

Tunga Kantarci, Ingrid Smeets and Arthur van Soest
**Implications of Full and Partial
Retirement for Replacement Rates in a
Defined Benefit System**

Implications of Full and Partial Retirement for Replacement Rates in a Defined Benefit System[☆]

Tunga Kantarcı

Tilburg University, Dept. of Econometrics, PO Box 90153, 5000 LE Tilburg, Netherlands

Ingrid Smeets

Algemene Pensioen Groep, PO Box 4919, 6401 JS Heerlen, Netherlands

Arthur van Soest

Netspar & Tilburg University, Dept. of Econometrics, PO Box 90153, 5000 LE Tilburg, Netherlands

Abstract

In this paper we use the actual rules and formulas of an occupational pension fund, the state pension fund and the tax system in the Netherlands to calculate net replacement rates at each age from 60 to 70 in full and partial retirement scenarios. We then vary the parameters of the pension formulas to study the sensitivity of the replacement rates. We also analyze the implications of late full retirement and partial retirement for the occupational and state pension entitlements. We pay particular attention to the retirement scenarios that are relevant for the current policy measures, aimed at making people work longer. We find that in the full retirement scenarios the replacement rates depend substantially on the underlying parameters of the pension system and on worker characteristics. In the partial retirement scenarios these changes are much less substantial. We also find that partial retirement results in a much smoother income path and encourages employees to defer their pension claims beyond age 65.

Keywords: older workers, pensions, gradual retirement

JEL classification codes: D31, G23, H55, J14, J22, J26

1. Introduction

Labor force participation and labor supply of older workers is at the top of the policy agenda in many OECD countries. Early retirement programmes and other exit routes that lead to early withdrawal from the labor market imply a burden for the macro-economy, magnified by the aging of the population (see, for example, Latulippe and Turner (2000) and Belloni et al. (2006)). In many countries, the debate focuses not only on abolishing very generous early retirement schemes, but more generally on increasing flexibility and allowing individuals to choose an optimal labor market trajectory among a set of actuarially fair options. This implies removing mandatory retirement, getting rid of impediments for working after a given standard retirement age such as issues with health or disability insurance, and removing obstacles for partial retirement (also called gradual or phased retirement), such as financial disincentives in the pension system or the tax rules. Since the literature suggests that financial incentives play a large role for retirement decisions (see, for example, Gruber and Wise (2004)), this may

have important consequences for labor force participation and hours worked by older age groups.

Partial retirement in particular has the potential to improve the lifetime utility of older workers by smoothing the transition for a working life to a life with very different activities, while at the same time increasing labor supply and the sustainability of the pension system if it raises total hours worked. Several studies have analyzed the impediments for partial retirement in the United States (Chen and Scott, 2003; Brown and Schieber, 2003; Hurd, 1996; Hutchens, 2010). In Europe, several studies have compared incidence of partial retirement across countries and have analyzed specific programmes to stimulate partial retirement in various countries (see, for example, Delsen and Reday-Mulvey (1996), Reday-Mulvey (2000), Wadensjö (2006)).

In this paper we analyze the financial incentives and disincentives for early and late full and partial retirement for Dutch employees entitled to an occupational pension from the largest pension fund in the Netherlands. After substantial reforms in the past 20 years, this pension fund now aims at maximum retirement flexibility with actuarially fair trade offs: the employee can choose how much to work at an older age, but pays a fair price for retiring early or working fewer hours and is rewarded for working longer. While the occupational pension system is actuarially fair, we analyze the links to the state pension system

[☆]This research is supported by a grant from the Network for Studies on Pensions, Aging and Retirement (Netspar).

Email addresses: kantarci@uvt.nl (Tunga Kantarcı),
ingrid.smeets@apg.nl (Ingrid Smeets), avas@uvt.nl (Arthur van Soest)

and several features of the tax, benefits, and income or employment status related subsidies that break the actuarial fairness from the point of view of the employee considering net replacement rates. Our main goal is therefore to show to which extent a flexible occupational pension system that seems to put the incentives right *ex ante* can still have actuarially unfair features reducing labor force participation and labor supply due to taxes and benefits that are inherently linked to the occupational pension.

In the Netherlands, all retirees who never lived abroad receive the full state pension and former employees also receive an occupational pension of the Defined Benefit type (Alessie and Kapteyn, 2001). This fairly homogeneous pension system allows a systematic analysis of retirement income across a large population of retirees with otherwise heterogeneous characteristics. We consider a hypothetical employee with given earnings level, entitled to a full state pension, and participating in the biggest occupational pension scheme in the Netherlands. We calculate this worker's future pension entitlements using the actual rules and formulas of these schemes. We also calculate net work income and state and occupational pension entitlements using the currently effective Dutch income tax rules. These amounts are used to calculate the net replacement rate which measures the financial well-being of the employee in retirement and the effectiveness of the pension system to replace earnings. We then determine the sensitivity of the net replacement rate to changes in the parameters of the underlying pension system and the labor market characteristics of the employee to analyze how the financial well-being of the retiree is affected by the changes in these parameters.

We compute net pension entitlements and replacement rates in early and late retirement scenarios and differentiate between full and partial retirement. Early retirement schemes were introduced in the 1980s and are still common in the Netherlands (Euwals et al., 2010). We consider cases of early receipt of an occupational pension, with pension amounts actuarially reduced for early receipt. Later retirement is expected to become more prevalent with the increase in the state pension age and the phasing out of early retirement incentives. We consider cases of delayed receipt of an occupational pension, with pension amounts adjusted in an actuarially fair manner. We also consider delaying the state pension because the Dutch government is considering to allow delaying part or the full amount of the state pension beyond age 65, for about a six percent increase of the state pension for each year of delay. We analyze the financial impact of delaying the state pension for the beneficiary, and on the aggregate level for the public finances.

Besides early or late full retirement, we consider partial retirement at varying duration. Partial retirement is relevant for several reasons. First, the plans to raise the state pension age to 67 aim to make people work longer, while currently many employees in the Netherlands are observed to retire much earlier than age 65 (OECD, 2006). Partial retirement may help to keep people employed between the effective and statutory ages of retirement and may decrease the number of years full pension rights are claimed. Second, elderly Dutch employees express substantial interest in working part-time before retiring fully but

appear to be restricted by labor market rigidities (Kantarci and van Soest, 2008). Third, partial retirement provides a smoother transition into full retirement, in terms of income but mainly also in terms of daily activities, social contacts, etc. Income smoothing can be achieved because employees can supplement their retirement income with part-time earnings. Partial retirement may even be beneficial to health, since working part-time instead of not at all may help to limit the loss of cognitive skills, which is recently shown to arise with full retirement (Rohwedder and Willis, 2010). In reference to partial retirement, we analyze cases where employees claim part of the occupational and state pensions they are entitled to and defer the other part until their full retirement age. The partial retirement scenarios we consider may be attractive alternatives to the traditional full retirement scenarios.

Studies particularly close in spirit to our study are the following. Forman and Scahill (2003, 2004) calculate pension rights in full and partial retirement scenarios in a final average pay defined benefit system. Munzenmaier and Paciero (2002) and Brown et al. (2005) calculate net replacement rates in full and partial retirement scenarios using observed pension entitlements in defined contribution and defined benefit plans. Fouarge and Huynen (2005) and Euwals et al. (2010) calculate gross replacement rates for full retirement at early and normal retirement ages using observed data in the Netherlands. However, these studies do not calculate pension rights or replacement rates beyond the statutory retirement age and provide limited information on how the pension rights or the replacement rates change with the underlying rules of the pension system and with worker characteristics. The full and partial retirement scenarios are also often simplified. As a result, in the given pension systems in these studies, it is difficult to identify an employee's opportunity set and financial well-being in different retirement scenarios.

The main results of this paper are the following. Analysis of the occupational pension shows that partial retirement around age 65 provides an actuarially neutral alternative to full retirement at age 65. Analysis of the state pension shows that the financial gain for the individual when the state pension is deferred beyond age 65 is rather limited. The principal results of the replacement rate analysis are the following. First, partial retirement instead of full retirement results in a much smoother income path before age 65 and encourages employees to defer their pension rights beyond age 65. Second, replacement rates differ substantially across employees with different earnings levels in the cases of early and late full retirement, and this difference is much less substantial in the case of partial retirement. The replacement rates also change substantially with respect to service length, domestic situation, and the occupational pension accrual rate. Third, the government's current plan of increasing the retirement age to 67 allows for a reduction of about 25% in the current accrual rate of occupational pension rights while the financial well-being of a retiree at age 67 remains the same as that of a retiree at age 65 if the retirement age is not increased.

The remainder of the paper is structured as follows. Section 2 introduces the pension system and Section 3 introduces the

tax system in the Netherlands. Section 4 analyzes the occupational pension income and Section 5 analyzes the state pension income. Section 6 calculates net replacement rates and analyzes them for changing parameters of the pension system. Section 7 concludes.

2. The Dutch pension system

The retirement income in the Netherlands stands on three pillars. The first pillar is the state pension, the second pillar is the mandatory occupational pension, and the third pillar is voluntary individual savings. We do not consider the individual savings, because its share in retirement income is much smaller but also considerably more heterogeneous across individuals than the other two main pillars (Alessie et al., 1997). Our analysis is therefore based upon the first two pillars. In Sections 2.1 and 2.2 below, we describe the occupational and state pension schemes and how they are implemented in selected retirement scenarios. Table 3 shows one such retirement scenario. In the note to the table we specify the parameters of the occupational pension scheme, the state pension scheme, and the labor market behavior of a hypothetical employee. In the table we present a time line that shows the ages at which the employee is working or retired. Below the time line we show, for the corresponding ages, the amounts of occupational and state pensions that the employee is entitled to, as well as the amount of earnings.¹ The amounts presented in the table depend, among others, on the parameters shown in the note to the table. In the table we also present the amounts of the tax and tax credits and the calculation of the net replacement rates, explained in later sections.

2.1. An occupational pension scheme

The majority of the occupational pensions in the Netherlands are of the defined benefit type. We base our analysis on the defined benefit scheme of the Algemeen Burgerlijk Pensioenfonds (ABP), the biggest pension fund in the Netherlands.² ABP is an industry-wide pension fund covering employees in the government and education sectors. The scheme is funded so that the pensions are financed from the premiums of the participants paid in the past and from the returns on the investment of these premiums. These premiums, for a period of one year, are calculated according to the formula:

$$FTE_t * PR_i * (PI_t - SPO_{t,i}). \quad (1)$$

The full-time equivalent (FTE) is the ratio of the actual number of hours of paid work to the number of working hours in a full-time job. In the equation, FTE determines the fraction

¹In the tables, we abbreviate occupational pension as OP, state pension as SP and health care insurance as HI.

²Besides the prevalence of defined benefit schemes in the Netherlands, our choice of the defined benefit system for the analysis of retirement income is not arbitrary but one of a necessity because in the alternative defined contribution system the pension entitlements vary across individuals with respect to their idiosyncratic saving patterns which makes it difficult to analyze retirement income in full and partial retirement scenarios at different ages that are representative for one population or another.

of the premium paid in the corresponding work year at age t . The premium rate (PR) is the contribution rate. It is shared between employee and employer and specific to the type of the premium (i), as shown in Table 1. Pensionable income (PI) is the amount of annual gross income on a full-time basis, including holiday allowance and end-of-year bonus.³ For a part-time worker, it is obtained by dividing the actual earnings with the FTE of the part-time worker. The state pension offset (SPO) is determined by the pension fund but it closely follows the state pension benefit which is equal to the net minimum wage. It is specific to the type of the premium (i) as shown in Table 1. Employees pay premiums for their occupational pension over the so called premium base ($PI_t - SPO_{t,i}$). PI is reduced by the SPO because employees also pay premiums for their state pension, although the premium base for the state pension premiums is not the SPO; see Section 2.2.

Unlike in a defined contribution plan, the participant does not accumulate pension rights according to the premiums he pays and the returns generated on these premiums, but according to the formula:

$$PA_{65}^d = \sum_{t=25}^{64} FTE_t * AR_t * (PI_t - SPO_{t,i}). \quad (2)$$

The formula shows the accumulation of pension rights during an assumed period from age 25 to 64. The accumulated pension rights are paid as an annuity as of age 65 when the beneficiary retires. FTE is as defined above. The accrual rate (AR) is the rate at which the pension rights build up. The current rate is 2.05% and we assume that it does not change throughout the period.⁴ Pension rights accrue over the premium base ($PI_t - SPO_{t,i}$). In our analysis we assume that the gross income PI_t is constant throughout the period when pension rights are being accumulated. This is a stylized case since in reality the age profile of gross income is usually not flat over the life cycle. SPO is roughly equal to the net minimum wage and its current level is €10,500.⁵

The presented scheme is an average salary scheme because the salary of each year contributes to the eventual amount of the

³In fact, the annual gross income will slightly differ from the pensionable income. This is because employers increase the annual gross income by a certain percentage, but up to a maximum amount of €791.85, to compensate the employee for a certain type of transfer fee. To prevent this increase in gross income to increase the pension premiums employees pay, employers reduce the gross income by the amount with which it is raised when calculating the pensionable income. Our calculation of the pensionable income accounts for this adjustment. In particular, we assume below that the employee earns an annual gross income of €30,000 which is adjusted to a pensionable income of €29,441.

⁴In fact, the accrual rate changed only with specific policy changes – it increased from 1.75% to 2.05% when ABP changed the final salary scheme to the career average scheme in 2004. Moreover, it depends on the state pension offset SPO. If SPO is increased (due to, for example, an increase in the minimum wage), the accrual rate must be reduced. For simplicity, we do not consider such changes.

⁵All pension and tax rules and parameter values are for year 2010 and assumed to remain unchanged thereafter. Certain pension and tax rules are different for cohorts born before 1950s. We assume the cohort is younger. None of the parameters of the analysis depends on gender. For convenience, we refer the employee as ‘he’ unless we need to be specific about gender.

pension annuity in Equation (2). There are three specific issues regarding the pension annuity in Equation (2) that need to be mentioned. First, the pension annuity depends on the domestic situation (d). If the participant is not single when he first claims his pension rights, Equation (2) gives his actual pension amount, and the participant's spouse is entitled to a survivor pension when the participant dies. If the partner is single when he first claims, the pension amount in Equation (2) is increased by 16.8%. Second, the accrual of pension rights in Equation (2) is increased by a supplementary amount of €40.50 in a year if the employee earns in that year a gross income that is less than €28,031, a threshold determined by ABP. The threshold income and the amount of the supplementary pension rights depend on the full-time equivalent of the employee (Stichting Pensioenfondsen ABP, 2010b). Our calculations account for this supplement. Third, every year ABP aims to increase the pension annuity in accordance with the average increase in wages in the government and education sectors. The increase in the pension annuity can be the same, lower, or higher than the increase in the average wage, depending on the financial situation of the pension fund. This is called conditional indexation. For example, on January 1, 2008, ABP has increased the pension rights by 2.05%, according to the average wage increase in that year, but also by an additional 1.96%, to compensate for the lack of increase in previous years, since its financial situation improved in 2008. Table 2 documents the increases in pension rights, average wages and general prices from 2005 until 2009. In our analysis we assume no increase in wages, and hence no indexation. This implies that our analysis can be interpreted as an analysis of real wages under the assumptions of full indexation and equality of wage and price inflation.

Table 3 demonstrates a retirement scenario where we calculate the prospective pension entitlement of a hypothetical employee who starts to participate in the described pension scheme today at age 25 and works full-time (staying in the same pension scheme) without interruptions until full retirement at age 65. His PI is €30,000, which is roughly the average gross income in the Netherlands. The employee builds up €388 every year which amounts to a gross occupational pension annuity of €15,531 at age 65, as shown in the table. We denote this annuity as PA_{65}^d . The lower panel of the table shows the premiums paid to the pension fund according to Equation (1), which amount to €1,927 per year.

Table 4 demonstrates a second retirement scenario where the hypothetical employee decides to continue to work full-time ($FTE = 1$) until age 70, and also defers his claim of pension rights till age 70. For his pension annuity at age 70, this has the following consequences. First, the pension annuity that is deferred at age 65 will be paid as of age 70 with an increased amount due to the actuarial adjustment at age 70. The amount of the annuity that is deferred is determined according to the formula:

$$FTE_{65} * PA_{65}^d. \quad (3)$$

The first factor determines the share of the pension annuity deferred at age 65. The fiscal regulation requires that the fraction

of the pension that the employee defers is equal to at least the fraction of the work time that the employee works. In our case, the employee continues to work full-time at age 65 so the FTE must be equal to 1. The second factor is the pension annuity at age 65 which is given by Equation (2). The amount of the actuarial increase is determined according to the formula:

$$FTE_{65} * PA_{65}^d * (AF_{70} - 1). \quad (4)$$

The third factor is the actuarial adjustment due to the late claim of pension rights: pension rights are actuarially adjusted in case they are claimed before or after the official retirement age of 65 through the actuarial factor (AF) which depends on mortality rates and a certain interest rate. Table 8 shows the full set of actuarial factors for all retirement ages. The actuarial factor for age 70 is equal to 1.461, increasing the deferred pension in our example by €7,160.

