Ageing Report 2021

Country fiche Spain

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1 Overview of the pension system

1.1 Main features of the Spanish pension system

The Spanish pension system is based on a public, mandatory system. Private pension schemes do exist, but they have a voluntary nature and usually play the role of complementary savings sources for retirement.

The main component of the public pension system is the general regime of the Social Security system. Additionally, a special scheme covers the Civil Service, the judiciary, the military and police forces ('*Clases Pasivas*'), although it is closed to new entrants since 2011[1]. Both of these two systems are mandatory, earnings-related, defined benefit schemes. They cover four types of pensions: old-age, disability, survivors and other pensions ('*favor de familiares*', i.e. survivors' other than spouses and children that are eligible). The public pension system last component is a non- earnings related scheme.

This section describes the main features of each of these systems: eligibility requirements, contributions and rules for calculating each benefit.

1.1.1 Coverage and funding of the system

The Social Security system is a mandatory, pay-as-you-go system. It covers employees in the private sector and those in the public sector who have not joined the system of *Clases Pasivas,* and the self-employed[2]. *Clases Pasivas* covers civil servants at the central, regional and local governments and the military. This system is closed to new entrants as of 1-1-2011 and will progressively phase-out, with new civil servants since then joining the general Social Security system. The non-earnings related basic scheme is granted to people with income below a threshold set every year in the Budget Law (annual €5,538 in 2019 for the basic amount). The table below summarizes the main figures of the three component in the base year 2019.

	Expenditure (% GDP)	Share of total public expenditure in pensions (%)	Number of pensiones (1,000)	Share of total number of pensions (%)
General regime Social Security system	11.0	88.8	9800.9	90.4
Clases Pasivas	1.3	10.3	649.9	6.0
Non-earnings related system	0.1	0.9	391.2	3.6

[1] For a definition of special pensions see **Box II.1.2** of European Commission (DG ECFIN), Economic Policy Committee (Ageing Working Group) (2019) 'The 2018 Ageing Report: Economic and Budgetary Projections for the EU Member States (2016-2070)', For more details on special pensions in Spain, see Penref database: https://webgate.ec.europa.eu/scopax/pensref/index.cfm#/specialPensions.

[2] The self-employed are covered by a special scheme inside the Social Security system. Other minor special schemes exist for certain economic activities (miners, seamen, domestic employees).

Special pension and public pension expenditure across AR rounds, % of GDP

Reference year and publication	Special pension expenditure				Public pension expenditure
	Total available	Difficult conditions	Security and defence	Other	
2016 in AR 2018	1.5	0.3	0.3	0.9	12.2
2019 in AR 2021	1.6	0.4	0.3	1.0	12.3

Special pensions across AR rounds, % of pensioners covered

Reference year and publication	Total available	Difficult conditions	Security and defence	Other
2016 in AR 2018	8.0	2.0	1.8	4.2
2019 in AR 2021	8.5	2.4	1.8	4.3

Source: Spanish General Directorate for Macroeconomic Analysis

Social Security pensions are funded through contributions (from employers, employees, the self-employed and part of the unemployed[3]). Additionally, in the past the Social Security system has covered transitory deficits with the additional resources coming from the pension system's Reserve Fund, where the system's surpluses accumulate. Finally, the central government transfers additional funds to fund certain benefits and expenses, top-up minimum pensions and bridge annual financial deficits when the Reserve Fund's resources are insufficient. Pensions from the *Clases Pasivas* system are funded through contributions paid by civil servants and the military and through direct payments made by the Central Government. Non-earnings related benefits are funded through direct transfers from the Central Government (see Section 3.4 for additional information on the financing of the system). Pension benefits are taxed as labour income, except for benefits to some disability pension types[4]. Compulsory social contributions are excluded from the income tax base.

Private pension schemes are voluntary systems offered by financial and insurance institutions as complementary savings products. These schemes can be grouped into individual and occupational pension funds. (61% individual and 38% occupational of total private pension funds' assets in 2019). Individual private plans are funded, mostly defined-contribution schemes. Occupational pension plans cover occupational plans and collective pension insurance plans (with retirement benefit purposes). Occupational private pension schemes are offered in the context of labour bargaining between employers and employees. They are usually financed by employers and employees. Private pension benefits are also taxed as labour income. Contributions to private pension plans are taxed following the ETT principle (Exempt contributions, Taxed investment income and capital gains of the pension institution, Taxed benefits) with the exception of collective insurance plans, that do not enjoy tax exemptions. Private pensions amount to 0.8% of GDP in 2020.

1.1.2 Eligibility requirements

Social security system

Earnings-related old-age pensions are granted to workers who meet two requirements:

- Having contributed for at least 15 years, of which at least 2 years of contributions must have taken place in the 15 years prior to the statutory retirement age.

[3] All unemployed receiving benefits, and subsidies if aged over 55.
[4] Absolute, permanent and great disability pensions, see Pensref database.

- Having reached the statutory retirement age, which in turn depends on the number of years of contributions. The general statutory retirement age is currently being extended 2 months per year until 2027, where the statutory retirement age will be set at 67. Those workers having contributed for at least 38.5 years can retire with a full pension at 65.

Workers can retire before and after the statutory retirement age, within certain age limits and requirements and subject to a bonus/malus scheme. Early retirement can be voluntary, involuntary and partial. Workers can apply for voluntary early retirement as long as their age is not more than 2 years lower than the statutory retirement, they have contributed for at least 35 years and the computed benefit is greater than the minimum pension. Involuntary early retirement is aimed at workers who lose their job through collective dismissals[5]. To be eligible to receive the pension benefit, they must be at least 63 years of age and must have contributed to the system for at least 33 years. Early partial retirement is available for workers of different ages depending on the number of years of contributions[6]. Pension benefits for early retirement are penalized depending on the worker's number of years of contributions and the difference with the statutory retirement age. These penalties are summarized in the table below

Penalty to early retirement depending on the nature of the retirement and the worker's contribution profile, for every year remaining until statutory age				
	Length of the worker's contributory profile (years)			
	<38.5 years	38.5-41.5	41.5-44.5	>44.5 years
Involuntary early retirement	7.5%	7.0%	6.5%	6.0%
Voluntary early retirement	8.0%	7.5%	7.0%	6.5%

Source: Spanish General Directorate for Macroeconomic Analysis

Retirement beyond the statutory age is incentivized through premiums for every extra year of work depending on the length of the worker's contributory profile: +2%, +2¾%, and +4% for contributory profiles below 25 years, between 25 and 37, and over 37, respectively. The resulting benefit can be higher than the maximum pension. Table 1 summarizes the qualifying conditions for retirement.

[5] Firms that lay off workers over 50 years of age through collective dismissals have to make a special economic contribution to the pension system.

[6] The age of early partial retirement in 2027 will be 63 for contribution profiles longer than 36.5, 65 for contribution profiles between 33 and 36.5 years. Below 33 years of contribution early partial retirement is not possible.

Table 1. Qualifying conditions for retirement

			2019	2030	2040	2050	2060	2070
Qualifying condition for retiring with a full pension	Statutory retirement age - men		65yr8mo	67	67	67	67	67
	Statutory retirement age - women		65yr8mo	67	67	67	67	67
	Minimum requirements	Contributory period - men	36yr9mo	38yr6mo	38yr6mo	38yr6mo	38yr6mo	38yr6mo
		Retirement age - men	65	65	65	65	65	65
		Contributory period - women	36yr9mo	38yr6mo	38yr6mo	38yr6mo	38yr6mo	38yr6mo
		Retirement age - women	65	65	65	65	65	65
Qualifying condition for retirement *without* a full pension	Early retirement age - men		65yr8mo or 63	65 or 63	65 or 63	65 or 63	65 or 63	65 or 63
	Early retirement age - women		65yr8mo or 63	65 or 63	65 or 63	65 or 63	65 or 63	65 or 63
	Penalty in case of earliest retirement age		16%	16%	16%	16%	16%	16%
	Bonus in case of late retirement		8%	8%	8%	8%	8%	8%
	Minimum contributory period - men		15	15	15	15	15	15
	Minimum contributory period - women		15	15	15	15	15	15
	Minimum residence period - men		:	:	:	:	:	:
	Minimum residence period - women		:	:	:	:	:	:

Source: Spanish General Directorate for Macroeconomic Analysis

Disability pensions take into account the level and the cause of disability, the worker's age and whether the worker is currently employed and paying contributions to the system. For statistical purposes, once pensioners benefiting from a disability pension reach 65 years of age, their pensions are registered as old-age retirement pensions.

Survivors' pensions include widow(er)s and orphans. These are earnings related benefits, as the deceased worker whose relatives can benefit of the pension must meet some contribution requirements. The pension benefit for the widow(er) amounts to 52% of the deceased spouse's pensionable income (in some cases 70%). Pension benefit for orphans is 20% of the parent's pensionable income. For other relatives, the pension benefit amounts to 20% of the pensionable income and can be increased to 52% in the absence of either a widow(er) or an orphan. In all cases, the sum of the benefits granted to the deceased worker's relatives cannot exceed 100% of pensionable income.

Special scheme for the civil service and the military (*Clases Pasivas*)

Workers included in this scheme are eligible for an old-age pension provided that they are 65 and have contributed for at least 15 years. Early and late retirement are possible. Early retirement is allowed once the worker reaches 60 and has a contributory profile of at least 30 years. The resulting pension benefit is subject to a penalty. Late retirement is allowed until 70 years of age and workers' benefit is increased with a bonus.

1.1.3 Rules for calculating benefits, including the valorisation of pension contributions

The old-age pension benefit in the Social Security system is calculated as a percentage of the computed pensionable income. The computed pensionable income is the average of the last 25 years[7] of contribution bases. The contribution base is equal to the monthly earned income within thresholds (the lower bound depends on the occupational category of the worker and the upper bound is the same for all workers). The average that results in the computed pensionable income is calculated as the sum of the contribution bases of the last 300 months prior to retirement divided by 350[8]. Contribution bases corresponding to the 24 months prior to retirement are computed in nominal terms and

[7] As of 2019, the number of years is 22 and will gradually increase to 25 years by 2022.
[8] 25 years is equal to 300 months. The sum is divided by 350 because contributions are paid monthly but annual pension benefits are paid in 14 installments (25 years x 14 = 350).

the remaining ones are valorised according to CPI. Thus, the legal valorisation rule establishes that pension contributions paid and accumulated during working life are capitalised with CPI. Rules also apply to cover contribution gaps in the worker's profile. Gaps occurring within the 48 most recent months prior to retirement are filled using the minimum contribution base. Gaps farther in time are filled with 50% of the minimum contribution base.

The Spanish legislation allows to benefit from an earnings-related old-age pension and keep working full time or part time, both as an employee or a self-employed. In these cases, the pensioner must have reached the statutory retirement age and the pension benefit is reduced to half of the amount the pensioner would receive if she remained retired. Once the labour contract or the self-employed activity is ended, the full benefit is re-established. While working, pensioner and employer only pay a fraction of contributions.

Old-age pension benefits in the special scheme for the Civil Service and the military are calculated with rules very similar to those of the general Social Security system. Computable pensionable income depends on the civil servant's professional category and the length of her contributory profile.

The accrual rate for the pension benefit depends on the length of the worker's contributory profile. The minimum contributory period (see table 1 above) is 15 years. For these shortest contributory profiles, the accrual rate on pensionable income is 50%. Thereafter, the rate increases linearly until the point where the length of the contributory profile reaches 38 years and 6 months, where the accrual rate is 100% of pensionable income. On top of this, a bonus/malus scheme is applied depending on the worker's age, difference with the statutory retirement age and contributory profile.

1.1.4 Indexation rules

A feature of the Spanish public pension system is the existence of two automatic adjustment mechanisms. First, the Index for Pension Revaluation (IRP by its Spanish acronym) is an index whose main purpose is to adapt annual pension indexation to the projected financial situation of the system. Second, the Sustainability Factor (SF) is a discount mechanism applied to new old-age pensions linked to the evolution of life expectancy at 67 years of age. Both the IRP and the SF are complementary and tackle different sources of potential imbalance of the pension system.

The IRP formula is described in article 58 of the General Social Security Act. It takes into account the Social Security system's revenue and expenditure, the stock of pensions and the evolution of the difference between the average pension of new and deceased pensioners. These variables capture the projected trend in the system's financial balance and determine the values the IRP takes on –which are constrained between a floor (0.25%) and a cap (CPI+0.5%). Annually, the IRP's value for the next year is set in the Budget Law. For further technical details, see Section 4.5.1.

Since 2018 the IRP has been suspended and replaced with a CPI indexation rule. Technically, this suspension is transitory and the general rule of indexing according to the IRP is still foreseen by the General Social Security Act. The original suspension was in force for fiscal years 2018 and 2019 and was extended an additional year afterwards. As of the writing of this country fiche, it is expected that the suspension of the IRP remains in place in 2021 as well. There is also broad political support for the permanent removal of the IRP and its replacement with a CPI indexation rule (see box 1.2.A).

The SF is meant to adjust automatically new pensions to the evolution in life expectancy of new pensioners (see Section 4.5.2 for further technical details). Gains in life expectancy at 67 in five years windows lead to discounts in new, old-age pensions that adjust the system's expenditure to the ageing of the population. Its formula is described in article 211 of the General Social Security Act. Initially, the sustainability factor should have been applied since 2019 but its application was delayed in 2018 until 2023, at the latest, by the Final provision 38.Cinco of the 2018 Budget Law.

Current legislation foresees that earnings-related pension benefits and the minimum pension are indexed according to the IRP. The indexation factor of maximum pensions is set annually in the Budget Law.

1.2 Recent reforms of the pension system included in the projections.

Since the Ageing Report 2018 no major reform has been implemented. However, there have been some changes to the implementation of the 2011 and 2013 reform that have been incorporated to the projections. The two major reforms of the Spanish pension system in the last decade took place in 2011 and 2013. The two main changes of the 2011 reform were the gradual delay of the general statutory retirement age from 65 to 67 years of age in 2027 and the increase in the time window used to calculate the initial retirement pension from the last 15 years of pensionable income to the last 25 years by 2022. The implementation schedule of these reforms has been followed and is included in the projection model. The participation rates used in the model provided by the European Commission's services take into account the delay in the general statutory retirement age. Calculated new pensions take into account the expansion of the time window for pensionable income.

The two main measures of the 2013 pension reforms were the introduction of the Index for Pension Revalorization (IRP by the Spanish acronym) and the Sustainability Factor (SF). The implementation of these reforms has suffered changes since the Ageing Report 2018 and these changes are taken into account in the model. As explained above, the IRP was suspended in 2018 and replaced with a CPI indexation rule. The projection model assumes an indexation rule of 0.9% for years 2020 and 2021 (consistent with the actual indexation rates observed in 2020 and announced for 2021) and uses the projected value of the IRP from 2022 onwards, given the constant legislation principle guiding the projection exercise. The projected value of the IRP remains at its floor level of 0.25% through the projection. This contrasts with the projections in the Ageing Report 2018 (AR18), where the IRP shifted from its floor level to its ceiling at the end of the 2050s and remained at that level during the 2060s.

Finally, current legislation foresees that the SF will be applied starting on January 1st, 2023, at the latest. The model takes this provision into account and the SF is applied since 2023 onwards.

Similarly to the AR 2018, the model includes the gradual unfolding of the pension reforms of 2011 and 2013, namely, a gradual increase in the statutory retirement age to 67 by 2027, a gradual increase to 25, by 2022, in the reference period for contributions used to compute pensionable income and a phasing in of the sustainability factor. Differently from the AR 2018, the application of the sustainability factor is delayed from 2019 to 2023, as legislated in the meantime. Given the constant legislation assumption of the AWG methodology, the IRP is still used in the baseline scenario, although it has been suspended since 2018 and it will very likely be permanently removed from the Spanish legislation soon. To reflect this change, an alternative scenario is calculated, where a CPI indexing rule is used instead (see Box 3.2.B). An additional scenario depicts the permanent suspension of the sustainability factor (see Box 3.6.4.C).

Box 1.2.A The Update of the Toledo Pact

The Toledo Pact (*Pacto de Toledo*, by its Spanish name) is an agreement first reached in 1995 by the main political parties in Spain. The aim of this pact is to build a broad political consensus on the design and management of the Spanish pension system and guarantee its performance according to a set of principles, including its financial sustainability. This agreement is periodically assessed and updated by a standing committee of the Spanish Parliament ('the committee').

On October 27th, 2020, the committee approved an update of the text of the agreement. The revision was passed with 30 votes out of 37. On November 19th, 2020, the new agreement was endorsed by the Spanish Parliament with the support of political parties representing 75% of the seats. Traditionally, the endorsement by the Spanish Parliament of an update of the Toledo Pact has been the first step towards enacting a reform of the Spanish pension system. Likewise, the updated text has usually become the blueprint that guides the reform. This was the case with the pension reform of 2011. However, the 2013 pension reform was not preceded by the endorsement of the standing committee monitoring the Toledo Pact and its partial reversal is currently under discussion.

The latest update of the Toledo Pact includes the following recommendations, among others:

- **Clarify and separate the system's financial sources according to their nature.** The commission underlines that social contributions must exclusively finance contributory benefits and points out several expenditure categories whose funding should be transferred to the Budget of the Central Government: early retirement policies for workers in some sectors, reductions in Social Security contributions to foster the hiring of targeted groups of workers, benefits related to childbirth and the care of minors.
- **Guarantee the purchasing power of pensions.** The commission acknowledges the IRP's lack of social and political support and recommends linking pension indexation to CPI by law.
- **Reduce the gap between statutory and effective retirement ages.** The commission advocates for mechanisms to encourage the extension of working life beyond the statutory retirement age, supports partial retirement schemes compatible with salaried and professional activities, demands active labor policies to re-skill older workers and to limit the use of early retirement, which should only be used in special circumstances.
- **Strengthen employment pension plans (second pillar) and individual pension plans (third pillar)** as complementary tools of public pensions.
- **Finalize the process of simplification of special schemes.** The commission sets as a goal a simplification of the public pension system where only two schemes are available: the general system and the special system for the self-employed. This latter system should be revamped to guarantee that the self-employed contribute according to their real earnings (instead of using proxy variables for their annual income).

