Analysis (around 40 percent); see CPB (2004, p.58), CPB (2003a, p. 16), and our Annex.

14 One could argue that the effective rate is lower than 1.2 percent. A 4 percent presumptive annual return is taxed at 30 percent, however, a part of net asset is tax exempt under the new Income Tax Act 2001. Dutch CPB Netherlands Bureau of Economic Policy Analysis employs for this reason an effective rate of 0.7 percent (see Kooiman et al, 2003, p. 16). However, the exemption does not apply to pension savings. In general, we do not consider tax exemptions as part of the benchmark rule.

Figure 1 Fiscal subsidy associated with current Dutch tax rule, 1990-2003



Source: own calculations

The fiscal subsidy as a percentage of the investment is rather constant in the period 1990-2000, because both the fiscal subsidy and the contributions for pensions and annuities have risen sharply since 1990.[15] At an actual return on the pension capital of 3 percent and a duration of 15 years in net present value terms, the fiscal subsidy amounts 36 percent of the investment in the period 1992-2000; see Figure 1, panel (b). At an annual investment return of 5 percent the fiscal subsidy in the period 1990-2000 is much higher at 43 percent.

The new Income Tax Act 2001 implied a reduction in tax rates. This has also consequences for the calculations in the benchmark case. The accumulation of capital should be taxed at a lower rate in the benchmark case. As a consequence the new tax regime caused a decrease in the fiscal subsidy on pension savings (as a percentage of the investment) of applying the current Dutch tax rule. The fiscal subsidy as a percentage of the investment is now around 25 to 32 percent, depending on the annual investment return rate used.

Figure 1 shows the estimates for the period 1990-2003.

6. The no-fiscal subsidy case

Table 3 shows the simulation results of the no-fiscal subsidy case, before (2000, panel (a)) and after the tax reform (2001, panel (b)). We have calculated the level of the tax rate on pension benefits under the current Dutch tax rule (τ_b*) that would generate exactly the same amount of tax revenue compared to the benchmark rule. When this tax rate would be applied, the fiscal subsidy on pension saving would disappear.

The equivalent pension benefit tax rate is significantly higher than the actual tax rate on pension benefits (see equation 9; τ_b= 25.5 percent). For rather low annual investment return rates (3 percent), the equivalent tax rate on pension benefits is relatively high because the fiscal subsidy on pension savings is relatively high compared to the pension benefits (before tax). Moreover, for a longer build-up period, the equivalent tax rate on pension benefits is also relatively high because the fiscal subsidy on pension savings is relatively high compared to the pension benefits (before tax).

The new Tax Act 2001 has decreased the fiscal subsidy on pension savings, and has therefore reduced the equivalent tax rate on pension benefits. In all simulated cases we find a drop in the equivalent tax rate on pension benefits from 4 to 14 percentage points.

15 The pension investment rose from 2.6 percent of GDP in 1990, to 3.7 percent in 2000, up till an estimated 4.7 percent in 2003.

Table 3 Equivalent tax rate on pension benefits

	Investment return 5%				Investment return 3%			
	benchmark tax rate TTE		actual tax rate EET	equivalent tax rate EET	benchmark tax rate TTE		actual tax rate EET	equivalent tax rate EET
	τ_c	τ_g	τ_b	τ_b*	τ_c	τ_g	τ_b	τ_b*
panel (a): year 2000								
Duration 20 years: tax rates	44.0	44.0	25.5	***58.5***	44.0	44.0	25.5	***68.0***
Duration 15 years: tax rates	44.0	44.0	25.5	***56.6***	44.0	44.0	25.5	***61.6***
Duration 10 years: tax rates	44.0	44.0	25.5	***53.7***	44.0	44.0	25.5	***56.1***
panel (b): year 2001								
Duration 20 years: tax rates	41.1	30.0	25.5	***44.6***	41.1	30.0	25.5	***62.6***
Duration 15 years: tax rates	41.1	30.0	25.5	***44.3***	41.1	30.0	25.5	***57.5***
Duration 10 years: tax rates	41.1	30.0	25.5	***43.7***	41.1	30.0	25.5	***52.3***

Source: own calculations

7. Conclusion

Several OECD countries use tax incentives to encourage private pension savings. These incentives may imply a large revenue loss to the Treasury. This paper investigates the ex ante budgetary effects of a cash-flow tax regime for pension savings by full present-value calculations. We used a specified form of a comprehensive income tax system (TTE) as a benchmark. Compared to the comprehensive income tax, the cash flow tax regime implies net budgetary cost, because tax payments are deferred (and returns on accumulated funds are exempted), and because withdrawals are generally subject to lower marginal tax rates than pension contributions. With our model the ex ante budgetary cost of the current tax treatment of pension saving in countries can be quantified.

