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PENSION PROJECTIONS FOR THE 2018 AGEING REPORT

COUNTRY FICHE

FRANCE

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1. Overview of the pension system

1.1. Description

The French pension system is essentially a pay-as-you-go system financed by contributions from both workers and employers. The description of the pension system and the projections are based on the legislation in force in 2017.

- *A system made of different schemes*

The French pension system is based on several schemes depending on the professional sector or occupational status. The private sector employees scheme (CNAVTS) is the largest one. These schemes follow different rules. All workers are affiliated, according to their profession, at the same time to a basic and a mandatory complementary scheme. They can belong to several basic schemes during their career: they then receive several pensions at retirement.

Table 1.1 - Outline of the French pension system

		Basic scheme	Mandatory complementary scheme
Private sector employees	Industry, trade and services	CNAVTS	ARRCO + AGIRC for executives
	In public sector		IRCANTEC
	Farm workers	MSA	
Public sector employees	State government	FPE	RAFP
	Hospitals and local government	CNRACL	RAFP
	Other	Special schemes (RATP-SNCF, CNIEG, etc.)	
Independent workers	Craftsmen & shopkeepers	RSI	
	Farmers	MSA	
	Other	CNAVPL (gathering 10 professional schemes), CNBF (lawyers), etc.	Complementary pension schemes for self-employed (RCI : for professions such as craftsmen, tradesmen... ; CAVP ; CARCDSF ; CARPIMKO ; CARPV ; CAVEC ; CAVAMAC ; CRN ; CAVOM ; CIPAV for doctors, pharmacists,...) ; CNBF (lawyers)

**Table 1.2 - Number of contributors and pensioners of different pension schemes in 2015
(in 1000)**

	Contributors	Pensioners
CNAVTS	17 500	13 900
CNAVPL	647	326
MSA employees	675	2 506
ARRCO	17 968	14 013
AGIRC	4 176	2 991
FPE	2 033	2 121
CNRACL	2 230	1 000
Special schemes	544	1 195
RSI	2 098	2 151
MSA farmers	497	1 517

Source: Social security accounts June 2016 and CNAV.

Note: It is not possible to sum these numbers due to the fact that contributors and pensioners can belong to more than one scheme. On average, one pensioner receives pensions from 2 to 3 different schemes.

- *Retirement age*

The retirement age depends on the behaviour of the new pensioners. There is a legal minimum age¹ and incentives to retire later.

- People can retire when they reach the earliest retirement age (62 for the 1955 generation and the following ones), with a penalty if they do not meet the required contribution period condition (43 years from the 1973 generation onward).
- They can also delay their entry into retirement in order to obtain a full pension which is granted for people with the required contribution period or above the statutory retirement age (also called full pension age, 65 up to the 1951 generation, 67 for generations born in 1955 and after). People who are allowed to retire with a full pension (as they meet the age and contribution period conditions) but who decide to keep working will receive a bonus on their pension proportional to the number of extra years worked.

¹ Rules may differ from the general situation in certain schemes, for instance, the complementary scheme of independent professions.

Table 1.3 - Statutory retirement age, earliest retirement age and penalties for early retirement

			2016	2020	2030	2040	2050	2060
Private sector	20 contribution years *	statutory retirement age **	66,6	67,0	67,0	67,0	67,0	67,0
		earliest retirement age	61,6	62,0	62,0	62,0	62,0	62,0
		penalty in case of earliest retirement age	25,0%	25,0%	25,0%	25,0%	25,0%	25,0%
		bonus in case of late retirement ***	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
	40 contribution years *	statutory retirement age **	62,8	63,8	64,5	65,0	65,0	65,0
		earliest retirement age	61,6	62,0	62,0	62,0	62,0	62,0
		penalty in case of earliest retirement age	6,3%	8,8%	12,5%	15,0%	15,0%	15,0%
		bonus in case of late retirement ***	18,8%	16,3%	12,5%	10,0%	10,0%	10,0%
Public sector	20 contribution years *	statutory retirement age **	65,5	67,0	67,0	67,0	67,0	67,0
		earliest retirement age	61,6	62,0	62,0	62,0	62,0	62,0
		penalty in case of earliest retirement age	25,0%	25,0%	25,0%	25,0%	25,0%	25,0%
		bonus in case of late retirement ***	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
	40 contribution years *	statutory retirement age **	62,8	63,8	64,5	65,0	65,0	65,0
		earliest retirement age	61,6	62,0	62,0	62,0	62,0	62,0
		penalty in case of earliest retirement age	6,3%	8,8%	12,5%	15,0%	15,0%	15,0%
		bonus in case of late retirement ***	13,4%	16,3%	12,5%	10,0%	10,0%	10,0%

* We assume that people have accumulated 20 or 40 years of contribution at their earliest retirement age the given year. Statutory retirement age is then reached after that year.