The Ministry of Social Security and Inclusion has publicly laid out a reform plan along the lines indicated by the committee.

1.3 Description of the actual 'constant policy' assumptions used in the projection

The pension expenditure projections are based on a model underpinned by a set of demographic, macroeconomic and institutional assumptions. The European Commission services provided the Spanish delegation with the demographic and macroeconomic assumptions and are discussed in Section 2 of this fiche.

The constant policy assumptions used in the model are the following:

- Contributory bases are projected assuming that they grow in line with nominal wages. The cap and floor on the contributory bases are assumed to grow with nominal wages as well.
- Pensionable income ('*base reguladora*') is calculated from 2022 onwards as the sum of the last 300 contributory bases divided by 350. Contributory bases used to calculate pensionable income are valorized using CPI except for the last 24 months before the retirement date, which enter the calculation with their observed, nominal value.
- The cap on the initial pension (i.e. the value of the maximum pension) is assumed to grow with CPI.
- The floor on the initial pension (i.e. the minimum pension) is indexed with the CPI up to 2049 and with nominal wage growth thereafter, as opposed to the IRP currently foreseen by the law and differently from the AR 2018 round, when minimum pensions were indexed with nominal wages all throughout the projection period. This takes into account that minimum pensions' ultimate goal is to guarantee a minimum standard of living for pensioners. Therefore, pensions are indexed with the CPI up to the moment where the minimum pension is close to the guaranteed income (the minimum level of income guaranteed by the Minimum Vital Income, the new flagship measure of the Ministry of Social Security and Inclusion to fight poverty in Spain), which tracks nominal wage growth. From that point on, the minimum pension is indexed with nominal wage growth.
- Once the value of new pensions have been calculated and enter the stock of pensions, they are indexed annually using the IPR, as foreseen by the current law. In this sense, this assumption reflects constant legislation rather than constant policy, but is presented here for a broad view of pension expenditure calculations.

Finally, when projecting private pension schemes, a 3% nominal interest rate is assumed throughout the projection horizon.

The table below summarizes the assumptions for some of the main parameters of the model.

Variable	Legal provision in force	Rule applied in practice	Modelling assumption
Contributory base	The monthly contributory base is equal to the monthly wage (if it lies between a cap and a floor. Otherwise either the cap or the floor will be used). Some wage items can be removed from the contributory base under certain circumstances.	The monthly contributory base is equal to the monthly wage if it lies in between the cap and the floor level. Otherwise the cap/floor is computed. Some wage items can be removed from the contributory base under certain circumstances.	Future contributory bases are projected assuming that they grow in line with nominal wages.
Cap to the contributory base	Set annually in the Budget Law.	Between 2011 and 2019 it grew faster than CPI. Most of the growth is due to three annual, substantial increases.	Grow with nominal wages (currently over 90% of the wages lie below the cap)
Floor to the contributory base	Set annually in the Budget Law.	Between 2011 and 2019 it grew faster than CPI	Grow with nominal wages
Pensionable income	Calculated as the sum of the last 300 contributory bases, divided by 350. Contribution bases corresponding to the 24 months prior to retirement are computed in nominal terms and the remaining ones are valorized according to CPI.	Calculated as the sum of the last 300 contributory bases, divided by 350. The rule is that in order to calculate the sum, old wages are valorized using CPI –except for the last 24 wages, which are not valorized at all. This rule is still in place and is used in the model as well.	Calculated as the sum of the last 300 contributory bases, divided by 350. The rule is that in order to calculate the sum, old wages are valorized using CPI –except for the last 24 wages, which are not valorized at all. This rule is still in place and is used in the model as well.
New pensions	Is the result of multiplying the pensionable income by an accrual rate that depends on the worker's contributory profile. The Sustainability Factor is also applied to new old-age pensions.	The application of the Sustainability Factor has been delayed until 2023 at the latest.	As foreseen in the legislation. The SF is applied since 2023.
Cap for new pensions	Set annually in the Budget Law	With CPI since 2018 (IPR in 2016-17)	Grow with CPI
Floor for new pensions	Indexed with the IPR	Grew with CPI since 2018 (IPR in 2016-17)	Grow with CPI until 2049 and with nominal wages from 2050 onwards
Pre-existing pensions	Indexed with the IPR	Indexed with CPI since 2018	Indexed with the IPR

Source: Spanish General Directorate for Macroeconomic Analysis

2 Overview of the demographic and labour force projections

The demographic dynamics is a crucial element of the projection exercise. The size and age composition of the Spanish population are a key driver of pension expenditure in the future. Moreover, the size of the labour force is one of the factors behind long-term nominal GDP growth and influences the relative magnitude of pension expenditure as a percentage of GDP. This part of the country fiche analizes the main projected features of the Spanish population and labour force through the projection horizon.

2.1 Demographic developments

The Spanish population in 2070 is projected to be very similar in size to the one in 2019. The projected population in 2070 is 47.05 millions, compared with 47.13 millions in 2019. This relative aggregate stability in volume hides two different growth trends (see table 2 below). From 2019 to 2044 the Spanish population is projected to grow, peaking in 2044 at 49.48 millions. From there onwards, the population projection shows a downward trend.

Table 2. Main demographic variables

	2019	2030	2040	2050	2060	2070	peak value	peak year	change 2019-2070
Population (thousand)	47.129	48.786	49.395	49.320	48.321	47.048	49.478	2044	-81
Population grow th rate	0,7	0,2	0,1	-0,1	-0,3	-0,2	0,7	2020	-1,0
Old-age dependency ratio (pop 65+ / pop 20-64)	32,1	40,9	54,0	64,7	64,1	62,5	65,1	2053	30,5
Old-age dependency ratio (pop 75+ / pop 20-74)	13,7	16,6	22,2	29,7	33,8	31,8	33,9	2059	18,1
Ageing of the aged (pop 80+ / pop 65+)	31,2	30,5	32,1	38,0	46,3	45,6	47,2	2064	14,4
Men - Life expectancy at birth	81,2	82,4	83,7	84,9	86,0	87,1	87,1	2070	5,9
Women - Life expectancy at birth	86,8	87,7	88,7	89,7	90,6	91,4	91,4	2069	4,6
Men - Life expectancy at 65	19,9	20,7	21,6	22,5	23,3	24,1	24,1	2069	4,2
Women - Life expectancy at 65	23,9	24,6	25,5	26,2	27,0	27,7	27,7	2070	3,8
Men - Survivor rate at 65+	88,5	90,3	91,7	92,8	93,8	94,6	94,6	2070	6,1
Women - Survivor rate at 65+	94,3	95,1	95,7	96,3	96,7	97,1	97,1	2070	2,9
Men - Survivor rate at 80+	63,2	67,9	71,9	75,4	78,5	81,3	81,3	2070	18,1
Women - Survivor rate at 80+	80,6	83,3	85,5	87,4	89,0	90,5	90,5	2070	9,9
Net migration (thousand)	438,5	185,4	178,2	178,7	175,7	169,0	438,5	2019	-269,6
Net migration over population change	1,3	2,3	4,5	-3,4	-1,4	-1,5	21,6	2044	-2,8

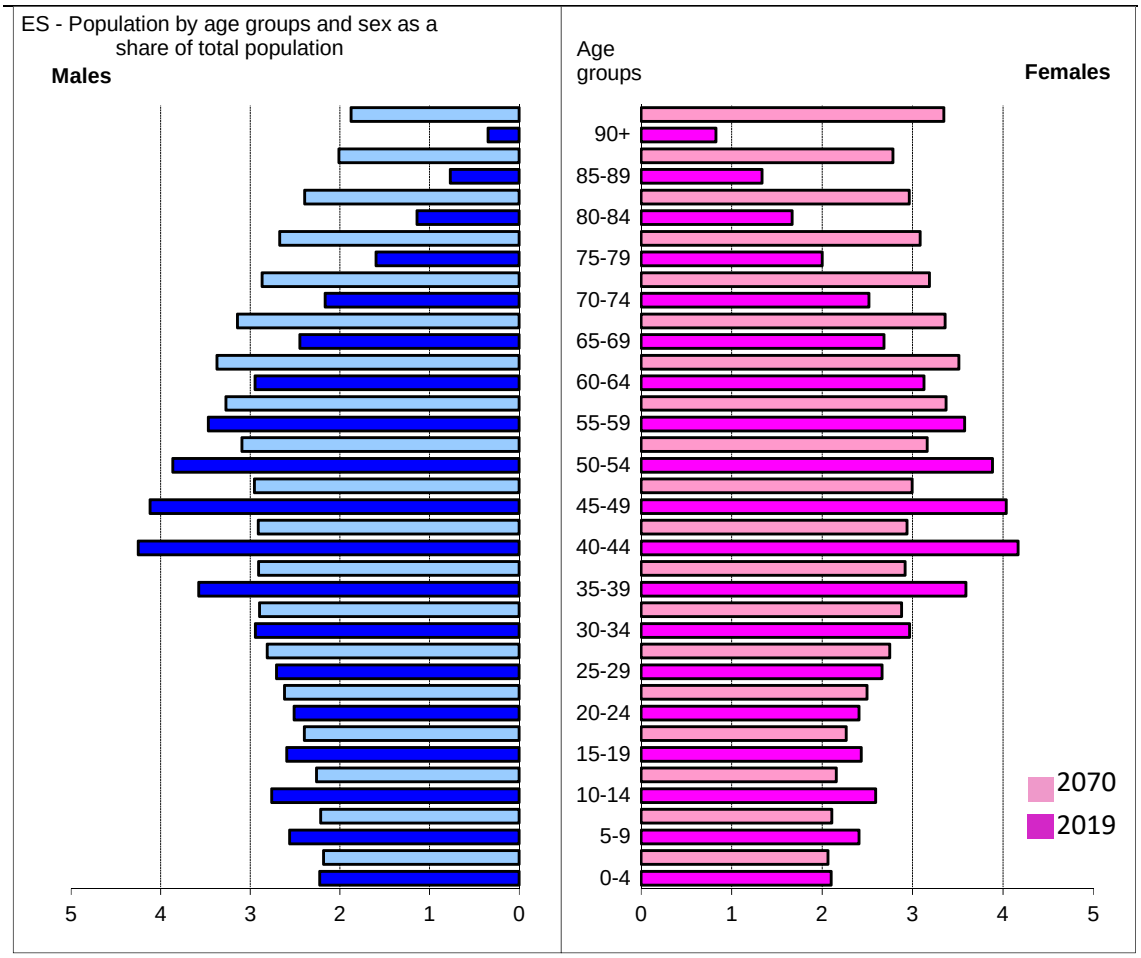
Source: Eurostat and European Commission

Fertility and mortality projections result in negative natural growth for the whole projection horizon. Fertility rates are projected to increase at a moderate pace from a level close to 1.3 child per women in 2020 to around 1.5 in 2070. Mortality rates fall during the projection horizon, resulting in a higher life expectancy at birth. Life expectancy at 67 – a relevant metric in the Spanish case given that the general statutory retirement age is set to be 67 from 2027 onwards- is expected to grow almost 4 years (from about 20 to 24 years for men and from 24 to almost 28) between 2020 and 2070. The combination of relatively low fertility rates and an ageing population (that results in an increasing number of deaths despite the gains in life expectancy) leads to a negative natural growth of the population for the whole scenario and this trend is projected to accelerate between 2040 and 2060.

The only source of population growth in the projection is net migration. Net migration starts at a relatively high level of over 400,000 net migrants per year, although it quickly moderates to under 200,000 by the mid-2020s. From that point onwards, net migration slowly shrinks in a linear fashion to around 175,000 by 2070. This migratory dynamic, coupled with a negative natural growth, implies that the composition of the Spanish population by country of origin is projected to change significantly in the coming decades.

The old-age dependency ratio is set to increase very significantly due to the ageing of the Spanish population. At the beginning of the projection the old-age dependency ratio (measured as the ratio of population aged over 64 and population aged 15-64) is close to 0.3. In the projection, this ratio grows quickly and more than doubles in three decades, to peak at 0.65 by 2053 and plateaus around this level for the rest of the projection horizon. This is the single most significant development in the demographic scenario for the dynamics of pension expenditure, as it is shown at length below.

Figure 1. Age pyramid, comparison between 2019 and 2070



Source: Eurostat and European Commission

The demographic projections for the 2021 edition of the Ageing Report differ from the 2018 edition in several, meaningful ways. On the one hand, fertility rates are substantially lower in this exercise (1.9 children per women in 2070 in the AR18 vs. 1.5 in the AR21). On the other hand, net migration is higher throughout the projection horizon

in the AR 2021. These differences result in a different dynamic of the old-age dependency ratio that becomes most apparent from the decade of 2050 onwards. Up to the mid-2050s, the old-age dependency ratio was greater in the AR18, peaking sooner (mid-2040s) and at a higher level. However, while the old-age dependency ratio remains stable at 0.6 in the AR21 for the last two decades of the projection horizon, in the AR18 it was projected to drop close to 0.45 by 2070. Therefore, the old-age dependency ratio in the AR21 stabilizes at a higher level from 2050 onwards, compared with the previous round of projections.

Figure 2. Projected fertility rate (number of children) in the Ageing Report 2018 and the Ageing Report 2021

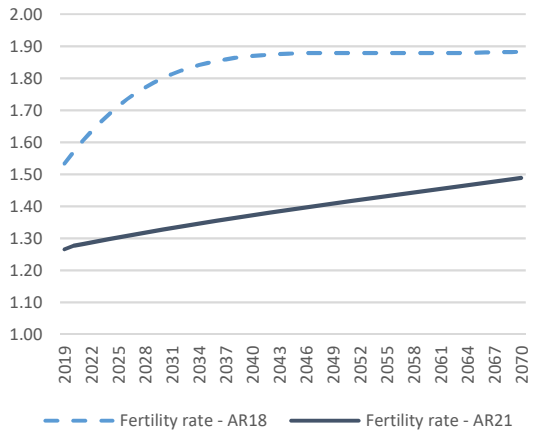


Figure 3. Life expectancy at birth (number of years) in the Ageing Report 2018 and the Ageing Report 2021

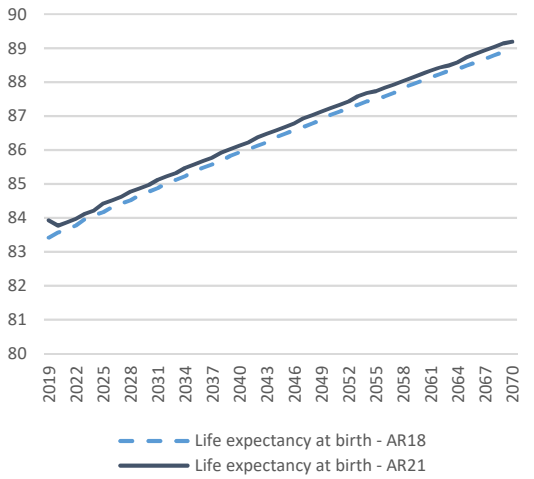


Figure 4. Net migration (number of migrants) in the Ageing Report 2018 and the Ageing Report 2021

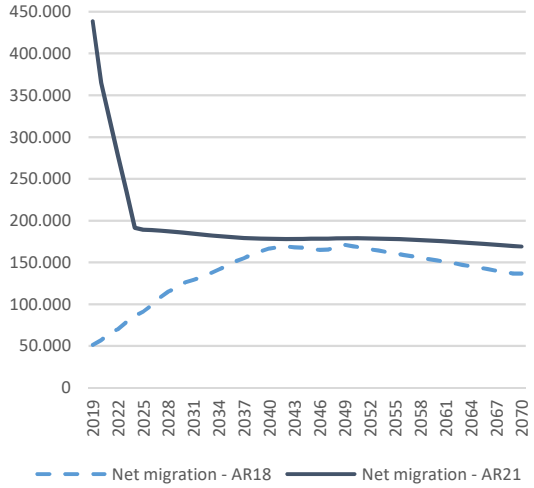
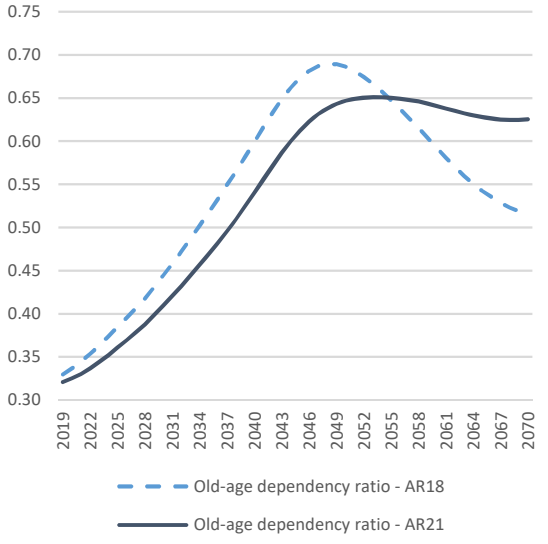


Figure 5. Old-age dependency ratio (ratio over 1) in the Ageing Report 2018 and the Ageing Report 2021



Source: Eurostat and Spanish General Directorate for Macroeconomic Analysis

2.2 Labour force

The labour force is calculated by the European Commission's services on the basis of the demographic projections described in the section above and the macroeconomic scenario. Participation and employment rates take into account the 2011 pension reforms that gradually increases the general statutory retirement age in Spain from 65 to 67 years by 2027. As table 3 shows, the general participation rate is expected to increase almost 3 pp trough the projection interval, with greater gains in terms of employment rates (8 pp) and the share of employed population (7 pp). These positive developments are more salient for older workers aged 55-64 and 65-74. This is reflecting the effects of the 2011 pension reform that gradually delays the general statutory retirement age to 67 by 2027 and partially counters the increase in the old-age dependency ratio.