Second, the pension annuity at age 70 will increase due to the additional rights accumulated from age 65 until age 69 and due to the actuarial adjustment of these rights at age 70. That is, the pension rights accumulate, as in Equation (2), according to the formula:

$$PA_{65-69}^d = \sum_{t=65}^{69} FTE_t * AR_t * (PI_t - SPO_t). \quad (5)$$

These pension rights are then actuarially adjusted by the actuarial factor corresponding to the age when these rights are claimed, as in Equation (4):

$$PA_{65-69}^d * (AF_{70} - 1). \quad (6)$$

In our example, the accumulated pension rights between ages 65 and 69 together with the actuarial adjustment to age 70 amount to €2,836. The total amount of the pension annuity at age 70 is equal to €25,528. We denote this annuity as PA_{70}^d . The fiscal regulation requires that the accrued pension rights do not exceed the pensionable income. The pension fund is required to pay out the pension rights once they reach the level of the pensionable income. Our calculations take into account this fiscal limit.

Table 5 demonstrates a third retirement scenario where our employee retires and claims his pension at age 62. The pension annuity at age 62 is determined according to Equation (2) but the pension rights accumulate from age 25 to 61. We denote this annuity as PA_{62}^d . Claiming the pension annuity early has the consequence that it will be decreased due to the actuarial adjustment at age 62. The amount of the decrease is determined according to the formula:

$$PA_{62}^d * (AF_{62} - 1). \quad (7)$$

The actuarial adjustment factor AF_{62} at age 62 is equal to 0.819 according to Table 8 implying that in our example the pension annuity is decreased by €2,600.

Table 6 demonstrates a scenario where the employee retires partially at age 65 and fully at age 70, working half-time ($FTE = 0.5$) from age 65 until age 70. We assume that he claims

half of his pension rights at age 65 and defers the other half until age 70. In fact, the fiscal regulation requires that the fraction of the pension that the employee claims is equal to at most the fraction of the work time that the employee retires. Therefore, our employee could claim less of his pension rights but not more than half. For his pension annuity at age 70, this has the following consequences. First, the share of the pension annuity claimed at age 65 will stay the same for the remaining lifetime, without actuarial adjustment (since $AF_{65} = 1$), giving a pension annuity of €7,766. Second, the share of the pension annuity that is deferred at age 65 will be paid as of age 70 with an increased amount due to the actuarial adjustment at age 70. The share of the pension annuity that is deferred (€7,766) is determined in a similar manner as in Equation (3) but the FTE is now equal to 0.5. The amount of the actuarial increase is determined in a similar manner as in Equation (4). The actuarial revaluation increases the deferred pension by €3,580. Third, the pension annuity at age 70 will increase due to the additional rights accumulated during partial retirement and due to the actuarial adjustment of these rights at age 70. The accrual of rights is determined in a similar manner as in Equation (5) but the FTE drops to 0.5. The actuarial increase is determined in a similar manner as in Equation (6). The accumulated pension rights between ages 65 and 69 together with the actuarial adjustment at age 70 amount to €1,418. The total amount of the pension annuity at age 70 is equal to €20,529.

It is possible to trade off pension rights over the (partial) retirement years. According to the rules of ABP, if the pension annuity PA_t is increased or decreased by an amount PT from the (partial) retirement age t until age $t + n$, then PA_t will be decreased or increased for the remaining lifetime by the amount

$$PT * PTF_{t,t+n} \quad (8)$$

at age $t + n$ so that the pension trade-off is actuarially neutral. The actuarial factor $PTF_{t,t+n}$ is prescribed by ABP and depends on the ages t and $t + n$. Table 9 documents the actuarial factors for various age combinations t and $t + n$. For example, consider the retirement scenario in Table 6 where the employee partially retires at age 65 and starts to receive pension rights of €7,766 every year. Table 7 demonstrates an alternative scenario where the employee increases his pension rights by 20% from age 65 until age 70, implying a reduction of by 9.2% at age 70 for the remaining life time (where 9.2% is calculated as $20% * 0.461$ according to Equation (8)). This trade-off effectively supplements the reduced earnings during partial retirement, but also smooths out the net replacement rates and hence the income path after age 65. However, the fiscal law imposes limits on the amounts that can be traded off: to avoid that the employee cashes an excessive amount in a few years, the ratio of the annuity that is increased at the time of retirement, $PA_t + PT$, to the annuity that is decreased subsequently, $PA_t - PT * PTF_{t,t+n}$, should be smaller than or equal to 100/75. Likewise, the ratio of the annuity that is decreased at the time of retirement, $PA_t - PT$, to the annuity that is increased subsequently, $PA_t + PT * PTF_{t,t+n}$, should be bigger than or equal to 75/100.

2.2. The state pension scheme

The General Old Age Pensions Act (AOW) is the state pension scheme in the Netherlands, paying a flat-rate benefit to people of 65 years and older, independent of earnings, income, or premiums paid. The scheme is unfunded and based on the pay-as-you-go principle so that current pensions are financed from the current premiums paid by workers. The premiums are paid as a percentage of work income through the income tax in the name of national insurance premiums; see Section 3 below. However, employees do not accumulate pension rights according to the premiums they pay but according to the formula:

$$PA_{65}^d = \sum_{t=15}^{64} AR_t * PB_t^d. \quad (9)$$

Everybody who lives in the Netherlands is insured under the scheme. The maximum period of insurance is 50 years covering the period between a person's 15th and 65th birthdays. For those who do not live in the Netherlands all this time, the benefit is adjusted proportionally. The current accrual rate (AR) is 2% per year. The pension base (PB) is determined by the government according to the net minimum wage. Its amount depends on the domestic situation (d) of the retiree which will be simplified in 2015 into three categories: single without a child (€13,310), single with a child under 18 years old (€16,766), and sharing a household with a partner (€9,282). Table 3 demonstrates that our hypothetical employee, whom we assume is living with a partner, is building up €186 every year for a period of 50 years, leading to an annuity of €9,282 paid as of age 65.

In 2008, the Dutch government put forward a draft law to promote employment after age 65 and to offset the financial effects of aging (Ministerie van Sociale Zaken en Werkgelegenheid, 2008). The law allows an employee to defer part or all of his state pension rights for a maximum of five years. These rights are then actuarially increased at the time of claim. However, it is not possible to accrue additional rights during the deferral period. Table 6 shows an example where someone claims half of his state pension rights at age 65 and defers the other half until age 70. For his pension annuity at age 70, this has the following consequences. First, the share of the pension annuity claimed at age 65 will stay the same for the remaining lifetime. Second, the share of the pension annuity that is deferred at age 65 will be paid as of age 70 with an increased amount due to the actuarial adjustment at age 70. The amount of the annuity that is deferred is determined according to the formula:

$$FTE_{65} * PA_{65}^d. \quad (10)$$

FTE is 0.5 in our example. The first factor determines the deferred share of the pension annuity at age 65. The second factor is the pension annuity which is defined by Equation (9). The amount of the actuarial increase is determined according to the formula:

$$FTE_{65} * PA_{65}^d * (AF_{65+NYD} - 1). \quad (11)$$

The third factor is the actuarial adjustment due to later claim-

ing. The adjustment is made through the actuarial factor which depends on mortality rates. In particular, AF_{65+NYD} is defined as $LE_{65}/(LE_{65} - NYD)$. LE is the average of the life expectancies of men and women at age 65 and it is equal to 19.6 years in 2010 (according to Statistics Netherlands). The number of years of delay (NYD) is five in our example. Table 8 shows the actuarial factors for other possible ages of claiming. The actuarial revaluation increases the deferred state pension by €1,587. A similar calculation applies in Table 4 where all pension rights are deferred until age 70.

Equation (11) resembles Equation (4). However, note that the actuarial increase due to deferral of pension rights beyond age 65 is lower in the state pension scheme than in the occupational pension scheme, since the actuarial factors are lower (see Table 8). This is due to the fact that the actuarial factors of the state pension scheme are driven by mortality rates only, whereas those of the occupational pension scheme are driven by the mortality rates and a certain interest rate. Section 5 will discuss the implications of this difference for the state pension rights.

With an assumed gross income and the calculated occupational and state pension benefits, we can compute the gross replacement rates for the type of retirement scenarios presented in Tables 3-7. For example, Table 3 shows that the occupational and the state pension benefits together replace 83% of the full-time work income. Since the income tax rate in the Netherlands is substantially lower after age 65, this does not immediately translate into how much the pension benefits replace previous earnings after the tax is accounted for. This is the topic of the next section.

3. The Dutch tax system

Every person who lives in the Netherlands and has some source of income is subject to the income tax. Besides, every person has to buy health insurance. The lower panel of Table 3 shows the calculation of income after tax and health insurance payments, which we explain here in four steps. First, we determine the basis for wage tax and national insurance premiums according to Table 10. In particular, we first determine gross income, including (where applicable) work income, occupational pension benefits, and state pension benefit.⁶ We consider income on an annual basis, including holiday allowance, end-of-year bonus, etc. We then deduct the pension premiums paid to the occupational pension scheme, as calculated in Section 2.1, since these premiums are tax deductible. Because we assume that there are no tax deductible savings, wage payments in kind, or claims for future income, this gives the basis for the employee insurance premiums. This is also our basis for income-related Health Insurance premiums because as of 2009 employees do not pay the Unemployment Insurance premium and we assume no savings or private car use. Finally, the

⁶For income tax purposes there are three types of taxable income: income from (current or past) employment and home ownership, income from a substantial interest and income from savings and investments. We consider the former only.

income-related Health Insurance premium is added to the basis for income-related Health Insurance premiums because the employer fully compensates the employee for this premium which is therefore treated as taxable income. This gives the basis for wage tax and national insurance contributions.

The Health Insurance premiums are determined as follows. Every income earner or pension receiver has to pay an income-related premium to the tax office for the state-controlled mandatory health insurance according to the formula:

$$PR_i * (GI_{it} - PP_t). \quad (12)$$

The premium rate (PR) is specific to the type of the premium (i) as documented in Table 11. The second term is the basis for the premiums as defined in Table 10. Depending on the type of the premium, gross income (GI) is either the income from full or part-time work, in which case the income is reduced by the amount of the pension premiums (PP), or it is the state or the occupational pension benefit, in which case PP is 0. The insured pays premiums over each source of income. The benefit agencies do not compensate, but the employer will fully compensate the insured for the premiums paid on the work income. This compensation is added to taxable income as explained above. Besides the health insurance from the state, everyone has to buy basic health insurance from a private insurer. A flat-rate health insurance premium is paid to the insurer. The premiums for a person paying for himself or for himself and his partner are presented in Table 11.⁷ The tax office will compensate the insured for the premiums paid if total income is lower than some threshold. The amount of the compensation depends on total gross income following the rules shown in Table 12. Table 3 shows the amount of each health insurance premium and the corresponding compensation for the employee we are considering.

Second, given the basis for wage tax and national insurance premiums, the amount of tax and national insurance premiums is determined according to the income related progressive tax brackets in Table 13.⁸ For example, the tax basis amount of €30,053 in Table 3 is taxed as $18,218 * 33.45\% + (30,053 - 18,218) * 41.95\%$ which amounts to €11,059. Note that the tax rates decrease after age 65, for the first two tax brackets, solely due to the absence of the old age pension insurance contribution, and they increase, through the four tax brackets, solely due to the increase in marginal income tax rates. Hence, retirees with low income have the lowest income tax as a fraction of their income.

Third, we calculate the tax credits, where applicable, to find the eventual amount of the tax to be paid. Table 14 presents the tax credits and their respective rules. Some of them provide a flat-rate amount while others are income related, and some of them depend on the domestic situation. The amount of a tax credit is limited by the amount of tax paid. The basis over

⁷In our scenarios we assume that, unless he or she is single, our employee is the breadwinner in the household and therefore pays health insurance premiums also for the partner.

⁸For convenience we will use the term “tax (rate)” to refer to the sum of tax and national insurance premiums.

which the credits are calculated differ. For example, Table 3 shows that our employee receives the work bonus as of age 62 until he retires at age 65. The work bonus amounts to €1,467 at age 63 $((30,000 - 9,042) * 7\%)$.

Finally, given the pension premiums, taxes, tax credits, health insurance premiums and the health insurance premium compensations calculated above, the net work income and retirement income are calculated according to Table 15. Table 3 presents this calculation for our hypothetical employee who retires at age 65. In the following sections, we discuss the implications of full and partial retirement for the occupational pension rights, state pension rights, and the replacement rates given the described pension and tax system.

4. Occupational pension income analysis

In the case of full retirement, early and late claiming of pension rights has the following implications. As we demonstrated in Section 2.1, for claims later than at age 65, the pension annuity increases by the amount given in Equation (4). In particular, since the actuarial factors for ages later than 65 in Table 8 are higher than one, the pension annuity is actuarially increased by the third factor in that equation. The annuity also increases due to the additional rights accrued after age 65 according to Equation (6). Similarly the pension annuity decreases for claims earlier than at age 65. The total amount of the gain from the actuarial increase or that of the loss from the actuarial decrease depends on the total number of years the beneficiary claims pension rights.

In the case of partial retirement, the pension annuity decreases and increases, in the same manner as in the full retirement case, if partial retirement takes place, respectively, before or after age 65. The annuity is actuarially adjusted at two instances, first at the beginning and then at the end of partial retirement, as shown in Table 6. If partial retirement starts before age 65 and ends after age 65, the annuity is actuarially decreased when it is claimed the first time, according to Equation (7), and it is actuarially increased when it is claimed the second time, according to Equation (4). If the actuarial losses and gains cancel out, partial retirement can constitute a costless substitute to full retirement at age 65. A beneficiary might then prefer partial retirement with the advantage that it provides a smooth transition into full retirement. Forman and Scahill (2003, 2004) demonstrate a similar way of achieving actuarial neutrality in partial retirement in a final average pay defined benefit system and argue that actuarial neutrality is essential to avoid an actuarial gain or loss as a result of paying benefits prior to full retirement so that the employee and the employer can agree on a partial retirement arrangement.

In Section 2.1, we discussed that a beneficiary can trade-off occupational pension rights over the (partial) retirement years. For example, he can receive an increased pension for several years at the expense of a lower pension later, to supplement his reduced pension in the case of early retirement or partial retirement. The lifetime financial impact of this trade-off depends on the total number of years the beneficiary claims pension rights. For example, in the case of an increased pension in exchange

for a lower pension later, the total loss will exceed the total gain if the period associated with the lower pension is long enough.

5. State pension income analysis

In this section, we discuss two issues regarding the proposed scheme on deferring the state pension at age 65. The first issue is the financial impact of deferring the state pension for the beneficiary, and on the aggregate level for the government. The framework we have built for the retirement scenarios in Tables 3-6 allows us to quantify this impact. For a beneficiary, we determine the lifetime financial gain or loss from deferring the state pension as in the following example. Between ages 65 and 70, where the deferral period is five years, the beneficiary loses from not receiving the state pension, but may gain from not paying tax on the state pension, from receiving the elderly person's tax credit for decreased income, from not paying the income-related health insurance premium on the state pension, and from receiving the flat-rate health insurance premium compensation for decreased income. After age 70, where we assume that the beneficiary lives 13.5 years, which is the life expectancy for men at age 70 in the Netherlands, the beneficiary gains from receiving increased state pension because of the actuarial increase (see Table 8), but may lose from paying tax on the increased state pension, from not receiving the elderly person's tax credit for increased income, from paying the income-related health insurance premium on the increased pension, and from not receiving the flat-rate health insurance premium compensation for increased income.

Among these listed sources of gains and losses, the amounts of income tax, the elderly person's tax credit and the flat-rate health insurance premium compensation depend on the level of total income, including the state pension for every beneficiary but also any occupational pension. We first consider the case where the beneficiary has the state pension as the only source of retirement income so that our calculation of the financial impact of deferring the state pension is free from the parameters of the occupational pension. We assume that the beneficiary receives no income during the deferral period. We then consider the case where the beneficiary has an occupational pension as an additional source of retirement income. In this case we assume that the beneficiary works and therefore receives work income during the deferral period.

Table 16 presents the lifetime financial impact of deferring the full amount of the state pension for two, three, four and five years, for two categories of life expectancy (men and women) and for two domestic situations (living with a partner and single). The table reveals clear patterns of gains and losses. First, the gains increase with the number of years of deferral. Second, the gains are larger for women than for men because of women's longer life expectancy. Third, the gains and losses are larger for singles than for beneficiaries with a partner. For men, the gain from receiving increased state pension during the access period falls short of the loss from not receiving the state pension during the deferral period when the state pension is deferred for two or three years. For longer deferral periods and for women, the gains offset the losses.

