

Country fiche on pensions for the Netherlands (AR 2021)

Contents

1	Overview of the Dutch pension system	3
1.1	Description.....	3
1.1.1	First pillar: the state old-age pension (AOW)	4
1.1.2	Second pillar: occupational pensions	6
1.1.3	Disability benefits	9
1.1.4	Survivors benefits.....	10
1.2	Recent reforms of the pension system	10
1.3	Actual ‘constant policy’ assumptions used in the projection	12
2	Demographic and labour force projections	13
2.1	Demographic development.....	13
2.2	Labour force projections	15
3	Pension projection results	17
3.1	Coverage.....	17
3.2	Overview of projection results.....	17
3.3	Description of main driving forces and implications	20
3.4	Financing of the pension system.....	24
3.5	Sensitivity analysis	25
3.6	Comparison with previous projections.....	28
4	Description of the model	31
4.1	The first pillar	31
4.2	The second pillar	32

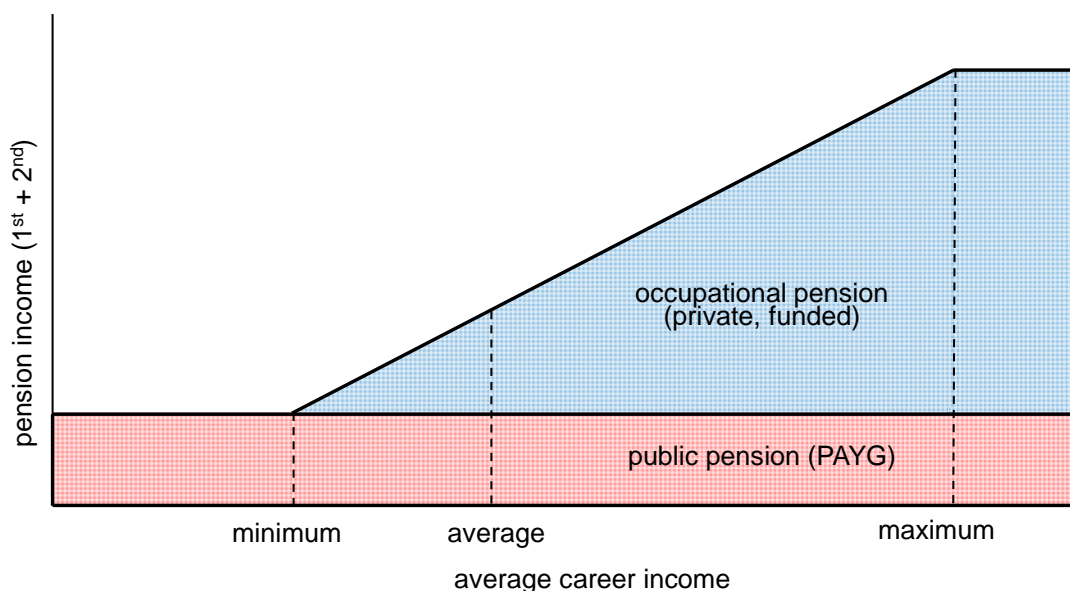
1 Overview of the Dutch pension system¹

1.1 Description

The mandatory part of the Dutch pension system comprises the government provided basic old-age pension scheme (first pillar), occupational pension schemes (second pillar), disability benefits and survivor benefits. The basic old-age pension provides an equal income for all pensioners at a level related to the net minimum wage. The state pension in the Netherlands is only a part of the total old-age pension system. The second pillar comprises the occupational pension schemes. It is funded, supplements the state pension and is related to past contributions and previously earned income. The annual build-up of pension rights is capped at an income level of 107,593 euros (in 2019), a level that is indexed each year in line with wages. On average the two pensions are roughly equal in size. Due to the dependency on past income however, the weights for individuals differ substantially. Figure 1 sketches how both pensions are related to past earnings. In 2019 the aggregates of paid out public and occupational old-age pensions were roughly equal in size, the public pension amounting to 4.9% of GDP and the occupational pension to 5.1%.

Disability benefits and survivor benefits currently make up 1.9% and 0.1% of GDP respectively. The rest of this section describes these pensions separately.

Figure 1 Overall sketch of the 1st and 2nd pillar system of old-age pensions



¹ This section and the next is partly based on "The old age pension system in the Netherlands; a brief outline" by the Ministry of Social Affairs and Employment.

1.1.1 First pillar: the state old-age pension (AOW)

The AOW is the statutory old-age pension scheme of the Netherlands. It provides all residents of the Netherlands a flat-rate pension benefit as from the eligibility age (see below). In 2019 the pension for a single amounts to 15,578 euros annually in gross terms and 14,738 euros in net terms.² For a couple these figures are 21,450 euros and 20,296 euros respectively, each of the partners receiving half. It is a basic provision. In net terms, the pension equals roughly 80% of the minimum wage for singles. For a couple this is roughly 100%. The pensions rise in line with minimum wages, which in turn are decided each year by the Minister of Social Affairs and Employment. There is no means-test for the eligibility of benefits; other forms of income have no effect on the AOW benefit.³

All residents of the Netherlands are insured for the AOW during the 50 years before they reach the eligibility age. No distinction is made between men and women and between civil servants, employees and the self-employed. Past contributions have no effect on the benefit level. During the period of insurance, entitlement is accrued in 2% steps for every insured year. This leads to a 100% entitlement to the relevant pension benefit on reaching the eligibility age, provided there are no gaps in the period of insurance. A gap, of 2% per year, occurs when a person resides outside the Netherlands during (part of) the insured period. People who are not entitled to the full AOW benefit and who have, together with other sources of income, a total income below the subsistence level (i.e. less than 70% of the legal minimum wage) are entitled to receive a supplementary social assistance benefit. In 2019, this supplement amounted to 307 mln euros, or 0.8% of the aggregate AOW expenditure in that year, and it involved around 49 thousand beneficiaries. The pensions are exportable. The supplementary benefit however is not. Currently about 10% of pensions is paid to a person living outside the Netherlands. However, of those with a full pension this is only 0.7%.

State old-age pensions are financed according to the pay-as-you-go system: today's contributors finance the pension payments made to the pensioners of today. The administrative body for the AOW is the Social Insurance Bank (SVB). The SVB is independent of the government in its day-to-day operations. The Board of Directors manages the Bank in consultation with the Board of Advisors. The Ministry of Social Affairs and Employment (SZW) appoints the members of both the Board of Directors and Board of Advisors and approves its annual plan and budget. The SVB is subject to inspection by the Work and Income Inspectorate (IWI), part of SZW. SZW is also responsible for the design of the pension system as well as changes therein such as the various pension reforms (see below).

The eligibility age for the AOW used to be 65 ever since its introduction in 1957. However, the eligibility age was raised by one month per year in the period 2013 till 2015, three months per year in 2016-2018 and four months in 2019. By that time, it had reached a value of 66 years and 4 months. In 2020 and 2021, there will be no further increases, and

² Data on public old-age pensions are obtained from the Dutch Social Insurance Bank (SVB).

³ Until 2015, a supplementary allowance was granted to couples of which one of the partners had not yet reached the eligibility age and had insufficient means. Nowadays, this allowance is of very limited relevance, since only couples that already received the allowance before 2015 are still entitled to it (as long as the aforementioned criteria are met).

afterwards the eligibility age will grow at a slower pace than planned earlier (and consequently at a slower pace than assumed in the previous projection round). This is the result of the 2019 pension reform: see section 1.2. After a three-month increase in 2022 and 2023 and a two-month increase in 2024, the eligibility age will be 67 years in 2024.⁴ After that year it will be linked to the remaining life expectancy for 65 year olds, as projected by Statistics Netherlands,⁵ in a way that is laid down in law by the formula:

$$V = \frac{2}{3}(L - 20.64) - (P - 67)$$

in which:

V = the increase of the eligibility age (in years)

L = projected average remaining life expectancy at the age of 65 as projected by Statistics Netherlands (in years)

P = the eligibility age in the year preceding the year in which the rise is considered (in years).

The formula is applied to all future years. If V is negative or smaller than 0.25 the eligibility age remains unchanged. However, if V exceeds the value of 0.25, the eligibility age is raised by three months. The rise is announced five years before it is to become effective and is based on the latest projection of life expectancies at the time.

According to the AWG projections of life expectancy,⁶ this effectively leads to a further rise of the eligibility age to 69 years and 9 months in 2070, the last year of the projection.⁷ This will take place in 11 three-month steps in 2028, 2032, 2035, 2039, 2043, 2047, 2051, 2055, 2059, 2063, and 2067. This time path is imputed in the calculations presented in section 3. Table 1 shows the accumulated effect for a selection of years. Changes in the projection of life expectancies will lead to corresponding adjustments of this time path, but not before five years after the change is made public by Statistics Netherlands. The level of the pension will remain unaffected. As the public pension remains to be a flat rate system, the table features a uniform across the board rise in the eligibility age. Variables that are not relevant in the Dutch pension system, such as the contributory period, are left empty in table 1.

⁴ In the previous round, the eligibility age of 67 was reached in 2021.

⁵ According to the most recent projection, average life expectancy (in years) as projected by Statistics Netherlands rises from its 2019 level of 20.13 to 21.32 in 2030, 22.48 in 2040, and eventually 24.59 in 2060.

⁶ For the sake of consistency, and due to the fact that Statistics Netherlands only projects life expectancy up until the year 2060, we use the life expectancy projections as provided in the AWG baseline assumptions for this exercise (rather than the numbers from Statistics Netherlands). Consequently, we also use a slightly different formula for determining the eligibility age to be used in the pension projections: $V = \frac{2}{3}(L - 20.56) - (P - 67)$.

⁷ The ages at which the pension rights are accrued move up in line with the eligibility age. They will remain to be built up in the 50 years preceding the eligibility age, at a rate of 2% for each year.

Table 1 **Qualifying condition for retiring**

			2019	2030	2040	2050	2060	2070
Qualifying condition for retiring with a full pension	Minimum requirements	Contributory period - men	-	-	-	-	-	-
		Retirement age - men	66+4m	67+3m	68	68+6m	69+3m	69+9m
		Contributory period - women	-	-	-	-	-	-
		Retirement age - women	66+4m	67+3m	68	68+6m	69+3m	69+9m
		Statutory retirement age - men	66+4m	67+3m	68	68+6m	69+3m	69+9m
		Statutory retirement age - women	66+4m	67+3m	68	68+6m	69+3m	69+9m
Qualifying condition for retirement WITHOUT a full pension		Early retirement age - men	-	-	-	-	-	-
		Early retirement age - women	-	-	-	-	-	-
		Penalty in case of earliest retirement age	-	-	-	-	-	-
		Bonus in case of late retirement	-	-	-	-	-	-
		Minimum contributory period - men	-	-	-	-	-	-
		Minimum contributory period - women	-	-	-	-	-	-
		Minimum residence period - men	see text	see text	see text	see text	see text	see text
		Minimum residence period - women	see text	see text	see text	see text	see text	see text

1.1.2 Second pillar: occupational pensions

In the Netherlands there are mainly four types of occupational pension providers:

1. industry-wide pension fund providers that administer the pension scheme of a whole branch of industry;
2. company-specific pension fund providers that administer the pension scheme of a larger enterprise;
3. pension funds for professional groups which have to do with self-employed professionals within a particular profession (there are only active members and pensioners and no employer).
4. insurance providers who have to deal with group life insurance contracts for separate enterprises;

The joint capital of these pension providers is estimated to be more than twice the size of GDP. The pension sector is also concentrated. The largest fund, with an invested capital of 466 billion euros⁸ (The Dutch Civil Servants' Pension Fund ABP), represents around 25% of the total assets. The largest five funds share about half of the total assets. At present (end of 2019), 216 pension funds are in operation.⁹ Other than these, 40,000 group pension agreements have been made with insurance providers by companies that do not have a pension fund. All these pension providers are being supervised by the Dutch Central Bank (DNB). About 95% of the capital is managed by pension funds (including Pension Premium Institutions, PPI).