Table 3. Participation rate, employment rate and share of workers for the age groups 20-64, 20-74, 55-64 and 65-74

	2019	2030	2040	2050	2060	2070	peak value	peak year	change 2019 2070
Labour force participation rate 20-64	79,0	81,7	82,2	82,3	82,0	81,8	82,3	2047	2,8
Employment rate of w orkers aged 20-64	68,1	70,4	73,7	76,5	76,4	76,2	76,6	2052	8,2
Share of w orkers aged 20-64 in the labour force 20-64	86,2	86,2	89,7	93,0	93,2	93,2	93,2	2059	7,0
Labour force participation rate 20-74	68,6	70,5	69,4	68,8	70,6	70,3	70,6	2063	1,7
Employment rate of w orkers aged 20-74	59,2	61,1	62,5	64,2	65,9	65,7	66,0	2063	6,5
Share of w orkers aged 20-74 in the labour force 20-74	86,3	86,5	90,0	93,2	93,4	93,4	93,4	2052	7,1
Labour force participation rate 55-64	61,7	77,1	79,0	78,5	78,5	78,3	79,1	2038	16,6
Employment rate of w orkers aged 55-64	53,9	67,6	71,7	73,5	73,7	73,5	73,8	2063	19,6
Share of w orkers aged 55-64 in the labour force 55-64	87,4	87,7	90,7	93,6	93,9	93,9	93,9	2067	6,5
Labour force participation rate 65-74	4,5	17,5	20,2	19,0	20,1	21,2	21,2	2070	16,7
Employment rate of w orkers aged 65-74	4,2	16,4	19,4	18,4	19,6	20,6	20,6	2070	16,3
Share of w orkers aged 65-74 in the labour force 65-74	94,3	93,8	95,6	97,2	97,2	97,2	97,2	2052	2,8
Median age of the labour force	42,0	45,0	44,0	43,0	44,0	44,0	45,0	2028	2,0

Source: European Commission

The effects of the gradual delay of the statutory retirement age to 67 by 2027 can also be seen in the evolution of the average labour market exit age. During the decade of 2020, when the effects of the reform are gradually unfolding, the average exit age from the labour makert increases significantly, with smaller gains afterwards. This development progressively translates into the average contributory period as well, that grows 2 years for men through the projection horizon (see table 4a). The effects of the reform can also be seen in the fact that despite the gains in life expectancy, the percentage of adult life spent in retirement remains roughly stable and the fall in the early to late exit ratio.

Table 4a. Labour market effective exit age and expected duration of life spent at retirement - MEN

	2020	2030	2040	2050	2060	2070	peak value	peak year	change 2020-2070
Average effective retirement age (administrative data)*	63.7								
Average labour market exit age (CSM)**	63.4	66.0	66.1	66.1	66.1	66.2	66.2	2069	2.8
Contributory period	40.4	40.8	41.3	41.7	42.2	42.6	42.6	2070	2.2
Duration of retirement***	21.3	19.9	20.8	21.7	22.5	23.2	23.2	2069	1.9
Duration of retirement/contributory period	0.5	0.5	0.5	0.5	0.5	0.5	0.5	2069	0.0
Percentage of adult life spent in retirement****	31.9	29.3	30.2	31.1	31.9	32.5	32.5	2069	0.6
Early/late exit*****	5.3	1.3	1.0	0.8	0.9	0.8	5.3	2020	-4.4

** 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 20 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.*

Source: European Commission

A similar general trend is observed for women (table 4b). In the baseline year, women show a higher average exit age from the labour market. This is at least in part the result of shorter contributory profiles compared with men that encourage women to remain in the labour market for longer to accumulate additional years of contributions to increase their future pension benefit. During the projection horizon, the length of the contributory profile of women converges to the men's profile. Accordingly, women's average exit age increases less than men's, narrowing the gender gap. The interplay between life expectancy and the increase in the average labour market exit age follows a similar pattern in the case of women, with the early to late exit ratio falling and the percentage of adult life spent in retirement remaining mostly stable from 2020 to 2070.

Table 4b. Labour market effective exit age and expected duration of life spent at retirement - WOMEN

	2020	2030	2040	2050	2060	2070	peak value	peak year	change 2020-2070
Average effective retirement age (administrative data)*	64.3								
Average labour market exit age (CSM)**	64.1	66.5	66.6	66.6	66.6	66.7	66.7	2069	2.6
Contributory period	37.0	38.1	39.2	40.3	41.5	42.6	42.6	2070	5.6
Duration of retirement***	24.7	22.8	23.6	24.4	25.1	25.8	25.8	2070	1.1
Duration of retirement/contributory period	0.7	0.6	0.6	0.6	0.6	0.6	0.7	2020	-0.1
Percentage of adult life spent in retirement****	34.9	32.0	32.7	33.4	34.0	34.6	34.9	2020	-0.3
Early/late exit*****	3.8	1.0	0.8	0.6	0.7	0.7	3.8	2020	-3.2

** 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 20 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.*

Source: European Commission

3 Pension projection results

3.1 Extent of the coverage of the pension schemes in the projections

The projections offer full coverage of the Spanish pension system. More precisely, the projection covers the three components of the public system (Social Security, *Clases Pasivas* and non-earning related pensions) as well as private pension schemes. The Social Security system comprises several special schemes covering the self-employed, domestic workers, miners, seamen and artists. These special schemes are included in the model as part of the Social Security figures although they are not modelled separately. First, the very small size of the miners and seamen schemes means that the extra complexity of modelling them separately would not add much value to the model. Second, given their small size, there could be problems gaining access to the microdata. Third, in the case of domestic workers and the self-employed, the rules that give access to a pension and the calculation rules of the benefits are very similar to the general Social Security regime. The main differences compared with the general Social Security system stems from the contribution rules. Given that contributions are modelled as a percentage of GDP, the complexity of modelling them would not add to the expenditure side of the projections.

The four types of pensions are covered both for the Social Security system and *Clases Pasivas*:

- **Retirement and early retirement**, representing 73% of total public pension expenditure in 2019 and 65% of total public pensions in the same year.
- **Disability**, 9% of both total public pension expenditure and pensions.
- **Survivors**, comprising widow(er)s and orphans, and representing 18% of total public expenditure and 26% of pensions in 2019.
- **Other pensions**, includes survivors' pensions other than spouses and children ('favor de familiares' by its Spanish denomination). It is a marginal group that was included in the survivors' category in the Ageing Report 2018 and represented 0.2% of total expenditure and 0.4% of total public pensions in 2019.

Table 5 compares the actual expenditure in public pensions observed by Eurostat with the projections of the Ageing Working Group. Starting from a low difference in 2010, the projection error has decreased to the point where it has become minimum (below 0.1 pp) and caused partially by rounding discrepancies.

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

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	change 2009-2017
Eurostat total pension expenditure	10.2	10.6	11.1	11.9	12.6	12.8	12.7	12.6	12.4	:	2.2
Eurostat public pension expenditure (A)	:	10.2	10.7	11.5	12.2	12.4	12.3	12.2	12.0	:	:
Public pension expenditure (AWG: outcome) (B)	9.3	9.8	10.5	11.4	12.1	12.3	12.3	12.2	12.1	12.0	2.8
Difference Eurostat/AWG: (A)-(B)	:	0.4	0.2	0.1	0.1	0.1	0.0	0.0	-0.1		:

Source: Eurostat and Spanish General Directorate for Macroeconomic Analysis

Private pension data coverage remains the same as in the Ageing Report 2018 showing information on non-mandatory individual and occupational schemes. The collective schemes category comprises two financial products: occupational pension planes ('planes de pensiones') and collective pension insurance plans ('seguros colectivos'). The individual schemes category includes individual pension plans

('planes individuales') and individual insurance plans ('planes de prevision asegurados').

3.2 Overview of projection results

This subsection describes the main trends in pension expenditure projected for the period 2019-2070. Pension expenditure is disaggregated by i) pension regime (Social Security, *Clases Pasivas* and non-earnings related expenditure), ii) type of pension (retirement, disability, survivors and others), iii) age group and iv) public/private pension schemes. Total pension expenditure in public pensions includes pensions from the three public regimes and all pension types.

The series of expenditure as a share of GDP has an early peak in 2020 as a result of the effect of Covid-19 on GDP growth. The effect of the pandemic is projected to be transitory (see section 3.5.4 for results under alternative assumptions) and the ratio of expenditure to GDP drops afterwards. From 2030 until 2048 the share of public pensions expenditure on GDP grows again, pushed by the retirement of large cohorts of workers (the Spanish baby boom generation) and the progressive increase of the old-age dependency ratio. Once this demographic pressure eases in the 2050s, the public expenditure falls back again to levels below the currently observed ones (see table 6).

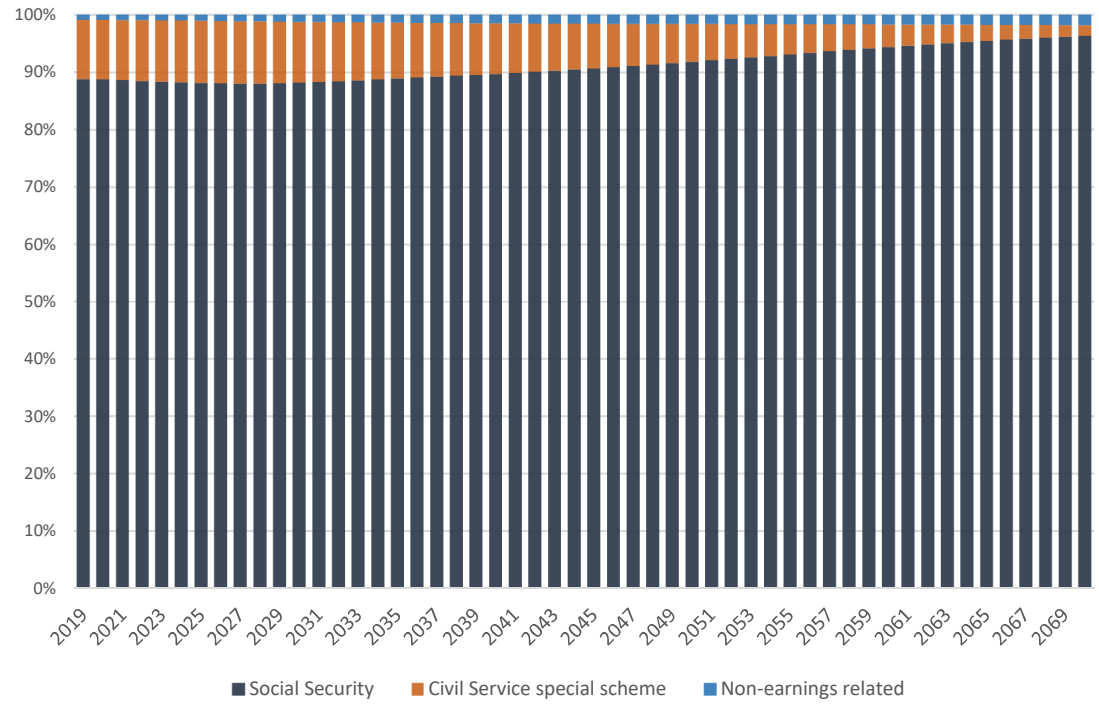
Table 6. Projected gross and net pension spending and contributions (% of GDP)

Expenditure	2019	2030	2040	2050	2060	2070	peak value	peak year	change 2019-2070
Gross public pension expenditure	12.3	12.3	12.8	13.0	11.7	10.3	14.0	2020	-2.1
Private occupational pensions	0.3	0.3	0.4	0.4	0.4	0.3	0.4	2055	0.0
Private individual mandatory pensions	:	:	:	:	:	:	:	:	:
Private individual non-mandatory pensions	0.2	0.4	0.5	0.5	0.4	0.4	0.5	2041	0.1
Gross total pension expenditure	12.9	13.1	13.7	13.9	12.5	11.0	14.6	2020	-1.9
Net public pension expenditure*	11.4	11.3	11.8	11.9	10.7	9.4	12.9	2020	-2.0
Net total pension expenditure*	11.9	12.1	12.7	12.8	11.6	10.1	13.5	2020	-1.8
Contributions	2019	2030	2040	2050	2060	2070	peak value	peak year	change 2019-2070
Public pension contributions	11.8	11.8	11.8	11.8	11.8	11.8	11.8	2020	0.0
Total pension contributions	12.4	12.3	12.2	12.1	12.0	12.0	12.4	2020	-0.4

Source: European Commission

By regime (see figure 6), the general regime of the Social Security system represents the lion's share of aggregate expenditure and it determines the overall dynamics of expenditure. *Clases Pasivas* was closed to new entrants on January 1st, 2011. Therefore, this regime is set to fade away progressively and eventually disappear. The projections show that by 2070 this process would be almost completed. Finally, non-earnings-related public pensions represent a minor share of overall expenditure on public pensions and are projected to remain this way.

Figure 6. Total public pension expenditure breakdown by pension scheme



Source: Spanish General Directorate for Macroeconomic Analysis

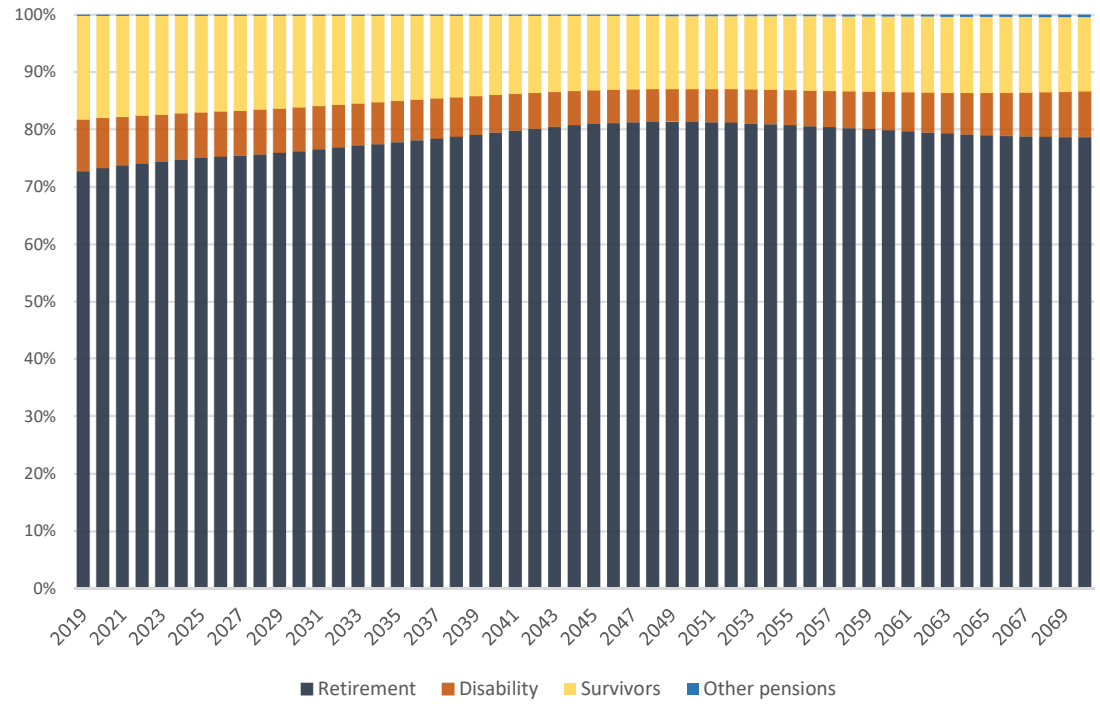
By pension type, retirement pensions represent the bulk of total expenditure on public pensions and the main driver behind its dynamics. The second most important pension type in Spain are survivors' pensions (orphans and, especially, widow(er)s). Expenditure projections in this category are based on general mortality and marriage rates, average age differences between spouses and the size of the population. On the one hand, lower mortality rates imply that new pensions are granted later (and thus, on this account, they reduce the average duration). On the other hand, higher life expectancy imply that pensioners will benefit from the pension for longer. The size of the population and indexation rules are the other two drivers that help explain the evolution of survivors' pensions. Disability pensions represent a minor share of total expenditure and are modelled as a proportion of the labor force. This proportion is a weighted average of the observed probabilities of suffering a disability across ages in the baseline year and remains constant throughout the projection. Finally, survivors' pensions where the survivors are neither the spouse or the children of the deceased person are included in the other pension category. Its associated expenditure is a tiny fraction of the total.

