

The state pension age and inequality in old-age social security wealth in the Netherlands

International Social Security project, Phase 11

Adriaan Kalwij (Utrecht University) and Arie Kapteyn (University of Southern California)

ABSTRACT

Since the early 2010s, the state pension age (SPA) is one of the main public policy instruments in the Netherlands for inducing people to postpone retirement. The SPA has gradually increased from 65 years in 2012 to 66 years and 4 months in 2021. In the context of the Dutch old-age social security system, an increase in the SPA is hypothesized to decrease the retirement probability and to increase inequality in pension benefits entitlements. Empirical support for the two hypotheses is found with data on individuals aged 55–69 over the period 2011–2021. Inequality in old-age social security wealth has increased after 2015 for non-retirees. However, the findings do not support that this increase is because of the SPA increase.

Keywords: Inequality, old-age social security, pension benefits, retirement probability, state pension age, the Netherlands.

1. INTRODUCTION

Since the early 2010s, the state pension age (SPA) is one of the main public policy instruments in the Netherlands for inducing people to postpone retirement and receive pension benefits later in life. The SPA had been 65 from the introduction of a universal SP in 1957 until 2013. From 2013 onward the SPA gradually increased to 66 years and 10 months in 2023 (Figure 1). This chapter examines the importance of the increase in the SPA for employment rates and income inequality at older ages (Figures 2 and 3). It also examines the effect of the increase in the SPA on inequality in old-age social security wealth (SSW), i.e., in individuals' expected pension benefits over their remaining lifetime.

An increase in the SPA can affect when workers retire. First, from the SPA until death all residents receive a state pension (SP) benefit, giving workers the means to retire. Workers can, therefore, also regard the SPA as a social norm for when to retire. Furthermore, employers can terminate labor contracts without incurring severance costs and labor contracts after the SPA are often less secure than before the SPA (Article 7:669 par. 4 of the Dutch Civil Code). Second, while it is not an individual choice when to receive a SP benefit, claiming an occupational pension (OP) benefit, i.e., a private old-age pension benefit for employees, before (or after) the SPA is an individual choice. OP wealth can be used to finance retirement before the SPA, henceforth referred to as early retirement. For a given age below the SPA, an increase in the SPA requires a larger share of OP wealth to be allocated to the early retirement years if one would retire at that age with a constant annual pension benefit during retirement. Hence, an increase in the SPA can reduce the annual pension benefit entitlement and can decrease the probability of retirement at that age (Appendix A).

Further, an OP benefit is a supplement to a flat-rate SP benefit after the SPA and depends on past earnings. For a given early retirement age, the increase in the SPA has a relatively smaller adverse effect on the annual pension benefit entitlement of an individual with high OP wealth than on that of an individual with low OP wealth (Appendix A). Inequality in annual pension benefits can therefore increase with an increase in the SPA. Individuals can, however, offset the adverse effect of the increase in the SPA on their annual pension benefit entitlements by, e.g., working longer and continuing to accumulate OP wealth. Such a response suggests that workers with low earnings may extend their working lives more than those with high earnings in response to an increase in the SPA because the former group experienced a relatively larger drop in their annual pension benefit when retiring early. These considerations suggest that adverse effects of an increase in the SPA on expected pension benefits over individuals' remaining lifetime, i.e., on their SSW, can be mitigated by working longer. Because an increase in the SPA can increase inequality in pension benefits entitlements, it is hypothesized that an increase in the SPA increases inequality in SSW.

Finally, the hypothesized effects of an increase in the SPA on the retirement probability, annual pension benefits entitlements and SSW apply mostly to the younger birth cohorts, i.e., those born after 1949. These birth cohorts were mostly entitled to actuarially fair OP benefits while for those born before 1950 OP benefits were often not actuarially fairly adjusted when retiring early (Kalwij and Kapteyn, 2024). Also, the 1950 birth cohort reached the age of 65 in 2015; the year in which a supplementary SP benefit when having a younger partner was abolished (Nagore García and Van Soest, 2022).

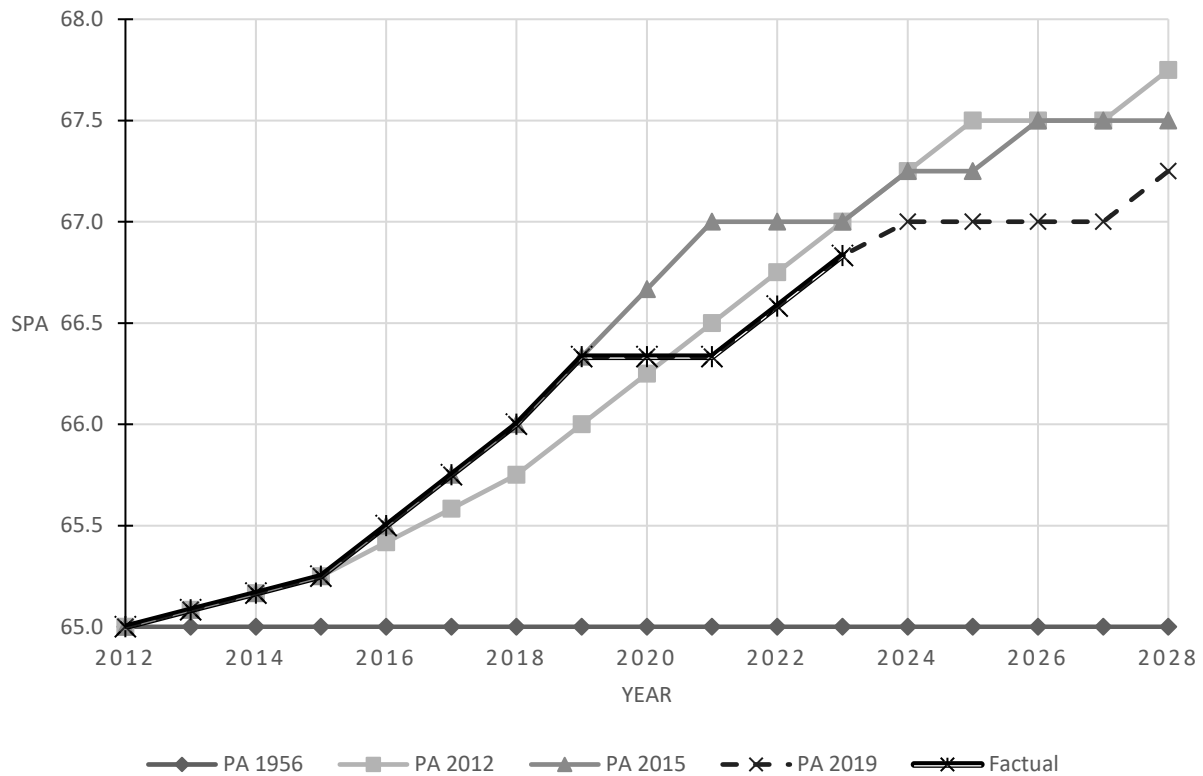


Figure 1. The state pension age (SPA) by Pension Act (PA) and calendar year

Source: wetten.overheid.nl.

Notes: The SPA over the years differs by Pension Act (PA); it is an expected SPA. The Pension Act of 1956 was in place from 1957 up to and including 2012, the Pension Act of 2012 was in place for the years 2013 and 2014, the Pension Act of 2015 was in place for the years 2016-2019, and the Pension Act of 2019 became effective in 2020. Nowadays the SPA is determined 5 years ahead based on population life expectancy forecasts. See Section 2 for details of the SP scheme.

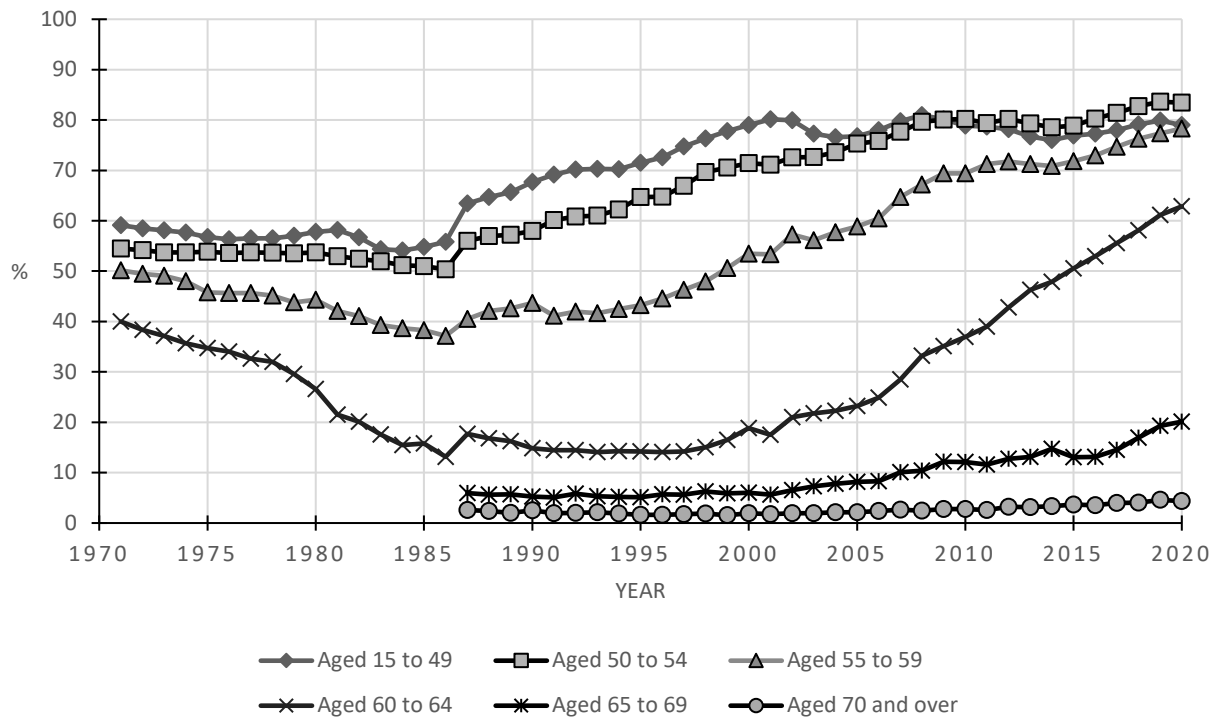


Figure 2 Employment rate by age group.

Source: OECD (Data extracted on February 24, 2023; stats.oecd.org).

Notes: Men and women are combined, as are full and part-time employment. Employment includes self-employment.

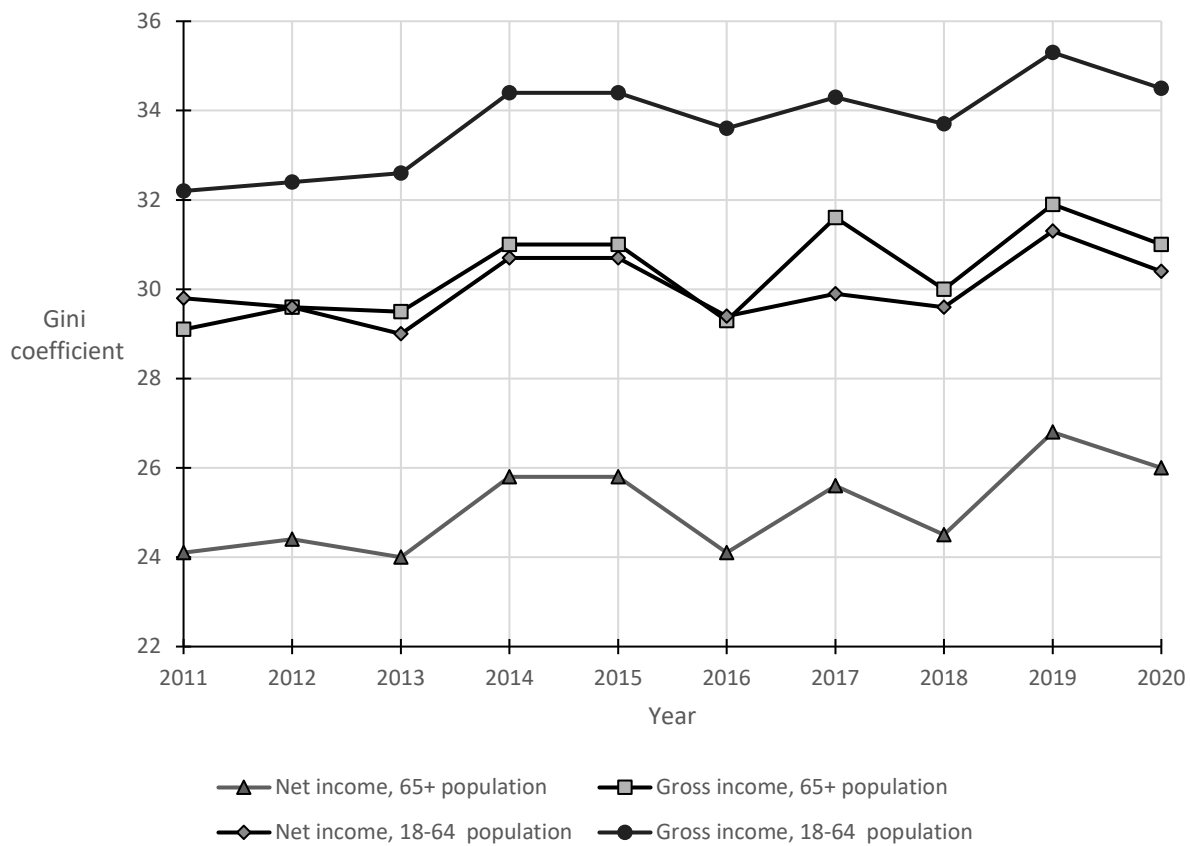


Figure 3 Income inequality for the working age population (ages 16-64) and at older ages (65+).