⁸ <https://www.abp.nl/over-abp/financiele-situatie/jaarverslag.aspx>

⁹ <https://statistiek.dnb.nl/statistiek/index.aspx>

The vast majority of those employed in the Netherlands participate in an occupational pension scheme. This form of saving is attractive for most employees as it is tax favoured.¹⁰ As of 2015 it is capped. The 2020 level at which it is capped is a gross income of 107,593 euros. About 80% of people above the statutory retirement receive additional pension income in addition to the state old-age pension (AOW). For example, for people aged 65-70 years old, this share has increased from 74% in 2011 to 80% in 2017.¹¹

Occupational pensions are subject to negotiation between the social partners at industry level and are legally binding for all firms in that industry. Individual firms can be exempt from these if they offer a company specific pension scheme of comparable or better quality. The pension funds have to be financed by capital funding. A pension scheme is part of the employment conditions laid down in an agreement (which may be a collective agreement). A vast majority of pension funds currently have an average pay scheme promising a maximum yearly accrual rate of 1.875% of average career salary (including first pillar benefits). If the collective labour agreement lasts for 40 years, total pension benefit (first plus second pillar) therefore will be 75% of the average salary. Indexation of pension rights of the working population on average used to equal 50% of the wage rise and 50% of the price rise, though in recent years price indexation seems to become more dominant especially for the retired. Occupational pension schemes are considered supplementary to the public old-age pension (AOW). The AOW benefit is therefore a factor included in most calculations of second pillar pension schemes in order to arrive at the 75% aim referred to above. This factor is known as the AOW franchise. Pension premiums are only paid over income above this franchise, and correspondingly only pension rights built up. On average, pension contribution rates amount to 24% of gross income above this franchise, of which roughly 70% is covered by the employers and 30% by the employees. Together these two parts of the contribution to pension funds currently amount to around 14% of aggregate gross labour income. Most employees participate in a pension scheme. However, around 13% of them do not.^{12, 13}

In addition, the last ten years have featured a spectacular increase in the number of self-employed, up to a number of about 1.4 million persons in 2017.¹⁴ These self-employed persons are not covered by second-pillar schemes at all, except if they have been salary workers before they became self-employed and if they had the opportunity to stay with their previous pension scheme. A recent investigation estimated that about 200 thousand self-

¹⁰ Saving via the occupational pension system falls under an EET arrangement. This means that the contribution to the pension fund is tax exempt (the first E), that the accrual of revenues to the pension fund are tax exempt as well (the second E) and that the paid out pensions are taxed (the T). As for many employees the tax rate at which the contributions to the fund can be deducted is higher than the tax rate that is due on the paid out pensions this form of saving is considered to be subsidized.

¹¹ <https://www.cbs.nl/nl-nl/maatwerk/2019/27/aow-ers-met-aanvullend-pensioen-2011-2017>

¹² <https://www.cbs.nl/nl-nl/maatwerk/2018/45/witte-vlek-op-pensioengebied-2016>

¹³ As mentioned above, occupational pensions are subject to negotiations between the social partners at industry level and are legally binding for all firms in that industry. Hence, if social partners do not agree on a mandatory occupational pension scheme (or a minimal fee of 0% is agreed upon), employees may not participate. Some employees can also be exempted from participation in a pension scheme. These include students/interns, employees receiving a youth minimum wage (i.e. a wage below the adult minimal wage), employees living in Belgium, recently started employees (during the first 2-6 months, participating in a pension scheme is not compulsory), or employees working in a recently started firm.

¹⁴ CBS, 2018. <https://opendata.cbs.nl/statline/#/CBS/nl/dataset/82309NED/table?ts=1543063126915>

employed persons do not accumulate any second-pillar pension at all.¹⁵ The Dutch government investigates possibilities to enlarge the coverage of the second-pillar schemes by salary workers and the self-employed.¹⁶

The third (non-mandatory savings via life insurance companies) and fourth pillar (free savings) in the Netherlands are relatively small.

According to Statistics Netherlands, the current average labour market exit age (including early retirement) of Dutch employees is 65.1 years in 2019. This age is steadily rising from 60.7 years in 2002. Between 2018 and 2019, it rose from 64.8 years to 65.1 years.¹⁷

The financial position of pension funds

The second pillar of the Dutch pension system is characterised by the legal obligation of full funding for the nominal, i.e. non-indexed, liabilities of pension funds. Many pension funds have invested in equity and real estate. In order to compensate the higher risks involved in these investments, the supervisor requires that a Dutch pension fund hold additional reserves (buffers).

Since the 1990's certain developments took place, including a systemic increase in pension obligations (and costs) due to a higher life expectancy, a reduction of contributions paid (during the 1990's) and – most importantly - a continuous drop of the capital market risk free interest rate. Despite an increase in contributions paid during the first decade of the 21st century and favourable rates of return on pension wealth, these developments led to a sharp fall of the funding ratio. This ratio, which is defined as the ratio between assets and nominal, that is non-indexed, liabilities fell from approximately 230% in 1990, to 115% in 2004 and to a current level (end of third quarter of 2020) of 95%.^{18, 19}

The supervision structure, the financial assessment framework (FTK), has been revised in 2015. The government, social partners, pension fund administrators and the supervising authority agreed that stop-gap regulations aimed at short-term financial stability could be counterproductive to the long-term quality of the pension system. Achieving a balance between short-term exigent requirements and the long-term robustness of the pension system remains to be a challenging task. Pension funds are allowed to base their indexation policies on the year-averaged funding ratio instead of the funding ratio at the end of the year. Moreover, current rules already allow that the cost-effective contribution rate to be based on the ten-year-averaged interest term structure. These measures intend to make the

¹⁵ Ministerie van SZW, 2018. Verzamelbrief Pensioenonderwerpen en het vervolgonderzoek over de witte vlek ([link](#)).

¹⁶ Ministerie van SZW, 2020. Kamerbrief uitwerking Pensioenakkoord.

<https://www.rijksoverheid.nl/documenten/kamerstukken/2020/07/06/uitwerking-pensioenakkoord>

¹⁷ <https://www.cbs.nl/nl-nl/nieuws/2020/47/werknemers-bij-pensionering-voor-het-eerst-gemiddeld-boven-65-jaar>

¹⁸ <https://www.dnb.nl/nieuws/nieuwsoverzicht-en-archief/statistisch-nieuws-2020/dnb390555.jsp>

¹⁹ If the funding ratio of a pension fund is considered insufficient, the pension fund is expected to come up with plans to restore this. Most do so by freezing indexation of pensions: this includes the biggest Dutch pension funds (ABP and PFZW) as has been practice during the last 10 years. At the moment, a transition scheme is being discussed between the government and social partners to obtain a balanced transition from the current pension contract to the new pension contract (see section 1.2) in order to avoid 'unnecessary' pension cuts. This includes a reassessment of the minimum solvency requirement. Importantly, the Dutch government does not provide guarantees in case pension funds are unable to meet their obligations. Therefore, pension cuts can never be completely ruled out.

participants in the pension system less vulnerable to short-term fluctuations in the interest rate and the capitalization rate of the funds.

It is legally required for pension funds to determine a cost-effective contribution rate and a minimum solvency rate in order to guarantee their members a pension benefit. If the amount is less than this basic limit, pension funds are compelled to take measures (including cutting promised pension benefits) to restore this level. According to the FTK, pension funds have to state in a clear way whether or not they will index the pension rights and under what conditions they intend to do so. The parameters used in FTK will be assessed every five years (such as the expected returns on assets and expected inflation).

1.1.3 Disability benefits

The system of disability pensions consists of three parts: the WAO, the WIA and the Wajong. Around 750 thousand people currently depend on one of these schemes, corresponding to 8% of the workforce.²⁰ The WAO and WIA are financed by social security contributions paid by employers, the Wajong is financed by general taxation.

The WAO covers individuals who became disabled before 2004 and had past earnings. For these people the old benefit levels apply. It involves a benefit that depends on past earnings, age and degree of disability. It can amount to a maximum of 75% of past earnings and is capped at around 55,000 euros (in 2019). Between 2002 and 2007 several reforms were implemented and the WAO was replaced by the WIA for new claimants. These reforms involved a number of measures that substantially affected the disability schemes. The reforms intend to curb the inflow into these schemes. This inflow had always been very high in the Netherlands and had resulted in a stock of beneficiaries that amounted to almost one million around the turn of the century.

The first round measures were threefold. First, it involved the extension from 1 to two years of the duration of the period in which employers have to continue to pay 70% of the wages of sick employees.²¹ This measure has a direct limiting effect on eligibility which sharply reduced the inflow in 2005. Apart from this, it is also expected to curb the future inflow by raising the incentives for employers to enhance working conditions and to increase the effort to fit the involved employees into the workforce. A further improvement may come from recovery from sickness during the period of the extension. The second 2004 measure involves a restriction of eligibility by raising the requirements to qualify for these schemes. Not only the new claimants are submitted to the new, sharpened, criteria, the measure also applies to the existing stock of beneficiaries which undergo a one-off screening on the basis of the revised criteria. The third measure taken in 2004 was the abolition of the, separate, public scheme for the self-employed. These people have to resort to private insurers.

The 2006 measures distinguish between degrees of disability. It restricted the eligibility of those who are partially disabled. Especially those with a low degree of disability (smaller than 35%) can in the future not apply at all. For fully and permanently disabled a new benefit scheme is introduced that provides an earnings related benefit till the pensionable age.

²⁰ Data on disability pensions are obtained from Statistics Netherlands.

²¹ The organizations of employees and employers can agree on a higher level in collective agreements.

Between 2007 and 2019, the total stock of persons that benefit from either the WAO scheme or the WIA scheme decreased by roughly a third.²²

The third part of the system of disability benefits, the Wajong, covers young individuals. Its benefit levels are low and generally do not exceed those of social assistance. It has shown a sharp rise in the number of claimants from 2007 up to 2012 that partially counteracts the favourable effects of the replacement of the WAO by the WIA. From 2012 onwards, the number of claimants has remained quite stable around 215,000. Most claimants did not participate in the labour market at all, even though a substantial number was expected to be able to do so (at least partially). In 2010 several changes were introduced in the Wajong, aiming to stimulate labour force participation among claimants. But although these changes have reduced the inflow into the Wajong, the total number of claimants remains substantial.