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	12,3	12,3	12,8	13,0	11,7	10,3	14,0	2020	-2,1
Old-age and early pensions	9,0	9,4	10,2	10,6	9,3	8,1	10,7	2047	-0,9
Flat component	:	:	:	:	:	:	:	:	:
Earnings-related	8,9	9,2	10,0	10,3	9,1	7,9	10,5	2047	-1,0
Minimum pensions (non-contributory) i.e. minimum income guarantee for people above 65	0,1	0,2	0,2	0,2	0,2	0,2	0,2	2049	0,1
Disability pensions	1,12	0,95	0,85	0,76	0,79	0,82	1,2	2020	-0,3
Survivors' pensions	2,23	1,97	1,77	1,65	1,54	1,33	2,49	2020	-0,9
Other pensions	0,03	0,03	0,03	0,03	0,04	0,05	0,05	2070	0,0

Source: European Commission

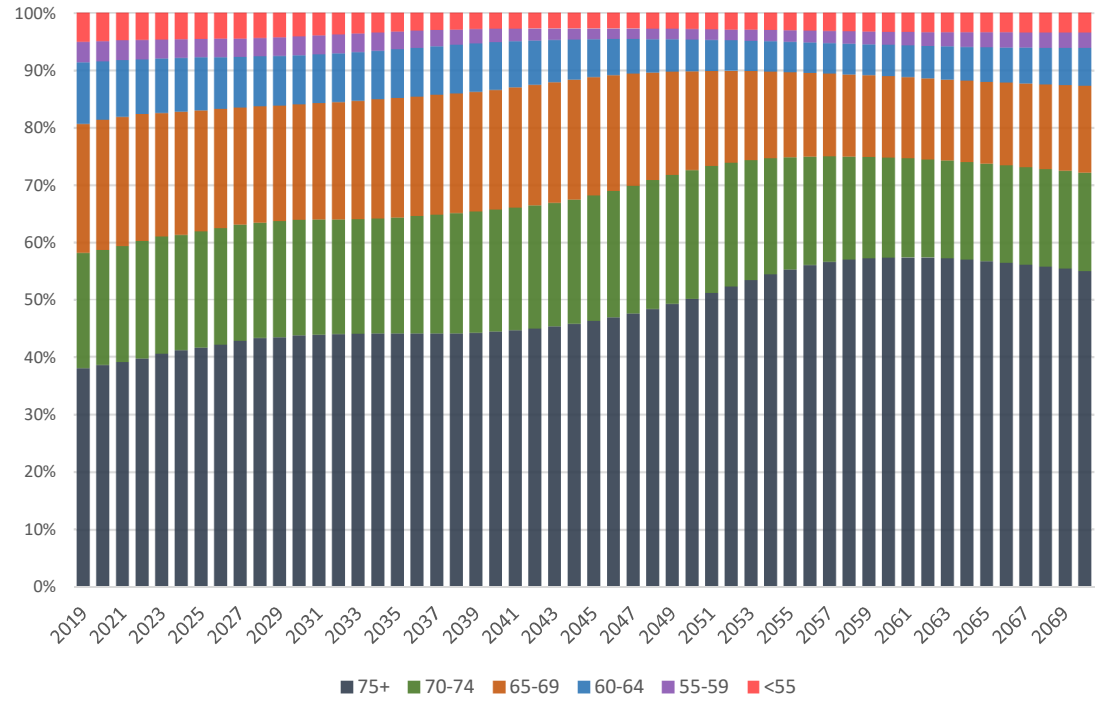
Figure 7. Total public pension expenditure breakdown by pension type



Source: Spanish General Directorate for Macroeconomic Policy

The breakdown by age groups is consistent with the projected dynamics of the labour market and age structure of the Spanish population (and namely its ageing process) and the full unfolding of the reforms of the system enacted in 2011 and 2013. The share of the age group below 55 is set to decrease over the projection horizon, reflecting the progressive increase in the effective retirement age. On the other end of the age distribution, the share of pension expenditure on those aged above 75 is projected to increase steadily, reflecting gains in life expectancy and the ageing of population. For age groups in between, their respective share is projected to increase while the Spanish baby boom cohorts are in this age bracket and to decrease afterwards, reflecting the relative cohort size of the Spanish population pyramid.

Figure 8. Total public pension expenditure breakdown by age group



Source: General Directorate for Macroeconomic Policy

Projected expenditure in private pension schemes as a share of GSP also shows a trend influenced by demographics. It grows until the beginning of the 2040s and flattens at that level during this decade and the 2050s, before starting to decline. This is consistent with the Spanish baby boom generation starting to retire in the 2030s and new old-age pensions peaking in the early 2040s. The flat phase of the curve corresponds to the retirement years of these large cohorts and the final decline during the 2060s is consistent with the retirement of smaller cohorts.

The share of expenditure in private pensions as a share of GDP is lower compared with the AR18 figures. This is mainly driven by differences in observed contributions in the base year related to changes in data gathering. In the AR18, projections were based on a sample of 70% of the Spanish private pension schemes universe. Those figures were then extrapolated to the full population. In this edition of the Ageing Report, however, private pension projections are based on observed data for the whole population in the base year. As a result, contributions in the base year are around 30% lower than the AR18 projection for 2019. This difference results for the observed downward trend in contributions in the last 5 years and the technical improvement in data gathering. As private pension expenditure in capitalization systems is the result of past contributions and their returns, the lower level of contributions through this round of projections results in lower expenditure years later.

The number of contributors and pensions is also affected by the changes in the demographic scenario compared with the AR18. In this edition of the Ageing Report, the number of pensions –accounted as the number of individuals benefiting from a pension scheme- is lower than in the AR18. The difference is due to a level effect in the base

year explained by the improvements in data gathering. By the 2050s the number of pensions remains higher in the AR21, as the number of people above 65 is greater than in the AR18. Finally, the number of contributors show a downwards trajectory, as in the AR18. However, the reduction in the number of contributors is lower in this edition, given the higher net migration compared with the AR18.

Box 3.2.B Baseline scenario under an alternative indexing rule

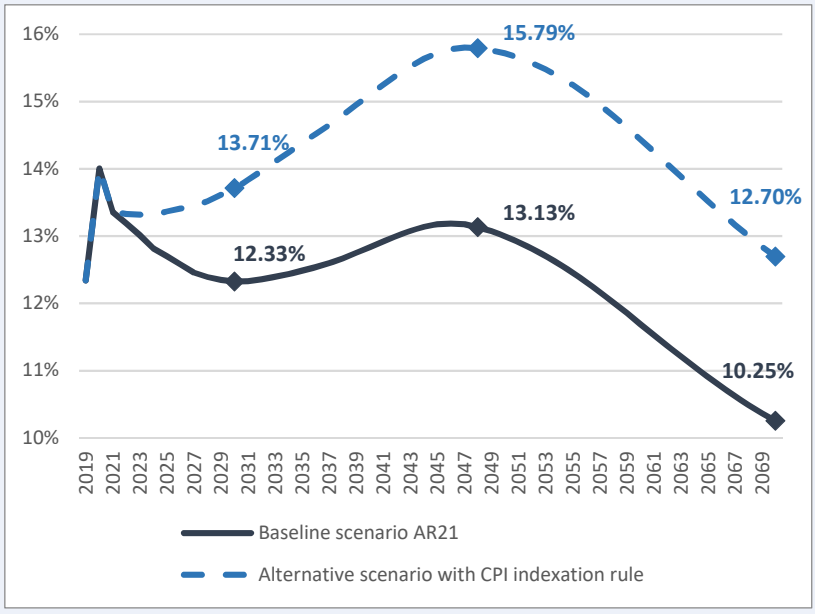
The common methodology agreed upon by the members of the Ageing Working Group includes the principle of constant legislation. This principle means that all the rules in force under the prevailing legislation at the time of the exercise should be included in the baseline scenario (with the exception of minimum pensions' indexation under some circumstances).

In the Spanish case, the Index for Pension Revalorization still is the general indexation rule for pre-existing pensions and minimum pensions according to article 58 of the General Social Security Act. However, since 2018 this rule has been suspended and replaced by a CPI indexation rule. Moreover, the Spanish Draft Budgetary Plan for fiscal year 2021 includes the extension of the current suspension of the IRP. Finally, the updated Toledo Pact (see Box 1.2.A) has recently acknowledged the IRP's lack of political and social support and endorsed the return to a CPI indexation rule.

All of the above suggests that the most probable course of events is the abolition of the IRP and the return to a CPI indexation rule. Given that this possibility has not materialized yet, the IRP is still used in the baseline scenario following the constant legislation principle (although the model uses the known indexation rates of 0.9% for years 2020 and 2021). Nevertheless, the Spanish delegation has run the projection under the alternative assumption of a CPI indexation rule, which is deemed more probable in the future. Figure 3.2.B.1 shows the result of this alternative scenario and compares it with the Ageing Report baseline scenario for Spain.

Replacing the IRP with a CPI indexation rule has a substantial impact on public pension expenditure. Whereas the assumed CPI for the projection horizon is 2% from the mid-2020s onwards, the projected value of the IRP stays at its floor of 0.25%. This results in a 2.66 pp increase of public pension expenditure as a share of GDP by 2050 compared to the scenario where the IRP is used.

Figure 3.2.B.1 Total public expenditure in pensions as a share of GDP under different scenarios

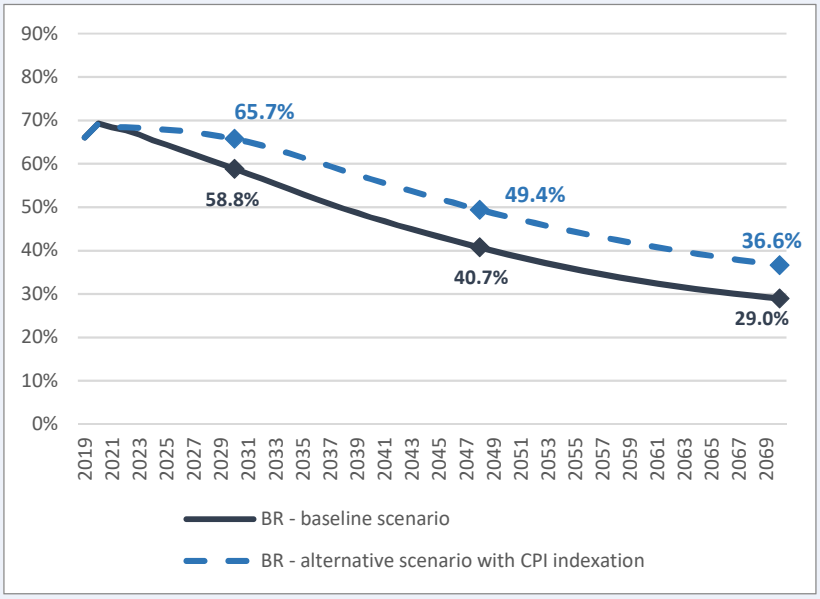


Note: Baseline scenario indexation is also done with CPI for the years 2019-2021 (see footnote 10 above)

Source: Spanish General Directorate for Macroeconomic Analysis

The difference between the two scenarios is also observed when comparing the old-age benefit ratio (BR). The greater indexation under the CPI alternative scenario results in a slower reduction in the benefit ratio (see figure 3.2.B.2 below). As further discussed in Section 3.3.2, the benefit ratio falls 37 pp between 2019-2070 in the baseline scenario, whereas in the alternative CPI scenario the reduction is smaller -30 pp- although still very substantial. The gross average replacement ratio remains unchanged in the alternative scenario, since new pensions are not affected by indexation rules (rather, they are affected by valorization rules, the accrual rate and the sustainability factor, all of which remain unchanged in the alternative scenario).

Figure 3.2.B.2 Benefit ratio for old-age earnings-related pensions under different scenarios



Source: Spanish General Directorate for Macroeconomic Analysis

This alternative scenario, based on a constant (and foreseen) policy assumption, differing from the constant legislation principle agreed by the Ageing Working Group, is deemed to reflect the current inertia of the system more accurately. The IRP has been de facto suspended since 2018 and it is expected to be permanently replaced by a CPI indexation rule in the near future (see Box 1.2.A). Other institutions, such as the Spanish Independent Fiscal Authority (AIReF) already assume a CPI indexation rule in its baseline scenario.

It is true that the reforms foreseen in the Toledo Pact Agreement have not been passed into law yet, although some of them have already been applied in the last three years and in all likelihood, they will be adopted soon. When they enter into force, the current analysis will have to be updated in order to evaluate the effects of indexing pensions with CPI, as well as the effects of the reforms geared towards ensuring sustainability, which are included in the Agreement. The result of this future exercise will hopefully be a more realistic assessment of the Spanish pension system.

3.3 Description of main driving forces behind the projection results and their implications

This subsection further analyzes the projections, focusing on key aspects of the system. First, the evolution of the share of pension expenditure on the GDP is disaggregated into

multiple components. Then, two of these components (the benefit ratio and the dependency ratio) are examined separately as they drive some of the most important dynamics of the projections. Finally, new pension expenditure is also decomposed.

3.3.1 Public pension expenditure decomposition

The share of public pension expenditure on GDP can be decomposed into four components (see figure 9). The dependency ratio captures the dynamics of the age structure of the population. The coverage ratio indicates how broadly the public pension benefits are distributed among the population. The benefit ratio relates the average pension in the system to the average wage in the economy. Finally, the labor market effect shows how the effort to fund the system is distributed across the labor force.

Figure 9. Disaggregation of public pension expenditure

$$\frac{pension\ \ exp enditure}{GDP} = \underset{\downarrow}{\frac{population\ \ 65+}{population\ \ 20-64}} \times \underset{\downarrow}{\frac{number\ \ of\ \ pensioners}{pop ulation\ \ 65+}} \times \underset{\downarrow}{\frac{average\ \ pension\ \ income}{\frac{GDP}{hours\ \ worked\ \ 20-74}}}} \times \underset{\downarrow}{\frac{population\ \ 20-64}{hours\ \ worked\ \ 20-74}} \quad [1]$$

dependency ratio; coverage ratio; benefit ratio; labour market effect

$$\frac{number\ \ of\ \ pensioners}{pop ulation\ \ 65+} = \underset{\downarrow}{\frac{number\ \ of\ \ pensioners\ \ 65+}{pop ulation\ \ 65+}} + \left(\underset{\downarrow}{\frac{number\ \ of\ \ pensioners\ \ \leq 65}{population\ \ 50-64}} \times \underset{\downarrow}{\frac{population\ \ 50-64}{population\ \ 65+}}\right) \quad [2]$$

coverage ratio old-age; coverage ratio early-age; cohort effect

$$\frac{population\ \ 20-64}{hours\ \ worked\ \ 20-74} = \underset{\downarrow}{\frac{population\ \ 20-64}{employed\ \ people\ \ 20-64}} \times \underset{\downarrow}{\frac{employed\ \ people\ \ 20-64}{hours\ \ worked\ \ by\ people\ \ 20-64}} \times \underset{\downarrow}{\frac{hours\ \ worked\ \ by\ people\ \ 20-64}{hours\ \ worked\ \ by\ peop le\ 20-74}} \quad [3]$$

1/employment rate; 1/labour intensity; 1/career shift

Source: European Commission

Taking the projection horizon as a whole, the ratio of pension expenditure over GDP falls 2.1 pp by 2070 (see table 8). The bulk of this dynamic is explained by two forces of opposite sign. On the one hand, the old-age dependency ratio rises significantly (9.2 pp) between 2019 and 2070, reflecting the demographic projections discussed in section 2.1. On the other hand, the decline of the benefit ratio is almost of the same magnitude (-8.3 pp). Roughly half of the change in the benefit ratio can be attributed to the role played by the IRP and SF, that help moderate the average pension's growth. The rest can be explained by the increasing share of capped old-age retirement pensions and other residual factors. Finally, the labor market effect also contributes to reducing the pension expenditure ratio, mainly because of a higher employment ratio.

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	0,0	0,5	0,2	-1,3	-1,4	-2,1
Dependency ratio effect	3,4	3,7	2,5	-0,1	-0,3	9,2
Coverage ratio effect*	-1,3	0,0	0,5	0,6	0,0	-0,1
Coverage ratio old-age	-0,8	0,6	1,0	0,6	-0,1	1,3
Coverage ratio early-age	-1,8	1,0	-0,3	-0,2	0,3	-1,1
Cohort effect	-1,3	-3,8	-3,1	0,8	0,4	-7,0
Benefit ratio effect	-1,0	-2,1	-2,1	-1,8	-1,2	-8,3
Labour market effect	-0,9	-0,8	-0,4	0,1	0,0	-2,1
Employment ratio effect	-0,5	-0,6	-0,5	0,0	0,0	-1,5
Labour intensity effect	0,0	0,0	0,0	0,0	0,0	0,1
Career shift effect	-0,5	-0,2	0,0	0,1	-0,1	-0,7
Residual	-0,2	-0,3	-0,2	0,0	0,0	-0,8

Source: European Commission

A closer look at the overall change in the pension expenditure ratio shows two periods with different trends and component dynamics. From 2019 to 2050 pension expenditure increases, pushed by the increase in the old-dependency ratio as a result of the quick ageing of the Spanish population and the retirement of the Spanish baby boom generation. During these decades, the fall in the benefit ratio can only partially counter the demographic trend. The coverage ratio also helps mitigate the increase in the ratio of pension expenditure, especially in the first decade of the projection. These are the years where the delay of the statutory retirement age is unfolding and this projected policy outcome is reflected in the fall of the early age coverage ratio component. This is also reflected in the employment rate effect, pushing the labor market effect down. In the 2030s and 2040s, the cohort component of the coverage rate becomes its main driver, showing the relatively smaller size of the cohorts born after the Spanish baby boom generation.

From 2050 to the end of the projection, the demographic trend reverses and a minor drop in the dependency ratio contribution is observed. The benefit ratio effect keeps falling at roughly the same pace as in the previous decades and becomes the stronger force driving the overall results. In this second period, both the coverage ratio and the labor market effect have a relatively small impact on the public pension expenditure ratio.

3.3.2 Benefit ratio and replacement rate at retirement

The benefit ratio compares the average pension with the average wage in the economy. The replacement rate compares the average initial benefit of new pensions to the average wage in the economy. Both metrics show a downward trajectory over the projection horizon.

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)	60%	54%	45%	38%	33%	29%	-31%
Coverage	81.8	75.5	74.4	75.3	76.2	76.5	-5.3
Public scheme: old-age earnings related (BR)	66%	59%	48%	39%	33%	29%	-37%
Public scheme: old-age earnings related (RR)	77%	67%	60%	53%	46%	41%	-36%
Coverage	53.3	51.5	54.6	58.1	59.2	59.6	6.3
Private occupational scheme (BR)							
Private occupational scheme (RR)							
Coverage	3.4	3.3	3.3	3.1	3.0	3.0	-0.4
Private individual schemes (BR)							
Private individual schemes (RR)							
Coverage	4.3	11.3	13.3	13.3	13.0	13.1	8.9
Total benefit ratio							
Total replacement rate	:	:	:	:	:	:	:

Source: European Commission

The total public pension scheme benefit ratio is projected to halve from 0.60 in 2019 to 0.29 in 2070 (see table 9). Additionally, it converges to the old-age earnings related benefit ratio as the Civil Service special scheme gradually fades away. Several factors affect the benefit ratio. First, the initial pension of new pensioners is on average higher than the average pension of deceased pensioners and this tends to increase the average pension in the system. That is why the replacement rate is higher than the benefit rate. Secondly, indexation rules have great influence on the average pension growth. In this case, the combined effect of the IRP and Sustainability Factor explains roughly one third of the fall in the benefit ratios. The increase in the share of capped old-age pensions is another important factor that helps explain this dynamic.