Source: OECD (Data extracted on March 27, 2023; stats.oecd.org).

Notes: Income refers to annual individual income.

The rest of the chapter is structured as follows. Section 2 discusses the development over time and the main ingredients of old-age social security in the Netherlands. The empirical analysis focuses on the recent period 2011-2021 for which the main policy reform to old-age social security was the increase in the SPA (Figure 1). Section 3 presents, among other things, the levels of and inequalities in individual income and pension benefits for this period. Section 3 also examines the effects of an increase in the SPA on the retirement probability, and on inequalities in pension benefits entitlements and SSW. Section 4 concludes.

2. OLD-AGE SOCIAL SECURITY IN THE NETHERLANDS

Old-age social security in the Netherlands consists of a state pension (SP) scheme and occupational pension (OP) schemes (Gateway to Global Aging Data, 2023). The latter include supplementary disability and survivor pensions schemes. These schemes are considered part of old-age social security because they are fully or partly publicly financed and regulated by public policymakers with pension laws. Appendix Table A1 provides a brief overview of the SP schemes since the early nineteenth hundreds.

2.1 State pension (SP)

A SP scheme was introduced in 1913 for wage earners through the Disability Insurance Act 1913. It was an employee insurance scheme against work-disability. From age 70 onward, (former) employees were considered work-disabled and entitled to their benefits. The scheme was a voluntary social insurance scheme with a state guarantee that provided an income supplement from age 70 onwards. The Voluntary Old-Age Pensions Act 1919 (VOV) reduced the eligibility age to 65 and eligibility was extended to non-wage earners with a low income. In 1923, the VOV scheme

was extended to all residents. The main issues with the VOV scheme were the relatively low supplemental income benefits and that many could not afford the voluntary insurance contributions. Many older people, therefore, still depended on social assistance (Poor Act 1854).

To combat poverty among older people, the Emergency Old-Age Pensions Act was put into force in 1947. It was a means tested SP scheme, publicly financed, and all residents aged 65 or over were eligible except married women. Married women were covered through their spouse receiving a higher SP. The Emergency Old-Age Pensions Act was a steppingstone towards the National Old-Age Pensions Act (AOW in Dutch) which came into force in 1957. The latter act entitled every Dutch resident to a basic old age pension benefit, referred to as a State Pension (SP) benefit. The scheme is publicly financed, i.e., it is a pay as you go scheme, and not means tested. For this scheme as well, however, its relatively low benefits remained an issue and in 1965 the SP benefit was raised to the “social minimum level”. The SP benefit was linked to the net minimum wage in 1974 and remains so to this day. From 1985 onward, men’s and women’s SP benefit entitlements were treated equally, there was no distinction between married or unmarried partners, and a supplementary allowance was introduced for pensioners with a partner younger than the SPA. The latter supplement was means tested. In 1989 it was decided that the supplementary allowance scheme would be discontinued in 2015.

Since the National Old-Age Pensions Act was put into force in 1957, the population remaining life expectancy at age 65 had risen from about 15 to 20 years around 2010 (statline.cbs.nl) and fertility rates decreased sharply during the nineteen-sixties with a below replacement level fertility since. These trends caused a relatively shrinking workforce (Figure 4): For every person over 65 there were about six persons of working age (20-64) in 1957 and four persons in 2010. Moreover, it is forecasted to further drop to two persons in 2050. Until 2013 the state pension age (SPA) remained

65, which caused an increased burden on public finances over time of the SP scheme and the financial sustainability of the scheme was at risk (OECD 2011; van Ewijk et al., 2006). Therefore, from 2013 onwards the SPA was gradually raised from 65 in 2012 to 66 and 10 months in 2023 (Pension Acts of 2012, 2015, and 2019; Figure 1). The SPA will continue to rise in line with increases in population life expectancy and is set five years in advance (Pension Act 2019). The SPA will be 67 for the years 2024-2027 and will increase by 3 months in 2028.

Finally, individuals start receiving a flat-rate SP benefit in the month after they reach their SPA. The benefit received depends on the years an individual resided in the Netherlands. The entitlement is two percent of the full SP benefit for each year residing in the Netherlands during the 50 years before the SPA. Hence, after having resided in the Netherlands for 50 years before the SPA, a full SP benefit is received from the SPA onward until death. A Dutch national who stays abroad can contribute voluntarily. Since 1974 the full SP benefit equals about 70 percent of the gross minimum wage for a single person. The minimum wage is about 1400 euros per month in 2023. Since 2015, the full SP benefit equals 50 percent of the gross minimum wage for an individual who is part of a couple (Appendix Table A1). Before 2015, a means-tested SP supplementary benefit was given to couples in which the younger spouse's age was below the SPA. Those who are not entitled to a full SP benefit can receive an income supplement (social assistance) when their income is below the full SP benefit.

2.2 Occupational pension (OP) and early retirement

With the introduction of a SP scheme in 1913 for wage earners, it was envisioned it would take at least 75 years before a universal private pension scheme could be in place without state support. Although with hindsight the latter was rather optimistic as the SP scheme remained a fully publicly financed scheme, during the twentieth century private occupational pension OP schemes have

gradually grown in importance for individuals' pension income. OP schemes, however, also rely on state support (deferred income taxation) and there is still no mandatory private pension scheme for the self-employed.

OP schemes are the result of collective bargaining by firms, industries, and unions. These schemes are most often industry specific. Almost all workers are mandatorily enrolled in their employers' OP schemes from the age of 25 (lowered to 21 in 2008) until SPA. About 96 percent of employees is covered by an OP scheme. OP schemes can differ in terms of defined benefits or defined contributions, among others, and nearly all schemes provide an annuity income from the age of retirement until death. OP schemes are legislated by national pension laws and enjoy a fiscal-friendly treatment which entails deferred income taxation and no OP wealth tax. Finally, workers enrolled in an OP scheme often have the option of taking early retirement (ER), that is to start receiving OP benefits before the SPA. The level of benefits is then actuarially adjusted.

In the late 1970s, very generous ER schemes were introduced that gradually covered almost all workers by the end of the nineteen-eighties (Kalwij and Kapteyn, 2024, and references therein). These schemes have left their mark on the retirement rates during the last four decades in terms of low employment rates at older ages (Figure 2). These generous ER schemes were usually characterized by very high net replacement rates with pension benefits that lasted until the SPA, hence no actuarially fair adjustments were applied for retiring early, and pension benefits after the SPA were calculated as if they had continued working until SPA. Thus, there was a large financial disincentive to keep working once ER was offered, which was typically around ages 58 to 62. The main political argument for having such generous ER schemes was that workers who made use of it often worked in declining industries. While unhealthy workers could claim disability insurance benefits, the healthy ones could make use of ER schemes, with equally generous options

(Jansweijer, 1996). Another argument in times of high youth unemployment was that ER schemes would create jobs for the young; an argument still often made but with little basis in fact (Kalwij, Kapteyn, & de Vos, 2010). Generous ER schemes stayed in place until 1996. From the mid-nineteen-nineties onwards, the ER schemes were targeted for reform when it became apparent that these would not be financially sustainable as they were by and large unfunded (Jansweijer, 1996). Gradually, over the period 1997-2005, most ER schemes have been made more actuarially fair (before SPA) with a typical gross replacement rate of around 70% at age 62. From 2006 onwards, workers born before 1950 faced slightly less generous ER schemes but the major ER reform affected those born after 1949. The latter younger cohorts mostly have ER schemes that are directly linked to their OP schemes and when a worker retires early, actuarially fair adjustments of OP benefits take place. Nevertheless, more generous ER benefits are still possible but discouraged through, e.g., high costs for employers.

Further, before 2004 a typical OP scheme was designed to provide a pension income (SP plus OP benefits) equal to 70% of final gross earnings at the SPA if a worker had accrued entitlements for at least 40 years in that scheme (a defined benefit scheme). While pension contracts in the Netherlands are in nominal terms, wage or price indexation of OP benefits is an ambition held by the pension funds. During the last two decades, however, retirees have on average experienced a drop in their OP benefits (Kalwij et al., 2018). Events such as the dotcom crash in 2000-2001 and the financial crisis of 2007-2008 caused indexations to be lower, on average, than the consumer price inflation index, or even absent for many years until 2022, and curtailments took place when funding ratios of pension funds were too low. In addition, from the turn of the millennium onward, active participants saw their pension premiums almost double and defined benefits were switched from being based on final salary to lifetime average salary. Therefore, the Dutch pension system

turned out to be much riskier for participants than they may have perceived before the turn of the millennium. Effective from July 1, 2023, onward is a major OP reform that aims to make the system more sustainable in terms of coping with financial risks and more transparent to participants in terms of what to expect.

The fiscal treatment of OP schemes has only recently been reformed. For instance, OP wealth accrual has been limited in absolute terms by means of a pensionable salary cap at about €110K in 2020 and in relative terms by capping pension accrual at 75 percent of average lifetime pay at the so-called pensionable age (accrued in 40 years). The pensionable age was equal to 65 until 2013 and has since increased to 68 from 2018 onwards. There are also some constraints on how early one can start receiving OP while still enjoying the fiscal advantages, often from age 60, and how many years one can delay start receiving OP, often at most until five years after the SPA.

Furthermore, nowadays pension schemes often allow participants to allocate OP wealth such that they have a higher pension income before than after the SPA. That can be an attractive option for those in bad health. Also, partial retirement before the SPA has been financially encouraged with schemes that are industry specific. Further, continuing to work after the SPA was made easier and individuals can still accrue OP wealth on a voluntary basis. Nevertheless, having reached the SPA remains a valid reason for dismissal (Article 7:669 par. 4 of the Dutch Civil Code). Finally, most OP schemes provide supplementary disability and survivors' pension benefits, supplements to state-provided disability insurance and survivors benefits (Kalwij and Kapteyn, 2024).

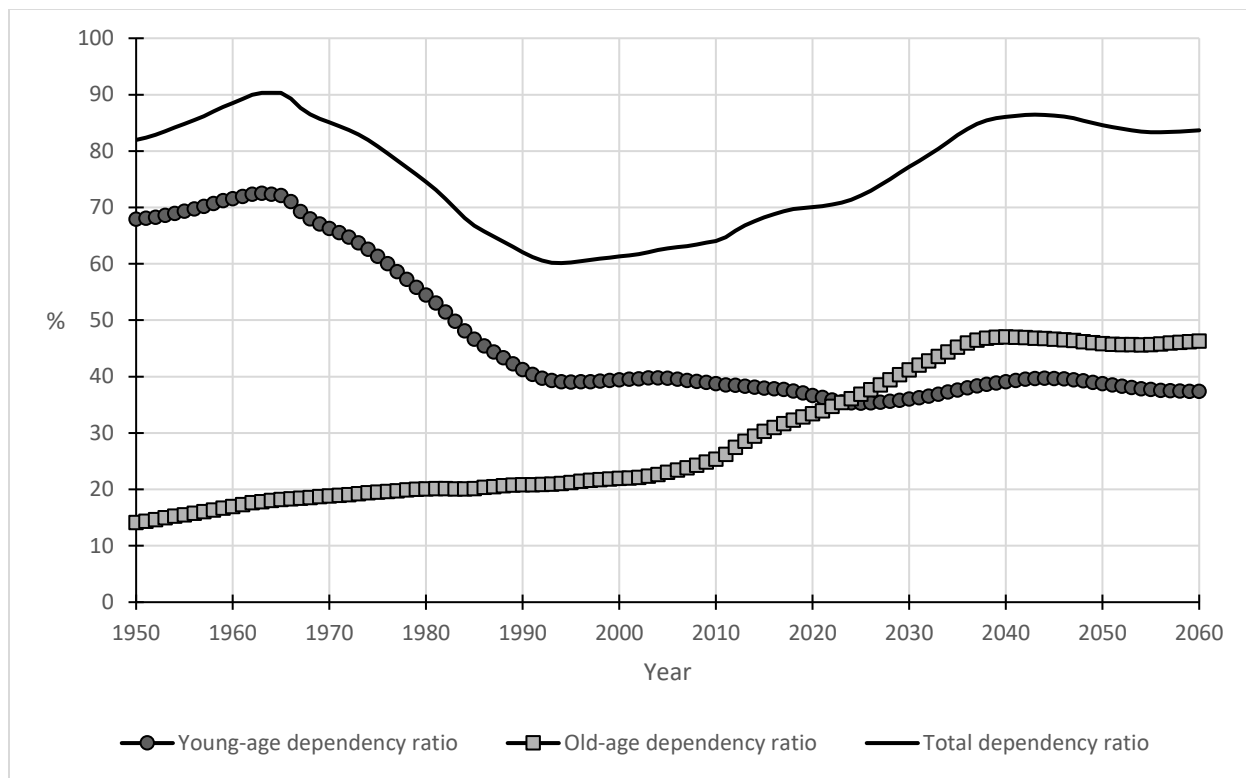


Figure 4 Dependency ratios 1950-2060.