In the analysis above, we assumed that the beneficiary defers the full amount of the state pension. Instead, he might prefer to defer only a fraction of it, for example, in the case of partial retirement. In that case, the gains and losses presented in Table 16 change proportionally with the fraction of the state pension deferred at age 65.

The net impact of deferring the state pension will be different when the beneficiary also has additional income from work or from an occupational pension. For the income amounts in Tables 3 and 4, we find that the lifetime losses increase in the following manner. Among the aforementioned sources of gains and losses, the amounts of the tax, the elderly person's tax credit and the flat-rate health insurance premium compensation depend on the level of total income. When the occupational pension raises total income, the beneficiary will enter a higher tax bracket. Moreover, when total income exceeds the respective thresholds in Tables 12 and 14, the beneficiary no longer receives the elderly person's tax credit and the health insurance premium compensation. The occupational pension raises the total income especially when it is deferred, due to the actuarial increase by the time the pension is claimed. As a result, the loss from paying tax during the access period can exceed the gain from not paying tax during the deferral period, and the chances that the beneficiary loses the elderly person's tax credit and the health insurance premium compensation during the access period increase. As a consequence, the losses increase during the access period, and they might increase sufficiently enough to turn the lifetime gains to losses or to increase the losses presented in Table 16. The net financial impact of deferring the state pension then depends on the work income and the occupational pension, as specified in Tables 3-7, and it is difficult to draw general conclusions.

At the micro level, Table 16 suggests that when the beneficiary has the state pension as the only source of retirement income, the amount of the lifetime gain from deferring the state pension appears rather limited to attract the beneficiary to defer his state pension. However, when the beneficiary has an occupational pension as an additional source of retirement income, deferring the state pension results in lifetime losses and, depending on how large the losses are, this might deter the beneficiary to defer his state pension. The losses may increase because of the increase in the tax paid on the state pension and the reduction or the total loss of the health insurance premium compensation and the elderly person's tax credit during the access period. Therefore, the policy might consider exempting the employee from losing the latter benefits in case he decides to work longer and hence defer his state pension.

At the macro level, the results have the following implication. The gain of a beneficiary is the loss of the government. The presented amounts suggest that the gain for the government is rather limited. These amounts can be aggregated, with an estimate of the number of beneficiaries who would defer their state pension, to estimate the impact of the proposed scheme for the public finances. However, the amounts depend on the labor market status of the beneficiary. The financial impact for public finances depends on the amounts of work income and occupational pension. For example, if the proposed state pen-

sion scheme attracts people to work during the deferral period, the government will gain from tax on work income which may be substantial.

The second issue of the proposed scheme is the amount of the actuarial increase in the state pension in comparison to that in the occupational pension. If the state and the occupational pensions are deferred at age 65, the actuarial increase for deferral is lower in the state pension scheme than that in the occupational pension scheme. This is because the actuarial factors of the proposed state pension scheme are lower than those of the occupational pension scheme as shown in Table 8. This owes to the fact that the actuarial factors of the state pension scheme are driven by the mortality rates only, whereas those of the occupational pension scheme are driven by the mortality rates and a certain interest rate to account for the return on invested pension premiums. That is, the occupational pension fund can support higher actuarial factors because the fund generates returns from the investment of the premiums paid during the deferral period. It seems difficult for the government to increase the actuarial factors to the level of those of the occupational pension fund because the state pension system is unfunded so that the government cannot generate returns on the premiums.

The discussion above suggests that, as far as the actuarial increases are concerned, deferring the state pension is not as attractive as deferring the occupational pension. In fact, Sanders et al. (2010) show that the beneficiary might be better off by claiming the state pension annuity early and using it to buy an annuity product from a private insurance company. For example, Table 6 shows that, due to partial deferral of the state and the occupational pensions at age 65 until age 70, the state pension increases by €1,587, while the occupational pension increases by €3,580, according to Equations (11) and (4), respectively. The total actuarial increase amounts to €5,167. Instead, at age 65, the employee could give up deferring his state pension rights of €4,641 but defer more of his occupational pension rights just as much as €4,641. The actuarial increase in the occupational pension would then have amounted to €5,728, which is about 11% higher than the increase of €5,167. This corresponds to a 2 percentage points increase in the replacement rate at age 70.

However, in three cases a beneficiary might still defer his state pension rather than the occupational pension. First, if the employee defers all his occupational pension, as for example in Table 4 where the regulation requires the employee to defer all his occupational pension since he continues to work full-time, then there is no room for substitution. Second, if the occupational pension itself is too low, again, there is no room to increase the deferred share of the occupational pension. Third, with a behavioral motive rather than a financial one, a beneficiary might prefer to defer his state pension if doing so is perceived less risky or becomes the default option. This is supported by Madrian and Shea (2001) who show that a substantial fraction of the 401(k) participants opt for the default fund allocation suggested by their employers which actually yields low returns. Besides, employees might defer their state pension if the government provides a higher actuarial increase to the individuals who will participate in the labor market after age 65 as

an incentive for working longer (den Butter and van Sonsbeek, 2008).

6. Replacement rate analysis

Tables 3-6 demonstrated in selected retirement scenarios the calculation of the gross and net replacement rates for a hypothetical employee at the given parameters of an occupational pension scheme, the state pension scheme, and the Dutch tax system. We consider in total 35 different retirement scenarios and study them in the same way we study the retirement scenarios in Tables 3-6. These are scenarios of full retirement at each age from 60 to 70, and scenarios of partial retirement with durations of five, four, three and two years at each age from 60 to 65. We first define the baseline values for work income and state and occupational pensions and calculate the associated replacement rates for these retirement scenarios. We then analyze the sensitivity of the replacement rates in these retirement scenarios to the changes in the baseline values.

6.1. Baseline analysis

We consider the parameter values in the note to Table 3 as the baseline and accordingly calculate gross and net replacement rates for various types of retirement scenarios. Table 17 presents the gross replacement rates, defined as the ratio of gross retirement income over gross work income. Retirement income includes work income in the case of partial retirement. We assume that the work income represents the average lifetime work income. The table shows that the gross replacement rate at age 65 is 83%, which can be compared to the gross replacement rate of 88.1% calculated by OECD (2011) using the national parameters and rules applying in 2008.

Table 18 presents the net replacement rates for the retirement scenarios in Table 17, defined as the ratio of net retirement income over net work income. Table 4 shows that the net work income changes with age in the last years before retirement, due to the change in the work bonus with age (see Table 14) or in the tax rate at age 65 (Table 13). We assume that the work income we consider in our replacement rate calculation is not affected by these changes. We have illustrated the calculation of the net replacement rates for particular retirement scenarios in Tables 3-6. Table 18 shows that the baseline net replacement rate at age 65 is 102%, which can be compared to the net replacement rate of 99.8% calculated by OECD (2011).

The upper panel of Table 18 shows that before age 65 the net replacement rates are about 7 percentage points higher, and as of age 65 they are about 20 percentage points higher than the corresponding gross replacement rates in Table 17. This is because the tax rate as of age 65 is lower than that before age 65, as shown in Table 13. The lower panel of Table 18 shows that before age 65 the net replacement rates are about 10 percentage points higher than the gross replacement rates in Table 17. However, as of age 65, the net replacement rates during partial retirement are 25 percentage points higher, while those during full retirement are about 19 percentage points higher than the corresponding gross replacement rates in Table 17. The 6 percentage points difference owes to the fact that during partial

retirement the employee is granted the labor tax credit for his participation in the labor market, while he does not receive this tax credit once he is fully retired. In the rest of the analysis we consider only the net replacement rates.

The upper panel of Table 18 reveals the following results. First, the diagonal elements show that delaying full retirement results in progressively higher replacement rates. This is because the actuarial factors in Table 8 progressively increase because of the progressive increase in the mortality rate with age. The progressively increasing actuarial factors then progressively raise, for example after age 65, the occupational pension annuity in Equations (4) and (6), and the state pension annuity in Equation (11). A direct implication is that the price of leisure increases with age and the table demonstrates how much it increases in terms of the replacement rates. Second, before age 65, the retirement income consists of only the occupational pension and the accumulated occupational pension rights are actuarially decreased because of early retirement, as discussed in Sections 2.1 and 4. Consequently, the occupational pension replaces less than half of the previous earnings at the assumed parameter values. Unless the beneficiary is participating in a private pension scheme, early retirement appears to restrict retirement income substantially. In fact, the early retirement schemes introduced in mid-nineties (and abolished in 2006) aimed at a gross replacement rate of about 70%. Third, as a standing policy goal, the pension system in the Netherlands aims to maintain the living standard of employees before retirement with a target net replacement rate of 100% at age 65. The table shows that the current pension system achieves this target level with a net replacement rate of 102% at age 65.

The lower panel of Table 18 reveals the following results. First, the diagonal elements show that delaying partial retirement results in higher replacement rates in partial retirement. Delaying partial retirement also results in higher replacement rates in full retirement but the amount of the increase is lower than that in the case of delaying full retirement because only a fraction of the pension rights are delayed at the time of partial retirement. Second, when we compare partial retirement in the lower panel to full retirement at the corresponding ages in the upper panel, we observe that the replacement rates are about two times larger, before age 65. This is because during partial retirement the work income provides an additional source of income and it supplements the decreased occupational pension up to the level of the occupational pension in the case of full retirement. This suggests that in the case of full retirement before age 65, the occupational pension constitutes the only source of retirement income and it may not provide a sufficient amount of income replacement. Therefore, the employee may wish to partially retire to bring his replacement rate up to a level considered to be sufficient and smooth his income path towards full retirement. A caveat is that if partial retirement ends several years before age 65, the employee will realize a substantial loss in his total income until he starts to receive his state pension income at age 65. This suggests that partial retirement should precede immediately before the state pension age. On the other hand, when we compare partial retirement in the lower panel to full retirement at the corresponding ages in the upper panel, we ob-

serve that the difference between the replacement rates as of age 65 is smaller than that before age 65. This is because, as of age 65, the employee receives half of the state pension in the case of partial retirement in the lower panel, while he receives the full amount of the state pension in the case of full retirement in the upper panel. The state pension played no role in retirement income before age 65. This suggests that in the case of full retirement as of age 65, the state pension may sufficiently supplement the occupational pension so that the employee might not need to partially retire to supplement his occupational pension with work income as much as he might need to before age 65. Third, as a standing policy goal, the Dutch pension system aims to meet a minimum net replacement rate level of 70% in full or partial retirement. Table 18 shows that the current pension system achieves a net replacement rate of about 80% during partial retirement, well above the target level.

In Table 18 we assumed that the employee defers his state pension as of age 65, partially in the case of partial retirement and fully in the case of full retirement according to the proposed state pension scheme explained in Section 2.2. In fact, the employee is not allowed to defer his state pension in the current state pension scheme. Table 19 presents the net replacement rates when the state pension is not deferred at age 65. A particular result in the lower panel of Table 19 is that the replacement rates during partial retirement as of age 65 are substantially higher than the corresponding replacement rates in Table 18. However, the income path towards full retirement is much more smooth when the state pension is deferred partially at age 65 in Table 18. This suggests that, in the case of partial retirement as of age 65, the part-time work income may sufficiently supplement the partial occupational pension so that the employee might prefer to defer his state pension, at least partially, to smooth his income path towards full retirement. In a similar manner, if the employee decides to continue to work full-time at age 65, he might prefer to defer all his state pension. Besides, the lower income tax rate as of age 65 and the tax relief on the premiums paid to the occupational pension scheme already make it attractive to continue to work beyond age 65. All this implies that employees shall be given the opportunity to defer their state pension so that they can adjust the composition of their income and smooth their income path towards full retirement.

In the remainder of our analysis, we assume that the employee prefers to defer his state pension as of age 65, partially in the case of partial retirement and fully in the case of full retirement. The first reason for this assumption is that if the employee decides to continue to work part-time or full-time at age 65, he would prefer to defer his state pension, at least partially, as suggested above. A second reason for this assumption is the following. In Section 5 we argued that during partial retirement the employee is better off if he does not defer his state pension but defers more of his occupational pension because the actuarial increase in the state pension is lower than that in the occupational pension. However, we also argued that the government cannot provide a higher actuarial increase in the state pension. Therefore, we assume that the employee accepts the proposed actuarial increase in the state pension as it is and defers his state

pension.

6.2. Sensitivity analysis

In the following subsections we analyze the sensitivity of the replacement rates in Table 18 to deviations from the baseline parameter values. We vary the values of selected parameters concerning labor market characteristics of an employee and the pension system.

6.2.1. Work income

In our baseline analysis in Table 18 we assumed that the employee earns a gross income of €30,000 a year, which is roughly the gross average wage in the Netherlands. In this section, we consider two alternative levels of work income: a low income level of €15,000, which is roughly the gross minimum wage in the Netherlands, and a high income level of €60,000. Tables 20 and 21 present the net replacement rates for these incomes.

The comparison of the replacement rates in the upper panels of the tables reveals the following results. First, in the case of early retirement, when the retirement income consists of only the occupational pension, low income earners realize a lower replacement rate before age 65. This is because low income earners accumulate less occupational pension rights relative to their work income. In particular, as work income decreases, the pension base (defined by Equation (2)), decreases at a higher pace since the state pension offset is fixed. Moreover, the replacement rates are lower for the lowest income earners because the amount of the tax they pay is so low that they cannot fully benefit from the flat-rate general tax credit (see Section 3). Second, in the case of early retirement, low income earners realize a higher replacement rate as of age 65, whereas in the case of late retirement they realize a lower replacement rate than the high income earners. However, the gap between the replacement rates across the income groups narrows around age 65. The reason for this pattern is that for low income earners the share of the occupational pension in the replacement rate is lower than that of the state pension, so that by retiring later they accumulate less occupational pension rights relative to their work income.

The comparison of the replacement rates in the lower panels of the tables reveals the following results. First, the difference between the replacement rates across income groups during the years of partial retirement is smaller than that during the corresponding years of full retirement in the upper panels of the tables. This is because, in the case of partial retirement, the replacement rate includes the share of the work income and therefore it changes in a more proportional manner with the amount of the work income. Second, the difference between the replacement rates across the income groups during the years of full retirement following partial retirement is also smaller than that during the corresponding years of full retirement in the upper panels of the tables. This is because during partial retirement employees accumulate occupational pension rights which in turn increase the replacement rate during full retirement, but the replacement rate for high income earners increases more than that for low income earners, reducing

the difference between the replacement rates of the two income groups. These results therefore imply that in the case of partial retirement there is less variation in the replacement rates across the income groups than in the case of full retirement.

6.2.2. *Service length*

In our baseline analysis in Table 18, we calculated net replacement rates under the assumption of an uninterrupted service length of 40 years. For employees with career gaps, this is an unrealistic assumption. In this subsection, we consider a service length of 20 years by the time the employee enters into full or partial retirement at age 65, and analyze its impact on the net replacement rates. Table 22 presents the net replacement rates. These results can be extrapolated to other changes in service length. For example, for an employee who is fully retired at age 65, the net replacement rate decreases by about 7 percentage points for each five years the employee spends less in full-time work. The decrease is less in the case of retirement at earlier ages.

The comparison of the replacement rates in the upper panels of Tables 22 and 18 reveals the following results. First, the replacement rates are lower when the service length is shorter, because employees accumulate less occupational pension rights (see Equation (2)). However, the employee still achieves a net replacement rate of 74% at age 65. Second, the difference between the replacement rates increases as the retirement age increases. This is because those with a shorter service length accumulate less pension rights and the actuarial increase on these rights are lower. This means that spending more years in the labor market yields a more than proportional increase in the occupational pension rights and therefore in the net replacement rates.

The main result from the comparison of the replacement rates in the lower panels of Tables 22 and 18 is the following. The difference between the replacement rates across the two groups of service length during the years of partial retirement is smaller than that during the corresponding years of full retirement in the upper panels of the tables. This is because in the case of partial retirement the retirement income includes work income and therefore depends less on the occupational pension income. Therefore, the replacement rates differ less across the individuals with different levels of occupational pension rights due to the differences in service length.

6.2.3. *Hours worked during partial retirement*

During partial retirement some employees may wish to work more hours than others. In our baseline analysis in Table 18, we calculated net replacement rates under the assumption of a full-time equivalent of 0.5 during partial retirement, which refers to 20 hours of work per week. In this subsection, we consider the net replacement rates for a full-time equivalent level of 0.2, or 8 hours of work per week. Our analysis shows that the replacement rates change in a proportional manner with the level of the FTE, but otherwise depend on the amounts of the employed person's tax credit and the work bonus in Table 14. We assume that when the employee partially retires he simultaneously defers his occupational and state pensions by the same fraction of

the FTE he works during partial retirement. In fact, the fiscal law requires that the fraction of the occupational pension that the employee defers is as large as at least the fraction of the work time that he works, as discussed in Section 2.1. Table 23 presents the net replacement rates when the FTE is 0.2.