The evolution of the benefit ratio in the last decade of the projection is greater from the one calculated in the AR18. This is the result of two main factors. First, as already mentioned, the IRP remains at its floor level during the 2060s in the AR21, while in the AR18 the IRP picked up during this decade to reach its ceiling level (CPI + 0.5%). Second, in the AR21 the share of capped, new old-age pensions is greater as a result of a methodological change (see Section 4.4.1 for further details).

Regarding the replacement rate, the IRP has no impact on it, but the SF is a major driver of the dynamic, as it reduces the initial pension of new pensioners according to life expectancy developments. This effect explains 25% of the reduction in the replacement rate. An additional contributor to this trend –especially in the second half of the projection- is the increasing share of new pensions capped at the maximum threshold. This feature comes from the maximum pension threshold growing more slowly than wages in the economy.

The coverage ratio remains basically stable through the projection period, starting from relative high levels. Nevertheless, it grows 2 pp between 2019 and 2070 driven by a higher coverage rate for older age groups and a somewhat lower level for early-age pensioners, in line with the effects of the pension reforms aimed at delaying the effective retirement age. The different evolution between old-age and total public scheme is partly due the lower number of widow(er)s pensions.

3.3.3 Dependency ratio and old-age dependency ratio

The ageing of the Spanish population in the coming decades becomes apparent observing the projected evolution of dependency and old-age dependency ratios (see table 10). The number of pensioners is expected to increase significantly in the 2019-2070 interval, while the number of workers is projected to remain mostly stable. This leads of a substantial increase of the pension system dependency ratio of more than 30 pp in 50 years. The projected evolution of the old-age dependency ratio and its two components is very similar and thus, the system efficiency is expected to decline only slightly after 2030.

Table 10. System dependency ratio and old-age dependency ratio

	2019	2030	2040	2050	2060	2070	change 2019-2070
Number of pensioners (thousand) (I)	9961	11529	14272	16496	16822	16167	6206
Employment (thousand) (II)	19860	21318	21300	20512	20039	19715	-145
Pension system dependency ratio (SDR) (I)/(II)	50,2	54,1	67,0	80,4	83,9	82,0	31,8
Number of people aged 65+ (thousand) (III)	9194	11729	14499	16131	15722	15066	5873
Working age population 20-64 (thousand) (IV)	28662	28646	26846	24943	24538	24088	-4574
Old-age dependency ratio (OADR) (III)/(IV)	32,1	40,9	54,0	64,7	64,1	62,5	30,5
System efficiency (SDR/OADR)	1,6	1,3	1,2	1,2	1,3	1,3	-0,3

Source: European Commission

The dynamics of the ratio of pensioners to inactive population and to total population show two main features. First, these ratios increase sequentially by as the baby boom cohorts reach each age group. Second, projected increases in participation rates for older workers lead to increases in the pensioners to inactive population ratios for age groups below 65 and decreases in the ratio of pensioners to total population in those same age groups.

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

	2019	2030	2040	2050	2060	2070
Age group -54	6.0	6.3	5.3	5.2	5.4	4.9
Age group 55-59	42.7	62.8	67.8	62.6	66.2	68.7
Age group 60-64	56.5	79.9	97.8	92.5	92.0	94.4
Age group 65-69	86.8	90.1	105.2	110.7	107.6	107.9
Age group 70-74	84.9	87.2	96.2	103.5	102.0	100.5
Age group 75+	93.6	92.2	92.4	98.2	104.9	105.7

Source: European Commission

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

	2019	2030	2040	2050	2060	2070
Age group -54	2.4	2.5	2.1	2.1	2.2	2.0
Age group 55-59	11.0	10.5	10.6	10.4	10.9	11.4
Age group 60-64	29.8	23.6	25.1	24.3	24.5	25.2
Age group 65-69	80.8	63.9	70.2	74.0	71.1	70.3
Age group 70-74	83.4	83.9	90.6	97.1	95.6	94.0
Age group 75+	93.6	92.2	92.4	98.2	104.9	105.7

Source: European Commission

The same dynamics are present when breaking down the figures by gender, although female ratios show stronger trends in the same direction due to the reduction in the participation gap. As a result, one can observe female ratios (tables 12a and 12b)

converge to total ratios for the oldest age groups (65-69, 70-74 and 75+). Decomposing this convergence into the evolution of the pensioners and population ratios (decompositions not shown here), it is apparent that the main driver of female ratios getting closer to total ratios over time (and ever surpassing them, as in the case of the ratio of female pensioners to inactive population for the age group 70-74) is the convergence in participation rates between men and women. An additional factor, although of lesser importance, is that by 2070 the share of women over total population aged 75+ falls slightly, due to the projected convergence in life expectancy between men and women.

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

	2019	2030	2040	2050	2060	2070
Age group -54	5.0	5.5	4.6	4.5	4.7	4.3
Age group 55-59	29.5	45.4	54.1	49.3	52.0	53.8
Age group 60-64	42.8	68.1	92.2	86.5	83.5	85.6
Age group 65-69	72.9	83.9	102.2	110.9	107.1	106.8
Age group 70-74	71.1	80.3	94.4	104.0	102.3	99.8
Age group 75+	87.4	88.0	92.2	101.1	110.2	111.8

Source: European Commission

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

	2019	2030	2040	2050	2060	2070
Age group -54	2.2	2.3	1.9	1.9	2.0	1.9
Age group 55-59	10.0	9.5	9.6	9.2	9.7	10.1
Age group 60-64	25.0	21.6	23.5	22.1	22.1	22.6
Age group 65-69	68.7	61.2	69.4	74.6	71.4	70.3
Age group 70-74	70.4	77.4	88.8	97.4	95.8	93.4
Age group 75+	87.4	88.0	92.2	101.1	110.2	111.8

Source: European Commission

3.3.4 New public pension expenditure decomposition

New public pension expenditure is the product of the average contributory period, average pensionable earnings, the average accrual rate, the number of new pensions and the sustainability factor. This decomposition tries to assess the consistency of the projections and provides additional insights.

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

New old-age earnings-related pensions	2019	2030	2040	2050	2060	2070
Projected new pension expenditure (million EUR)*	3246.1	4937.9	8387.0	9535.6	10522.7	13870.2
I. Number of new pensions (1000)	328.2	435.5	577.1	515.9	447.6	465.4
II. Average contributory period (years)	38.9	39.5	40.2	41.0	41.8	42.6
III. Average accrual rate (%)	2.4	2.1	1.9	1.7	1.6	1.4
IV. Monthly average pensionable earnings (1000 EUR)	1.5	2.0	2.9	4.2	6.0	8.6
V. Sustainability/adjustment factors	1.0	1.0	0.9	0.9	0.9	0.8
VI. Average number of months paid the first year	7.0	7.0	7.0	7.0	7.0	7.0
(Monthly average pensionable earnings) / (monthly economy-wide average wage)	71%	71%	71%	71%	71%	71%

**New pension expenditure equals the product of I, II, III, IV, V & VI*

Source: European Commission

The number of new pensions is determined by the labor force and participation rates provided by the European Commission's services. New pensions reach a peak in the 2040s when the Spanish baby boomers are projected to retire and decrease afterwards in line with the relative cohort size of the following generations.

The average contributory period depends on the dynamics of the labor market and the decision to retire (namely, whether workers decide to retire at the statutory age or before/after that moment). It increases in 3.7 years through the projection horizon as a result of higher participation rates for older workers in line with the delay in the statutory and effective retirement ages. Moreover, it is assumed that the average contributory gap between men and women closes by the end of the projection, and thus the increase in the average contributory period for women is greater. However, the gender pay gap remains stable and is reflected in the average pensionable income, which captures past dynamics in nominal wages. Since the model's methodology doesn't project different wage growth rates by gender, the gender wage gap in the baseline year remains the same through the projection.

Individual accrual rates applied on pensionable income depends on the number of years of contributions of each worker, as explained in Section 1.1.3. The average accrual rate falls during the projection horizon and shows the interplay between the average growth of new pensions and the changes in contributory periods, pensionable income and the sustainability factor. This is consistent with the falling benefit ratio discussed in Section 3.3.2. More precisely, the extension of contributory periods and the sustainability factor explain the decrease in the implicit average accrual rate. Even if legal accrual rates are the same for men and women, the average accrual rate fall is greater for women as a result of the convergence in contributory periods between men and women, the fixed wage gender gap and the common sustainability factor.

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

New old-age earnings-related pensions	2019	2030	2040	2050	2060	2070
Projected new pension expenditure (million EUR)*	2055.6	2867.9	4813.2	5411.7	5884.9	7708.0
I. Number of new pensions (1000)	191.5	227.9	292.6	251.7	217.8	228.7
II. Average contributory period (years)	40.3	40.8	41.3	41.7	42.2	42.6
III. Average accrual rate (%)	2.2	2.0	1.9	1.8	1.6	1.4
IV. Monthly average pensionable earnings (1000 EUR)	1.7	2.3	3.2	4.7	6.8	9.6
V. Sustainability/adjustment factors	1.0	1.0	0.9	0.9	0.9	0.8
VI. Average number of months paid the first year	7.0	7.0	7.0	7.0	7.0	7.0
(Monthly average pensionable earnings) / (monthly economy-wide average wage)	80%	80%	80%	80%	80%	80%

**New pension expenditure equals the product of I, II, III, IV, V & VI*

Source: European Commission

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

New old-age earnings-related pensions	2019	2030	2040	2050	2060	2070
Projected new pension expenditure (million EUR)*	1190.5	2070.0	3573.8	4123.9	4637.8	6162.2
I. Number of new pensions (1000)	136.7	207.6	284.5	264.2	229.8	236.7
II. Average contributory period (years)	36.9	38.1	39.2	40.3	41.5	42.6
III. Average accrual rate (%)	2.7	2.3	2.1	1.8	1.6	1.5
IV. Monthly average pensionable earnings (1000 EUR)	1.3	1.7	2.4	3.5	5.0	7.1
V. Sustainability/adjustment factors	1.0	1.0	0.9	0.9	0.9	0.8
VI. Average number of months paid the first year	7.0	7.0	7.0	7.0	7.0	7.0
(Monthly average pensionable earnings) / (monthly economy-wide average wage)	59%	59%	59%	59%	59%	59%

**New pension expenditure equals the product of I, II, III, IV, V & VI*

Source: European Commission

3.4 Financing of the pension system

Funding of the public pension system comes from three sources. First, the contributions of both employers and employees to the general, Social Security regime. Second, the contributions from civil servants, security forces and the public sector to the Clases Pasivas special scheme. Finally, non-earnings related pensions, the top-up of minimum pensions and any transitory financial imbalance that may arise are covered through direct transfers from the Central Government's budget.

Table 14 shows the main features of contributions both to the general, Social Security regime and to the *Clases Pasivas* special scheme in 2019. The second column shows contribution rates, maximum and minimum contributory bases for the general, Social Security system that covers most workers. The third column shows the contribution rules in the special scheme for the self-employed. Contribution rules for Clases Pasivas are slightly different, as the State plays the role of the employer and the system manager. In practice, employees' contribution rate is 3.9% and the Public Sector makes transfers for an amount equal to the remaining balance so that the system is balanced on an annual basis.

Table 14. Financing of the public pension system

	Public employees	Private employees	Self-employed
Contribution base			
Contribution rate/contribution		28.30%	28.30%
Employer		23.6%	
Employee		4.7%	28,3%
*State**			
*Other revenues**			
Maximum contribution		4070.1 €/month	4070.1 €/month
Minimum contribution		1050 €/month	944,40 €/month

*only legislated contributions are reported

Source: European Commission and Spanish General Directorate for Macroeconomic Analysis

Table 15 shows the projected revenue of the system during the projection horizon. Contributions are projected as a fixed proportion (11.8%) of GDP through the projection horizon. This methodological choice is based on the long projection horizon. Nevertheless, contributions are sensitive to the business cycle, the performance of the labor market and policy choices (such as contribution rebates aimed at fostering employment of certain groups).

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)	11.8	11.8	11.8	11.8	11.8	11.8	0.0
Employer contributions	*8.3*	*8.3*	*8.4*	*8.5*	*8.8*	*9.0*	*0.7*
Employee contributions	*1.7*	*1.6*	*1.7*	*1.7*	*1.8*	*1.8*	*0.1*
*State contribution**	*1.7*	*1.8*	*1.7*	*1.5*	*1.2*	*0.9*	*-0.8*
*Other revenues**	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.0*
Number of contributors (I) (1000)	23124	24741	23726	22047	21497	21146	-1978
Employment (II) (1000)	19860	21318	21300	20512	20039	19715	-145
(I) / (II)	1.2	1.2	1.1	1.1	1.1	1.1	-0.1

*only legislated contributions are reported

Source: European Commission

In the AR18 contributions from the general Social Security system were calculated as a constant share of GDP. Yet, total public pension contributions were not constant as a share of GDP as *Clases Pasivas* was projected to phase out and so did revenues linked to this special scheme.

In the AR21 it is assumed that total public pension contributions are a fixed share of GDP. The reason for this is that even if *Clases Pasivas* is still projected to phase out, its revenues are not, although they are relabelled. As discussed in Section 1.1, the phasing out of *Clases Pasivas* means that new civil servants joining the Civil Service from 2011 onwards are included in the general Social Security System. Therefore, by fixing total public pension contributions as a share of GDP, contributions of new civil servants from *Clases Pasivas* are relabelled as revenues of the general Social Security system automatically as *Clases Pasivas* phases out. In terms of table 15, this means that the progressive fall in State contributions is compensated by an increase in employers' and employees' contributions. State contributions do not fall to zero even if Clases Pasivas phases out because it also includes the funding of non-earnings

related pensions, the top-up of minimum pensions and additional transfers to the Social Security system's budget to fund financial imbalances.

3.5 Sensitivity analysis

The results of the baseline scenario rely on a set of demographic, macroeconomic and policy assumptions. Changes in those assumptions lead to different results. To test the sensitivity of the baseline scenario to changes in its assumptions, a number of alternative scenarios where projected. These alternative scenarios can be grouped into four blocks:

- **Demographic scenarios:** 2 years increase in life expectancy at birth, 33% increase / decrease in net migration throughout the projection horizon and 20% decrease in the fertility rate.
- **Macroeconomic scenarios**: TFP convergence to an annual growth rate of 1.2% / 0.8% and 10 pp increase in the participation rates of workers aged 54 and older.
- **Policy scenarios:** change of the statutory retirement age according to the evolution of life expectancy, fixed statutory retirement age throughout the projection horizon at the base year level and limit to the fall in the benefit ratio of the system to 90% of the level in the base year.
- **Covid-19 scenarios:** transitory and permanent macroeconomic shocks due to Covid-19.

Table 17 summarizes the results for both public pension expenditure and total pension expenditure (public and private).

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

Public pension expenditure	2019	2030	2040	2050	2060	2070	change 2019-2070 (pps)
Baseline (% GDP)	12.3	12.3	12.8	13.0	11.7	10.3	-2.1
Higher life expectancy at birth (+2y)	0.0	0.0	0.1	0.0	0.1	0.1	0.1
Higher migration (+33%)	0.0	-0.2	-0.4	-0.7	-0.7	-0.5	-0.5
Lower migration (-33%)	0.0	0.2	0.4	0.8	0.8	0.7	0.7
Lower fertility (-20%)	0.0	0.0	0.0	0.4	0.7	1.0	1.0
Higher employment rate of older workers (+10 pps.)	0.0	-1.4	-2.6	-2.7	-2.0	-1.4	-1.4
Higher TFP growth (convergence to 1.2%)	0.0	-0.1	-0.4	-0.6	-0.8	-0.9	-0.9
TFP risk scenario (convergence to 0.8%)	0.0	0.0	0.2	0.5	0.7	0.9	0.9
Policy scenario: linking retirement age to change in life expectancy	0.0	-0.4	-0.8	-1.1	-1.1	-1.1	-1.1
Policy scenario: unchanged retirement age	0.0	2.3	3.2	2.5	1.8	1.5	1.5
Policy scenario: offset declining pension benefit ratio	0.0	0.1	2.5	5.4	7.3	8.3	8.3
Lagged recovery scenario	0.0	0.1	0.0	-0.1	-0.1	-0.1	-0.1
Adverse structural scenario	0.0	0.4	0.7	0.8	1.1	1.4	1.4

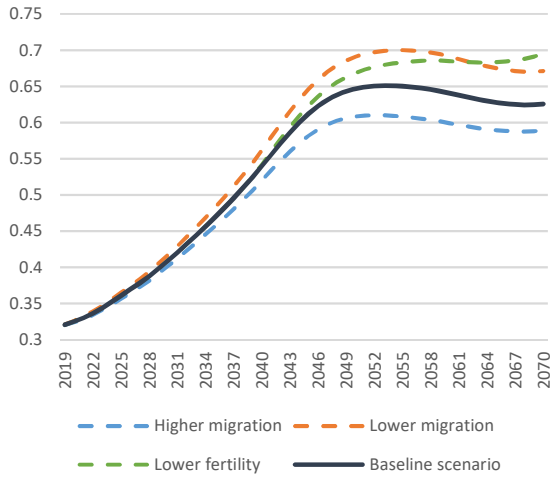
Total pension expenditure	2019	2030	2040	2050	2060	2070	change 2019-2070 (pps)
Baseline (% GDP)	12.9	13.1	13.7	13.9	12.5	11.0	-1.9
Higher life expectancy at birth (+2y)	0.0	0.0	0.1	0.0	0.1	0.1	0.1
Higher migration (+33%)	0.0	-0.2	-0.4	-0.7	-0.7	-0.6	-0.6
Lower migration (-33%)	0.0	0.2	0.5	0.8	0.9	0.7	0.7
Lower fertility (-20%)	0.0	0.0	0.0	0.4	0.7	1.1	1.1
Higher employment rate of older workers (+10 pps.)	0.0	-1.4	-2.6	-2.7	-2.1	-1.4	-1.4
Higher TFP growth (convergence to 1.2%)	0.0	-0.1	-0.4	-0.7	-0.9	-1.0	-1.0
TFP risk scenario (convergence to 0.8%)	0.0	0.0	0.2	0.5	0.8	1.0	1.0
Policy scenario: linking retirement age to change in life expectancy	0.0	-0.4	-0.8	-1.1	-1.1	-1.1	-1.1
Policy scenario: unchanged retirement age	0.0	2.3	3.2	2.5	1.8	1.5	1.5
Policy scenario: offset declining pension benefit ratio	0.0	0.1	2.5	5.4	7.3	8.3	8.3
Lagged recovery scenario	0.0	0.1	0.0	-0.1	-0.1	-0.1	-0.1
Adverse structural scenario	0.0	0.4	0.7	0.9	1.2	1.5	1.5

Source: European Commission

3.5.1 Demographic scenarios

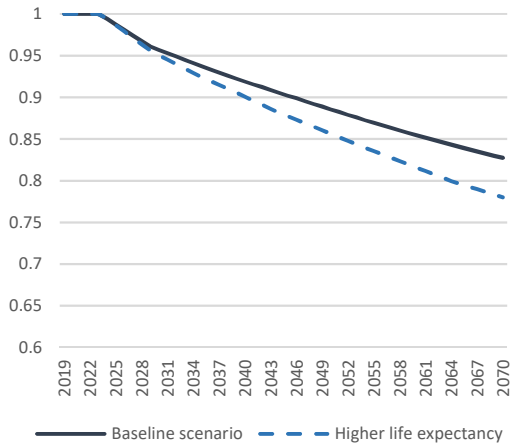
Changes in demographic assumptions are best observed in the old-age dependency ratio, although variations in the labor supply also have effects on GDP growth. The two net migration scenarios show the same effect although with opposite sign. An increase in net migration improves the old-age dependency ratio, resulting in a 0.5 pp drop in expenditure by 2070. In the case of lower net migration, the old-age dependency ratio further increases compared with the baseline scenario adding an extra 0.66 pp to expenditure by 2070. The lower fertility scenario takes more time to diverge from the baseline scenario and looks very similar to the lower net migration scenario until 2060. From that point on, the accumulated drop in fertility becomes apparent and the labor force shrinks compared with both the baseline scenario and the lower migration scenario (in this latter case, given that migrant workers eventually retire as well), resulting in a further increase of the old-age dependency ratio.