Source: OECD (Data extracted on February 24, 2023; stats.oecd.org).

Notes: The total dependency ratio is defined as the number of people under 20 or 65 and over as a percentage of the number of people aged 20-64, the young-age dependency ratio as the number of people under 20 as a percentage of the number of people aged 20-64, and the old-age dependency ratio as the number of people 65 and over as a percentage of the number of people aged 20-64.

3. THE DATA AND EMPIRICAL ANALYSIS

The empirical results are based on the authors' own calculations using non-public microdata from Statistics Netherlands (cbs.nl). The data used cover the years 2011-2021 and pertain to about 17 million residents in the Netherlands who were alive on December 31 of a year. Data on causes of death is available until 2023. The main analysis is carried out with a sample of individuals aged 55-69. To avoid outliers affecting the analysis we dropped observations in the bottom 1% (about 5K euros) and top 1% (about 180K euros) of the annual equivalized gross household income distribution. The OECD equivalence scale factor of 1.7 is used for couples. Furthermore, for about 8% of observations variables such as SSW could not be constructed because of missing information (see Section 3.1). The estimation sample consists of about 31 million observations. Information is available on individuals' gender, years of birth and death, marital status, labor force status, gross annual earnings and income, public and occupational pensions, homeownership, and occupational pension contributions.

3.1 Definitions of variables and descriptive statistics

Age is measured in full years and equal to calendar year minus year of birth. Individuals' earnings are gross annual earnings in 2023 euros and include all income from work. Individual income is gross annual income from all sources, including gross annual pension income (which is also separately observed) and excluding household income that cannot be attributed to an individual (e.g., income from financial assets). Gross annual individual income has on average increased for non-retirees (Figure 5). For male retirees, income has decreased until 2015, arguably because of less generous pension benefits for the younger generations or insufficient indexation of OP benefits (Section 2). Arguably, the relative stronger increase in women's than in men's average income when not retired is because of increased female labor force participation over time and, therefore,

of more women being entitled to occupation pension income. The latter is reflected in the increase in women's average pension income (Figure 6).

Homeownership is a household-level variable; equal to 1 if either the individual or spouse owns the home, and equal to 0 otherwise. The homeownership rate increased from about 63 percent in 2011 to 65 percent in 2021. Marital status is a binary variable equal to 1 if an individual is married or cohabiting, and equal to 0 otherwise. The percentage of married individuals decreased from about 79 in 2011 to 75 in 2021.

Mortality is a binary variable equal to 1 if an individual died during the next calendar year (equal to 0 otherwise). The annual mortality rate at ages 55-69 decreased for men from 0.98 percent in 2011 to 0.77 percent in 2021 and decreased for women from 0.66 percent in 2011 0.5 percent in 2021 (Figure 7). The higher mortality rates in 2019 for men and in 2020 for men and women are, arguably, due to the COVID-19 pandemic.

Labor force participation (LFP) status is based on the largest source of gross annual income (Figure 8). 'Employed' refers to having paid work (including self-employment), 'nonparticipant' to having no income from work, 'unemployed' to receiving unemployment insurance or social assistance benefits, 'on disability' to receiving disability or sickness insurance benefits, and 'retired' refers to receiving public or private pension benefits. After the SPA, individuals are still entitled to sickness insurance benefits if employed, but they cannot receive unemployment insurance, social assistance, nor disability insurance benefits. Hence, after the SPA, individuals are classified as either retired or employed. The main trends for the period 2011-2021 in the labor force participation of individuals aged 55-69 are a decrease in the proportion of retired individuals (15 percentage points for men and 10 for women) and an increase in the proportion of employed individuals over time (21 percentage points for men and 25 for women). Also, the proportion of

non-participating women declined by 10 percentage points to 5 percent in 2021. Finally, the proportions of men claiming unemployment or disability insurance benefits decreased from about 15 to 8 percent (from 13 to 8 percent for women).

Individuals' average lifetime annual earnings up to age 50 (ALTE50) were predicted based on an earnings equation (Appendix B.1; Appendix Tables A2 and A3). Further, SP pension wealth is based on full SP benefits that are the same for all individuals (Appendix Table A1). OP pension wealth is based on, among other things, pension accrual, which is observed for workers, or on pension benefits for retirees (Appendix B.2). Pension wealth is defined as the sum of SP and OP wealth and its sample average is depicted in Figure 9 by gender and retirement status over time. Arguably, the difference in the levels of pension wealth between men and women are because women in the Netherlands often work part-time. The difference in the levels between retirees and non-retirees can be because the older retirees had more generous pensions (Section 2) or because the non-retirees can still accumulate pension wealth.

Income inequality has decreased for non-retired men and women (Figure 10). For retired men income inequality increased in the first half of the observation period while for retired women income inequality decreased during those years. From 2015 onward and for both genders, income inequality remained by and large unchanged, albeit with a slight decrease after 2019. The patterns for retirees are in line with those for inequality in pension income (Figure 11). While inequality in pension income differs between men and women, the changes after 2015 are similar for both genders.

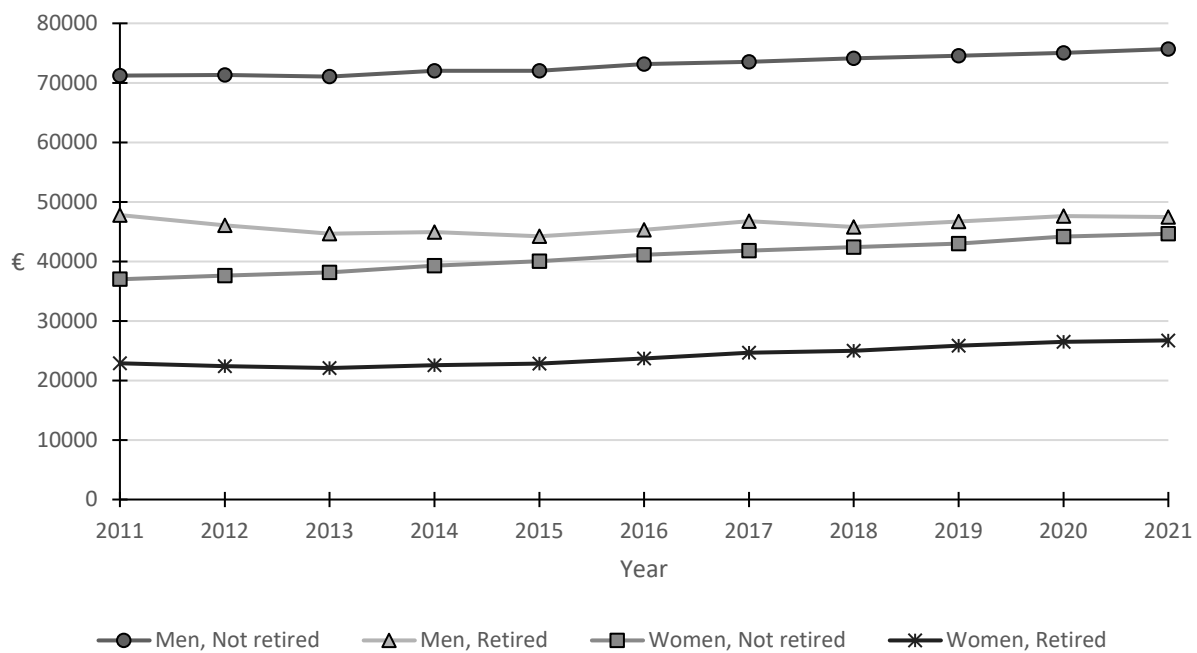


Figure 5. Average annual gross individual income by gender, retirement status and calendar year.

Source: microdata from Statistics Netherlands (cbs.nl).

Notes: A sample of individuals aged 55-69. Individual income is in 2023 euros.

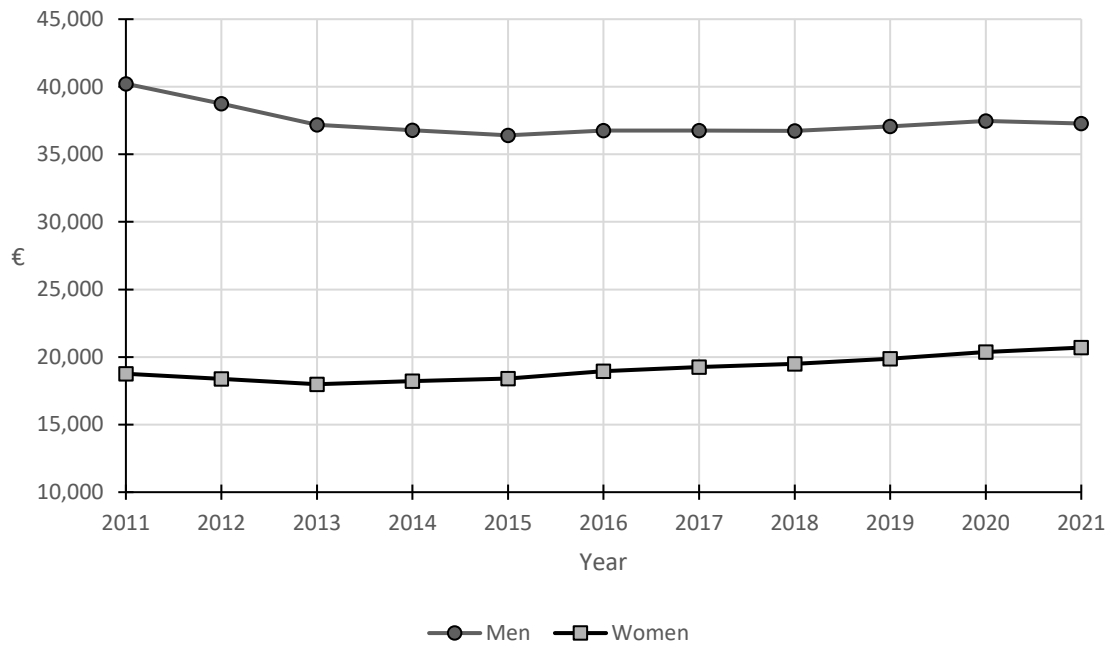


Figure 6. Average annual gross pension income for retirees by gender and year.

Source: microdata from Statistics Netherlands (cbs.nl).

Notes: A sample of individuals aged 55-69. Pension income is in 2023 euros.

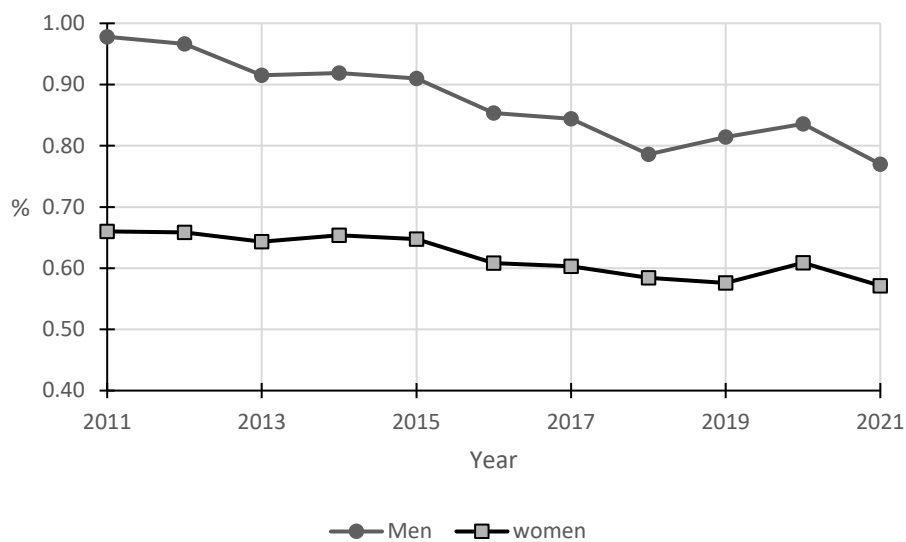


Figure 7 The annual mortality rate over time by gender.

Source: microdata from Statistics Netherlands.

Notes: A sample of individuals aged 55-69. The annual mortality rate is defined as the percentage of individuals who died during the next year relative to the number of individuals alive at the end of the current year.