We performed an empirical analysis for the Netherlands as a typical example of a country with significant tax-favoured private retirement saving schemes. Our simulations, using Income Panel Data from Statistics Netherlands for the year 2000, show that that current Dutch tax rule – i.e. taxation on a cash-flow basis - means on balance a major loss to the Treasury, compared to a specific form of a comprehensive income tax which we consider as the benchmark. At a relatively low real return on the pension capital of 3 percent and a build up period of 15 years, the fiscal subsidy in terms of net present value comes to 1.3 percent of the GDP. At an interest return of 5 percent, the fiscal subsidy on pension saving rises to 1.5 percent of GDP.

The new Income Tax Act 2001 reduced the amount of the fiscal subsidy on pension saving due to the lower relevant tax rates, but the amount of contributions and annuities have risen sharply since 2000. For the year 2003 we estimate a fiscal subsidy of the current Dutch tax rule of 1.2 to 1.5 percent of GDP, depending on the annual investment return rate used. To present this result in another way: when the current tax rule is maintained, the tax rates on pension benefits should roughly be doubled to fade away the current fiscal subsidy on pension savings in the Netherlands.

We conclude that fiscal support for pension savings is an expensive business for the Dutch government, and it will probably become more expensive in the near future, because of increasing pension contributions. The tax subsidy on pension is one of the largest ‘tax expenditures’ which

therefore should be justified.[16] This does not necessarily imply that this tax expenditure should be abolished. Our model and material presented are tentative and do not give any answer on the question whether society would be better off in case alternative tax codes on pension saving would be applied. This would require a comprehensive economic analysis which is beyond the scope of this paper.

16 See Butare (1998) on the roles of government and markets in the case of pensions, and on market failure to justify (tax) subsidies.

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Annex: A number of features of the Dutch pension system [17]

There are three pillars of the Dutch pension system: (1) the basic old age pension scheme or AOW (OAP), (2) the supplementary pension scheme which is arranged by employers and employees, and (3) the individual build-up and/or addition to old age provision.

- The basic pension scheme provides, by way of a statutory national insurance, for a flat pension benefit for all residents at a level which is related to the level of the statutory minimum income level. Contributions for the public pensions depend on taxable income; the premium is paid only by those younger than 65 years of age. The basic pension is financed through an unfunded pay-as-you-go scheme. As the current working generation provides the contributions for the current OAP benefit payments (in the expectation that younger generations will do the same for them at a later time) the solidarity between generations plays a major role in the basic pension scheme. Nearly every OECD country has a public basic pension scheme financed as an unfunded scheme. In some countries the public PAYG system provides a minimum standard of living in old age or a means-tested benefit (the Netherlands, Ireland, United Kingdom, Denmark and Australia). Most other countries have a wage-linked arrangement.
- In the Netherlands most employees (91 percent) have on attaining the age of 65, supplementary pension insurance in addition to the OAP scheme. This supplementary pension insurance is financed through a funded system. Anyone who is a member of a pension fund is actually saving for his own pension (equivalence). Contributions to occupational pension schemes are typically shared between employers and employees. Premiums are usually levied on wage income above a certain *franchise*. Below this franchise, employees are covered by the public pension scheme (OAP). Participants usually build up their supplementary pension over a period of forty years. On retirement they receive a pension for an average of fifteen years. In European perspective, the Netherlands has, alongside the United Kingdom, Denmark and Sweden, funded a relatively large proportion of future pension claims with capital.[18] These countries seem because of this to be better prepared for an increase in the ageing population than other countries.[19] Countries such as Belgium, Germany and Italy make virtually no use of funding.

  In the Netherlands about 56 percent of the supplementary pensions in the second pillar are based on a final-pay pension scheme where the amount of the gross pension benefits depends on the gross wage at the end of the career. A so called average-pay pension scheme is seen less often (33 percent) in which the amount of the gross pension benefits depends on the average gross wage during the career.[20] The average-pay pension scheme is however gaining ground, partly as a result of the financial problems of the pension funds.

  Wage-linked pension systems dominate in most European countries ('defined benefits'). In Germany, the Netherlands, the United Kingdom and also in Japan more than 95 percent of retirees in the second pillar have a form of wage-linked pension benefit. In the United States, on the other hand, nearly half of the pensions have the features of 'defined contribution'. In this system the result is not fixed but the pension scheme determines which amount or which percentage of the wage employers and employees will deposit annually in the pension fund as a contribution. In this case therefore, the amounts to be deposited are determined. The contribution payment and the investment results obtained in later years determine how much pension capital will be available for the participants in due course. The final pension result is therefore uncertain. There are also combinations of defined benefits and defined contributions in, among other places, Belgium.
- The third pillar forms the final piece of the pension system. The third pillar of pension insurance includes voluntary pension insurance bought by individuals. Personal pensions are of the defined-contribution type and are typically supplied by life insurance companies. In the third pillar everyone has the opportunity to enter into an individual pension insurance scheme with an insurer. The payments from such insurances (annuities) may be used as a supplement to the basic pension and/or as a supplementary company pension.