Figure 9. Old-age dependency ratio under different scenarios



Source: Spanish General Directorate for Macroeconomic Analysis

Figure 10. Sustainability Factor under different scenarios



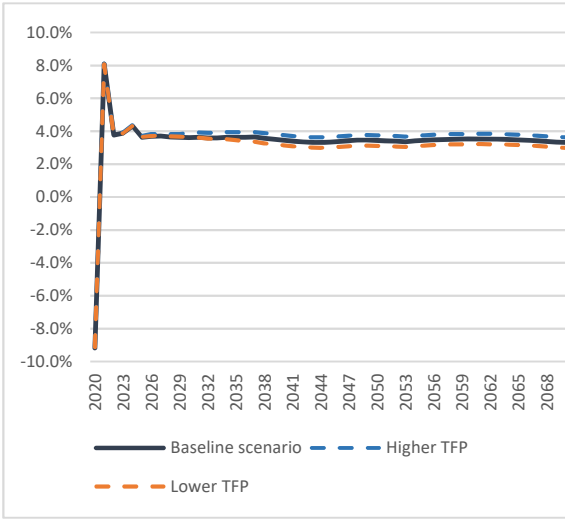
Source: Spanish General Directorate for Macroeconomic Analysis

The last demographic scenario is an additional increase of two years in life expectancy at birth. This development barely affects pension expenditure thanks to the functioning of the sustainability factor, as it cushions life expectancy gains lowering the initial pension of cohorts that will benefit from it.

3.5.2 Macroeconomic scenarios

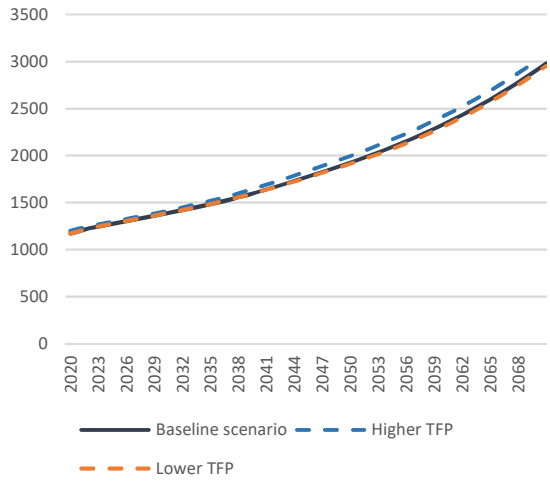
The two TFP scenarios show impacts of the same magnitude and opposite sign that work through two main channels. On the one hand, a higher (lower) PTF results in higher (lower) GDP growth that lowers (increases) pension expenditure as a share of GDP. On the other hand, higher (lower) TFP leads to higher (lower) wages and average pensions that increase (decrease) pension expenditure. In the projections, the former effect is greater than the latter, resulting in a 0.9 pp increase in expenditure as a share of DGP by 2070 when TFP grows more slowly. Likewise, faster TFP growth reduces public pension expenditure as a share of GDP in 0.95 pp by 2070.

Figure 11. Annual nominal GDP growth rate (%) under different scenarios



Source: Spanish General Directorate for Macroeconomic Analysis

Figure 12. Annual growth rate of the average retirement pension (%) under different scenarios



Source: Spanish General Directorate for Macroeconomic Analysis

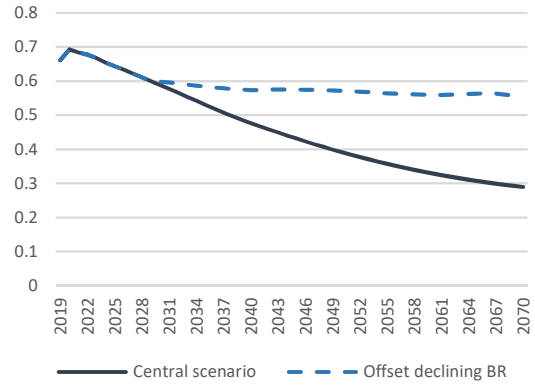
In the scenario where participation rates of workers aged 54 and above are increased, the numerator (expenditure) and denominator (GDP) effects work in the same direction, amplifying the impact on expenditure. First, higher participation rates of older workers mean that the effective retirement age is delayed, improving the ratio of pensioners over workers and reducing the average share of life spent in retirement. Second, higher participation rates leads to more economic activity and economic growth. Both effects lead to lower pension expenditure. The impact is greatest around 2050 (-2.7 pp) and shrinks afterwards, although it remains sizeable (-1.4 pp in 2070).

3.5.3 Policy scenarios

The scenarios where the statutory retirement age either stays fixed at its 2019 level or varies with life expectancy test how pension expenditure would change if statutory and effective retirement ages were to change. In the first case, fixing the statutory retirement age at the 2019 level (65 years and 8 months) for the whole projection horizon increases expenditure by 2.5 pp by 2050, compared to the baseline scenario, as the labor force would be lower (leading to less economic growth) and nominal pension expenditure would be higher due to longer average spells in retirement. In the second case, the effects are the opposite and pension expenditure decreases 1.1 pp in 2070.

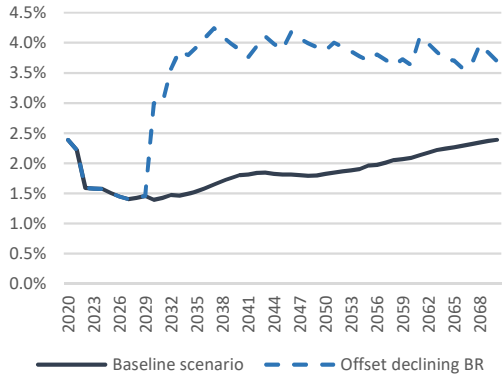
The last policy scenario explores what would happen if a floor was set on the benefit ratio (the ratio between the average pension and the average wage in the economy) such that it couldn't go below 90% of its initial level. In this scenario, this is done by building an alternative index for pre-existing pensions that guarantees that the annual benefit ratio hovers around 90% of the 2019 level. This implies that the average pension in this alternative scenario grows significantly faster than in the baseline scenario. The result is an increase in pension expenditure of 8.5pp by 2070.

Figure 13. Benefit ratio under different scenarios



Source: Spanish General Directorate for Macroeconomic Analysis

Figure 14. Annual growth rate of the average retirement pension (%) under different scenarios

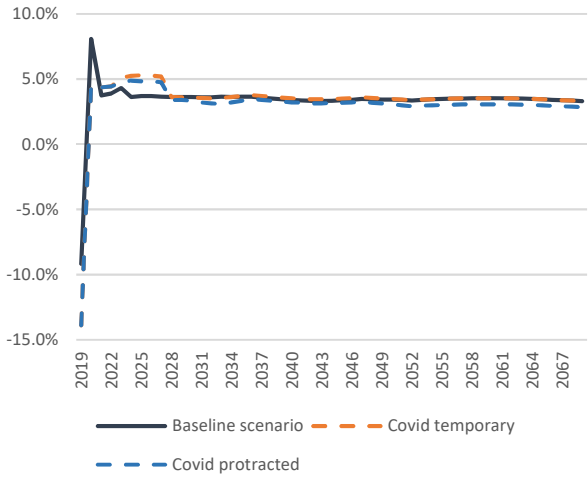


Source: Spanish General Directorate for Macroeconomic Analysis

3.5.4 Covid-19 scenarios

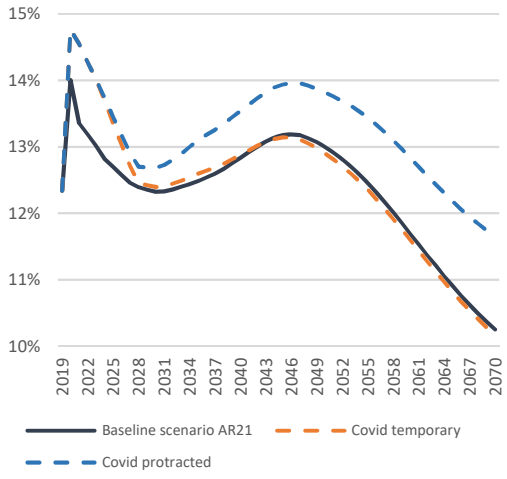
The baseline scenario already factors in the impact of the Covid-19 pandemic, as already discussed. These two alternative scenarios explore the implications for pension expenditure of different macroeconomic trajectories derived from the pandemic. In the transitory shock scenario the adverse macroeconomic outcomes of the pandemic are relatively contained. This means that the negative short-term effect on expenditure is greater than in the baseline scenario but in the long term pension expenditure reverts to the central path. In fact, in 2070 expenditure in public pensions as a share of GDP is slightly lower than in the baseline scenario (-0.1 pp) as a result of a projected nominal GDP that is marginally higher. However, when considering a protracted economic crisis with lasting macroeconomic effects on structural unemployment and productivity, the dynamics of pension expenditure look grimmer. In this case, the model projects a 1.4 pp increase in pension expenditure by 2070.

Figure 15. Annual nominal GDP growth rate (%) under different scenarios



Source: Spanish General Directorate for Macroeconomic Analysis

Figure 16. Total expenditure in public pensions as a share of GDP



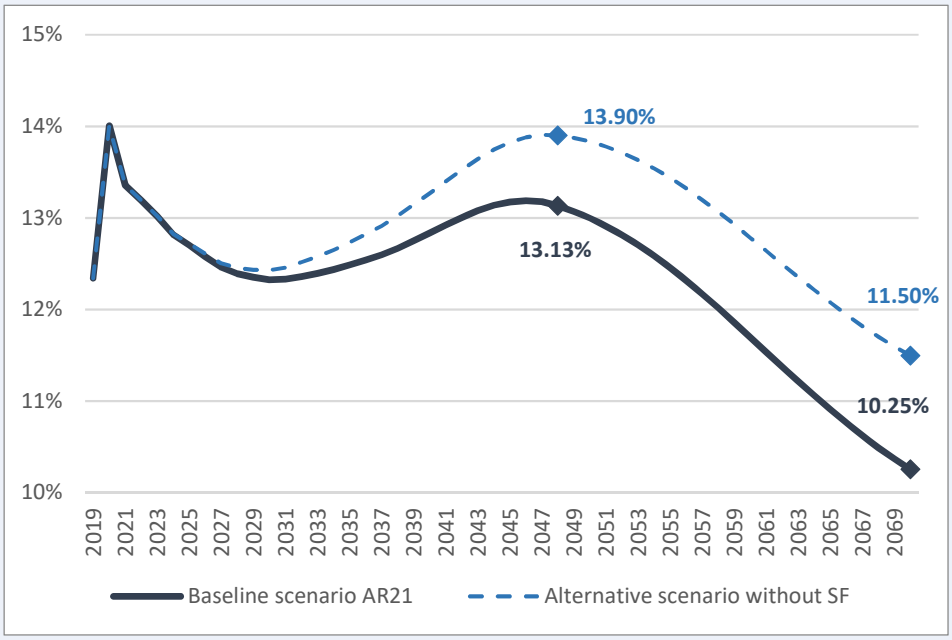
Source: Spanish General Directorate for Macroeconomic Analysis

Private pension projections are less sensitive than public pension projections to the various changes in the alternative scenarios. Within that range, the scenarios where private expenditure increases the most are the ones associated with higher life expectancy, higher migration and higher TFP. In the first case, this is the result of an increase in the number of years pensioners receive an annuity from their plans; in the second case, the increase in expenditure is driven by the higher number of contributors and the greater number of contributions to the schemes. In the latter case, the impact comes from increased contributions, that grow with nominal GDP. On the other hand, the scenarios that result in lower private pension expenditure are lower migration (given the fewer contributors and hence the lower volume of contributions) and the permanent COVID-19 shock, that would affect productivity and impaired nominal GDP growth and thus, the volume of contributions.

Box 3.6.4.C Alternative scenario without Sustainability Factor

In the Spanish case, an additional alternative scenario has been modelled where the Sustainability Factor is never applied (note that in the baseline scenario the SF is applied starting in 2023). This leads to higher, new old-age pensions throughout the projection horizon (as they cease to be adjusted for the gains in life expectancy at 67 years of age) and greater aggregate expenditure in public pensions (0.8 pp in 2050, 1.4 pp in 2070).

Figure 3.6.4.C.1 Total public expenditure in pensions as a share of GDP under different scenarios



Source: Spanish General Directorate for Macroeconomic Analysis

The two main drivers of the increase in expenditure compared with the baseline scenario is the lower reduction in both the benefit ratio and the gross average replacement rate (see figures 3.6.4.C 2 and 3). The sustainability factor applies a discount on new pensions. Hence, given that this correction is not applied, the replacement ratio falls less compared with the baseline scenario in 2070 (-27 pp vs. -36 pp). A milder drop in the benefit ratio is also observed, although the difference with the baseline scenario is smaller than in the alternative scenario with CPI indexation, as the IRP is still applied.

Figure 3.6.4.C.2 Benefit ratio for old-age earnings-related pensions under different scenarios

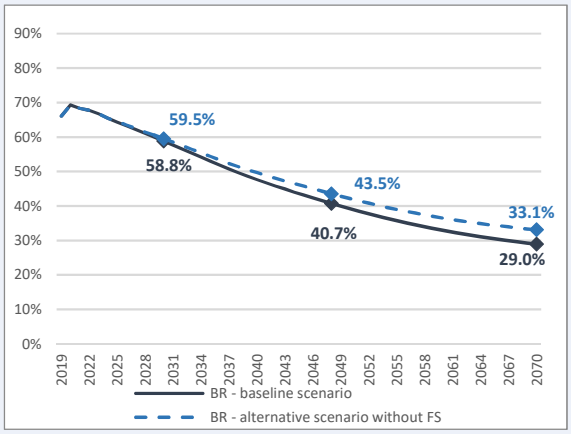
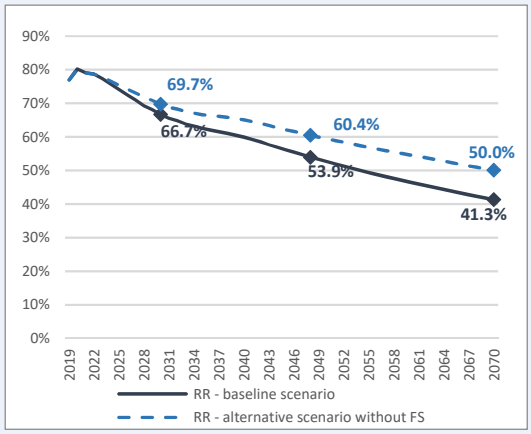


Figure 3.6.4.C.3 Gross average replacement ratio for old-age earnings-related pensions under different scenarios



Source: Spanish General Directorate for Macroeconomic Analysis

3.5.5 Additional scenarios for Spain

Given the legislative changes affecting the IRP and the Sustainability Factor, two additional alternative scenarios have been calculated. The first one explores a baseline scenario where the IRP is replaced with a CPI indexing rule and was presented in Box 3.2.B. The second one examines what would happen in the baseline scenario if the sustainability factor were never to be implemented and was presented in Box 3.6.4.C. Table 17.b summarizes the impact of both alternative scenarios with respect to the central projection.