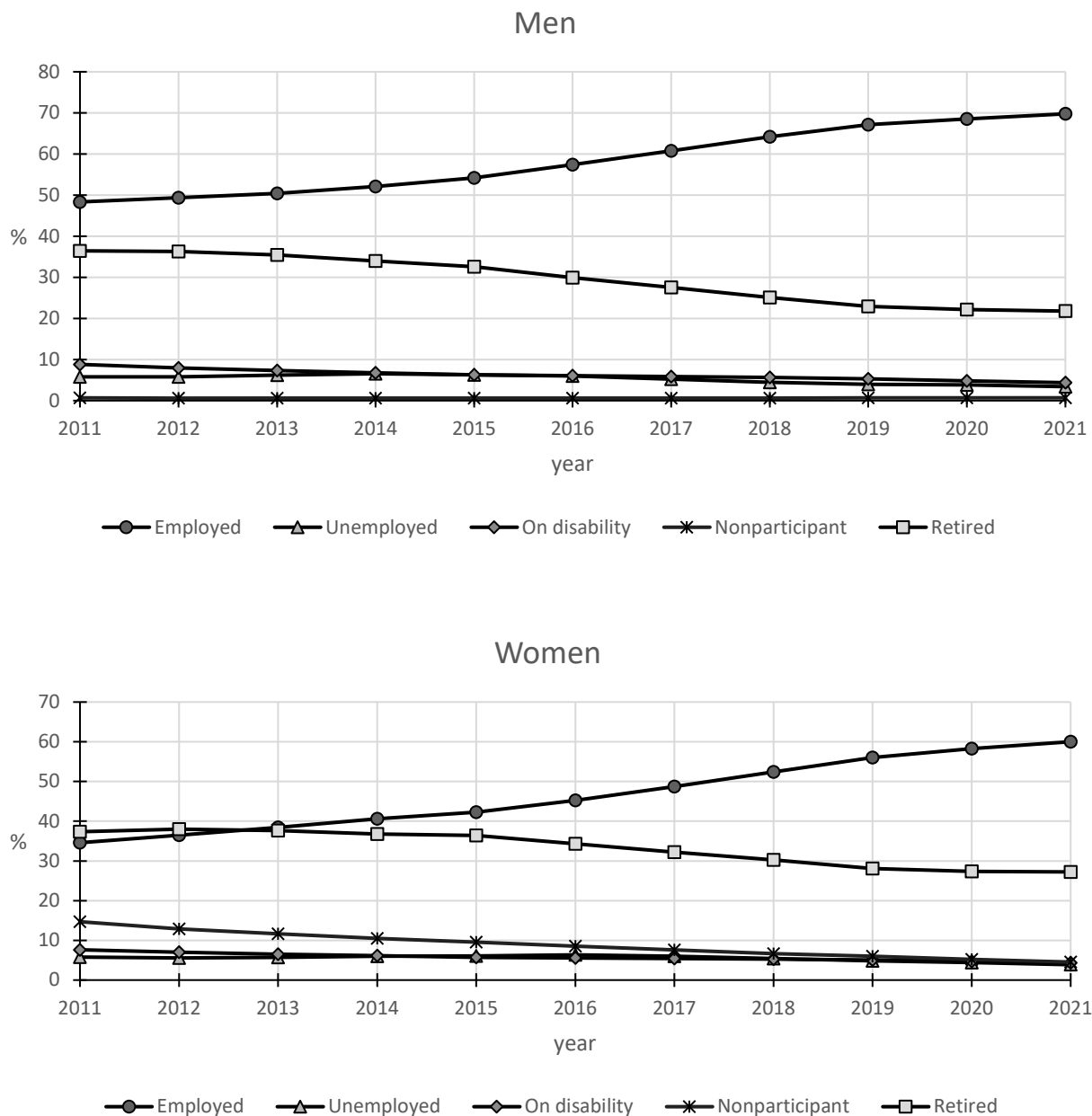


Figure 8 Labor force participation of individuals aged 55-69 by gender and year.

Source: microdata from Statistics Netherlands.

Notes: A sample of individuals aged 55-69. LFP status is based on the largest source of gross annual income. Employed: paid work; Nonparticipant: no income from work; Unemployed: received unemployment insurance or social assistance benefits; On disability: received disability or sickness insurance benefits. Retired: received public or private pension benefits.

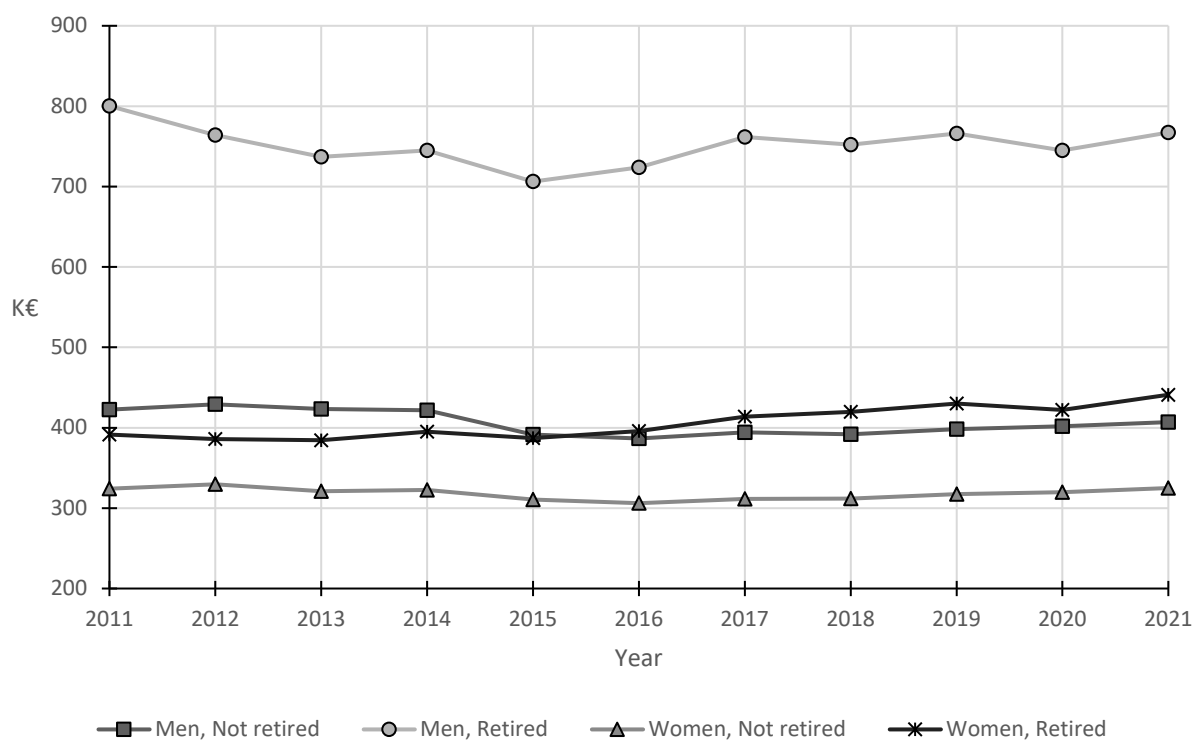


Figure 9. Average pension wealth by gender, retirement status and year.

Source: microdata from Statistics Netherlands.

Notes. A sample of individuals aged 55-69. Gross pension wealth in 2023 euros (Appendix B.2).

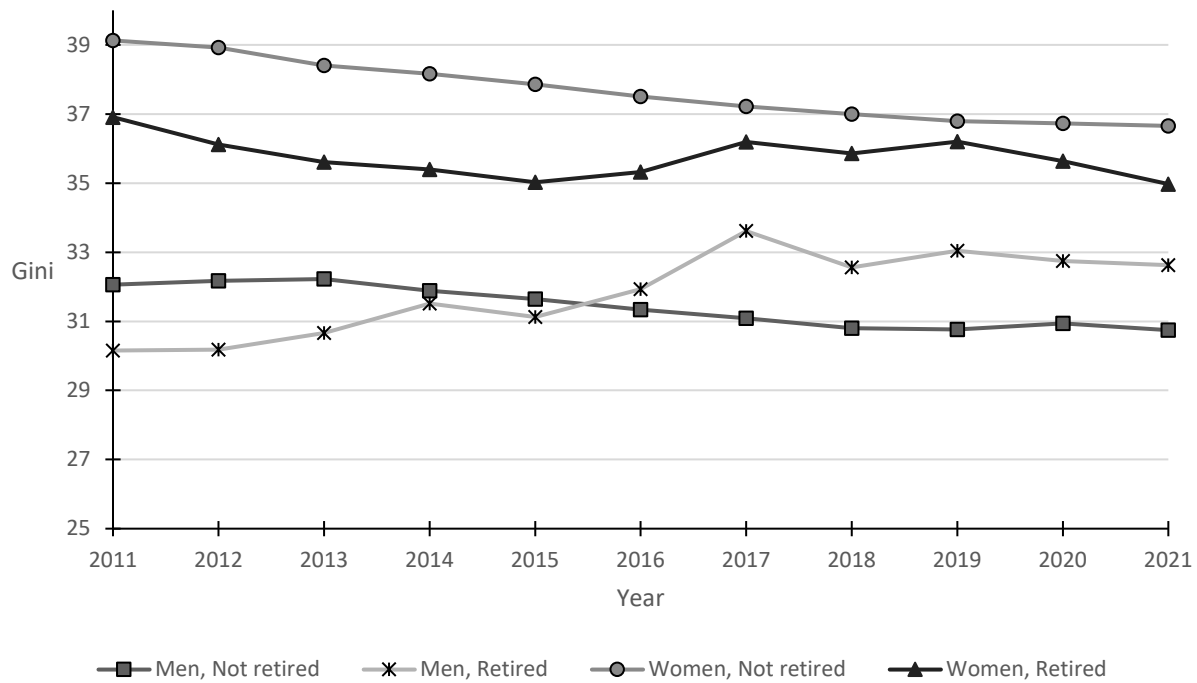


Figure 10. Gini coefficient of annual gross individual income by gender, retirement status and year.

Source: microdata from Statistics Netherlands (cbs.nl).

Notes: A sample of individuals aged 55-69. Figure 5 shows average annual gross individual income. The Gini coefficient is on a 0-100 scale.

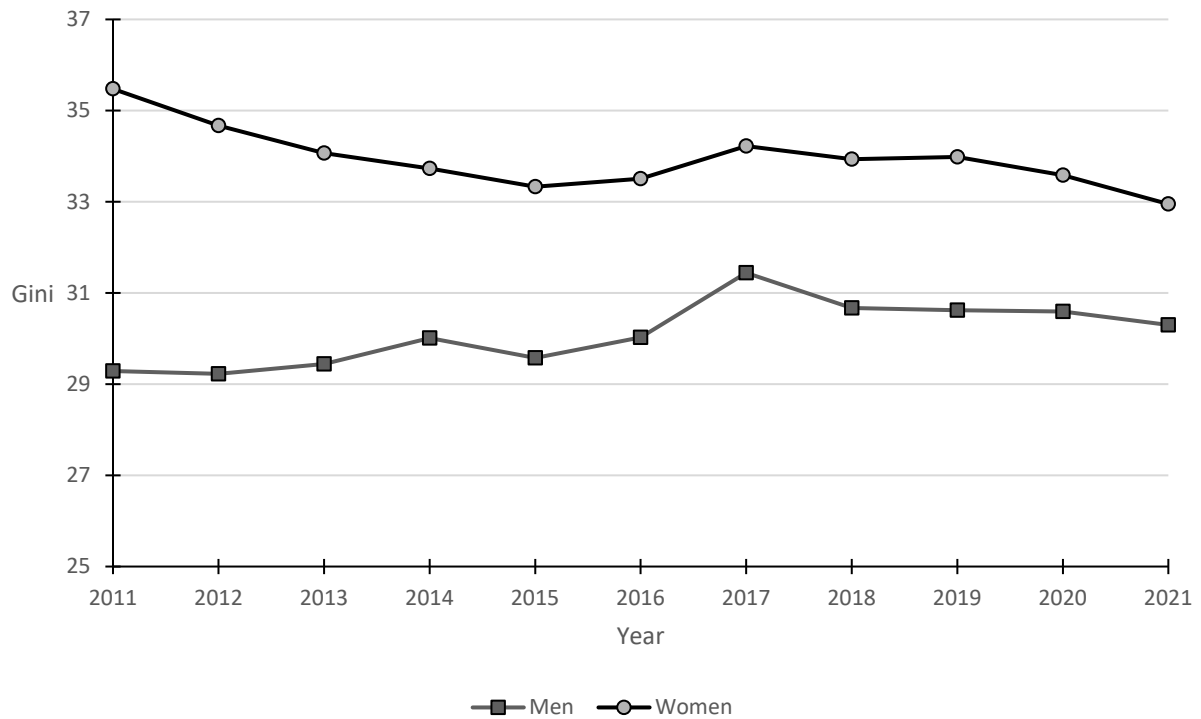


Figure 11. Gini coefficient of pension benefits by gender and year.

Source: microdata from Statistics Netherlands (cbs.nl).

Notes: A sample of retired individuals aged 55-69. Figure 6 shows average annual gross pension benefits. The Gini coefficient is on a 0-100 scale.

3.2 The effect of the SPA on the retirement probability

The retirement decision conditional on not being in retirement the previous year is modelled with a logit model. We assume the decision depends on age, calendar year, the net annual pension benefit entitlement (Equations (A3) and (A4)), the implicit tax rate on continued work (Equation (A10)), the SPA, and whether one is eligible for a SP benefit (hence, below or above the SPA). The estimation results show, among other things, that for both men and women there are positive effects of the implicit tax rate and of the expected net annual pension benefit on the retirement probability (Table 1). Furthermore, being eligible for SP benefits increases the retirement probability.