In total (WAO + WIA + Wajong), the number of disability claimants has decreased from 810,000 in 2007 to 750,000 in 2019.

Pension reforms affect the disability scheme by prolonging or shortening the ages at which one can be eligible for this benefit. This age rises in line with the old-age public pension.

1.1.4 Survivors benefits

The scheme of survivors benefits covers widowers, widows and orphans. The benefit level has a maximum of 70% of minimum wage. This level applies only to individuals with no income from labour. In net terms it equals the social assistance level. In case the involved individual has income from labour, the benefit is reduced by a level that equals 50% of minimum wage plus two thirds of the surplus of labour income. Possession of personal wealth or incomes from pensions do not lead to a reduction of the benefit. A reform that was implemented in 1996, that mainly affects individuals born as from 1950, has substantially restricted the eligibility to this scheme and consequently curbed the inflow of claimants. For individuals born as from 1950 it is now required to have a degree of disability to work of at least 45% or to be responsible for the care of a child below the age of 18.

Pension reforms only affect the survivor scheme by prolonging or shortening the ages at which one can be eligible for this benefit. This age rises in line with the old-age public pension.

1.2 Recent reforms of the pension system

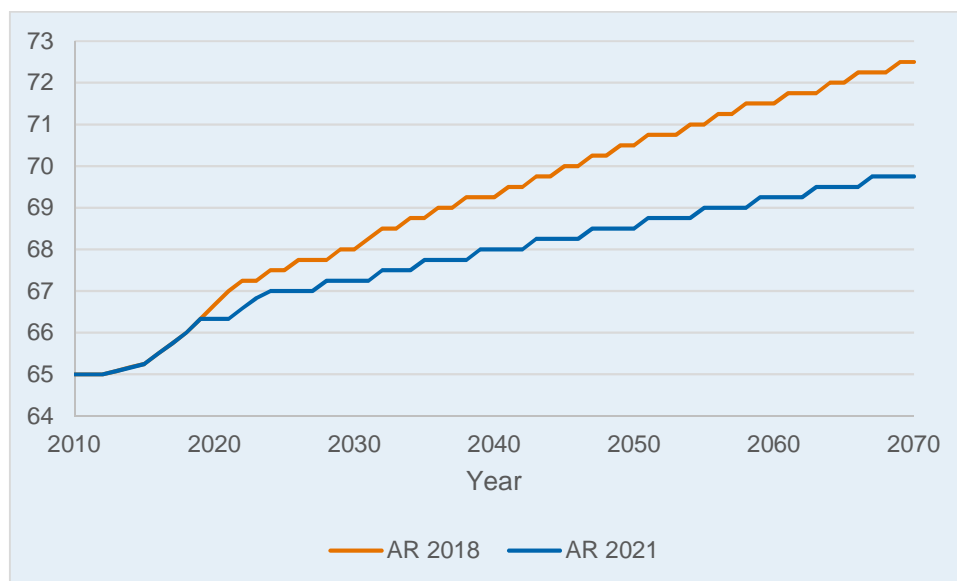
In 2019, unions and employers struck a deal to reform the pension system. As part of this deal, the government agreed to temporarily halt the increase of the retirement age.²³ It will remain 66 years and 4 months until 2021, whereas under previous legislation it would have

²² CBS, 2020, <https://opendata.cbs.nl/statline/#/CBS/nl/dataset/80794NED/table?dl=447B0>

²³ Note that a deal with the social partners is not required in order to reform the statutory retirement age.

increased to 67 years in this period. Now, the statutory retirement age will reach 67 years only in 2024; after that year it will again be linked to the remaining life expectancy for 65 year olds. However, constituting another major reform, the link between the retirement age and life expectancy is limited to an 8-month increase rather than a one-year increase per year of life expectancy gains. As a consequence, the eligibility age will continue to grow at a slower pace than previously assumed. Figure 2 illustrates the difference between the time paths that were imputed in the current and previous projection round. The retirement age is now projected to be 69 years and 9 months in 2070, as opposed to 72 years and 6 months as assumed in the 2018 AR.

Figure 2 Evolution of the retirement age over time in AR 2018 and AR 2021



The slower increase of the retirement age has an upward pressure on public pension expenditure with respect to the previous projection. It is also expected to temper the rise in labour participation of older people. In section 3.5 we present a policy scenario in which the retirement age is (again) fully linked to increases in life expectancy.

The statutory retirement age in the second pillar (occupational pensions) is linked to life expectancy using the same formula as for the public pension, and will consequently also grow at a slower pace.²⁴ The possibilities for early or late retirement will remain to be actuarially neutral. It is important to note that built up pension rights in the past are respected and not affected by the reform.

Another change envisaged by the pension reform is the introduction of a new pension contract in the second pillar.²⁵ This turns the Dutch occupational pension contract more into a DC system rather than a DB system (see the box below for some details). The new pension

²⁴ A difference is that increases of the retirement age are implemented ten years earlier and take place in full one-year steps. Therefore, the retirement age for occupational pensions "leads" the retirement age for public pensions.

²⁵ <https://www.rijksoverheid.nl/onderwerpen/pensioen/toekomst-pensioenstelsel>

contract should be used in practice from 2026 onward;²⁶ however, since this involves a reform in the private pension system, its effects on public finances will be very modest.²⁷

A new pension contract

Regarding the second pillar, probably the most important element of the proposed reform is the change from pension *entitlements* to pension *expectations*, based upon individually accumulated wealth. Hence, accrual rates and funding ratios on the basis of the actual risk free rate play no role in this new contract. In the current arrangement, participants are entitled to a benefit which is related to the average wage in their labour career, conditional on the funding ratio of the pension fund. The proposed reform turns the pension contract more into a “collective defined contribution” contract. The contribution rate will be fixed and the same for all ages. The “collective” element of the contract comes from the fact that wealth of participants will be invested collectively and returns are divided among participants based upon pre-determined rules. Moreover, similar to the current pension contract, idiosyncratic longevity risk is shared between all participants. There can be a third collective element: the proposed contract features as an option an anonymous solidarity fund. Part of the contributions are used to build up this fund and the fund is used to supplement pensions, e.g. during bad financial times.

1.3 Actual ‘constant policy’ assumptions used in the projection

The (slower) rise of the statutory retirement age is included in the projection. In principle, all public pensions are fully indexed to wages after the upcoming government period. However, our model does take into account policy measures that affect the (average) level of pensions, including measures that do so by affecting the number of beneficiaries.²⁸ More information on the model can be found in chapter 4.

²⁶ The new pension contract will most likely apply to *all* participants (rather than only new entrants). In principle, all pension wealth will be transferred to the new pension contract. Very significant attention is being paid towards balanced intergenerational effects of the new pension contract. Participants who are expected to be worse off as a result of the reform (several outcomes are being monitored) will likely receive adequate compensation. The practical details are still being worked out.

²⁷ Current expectations are that the new pension contract will lead to somewhat higher pension benefits in the short run and somewhat lower benefits in the long run vis-à-vis the current contract (see CPB, 2020 [[link](#), in Dutch]). As a result, there might be some redistributive effects over time, but these are expected to (more or less) cancel out on aggregate. Moreover, note that, from a government perspective, only taxes on pensions are relevant for the projections as far as the occupational pension scheme is concerned. Even if the new pension contract would have a non-zero effect on private pension benefits, the net effect on tax income would be much smaller (given the 35% marginal tax rate on pension income which is assumed in our projections).

²⁸ The so-called ‘Participatiewet’, which reduces the inflow in the Wajong scheme, is an example of such a policy measure.

2 Demographic and labour force projections

2.1 Demographic development

Table 2 provides an overview of the demographic development until 2070. It shows that the total size of the population will gradually increase in the next two decades from its current level of around 17.3 million to 18.2 million in 2042. This is largely due to net migration. Afterwards, the population size remains roughly constant and reaches a value of 18 million in 2070. Importantly, the age composition shows significant changes: the old-age dependency ratio increases from 32.9% in 2019 to 55.2% in 2070. This results from two factors: an increase in the size of the cohorts that reach the age of 65 and beyond (relative to the working age population) and the increase in life expectancy at 65. The latter of the two rises by 4.5 years (from 19.0 to 23.5 years) for men and by 4.9 years (from 21.4 to 26.3 years) for women.