The comparison of the replacement rates in the partial retirement scenarios in Tables 18 and 23 reveals the following results. First, during partial retirement before age 65, as the number of hours worked decreases, and the claim of occupational pension rights increases, the share of work income in the replacement rate falls and the share of the occupational pension increases. As a consequence, the replacement rate is lower. The decreases in the amounts of the employed person's tax credit and the work bonus reduce the replacement rate further. During partial retirement as of age 65, the pace of the decrease in the replacement rates is smaller, because those working less claim more of their state pension. Second, during full retirement the replacement rates decrease because the employees who work less hours during partial retirement defer less of their occupational pension rights until full retirement (see Equation (4)) and accumulate less pension rights for full retirement (see Equation (6)).

6.2.4. *Hours worked during the career years*

Table 18 assumed that the employee works full time during his career years, before entering into partial or full retirement. However, Kantarcı and van Soest (2008) show that, in the last 20 years about 75% of Dutch women who were active in the labor market worked 1-34 hours a week. To allow for part-time work, we consider a case where the employee works 20 hours a week before entering into full retirement. Partial retirement seems less relevant in this case and is therefore not considered. We assume that pension rights are delayed until after retirement. Table 24 presents the replacement rates under these assumptions.

Comparing Tables 18 and 24 shows that, before age 65, when the retirement income consists of only the occupational pension, the replacement rates do not change with the full-time equivalent. This is because employees accumulate pension rights in proportion to their full-time equivalent during their career, according to Equation (2), but their work income also changes in proportion to their full-time equivalent. As of age 65, when employees start to receive their state pension, the replacement rates of the part-time employees are much higher. This is because their share of the state pension in the replacement rate is higher. This result shows that the income path of the part-time employees is less smooth than that of the full-time employees. An implication is that part-time employees may consider trading off higher occupational pension rights before age 65 against lower rights after age 65, as discussed in Section 2.1 and demonstrated in Table 7.

6.2.5. *Domestic situation*

The amounts of the occupational pension, the state pension, the flat rate health insurance premium and certain tax credits depend on the domestic situation, as explained in Sections 2.1, 2.2 and 3. In our baseline analysis in Table 18, we calculated the

net replacement rates under the assumption that the employee is not single. Table 25 presents the replacement rates when the employee is single and has no children living with him.

The comparison of the replacement rates in the upper panels of the tables reveals the following results. First, before age 65, the replacement rates are about 7 percentage points higher if the employee is single. This is because the accumulated occupational pension rights are increased if the employee is single by the time he claims his pension rights (see Section 2.1), but also because he pays a lower flat rate health insurance premium and receives the elderly single person's tax credit. As of age 65, the replacement rates are about 25 percentage points higher if the employee is single. The additional increase is due to the fact that the single beneficiary receives an increased state pension as of age 65 (see Section 2.2). The comparison of the replacement rates in the lower panels of the tables shows that the difference between the replacement rates across the two domestic situations during the years of partial retirement is smaller than that during the corresponding years of full retirement in the upper panels of the tables. This is because the employee claims only part of his accrued pension rights during partial retirement and hence the replacement rates increase at a lower pace. When we assume that the employee is single and has children under the age of 18 living with him, the state pension rights increase further, which further increase the replacement rates in Table 25. The employee also receives as additional tax credits the single parent's tax credit, single parent's supplementary tax credit and the combination tax credit, but in fact these reduce the replacement rates as of age 65 because their amounts are larger before age 65 (as was shown in Table 14).

6.2.6. Pension trade-off

In Section 6.1, we showed that early retirement restricts the retirement income substantially and Table 18 showed that, before age 65, the occupational pension replaces less than half of the previous earnings for the baseline scenario. In Section 2.1 however, we explained that the rules of the occupational pension scheme allow the employee to trade off pension rights over the retirement years. This means that the employee can opt for a higher early pension, to supplement income during early retirement, at the expense of a lower pension later. In Table 26 we consider a selection of full and partial retirement scenarios where the employee retires before age 65 and claims 20% higher occupational pension rights than in Table 18. Consequently his pension rights as of age 65 fall according to the actuarial factors in Table 9. The employee cannot claim more pension rights than the stated amounts due to the fiscal constraints described in Section 2.1. We do not consider retirement scenarios where the employee retires at or after age 65 since the employee receives the state pension by then and would no longer be concerned about smoothing income.

The comparison of the replacement rates in the upper panels of Tables 18 and 26 shows that the replacement rates increase by about 7 percentage points before age 65 and falls by about 2 percentage points as of age 65 due to the claim of additional pension rights before age 65. Note that the actuarial decrease of the pension rights due to early retirement, accord-

ing to Equation (7), also increase with the claim of additional pension rights, which restricts the increase in the replacement rates before age 65. The comparison of the replacement rates in the lower panels to those in the upper panels in Tables 18 and 26 shows that the increase in the replacement rates during partial retirement is lower than that at the same ages during full retirement because only the partial occupational pension rights claimed during partial retirement are increased according to the trade-off. These results show that employees benefit from trading off their occupational pension rights by smoothing their income path. However, the difference between the replacement rates in the case of full retirement before and after age 65 is still large in Table 26. This suggests that the fiscal law that restricts the amount of the pension rights that can be traded off against future rights can be loosened for employees that meet a certain number of years of contribution so that they are able to smooth their income path and still achieve a certain replacement rate at age 65.

6.2.7. Accrual rate

Goudswaard et al. (2010) indicate that two factors contribute to the increasing cost of pension benefits in the Netherlands. The first is that the return on the invested pension premiums is decreasing due to the structural decline in the interest rates, and the second is that the number of years retirees are drawing pensions is increasing due to the increasing life expectancy. The authors explain that an increase in the pension premiums paid by the employees or a decrease in the pension accrual rate can reduce the cost of pensions. They claim that there is little room for increasing the pension premiums in the Netherlands and therefore favor reducing the pension accrual rate. In fact, the accrual rate of the occupational pension in the Netherlands is among the highest among OECD countries (Whitehouse, 2006). The pension regulation in the Netherlands allows pension funds to decrease the accrual rate while keeping the premiums constant. In Table 27 we show how reducing the accrual rate by about 25% from its current level of 2.05% to 1.55% affects the net replacement rates.

The comparison of the replacement rates in the upper panels of Tables 27 and 18 shows that when the accrual rate is reduced the net replacement rates fall, for example, by 13 percentage points in the case of full retirement at age 65. This implies that the employee needs to work two additional years, until age 67, to reach the baseline level of replacement rate. This decrease in the accrual rate, which can be offset by working until age 67, seems to accord well with the government's plans launched in 2009 to increase the retirement age to 67 by 2025. Note however that our calculation assumes that the state pension is deferred according to the proposed state pension scheme. When we repeat our calculation under the assumption that the state pension is not deferred, the additional number of years of work required to offset the decrease in the accrual rate increases to almost three years. The table shows that the offsetting number of years of work also increases with retirement at earlier ages, since the rate of the actuarial increase in the pension rights for delaying retirement is lower at those ages. In the case of partial retirement, during the partial retirement years, the decrease in

the replacement rates is lower, because the replacement rate is proportional to the earned income, but in the years of full retirement, the reduction is about the same as in the case of full retirement.

6.2.8. *Work bonus*

Section 3 introduced the tax credits we have accounted for in our calculation of net income. One of these tax credits is the work bonus, introduced in January 2009 to encourage older workers to work beyond age 62. The tax credit varies by age and people receive it from age 62 to age 67 if they earn a certain amount of labor income during these years (see Table 14). Policy makers are currently discussing whether the work bonus is an effective tool to improve the labor market participation among older workers. For example, Sap et al. (2009) argues that since low educated employees leave the labor market much earlier than highly educated employees, the work bonus would mainly apply to the latter group. However, since this group includes mostly high income earners, they would be less likely to be sensitive to the work bonus as a financial incentive.

In the current analysis we study the impact of abolishing the work bonus on the net replacement rate of the average income earner. Table 28 shows a selection of full and partial retirement scenarios. The upper panel of the table shows that during the period when the employee is working full-time, his work income is 6, 8, 11, 2, 2 and 1 percentage points lower than if the work bonus is not abolished, at the corresponding ages from 62 to 67. The lower panel of the table shows that during the five year period when the employee is working part-time, the replacement rates are 1, 2, 3, 1, 1 and 0 percentage points lower than if the work bonus is not abolished. These results show that abolishing the work bonus would result in a fairly substantial loss of income in the case of full-time work at ages 62, 63 and 64, but a less than proportional loss of income in the case of part-time work. This is because the work bonus only applies to work income exceeding a fixed amount of €9,042 (see Table 14), so that part-time workers benefit less relative to their work income.

7. Conclusion

Increasing life expectancy implies that the number of years retirees claim pensions increases, which raises concerns for the financing of these pensions. In fact, recent austerity measures taken to guarantee the sustainability of the pension system in the Netherlands aim at increasing the effective retirement age so that the number of years retirees draw pensions decreases. We studied full and partial retirement scenarios where employees delay their occupational and state pension claims beyond the statutory retirement age, and showed how this affects the net retirement income relative to the previous earnings. We also studied full and partial retirement before the statutory retirement age since in the Netherlands many employees retire early. We showed that by working part-time after the statutory retirement age, individuals can rely on their work income instead of

their pensions only and at the same time continue to accrue pension rights. This implies a more self-reliant financial security in retirement.

Increasing life expectancy may also imply extended work lives. For an increasing population of older workers working in different occupations involving different levels of physical or mental activity, it is essential to provide varied retirement path options. We demonstrated a rich set of income paths in full and partial retirement scenarios. We paid particular attention to partial retirement since older workers might prefer to continue to work at a reduced work effort. In Section 1, we argued that older workers in search of partial retirement opportunities are restricted by labor market rigidities. Our analysis shows that the current pension system in the Netherlands provides ample opportunities for partial retirement. This implies that the labor market restrictions that might be preventing employees take up a partial retirement arrangement in the Netherlands shall be originating from other causes than the pension system.

The main results of the paper are the following. Our analysis of the occupational pension shows that partial retirement during the years surrounding age 65 provides an actuarially neutral alternative to full retirement at age 65. The analysis of the state pension shows that the financial gain for the individual, or the loss for the government, when the state pension is deferred beyond age 65 is rather limited. The principal result of the baseline analysis of the replacement rates is that partial retirement instead of full retirement results in a much smoother income path before age 65 and encourages employees to defer their pension rights beyond age 65. The sensitivity analysis shows first of all that the replacement rates differ substantially across the employees with different levels of work income in the cases of early and late full retirement. These changes are much less substantial in the case of partial retirement. This is also true for the changes in the service length, domestic situation, and the occupational pension accrual rate. Second, the government's current plan of increasing the retirement age to 67 allows for about a 25% decrease in the current accrual rate of the occupational pension rights while the financial well being of a retiree at age 67 remains the same as that of a retiree at age 65 if the retirement age is not increased.

From a policy point of view, perhaps the most interesting results are those comparing the replacement rates for different levels of pre-retirement earnings, keeping other variables constant such as the number of years of pension contributions at each given age. Differences are due to state pensions playing a larger role for the lower income groups, and taxes and benefits with different implications before and after retirement. For the baseline scenario of full retirement at age 65, the net replacement rates are 106, 102 and 104 percent for low, median, and high income levels (€15,000, €30,000 and €60,000). Late retirement (age 70) is financially attractive for everyone, but more so for the higher income group whose replacement rate would change from 104 to 156 than for the lower and medium income groups, whose replacement rates would change from 106 to 146 and from 102 to 140, respectively. This shows that the current system with flexible and actuarially fair occupational pensions unintentionally has a larger incentive to retire later for the high-

est income groups (even keeping the number of years employees have contributed to the pension fund constant).

Similarly, we can compare the incentives of the three income groups to retire partially and work half time from age 65 to age 70. For the median income group, this gives replacement rates 116 and 125 during partial and full retirement corresponding to a weighted (lifetime after 65) average of about 122 (Table 7), an increase of 20 percentage points compared to the baseline (102 for full retirement at age 65). For the lower income group, the replacement rates are 115 and 127 for a life time average of about 123, coming from a baseline of 106, so that this partial retirement scenario seems relatively less attractive for the low incomes. For the high income group the replacement rates are 117 and 136 during partial and full retirement for a life time average of about 130, compared to 104 at baseline, giving them a clearly larger advantage than both other groups. More flexibility and actuarial neutrality of occupational pensions will therefore benefit the higher income groups more than the lower incomes when other features of the institutions driving replacement rates in terms of disposable income are taken into account.

Acknowledgments

We thank Johannes Binswanger, Gerry Dietvorst, Angela Forch, Ron Linssen, Mauro Mastrogiacomo, Wim Moes, Eduard Ponds, Tim Schulteis, Kerstin Thoma, Jan-Maarten van Sonsbeek and Hasse Vleeming for their useful comments and assistance in our calculations.

References

- Alessie, R., Kapteyn, A., March 2001. Savings and pensions in the Netherlands. *Research in Economics* 55 (1), 61–82.
- Alessie, R., Kapteyn, A., Klijn, F., 1997. Mandatory pensions and personal savings in the Netherlands. *De Economist* 145, 291–324.
- Belastingdienst, 2010a. Loonheffingen. Handboek.
- Belastingdienst, 2010b. Toelichting zorgtoeslag. Handboek.
- Belloni, M., Monticone, C., Trucchi, S., 2006. Flexibility in retirement. A framework for the analysis and a survey of European countries. Research report commissioned by the European Commission, CeRP, Turin.
- Brown, K. N., Haley, J. J., McGill, D. M., Schieber, S. J., 2005. Changing the end of work: Phased retirement. *Fundamentals of Private Pensions*, Oxford University Press Chapter 20, 552–591.
- Brown, K. N., Schieber, S. J., 2003. Structural impediments to phased retirement. *Watson Wyatt Worldwide*.
- Chen, Y.-P., Scott, J. C., 2003. Gradual retirement: An additional option in work and retirement. *North American Actuarial Journal* 7 (3), 62–74.
- Delsen, L., Reday-Mulvey, G., 1996. *Gradual Retirement in OECD Countries: Macro and Micro Issues and Policies*. Dartmouth Publishing Company.
- den Butter, F., van Sonsbeek, J.-M., 2008. Opties voor flexibilisering van de aow. *ESB Economisch statistische berichten* 93 (4549), 742–745.
- Euwals, R., van Vuuren, D., Wolthoff, R., 2010. Early retirement behaviour in the Netherlands: Evidence from a policy reform. *De Economist* 158, 209–236.
- Forman, J. B., Scahill, P. L., 2003. Issues for implementing phased retirement in defined benefit plans. *North American Actuarial Journal*, 7 (3), 75–84.
- Forman, J. B., Scahill, P. L., 2004. Phased retirement for defined benefit plan participants. *Journal of Actuarial Practice* 11, 43–62.
- Fouarge, D., Huynen, B., 2005. Inkomenseffecten van uittrekking. *Tijdschrift-titel Sociaal-economische Trends: Statistisch Kwartaalblad Over Arbeidsmarkt, Sociale Zekerheid en Inkomen*, Centraal Bureau voor de Statistiek, 2(2005)1e Kwartaal, 49–56.
- Goudswaard, K. P., Beetsma, R. M. W. J., Nijman, T. E., Schnabel, P., 2010. Een sterke tweede pijler; naar een toekomstbestendig stelsel van aanvullende pensioenen. *Rapport van de commissie toekomstbestendigheid aanvullende pensioenregelingen*, Den Haag.
- Gruber, J., Wise, D., 2004. *Social Security Programs and Retirement around the World: Micro-Estimation*. University of Chicago Press, Chicago.
- Hurd, M. D., 1996. The effect of labor market rigidities on the labor force rigidities on the labor force. In: Wise, D. A. (Ed.), *Advances in the Economics of Aging*. National Bureau of Economic Research, pp. 11–60.
- Hutchens, R., 2010. Worker characteristics, job characteristics, and opportunities for phased retirement. *Labour Economics* 17 (6), 1010–1021.
- Kantarci, T., van Soest, A., 2008. Gradual retirement: Preferences and limitations. *De Economist* 156, 113–144.
- Latulippe, D., Turner, J., 2000. Partial retirement and pension policy in industrialized countries. *International Labour Review* 139 (2), 179–195.
- Madrian, B. C., Shea, D. F., 2001. The power of suggestion: Inertia in 401(k) participation and savings behavior. *The Quarterly Journal of Economics* 116 (4), 1149–1187.
- Ministerie van Sociale Zaken en Werkgelegenheid, 2008. *Beslisapunten flexibilisering AOW*. Nota.
- Munzenmaier, F., Paciero, J., 2002. Replacement ratios and phased retirement - A new tune on an old fiddle. *Benefits Quarterly* 18 (1), 7–14.
- OECD, 2006. *Ageing and employment policies - Statistics on average effective age of retirement* ISBN: 9789264035874.
- OECD, 2011. *Pensions at a glance 2011: Retirement-income systems in OECD and g20 countries* ISBN: 9789264095236.
- Reday-Mulvey, G., 2000. Gradual retirement in Europe. *Journal of Aging and Social Policy* 11 (2-3), 49–60.
- Rohwedder, S., Willis, R. J., 2010. Mental retirement. *Journal of Economic Perspectives* 24 (1), 119–138.
- Sanders, L., Waegenaere, A. D., Nijman, T. E., 2010. When can insurers offer products that dominate delayed old-age pension benefit claiming? *CENTER Discussion Paper No. 2010-43*.
- Sap, J., Schippers, J., Nijssen, J., 2009. *Langer doorwerken en flexibel pensioen*. Netspar NEA Paper 23.
- Stichting Pensioenfonds ABP, 2009. *Jaarverslag. Handboek*.
- Stichting Pensioenfonds ABP, 2010a. *Overzicht premies en franchises*. Handboek.
- Stichting Pensioenfonds ABP, 2010b. *Pensioenreglement*. Handboek.
- Wadensjö, E., 2006. Part-time pensions and part-time work in Sweden. *European Papers on the New Welfare* 6, 29–45.
- Whitehouse, E., November 2006. New indicators of 30 OECD countries' pension systems. *Journal of Pension Economics and Finance* 5 (3), 275–298.