Figure 12 quantifies the effects of the increase in the SPA on the retirement probability over time (see the figure's notes for details). A comparison of the predicted probabilities of retirement with and without the SPA reform shows that the gradual increase in the SPA has reduced the probability of retirement over time. Also, the probability of retirement is stronger affected by the increase in the SPA for women than for men. For the period 2011-2021, the estimated effects of the increased SPA on the annual probabilities of retirement are on average about one percentage point for men and two percentage points for women.

Table 1 Estimation results for the probability of retirement

P(retirement), men	Marginal effect	Standard error	z-statistic	p-value
Single person household (0-1)	0.0141	0.0002	85.06	0.0000
Homeowner (0-1)	-0.0273	0.0002	-180.98	0.0000
Logarithm of net pension benefit entitlement	0.1797	0.0002	741.68	0.0000
Implicit tax rate on continued work (a fraction)	0.0235	0.0001	186.88	0.0000
State Pension Age (in years)	-0.0002	0.0002	-0.98	0.3260
Received a state pension benefit (0-1)	0.0566	0.0003	183.90	0.0000
Number of observations	9,938,280			
Pseudo R2	0.5737			
P(retirement), women	Marginal effect	Standard error	z-statistic	p-value
Single person household (0-1)	-0.0259	0.0002	-127.55	0.0000
Homeowner (0-1)	-0.0081	0.0002	-44.07	0.0000
Logarithm of net pension benefit entitlement	0.1850	0.0004	432.52	0.0000
Implicit tax rate on continued work (a fraction)	0.0166	0.0001	145.57	0.0000
State Pension Age (in years)	-0.0017	0.0003	-6.36	0.0000
Received a state pension benefit (0-1)	0.1076	0.0004	257.51	0.0000
Number of observations	9,075,558			
Pseudo R2	0.5018			

Source: microdata from Statistics Netherlands (cbs.nl).

Notes: A sample of individuals aged 55-69 who were the previous year not in retirement. A logit model was estimated for men and women separately. Standard errors are clustered at the individual level. The dependent variable is retirement conditional on not being in retirement the previous year. That is, the transition probability into retirement is modeled. The models control for year-specific and age-specific fixed effects. The computations of the net (annual) pension benefit entitlements and the implicit tax rates on continued work are described in Appendix A.

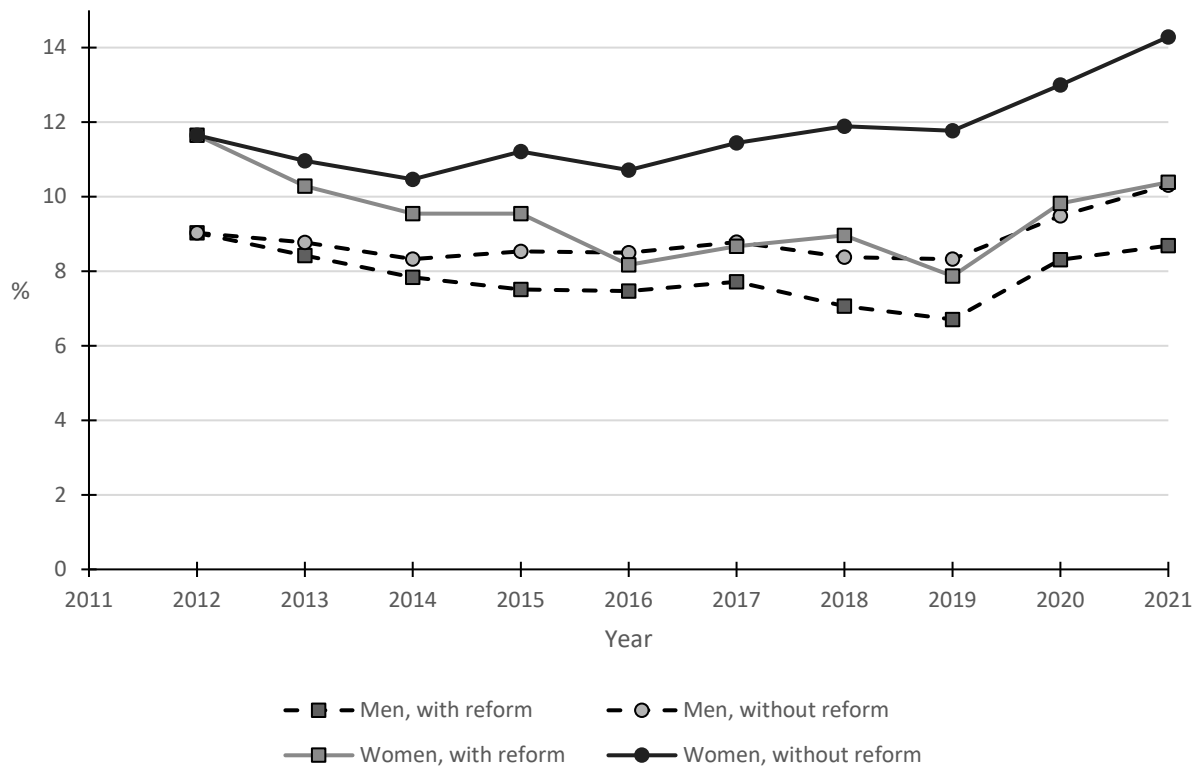


Figure 12 Retirement probabilities with and without the SPA reform by gender and year.

Source: microdata from Statistics Netherlands (cbs.nl).

Notes: Sample selection: individuals who were not in retirement the previous year (aged 55-69). Shown are average predicted probabilities of retirement (conditional on not in retirement the previous year). The predictions are based on the estimation results in Table 1. The factual SPAs of individuals are used for the series ‘with reform’ and the SPA is set equal to 65 years for all individuals for the series ‘without reform’.

3.3 Differential mortality

The literature has identified significant socioeconomic inequalities in mortality risk over many populations and time periods (Hurd et al., 1999; Huisman et al., 2004; Kalwij, 2014; Kalwij, Alessie, and Knoef, 2013a, 2013b; Kunst et al., 2004; Marmot et al., 1991; Menchik, 1993). Furthermore, even though in the Netherlands the welfare state was strengthened during the twentieth century, e.g., in introducing universal health care and state pensions, the empirical evidence suggests a steepening of the contemporaneous socio-economic status (SES) gradient in the mortality rate (Kalwij, 2019, and references therein). Possible reasons for the SES gradient include behavioral health risk factors such as smoking and obesity that vary across educational groups and psychological stress related to a lack of autonomy at work and (perceived) dissatisfactory outcomes of competitions, which relate to the SES (Cutler, Lange, Meara, Richards-Shubik, and Ruhm, 2011; Kalwij, 2018; Kutlu Koc and Kalwij, 2017, 2021; Lipowicz, Szklarska, Mitas, 2016; Lunau, Siegrist, Dragano, Wahrendorf, 2015; Siegrist and Marmot, 2004).

We defined the annual mortality rates as the proportion of individuals who died during the next calendar year (Figure 7) and found earnings-mortality gradients that are in line with those in previous studies (Figures 13 and 14). Men and women in the first three deciles of the earnings distribution have about a two to three times higher mortality rate than those in the top three deciles. Furthermore, the figures suggest no substantial changes in the strength of the earnings-mortality gradient over time. A notable exception is the relatively stronger decline in mortality over time for middle-income men.

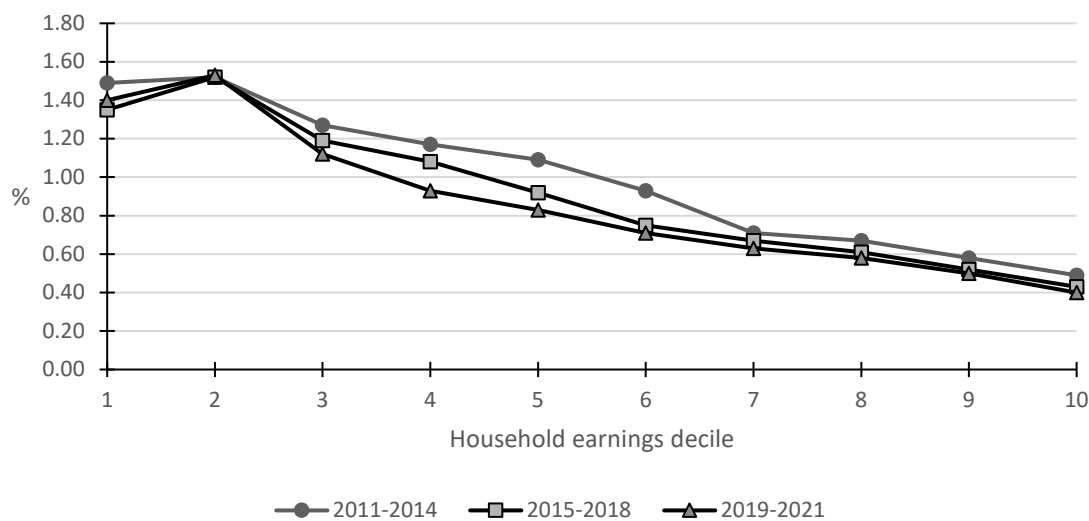


Figure 13. Men's Annual mortality rate by household earnings decile and period.

Source: microdata from Statistics Netherlands (cbs.nl).

Notes: A sample of men aged 55-69 (period 2011-2021). The annual mortality rate is defined as the number of individuals who died during the next year relative to the number of individuals alive at the end of the current year. Household earnings refer to the variable ALTE50 (average lifetime earnings at age 50) for a single person household and refers to the sum of ALTE50 of the individual and spouse for couple households and equalized using the factor 1.7. The earnings deciles were computed by year and for men and women combined.

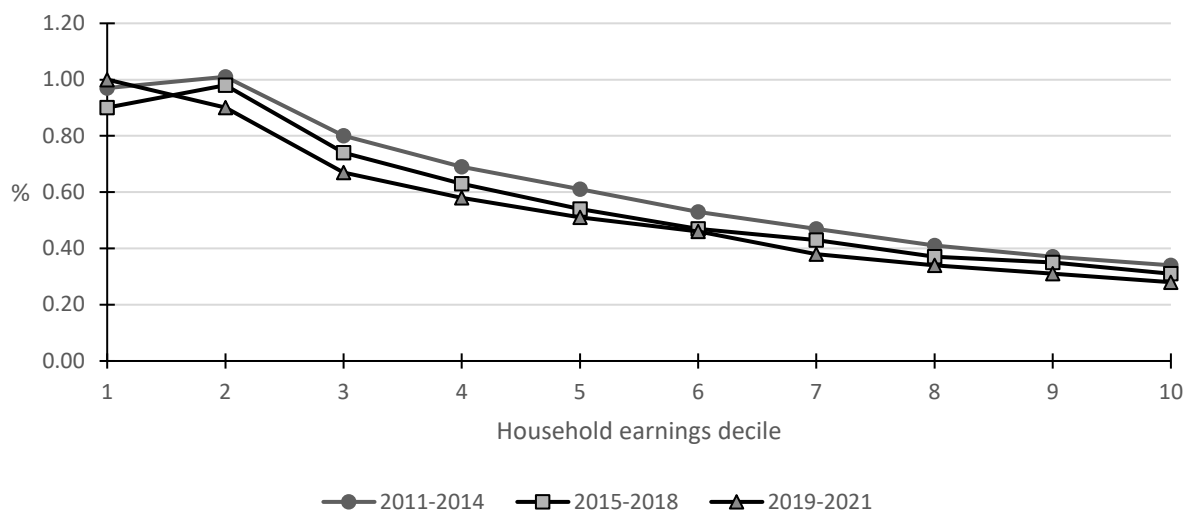


Figure 14. Women's Annual mortality rate by household earnings decile and period.

Source: microdata from Statistics Netherlands (cbs.nl).

Notes: A sample of women aged 55-69 (period 2011-2021). The annual mortality rate is defined as the number of individuals who died during the next year relative to the number of individuals alive at the end of the current year. Household earnings refer to the variable ALTE50 (average lifetime earnings at age 50) for a single person household and refers to the sum of ALTE50 of the individual and spouse for couple households and equalized using the factor 1.7. The earnings deciles were computed by year and for men and women combined.

3.4 Old-age social security wealth (SSW)

SSW is computed based on individuals' pension benefits entitlements, retirement probabilities and remaining life expectancy (Appendix A). The strong decrease in the average SSW for non-retirees as depicted in Figure 15 is because the increase in the SPA reduced annual pension benefits entitlements (Figure 16) and retirement probabilities over time (Figure 12). The latter reduction causes more weight given to pension benefit entitlements later in life when the remaining lifetime is lower, hence contributes to a decrease in SSW. While women have on average lower pension wealth than men (Figure 9), the difference between non-retired men and women in their average SSW is much smaller (Figure 15) because women have a higher life expectancy and retire earlier than men (Figures 7 and 12).