Two reasons can in general be given for why the second pillar plays a relatively major role in the Dutch pension system. Firstly from the corporatist viewpoint it can be explained why in the Netherlands there is relatively often an additional collective pension agreed between the employer and the employee. Secondly it may be assumed that the strong fiscal stimulus to build up an additional pension via the second (and third) pillars has contributed to a relatively large second pillar.

The Tax Treatment of Pensions Act has been effective since 1 July 1999 and is better known as the Witteveen Framework. This Act encompasses the framework for tax treatment of the old age pension savings under the income tax. The framework assumes a maximum pension build-up of 2 percent per year in a final-pay pension scheme (2.25 percent for an average-pay pension

17 This Annex uses material from the National Pension Debate Committee (2002, p. 14-34), the Ministry of Social Affairs and Employment (2000), and Bovenberg (2003). For a very detailed comparison of pension systems in Europe please refer to the joint report of the Commission and the Council of the European Communities (2002).

18 In Sweden (90 percent) and Denmark (80 percent), and to a lesser extent the United Kingdom (48 percent), a relatively large proportion of employees participate in a pension scheme.

19 See also the report by the National Pension Debate Committee (2002).

20 Figures are from Van Ewijk and Van de Ven (2003).

scheme). A pension benefit of 70 percent of the final wage can therefore be built up over a period of 35 years. The total pension build-up has been maximized at 100 percent of the final wage. The earliest age at which the pension may begin is 60 (the so-called pivotal age). There is a franchise in the build-up which is based on 10/7 of the OAP for those who are single. A separate tax framework applies for early retirement savings.

The pension build-up in the third pillar (annuities) traditionally receives fiscal support, although the annuity regime has become less generous in recent years. Up to a ceiling, annuities benefit from the same preferential tax treatment as occupational pension savings. Persons who lack sufficient pension rights may use a tax facility to supplement it. There is usually a lack of pension rights when the pension (including the OAP) is lower than seventy percent of the final wage. The Income Tax Act 2001 has not changed this in principle, although the amounts of pension contributions which can be deducted from income have been limited. Until recently there was a basic deduction (also in the new taxation system) of 1,000 euros for annuity premiums which were *not* checked against a possible lack of pension rights. This basic deduction was already much less than the so-called first tranche in the old tax system (2,804 euros in 2000) for which there was also no check. However, with effect from 2003 the basic annuity deduction facility has been abolished and only persons with a lack in pension rights may use the fiscal facility to supplement their income. This obviously makes the implementation of the Income Tax Act with respect to retirement provisions somewhat more difficult as a lack of pension rights must be demonstrated to the tax authorities in *all* cases. Moreover, the insight of many people with respect to their pension build-up or lack of pension rights remains very patchy.

Data

Pension build-up via the second and third pillars has become very popular in a fairly short time in the Netherlands. Table A.1 contains a summary of the development of the size of the annuity contribution deduction in the period 1990-2000. We used the Dutch Income Statistics which contain extensive information on the distribution of annuity contributions across income groups.[21] This makes it possible to classify holders of annuities by tax bracket and therefore to determine the reduction in tax levies and the direct budgetary effect of the annuity contribution deduction (or in other words the revenue loss to the Treasury) in that year. To do this we multiply for each user of this deduction the relevant marginal tax rate by the deduction applied and aggregate that across the users.[22] The tax reduction is calculated on the basis of the tax regime for 1990-2000 (tax rates, tax bracket, thresholds, et cetera).

Unfortunately no figures are available on the distribution of pension contributions, because of the fact that the pension contributions are not visible on the tax return and therefore also not in the Dutch Incomes Statistics. In line with CPB Dutch Bureau of Policy Analysis (2003a, p. 16; and 2004, p. 58), we used a marginal effective tax rate for the deduction of pension contributions of 40 percent for our calculations for the years 2001-2003; for the period 1990-2000 (before the tax reform), we employ somewhat higher figures. See Table A.1.

21 The Income Statistics are from an extensive income panel survey of Statistics Netherlands, which covers 217,000 income recipients. Sample data have been combined with data from the tax- and social security administrations. As a result, the survey contains the personal distribution of incomes (pre-tax, taxable and after-tax), the distribution of tax liabilities and almost all deductions for several socio-economic groups. The panel data are now available for a number of years up to 2000.