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

Public pension expenditure	2019	2030	2040	2050	2060	2070	change 2019-2070
Baseline (% GDP)	12.3	12.3	12.8	13.0	11.7	10.3	-2.1
Baseline - CPI Indexation Rule	0.0	1.4	2.3	2.7	2.7	2.4	2.4
Baseline - Suspension of Sustainability Factor	0.0	0.1	0.4	0.8	1.1	1.2	1.2

Source: Spanish General Directorate for Macroeconomic Analysis

The impact of eliminating the IRP is 2.7 pp at the peak, since the annual indexation of pensions would be significantly higher (average CPI of 2% vs an estimated value of the IRP up to 2050 of 0.25%). Since the IRP is designed to capture the sustainability trend of the system as a whole, if additional reforms were implemented to guarantee the financial sustainability of the system, the projected impact of the IRP would be lower, as the index would take on greater values.

The impact of never implementing the Sustainability Factor would gradually unfold along with changes in life expectancy at 67. Therefore, the maximum impact is reached at the end of the projection horizon and it is estimated at 1.2 pp. Moreover, while the IRP is

applied to all pre-existing pensions, the scope of the sustainability factor is narrower, since it is only applied to new old-age pensions.

The impact of these two alternative scenarios can also be observed when decomposing the change in public pension expenditure. In the case of the alternative CPI indexing rule, the benefit ratio falls less while the gross average replacement rate remains the same, since new pensions' calculation is not affected by indexing rules (see Box 3.2.B). In the case of the alternative scenario without the Sustainability Factor, the main impact is on the gross average replacement rate with a smaller impact on the benefit ratio (see Box 3.6.4.C). In both cases, the ratios fall less compared with the baseline scenario.

3.6 Description of the changes in comparison with the 2006, 2009, 2012, 2015 and 2018 projections

The central projections of this edition of the Ageing Report present the same qualitative results as the previous 2018 and 2015 editions, although with some differences. The broad picture is similar: the ratio of public pensions to GDP is expected to fall by 2070 compared to the baseline year and the two main opposite forces at play are the ageing of the population captured by the dependency ratio and the reduction in the benefit ratio as a result of the reforms of the system.

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

	Public pension expenditure	*Dependency ratio effect*	*Coverage ratio effect*	*Benefit ratio effect*	*Labour market effect*	*Residual (incl. interaction effect)*
2006 Ageing Report (2004-2050)	**7,0**	*12,4*	*-2,3*	*-0,8*	*-1,8*	*-0,5*
2009 Ageing Report (2007-2060)	**6,7**	*10,7*	*-0,9*	*-1,7*	*-0,9*	*-0,5*
2012 Ageing Report (2010-2060)	**-0,4**	*8,9*	*-1,2*	*-4,8*	*-2,1*	*-1,2*
2015 Ageing Report (2013-2060)	**-0,8**	*8,9*	*-0,6*	*-4,4*	*-3,8*	*-0,9*
2018 Ageing Report (2016-2070)	**-1,5**	*7,6*	*-0,4*	*-4,9*	*-2,8*	*-0,9*
2021 Ageing Report (2019-2070)	**-2,1**	*9,2*	*-0,1*	*-8,3*	*-2,1*	*-0,8*

- 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.

Source: European Commission

In this edition of the Ageing Report the pension expenditure ratio is expected to fall more in 2070 (compared with the baseline year) than in previous editions and this comes despite of a less favourable evolution of the dependency ratio compared with the 2018 edition. As already discussed, the demographic scenario for Spain has changed in the new projections, with a significantly lower fertility rate that yields a higher old-age dependency ratio after 2050 than in the 2018 edition. On the other hand, the drop in the benefit ratio is substantially higher. This is due to methodological improvements in the model (related to the modeling of the share of new pensions capped at the maximum threshold) and the different IRP projection, which remains at its floor for longer than in the 2018 edition. The labor and coverage effects are of lesser quantitative importance and change less compared with the previous round of projections.

Table 19a compares the projected expenditure in public pensions in the AR18 and the observed expenditure between 2016 and 2019. Table 19b highlights the main differences in the indexation rules between the AR18 assumptions and what was observed. In the AR18 the assumed indexation rule for pre-existing pensions was the IRP, whose value remained at its floor level of 0.25%. However, as already discussed, the IRP was suspended and replaced by a CPI indexation rule, that help explain the underestimation of public expenditure in the AR18. The update of the cap and floor on new pensions was assumed to follow CPI and nominal wages respectively. In practice, maximum pensions grew below the assumed rates between 2016-19 and minimum pensions grew in line with the assumption in 2018 and 2019.

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

	2016	2017	2018	2019
Ageing Report 2018 projections	12.2	12.1	12.0	12.1
Assumptions (pps of GDP)				
Coverage of projections (pps of GDP)				
Constant policy impact (pps of GDP)				
Policy-related impact (pps of GDP)				
Actual public pension expenditure	12.6	12.4	12.6	12.3

Source: Spanish General Directorate for Macroeconomic Analysis

Table 19b. Indexation values (%) assumed in the AR2018 and effectively observed

	Assumed in the AR18				Observed			
	2016	2017	2018	2019	2016	2017	2018	2019
Indexation of pre-existing pensions	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	1.70%	1.60%
Growth of the cap on new pensions (maximum pensions)	1.30%	2.07%	2.38%	2.59%	0.25%	0.25%	1.70%	1.60%
Growth of the floor on new pensions (minimum pensions)	2.05%	2.80%	3.20%	3.57%	0.25%	0.25%	3.10%	3.00%
Sustainability Factor	100%	100%	100%	99.20%	100%	100%	100%	100%

Source: Spanish General Directorate for Macroeconomic Analysis

Table 19c breaks down the difference between the AR18 and the AR21 projections into different components. First, changes in assumptions refer to the impact of changing the demographic and macroeconomic scenario. The macroeconomic and demographic assumptions of the AR21 reduce expenditure with respect to the AR18 up to 2050 and add expenditure in the last two decades of the projections. This is consistent with the differences in the old-age dependency ratio between the two exercises (lower in the AR21 until 2050 and higher thereafter). In this category is also included the fact that the projected values the IRP takes on during the 2060s have changed from the AR18 to the AR21. More precisely, in the AR21 the IRP remains at its floor level during the 2060s whereas it goes up to its ceiling in the AR18. This is due to the different dynamic of the system, reducing expenditure in the last decade of the projection.

Second, the coverage of the model remains the same as in the AR18. Yet, several methodological improvements are taken into account. First, the internal consistency of the model has been improved. In the AR18 the proportion of new old-age pensions that were capped at the maximum pension remained constant through the projection. In the AR21 this proportion changes with the dynamics of wages and the indexation of the cap and renders a more consistent evolution new old-age pensions (minimum pensions,

maximum pensions and new old-age pensions whose value is between the floor and the cap). More precisely, while the maximum contributory base is updated with nominal wage growth, the maximum pension increases with CPI. Since pensionable income (which is an average of past wages –i.e. contributory bases-) grows faster than the maximum pension, the number of new pensions that are capped increases. Second, the model uses lower effective retirement ages that are more in line with the observed data. This increases expenditure with respect to the AR18. Finally, this edition's model adds some additional changes, including widow(er)s' pension projections being modelled and linked more closely to marriage and age patterns, that are included in the 'Other changes' category in the table.

The interpretation of constant policy has changed in the AR21 with respect to minimum pensions. In the AR18 the minimum earnings-related pension (i.e. the minimum pension) grew with nominal wages. In the AR21 the minimum pension grows with the CPI until 2049 and with nominal wages from 2050 onwards (for further details, see Section 1.3). This results in lower expenditure, as some initial, earnings-related pensions that laid below the minimum pension and were previously topped-up are now above the minimum pension threshold. Finally, the policy-related changes component captures several changes in indexation rules. First, the fact that the indexation rules for 2020 and 2021 are already known is taken into account. Secondly, in the AR18 the sustainability factor was applied starting in 2019 while in the AR21, following the legal delay of its application, the sustainability factor is applied starting in 2023.

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

	2019	2030	2040	2050	2060	2070
AR18	**12.1**	**12.6**	**13.9**	**13.9**	**11.4**	**10.7**
Change in assumptions	**-0.2**	**-0.6**	**-1.3**	**-0.9**	**0.5**	**0.4**
Of which change in the value of the IRP in the 2060s	0.0	0.0	0.0	0.0	0.0	-1.0
Improvement in the coverage or in the modelling	**0.4**	**0.3**	**0.1**	**0.2**	**0.1**	**-0.6**
Improvement in the internal consistency of the model (growing share of max pensions/total new pensions over time)	0.0	-0.1	-0.4	-0.6	-0.7	-1.0
Changes in the effective retirement age	0.0	0.4	0.8	1.1	1.1	1.0
Other changes	0.4	0.0	-0.3	-0.3	-0.3	-0.6
Change in the interpretation of constant policy	**0.0**	**0.0**	**-0.2**	**-0.4**	**-0.5**	**-0.5**
Policy related changes	**0.0**	**0.2**	**0.2**	**0.3**	**0.3**	**0.3**
Observed CPI indexation rule for 2020 and 2021	0.0	0.1	0.1	0.1	0.1	0.1
Delay in the application of the SF	0.0	0.1	0.2	0.2	0.2	0.2
AR 21	**12.3**	**12.3**	**12.8**	**13.0**	**11.7**	**10.3**

The sum of the changes may not add up to the difference between the AR18 and the AR21 due to a rounding error.

Source: Spanish General Directorate for Macroeconomic Analysis

Table 19c has also been recalculated for the alternative scenario where pre-existing pensions are indexed to CPI instead of IRP (see Box 3.2.B). The only change between tables 16b and 19c is the greater magnitude of the policy related changes that now includes the impact of the different indexation rule.

Table 19d. Breakdown of the difference between the 2018 projection and the alternative scenario with CPI indexation (% of GDP)

	2019	2030	2040	2050	2060	2070
AR18	**12.1**	**12.6**	**13.9**	**13.9**	**11.4**	**10.7**
Change in assumptions	**-0.2**	**-0.6**	**-1.3**	**-0.9**	**0.5**	**0.4**
Of which change in the value of the IRP in the 2060s	0.0	0.0	0.0	0.0	0.0	-1.0
Improvement in the coverage or in the modelling	**0.4**	**0.3**	**0.1**	**0.2**	**0.1**	**-0.6**
Improvement in the internal consistency of the model (growing share of max pensions/total new pensions over time)	0.0	-0.1	-0.4	-0.6	-0.7	-1.0
Changes in the effective retirement age	0.0	0.4	0.8	1.1	1.1	1.0
Other changes	0.4	0.0	-0.3	-0.3	-0.3	-0.6
Change in the interpretation of constant policy	**0.0**	**0.0**	**-0.2**	**-0.4**	**-0.5**	**-0.5**
Policy related changes	**0.0**	**1.6**	**2.4**	**3.0**	**3.0**	**2.7**
Observed CPI indexation rule for 2020 and 2021	0.0	0.1	0.1	0.1	0.1	0.1
Delay in the application of the SF	0.0	0.1	0.2	0.2	0.2	0.2
Replacement of IRP with CPI	0.0	1.4	2.2	2.7	2.7	2.4
AR21 with CPI indexation rule	**12.3**	**13.7**	**15.1**	**15.7**	**14.4**	**12.7**

The sum of the changes may not add up to the difference between the AR18 and the AR21 due to a rounding error.

Source: Spanish General Directorate for Macroeconomic Analysis

4 Description of the pension projection model and its base data

The projection model used in this edition of the Ageing Report was developed by the Ministry of Economic Affairs and Digital Transformation and has been used in previous editions as well. This part of the country fiche describes its main features.

4.1 Institutional context in which the projections are made

The projections of this country fiche have been elaborated by the General Directorate for Macroeconomic Analysis of the Ministry of Economic Affairs and Digital Transformation. Prior to their submission to the Ageing Working Group, the projections were shared and discussed with the Ministry of Social Security and Inclusion and the Ministry of Finance. Most feedback from these institutions has been incorporated into the fiche.

According to the Law 23/2013, the Ministry of Social Security and Inclusion is responsible for the calculation of the IPR. This Ministry shall publish annually the values of the variables used in the computation of the IPR. Therefore, the IPR calculation made in this fiche does not necessarily coincide with the calculation made by the Ministry of Social Security and Inclusion.

4.2 Data used to run the model

The macroeconomic and demographic variables used in the projections are exogenous as agreed by the Ageing Working Group (AWG) and were made available by Eurostat and the European Commission.

Most data used to run the pension model were provided in 2020 by the Ministry of Social Security and Inclusion and the Ministry for the Civil Service (for civil servants and private pensions) and refer to the base year 2019 and historical data. All data are categorized by type of pensions (old-age and early retirement, disability and survivors), by sex and age (as of December 31st of each year) and include details on the number of new registrations and their average pension, number of withdrawal and their average pension, number of existing pensions and their average.

The projection method of the new registrations for each period and their corresponding pension benefit follow the rules of each pension type. The number of new pensions is linked to the participation rates and exit rates provided by the commonly agreed scenario.

The relevant historical data are also taken from an individual data set published by the Social Security, the MCVL[9]. This data set was used to analyse the impact of the reform on pension benefits.

Finally, the projection of pensioners leaving the system is obtained taking into account the possible causes of withdrawal from the system. Given that the main cause is mortality, the general projection applies age and gender specific mortality rates given by Eurostat's population projections.

4.3 Reforms incorporated in the model

As discussed in the sections above, similarly to the Ageing Report (AR) 2018, the model includes the gradual unfolding of the pension reforms of 2011 and 2013. Namely, the gradual delay of the statutory retirement age to 67 years of age by 2027, the gradual

[9] Muestra Continua de Vidas Laborales.

increase in the number of years of workers' contribution profile to 25 by 2022 used to calculate de computed pensionable income and the delay in the application of the sustainability factor to 2023, as opposed to an application starting in 2019, modelled in the AR 2018. Given the constant legislation assumption of the AWG methodology, the IRP is used in the baseline scenario although it has been suspended since 2018 and it is very likely that it will be permanently removed from the Spanish legislation in the short run. Nevertheless, an alternative scenario was calculated where a CPI indexing rule is used instead (see Box 3.2.B and section 3.5.6).

4.4 General description of the model(s)

The projections model of pensions are composed by four independent and deterministic modules:

- Module 1. A model for projecting Social Security pensions (for private sector employees, self-employed, unemployed and the public sector employees of the central, regional and local administrations). It includes old age and early retirement public pension expenditure, disability public pension expenditure and survivors' public pension expenditure (widowhood, orphanage, relatives).
- Module 2. A model for projecting public pension expenditure for public sector employees of the central administration, administered by the State (civil servants), including old age and early retirement pensions, disability pensions, survivors' pensions and war pensions.
- Module 3. A model for projecting non-earnings related minimum pensions. This model is connected with the results of the two previous models.
- Module 4. A model for projecting private pensions (occupational and individual voluntary schemes). This model is elaborated by the General Directorate of Insurance and Pension Funds.

4.4.1 Social Security module

The model simulates the net number of public earnings-related pensions of each category every year, their average pension benefit, and the total pension expenditure per year. The basic formula [1] is decomposed by class of pension (k), sex (s), age (e) and year (t). The types of pension are five: Retirement, Disability, Widowhood, Orphanage and other relatives. Expenditure is the sum of the product of the total number of pensions of each kind ($TP_{k,s,e,t}$) and their average Total pension Benefit ($TB_{k,s,e,t}$). The ratio to GDP is calculated by dividing expenditure over GDP:

$$\frac{PensionExpenditure_t}{GDP_t} = \frac{\sum_{k=1}^{5}\sum_{s=1}^{2}\sum_{e=0}^{100} TP_{k,s,e,t}\ TB_{k,s,e,t}}{GDP_t} \qquad [1]$$

The projection of demographic variables:

The number of pensions (TP) at 31 December each year, per year of age, is calculated adding to the existing number at 31 December of the previous year and one year of age younger the new entrants (NP) and subtracting people withdrawn from the system (WP) of the same age and year (mortality affects existing pensions and new pensions). The starting point is the registered pensions of the Social Security.

$$TP_{k,s,e,t} = TP_{k,s,e-1,t-1} + NP_{k,s,e,t} - WP_{k,s,e,t} \quad [2]$$

The projection of quantitative variables [simplified by expression 3 that follows] considers these inter-related components:

- The average pension benefit of new registrations (NB): this is the core of the projection and considers the rules of each type of pension as well as minimum (initially indexed to inflation and later indexed to productivity (prod) and inflation (inf)), maximum (indexed to inflation), within thresholds (indexed to productivity and inflation), SOVI pensions and others.
- The average pension benefit of people withdrawing from the system (WB) is a weighted average of the existing pensions indexed to the IPR and new entrant's pensions.
- The average total pension benefit (TB) is calculated as a weighted average of existing pensions indexed to the IPR, new pensions and deducting withdrawals of the year.

$$NB_{s,e,t} = NB_{s,e,t-1} * (1 + prod_t + inf_t)$$
$$WB_{s,e,t} = \frac{(TP_{s,e-1,t-1} * TB_{s,e-1,t-1} * (1 + IPR_t) + NP_{s,e,t} * NB_{s,e,t})}{TP_{s,e-1,t-1} + NP_{s,e,t}}$$
$$TB_{s,e,t} = \frac{(TP_{s,e-1,t-1} * TB_{s,e-1,t-1} * (1 + IPR_t) + NP_{s,e,t}\ NB_{s,e,t} - WP_{s,e,t} * WB_{s,e,t})}{TP_{s,e-1,t-1} + NP_{s,e,t} - WP_{s,e,t}} \quad [3]$$

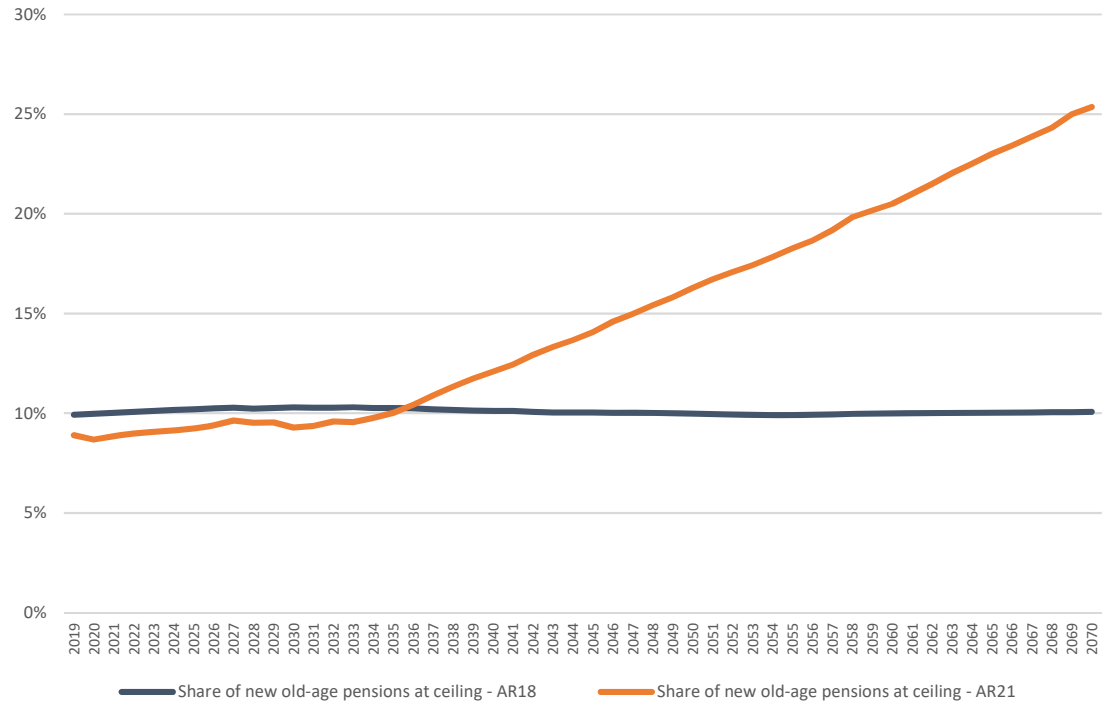
Data from the MCVL is used to estimate the impact of all reforms on the variables used in the model.