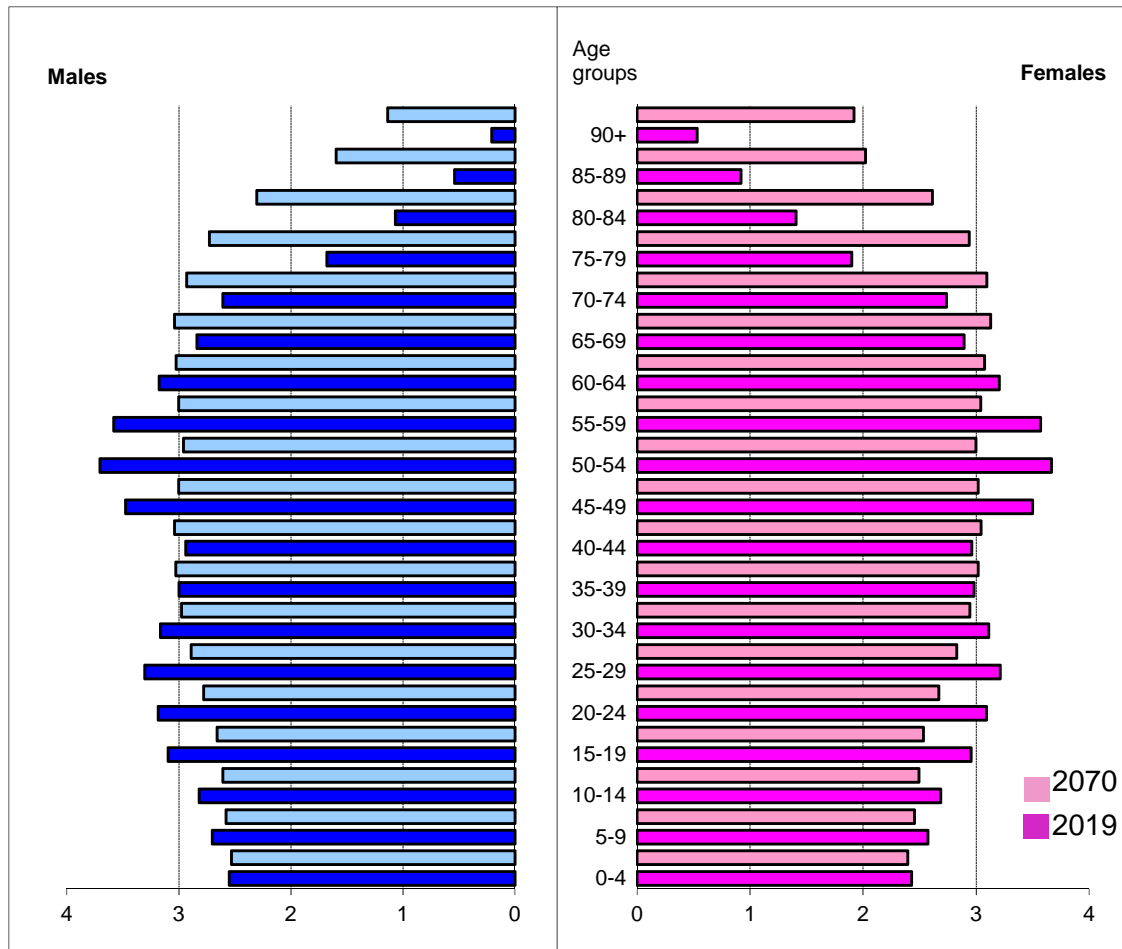
Table 2 Main demographic variables

	2019	2030	2040	2050	2060	2070	peak value	peak year	change 2019-2070
Population (thousand)	17,343	17,988	18,188	18,136	18,010	17,990	18,192	2042	647
Population growth rate	0.6	0.2	0.0	-0.1	-0.1	0.0	0.6	2019	-0.6
Old-age dependency ratio (pop 65+ / pop 20-64)	32.9	42.4	49.3	49.3	51.4	55.2	55.2	2070	22.4
Old-age dependency ratio (pop 75+ / pop 20-74)	11.8	17.0	21.9	24.9	24.2	26.3	26.3	2070	14.5
Ageing of the aged (pop 80+ / pop 65+)	24.2	29.2	33.4	40.8	39.4	39.4	41.6	2053	15.2
Men - Life expectancy at birth	80.7	81.9	83.2	84.4	85.5	86.6	86.6	2070	5.9
Women - Life expectancy at birth	83.6	85.1	86.4	87.6	88.8	89.9	89.9	2070	6.3
Men - Life expectancy at 65	19.0	19.9	20.9	21.8	22.7	23.5	23.5	2070	4.5
Women - Life expectancy at 65	21.4	22.5	23.5	24.5	25.4	26.3	26.3	2070	4.9
Men - Survivor rate at 65+	89.6	91.2	92.4	93.4	94.2	95.0	95.0	2070	5.3
Women - Survivor rate at 65+	92.3	93.6	94.5	95.3	96.0	96.6	96.6	2070	4.3
Men - Survivor rate at 80+	63.1	67.9	71.8	75.3	78.5	81.2	81.2	2070	18.2
Women - Survivor rate at 80+	74.0	78.0	81.3	84.0	86.4	88.5	88.5	2070	14.5
Net migration (thousand)	105.4	33.3	34.0	33.4	32.8	33.2	105.4	2019	-72.2
Net migration over population change	0.9	0.9	5.8	-2.9	-3.3	9.0	62.9	2067	8.1

Figure 1 compares the age distribution in 2019 with that at the end of the projection interval in 2070. For both males and females, the shares of all age groups above 65 are projected to

increase between 2019 and 2070. Consequently, pension expenditure as a percentage of GDP will increase over time.

Figure 2 Population by age groups and sex as a share of total population



2.2 Labour force projections

Table 3 provides an overview of the main changes that are expected in the labour market in the period from 2019 and 2070. It shows that in this time period the labour force participation rates of the 20 to 64 year olds will rise from 82.6% to 84.6% and those of the 20 to 74 year olds from 71.9% to 74.0%. The increase in labour force participation of the 65 to 74 year olds (13.5 percentage points) is considerably smaller than in the previous projection round (22.2 percentage points) as a result of the pension reform.

Table 3 Participation rate, employment rate and share of workers

	2019	2030	2040	2050	2060	2070	peak value	peak year	change 2019-2070
Labour force participation rate 20-64	82.6	83.0	83.7	83.8	84.1	84.6	84.6	2070	1.9
Employment rate of workers aged 20-64	80.2	79.2	79.9	80.1	80.3	80.7	80.7	2070	0.6
Share of workers aged 20-64 in the labour force 20-64	97.0	95.5	95.5	95.5	95.5	95.5	97.0	2019	-1.5
Labour force participation rate 20-74	71.8	71.6	71.7	73.8	73.6	74.0	74.0	2070	2.2
Employment rate of workers aged 20-74	69.7	68.4	68.4	70.4	70.2	70.6	70.6	2070	1.0
Share of workers aged 20-74 in the labour force 20-74	97.0	95.4	95.4	95.4	95.4	95.4	97.0	2019	-1.6
Labour force participation rate 55-64	72.0	72.4	74.1	75.6	77.1	78.5	78.5	2070	6.5
Employment rate of workers aged 55-64	69.7	68.9	70.4	72.0	73.3	74.7	74.7	2070	4.9
Share of workers aged 55-64 in the labour force 55-64	96.8	95.1	95.1	95.1	95.1	95.1	96.8	2019	-1.7
Labour force participation rate 65-74	14.4	19.4	18.5	22.6	25.6	27.9	27.9	2070	13.5
Employment rate of workers aged 65-74	13.8	18.2	17.4	21.3	24.1	26.3	26.3	2070	12.5
Share of workers aged 65-74 in the labour force 65-74	96.0	94.1	94.1	94.0	94.2	94.3	96.0	2019	-1.8
Median age of the labour force	40.0	39.0	40.0	41.0	41.0	41.0	41.0	2050	1.0

Tables 4a and 4b focus on careers lengths and durations of retirement for respectively men and women. It shows that the average labour market exit age rises by 2.7 years for men (from 65.8 to 68.5) and by 3.0 years for women (from 64.0 to 67.0). Due to their lower labour market exit age and higher life expectancy, women have a longer duration of retirement than men.²⁹

²⁹ There are no data available regarding the contributory period. As explained in section 1.1.1 this is not relevant for the pension.

Table 4a Exit ages and expected duration of retirement - MEN

	2020	2030	2040	2050	2060	2070	peak value	peak year	change 2020-2070
Average effective retirement age (administrative data)*	66.0								
Average labour market exit age (CSM)**	65.8	66.6	67.0	67.6	68.1	68.5	68.5	2069	2.7
Contributory period	:	:	:	:	:	:	:	:	:
Duration of retirement***	18.2	18.3	19.2	19.3	20.1	20.0	20.7	2067	1.8
Duration of retirement/contributory period	:	:	:	:	:	:	:	:	:
Percentage of adult life spent in retirement****	27.6	27.4	28.1	28.0	28.6	28.4	29.1	2067	0.8
Early/late exit*****	1.1	1.1	1.2	1.7	1.2	2.3	2.3	2069	1.2

* The effective retirement age shows the age at which people on average start receiving an old-age pension benefit. It is calculated on the basis of the administrative data for 2019 (see Annex Tables A4a and A4b); ** The labour market exit age as calculated based on Labour Force Survey data for the base year and estimated by the Cohort Simulation Model thereafter; *** 'Duration of retirement' is calculated as the difference between the life expectancy at the average labour market exit age and that exit age itself; **** The 'percentage of adult life spent in retirement' is calculated as the ratio between the duration of retirement and the life expectancy minus 18 years; ***** Early/late exit is the ratio between those who retire and are below the statutory retirement age and those who retire at the statutory retirement age or above.

Table 4b Exit ages and expected duration of retirement - WOMEN

	2020	2030	2040	2050	2060	2070	peak value	peak year	change 2020-2070
Average effective retirement age (administrative data)*	66.0								
Average labour market exit age (CSM)**	64.0	65.0	65.4	65.9	66.4	67.0	67.0	2068	3.0
Contributory period	:	:	:	:	:	:	:	:	:
Duration of retirement***	22.3	22.5	23.5	23.6	24.5	24.5	24.6	2061	2.2
Duration of retirement/contributory period	:	:	:	:	:	:	:	:	:
Percentage of adult life spent in retirement****	32.6	32.4	33.2	33.0	33.6	33.3	33.7	2061	0.7
Early/late exit*****	2.0	1.7	2.0	3.5	2.2	4.1	4.2	2069	2.1

* The effective retirement age shows the age at which people on average start receiving an old-age pension benefit. It is calculated on the basis of the administrative data for 2019 (see Annex Tables A4a and A4b); ** The labour market exit age as calculated based on Labour Force Survey data for the base year and estimated by the Cohort Simulation Model thereafter; *** 'Duration of retirement' is calculated as the difference between the life expectancy at the average labour market exit age and that exit age itself; **** The 'percentage of adult life spent in retirement' is calculated as the ratio between the duration of retirement and the life expectancy minus 18 years; ***** Early/late exit is the ratio between those who retire and are below the statutory retirement age and those who retire at the statutory retirement age or above.

3 Pension projection results

3.1 Coverage

The coverage analysis is carried out for 2016 and 2017. Table 5 shows that the Eurostat ESSPROS definition of pensions for these years amounts to respectively 13.0 and 12.5% of GDP. Of these, respectively 7.1 and 6.8% of GDP are classified as public pension expenditure. In the AWG definition, the latter figures equal 7.2 and 7.0% of GDP. Therefore, there is a difference of -0.1%-points in 2016 and -0.2%-points in 2017. This lies mainly in the fact that two specific arrangements for paid sick leave were classified as disability benefits according to our own definition, but were excluded from the Eurostat definition. These are the so-called 'ZW-vangnet' (being 0.12% of GDP in 2016 and 2017) and 'WAZO' (0.16% of GDP in 2016 and 0.15% of GDP in 2017). At the same time, a part of the items that constitute the disability arrangements were not included in the AWG definition. These include various funds ('sfn' and 'ufo', being 0.05% of GDP in 2016 and 0.04% of GDP in 2017) and used to include the items that relate to supplementary public disability benefits (in Dutch: 'toeslagenwet', being 0.11% of GDP in 2016). However, as of 2017 the 'toeslagenwet' is also excluded from the Eurostat definition.

Table 5 Eurostat (ESSPROS) vs. Ageing Working Group definition of pension expenditure (% GDP)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	change 2009- 2018
Eurostat total pension expenditure	12.1	12.2	12.5	12.9	13.1	13.2	13.0	13.0	12.5	:	:
Eurostat public pension expenditure (A)	6.6	6.6	6.7	6.8	7.0	7.1	7.1	7.1	6.8	:	:
Public pension expenditure (AWG: outcome) (B)	6.3	6.3	6.4	6.6	6.7	7.1	7.2	7.2	7.0	6.9	0.6
Difference Eurostat/AWG: (A)-(B)	0.2	0.3	0.2	0.3	0.3	0.0	-0.1	-0.1	-0.2	:	:
<i>Expenditure categories not considered in the Eurostat definition (see text)</i>											
ZW-vangnet								-0.1	-0.1		
WAZO								-0.2	-0.2		
<i>Expenditure categories not considered in the AWG definition (see text)</i>											
Sfn, ufo								0.0	0.0		
Toeslagenwet								0.1			

Numbers may not add up due to rounding.

3.2 Overview of projection results

Table 6 presents the results of the projections for both public and occupational pensions. All variables are expressed as a percentage of GDP. It shows that the public pensions, comprising old-age pensions, the disability benefits and survivors benefits, rise from 6.8% of GDP in 2019 to a level of 9.1% of GDP in 2040, and again reach this value in 2070, when the

effects of both the ageing population and the reforms have fully kicked in.³⁰ The time path of expenditure on the separate schemes is discussed hereafter.