22 Account has been taken in these calculations of the so-called threshold effect: tax payers may go into a lower tax bracket because of the use of the tax deduction. On this see Caminada and Goudswaard (1996).

Table A.1 Data and simulation results on "Budgetary costs of tax facilities for pension savings: an empirical analysis for the Netherlands", 1990-2003

	1990	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*
DATA														
GDP x billion euro	246.2	256.9	263.9	278.7	290.3	302.2	315.1	333.7	354.2	374.1	402.6	429.2	445.5	470.0
pension and annuity contributions x billion euro														
pensions	4.9	5.4	6.2	6.8	7.2	7.7	7.9	8.1	9.2	10.1	10.9	12.8	15.6	18.8
annuities	1.5	1.6	1.3	1.2	1.5	2.0	2.4	2.7	3.1	3.5	4.0	4.0	3.6	3.3
total (= pension investment C_0)	6.4	7.0	7.5	8.0	8.7	9.7	10.4	10.8	12.3	13.6	14.9	16.8	19.2	22.1
marginal effective tax rate deductions for:														
Pensions	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	40.0	40.0	40.0
Annuities	51.7	51.6	53.7	53.0	52.0	52.0	49.4	49.0	47.5	47.1	46.7	44.7	44.8	45.3
total (weighted average)	45.0	45.0	44.9	44.5	44.6	44.9	44.5	44.5	44.1	44.1	44.0	41.1	40.9	40.8
INPUT SIMULATION														
pension investment (C_0)	6.4	7.0	7.5	8.0	8.7	9.7	10.4	10.8	12.3	13.6	14.9	16.8	19.2	22.1
tax on the investment (τ_c)	45.0	45.0	44.9	44.5	44.6	44.9	44.5	44.5	44.1	44.1	44.0	41.1	40.9	40.8
annual return tax (τ_g)	45.0	45.0	44.9	44.5	44.6	44.9	44.5	44.5	44.1	44.1	44.0	30.0	30.0	30.0
tax on pension benefits (τ_b)	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5
build-up period (n = 10, 15 or 20)	15	15	15	15	15	15	15	15	15	15	15	15	15	15
retirement age	65	65	65	65	65	65	65	65	65	65	65	65	65	65
average age of death	77	77	77	77	77	77	77	77	77	77	77	77	77	77
number of pension payments periods	12	12	12	12	12	12	12	12	12	12	12	12	12	12
SIMULATION RESULTS														
pension investment. % of GDP	2.58%	2.72%	2.83%	2.88%	2.99%	3.21%	3.29%	3.23%	3.47%	3.64%	3.70%	3.91%	4.30%	4.71%
budgetary effect of deductions														
- x billion euro	2.9	3.1	3.3	3.6	3.9	4.3	4.6	4.8	5.4	6.0	6.6	6.9	7.8	9.0
- as % GDP	1.16%	1.23%	1.27%	1.28%	1.33%	1.44%	1.46%	1.44%	1.53%	1.60%	1.63%	1.61%	1.76%	1.92%
fiscal subsidy on pension saving (r=3%)														
- x billion euro	2.4	2.6	2.8	3.0	3.2	3.6	3.8	4.0	4.5	4.9	5.4	5.4	6.1	7.0
- as % GDP	0.97%	1.02%	1.05%	1.06%	1.10%	1.19%	1.21%	1.19%	1.26%	1.32%	1.34%	1.26%	1.37%	1.49%
fiscal subsidy on pension saving (r=5%)														
- x billion euro	2.8	3.0	3.2	3.4	3.7	4.2	4.4	4.6	5.1	5.7	6.2	4.2	4.8	5.5
- as % GDP	1.12%	1.18%	1.22%	1.22%	1.27%	1.38%	1.39%	1.37%	1.45%	1.52%	1.54%	0.99%	1.07%	1.17%

Explanatory note and sources:

- Pension contributions 1990-2000: Pension & Insurance Supervisory Board (2003). The figures relate to the supplementary old age pension in the second pillar in as far as a pension fund is an intermediary. Annuity contributions 1990-2000: Dutch Income Statistics, Statline 1990-2000 (CBS IPO).
- Estimates 2001, 2002, and 2003: own calculations on the basis of realized figures for 2000, a lower expected annuity contribution deduction and higher pension contribution in accordance with the CEP 2003 (employer's part) of CPB Netherlands Bureau of Economic Policy Analysis (2003b). To determine the marginal effective rate for the contributions calculations were made with the rates and tax brackets for 2001, 2002 and 2003.
- In all simulations a build-up period of 15 years and a discount rate of 3 percent has been used to calculated net present values (NPV).

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