Table 1

Occupational pension premiums

Premium type	Premium rate (%)		State pension offset (€)
	Employer	Employee	
OP OP/NP	14.910	6.390	10,500
OP ANW	0.075	0.225	10,500
OP AAOP	0.300	0.100	18,200
OP VUT/FPU	1.450	2.250	-

Source: Stichting Pensioenfonds ABP (2010a). Notes: Employees pay premiums to ABP for four types of benefits: The old age and surviving dependants' pension (OP/NP), surviving dependants' pension insurance (ANW), disability pension (AAOP) and flexible early retirement pension (VUT/FPU). The premium rate of the disability pension differs across the government sectors but the rate shown in the table applies to the majority of these sectors. The presented premium rates are effective from August 1, 2010 until December 31, 2010.

Table 2

Indexation of the pension rights

Year	Pension increase (%)	Average wage increase (%)	General price increase (%)
2009	0.28	2.20	1.20
2008	0.00	4.73	2.50
2007	4.01	2.05	1.60
2006	2.82	3.66	1.20
2005	0.17	0.38	1.70

Source: Stichting Pensioenfonds ABP (2009). Note: Pension rights are increased on the first of January of the following year indicated in the table.

Table 3

Scenario of full retirement at age 65

	61	62	63	64	65	66	67	68	69	70
	Work				Retirement					
Accrued OP					15,531					"
Claim as of 65					15,531	"	"	"	"	"
Adjustment as of 65					0	"	"	"	"	"
Defer to claim as of 70					0					"
Adjustment as of 70										0
Accrued as of 65										0
Adjustment as of 70										0
Accrued SP					9,282					"
Claim as of 65					9,282	"	"	"	"	"
Adjustment as of 65					0	"	"	"	"	"
Defer to claim as of 70					0					"
Adjustment as of 70										0
OP (gross)	-	-	-	-	15,531	"	"	"	"	"
SP (gross)	-	-	-	-	9,282	"	"	"	"	"
Work inc. (gross)	30,000	"	"	"	-	-	-	-	-	-
Total inc. (gross)	30,000	"	"	"	24,814	"	"	"	"	"
Rep. rate (gross)					83%	"	"	"	"	"
Tax basis	30,053	"	"	"	24,814	"	"	"	"	"
Tax	11,059	"	"	"	4,419	"	"	"	"	"
Tax cr. general	1,987	"	"	"	925	"	"	"	"	"
Tax cr. emp. per.	1,489	"	"	"	-	-	-	-	-	-
Tax cr. emp. per. red.	0	"	"	"	-	-	-	-	-	-
Tax cr. eld.	-	-	-	-	684	"	"	"	"	"
Tax cr. eld. sin.	-	-	-	-	0	"	"	"	"	"
Tax cr. sin. par.	-	-	-	-	-	-	-	-	-	-
Tax cr. sin. par. sup.	-	-	-	-	-	-	-	-	-	-
Tax cr. combi.	-	-	-	-	-	-	-	-	-	-
Tax cr. work bonus	-	1,048	1,467	2,096	-	-	-	-	-	-
Tax cr. total	3,476	4,524	4,943	5,572	1,609	"	"	"	"	"
OP prem.	1,927	"	"	"	-	-	-	-	-	-
I.r. HI prem. w.i.	1,979	"	"	"	-	-	-	-	-	-
I.r. HI prem. OP	-	-	-	-	769	"	"	"	"	"
I.r. HI prem. SP	-	-	-	-	654	"	"	"	"	"
I.r. HI prem. w.i. com.	1,979	"	"	"	-	-	-	-	-	-
F.r. HI prem.	2,524	"	"	"	"	"	"	"	"	"
F.r. HI prem. com.	1,024	"	"	"	1,284	"	"	"	"	"
Total inc. (net)	18,991	20,039	20,458	21,087	19,340	"	"	"	"	"
Rep. rate (net)					102%	"	"	"	"	"

Notes: 1. All amounts are in euros. 2. Ditto marks (") indicate the repetition of the amount presented next to it. 3. Parameter assumptions: OP parameters: Pensionable income: €29,441. SP offset: €10,500. OP base: €18,941. Accrual rate: 0.0205. Domestic situation: Not single. Age started working: 25. Years of work at 65th birthday: 40. Pension trade-off: 0.00. Claim OP: 1.00. Defer OP: 0.00. SP parameters: SP base: €9,282. Accrual rate: 0.02. Domestic situation: Not single. Age started insured: 15. Years of insurance at 65th birthday: 50. Claim SP: 1.00. Defer SP: 0.00. Work income parameters: Work income: €30,000. FTE during work: 1.00. FTE during partial retirement: 0.00. Deductions and compensations parameters: HI premium compensation domestic situation: Not single. Tax credit domestic situation: Not single.

Table 4

Scenario of full retirement at age 70

	61	62	63	64	65	66	67	68	69	70
	Work									Ret.
Accrued OP					15,531					25,528
Claim as of 65					0	"	"	"	"	=
Adjustment as of 65					0	"	"	"	"	+
Defer to claim as of 70					15,531					+
Adjustment as of 70										7,160
Accrued as of 65										+
Adjustment as of 70										1,941
Accrued SP					9,282					+
Claim as of 65					0	"	"	"	"	895
Adjustment as of 65					0	"	"	"	"	+
Defer to claim as of 70					9,282					+
Adjustment as of 70										3,175
OP (gross)	-	-	-	-	-	-	-	-	-	25,528
SP (gross)	-	-	-	-	-	-	-	-	-	12,457
Work inc. (gross)	30,000	"	"	"	"	"	"	"	"	-
Total inc. (gross)	30,000	"	"	"	"	"	"	"	"	37,985
Rep. rate (gross)										127%
Tax basis	30,053	"	"	"	"	"	"	"	"	37,985
Tax	11,059	"	"	"	5,679	"	"	"	"	7,587
Tax cr. general	1,987	"	"	"	925	"	"	"	"	"
Tax cr. emp. per.	1,489	"	"	"	1,057	"	"	"	"	-
Tax cr. emp. per. red.	0	"	"	"	"	"	"	"	"	-
Tax cr. eld.	-	-	-	-	684	"	"	"	"	0
Tax cr. eld. sin.	-	-	-	-	0	"	"	"	"	"
Tax cr. sin. par.	-	-	-	-	-	-	-	-	-	-
Tax cr. sin. par. sup.	-	-	-	-	-	-	-	-	-	-
Tax cr. combi.	-	-	-	-	-	-	-	-	-	-
Tax cr. work bonus	-	1,048	1,467	2,096	419	"	210	-	-	-
Tax cr. total	3,476	4,524	4,943	5,572	3,085	"	2,876	"	"	925
OP prem.	1,927	"	"	"	"	"	"	"	"	-
I.r. HI prem. w.i.	1,979	"	"	"	"	"	"	"	"	-
I.r. HI prem. OP	-	-	-	-	0	"	"	"	"	1,264
I.r. HI prem. SP	-	-	-	-	0	"	"	"	"	878
I.r. HI prem. w.i. com.	1,979	"	"	"	"	"	"	"	"	-
F.r. HI prem.	2,524	"	"	"	"	"	"	"	"	2,524
F.r. HI prem. com.	1,024	"	"	"	"	"	"	"	"	0
Total inc. (net)	18,991	20,039	20,458	21,087	23,980	"	23,770	"	"	26,657
Rep. rate (net)										140%

Notes: 1. All amounts are in euros. 2. Ditto marks (") indicate the repetition of the amount presented next to it. 3. Parameter assumptions: OP parameters: Pensionable income: €29,441. SP offset: €10,500. OP base: €18,941. Accrual rate: 0.0205. Domestic situation: Not single. Age started working: 25. Years of work at 65th birthday: 40. Pension trade-off: 0.00. Claim OP: 0.00. Defer OP: 1.00. SP parameters: SP base: €9,282. Accrual rate: 0.02. Domestic situation: Not single. Age started insured: 15. Years of insurance at 65th birthday: 50. Claim SP: 0.00. Defer SP: 1.00. Work income parameters: Work income: €30,000. FTE during work: 0.00. FTE during partial retirement: 1.00. Deductions and compensations parameters: HI premium compensation domestic situation: Not single. Tax credit domestic situation: Not single.

Table 5

Scenario of full retirement at age 62

	61	62	63	64	65	66	67	68	69	70
	Work	Retirement								
Accrued OP		14,366								11,766
Claim as of 62		14,366	"	"	"	"	"	"	"	=
Adjustment as of 62		-2,600	"	"	"	"	"	"	"	+
Defer to claim as of 70		0								+
Adjustment as of 70										0
Accrued as of 62										0
Adjustment as of 70										0
Accrued SP					9,282					"
Claim as of 65					9,282	"	"	"	"	=
Adjustment as of 65					0	"	"	"	"	+
Defer to claim as of 70					0					+
Adjustment as of 70										0
OP (gross)	-	11,766	"	"	"	"	"	"	"	"
SP (gross)	-	-	-	-	9,282	"	"	"	"	"
Work inc. (gross)	30,000	-	-	-	-	-	-	-	-	-
Total inc. (gross)	30,000	11,766	"	"	21,048	"	"	"	"	"
Rep. rate (gross)		39%	"	"	70%	"	"	"	"	"
Tax basis	30,053	11,766	"	"	21,048	"	"	"	"	"
Tax	11,059	3,936	"	"	3,514	"	"	"	"	"
Tax cr. general	1,987	"	"	"	925	"	"	"	"	"
Tax cr. emp. per.	1,489	-	-	-	-	-	-	-	-	-
Tax cr. emp. per. red.	0	-	-	-	-	-	-	-	-	-
Tax cr. eld.	-	-	-	-	684	"	"	"	"	"
Tax cr. eld. sin.	-	-	-	-	0	"	"	"	"	"
Tax cr. sin. par.	-	-	-	-	-	-	-	-	-	-
Tax cr. sin. par. sup.	-	-	-	-	-	-	-	-	-	-
Tax cr. combi.	-	-	-	-	-	-	-	-	-	-
Tax cr. work bonus	-	-	-	-	-	-	-	-	-	-
Tax cr. total	3,476	1,987	1,987	1,987	1,609	"	"	"	"	"
OP prem.	1,927	-	-	-	-	-	-	-	-	-
I.r. HI prem. w.i.	1,979	-	-	-	-	-	-	-	-	-
I.r. HI prem. OP	-	582	"	"	"	"	"	"	"	"
I.r. HI prem. SP	-	-	-	-	654	"	"	"	"	"
I.r. HI prem. w.i. com.	1,979	-	-	-	-	-	-	-	-	-
F.r. HI prem.	2,524	"	"	"	"	"	"	"	"	"
F.r. HI prem. com.	1,024	1,936	"	"	1,472	"	"	"	"	"
Total inc. (net)	18,991	8,647	"	"	16,855	"	"	"	"	"
Rep. rate (net)		46%	"	"	89%	"	"	"	"	"

Notes: 1. All amounts are in euros. 2. Ditto marks (") indicate the repetition of the amount presented next to it. 3. Parameter assumptions: OP parameters: Pensionable income: €29,441. SP offset: €10,500. OP base: €18,941. Accrual rate: 0.0205. Domestic situation: Not single. Age started working: 25. Years of work at 65th birthday: 40. Pension trade-off: 0.00. Claim OP: 1.00. Defer OP: 0.00. SP parameters: SP base: €9,282. Accrual rate: 0.02. Domestic situation: Not single. Age started insured: 15. Years of insurance at 65th birthday: 50. Claim SP: 1.00. Defer SP: 0.00. Work income parameters: Work income: €30,000. FTE during work: 1.00. FTE during partial retirement: 0.00. Deductions and compensations parameters: HI premium compensation domestic situation: Not single. Tax credit domestic situation: Not single.

Table 6

Scenario of partial retirement at age 65

	61	62	63	64	65	66	67	68	69	70
	Work				Partial Retirement					Ret.
Accrued OP					15,531					20,529
Claim as of 65					7,766	"	"	"	"	=
Adjustment as of 65					0	"	"	"	"	+
Defer to claim as of 70					7,766					+
Adjustment as of 70										3,580
Accrued as of 65										+
Adjustment as of 70										971
Accrued SP					9,282					+
Claim as of 65					4,641	"	"	"	"	10,952
Adjustment as of 65					0	"	"	"	"	=
Defer to claim as of 70					4,641					"
Adjustment as of 70										+
OP (gross)	-	-	-	-	7,766	"	"	"	"	20,529
SP (gross)	-	-	-	-	4,641	"	"	"	"	10,870
Work inc. (gross)	30,000	"	"	"	15,000	"	"	"	"	-
Total inc. (gross)	30,000	"	"	"	27,407	"	"	"	"	31,399
Rep. rate (gross)					91%					105%
Tax basis	30,053	"	"	"	27,433	"	"	"	"	31,339
Tax	11,059	"	"	"	5,049	"	"	"	"	6,003
Tax cr. general	1,987	"	"	"	925	"	"	"	"	"
Tax cr. emp. per.	1,489	"	"	"	1,057	"	"	"	"	-
Tax cr. emp. per. red.	0	"	"	"	0	"	"	"	"	-
Tax cr. eld.	-	-	-	-	684	"	"	"	"	"
Tax cr. eld. sin.	-	-	-	-	0	"	"	"	"	"
Tax cr. sin. par.	-	-	-	-	-	-	-	-	-	"
Tax cr. sin. par. sup.	-	-	-	-	-	-	-	-	-	-
Tax cr. combi.	-	-	-	-	-	-	-	-	-	-
Tax cr. work bonus	-	1,048	1,467	2,096	119	"	60	-	-	-
Tax cr. total	3,476	4,524	4,943	5,572	2,785	"	2,726	"	"	1,609
OP prem.	1,927	"	"	"	963	"	"	"	"	-
I.r. HI prem. w.i.	1,979	"	"	"	990	"	"	"	"	-
I.r. HI prem. OP	-	-	-	-	384	"	"	"	"	1,016
I.r. HI prem. SP	-	-	-	-	327	"	"	"	"	766
I.r. HI prem. w.i. com.	1,979	"	"	"	990	"	"	"	"	-
F.r. HI prem.	2,524	"	"	"	"	"	"	"	"	2,524
F.r. HI prem. com.	1,024	"	"	"	1,154	"	"	"	"	954
Total inc. (net)	18,991	20,039	20,458	21,087	22,098	"	22,038	"	"	23,653
Rep. rate (net)					116%	"	116%	"	"	125%

Notes: 1. All amounts are in euros. 2. Ditto marks (") indicate the repetition of the amount presented next to it. 3. Parameter assumptions: OP parameters: Pensionable income: €29,441. SP offset: €10,500. OP base: €18,941. Accrual rate: 0.0205. Domestic situation: Not single. Age started working: 25. Years of work at 65th birthday: 40. Pension trade-off: 0.00. Claim OP: 0.50. Defer OP: 0.50. SP parameters: SP base: €9,282. Accrual rate: 0.02. Domestic situation: Not single. Age started insured: 15. Years of insurance at 65th birthday: 50. Claim SP: 0.50. Defer SP: 0.50. Work income parameters: Work income: €30,000. FTE during work: 0.00. FTE during partial retirement: 1.00. Deductions and compensations parameters: HI premium compensation domestic situation: Not single. Tax credit domestic situation: Not single.