Public pension expenditure exceeds the directly designated (employer and employee) contributions to these schemes as the Wajong part of the disability scheme is financed from general taxation and the designated contribution to the old-age pension is capped.³¹ The remainder is supplemented by the government from other forms of taxation (state contributions), see section 3.4. This cap aims to prevent unintended distributional effects, both between income groups and generations. As the direct contribution weighs more heavily on lower incomes, it prevents differences in net income to increase. And as individuals who have reached the retirement age are exempt from paying this tax, it also avoids a disproportional part of the increasing costs of old-age pensions to be borne by the (younger) workers.

Private occupational pensions will rise from its current level of 5.1% of GDP to eventually 6.6% in 2070.³² This rise is roughly in line with that of the public old-age pensions (see hereafter). Taken together, total pension expenditure will rise from 11.9% of GDP in 2019 to a level of 15.8% of GDP in 2070. Total pension contributions rise more or less in line with expenditures, and will increase from their current level of 10.6% to eventually 14.1% in 2070.

By construction, projected net public and total pension expenditure rise perfectly in line with their gross counterparts. This results from the assumption of constant implicit tax rates on pensions.

Table 6 Projected gross and net pension spending and contributions (% of GDP)

Expenditure	2019	2030	2040	2050	2060	2070	peak value	peak year	change 2019-2070
Gross public pension expenditure	6.8	8.1	9.1	8.9	8.9	9.1	9.1	2070	2.3
Private occupational pensions	5.1	5.7	7.1	6.8	6.5	6.6	7.2	2042	1.5
Private individual mandatory pensions	:	:	:	:	:	:	:	:	:
Private individual non-mandatory pensions	:	:	:	:	:	:	:	:	:
Gross total pension expenditure	11.9	13.8	16.2	15.8	15.4	15.8	16.3	2042	3.8
Net public pension expenditure*	5.8	6.9	7.8	7.6	7.6	7.8	7.8	2070	2.0
Net total pension expenditure*	9.1	10.6	12.4	12.1	11.8	12.1	12.5	2042	3.0

³⁰ The projected ratio of public pension expenditure to GDP is higher than in the previous round (AR 2018: 7.8% of GDP in 2070). This is mainly driven by the 2019 pension reform (see section 1.2). Moreover, the old-age dependency ratio shows a more rapid increase than in AR 2018.

³¹ These contributions are capped at 17.9% of taxable income in the first two tax brackets. Individuals who have reached the retirement age are exempt from paying this contribution.

³² In the first couple of decades, private pension expenditure is lower than in the previous projection round. This is mainly the result of the current low interest rate, which seriously limits indexation of pensions in the short run. In the long run, this effect is more than offset by upward pressures due to e.g. the 2019 pension reform and stronger ageing effects. In 2070, the projected spending-to-GDP ratio is 0.6 percentage points higher than in AR 2018.

Contributions	2019	2030	2040	2050	2060	2070	peak value	peak year	change 2019-2070
Public pension contributions	6.5	7.7	8.8	8.6	8.4	8.7	8.8	2042	2.2
Total pension contributions	10.6	12.2	14.0	13.4	13.0	13.4	14.1	2042	2.8

Table 7 separately presents the projection of the three components of public pensions. It shows that the (state) first pillar old-age pensions rise from 4.9% of GDP in 2019 to 6.9% in 2070. This mainly results from two counterbalancing effects. The first is the rise by 68% of the old-age dependency ratio (from 32.9% to 55.2%, see Table 2), which given the flat rate nature and linkage of benefit levels to wages, leads to an equal upward pressure on expenditure. The second is the effect of the increase in the eligibility age over time, which reduces the number of beneficiaries. Rising labour participation rates (see section 2) add to this downward effect. However, expenditure on old-age pensions still shows an increase because future cohorts of pensioners will be larger in size than the current ones. Moreover, the link between the retirement age and life expectancy is limited to an 8-month increase per year of life expectancy gains (see section 1).

Table 7 also shows that disability benefits are projected to increase slightly from 1.9% of GDP in 2019 to eventually 2.2% in 2070.³³ Most importantly, this is due to the prolongation of this scheme, which is a result of the rise of the eligibility age for the old-age pension. This leads to an increase in the number of claimants over time. Table 7 also shows that expenditure on survivors benefits will remain at 0.1% of GDP throughout the period.

Table 7 Projected gross public pension spending by scheme (% of GDP)

Pension scheme	2019	2030	2040	2050	2060	2070	peak value	peak year	change 2019-2070
Total public pensions	6.8	8.1	9.1	8.9	8.9	9.1	9.1	2070	2.3
Old-age and early pensions	4.9	5.9	6.9	6.8	6.6	6.9	7.0	2042	2.0
<i>Flat component</i>	4.9	5.9	6.9	6.8	6.6	6.9	7.0	2042	2.0
<i>Earnings-related</i>	:	:	:	:	:	:	:	:	:
<i>Minimum pensions (non-contributory) i.e. minimum income guarantee for people above 65</i>	:	:	:	:	:	:	:	:	:
Disability pensions	1.86	2.09	2.05	2.08	2.19	2.16	2.2	2063	0.3
Survivors' pensions	0.09	0.08	0.09	0.08	0.08	0.08	0.09	2020	0.0
Other pensions	:	:	:	:	:	:	:	:	:

³³ In the intermediate years (2030-2060), the expenditure-to-GDP ratio is somewhat higher than in AR 2018. This is partially driven by higher forecast levels of disability benefits until 2025 (as provided by CPB, see section 4). Moreover, the age profile (that can also change over time as a result of changes in e.g. participation, see section 4.1) might lead to somewhat different patterns over time vis-à-vis the previous projection round. In 2070, however, the projected spending-to-GDP ratio is almost identical to the AR 2018 projection (2.16% of GDP versus 2.14% of GDP).

3.3 Description of main driving forces and implications

Table 8 decomposes the increase in the ratio of pension expenditures to GDP into the effects of changes in the dependency, coverage, employment, and benefit ratio and in labour market effects and a residual.³⁴ It shows that the driving force behind the 2.3%-point rise in the ratio of public pension expenditure to GDP between 2019 and 2070 lies in the enormous increase in the dependency ratio which results from the ageing population.

The other factors exert mitigating effects. The coverage ratio mainly decreases due to the rising eligibility age for public old-age pensions. Over the full period this dampens the rise by 1.2%-points.

The benefit ratio turns out to have a slightly mitigating effect of 0.3%-points, and the labour market developments also exert a downward effect on the ratio of pension expenditure to GDP. The total labour market effect in 2019-2070 is -0.4%-points. This is mostly driven by the rise of participation levels over the age of 65 (career shift effect), which, again, results from the increasing retirement age.

Table 8 Factors behind the change in public pension expenditures between 2019 and 2070 (in percentage points of GDP) – pensioners

	2019-30	2030-40	2040-50	2050-60	2060-70	2019-70
Public pensions to GDP	1.3	1.0	-0.2	0.0	0.3	2.3
Dependency ratio effect	2.0	1.3	0.0	0.4	0.6	4.3
Coverage ratio effect*	-0.5	-0.1	-0.1	-0.3	-0.1	-1.2
<i>Coverage ratio old-age</i>	-0.3	0.0	-0.1	-0.3	-0.1	-0.7
<i>Coverage ratio early-age</i>	0.6	0.6	-0.6	0.1	0.4	1.0
<i>Cohort effect</i>	-2.1	-1.5	0.6	-0.3	-0.8	-4.1
Benefit ratio effect	-0.1	-0.1	0.0	0.0	-0.1	-0.3
Labour market effect	0.0	-0.1	0.0	-0.1	-0.1	-0.4
<i>Employment ratio effect</i>	0.1	-0.1	0.0	0.0	0.0	-0.1
<i>Labour intensity effect</i>	0.0	0.0	0.0	0.0	0.0	0.0
<i>Career shift effect</i>	-0.1	0.0	0.0	-0.1	-0.1	-0.3
Residual	-0.1	0.0	0.0	0.0	0.0	-0.1

* Subcomponents of the coverage ratio effect do not add up necessarily.

Table 9 shows the development of the replacement rate at retirement³⁵ (RR) and the benefit ratio³⁶ (BR). Over the full period the changes turn out to be small.³⁷ The RR's are lower than the BR's because the Netherlands features a strong rise of wages with age. Wages just before retirement are therefore relatively high, leading to a larger decline in income at retirement.

³⁴ Table 8b (A3) is not discussed separately as it is identical to Table 8.

³⁵ The replacement rate at retirement (RR) is defined as the average first pension of those who retire in a given year over the average wage they earned before retirement.

³⁶ The benefit ratio (BR) measures the average pension benefit of all pensioners against the average, economy-wide wage.

³⁷ Driven by new realizations, the benefit ratio and replacement rate are relatively high in 2019. In the next decade, however, these ratios decline, particularly in the private occupational scheme. This is due to lower indexation (see footnote 32). In the long run, the total BR and RR are very similar to those projected in AR 2018.

Table 9 Replacement rate at retirement (RR), benefit ratio (BR) and coverage by pension scheme (in %)

	2019	2030	2040	2050	2060	2070	change 2019-2070 (pps)
Public scheme (BR)	37%	36%	36%	36%	36%	35%	-2%
Coverage	100.0	100.0	100.0	100.0	100.0	100.0	0.0
Public scheme: old-age earnings related (BR)	34%	33%	34%	34%	34%	34%	0%
Public scheme: old-age earnings related (RR)	31%	30%	30%	30%	30%	29%	-2%
Coverage	77.9	79.7	81.1	80.6	79.1	79.0	1.0
Private occupational scheme (BR)	49%	43%	46%	45%	44%	43%	-7%
Private occupational scheme (RR)	48%	40%	42%	41%	41%	40%	-8%
Coverage	56.7	59.9	60.9	60.5	59.4	59.3	2.6
Private individual schemes (BR)							
Private individual schemes (RR)							
Coverage	:	:	:	:	:	:	:
Total benefit ratio	65%	62%	64%	63%	62%	61%	-5%
Total replacement rate	54%	51%	53%	52%	51%	50%	-4%

Table 10 provides an insight in the dependency ratios and the impact of demographic factors on the financial sustainability of public pension schemes. It shows that, over the full period, the number of pensioners will increase by 32% (from 3.957 million to 5.220 million)³⁸ and that employment decreases by 5% (9.066 million to 8.602 million). This leads to an increase in the Pension System Dependency Ratio (SDR, row 3) from 43.6% to eventually 60.7%, a rise of 39%.

Comparing this rise to the steeper purely demographically determined rise in the old-age dependency ratio (OADR, row 6) reveals how other factors than demographic ones affect the SDR. It turns out that these factors are beneficial by exerting a dampening effect on the rise in SDR. This effect is expressed in the System efficiency variable (SDR/OADR, last row) which shows a decrease by 17% (from 1.3 to 1.1) over the full period. The dampening effect follows from the increase of the eligibility age, which curbs the number of pensioners.