For both men and women, inequality in SSW has increased after 2015 for non-retirees with about five points and remained stable over time for retirees (Figure 17). The relatively high inequality before 2015 among non-retirees is in accordance with the relatively high inequality in pension benefits entitlements before 2015 (Figure 20). A comparison of Figures 17 and 18 shows that the increase in SSW inequality for non-retirees is unlikely to be due to an increase in the SPA. That is, as shown in Figure 19, the inequality in SSW for non-retirees when the SPA would have been equal to 65 years (without the SPA reform) is for men higher than the actual inequality in SSW (with the SPA reform) and for women it is about the same. Furthermore, Figure 20 shows that the increase in SPA has increased inequality in net annual pension benefit entitlements. A mitigating effect of the increase in SPA on inequality in SSW can, therefore, stem from different retirement responses to the increase in the SPA across the income distribution. Figure 21 provides support for the latter argument by showing that high-income individuals' retirement probabilities decreased with an increase in the SPA more than those of low-income individuals.

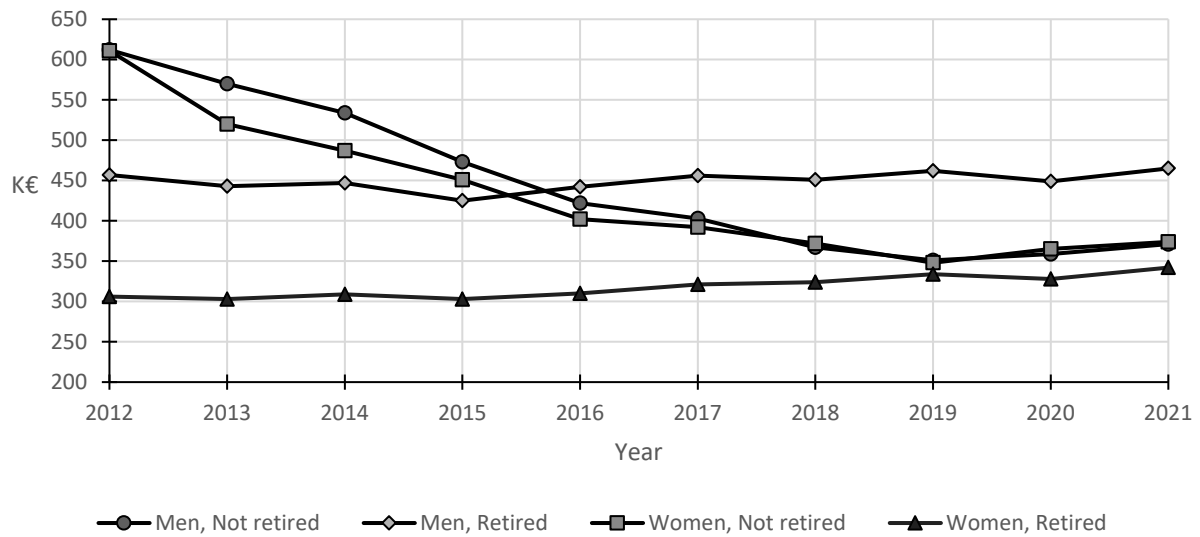


Figure 15. Average old-age social security wealth (SSW) by gender, retirement status and year.

Source: microdata from Statistics Netherlands (cbs.nl).

Notes: A sample of individuals aged 55-69. SSW is in 2023 euros. See Appendix A for the construction of SSW.

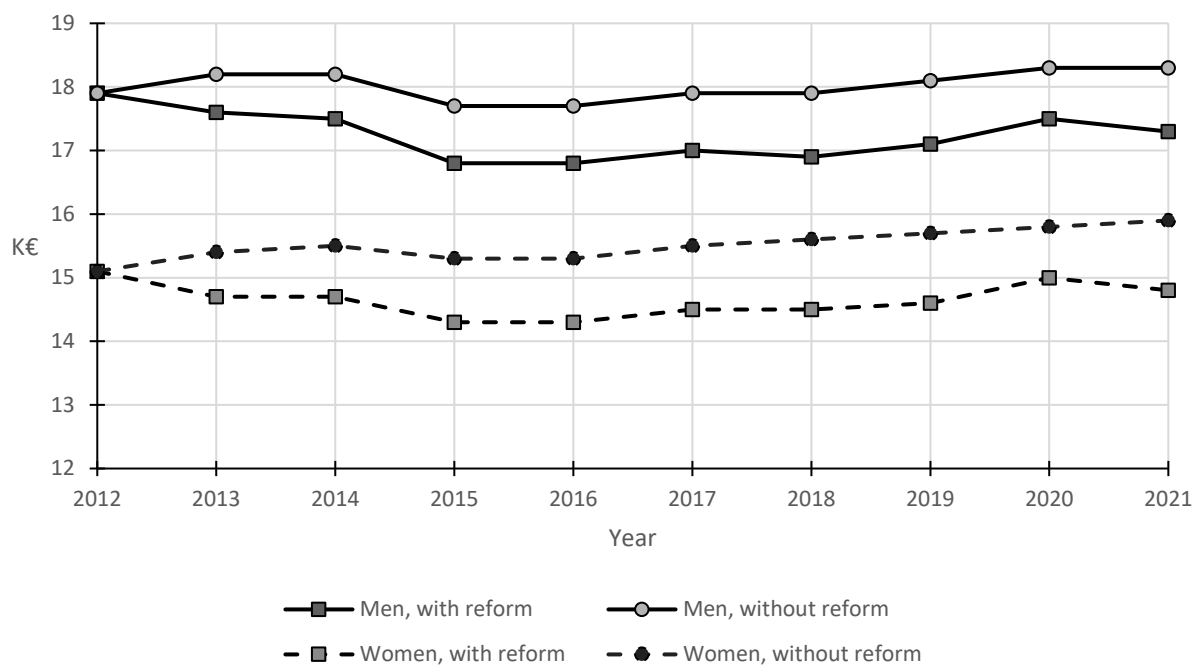


Figure 16. Average net pension benefits entitlements with and without the SPA reform for non-retirees by gender and year.

Source: microdata from Statistics Netherlands (cbs.nl).

Notes: A sample of individuals aged 55-69. The entitlements are in 2023 euros. The factual SPA is used for ‘with reform’ and the SPA was set equal to 65 for ‘without reform’. See Appendix A for the computation of pension benefit entitlements.

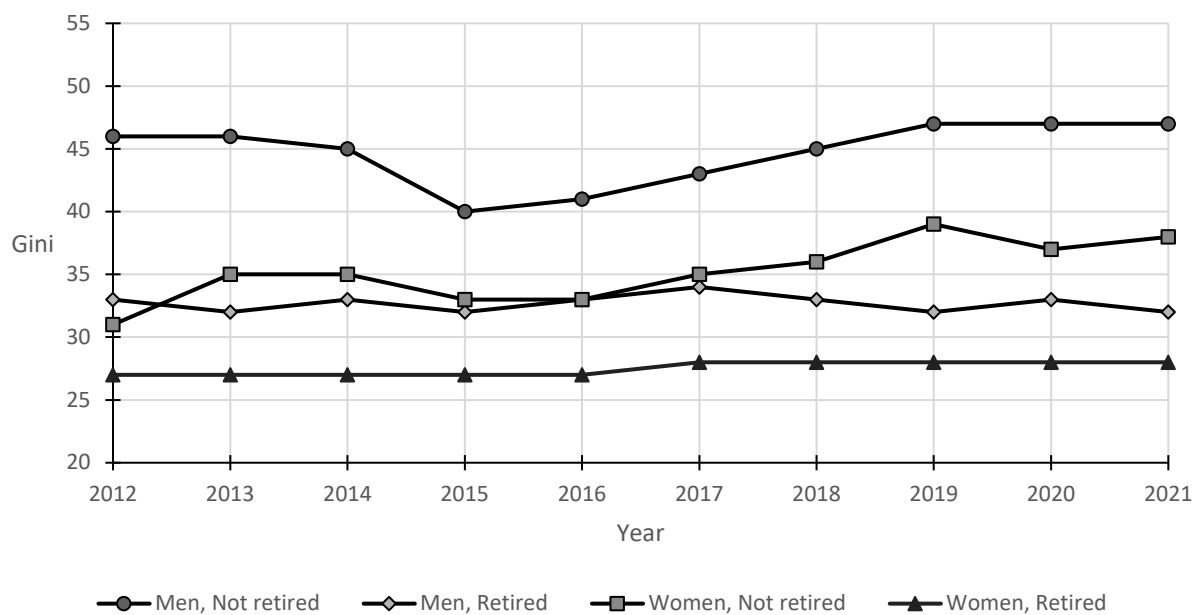


Figure 17. Gini coefficient of old-age social security wealth (SSW) by gender, retirement status and year.

Source: microdata from Statistics Netherlands (cbs.nl).

Notes: A sample of individuals aged 55-69. Figure 15 shows average SSW. The Gini coefficient is on a 0-100 scale.

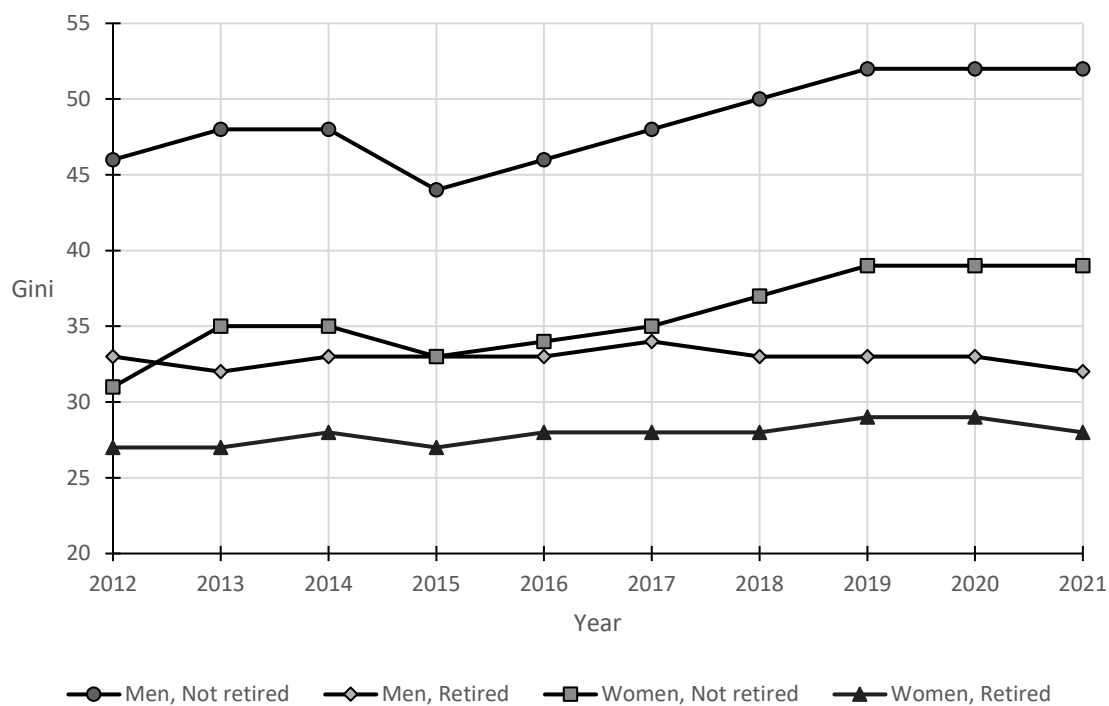


Figure 18. Gini coefficient of old-age social security wealth (SSW) without the SPA reform by gender, retirement status and year.

Source: microdata from Statistics Netherlands (cbs.nl).

Notes: A sample of individuals aged 55-69. Without the SPA reform refers to SPA being set equal to 65 for all individuals, which includes the pension benefits entitlements without the SPA reform (Figures 16 and 20) and retirement probabilities without the SPA reform (Figure 12). The Gini coefficient is on a 0-100 scale.

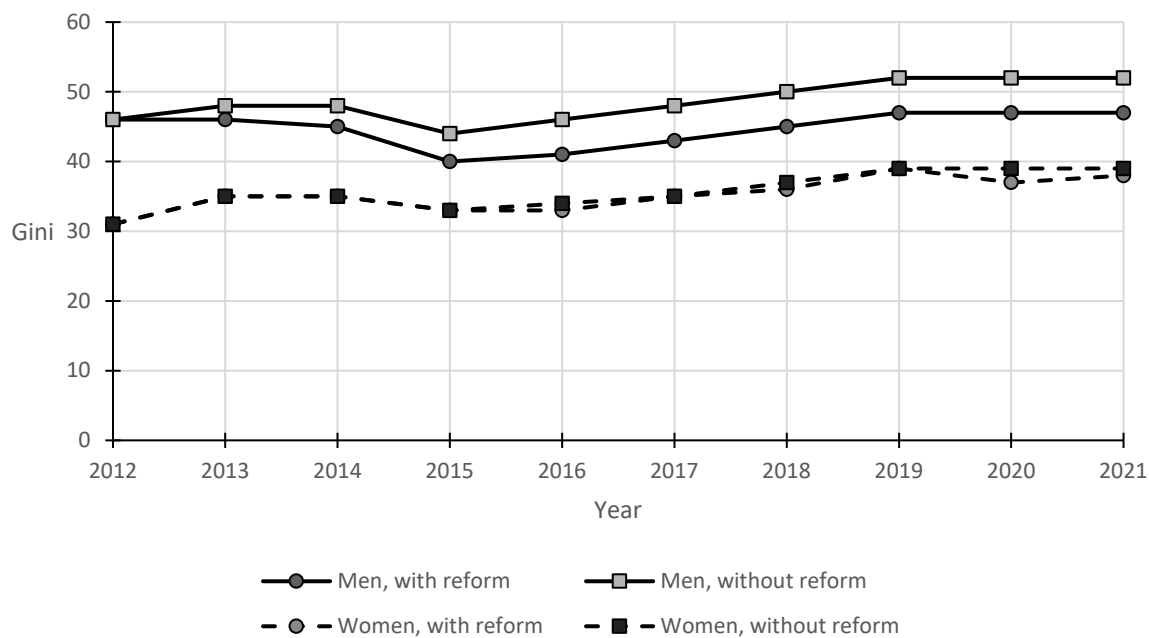


Figure 19. Gini coefficient of old-age social security wealth (SSW) with and without the SPA reform for non-retirees by gender and year.