Table 7

Scenario of partial retirement at age 65 with pension trade-off

	61	62	63	64	65	66	67	68	69	70
	Work				Partial Retirement					Ret.
Accrued OP					15,531					19,813
Claim as of 65					9,319					7,050
Adjustment as of 65					0	"	"	"	"	"
Defer to claim as of 70					7,766					"
Adjustment as of 70										3,580
Accrued as of 65										971
Adjustment as of 70										447
Accrued SP					9,282					10,870
Claim as of 65					4,641	"	"	"	"	"
Adjustment as of 65					0	"	"	"	"	"
Defer to claim as of 70					4,641					"
Adjustment as of 70										1,587
OP (gross)	-	-	-	-	9,319	"	"	"	"	19,813
SP (gross)	-	-	-	-	4,641	"	"	"	"	10,870
Work inc. (gross)	30,000	"	"	"	15,000	"	"	"	"	-
Total inc. (gross)	30,000	"	"	"	28,960	"	"	"	"	30,683
Rep. rate (gross)					97%					102%
Tax basis	30,053	"	"	"	28,986	"	"	"	"	30,683
Tax	11,059	"	"	"	5,423	"	"	"	"	5,831
Tax cr. general	1,987	"	"	"	925	"	"	"	"	"
Tax cr. emp. per.	1,489	"	"	"	1,057	"	"	"	"	-
Tax cr. emp. per. red.	0	"	"	"	0	"	"	"	"	-
Tax cr. eld.	-	-	-	-	684	"	"	"	"	"
Tax cr. eld. sin.	-	-	-	-	0	"	"	"	"	"
Tax cr. sin. par.	-	-	-	-	-	-	-	-	-	-
Tax cr. sin. par. sup.	-	-	-	-	-	-	-	-	-	-
Tax cr. combi.	-	-	-	-	-	-	-	-	-	-
Tax cr. work bonus	-	1,048	1,467	2,096	119	"	60	-	-	-
Tax cr. total	3,476	4,524	4,943	5,572	2,785	"	2,726	"	"	1,609
OP prem.	1,927	"	"	"	963	"	"	"	"	-
I.r. HI prem. w.i.	1,979	"	"	"	990	"	"	"	"	-
I.r. HI prem. OP	-	-	-	-	461	"	"	"	"	981
I.r. HI prem. SP	-	-	-	-	327	"	"	"	"	766
I.r. HI prem. w.i. com.	1,979	"	"	"	990	"	"	"	"	-
F.r. HI prem.	2,524	"	"	"	"	"	"	"	"	2,524
F.r. HI prem. com.	1,024	"	"	"	1,076	"	"	"	"	990
Total inc. (net)	18,991	20,039	20,458	21,087	23,123	"	23,064	"	"	23,181
Rep. rate (net)					122%	"	121%	"	"	122%

Notes: 1. All amounts are in euros. 2. Ditto marks (") indicate the repetition of the amount presented next to it. 3. Parameter assumptions: OP parameters: Pensionable income: €29,441. SP offset: €10,500. OP base: €18,941. Accrual rate: 0.0205. Domestic situation: Not single. Age started working: 25. Years of work at 65th birthday: 40. Pension trade-off: 0.20. Claim OP: 0.50. Defer OP: 0.50. SP parameters: SP base: €9,282. Accrual rate: 0.02. Domestic situation: Not single. Age started insured: 15. Years of insurance at 65th birthday: 50. Claim SP: 0.50. Defer SP: 0.50. Work income parameters: Work income: €30,000. FTE during work: 0.00. FTE during partial retirement: 1.00. Deductions and compensations parameters: HI premium compensation domestic situation: Not single. Tax credit domestic situation: Not single.

Table 8

Actuarial factors for earlier and later retirement than at age 65

Retirement age	Actuarial factor	
	Occupational pension scheme	State pension scheme
60	0.724	-
61	0.770	-
62	0.819	-
63	0.874	-
64	0.934	-
65	1.000	1.000
66	1.074	1.054
67	1.155	1.114
68	1.246	1.181
69	1.347	1.256
70	1.461	1.342

Source: The actuarial factors of the occupational pension scheme are obtained from Stichting Pensioenfonds ABP (2010b). The actuarial factors of the state pension scheme are authors' calculation according Ministerie van Sociale Zaken en Werkgelegenheid (2008).

Table 9

Actuarial factors for pension trade-off

Retirement age	Age at which the occupational pension is decreased or increased for the remaining lifetime								
	62	63	64	65	66	67	68	69	70
60	0.132	0.207	0.290	0.380	-	-	-	-	-
61		0.136	0.214	0.299	0.394	-	-	-	-
62			0.140	0.221	0.310	0.408	-	-	-
63				0.145	0.228	0.321	0.424	-	-
64					0.150	0.237	0.333	0.441	-
65						0.155	0.246	0.347	0.461

Source: Stichting Pensioenfonds ABP (2010b). Note: The ages in the left column refers to the retirement age (t) at which the pension is increased or decreased, and the ages in the top row refers to the later age ($t + n$) at which the pension is subsequently decreased or increased, respectively, for the remaining lifetime. The table presents factors only for selected retirement ages. The factors in the upper right section are not presented as they are not used in the analysis. For the complete set of factors see Stichting Pensioenfonds ABP (2010b).

Table 10

Calculation of the basis for wage tax and national insurance premiums

	Gross salary
-	OP premiums
-	Company saving scheme premium
+	Wage in kind excluding private car use
+	Claims for future income
=	Basis for employee insurance premiums
-	Unemployment Insurance premium
-	Life-cycle savings scheme premium
+	Private car use
=	Basis for income-related HI premiums
+	Income-related HI premium work income compensation
=	Basis for wage tax and national insurance premiums

Source: Belastingdienst (2010a).

Table 11

Premiums for the health insurance schemes

Premium type	Premium rate
Flat-rate HI single	€1,262
Flat-rate HI with partner	€2,524
Income-related HI work income	7.05%
Income-related HI OP	4.95%
Income-related HI SP	7.05%

Source: Belastingdienst (2010a). Notes: HI refers to health insurance. The maximum amount of each income-related health insurance premium is €33,189. The flat-rate premium will vary from one insurer to the other. The presented rate is approximately the market average according to Belastingdienst (2010a).

Table 12

Calculation of the flat-rate health insurance premium compensation

Domestic situation	Total income (€)	Amount (€)
Single	≤ 33,743	$1,262 - (527 + 0.05 * (TI - 19,528))$
With partner	≤ 50,000	$2,524 - (976 + 0.05 * (TI - 19,528))$

Source: Belastingdienst (2010b). Note: TI refers to total income.

Table 13

Tax brackets and tax rates for income tax and national insurance premiums

Bracket	Annual income (€)	Premium type	Premium rate (%)	
			< Age 65	≥ Age 65
1	0 - 18,218	AOW	17.90	-
		ANW	1.10	1.10
		AWBZ	12.15	12.15
		Wage	2.30	2.30
		Total	33.45	15.55
2	18,219 - 32,738	AOW	17.90	-
		ANW	1.10	1.10
		AWBZ	12.15	12.15
		Wage	10.80	10.80
		Total	41.95	24.05
3	32,739 - 54,367	AOW	17.90	17.90
		ANW	1.10	1.10
		AWBZ	12.15	12.15
		Wage	10.85	10.85
		Total	42.00	42.00
4	≥ 54,368	AOW	17.90	17.90
		ANW	1.10	1.10
		AWBZ	12.15	12.15
		Wage	20.85	20.85
		Total	52.00	52.00

Source: Belastingdienst (2010a). Note: The national insurance premiums are for the old age pension insurance (AOW), surviving dependants' pension insurance (ANW) and general exceptional medical expenses insurance (AWBZ) schemes.

Table 14
Tax credits

Credit type	Credit basis	Credit basis amount (€)	Credit rate (%)		Credit amount (€)		Credit maximum (€)	
			< Age 65	≥ Age 65	< Age 65	≥ Age 65	< Age 65	≥ Age 65
General tax credit	Tax basis	-	-	-	1,987	925	-	-
Employed person's tax credit	Tax basis	0 - 9,041 ≥ 9,042	1.737 11.888	0.807 8.779	CB * CR (CB - 9,042) * CR	-	-	1,489 1,057
Employed person's tax credit reduction	Work income	0 - 43,385 ≥ 43,386	- 1.250	- 0.581	- (CB - 43,386) * CR	-	-	56 56
Elderly person's tax credit	Total income	0 - 34,933 ≥ 34,934	- -	- -	- -	684 -	- -	- -
Elderly single person's tax credit	-	-	-	-	-	418	-	-
Single parent's tax credit	-	-	-	-	945	440	-	-
Single parent's supplementary tax credit	Work income	-	4.300	4.300	CB * CR	-	-	1,513 705
Combination tax credit	Work income	0 - 4,706 4,707 - 33,233	- 3.800	- 1.770	- (CB - 4,707) * CR + FR	-	-	1,859 865
Work bonus	Work income	0 - 9,041 9042 - 55,840	- 5.000 7.000 10.000	- 2.000 2.000 1.000	- (CB - 9,042) * CR	-	-	2,340 936 936 4,679

Source: Belastingdienst (2010a). Notes: CB refers to the credit basis amount, CR refers to the credit rate, and FR refers to a flat-rate credit. Single parent's tax credit: To be eligible for the credit the person should have no tax partner, have a child younger than 27 years old. Single parent's supplementary tax credit: To be eligible for the credit the household should be receiving the single parent's tax credit and have income from work, and have a child younger than 16 years old. Combination tax credit: It amounts to €775 before age 65 and €360 as of age 65. To be eligible for the credit the person should be entitled to the Single parent's supplementary tax credit, have income from work, have children under 12 years old, and be single. Work bonus: To be eligible for the credit the person should have income from work. The presented credit rates and the credit maximum amounts refer to those at ages 62, 63, 64, 65, 66 and 67.

Table 15
Calculation of income after tax and health insurance payments

Gross income
- OP premiums
- Tax
+ Tax credits
- Income-related HI premium work income
- Income-related HI premium OP
- Income-related HI premium SP
+ Income-related HI premium work income compensation
- Flat-rate HI premium
+ Flat-rate HI premium compensation
= Net income

Source: Belastingdienst (2010a) and authors' calculation.

Table 16

Lifetime financial impact of deferring the state pension

# of yrs deferred	Life expectancy	Domestic situation	
		With a partner	Single
2	16.47 (for men at 67)	-348	-482
3	15.71 (68)	-243	-335
4	14.96 (69)	104	168
5	14.23 (70)	775	1,136
2	19.55 (for wom. at 67)	2,100	3,033
3	18.73 (68)	3,587	5,159
4	17.91 (69)	5,426	7,803
5	17.10 (70)	7,709	11,084

Notes: Amounts in euros. The table assumes that the beneficiary never worked and therefore never received work income or built up occupational pension. The life expectancy figures are for the year 2010 and obtained from the Central Bureau of Statistics of Netherlands.

Table 17

Gross replacement rates under baseline parameter values

Full retirement age	Replacement rate at the indicated age											
	60	61	62	63	64	65	66	67	68	69	70	
60	0.33	0.33	0.33	0.33	0.33	0.64	0.64	0.64	0.64	0.64	0.64	
61	-	0.36	0.36	0.36	0.36	0.67	0.67	0.67	0.67	0.67	0.67	
62	-	-	0.39	0.39	0.39	0.70	0.70	0.70	0.70	0.70	0.70	
63	-	-	-	0.43	0.43	0.74	0.74	0.74	0.74	0.74	0.74	
64	-	-	-	-	0.47	0.78	0.78	0.78	0.78	0.78	0.78	
65	-	-	-	-	-	0.83	0.83	0.83	0.83	0.83	0.83	
66	-	-	-	-	-	-	0.90	0.90	0.90	0.90	0.90	
67	-	-	-	-	-	-	-	0.97	0.97	0.97	0.97	
68	-	-	-	-	-	-	-	-	1.06	1.06	1.06	
69	-	-	-	-	-	-	-	-	-	1.16	1.16	
70	-	-	-	-	-	-	-	-	-	-	1.27	
Partial retirement age												
60 (5 yrs)	0.66*	0.66*	0.66*	0.66*	0.66*	0.73	0.73	0.73	0.73	0.73	0.73	
61	-	0.68*	0.68*	0.68*	0.68*	0.83*	0.78	0.78	0.78	0.78	0.78	
62	-	-	0.70*	0.70*	0.70*	0.85*	0.85*	0.84	0.84	0.84	0.84	
63	-	-	-	0.71*	0.71*	0.87*	0.87*	0.87*	0.90	0.90	0.90	
64	-	-	-	-	0.74*	0.89*	0.89*	0.89*	0.89*	0.97	0.97	
65	-	-	-	-	-	0.91*	0.91*	0.91*	0.91*	0.91*	1.05	
60 (4 yrs)	0.66*	0.66*	0.66*	0.66*	0.40	0.71	0.71	0.71	0.71	0.71	0.71	
61	-	0.68*	0.68*	0.68*	0.68*	0.75	0.75	0.75	0.75	0.75	0.75	
62	-	-	0.70*	0.70*	0.70*	0.85*	0.80	0.80	0.80	0.80	0.80	
63	-	-	-	0.71*	0.71*	0.87*	0.87*	0.86	0.86	0.86	0.86	
64	-	-	-	-	0.74*	0.89*	0.89*	0.89*	0.92	0.92	0.92	
65	-	-	-	-	-	0.91*	0.91*	0.91*	0.91*	0.99	0.99	
60 (3 yrs)	0.66*	0.66*	0.66*	0.38	0.38	0.69	0.69	0.69	0.69	0.69	0.69	
61	-	0.68*	0.68*	0.68*	0.42	0.72	0.72	0.72	0.72	0.72	0.72	
62	-	-	0.70*	0.70*	0.70*	0.76	0.76	0.76	0.76	0.76	0.76	
63	-	-	-	0.71*	0.71*	0.87*	0.82	0.82	0.82	0.82	0.82	
64	-	-	-	-	0.74*	0.89*	0.89*	0.88	0.88	0.88	0.88	
65	-	-	-	-	-	0.91*	0.91*	0.91*	0.94	0.94	0.94	
60 (2 yrs)	0.66*	0.66*	0.36	0.36	0.36	0.67	0.67	0.67	0.67	0.67	0.67	
61	-	0.68*	0.68*	0.39	0.39	0.70	0.70	0.70	0.70	0.70	0.70	
62	-	-	0.70*	0.70*	0.43	0.74	0.74	0.74	0.74	0.74	0.74	
63	-	-	-	0.71*	0.71*	0.78	0.78	0.78	0.78	0.78	0.78	
64	-	-	-	-	0.74*	0.89*	0.84	0.84	0.84	0.84	0.84	
65	-	-	-	-	-	0.91*	0.91*	0.90	0.90	0.90	0.90	

Notes: The replacement rates with an asterisk (*) represents those during partial retirement. Assumptions about full retirement as in Table 4: FTE during partial retirement is 1.00. Defer OP is 1.00. Defer SP is 1.00. Assumptions about partial retirement as in Table 6: FTE during partial retirement is 0.50. Defer OP is 0.50. Defer SP is 0.50. The table shows the replacement rates before taxes and any contributions.