Table 10 System dependency ratio and old-age dependency ratio

	2019	2030	2040	2050	2060	2070	change 2019-2070
Number of pensioners (thousand) (I)	3957	4670	5157	5099	5061	5220	1263
Employment (thousand) (II)	9066	8915	8677	8746	8715	8602	-464
Pension system dependency ratio (SDR) (I)/(II)	43.6	52.4	59.4	58.3	58.1	60.7	17.0
Number of people aged 65+ (thousand) (III)	3354	4261	4785	4794	4915	5142	1788
Working age population 20-64 (thousand) (IV)	10205	10055	9709	9729	9557	9312	-893
Old-age dependency ratio (OADR) (III)/(IV)	32.9	42.4	49.3	49.3	51.4	55.2	22.4
System efficiency (SDR/OADR)	1.3	1.2	1.2	1.2	1.1	1.1	-0.2

³⁸ As a result of the 2019 pension reform, the total number of pensioners increases more rapidly than in the previous projection round.

Tables 11a and 11b present the ratio of all pensioners (men and women) to respectively the inactive population and the total population by age group. Tables 12a and 12b do the same for the female population alone. The most important feature in these tables is that they all show a marked decline in these ratios among the 65-69 age group. This is due to the rise in the eligibility age of the old-age pension.³⁹ It is only partially offset by an increase of people that draw from the disability and survivor schemes that are accordingly prolonged in their age coverage. In 2070, when the eligibility age has reached 69 years and 9 months, most people in this age group are no longer entitled to the old-age benefit. Almost all remaining pensioners, around a third of the total population (table 11b), are then individuals who draw from the disability and survivor schemes. This decline is far stronger than that of inactivity and results in a drop in the number of pensioners relative to that of the inactive population in this age group (table 11a). The remaining, uncovered, part of the population will have to resort to alternative means, such as the income of spouses, private wealth or earlier withdrawal of occupational pension income.⁴⁰

For females alone the ratios in this age group are somewhat lower (see tables 12a and 12b). There are two reasons for this. The first is that females feature fewer disability claimants as a result of their lower labour participation, leading to a lower numerator. The second, which applies to the comparison of 12a with 11a, is that inactivity among females is higher (participation lower), which pushes up the denominator.

Pensioners in the age groups under 65 are in either the disability scheme or the survivor scheme. The future increases in the ratios for these groups in tables 11a and 12a mainly reflect the decrease in inactivity (the denominator) and are not the result of more people becoming dependent on these schemes (the numerator). Tables 11b and 12b, where these pensioners are expressed as a share of the total population in these age groups, makes this clear.⁴¹ Slightly counterintuitively, it turns out that the 55-59 age group in tables 11a and 12a usually features higher percentages than the 60-64 age group. Here too, it is the result of the denominator. It is caused by the fact that participation rates of the 60-64 group are lower than those of the 55-59 group and this outflow is only partially absorbed by the public pension schemes. The remaining part covers the period up to 65 by living from privately accumulated savings or private early retirement pensions.

³⁹ Due to the slower increase of the retirement age (caused by the 2019 pension reform), the ratios are still substantially higher than in the previous projection round. This also holds for the 70-74 age group: according to the current time path of the retirement age, this entire age group will remain eligible for the public old-age pension over the full projection horizon, whereas in AR 2018 the statutory retirement age was projected to be 72 years and 6 months in 2070.

⁴⁰ Most pension funds offer this possibility on an actuarially neutral basis.

⁴¹ For the age groups 54- and 55-59, there are small differences in the ratios with respect to the previous projection round. These can be attributed to the updated age profiles for the disability pension. Moreover, in Table 11a, the size of the inactive population can also be affected by age-specific revisions in the participation rate.

Table 11a Pensioners (public schemes) to inactive population ratio by age group (%)

	2019	2030	2040	2050	2060	2070
Age group -54	9.5	9.4	10.3	10.1	10.1	10.4
Age group 55-59	72.0	77.5	81.3	80.0	80.5	85.1
Age group 60-64	56.0	59.2	67.3	69.9	77.6	87.4
Age group 65-69	99.2	93.5	84.4	77.1	66.4	61.4
Age group 70-74	108.8	107.5	107.1	107.9	108.9	109.6
Age group 75+	100.2	100.2	100.4	100.3	100.4	100.1

Table 11b Pensioners (public schemes) to total population ratio by age group (%)

	2019	2030	2040	2050	2060	2070
Age group -54	3.4	3.4	3.7	3.6	3.7	3.8
Age group 55-59	14.6	15.0	15.6	14.9	14.8	15.2
Age group 60-64	20.4	20.8	22.2	21.2	21.2	21.9
Age group 65-69	79.1	65.3	58.3	48.6	38.6	32.8
Age group 70-74	100.0	100.0	100.0	100.0	100.0	100.0
Age group 75+	100.2	100.2	100.4	100.3	100.4	100.1

Table 12a Female pensioners (public schemes) to inactive population ratio by age group (%)

	2019	2030	2040	2050	2060	2070
Age group -54	7.6	7.6	8.4	8.3	8.3	8.5
Age group 55-59	43.7	47.1	51.8	55.4	54.4	57.9
Age group 60-64	35.8	38.3	43.8	47.5	51.3	57.3
Age group 65-69	90.2	82.3	72.5	63.3	52.7	45.7
Age group 70-74	104.6	105.7	104.8	104.6	105.9	107.2
Age group 75+	100.1	100.1	100.2	100.2	100.3	100.0

Table 12b Female pensioners (public schemes) to total population ratio by age group (%)

	2019	2030	2040	2050	2060	2070
Age group -54	2.9	2.9	3.1	3.1	3.1	3.2
Age group 55-59	12.2	12.3	12.9	12.3	12.2	12.5
Age group 60-64	16.8	17.0	18.1	17.4	17.2	17.8
Age group 65-69	77.9	63.1	55.3	45.1	34.1	27.5
Age group 70-74	100.0	100.0	100.0	100.0	100.0	100.0
Age group 75+	100.1	100.1	100.2	100.2	100.3	100.0

Table 13a focuses on new old-age public pensions, and tables 13b and 13c present the results separately for males and females. The first two rows respectively show the development of expenditure on this item and the number of new pensions. The time path of the latter results from demographic factors (ageing) and from the fact that the eligibility age increases over time. Obviously, a rise in the eligibility age features a lower number of new pensions (*ceteris paribus*). The rise of the average new pension (row 3) follows the development of wages and is identical for men and women.⁴² However, the number of new

⁴² The average new pension is lower than in the previous projection round. The first explanation for this is that we have updated the age profile of the old-age public pension, incorporating new data on the ratio between younger and older pensioners in terms of the amount received per person. Younger (new) pensioners have a higher probability that their

pensions is slightly higher for women (table 13c) than for men (table 13b), which results from their higher life expectancy. This also translates into slightly higher new pension expenditure among females.

Table 13a Projected and disaggregated new public pension expenditure (old-age and early earnings-related pensions)

New pension	2019	2030	2040	2050	2060	2070
I Projected new pension expenditure (millions EUR)	1385.8	3138.1	4225.1	5153.2	8025.8	11594.2
II. Number of new pensions ('000)	135.5	232.8	222.5	194.6	214.7	217.7
III Average new pension	10.2	13.5	19.0	26.5	37.4	53.3
<i>*New pension expenditure equals the product of II and III.</i>						

Table 13b Disaggregated new public pension expenditure (old-age and early earnings-related pensions) - MEN

New pension	2019	2030	2040	2050	2060	2070
I Projected new pension expenditure (millions EUR)	689.0	1553.4	2083.0	2548.3	3980.8	5768.1
II. Number of new pensions ('000)	67.4	115.3	109.7	96.2	106.5	108.3
III Average new pension	10.2	13.5	19.0	26.5	37.4	53.3
<i>*New pension expenditure equals the product of II and III.</i>						

Table 13c Disaggregated new public pension expenditure (old-age and early earnings-related pensions) - WOMEN

New pension	2019	2030	2040	2050	2060	2070
I Projected new pension expenditure (millions EUR)	696.8	1584.7	2142.1	2605.0	4045.0	5826.1
II. Number of new pensions ('000)	68.1	117.6	112.8	98.4	108.2	109.4
III Average new pension	10.2	13.5	19.0	26.5	37.4	53.3
<i>*New pension expenditure equals the product of II and III.</i>						

3.4 Financing of the pension system

Table 14 shows the system of contributions to the public old-age scheme in 2019. Employees, either public or private, and the self-employed are taxed at a rate of 17.9% over the first two tax brackets. The government supplements the shortfall between the expenditure on the old-age pension and the funds raised by the 17.9% tax levy. The survivor scheme is financed by a tax levy of 0.1% over the first two tax brackets. The disability scheme is financed by both general taxation (Wajong) and a levy on employers (WAO and WIA). There is no minimum contribution. The maximum contribution to the old-age scheme is 6140 euros⁴³ in 2019.

partner is still alive, and, as pointed out in section 1.1, couples receive a lower AOW benefit (per person) than singles. Therefore, the 2019 pension reform is also an important explanation for the lower average new pension vis-à-vis AR 2018: the lower retirement age causes people to enter the pension system at a younger age.

⁴³ This figure equals 17.9% of the first two tax brackets that were in place in 2019. The actual contribution to the public pension scheme however is lower as a result of a deduction that accounts for the effect of a general tax rebate.

Table 14 Financing system of the public old-age scheme

	Public employees	Private employees	Self-employed
Contribution base	First two tax brackets	First two tax brackets	First two tax brackets
Contribution rate/contribution			
<i>Employer</i>	-	-	0.179
<i>employee</i>	0.179	0.179	
<i>State</i>	See text	See text	See text
<i>Other revenues</i>	-	-	-
Maximum contribution	6140	6140	6140
Minimum contribution	-	-	-

Table 15 shows the contributions to the three schemes. The employer and employee contributions remain roughly constant as a fraction of GDP.⁴⁴ However, the state contribution grows at a far higher pace. This can be explained by the fact that the state picks up the shortfall in revenues, which is caused by the combined facts that the social security premium is capped (see above) and that expenditure on public old-age pensions is projected to grow faster than wages.^{45, 46}

Table 15 Revenue from contribution (% GDP), number of contributors in the public scheme (in 1000), total employment (in 1000) and related ratios (%)

	2019	2030	2040	2050	2060	2070	change 2019-2070 (pps)
Public pension contributions (%GDP)	6.5	7.7	8.8	8.6	8.4	8.7	2.2
<i>Employer contributions</i>	1.5	1.7	1.7	1.7	1.7	1.7	0.2
<i>Employee contributions</i>	3.4	3.4	3.5	3.4	3.4	3.4	0.0
<i>State contribution*</i>	1.6	2.7	3.6	3.5	3.3	3.7	2.0
<i>Other revenues*</i>	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Number of contributors (I) (1000)	9921	10139	10018	10122	10113	9877	-44
Employment (II) (1000)	9066	8915	8677	8746	8715	8602	-464
(I) / (II)	1.1	1.1	1.2	1.2	1.2	1.1	0.1

3.5 Sensitivity analysis

Table 17 presents the effects on public pensions (upper part) and total pensions (lower part) under assumptions that deviate from the baseline assumptions. The higher life expectancy scenario shows small positive effects on public pensions. Since the eligibility age is linked on

⁴⁴ This follows from the fact that employer and employee contributions rise in line with aggregate wages in our projections. In doing so, we make sure that the implicit contribution rate is constant over the projection horizon.