Source: microdata from Statistics Netherlands (cbs.nl).

Notes: A sample of individuals aged 55-69. With the SPA reform is with the factual SPA and the SPA was set equal to 65 for the scenario without the SPA reform. The latter includes pension benefits entitlements without the SPA reform (Figures 15 and 19) and retirement probabilities without the SPA reform (Figure 12). The Gini coefficient is on a 0-100 scale.

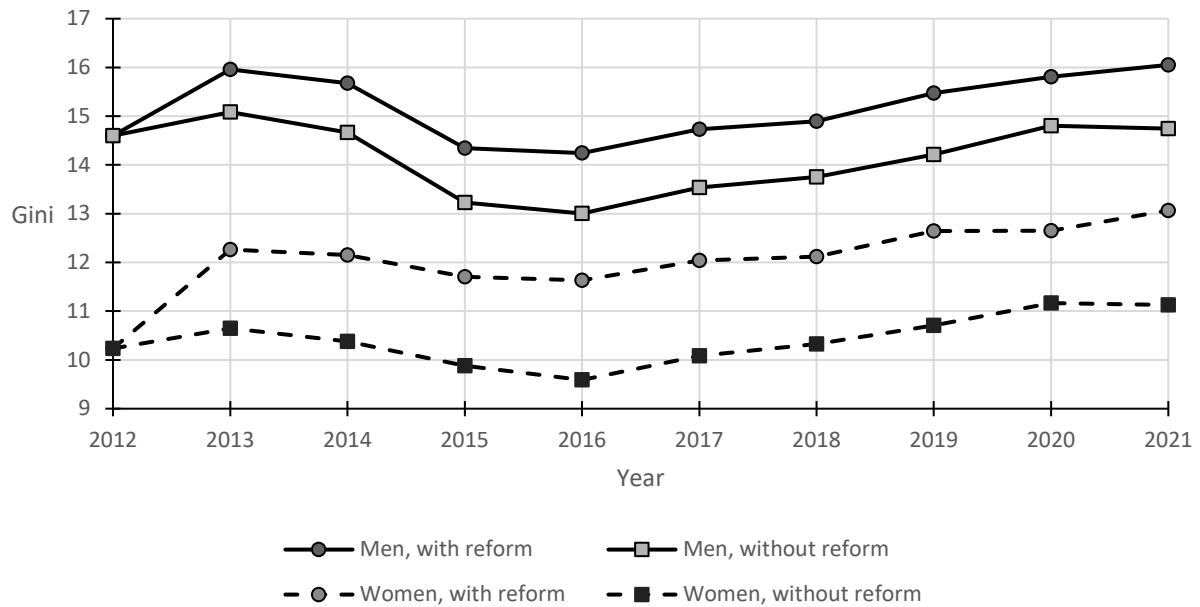


Figure 20. The Gini coefficient of net annual pension benefit entitlements with and without the SPA reform for non-retirees by gender and year.

Source: microdata from Statistics Netherlands (cbs.nl).

Notes: A sample of individuals aged 55-69. With the SPA reform refers to using the factual SPA and without the SPA reform refers to the SPA being set equal to 65 for the computation of net annual pension benefits entitlements (Appendix A). The Gini coefficient is on a 0-100 scale.

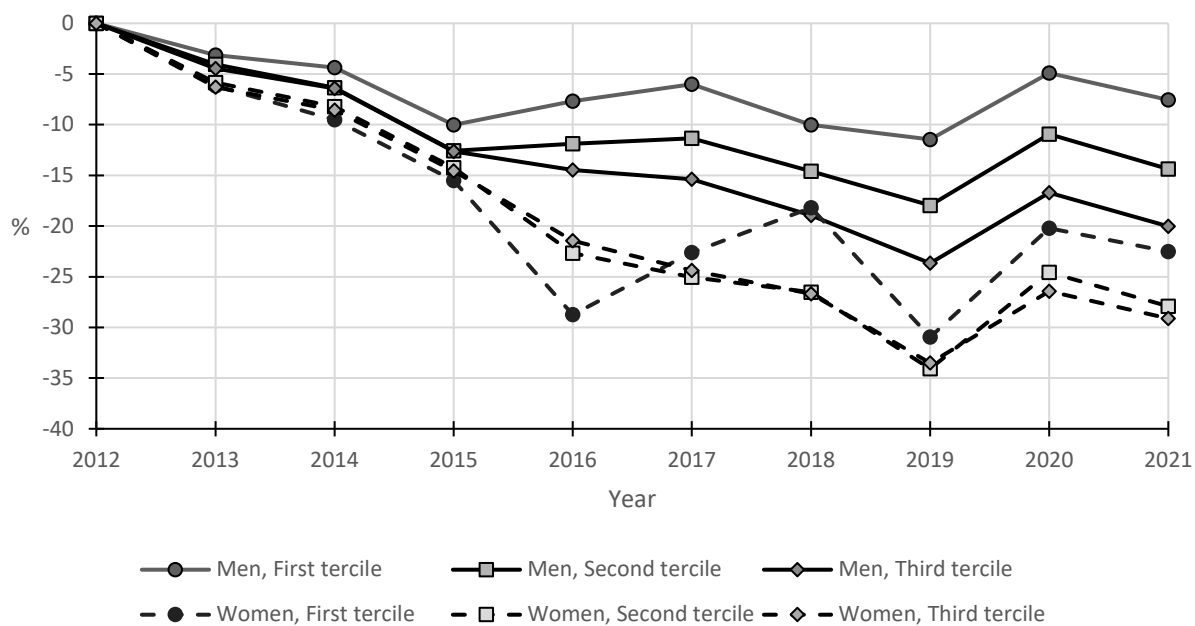


Figure 21. The relative effect of an increase in the SPA on the retirement probability by earnings tercile, by gender and year.

Source: microdata from Statistics Netherlands (cbs.nl).

Notes: A sample of individuals aged 55-69. The relative effect is defined as the relative difference between the retirement probability with and without the SPA reform (see Figure 12 for details).

4. CONCLUSIONS

We have investigated the effects of an increase in the SPA on working longer, and on inequalities in pension benefits entitlements and old-age social security wealth (SSW) of men and women at older ages in the Netherlands. SSW is based on pension benefits entitlements, retirement probabilities, and remaining life expectancy.

The SPA has gradually increased from 65 years in 2012 to 66 years and 4 months in 2021. In the context of the Dutch old-age social security system, an increase in the SPA is hypothesized to decrease the retirement probability and to increase inequality in pension benefits entitlements. Using data on individuals aged 55–69 over the period 2011–2021, our findings support the two hypotheses (Figures 12 and 20). Inequality in SSW has increased after 2015 for non-retirees. Our findings, however, do not support the hypothesis that an increase in the SPA increases inequality in SSW (Figures 19).

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APPENDIX A OLD-AGE SOCIAL SECURITY WEALTH

We present our computation of old-age social security wealth (SSW). This computation accounts for the main ingredients of the public and occupational pension schemes in the Netherlands. The following notation is used:

- age a , start working at a_0 ,
- state pension age SPA (policy instrument),
- remaining population life expectancy at age a is T_a ,
- remaining individual life expectancy at age a is $T_{a,i}$,
- state pension benefit SP (gross), and occupation pension benefit OP (gross),
- annual earnings Y are assumed constant over the working life,
- net annual pension benefit Y^R is assumed constant during retirement,
- OP wealth at age a is $OPW_a = \delta \cdot (Y - SP) \cdot (a - a_0)$, with $Y > SP$ and a pension accrual rate δ and the age of starting accumulating OP wealth a_0 ,
- income tax rates before and during retirement are τ_1 and τ_2 , respectively.

Pension benefits entitlements are computed under the institutional constraint that one cannot borrow against future state pension (SP) benefits. A SP benefit is received from SPA onward until death. That is, pension benefits before the SPA are financed with occupational pension (OP) wealth only. The accrual of OP wealth is proportional to their earnings minus the SP benefit level: $\delta \cdot (Y - SP)$ with accrual rate δ . It is assumed that $Y \geq SP$. A pension fund transforms OP wealth into annual annuities based on the current age, the SPA, the (annual) SP benefit, and remaining population life expectancy. The annuity will be higher before than after SPA to compensate for not receiving SP benefits before the SPA. The annuities are usually such that net annual pension

income remains constant during retirement. The computation below assumes an interest rate equal to zero. Finally, the computation of pension benefits does not account for private wealth. If private wealth is used to supplement an OP, it is optimal to do so before SPA and not after SPA. This is because private wealth is net of taxes and OP is taxed at a lower marginal rate after SPA than before SPA ($\tau_1 > \tau_2$).

A.1 Pension benefit entitlement.

Given the setup outlined above, the net annual pension benefit (entitlement) before SPA, i.e., at age $a < SPA$, is

$$Y^{R1} = (1 - \tau_1) \cdot \theta \cdot \frac{OPW_a}{(SPA - a)}. \quad (A1)$$

where θ is the fraction of OP wealth that a pension fund allocates to the period before SPA. After SPA a SP benefit is received, next to an OP benefit, and the net pension benefit is

$$Y^{R2} = (1 - \tau_2) \cdot \left[(1 - \theta) \cdot \frac{OPW_a + SP \cdot (T_a - SPA)}{(T_a - SPA)} \right]. \quad (A2)$$

To compute θ , we make use of the assumption that the net annual pension benefits before and after retirement are equal: $Y^{R1} = Y^{R2} \equiv Y^R$. That is, the SP benefit is “integrated” into the calculation of the annual pension benefit before retirement, so that the sum of SP and OP benefits is equal before and after retirement (net of taxes). Substituting the computed θ in Equation (A1) or Equation (A2) gives the gross annual pension benefit entitlement at age $a < SPA$:

$$\frac{Y_a^R}{(1 - \tau_1)} = \left[\frac{(1 - \tau_1)}{(1 - \tau_2)} \cdot (T_a - SPA) + (SPA - a) \right]^{-1} \cdot [OPW_a + SP \cdot (T_a - SPA)]. \quad (A3)$$

When retiring after SPA, i.e., at $a \geq SPA$, a SP benefit is received next to an OP benefit and the gross annual pension benefit entitlement is simply:

$$\frac{Y_a^R}{(1-\tau_2)} = (T_a - a)^{-1} \cdot [OPW_a + SP \cdot (T_a - a)]. \quad (A4)$$

The net annual pension benefit entitlement Y_a^R , as defined by Equations (A3) and (A4), is received from age a onward until death. Also, population life expectancy and not individual life expectancy determines the annual pension benefit entitlement, which reflects that pension funds cover longevity risk.

A.2 *The effects of the SPA on pension benefits entitlements and inequality.*

The SPA has a negative effect on the gross annual pension benefit entitlement before SPA (Equation (A3)):

$$\frac{d \frac{Y_a^R}{(1-\tau_1)}}{dSPA} = - \left[\frac{\tau_1 - \tau_2}{(1-\tau_2)} \right] \cdot \left[\frac{(1-\tau_1)}{(1-\tau_2)} \cdot (T_a - SPA) + (SPA - a) \right]^{-2} \cdot [OPW_a + SP \cdot (T_a - SPA)] - \left[\frac{(1-\tau_1)}{(1-\tau_2)} \cdot (T_a - SPA) + (SPA - a) \right]^{-1} SP. \quad (A5)$$

The relative effect $\frac{d \frac{Y_a^R}{(1-\tau_1)}}{dSPA} / \frac{Y_a^R}{(1-\tau_1)}$ is

$$- \left[\frac{\tau_1 - \tau_2}{(1-\tau_2)} \right] \cdot \left[\frac{(1-\tau_1)}{(1-\tau_2)} \cdot (T_a - SPA) + (SPA - a) \right]^{-1} - \left[\frac{SP}{OPW_a + SP \cdot (T_a - SPA)} \right]. \quad (A6)$$

Without loss of generality, we can assume $\tau_2 = \tau_1$ because the first term is the same for all individuals (given a). With this equality imposed the relative effect is

$$- \frac{SP}{OPW_a + SP \cdot (T_a - SPA)}, \quad (A7)$$

which shows that the relative negative effect of the SPA on the pension benefit entitlement decreases, in absolute terms, with an increase in OP wealth, i.e., with an increase in lifetime

earnings which determine OP wealth. Inequality in annual pension benefit entitlements before SPA, therefore, increases with an increase in the SPA. Furthermore, there is no effect of an increase in SPA on the annual pension benefit entitlement when retiring at or after SPA (Equation (A4)).