Table 18

Net replacement rates under baseline parameter values

Full retirement age	Replacement rate at the indicated age										
	60	61	62	63	64	65	66	67	68	69	70
60	0.40	0.40	0.40	0.40	0.40	0.82	0.82	0.82	0.82	0.82	0.82
61	-	0.43	0.43	0.43	0.43	0.85	0.85	0.85	0.85	0.85	0.85
62	-	-	0.46	0.46	0.46	0.89	0.89	0.89	0.89	0.89	0.89
63	-	-	-	0.49	0.49	0.93	0.93	0.93	0.93	0.93	0.93
64	-	-	-	-	0.53	0.97	0.97	0.97	0.97	0.97	0.97
65	-	-	-	-	-	1.02	1.02	1.02	1.02	1.02	1.02
66	-	-	-	-	-	-	1.09	1.09	1.09	1.09	1.09
67	-	-	-	-	-	-	-	1.17	1.17	1.17	1.17
68	-	-	-	-	-	-	-	-	1.26	1.26	1.26
69	-	-	-	-	-	-	-	-	-	1.32	1.32
70	-	-	-	-	-	-	-	-	-	-	1.40
Partial retirement age											
60 (5 yrs)	0.76*	0.76*	0.77*	0.78*	0.79*	0.92	0.92	0.92	0.92	0.92	0.92
61	-	0.77*	0.78*	0.79*	0.80*	1.08*	0.97	0.97	0.97	0.97	0.97
62	-	-	0.80*	0.80*	0.81*	1.10*	1.10*	1.03	1.03	1.03	1.03
63	-	-	-	0.82*	0.83*	1.12*	1.12*	1.11*	1.09	1.09	1.09
64	-	-	-	-	0.84*	1.14*	1.14*	1.14*	1.14*	1.16	1.16
65	-	-	-	-	-	1.16*	1.16*	1.16*	1.16*	1.16*	1.25
60 (4 yrs)	0.76*	0.76*	0.77*	0.78*	0.46	0.90	0.90	0.90	0.90	0.90	0.90
61	-	0.77*	0.78*	0.79*	0.80*	0.94	0.94	0.94	0.94	0.94	0.94
62	-	-	0.80*	0.80*	0.81*	1.10*	0.99	0.99	0.99	0.99	0.99
63	-	-	-	0.82*	0.83*	1.12*	1.12*	1.05	1.05	1.05	1.05
64	-	-	-	-	0.84*	1.14*	1.14*	1.14*	1.11	1.11	1.11
65	-	-	-	-	-	1.16*	1.16*	1.16*	1.16*	1.19	1.19
60 (3 yrs)	0.76*	0.76*	0.77*	0.44	0.44	0.87	0.87	0.87	0.87	0.87	0.87
61	-	0.77*	0.78*	0.79*	0.48	0.91	0.91	0.91	0.91	0.91	0.91
62	-	-	0.80*	0.80*	0.81*	0.95	0.95	0.95	0.95	0.95	0.95
63	-	-	-	0.82*	0.83*	1.12*	1.01	1.01	1.01	1.01	1.01
64	-	-	-	-	0.84*	1.14*	1.14*	1.07	1.07	1.07	1.07
65	-	-	-	-	-	1.16*	1.16*	1.16*	1.14	1.14	1.14
60 (2 yrs)	0.76*	0.76*	0.43	0.43	0.43	0.85	0.85	0.85	0.85	0.85	0.85
61	-	0.77*	0.78*	0.46	0.46	0.89	0.89	0.89	0.89	0.89	0.89
62	-	-	0.80*	0.80*	0.49	0.93	0.93	0.93	0.93	0.93	0.93
63	-	-	-	0.82*	0.83*	0.97	0.97	0.97	0.97	0.97	0.97
64	-	-	-	-	0.84*	1.14*	1.03	1.03	1.03	1.03	1.03
65	-	-	-	-	-	1.16*	1.16*	1.09	1.09	1.09	1.09

Notes: The replacement rates with an asterisk (*) represents those during partial retirement. Assumptions about full retirement as in Table 4: FTE during partial retirement is 1.00. Defer OP is 1.00. Defer SP is 1.00. Assumptions about partial retirement as in Table 6: FTE during partial retirement is 0.50. Defer OP is 0.50. Defer SP is 0.50. The table shows the replacement rates net of taxes and any contributions. Other assumptions: Work income is €30,000. Domestic situation is not single. Service length is 40 years. Full-time equivalent during the career years is 1.00.

Table 19

Net replacement rates when there is no state pension deferral

Full retirement age	Replacement rate at the indicated age										
	60	61	62	63	64	65	66	67	68	69	70
60	0.40	0.40	0.40	0.40	0.40	0.82	0.82	0.82	0.82	0.82	0.82
61	-	0.43	0.43	0.43	0.43	0.85	0.85	0.85	0.85	0.85	0.85
62	-	-	0.46	0.46	0.46	0.89	0.89	0.89	0.89	0.89	0.89
63	-	-	-	0.49	0.49	0.93	0.93	0.93	0.93	0.93	0.93
64	-	-	-	-	0.53	0.97	0.97	0.97	0.97	0.97	0.97
65	-	-	-	-	-	1.02	1.02	1.02	1.02	1.02	1.02
66	-	-	-	-	-	-	1.07	1.07	1.07	1.07	1.07
67	-	-	-	-	-	-	-	1.13	1.13	1.13	1.13
68	-	-	-	-	-	-	-	-	1.20	1.20	1.20
69	-	-	-	-	-	-	-	-	-	1.28	1.28
70	-	-	-	-	-	-	-	-	-	-	1.32
Partial retirement age											
60 (5 yrs)	0.76*	0.76*	0.77*	0.78*	0.79*	0.92	0.92	0.92	0.92	0.92	0.92
61	-	0.77*	0.78*	0.79*	0.80*	1.24*	0.96	0.96	0.96	0.96	0.96
62	-	-	0.80*	0.80*	0.81*	1.25*	1.25*	1.01	1.01	1.01	1.01
63	-	-	-	0.82*	0.83*	1.27*	1.27*	1.27*	1.06	1.06	1.06
64	-	-	-	-	0.84*	1.30*	1.30*	1.29*	1.29*	1.12	1.12
65	-	-	-	-	-	1.32*	1.32*	1.32*	1.32*	1.32*	1.19
60 (4 yrs)	0.76*	0.76*	0.77*	0.78*	0.46	0.90	0.90	0.90	0.90	0.90	0.90
61	-	0.77*	0.78*	0.79*	0.80*	0.94	0.94	0.94	0.94	0.94	0.94
62	-	-	0.80*	0.80*	0.81*	1.25*	0.98	0.98	0.98	0.98	0.98
63	-	-	-	0.82*	0.83*	1.27*	1.27*	1.03	1.03	1.03	1.03
64	-	-	-	-	0.84*	1.30*	1.30*	1.29*	1.09	1.09	1.09
65	-	-	-	-	-	1.32*	1.32*	1.32*	1.32*	1.15	1.15
60 (3 yrs)	0.76*	0.76*	0.77*	0.44	0.44	0.87	0.87	0.87	0.87	0.87	0.87
61	-	0.77*	0.78*	0.79*	0.48	0.91	0.91	0.91	0.91	0.91	0.91
62	-	-	0.80*	0.80*	0.81*	0.95	0.95	0.95	0.95	0.95	0.95
63	-	-	-	0.82*	0.83*	1.27*	1.00	1.00	1.00	1.00	1.00
64	-	-	-	-	0.84*	1.30*	1.30*	1.05	1.05	1.05	1.05
65	-	-	-	-	-	1.32*	1.32*	1.32*	1.11	1.11	1.11
60 (2 yrs)	0.76*	0.76*	0.43	0.43	0.43	0.85	0.85	0.85	0.85	0.85	0.85
61	-	0.77*	0.78*	0.46	0.46	0.89	0.89	0.89	0.89	0.89	0.89
62	-	-	0.80*	0.80*	0.49	0.93	0.93	0.93	0.93	0.93	0.93
63	-	-	-	0.82*	0.83*	0.97	0.97	0.97	0.97	0.97	0.97
64	-	-	-	-	0.84*	1.30*	1.02	1.02	1.02	1.02	1.02
65	-	-	-	-	-	1.32*	1.32*	1.08	1.08	1.08	1.08

Notes: The replacement rates with an asterisk (*) represents those during partial retirement. Assumptions about full retirement: FTE during partial retirement is 1.00. Defer OP is 1.00. Defer SP is 0.00. Assumptions about partial retirement: FTE during partial retirement is 0.50. Defer OP is 0.50. Defer SP is 0.00.

Table 20

Net replacement rates when the work income is €15,000

Full retirement age	Replacement rate at the indicated age										
	60	61	62	63	64	65	66	67	68	69	70
60	0.25	0.25	0.25	0.25	0.25	0.94	0.94	0.94	0.94	0.94	0.94
61	-	0.28	0.28	0.28	0.28	0.96	0.96	0.96	0.96	0.96	0.96
62	-	-	0.30	0.30	0.30	0.98	0.98	0.98	0.98	0.98	0.98
63	-	-	-	0.33	0.33	1.01	1.01	1.01	1.01	1.01	1.01
64	-	-	-	-	0.37	1.03	1.03	1.03	1.03	1.03	1.03
65	-	-	-	-	-	1.06	1.06	1.06	1.06	1.06	1.06
66	-	-	-	-	-	-	1.13	1.13	1.13	1.13	1.13
67	-	-	-	-	-	-	-	1.20	1.20	1.20	1.20
68	-	-	-	-	-	-	-	-	1.28	1.28	1.28
69	-	-	-	-	-	-	-	-	-	1.37	1.37
70	-	-	-	-	-	-	-	-	-	-	1.46
Partial retirement age											
60 (5 yrs)	0.64*	0.64*	0.64*	0.64*	0.64*	1.00	1.00	1.00	1.00	1.00	1.00
61	-	0.65*	0.65*	0.65*	0.65*	1.09*	1.05	1.05	1.05	1.05	1.05
62	-	-	0.66*	0.66*	0.66*	1.10*	1.10*	1.09	1.09	1.09	1.09
63	-	-	-	0.67*	0.67*	1.12*	1.12*	1.12*	1.15	1.15	1.15
64	-	-	-	-	0.69*	1.13*	1.13*	1.13*	1.13*	1.20	1.20
65	-	-	-	-	-	1.15*	1.15*	1.15*	1.15*	1.15*	1.27
60 (4 yrs)	0.64*	0.64*	0.64*	0.64*	0.31	0.99	0.99	0.99	0.99	0.99	0.99
61	-	0.65*	0.65*	0.65*	0.65*	1.01	1.01	1.01	1.01	1.01	1.01
62	-	-	0.66*	0.66*	0.66*	1.10*	1.06	1.06	1.06	1.06	1.06
63	-	-	-	0.67*	0.67*	1.12*	1.12*	1.10	1.10	1.10	1.10
64	-	-	-	-	0.69*	1.13*	1.13*	1.13*	1.16	1.16	1.16
65	-	-	-	-	-	1.15*	1.15*	1.15*	1.15*	1.22	1.22
60 (3 yrs)	0.64*	0.64*	0.64*	0.29	0.29	0.97	0.97	0.97	0.97	0.97	0.97
61	-	0.65*	0.65*	0.65*	0.32	1.00	1.00	1.00	1.00	1.00	1.00
62	-	-	0.66*	0.66*	0.66*	1.02	1.02	1.02	1.02	1.02	1.02
63	-	-	-	0.67*	0.67*	1.12*	1.07	1.07	1.07	1.07	1.07
64	-	-	-	-	0.69*	1.13*	1.13*	1.12	1.12	1.12	1.12
65	-	-	-	-	-	1.15*	1.15*	1.15*	1.17	1.17	1.17
60 (2 yrs)	0.64*	0.64*	0.28	0.28	0.28	1.00	1.00	1.00	1.00	1.00	1.00
61	-	0.65*	0.65*	0.31	0.31	1.02	1.02	1.02	1.02	1.02	1.02
62	-	-	0.66*	0.66*	0.34	1.04	1.04	1.04	1.04	1.04	1.04
63	-	-	-	0.67*	0.67*	1.07	1.07	1.07	1.07	1.07	1.07
64	-	-	-	-	0.69*	1.13*	1.08	1.08	1.08	1.08	1.08
65	-	-	-	-	-	1.15*	1.15*	1.13	1.13	1.13	1.13

Notes: The replacement rates with an asterisk (*) represents those during partial retirement. The table assumes that the work income is €15,000.

Table 21

Net replacement rates when the work income is €60,000

Full retirement age	Replacement rate at the indicated age										
	60	61	62	63	64	65	66	67	68	69	70
60	0.47	0.47	0.47	0.47	0.47	0.74	0.74	0.74	0.74	0.74	0.74
61	-	0.50	0.50	0.50	0.50	0.77	0.77	0.77	0.77	0.77	0.77
62	-	-	0.54	0.54	0.54	0.83	0.83	0.83	0.83	0.83	0.83
63	-	-	-	0.58	0.58	0.89	0.89	0.89	0.89	0.89	0.89
64	-	-	-	-	0.61	0.96	0.96	0.96	0.96	0.96	0.96
65	-	-	-	-	-	1.04	1.04	1.04	1.04	1.04	1.04
66	-	-	-	-	-	-	1.14	1.14	1.14	1.14	1.14
67	-	-	-	-	-	-	-	1.26	1.26	1.26	1.26
68	-	-	-	-	-	-	-	-	1.38	1.38	1.38
69	-	-	-	-	-	-	-	-	-	1.53	1.53
70	-	-	-	-	-	-	-	-	-	-	1.56
Partial retirement age											
60 (5 yrs)	0.73*	0.73*	0.76*	0.77*	0.79*	0.88	0.88	0.88	0.88	0.88	0.88
61	-	0.75*	0.78*	0.79*	0.81*	1.04*	0.95	0.95	0.95	0.95	0.95
62	-	-	0.80*	0.81*	0.83*	1.07*	1.07*	1.04	1.04	1.04	1.04
63	-	-	-	0.83*	0.85*	1.10*	1.10*	1.09*	1.14	1.14	1.14
64	-	-	-	-	0.88*	1.13*	1.13*	1.13*	1.13*	1.24	1.24
65	-	-	-	-	-	1.17*	1.17*	1.16*	1.16*	1.16*	1.36
60 (4 yrs)	0.73*	0.73*	0.76*	0.77*	0.55	0.84	0.84	0.84	0.84	0.84	0.84
61	-	0.75*	0.78*	0.79*	0.81*	0.90	0.90	0.90	0.90	0.90	0.90
62	-	-	0.80*	0.81*	0.83*	1.07*	0.98	0.98	0.98	0.98	0.98
63	-	-	-	0.83*	0.85*	1.10*	1.10*	1.07	1.07	1.07	1.07
64	-	-	-	-	0.88*	1.13*	1.13*	1.13*	1.17	1.17	1.17
65	-	-	-	-	-	1.17*	1.17*	1.16*	1.16*	1.28	1.28
60 (3 yrs)	0.73*	0.73*	0.76*	0.52	0.52	0.81	0.81	0.81	0.81	0.81	0.81
61	-	0.75*	0.78*	0.79*	0.56	0.86	0.86	0.86	0.86	0.86	0.86
62	-	-	0.80*	0.81*	0.83*	0.93	0.93	0.93	0.93	0.93	0.93
63	-	-	-	0.83*	0.85*	1.10*	1.02	1.02	1.02	1.02	1.02
64	-	-	-	-	0.88*	1.13*	1.13*	1.11	1.11	1.11	1.11
65	-	-	-	-	-	1.17*	1.17*	1.16*	1.21	1.21	1.21
60 (2 yrs)	0.73*	0.73*	0.50	0.50	0.50	0.78	0.78	0.78	0.78	0.78	0.78
61	-	0.75*	0.78*	0.54	0.54	0.83	0.83	0.83	0.83	0.83	0.83
62	-	-	0.80*	0.81*	0.58	0.89	0.89	0.89	0.89	0.89	0.89
63	-	-	-	0.83*	0.85*	0.97	0.97	0.97	0.97	0.97	0.97
64	-	-	-	-	0.88*	1.13*	1.05	1.05	1.05	1.05	1.05
65	-	-	-	-	-	1.17*	1.17*	1.15	1.15	1.15	1.15

Notes: The replacement rates with an asterisk (*) represents those during partial retirement. The table assumes that the work income is €60,000. In the case of full retirement at age 70, the fiscal limit is restricting the accumulation of occupational pension rights. The replacement rate of 1.56 would have been otherwise equal to 1.69.