⁴⁵ As a result of the 2019 pension reform, expenditure on public old-age pensions increases substantially vis-à-vis the previous projection round. This also explains why the state contribution is significantly higher than in AR 2018.

⁴⁶ On average, the total number of contributors does not increase between 2019 and 2070, whereas it rose by 5.5% between 2020 and 2070 in the previous projection round. Demographic developments seem to be the main explanation for this. In the current projection round, the total size of the population remains roughly constant as of 2040 (see section 2.1), whereas it kept increasing in AR 2018.

a $\frac{2}{3}$ -to-1 basis to life expectancy, public pension expenditure rises when people live longer. At the same time, GDP increases as a result of a higher labour force participation rate, thereby having a mitigating effect on the expenditure-to-GDP ratio. The same pattern applies to total pensions that show a small rise of 0.2%-points over the full period.

The higher migration scenario shows a downward effect on the public pension expenditure-to-GDP ratio that eventually amounts to 0.3% of GDP. This figure equals -0.6%-point for total pension expenditure. This is mostly due to an increase in the denominator (GDP): the change in the numerator (pension expenditure) is far smaller. This is because a large part of the immigrants, who typically enter the country at a young age, haven't yet reached the eligibility age for the old-age pension before 2070. The lower migration scenario has similar effects, though with the opposite sign.

The lower fertility scenario features a substantial increase in pension expenditure relative to GDP. As in the migration scenarios, this is largely due to the drop in GDP (the denominator). There is only a small effect on pension expenditure (the numerator) as none of the newborns reach the eligibility age for the old-age pension before 2070. There is only a small effect on the disability and survivor schemes.

A higher employment rate of older workers leads to a small drop in public pensions relative to GDP. This is mostly due to an increase in GDP (the denominator), since public old-age pensions are not affected by an increase in employment. Occupational pensions do tend to increase in the long run, as this scheme links pension entitlements to past (average) wages.

In the higher and lower labour productivity growth scenarios, the ratios of public pensions to GDP remain virtually unchanged. This reflects the wage indexation rules of public schemes. However, the ratios of total pensions to GDP decline somewhat in the high growth scenario and increase somewhat in the TFP risk scenario, due to a lagged adjustment of occupational pensions. The reason for this lies in the average pay schemes.

If the eligibility age for public old-age pensions is again fully linked to life expectancy at 65, the retirement age will be 1.5 years higher in 2070.⁴⁷ This would reduce public pension expenditure by 0.4%-points at the end of the projection horizon. This reduction is also partly driven by a higher GDP level (denominator) due to the increase in labour force participation. Similar effects are observed in the occupational pension scheme. Consequently, the effects on total pension expenditure are about twice the size of the effects on public pension expenditure.

If the eligibility age for public old-age pensions is kept constant at its 2020 level, the retirement age will be 3 years and 5 months lower in 2070. This would raise public pension expenditure by 1.2%-points at the end of the projection horizon, partly driven by a lower

⁴⁷ Note that this difference vis-à-vis the baseline is smaller than the difference between the baseline retirement age in the current projection round (69 years and 9 months) and the baseline retirement age that was imputed in the previous projection round (72 years and 6 months, see section 1.2). This results from the fact that the link between the eligibility age and life expectancy can only be altered as of 2025.

GDP level (denominator) due to a reduction in labour force participation. The effects in the occupational pension scheme are a bit smaller.⁴⁸ Consequently, total pension expenditure is projected to increase by 1.8%-points in 2070 vis-à-vis the baseline.

The lagged recovery scenario has no long-term effects, since GDP growth eventually returns to its baseline assumptions. The adverse structural scenario, however, has permanent effects on productivity growth and unemployment. Most importantly, this has an upward pressure on total pension expenditure as a fraction of GDP. Even though private pension expenditure decreases as a result of the decline in employment, this effect is more than offset by a lower GDP level (denominator). Again, this is due to a lagged adjustment of occupational pensions.

Table 17 Public and total pension expenditure under different scenarios (p.p. deviation from the baseline)

<i>Public pension expenditure</i>	2019	2030	2040	2050	2060	2070	change 2019-2070 (pps)
Baseline (% GDP)	6.8	8.1	9.1	8.9	8.9	9.1	2.3
Higher life expectancy at birth (+2y)	0.0	0.0	0.0	0.1	0.1	0.0	0.0
Higher migration (+33%)	0.0	-0.1	-0.1	-0.2	-0.3	-0.3	-0.3
Lower migration (-33%)	0.0	0.1	0.2	0.2	0.3	0.4	0.4
Lower fertility (-20%)	0.0	0.0	0.1	0.5	0.8	1.3	1.3
Higher employment rate of older workers (+10 pps.)	0.0	-0.2	-0.2	-0.1	-0.2	-0.2	-0.2
Higher TFP growth (convergence to 1.2%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TFP risk scenario (convergence to 0.8%)	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Policy scenario: linking retirement age to change in life expectancy	0.0	-0.1	-0.1	-0.2	-0.3	-0.4	-0.4
Policy scenario: unchanged retirement age	0.0	0.3	0.5	0.7	1.0	1.2	1.2
Policy scenario: offset declining pension benefit ratio	:	:	:	:	:	:	:
Lagged recovery scenario	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Adverse structural scenario	0.0	0.1	0.1	0.1	0.1	0.1	0.1
<i>Total pension expenditure</i>	2019	2030	2040	2050	2060	2070	change 2019-2070 (pps)
Baseline (% GDP)	11.9	13.8	16.2	15.8	15.4	15.8	3.8
Higher life expectancy at birth (+2y)	0.0	-0.3	-0.1	0.1	0.3	0.2	0.2
Higher migration (+33%)	0.0	-0.1	-0.3	-0.4	-0.5	-0.6	-0.6
Lower migration (-33%)	0.0	0.1	0.3	0.4	0.6	0.7	0.7
Lower fertility (-20%)	0.0	0.0	0.2	0.8	1.4	2.1	2.1
Higher employment rate of older workers (+10 pps.)	0.0	-0.4	-0.3	-0.1	-0.1	-0.2	-0.2
Higher TFP growth (convergence to 1.2%)	0.0	-0.1	-0.2	-0.3	-0.3	-0.3	-0.3
TFP risk scenario (convergence to 0.8%)	0.0	0.0	0.0	0.1	0.1	0.2	0.2
Policy scenario: linking retirement age to change in life expectancy	0.0	-0.1	-0.3	-0.4	-0.6	-0.8	-0.8
Policy scenario: unchanged retirement age	0.0	0.6	0.7	0.9	1.5	1.8	1.8
Policy scenario: offset declining pension benefit ratio	:	:	:	:	:	:	:
Lagged recovery scenario	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Adverse structural scenario	0.0	0.2	0.5	0.7	0.9	1.1	1.1

⁴⁸ Recall that adjustments of the retirement age in the second pillar take place in full one-year steps. In this case, a three-year reduction (which is a smaller decrease than that of the retirement age in the first pillar) would be sufficient.

It should be noted that the effects on government finances of the migration and low fertility scenarios up until 2070 do not show the structural (ultimate) effects of these scenarios and therefore are inappropriate to derive the sustainability effects from. This would require an analysis that covers the full life cycle of immigrants and newborns and thus also the years in which the built up pension entitlements are actually paid out. In our analysis, which only covers the period up to 2070, this is not the case. This is reflected in the small changes in pension expenditure in these scenarios. In the migration scenarios there is also a second reason. It is that immigrants may have economic characteristics that differ from those of the native population which are neglected here.

3.6 Comparison with previous projections

Table 18 compares the rise in the public pension to GDP ratio in this round of projections to their equivalents in the previous rounds. As the 2006 and 2009 projections are similar the difference between these will not be discussed and we will focus only on the differences between the later projections.

The table shows that the 2012 projection differs much from the previous one in 2009. The 2.2%-point lower overall increase in public pension expenditure of the 2012 projection, 1.7% of GDP versus the 3.9%, is mainly the result of the 2012 pension reform (which raised the statutory retirement age). This explains 1.8%-point of it.⁴⁹ The remaining 0.4%-point stems mainly from the rising employment which increases GDP and in this way reduces the rise of the ratio of pensions to GDP.

In the 2015 round the rise in pension expenditure drops by a further 0.8% of GDP, 0.9% versus 1.7% in the 2012 round. This can mainly be attributed to the fact that the Statistics Netherlands projection of life expectancy at 65, on which the increase of the eligibility age is based, is now higher than in 2012 round. It results in a 6½ year increase in the eligibility age over the full time horizon compared to 4¾ in the 2012 round. As the Eurostat projection of life expectancy remained basically unchanged, this leads to a smaller number of benefit claimants.⁵⁰ The 2018 round shows a further drop, by 0.4%-points, to 0.6% of GDP. Demographic factors formed the most important explanation for this: the old-age dependency ratio rose less sharply than in the previous round.

In the current 2021 round, the rise in pension expenditure increases again to 2.3% of GDP. This results mainly from the 2019 pension reform, as can be seen by the substantially less mitigating coverage ratio effect. Due to a lower increase in employment (mostly caused by the pension reform, but also driven by higher base-year values), labour market effects are also less mitigating than in the previous projection round.

⁴⁹ This is presented in table 13a of the country fiche for the Netherlands in the 2012 round, which dealt with the effects of the 2012 pension reform.

⁵⁰ In the 2012 round the Statistics Netherlands projection of life expectancy was about 1 year lower than that of Eurostat. In their latest update for the 2015 round, SN raised their projection by around 2 years thereby surpassing Eurostat that kept its projection of this variable roughly unchanged.

Table 18 Overall change in public pension expenditure to GDP under the 2006, 2009, 2012, 2015, and 2018 projection exercises

	Public pension expenditure	<i>Dependency ratio effect</i>	<i>Coverage ratio effect</i>	<i>Benefit ratio effect</i>	<i>Labour market effect</i>	<i>Residual (incl. interaction effect)</i>
2006 Ageing Report (2004-2050)	3.8	6.3	-1.6	-0.4	-0.2	-0.3
2009 Ageing Report (2007-2060)	4.0	6.6	-1.5	-0.6	-0.2	-0.4
2012 Ageing Report (2010-2060)	1.7	5.6	-2.0	-0.6	-0.5	-0.7
2015 Ageing Report (2013-2060)	0.9	4.8	-2.2	-0.5	-0.8	-0.3
2018 Ageing Report (2016-2070)	0.6	4.2	-2.7	0.0	-0.8	-0.2
2021 Ageing Report (2019-2070)	2.3	4.3	-1.2	-0.3	-0.4	-0.1
- The disaggregation for 2006/2009/2012 is on the basis of pensions; for 2015/2018/2021 it is on the basis of pensioners.						
- The projection horizon has been extended over consecutive Ageing Reports, limiting comparability over time.						