A.3. *Old-age social security wealth (SSW) and implicit tax rates on continued work (ITAX).*

SSW is defined as the future stream of expected annual net pension benefits. SSW accounts for retirement status which depends on, e.g., the SPA. With an annual net pension benefit entitlement that is constant over time (Section A.1) and an intertemporal discount rate ρ , SSW at age a is

$$SSW_a = \sum_{s=a}^{69} \left\{ \sum_{t=s}^{\infty} \left(\frac{1}{1+\rho} \right)^{t-a} \cdot Y_s^R \cdot S_{t,i} \right\} \cdot Pr(R_s = 1). \quad (A8)$$

The maximum age until individuals can work is 69 (all individuals are assumed to be retired at age 70), $S_{t,i}$ is the probability of survival until age t of individual i (see Section A.4), and $Pr(R_s = 1)$ is the probability of retiring at age s (see Section A.5). The latter probability conditions on, e.g., the SPA. Y_s^R is defined by Equations (A3) and (A4). If an individual is already retired at age a , it is assumed the individual remains retired until death.

The implicit tax rate on continued work (*ITAX*) at age a is refined as

$$ITAX_a = - \frac{SSW_{a+1} - SSW_a}{Y_a^R}, \quad (A9)$$

where SSW_a is computed under the assumption of retiring this year and SSW_{a+1} is computed under the assumption of working this year and retiring next year. SSW_{a+1} depends on next year's pension benefit entitlement, which is a function of pension wealth the next year. When working one more year, pension wealth accrues with $\delta \cdot (Y - SP)$ before SPA. After SPA individuals usually do not accrue pension wealth. Also, pension wealth is decreased by SP for $a \geq SPA$ because one cannot

postpone receiving SP benefits. The more negative $ITAX$, the stronger is the incentive for working one more year. One can show under certain simplifying assumptions, such as no differential mortality, that the lower Y , the larger is the incentive to continue working. Also, while $ITAX$ is negative for $a < SPA$ because $Y \geq SP$, $ITAX$ is positive for $a \geq SPA$ if the accrual $\delta \cdot (Y - SP)$ is smaller than SP , which is likely to be the case for most workers. The latter positive $ITAX$ stems from the fact that SP is received from SPA onward, also when working past the SPA . Workers past their SPA can therefore have a financial incentive to stop working.

A.4 Empirical implementation.

Pension wealth is constructed with the available data (Section 2). The data includes information on SP and OP benefits for retirees, which can be used to construct their pension wealth at age a using Equations (A3) and (A4). That is, $OPW_a + SP \cdot (T_a - SPA)$ of Equation (A3) and $OPW_a + SP \cdot (T_a - a)$ of Equation (A4) are constructed. We assume that retirees remain retired until death and receive their current observed pension benefits until death. For non-retirees we observe their occupational pension accrual if they are employed. For those non-retirees who are not in employment we assume that they worked until last year with an income equal to $ALTE50$ and accumulated OP wealth with an accrual rate of 0.12 (about the sample average).

Age and year specific population life expectancy is obtained from Statistics Netherlands (cbs.nl) and used to compute T in Equations (A3) and (A4). Also, for the empirical analysis we use $\frac{(1-\tau_1)}{(1-\tau_2)} = 0.7$ for Equation (A3). This approximation stems from not having to pay social security insurance contributions from SPA onward; about $\tau_1 = 0.5$ and $\tau_2 = 0.3$ for marginal tax rates at medium income. For computing net benefits, the tax-free allowance of an amount about equal to SP benefit

level is used for all individuals and income tax is paid with marginal tax rates τ_1 before SPA and τ_2 after SPA.

For the computation of SSW (Equations (A8)) we assume a three percent intertemporal discount rate ρ and that those who will retire have done so before age 71. The survival probabilities are computed as follows: First, we allow for age and gender differences in remaining life expectancy based on 2020 period life tables (Royal Dutch Actuarial Association; <https://www.ag-ai.nl/>). For both genders, the differences in remaining life expectancy are about 13 years between individuals aged 55 and those aged 69. Remaining life expectancy at age 65 is about 16 years for men and 19 years for women. Second, we allow for differential mortality by lifetime earnings. This is modelled such that there is a one-year lower life expectancy for individuals in the lower tercile of the earnings distribution and a two-year higher life expectancy for individuals in the upper tercile of the earnings distribution, compared to the individuals in the middle tercile of the earnings distribution (Kalwij et al., 2013b). Third, the age-specific survival rates are computed based on the assumption of a Gompertz distribution for mortality (Gompertz, 1825).

APPENDIX B CONSTRUCTED VARIABLES

B.1. Average lifetime annual earnings up to age 50 (ALTE50)

Individuals' ALTE50 is a prediction based on the estimation results of an earnings equation with a sample of individuals aged 25-69. The dependent variable is annual gross earnings from work or income received from an earnings replacement scheme. Next to controlling for year, age, and individual specific fixed effects, the model controls for labor market status to capture that those

who receive disability insurance or unemployment insurance benefits, or those retired and receiving an occupational pension, receive an earnings-related replacement income.

The estimated parameters of the age-earnings profile and individual-specific fixed effects are used to compute ALTE50. Individuals' ALTE50 is time-invariant and refers to gross earnings in 2020 euros. ALTE50 could not be computed for about 10% of the individuals aged 55-69. The latter was most often the case for retired women with no occupation pension. These women could have had, e.g., part-time jobs in years, or at ages, when pension contributions for such jobs were not yet mandatory. For these individuals we set their ALTE50 equal to the minimum ALTE50 by gender and birth cohort. Hence, all individuals have positive values of ALTE50. Tables A2 and A3 show the distribution of ALTE50 by gender, retirement status and year. Likewise, we compute average lifetime annual earnings up to the current age (ALTEAGE).

B.2 State pension (SP) benefits and Occupation pension (OP) wealth

Individuals are entitled to SP benefits by residing in the Netherlands before the SPA (Section 2). We assume all individuals resided in the Netherlands their entire lives and that they are, therefore, entitled to the full SP benefit which is equal to 70 percent of the gross minimum wage. For those who receive OP benefits, OP wealth is $OP \times (\text{population life expectancy at age 65} - \text{age})$. We assumed zero discounting. The population life expectancy at age 65 is cohort and year specific, provided by Statistics Netherlands (cbs.statline.nl), and is used by pension funds to annuitize individuals' OP wealth upon retirement. For those who do not yet receive OP, their contributions to an occupational pension plan are used to compute OP wealth. For this computation we assume their accrual rates were constant over time and that they contributed to a pension plan from age 25 onward with earnings equal to ALTEAGE (see Section B.1). If we also do not observe the accrual rate, we set it equal to 12 percent (about the sample average).

Table A1 State pension schemes and reforms: the main ingredients.

Act	SPA	Benefit for a single person	Benefit for a couple
1. <i>Disability Insurance Act 1913</i> ; For employees.	70y [†]	max. €0.91 per week	max. €1.36 per week
2. <i>Voluntary Old-Age Pensions Act 1919</i> ; Eligibility extended to non-wage earners.	65y	max. €2.27 per week	max. €2.72 per week
1923: all residents covered	65y	max. €9.08 per week	max. €9.08 per week
3. <i>Emergency Old-Age Pensions Act 1947</i>	65y	€239.60 per year	€424.74 per year
4. <i>National Old-Age Pensions Act 1956</i>	65y	€32.45 per month	€54.00 per month
1962: benefits raised by 15%	65y	€37.31 per month	€62.10 per month
1965: benefits raised to a 'social minimum'***	65y	€99.38 per month	€142.02 per month
1974: benefits raised to minimum wage (MW) level (about €470 per month)	65y	70% of MW	100% of MW
1985: gender equality in benefits	65y	70% of MW	100% of MW or 50% + partner < 65 allowance***
1987: no distinction married and unmarried couples	65y	70% of MW	100% of MW or 50% + partner < 65 allowance***
1988: means tested partner allowance & the abolished of it in 2015 was announced.	65y	70% of MW	100% of MW or 50% + partner < 65 means tested allowance***
5. <i>Pension Act 2012</i>			
SPA increased with 1 month in 2013	65y+1m	70% of MW	100% of MW or 50% + partner age < SPA, means tested allowance***
SPA increased with 1 month in 2014	65y+2m	70% of MW	100% of MW or 50% + partner age < SPA, means tested allowance***
SPA increased with 1 month in 2015	65y+3m	70% of MW	50% of MW per person (pp) age ≥ SPA
6. <i>Pension Acts 2015</i>		70% of MW	
SPA increased with 3 months in 2016	65y+6 m	70% of MW	50% of MW pp age ≥ SPA
SPA increased with 3 months in 2017	65y+9m	70% of MW	50% of MW pp age ≥ SPA
SPA increased with 3 months in 2018	66y	70% of MW	50% of MW pp age ≥ SPA
SPA increased with 4 months in 2019	66 y+4m	70% of MW	50% of MW pp age ≥ SPA
7. <i>Pension Act 2019</i>		70% of MW	
SPA did not increase in 2020 nor in 2021	66y+4m	70% of MW	50% of MW pp age ≥ SPA
SPA increased with 3 months in 2022	66y+7m	70% of MW	50% of MW pp age ≥ SPA
SPA increased with 3 months in 2023	66y+10m	70% of MW	50% of MW pp age ≥ SPA
SPA will increase with 2 months in 2024 and no increases until 2028	67y	70% of MW	50% of MW pp age ≥ SPA

Notes: MW=minimum wage; pp=per person. The Poor Act of 1854 and successive social assistance related acts are universal. The acts listed in the Table cover or covered all residents except the Disability Insurance Act 1913, which covered employees, and the Voluntary Old-Age Pensions Act 1919, which covered employees and non-wage earners (self-employed) with a low income. The benefits of the schemes of these latter two acts were based on participants' contributions. The other schemes had or have flat-rate benefits.

[†] From age 70 onward, (former) employees were considered work-disabled and entitled to their benefits.

Table A2. The distribution of ALTE50 for men aged 55-69 by retirement status and year.

	P10	P25	P50	Mean	P75	P90	P10	P25	P50	Mean	P75	P90
Year	NR	NR	NR	NR	NR	NR	R	R	R	R	R	R
2011	18070	27730	41730	47142	59856	81378	17975	25821	36101	41358	50370	70089
2012	18401	28668	42828	48164	61057	82641	18557	26776	37174	42716	52003	72272
2013	18736	29531	43735	48917	61956	83402	19038	27663	38276	44135	53690	74612
2014	19233	30425	44550	49667	62817	84205	19356	28472	39392	45395	55277	76617
2015	19695	31242	45236	50441	63661	85244	19653	29244	40583	46770	56993	78732
2016	20046	31792	45646	50808	64084	85617	19215	29591	41691	47793	58654	80625
2017	20265	32077	45803	50880	64166	85507	18904	29861	42680	48581	60024	81812
2018	20568	32517	46203	51421	64721	86367	18698	30169	43625	49586	61437	83677
2019	20759	32762	46368	51624	64905	86599	18611	30762	44736	50527	62735	85116
2020	20923	33040	46557	51865	65118	86885	18703	31214	45641	51239	63731	86115
2021	21128	33265	46667	52003	65250	86961	18881	31714	46455	51846	64548	86770

Source: microdata from Statistics Netherlands (cbs.nl).

Notes: Amounts in 2023 euros. ALTE50=Average lifetime annual earnings up to age 50, NR=not retired, R=retired,

P10 = 10th percentile, p25 = first quartile, p50 = median, p75 = third quartile, p90 = 90th percentile.

Table A3. ALTE50 for women aged 55-69 by retirement status and year.

	P10	P25	P50	Mean	P75	P90	P10	P25	P50	Mean	P75	P90
Year	NR	NR	NR	NR	NR	NR	R	R	R	R	R	R
2011		5610	16549	20457	29619	45960			14658	17270	26115	40438
2012		6952	17570	21790	31470	47748			14559	17458	26078	40812
2013	224	8217	18702	22994	33028	49271			14672	17841	26381	41504
2014	1110	9494	19965	24205	34514	50791		1677	14807	18249	26860	42350
2015	2106	10635	21213	25444	35953	52262		3209	15091	18755	27516	43330
2016	3130	11755	22346	26530	37143	53522		3607	15305	19144	28221	44387
2017	4169	12753	23353	27486	38143	54541		4187	15942	19727	29083	45376
2018	5165	13615	24284	28449	39085	55685		4868	16319	20392	30012	46243
2019	6022	14327	25053	29252	39884	56613		5652	16996	21268	31115	47464
2020	6737	14932	25820	30049	40699	57602	276	6521	17785	22094	32121	48477
2021	7332	15467	26480	30751	41377	58539	705	7665	18668	23080	33312	49722

Source: microdata from Statistics Netherlands (cbs.nl).

Notes: Amounts in 2023 euros. ALTE50=Average lifetime annual earnings up to age 50, NR=not retired, R=retired,

P10 = 10th percentile, p25 = first quartile, p50 = median, p75 = third quartile, p90 = 90th percentile. Cells with very low values were removed from this table (Statistics Netherlands' guidelines).