Table 22

Net replacement rates when the service length is 20 years

Full retirement age	Replacement rate at the indicated age										
	60	61	62	63	64	65	66	67	68	69	70
60	0.20	0.20	0.20	0.20	0.20	0.60	0.60	0.60	0.60	0.60	0.60
61	-	0.23	0.23	0.23	0.23	0.63	0.63	0.63	0.63	0.63	0.63
62	-	-	0.26	0.26	0.26	0.65	0.65	0.65	0.65	0.65	0.65
63	-	-	-	0.29	0.29	0.68	0.68	0.68	0.68	0.68	0.68
64	-	-	-	-	0.31	0.71	0.71	0.71	0.71	0.71	0.71
65	-	-	-	-	-	0.74	0.74	0.74	0.74	0.74	0.74
66	-	-	-	-	-	-	0.80	0.80	0.80	0.80	0.80
67	-	-	-	-	-	-	-	0.86	0.86	0.86	0.86
68	-	-	-	-	-	-	-	-	0.92	0.92	0.92
69	-	-	-	-	-	-	-	-	-	0.99	0.99
70	-	-	-	-	-	-	-	-	-	-	1.08
Partial retirement age											
60 (5 yrs)	0.66*	0.66*	0.68*	0.68*	0.69*	0.67	0.67	0.67	0.67	0.67	0.67
61	-	0.67*	0.69*	0.69*	0.70*	0.98*	0.71	0.71	0.71	0.71	0.71
62	-	-	0.70*	0.70*	0.71*	0.99*	0.99*	0.76	0.76	0.76	0.76
63	-	-	-	0.72*	0.73*	1.00*	1.00*	1.00*	0.81	0.81	0.81
64	-	-	-	-	0.74*	1.01*	1.01*	1.01*	1.01*	0.86	0.86
65	-	-	-	-	-	1.03*	1.03*	1.03*	1.03*	1.03*	0.91
60 (4 yrs)	0.66*	0.66*	0.68*	0.68*	0.26	0.66	0.66	0.66	0.66	0.66	0.66
61	-	0.67*	0.69*	0.69*	0.70*	0.68	0.68	0.68	0.68	0.68	0.68
62	-	-	0.70*	0.70*	0.71*	0.99*	0.73	0.73	0.73	0.73	0.73
63	-	-	-	0.72*	0.73*	1.00*	1.00*	0.77	0.77	0.77	0.77
64	-	-	-	-	0.74*	1.01*	1.01*	1.01*	0.82	0.82	0.82
65	-	-	-	-	-	1.03*	1.03*	1.03*	1.03*	0.87	0.87
60 (3 yrs)	0.66*	0.66*	0.68*	0.24	0.24	0.64	0.64	0.64	0.64	0.64	0.64
61	-	0.67*	0.69*	0.69*	0.28	0.67	0.67	0.67	0.67	0.67	0.67
62	-	-	0.70*	0.70*	0.71*	0.70	0.70	0.70	0.70	0.70	0.70
63	-	-	-	0.72*	0.73*	1.00*	0.74	0.74	0.74	0.74	0.74
64	-	-	-	-	0.74*	1.01*	1.01*	0.79	0.79	0.79	0.79
65	-	-	-	-	-	1.03*	1.03*	1.03*	0.84	0.84	0.84
60 (2 yrs)	0.66*	0.66*	0.23	0.23	0.23	0.65	0.65	0.65	0.65	0.65	0.65
61	-	0.67*	0.69*	0.26	0.26	0.67	0.67	0.67	0.67	0.67	0.67
62	-	-	0.70*	0.70*	0.29	0.69	0.69	0.69	0.69	0.69	0.69
63	-	-	-	0.72*	0.73*	0.72	0.72	0.72	0.72	0.72	0.72
64	-	-	-	-	0.74*	1.01*	0.76	0.76	0.76	0.76	0.76
65	-	-	-	-	-	1.03*	1.03*	0.80	0.80	0.80	0.80

Notes: The replacement rates with an asterisk (*) represents those during partial retirement. The table assumes that the service length is 20 years.

Table 23

Net replacement rates when the full-time equivalent during partial retirement is 0.2

Partial retirement age	Replacement rate at the indicated age										
	60	61	62	63	64	65	66	67	68	69	70
60 (5 yrs)	0.55*	0.55*	0.55*	0.55*	0.55*	0.86	0.86	0.86	0.86	0.86	0.86
61	-	0.58*	0.58*	0.58*	0.58*	0.97*	0.90	0.90	0.90	0.90	0.90
62	-	-	0.61*	0.61*	0.61*	1.00*	1.00*	0.94	0.94	0.94	0.94
63	-	-	-	0.64*	0.64*	1.03*	1.03*	1.03*	0.99	0.99	0.99
64	-	-	-	-	0.68*	1.07*	1.07*	1.07*	1.07*	1.05	1.05
65	-	-	-	-	-	1.11*	1.11*	1.11*	1.11*	1.11*	1.11
60 (4 yrs)	0.55*	0.55*	0.55*	0.55*	0.42	0.85	0.85	0.85	0.85	0.85	0.85
61	-	0.58*	0.58*	0.58*	0.58*	0.89	0.89	0.89	0.89	0.89	0.89
62	-	-	0.61*	0.61*	0.61*	1.00*	0.93	0.93	0.93	0.93	0.93
63	-	-	-	0.64*	0.64*	1.03*	1.03*	0.98	0.98	0.98	0.98
64	-	-	-	-	0.68*	1.07*	1.07*	1.07*	1.03	1.03	1.03
65	-	-	-	-	-	1.11*	1.11*	1.11*	1.11*	1.09	1.09
60 (3 yrs)	0.55*	0.55*	0.55*	0.42	0.42	0.84	0.84	0.84	0.84	0.84	0.84
61	-	0.58*	0.58*	0.58*	0.45	0.88	0.88	0.88	0.88	0.88	0.88
62	-	-	0.61*	0.61*	0.61*	0.91	0.91	0.91	0.91	0.91	0.91
63	-	-	-	0.64*	0.64*	1.03*	0.96	0.96	0.96	0.96	0.96
64	-	-	-	-	0.68*	1.07*	1.07*	1.01	1.01	1.01	1.01
65	-	-	-	-	-	1.11*	1.11*	1.11*	1.07	1.07	1.07
60 (2 yrs)	0.55*	0.55*	0.41	0.41	0.41	0.83	0.83	0.83	0.83	0.83	0.83
61	-	0.58*	0.58*	0.44	0.44	0.87	0.87	0.87	0.87	0.87	0.87
62	-	-	0.61*	0.61*	0.47	0.90	0.90	0.90	0.90	0.90	0.90
63	-	-	-	0.64*	0.64*	0.95	0.95	0.95	0.95	0.95	0.95
64	-	-	-	-	0.68*	1.07*	0.99	0.99	0.99	0.99	0.99
65	-	-	-	-	-	1.11*	1.11*	1.05	1.05	1.05	1.05

Notes: The replacement rates with an asterisk (*) represents those during partial retirement. Assumptions about partial retirement as in Table 6: FTE during partial retirement is 0.20. Defer OP is 0.20. Defer SP is 0.20.

Table 24

Net replacement rates when the full-time equivalent during the career years is 0.5

Full retirement age	Replacement rate at the indicated age										
	60	61	62	63	64	65	66	67	68	69	70
60	0.40	0.40	0.40	0.40	0.40	1.08	1.08	1.08	1.08	1.08	1.08
61	-	0.44	0.44	0.44	0.44	1.11	1.11	1.11	1.11	1.11	1.11
62	-	-	0.48	0.48	0.48	1.14	1.14	1.14	1.14	1.14	1.14
63	-	-	-	0.51	0.51	1.18	1.18	1.18	1.18	1.18	1.18
64	-	-	-	-	0.54	1.22	1.22	1.22	1.22	1.22	1.22
65	-	-	-	-	-	1.27	1.27	1.27	1.27	1.27	1.27
66	-	-	-	-	-	-	1.35	1.35	1.35	1.35	1.35
67	-	-	-	-	-	-	-	1.44	1.44	1.44	1.44
68	-	-	-	-	-	-	-	-	1.53	1.53	1.53
69	-	-	-	-	-	-	-	-	-	1.64	1.64
70	-	-	-	-	-	-	-	-	-	-	1.76

Notes: Assumptions about full retirement as in Table 4: FTE during partial retirement is 0.50. Defer OP is 1.00. Defer SP is 1.00. The table assumes that the full-time equivalent during the career years is 0.50.

Table 25

Net replacement rates when the employee is single

Full retirement age	Replacement rate at the indicated age										
	60	61	62	63	64	65	66	67	68	69	70
60	0.46	0.46	0.46	0.46	0.46	1.03	1.03	1.03	1.03	1.03	1.03
61	-	0.49	0.49	0.49	0.49	1.07	1.07	1.07	1.07	1.07	1.07
62	-	-	0.53	0.53	0.53	1.11	1.11	1.11	1.11	1.11	1.11
63	-	-	-	0.56	0.56	1.16	1.16	1.16	1.16	1.16	1.16
64	-	-	-	-	0.61	1.21	1.21	1.21	1.21	1.21	1.21
65	-	-	-	-	-	1.26	1.26	1.26	1.26	1.26	1.26
66	-	-	-	-	-	-	1.35	1.35	1.35	1.35	1.35
67	-	-	-	-	-	-	-	1.41	1.41	1.41	1.41
68	-	-	-	-	-	-	-	-	1.53	1.53	1.53
69	-	-	-	-	-	-	-	-	-	1.66	1.66
70	-	-	-	-	-	-	-	-	-	-	1.81
Partial retirement age											
60 (5 yrs)	0.78*	0.78*	0.80*	0.80*	0.81*	1.15	1.15	1.15	1.15	1.15	1.15
61	-	0.80*	0.81*	0.82*	0.83*	1.20*	1.21	1.21	1.21	1.21	1.21
62	-	-	0.83*	0.83*	0.84*	1.22*	1.22*	1.28	1.28	1.28	1.28
63	-	-	-	0.85*	0.86*	1.24*	1.24*	1.24*	1.35	1.35	1.35
64	-	-	-	-	0.88*	1.26*	1.26*	1.26*	1.26*	1.41	1.41
65	-	-	-	-	-	1.29*	1.29*	1.29*	1.29*	1.29*	1.51
60 (4 yrs)	0.78*	0.78*	0.80*	0.80*	0.53	1.12	1.12	1.12	1.12	1.12	1.12
61	-	0.80*	0.81*	0.82*	0.83*	1.17	1.17	1.17	1.17	1.17	1.17
62	-	-	0.83*	0.83*	0.84*	1.22*	1.23	1.23	1.23	1.23	1.23
63	-	-	-	0.85*	0.86*	1.24*	1.24*	1.30	1.30	1.30	1.30
64	-	-	-	-	0.88*	1.26*	1.26*	1.26*	1.38	1.38	1.38
65	-	-	-	-	-	1.29*	1.29*	1.29*	1.29*	1.44	1.44
60 (3 yrs)	0.78*	0.78*	0.80*	0.51	0.51	1.10	1.10	1.10	1.10	1.10	1.10
61	-	0.80*	0.81*	0.82*	0.55	1.14	1.14	1.14	1.14	1.14	1.14
62	-	-	0.83*	0.83*	0.84*	1.19	1.19	1.19	1.19	1.19	1.19
63	-	-	-	0.85*	0.86*	1.24*	1.25	1.25	1.25	1.25	1.25
64	-	-	-	-	0.88*	1.26*	1.26*	1.32	1.32	1.32	1.32
65	-	-	-	-	-	1.29*	1.29*	1.29*	1.37	1.37	1.37
60 (2 yrs)	0.78*	0.78*	0.49	0.49	0.49	1.07	1.07	1.07	1.07	1.07	1.07
61	-	0.80*	0.81*	0.53	0.53	1.11	1.11	1.11	1.11	1.11	1.11
62	-	-	0.83*	0.83*	0.57	1.16	1.16	1.16	1.16	1.16	1.16
63	-	-	-	0.85*	0.86*	1.21	1.21	1.21	1.21	1.21	1.21
64	-	-	-	-	0.88*	1.26*	1.28	1.28	1.28	1.28	1.28
65	-	-	-	-	-	1.29*	1.29*	1.35	1.35	1.35	1.35

Notes: The replacement rates with an asterisk (*) represents those during partial retirement. The table assumes that the domestic situation is single.

Table 26

Net replacement rates when pension rights are traded off against future rights

Full retirement age	Replacement rate at the indicated age										
	60	61	62	63	64	65	66	67	68	69	70
60	0.46	0.46	0.46	0.46	0.46	0.79	0.79	0.79	0.79	0.79	0.79
61	-	0.49	0.49	0.49	0.49	0.83	0.83	0.83	0.83	0.83	0.83
62	-	-	0.53	0.53	0.53	0.87	0.87	0.87	0.87	0.87	0.87
63	-	-	-	0.57	0.57	0.91	0.91	0.91	0.91	0.91	0.91
Partial retirement age											
60 (5 yrs)	0.78*	0.78*	0.80*	0.80*	0.81*	0.91	0.91	0.91	0.91	0.91	0.91
61 (4 yrs)	-	0.80*	0.81*	0.82*	0.83*	0.92	0.92	0.92	0.92	0.92	0.92
62 (3 yrs)	-	-	0.83*	0.83*	0.84*	0.94	0.94	0.94	0.94	0.94	0.94
63 (2 yrs)	-	-	-	0.85*	0.86*	0.97	0.97	0.97	0.97	0.97	0.97

Notes: The replacement rates with an asterisk (*) represents those during partial retirement. The table assumes that the employee trades off occupational pension rights.

Table 27

Net replacement rates when the occupational pension accrual rate is 0.0155

Full retirement age	Replacement rate at the indicated age										
	60	61	62	63	64	65	66	67	68	69	70
60	0.33	0.33	0.33	0.33	0.33	0.73	0.73	0.73	0.73	0.73	0.73
61	-	0.35	0.35	0.35	0.35	0.76	0.76	0.76	0.76	0.76	0.76
62	-	-	0.37	0.37	0.37	0.79	0.79	0.79	0.79	0.79	0.79
63	-	-	-	0.40	0.40	0.82	0.82	0.82	0.82	0.82	0.82
64	-	-	-	-	0.42	0.85	0.85	0.85	0.85	0.85	0.85
65	-	-	-	-	-	0.89	0.89	0.89	0.89	0.89	0.89
66	-	-	-	-	-	-	0.94	0.94	0.94	0.94	0.94
67	-	-	-	-	-	-	-	1.01	1.01	1.01	1.01
68	-	-	-	-	-	-	-	-	1.08	1.08	1.08
69	-	-	-	-	-	-	-	-	-	1.16	1.16
70	-	-	-	-	-	-	-	-	-	-	1.26
Partial retirement age											
60 (5 yrs)	0.72*	0.72*	0.73*	0.74*	0.75*	0.81	0.81	0.81	0.81	0.81	0.81
61	-	0.73*	0.74*	0.75*	0.76*	1.04*	0.85	0.85	0.85	0.85	0.85
62	-	-	0.76*	0.76*	0.77*	1.05*	1.05*	0.90	0.90	0.90	0.90
63	-	-	-	0.78*	0.78*	1.06*	1.06*	1.06*	0.95	0.95	0.95
64	-	-	-	-	0.80*	1.08*	1.08*	1.08*	1.08*	1.01	1.01
65	-	-	-	-	-	1.10*	1.10*	1.09*	1.09*	1.09*	1.07
60 (4 yrs)	0.72*	0.72*	0.73*	0.74*	0.37	0.79	0.79	0.79	0.79	0.79	0.79
61	-	0.73*	0.74*	0.75*	0.76*	0.82	0.82	0.82	0.82	0.82	0.82
62	-	-	0.76*	0.76*	0.77*	1.05*	0.87	0.87	0.87	0.87	0.87
63	-	-	-	0.78*	0.78*	1.06*	1.06*	0.91	0.91	0.91	0.91
64	-	-	-	-	0.80*	1.08*	1.08*	1.08*	0.97	0.97	0.97
65	-	-	-	-	-	1.10*	1.10*	1.09*	1.09*	1.02	1.02
60 (3 yrs)	0.72*	0.72*	0.73*	0.36	0.36	0.78	0.78	0.78	0.78	0.78	0.78
61	-	0.73*	0.74*	0.75*	0.39	0.81	0.81	0.81	0.81	0.81	0.81
62	-	-	0.76*	0.76*	0.77*	0.84	0.84	0.84	0.84	0.84	0.84
63	-	-	-	0.78*	0.78*	1.06*	0.88	0.88	0.88	0.88	0.88
64	-	-	-	-	0.80*	1.08*	1.08*	0.93	0.93	0.93	0.93
65	-	-	-	-	-	1.10*	1.10*	1.09*	0.98	0.98	0.98
60 (2 yrs)	0.72*	0.72*	0.35	0.35	0.35	0.76	0.76	0.76	0.76	0.76	0.76
61	-	0.73*	0.74*	0.37	0.37	0.79	0.79	0.79	0.79	0.79	0.79
62	-	-	0.76*	0.76*	0.40	0.82	0.82	0.82	0.82	0.82	0.82
63	-	-	-	0.78*	0.78*	0.85	0.85	0.85	0.85	0.85	0.85
64	-	-	-	-	0.80*	1.08*	0.90	0.90	0.90	0.90	0.90
65	-	-	-	-	-	1.10*	1.10*	0.95	0.95	0.95	0.95

Notes: The replacement rates with an asterisk (*) represents those during partial retirement. The table assumes that the occupational pension accrual rate is 0.0155.

Table 28

Net replacement rates when there is no work bonus

Full retirement age	Replacement rate at the indicated age										
	60	61	62	63	64	65	66	67	68	69	70
68	0.00	0.00	0.06	0.08	0.11	0.02	0.02	0.01	1.26	1.26	1.26
Partial retirement age											
60 (5 yrs)	0.76*	0.76*	0.76*	0.76*	0.76*	0.92	0.92	0.92	0.92	0.92	0.92
61	-	0.77*	0.77*	0.77*	0.77*	1.07*	0.97	0.97	0.97	0.97	0.97
62	-	-	0.78*	0.78*	0.78*	1.09*	1.09*	1.03	1.03	1.03	1.03
63	-	-	-	0.80*	0.80*	1.11*	1.11*	1.11*	1.09	1.09	1.09
64	-	-	-	-	0.81*	1.13*	1.13*	1.13*	1.13*	1.16	1.16
65	-	-	-	-	-	1.16*	1.16*	1.16*	1.16*	1.16*	1.25

Notes: The replacement rates with an asterisk (*) represents those during partial retirement. The table assumes that there is no work bonus. The table assumes that the state pension is deferred fully and partially.