Specific detailed rules for the transition period 2013-27 are duly taken into account. A gradual but incomplete convergence of female careers to men is assumed, also reflected in developments in participation rates.

A methodological improvement compared with the model used for the AR18 projections refers to the proportion of new old-age pensions capped by the ceiling on new pensions (maximum pension). In the AR18 this proportion remained fixed trough the projection at approximately 10%. This assumption could be inconsistent with the internal dynamics of the projections and was changed for the AR21.

More precisely, in the AR21 projections the proportion of capped, new, old-age pensions is calculated endogenously in the model. This proportion results from the interplay between the growth rate of wages and contributory bases on the one hand (and especially the growth rate of the cap on contributory bases) and the growth rate of the cap on new, old-age pensions. In the model, the former grows with nominal wages while the latter is updated tracking CPI. As a result, a growing number of new pensioners see their old-age pensions capped at the maximum level. (see figure 17). This methodological change reduces public expenditure in pensions as a share of GDP in 0.5 pp at its peak.

Figure 17. Share of capped, new old-age pensions in the AR18 and the AR21



4.4.2 Clases Pasivas module

The same structure of module 1 applies as regards the basic formula of expenditure. The main difference is that the system is closed to new entrants as of 1-1-2011. Therefore, the number of contributors decreases according to mortality and new pensions. The figures for new pensions are derived from a coefficient of new pensions over contributors of last year and previous age applied to the remaining contributors each year. The average entry pension takes into account the different rules of the system as explained in part 1.

4.4.3 Non earnings-related pensions module

The number of new old-age entrants is the people at their retirement age not receiving any earning-related pension, adjusted by a coefficient that takes into account that there are people not entitled to a means-tested non-contributory pension (for having high income or assets) and people who do not claim their right to a pension. Both the average pension benefit of new entrants and the average pension benefit of existing pensions are linked to wages. The rest of variables are modelled in the same vein as in model 1.

4.4.4 Private pension schemes module

The agreed Eurostat demographic and AWG macroeconomic assumptions have been incorporated in the model for private pensions (occupational and individual schemes) elaborated by the Ministry of Economic Affairs and Digital Transformation (Directorate General for Insurance and Pension Funds).

In this edition of the Ageing Report the data gathering process required to project private pensions has been improved. In the AR18 data in the base year were based on a sample of pension insurers covering 70% of the system. Then, this sample was extrapolated for the whole system. In this edition, however, observed data for the whole population have been used, increasing the accuracy of the base year numbers. As it was explained above, this fact and the AR18's projections that have diverged from the observed developments in 2016-2018 have resulted in differences between the base year in the AR21 and what it was projected in the AR18 for 2019. Additionally, occupational plans are only included when their main purpose is to insure against retirement, as opposed to the previous projection, where plans that were specifically for survivors or disability were included too.

The model runs separate projections for individual and occupational pension plans and collective pension insurance plans. The assumptions made are very prudent and do not foresee changes in behaviour. The nominal interest rate assumed throughout the projection horizon is 3%.

4.5 Additional features of the projection model

Two important features of the Spanish pension system are the Index for Pension Revaluation (IRP) and the Sustainability Factor, whose implication for public pension expenditure have been discussed at length above. In this subsection, additional technical information on the calculation of each of these indices is provided.

4.5.1 Calculation of the Index for Pension Revaluation (IRP)

All social contributory social security pensions, including minimum pensions and civil servants' pensions (Clases Pasivas del Estado), are increased annually according to the Index for Pension Revaluation (or IPR), which is fixed annually by the National Budget Law. It has entered into force in 2014, immediately after the adoption of the 2013 reform.

The IPR seeks to ensure the sustainability of the public pension system over the medium run by reaching a balanced budget in structural terms. To this aim, this index determines an annual growth of pension expenditure in pace with the public pension revenues over the medium term.

The Index is defined according to the following formula:

$$IPR_{t+1} = \bar{g}_{R,t+1} - \bar{g}_{P,t+1} - \bar{g}_{S,t+1} + \alpha * \frac{R^*_{t+1} - E^*_{t+1}}{E^*_{t+1}}$$

Where the IPR for all pensions in year t+1 equals the arithmetic mean rate of revenues ($\bar{g}_{R,t+1}$) minus the mean rate of the number of pensions ($\bar{g}_{P,t+1}$), minus the average substitution effect ($\bar{g}_{S,t+1}$), plus/minus the adjustment needed to cover the structural disequilibrium of the system. The substitution effect is the year-on-year change of the average pension when no indexation is applied, and it results from the replacement of dying pensioners with new ones whose average pension is higher.

The system disequilibrium is computed as the difference between the geometric mean of revenues (R*) and expenses (E*) as a proportion of geometric mean expenses. The alpha parameter α measures the correction speed of imbalances and should lie between 0.25 and 0.33, being its value revised every five years. For years 2014-2018 α will be 0.25.

The mean values (both arithmetic and geometric) are centred on the reference year t+1, taking into consideration eleven values. The IPR must lie between a bottom cap of 0.25 and a top cap given by the year-on-year percentage change in annual CPI on December of year t plus 0.5%.

All four elements enter into the equation as geometric, moving averages of eleven years. The parameter alpha is fixed at 0.25. The substitution effect measures the difference in percentage points between the average new pension benefit and the average pension benefit of deceased pensioners. It is usually greater than 0, indicating that new average pensions are higher than the average pension of those pensioners who die in a year. An important thing to notice is how the expenditure variable is built. Following the methodology used in the AR18, public pension expenditure is multiplied by a beta coefficient. Beta is set at roughly 1.2 in the baseline year and gradually falls to 1.1 by 2070 (as in the AR18). It captures expenditure other than pension benefits that are currently financed through contributions like maternity leave benefits or the operating costs of the system. This implies that if contributions were equal to expenditure in contributory public pensions, there would still be a deficit in the system.

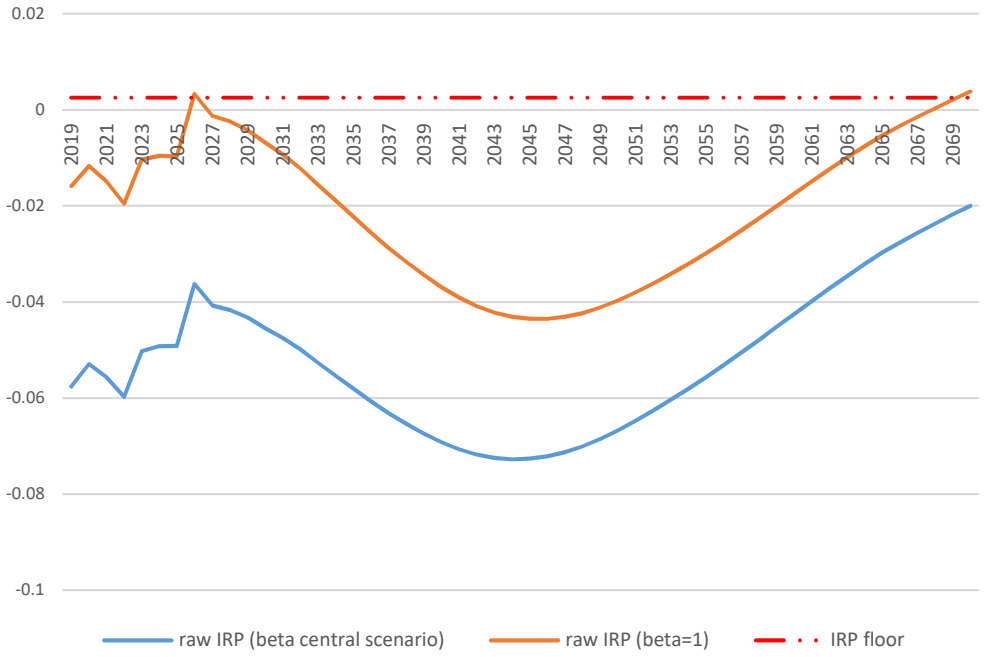
This indexation method guarantees pension expenditure cannot increase substantially while there are structural deficits in the pension system. The IPR can only be increased as long as the growth in revenues covers the growth in the number of pensions and the growth in the value of the new pensions versus the previous ones. Moreover, a part of the structural deficit has to be corrected each year. Additionally, a bottom cap is established to ensure pensions are not reduced in nominal terms.

For computing the formula, total non-financial revenues and expenditures of the system will be considered, excluding the following items:

- Budget corresponding to the National Institute of Health Management (INGESA) and the Institute for the Elderly and Social Services (IMSERSO).
- Non-recurrent items, as determined by the General Intervention Board of the State Administration (IGAE).
- Social contributions and benefits for cessation of business.
- On the revenue side, State transfers for financing non-contributory benefits (except transfers for minimum complements of contributory pensions); and, on the expenditure side, non-contributory benefits (except minimum complements of contributory pensions).

By law, the IPR can take values from 0.25% to CPI+0.5%. Therefore, the result of the formula (the raw IPR) might not be the index that is ultimately applied. This is the case in the AR21 baseline scenario (the raw IPR is always lower than the floor). Just as an illustration, if the beta coefficient was equal to 1 through the projection, the raw IPR would lie below the floor up until the very last year of the projection, when the raw IPR would be equal to the final IPR with a value of 0.0038 (see figure 18).

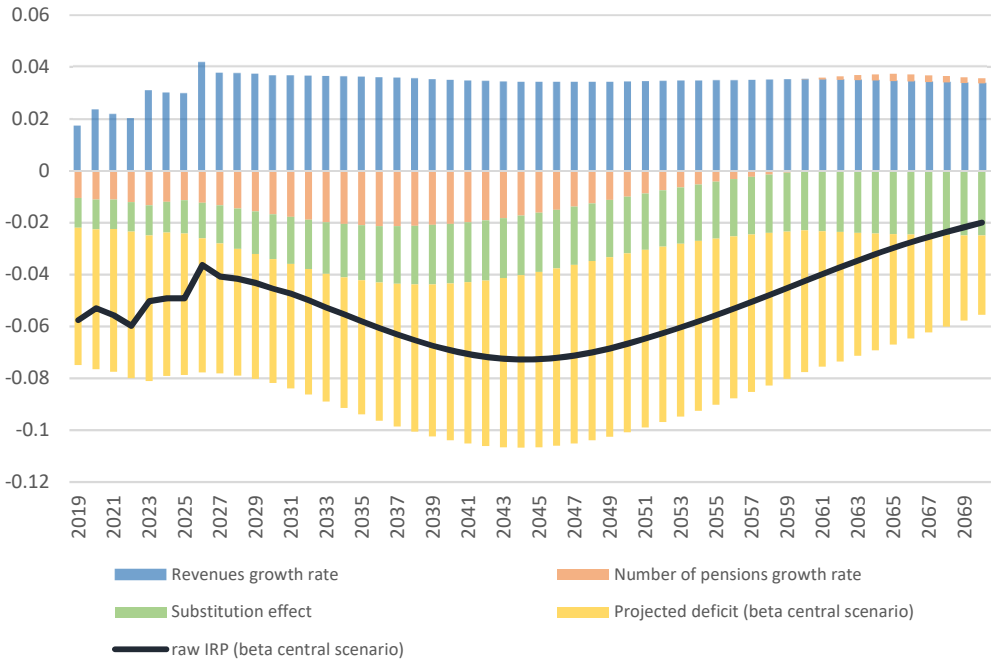
Figure 18. Raw IRP (before applying floor/ceiling) under different beta values



Source: Spanish General Directorate for Macroeconomic Analysis

The breakdown of the raw IPR is illustrative of the forces behind the system. The main two drivers of the IPR are the projected deficit, that increases during the central part of the projection when the largest cohorts are retiring and is reduced afterwards and the substitution effect. The increase in the number of pensions contributes to a lower IPR and once the stock of pensions starts to shrink, it pushes the IPR up.

Figure 19. Decomposition of the raw IRP



Source: Spanish General Directorate for Macroeconomic Analysis

4.5.2 Calculation of the Sustainability Factor

The sustainability factor is an automatic link between the amount of retirement pension benefits and developments in life expectancy of pensioners. It will be applied only once on each pensioner when determining the initial amount of a new pension. The sustainability factor is applied in the model since 2023, following current legislation.

The formula is the following:

$$SF_t = SF_{t-1} * \mathrm{e}^*_{67}$$

Where SF is the sustainability factor (equal to one up to 2022), t is the year of application of the factor and $\mathrm{e}^*_{67}$is the average annual change in life expectancy at 67 (according to Social Security mortality tables) in a previous period of five years. The value of e^*_{67} is kept fixed for periods of five years. The formula for computing e^*_{67} for the period 2019-2023 is the following:

$$\mathrm{e}^*_{67,2012-17} = \left[\frac{e_{67}^{2012}}{e_{67}^{2017}}\right]^{\frac{1}{5}}$$

The sustainability factor (SF) is computed based on Eurostat's projected life expectancy, which may have some differences when compared to Social Security mortality tables.

5 Annex

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	25,7	34,0	48,5	70,3	101,2	144,4	461,8
Economy-wide average gross wage	25,7	34,0	48,5	70,3	101,2	144,4	461,8

Table A2. Disability rates by age groups (%)

	2019	2030	2040	2050	2060	2070
Age group -54	1.3	1.3	1.2	1.3	1.3	1.3
Age group 55-59	7.2	7.1	7.5	7.7	8.0	8.2
Age group 60-64	10.6	10.5	11.4	11.8	12.1	12.5
Age group 65-69						
Age group 70-74						
Age group 75+						

For statistical purposes, disability pensions are transformed into old-age pensions when the pensioner reaches 65

Table A3. Factors behind the change in public pension expenditure between 2019 and 2070 (percentage points of GDP) – pensions

	2019-30	2030-40	2040-50	2050-60	2060-70	2019-70
Public pensions to GDP	0,0	0,5	0,2	-1,3	-1,4	-2,1
Dependency ratio effect	3,4	3,7	2,5	-0,1	-0,3	9,2
Coverage ratio effect*	-1,2	-0,1	0,4	0,5	0,0	-0,5
Coverage ratio old-age	-0,9	0,5	0,9	0,6	-0,1	1,0
Coverage ratio early-	-1,9	0,8	-0,4	-0,3	0,3	-1,5
Cohort effect	-1,3	-3,8	-3,1	0,8	0,4	-7,0
Benefit ratio effect	-1,1	-2,0	-2,0	-1,8	-1,1	-7,9
Labour market effect	-0,9	-0,8	-0,4	0,1	0,0	-2,1
Employment ratio effect	-0,5	-0,6	-0,5	0,0	0,0	-1,5
Labour intensity effect	0,0	0,0	0,0	0,0	0,0	0,1
Career shift effect	-0,5	-0,2	0,0	0,1	-0,1	-0,7
Residual	-0,2	-0,3	-0,2	0,0	0,0	-0,8

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

Age group	All	Old-age	Disability	Survivor	Other (including minimum)
15 - 49	32761	32	17458	14219	1052
50 - 54	12632	356	10250	1605	421
55 - 59	24930	7888	14852	1832	358
60 - 64	96912	82070	12750	1945	147
65 - 69	99669	97382	382	1871	34
70 - 74	5263	3232	34	1993	4
75+	8732	691	32	8000	9

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

Age group	All	Old-age	Disability	Survivor	Other (including minimum)
15 - 49	30485	20	12812	16623	1030
50 - 54	12315	35	6976	4785	519
55 - 59	17843	603	9730	7069	441
60 - 64	64418	45273	8862	10051	232
65 - 69	101275	87370	668	13179	58
70 - 74	21432	2585	61	18760	26
75+	65712	928	16	64718	50

Table A4c. Administrative data on new pensioners (2019) - total

Age group	All	Old-age	Disability	Survivor	Other (including minimum)
15 - 49	63246	52	30270	30842	2082
50 - 54	24947	391	17226	6390	940
55 - 59	42773	8491	24582	8901	799
60 - 64	161330	127343	21612	11996	379
65 - 69	200944	184752	1050	15050	92
70 - 74	26695	5817	95	20753	30
75+	74444	1619	48	72718	59