Table 19a attributes the difference between the current public expenditure outcomes and the respective projections from the previous round (2018) to its causes in terms of changes in modeling assumptions, policy etc. In AR 2018, it was correctly projected that pension expenditure as a fraction of GDP would decrease between 2016 and 2019. However, the decline was even bigger in reality (from 7.2% to 6.8%) than was projected (from 7.3% to 7.1%). The main explanation for this can be found in higher than previously assumed GDP realisations. This has a downward pressure on the expenditure-to-GDP ratio via a larger denominator. There were neither changes in the coverage of the pension projection, nor changes in policy⁵¹ or in the interpretation of constant policy in these years. Therefore, the differences between the current public expenditure outcomes and the projections from the previous round are solely attributed to changes in assumptions.

Table 19a Breakdown of the difference between the 2018 projections and outcome figures (% of GDP)

	2016	2017	2018	2019
Ageing Report 2018 projections	7.3	7.2	7.1	7.1
<i>Assumptions</i>	-0.1	-0.2	-0.2	-0.3
<i>Coverage of projections</i>				
<i>Constant policy impact</i>				
<i>Policy-related impact</i>				
Actual public pension expenditure	7.2	7.0	6.9	6.8

Table 19b performs a similar analysis for selected years in the projection period. In the current projection round, the expenditure-to-GDP ratio is projected to be 0.6%-points higher in 2030 vis-à-vis the previous projection round, and this difference increases to 1.2%-points in 2070. The 2019 pension reform is the most important driver of this difference. The lower retirement age is roughly estimated to have an upward pressure on public pension expenditure of about 0.8%-points in 2070 (including the effect on participation). There were no changes in the coverage or modeling of the pension projection, nor was there a change in

⁵¹ Note that the slower increase in the retirement age takes place as of 2020.

the interpretation of constant policy. The remaining differences are therefore a result of changes in assumptions regarding e.g. demographic developments and GDP growth.

Table 19b Breakdown of the difference between the 2018 and the new public pension projection (% of GDP)

	2019	2030	2040	2050	2060	2070
Ageing Report 2018 projections	7.1	7.5	8.5	8.2	7.9	7.9
<i>Change in assumptions</i>	-0.3	0.4	0.2	0.2	0.4	0.4
<i>Improvement in the coverage or in the modelling</i>						
<i>Change in the interpretation of constant policy</i>						
<i>Policy-related changes</i>		0.2	0.4	0.5	0.6	0.8
New projections	6.8	8.1	9.1	8.9	8.9	9.1

4 Description of the model

This section describes the methodology that is used to carry out the long term projections of pensions. The two pillars that form the pension system are treated separately (see below). The projections, similar to all previous projections, are made by using a partial equilibrium model of the Netherlands, GAMMA, which is developed and maintained by the CPB Netherlands Bureau for Economic Policy Analysis and is used from the year 2000 onwards for Dutch sustainability calculations. The model itself does not distinguish between males and females. It works with (weighted) averages. In the projections presented in this paper this distinction was made by supplementary calculations.

GAMMA is a long-term model with overlapping generations, featuring 100 representative agents (one for each age group between 0 and 99) in each year. The size of each cohort j at time t is based on population projections (usually provided by Statistics Netherlands). Given the pattern of government expenditure and tax income across age groups, this allows us to analyse the effects of demographic trends – such as ageing – on government finances.

The model uses National Accounts data up to the latest available year (2019) and is also calibrated on these data. For the subsequent years up to 2025, the model data are based on detailed midterm forecasts provided by CPB (the so-called *middellangetermijnverkenning*, or *mlt*).

After 2025, all implicit tax rates are held constant. On the individual level, average public pension benefits are then assumed to grow in line with wages,⁵² after which total expenditure results from the aggregation over all individuals and age groups. The assumptions of constant implicit tax rates and indexation of public pensions to wages follow from the main GAMMA assumption of ‘constant arrangements’. The idea behind this is that all generations benefit equally (over their lifetime) from the government. We do, however, take into account (planned) policy measures and/or reforms that have an effect after 2025, such as the rise of the statutory retirement age.⁵³

4.1 The first pillar

The flat rate nature of the Dutch system of public pensions entails that a relatively simple methodology suffices to carry out projections. GAMMA relates the development of public old-age pension expenditure to only two factors: the productivity in the economy and the number of people who have reached the eligibility age. The dependency on productivity is linear and reflects the fact that state old-pension pensions (AOW) are linked to the (minimum) wage level. In turn, wage levels are assumed to increase in line with productivity.

⁵² $X_t^{i,j} = (1 + w_t)X_{t-1}^{i,j}$

⁵³ More detailed information on the assumptions underlying the GAMMA model can be found in CPB, 2019 ([link](#), in Dutch).

The dependency on the number of pensioners is slightly more complicated. Some age-specificity within this group is introduced to take account of the positive correlation between age and the share of singles. As shown in section 1.1.1, singles are more expensive than married couples on a per capita basis. In the absence of any policy change such as an increase in the eligibility age, the flat rate system leads to an increase of the ratio of public pensions to GDP that almost exactly coincides with the rise of the old-age dependency ratio.

Technically, the starting point in the exercise is realized aggregate public pensions in the base year. From this we derive the average pension per person for each age, thereby taking account of the slightly rising pensions per person with age (due to the positive correlation between age and the share of singles). This age profile is subsequently extrapolated into the future by letting it rise with the growth rate of (minimum) wages. Aggregate expenditure in year t is then calculated by multiplying this resulting vector for year t with the vector of the numbers of people of each age in year t :

$$X_t = \sum_i \sum_{j=0}^{99} X_t^{i,j} = \sum_{j=0}^{99} (n_t^j X_t^{i,j}).^{54}$$

Projections for the disability benefits are also based on an age profile, describing the population-average disability pension (including zero values) received per person within each age group. Since disability increases with age and benefits are related to previously earned wages (see section 1.1.3), this age profile has an upward slope. We subsequently extrapolate it into the future by letting it rise with the growth rate of wages. In order to allow for potential changes in the number of claimants over time (thereby having an effect on the population-average benefit), the age profile is also allowed to shift as a result of changes in participation, life expectancy, and policy. Aggregate expenditure is then calculated by multiplying the resulting vector of average benefits of each age group with the vector of the numbers of people *that have not yet reached the statutory retirement age*. In doing so, we take into account the fact that eligibility for the disability pension stops as soon as people reach the eligibility age for the public old-age pension (disability pensions are then transformed into old-age benefits).

Finally, survivor benefits are exogenously imputed by using projections made by specialists. These projections also incorporate the effects of the reforms on the number of claimants and average benefit levels.

4.2 The second pillar

To project the development of contribution rates, pension payments, assets of pension funds etcetera, the pension funds in the Netherlands are assembled in a model of a single average pension fund. This average pension fund offers a pre-funded average pay scheme, aiming at a replacement rate of 75% of average pay in case of a 40-year career. Survivors pensions are not modelled explicitly but are taken into account through a surcharge on the old-age

⁵⁴ Where n_t^j represents the number of individuals i in age group j .

pension. The existence of the flat rate public pension, the AOW, is taken into account by the pension fund through a franchise. Only workers with a wage above this franchise are building up an occupational pension. The accumulated assets are invested in a mixed portfolio of bonds and equity. For the baseline case the portfolio mix is 50-50. Furthermore, actuarial cost-effective contribution rates are charged. It should be noted that the contribution rate is cost effective on an aggregate level, i.e. for the whole pension fund. Because building up pension rights is usually linear, e.g. 1.825% of the pension wage per year worked, the contribution rate is not cost-effective on an individual level. Younger workers pay more than the actuarial value of the additional pension right they receive, older workers pay less. This will change from 2026 onwards (see section 1.2).

Most pension funds in the Netherlands aim at wage or price indexation. It is, however, not guaranteed but conditional on the financial position of the fund (funding ratio). In our projection we use cost-effective pension premiums to obtain the stated replacement rate. For workers, indexation of pension rights equals the average of the rise in wages and prices. For the retired, it is mostly the price rise.

The pension fund has to follow the supervision rules of the FTK. These rules prescribe, among other things, the required levels of the funding ratio and which part of the liabilities has to be covered by the cost-effective contribution rate. For our average pension fund, the funding ratio required by the FTK is about 130% of the nominal, i.e. non-indexed, liabilities. Liabilities are discounted by the current risk free interest rate to calculate the funding ratio. In the long term, the pension fund aims at full funding of the indexed liabilities. Given the indexation assumptions, the interest rate, inflation rate, and real wage growth, this amounts to a 100% funding of the indexed liabilities in the model.

The pension model, as well as the GAMMA model, contains 100 overlapping generations (see above). For the first year of the projections, the total level of occupational pension liabilities (based on National Accounts data) is divided over the different generations. For every subsequent year the liabilities of each generation grow with the additional rights build up through an additional year of work. Of course, only workers build up occupational pension rights. The level of the pension benefit depends on the number of contributing years and the average wage. The assets grow with the contribution rates paid by the workers, the investment returns minus the pension benefits paid to the retirees.

In case shocks occur that affect the funding ratio (e.g. stock market crashes, changes in the interest rate, productivity shocks, etcetera) the pension fund restores the funding ratio by cutting indexation as well as raising contribution rates. Because of the ageing of the population, the wage sum will become much smaller relative to the size of the liabilities. As a result, cutting indexation will become a more important instrument to deal with shocks than increasing contribution rates.

Appendix

Table A1 presents the evolution of wages over time. Both the economy-wide average wage and the wage at retirement are assumed to evolve in line with labour productivity.⁵⁵

Table A1 Economy wide average wage at retirement (1000 EUR)

	2019	2030	2040	2050	2060	2070	% change 2019-2070
Economy-wide average gross wage at retirement	45.3	62.1	86.6	122.7	174.3	247.6	447.1
Economy-wide average gross wage	37.5	51.5	71.8	101.8	144.5	205.3	447.1

Tables A4a, A4b and A4c show the administrative data reported for the year 2019.

Table A4a Administrative data on new pensioners (2019) - men

Age group	All	Old-age	Disability	Survivor	Other (including minimum)
15 - 49	7537	0	7404	133	0
50 - 54	2991	0	2970	21	0
55 - 59	4141	0	4120	21	0
60 - 64	5270	0	5217	53	0
65 - 69	75881	74932	927	22	0
70 - 74	0	0	0	0	0
75+	0	0	0	0	0

Table A4b Administrative data on new pensioners (2019) - women

Age group	All	Old-age	Disability	Survivor	Other (including minimum)
15 - 49	12558	0	11742	816	0
50 - 54	3820	0	3718	102	0
55 - 59	4451	0	4222	229	0
60 - 64	4590	0	4068	522	0
65 - 69	76741	75900	556	285	0
70 - 74	0	0	0	0	0
75+	0	0	0	0	0

Table A4b Administrative data on new pensioners (2019) - total

Age group	All	Old-age	Disability	Survivor	Other (including minimum)
15 - 49	20095	0	19146	949	0
50 - 54	6811	0	6688	123	0
55 - 59	8592	0	8342	250	0
60 - 64	9860	0	9285	575	0
65 - 69	152622	150832	1483	307	0
70 - 74	0	0	0	0	0
75+	0	0	0	0	0

⁵⁵ The wage at retirement is related to the economy-wide average wage using a simple rule-of-thumb based on an average career profile.