** Statutory retirement age is reached when full pension is attained via contribution period or legal retirement age

*** We assume late retirement to be the legal automatic full rate pension age (65 yo. and 9 months in 2013; 67 yo. in 2020 and after)

NB: we do not distinguish between women and men since they face the same legislation.

There are some exceptions to the legal retirement age. The most important one is dedicated to people who have started working at a very young age and have validated more than the required time (see details infra). In the public sector, for some special branches labelled as “active service” (policemen, nurses, etc.), the minimum retirement age is 55 years old². In general, there is no gender difference in the eligibility requirements.

Tables 2.1 shows the number of new old-age pensioners by age group, for men (a), women (b) and both (c), for age-related pensions in the main base scheme, CNAVTS for the year 2014. As a pensioner can receive a pension from more than one base scheme, it is not possible to compile the administrative data on new pensioners from all the pension schemes, as it would include

² Since the 2014 reform, the minimum retirement age for “active service” is increased from 55 years old for generation 1956 and before, to 57 years old for generation 1960 and after.

double counts³. For the same reason, there is no aggregated data on the number of new pensioners from disability and survivor schemes.

Table 2.1.a – Number of new pensioners by age group – administrative data (Men)

Age group	New male pensioners
15 - 49	0
50 - 54	0
55 - 59	11 306
60 - 64	221 392
65 - 69	54 452
70 - 74	1 987

Source: Commission services

Table 2.1.b – Number of new pensioners by age group – administrative data (Women)

Age group	New female pensioners
15 - 49	0
50 - 54	0
55 - 59	2 695
60 - 64	206 626
65 - 69	89 909
70 - 74	2 018

Source: Commission services

Table 2.1.c – Number of new pensioners by age group – administrative data (Total)

Age group	New pensioners (Total)
15 - 49	0
50 - 54	0
55 - 59	14 001
60 - 64	428 018
65 - 69	144 361
70 - 74	4 005

Source: Commission services

Level of pension

- Benefit formulae

The rules to calculate pensions differ from one scheme to another. We present here only the formulae used to calculate the two components of the pension in the private sector (basic

³ The statistical office of the Ministry for Solidarity and Health, DREES, produce an estimate of the number of new old-age pensioners by age and sex. A mix of administrative and survey data are used to avoid double counts. See Annex I

pension from the CNAVTS and complementary pension from the AGIRC-ARRCO) and in the public sector.

➤ **Basic private sector pensions (CNAVTS and aligned schemes)**

In the basic private sector (CNAVTS) and the aligned schemes (RSI and MSA workers), the pension P is calculated according to the following formula:

$$P = \text{ref. wage} \times \text{Min} \left(1, \frac{D}{T} \right) \times t$$

Three factors compose that formula:

- The *reference wage* is the average wage over the 25 best wages (up to the social security ceiling, € 3 269 per month in 2017), with past earnings valorized in line with price inflation.
- The *coefficient of proratisation* $\text{Min} (1, D/T)$ with D being *the contribution period*, that is the number of years validated by the insured and T , the *reference length*. In other words, the pension is reduced in due proportion whenever $D < T$. For people born in 1956 (who will be 62 in 2018), T equals 41.5 years, this value will increase up to 43 years for people born in 1973 or after.
- The *pension rate* t . The standard rate is 50%.

However, in order to foster senior participation rate in the labor market, either a penalty or a bonus can be applied under certain conditions:

- A penalty is applied to the pension rate when the pension is withdrawn before the full pension age *if* the contribution period is lower than the reference one ($D < T$). The deduction is then calculated as $\text{Min} [\text{Full pension age} - \text{Age}, (T-D)]$ multiplied by the rate of deduction (1.25% per missing quarter from the 1953 cohort onward). The new pension rate t' is given by:

$$t' = t \times (1 - 1.25\% \times \text{number of missing quarters})$$

- Conversely, the pension is augmented by a premium when individuals decided to continue to work although they had met the conditions for a full pension. The premium is calculated as $\text{Min} [\text{Age} - \text{Minimum retirement age}, (D-T)]$ multiplied by the premium rate (1.25% per quarter). The new pension P' is given by:

$$P' = P \times (1 + 1.25\% \times \text{number of extra quarters worked})$$

There is a minimum contributory pension (named *minimum contributif*) for individuals who meet the requirements for a full pension (ie. they are 67 years old or they have contributed long enough for being granted a full pension before the age of 67) amounting to € 634.66⁴ per month in January 2017. This minimum is price-indexed.

⁴ Only individuals whose *total* pension (basic + complementary) does not exceed € 1 146.29 per month (in 2017) are entitled to the minimum contributory pension of the basic scheme. A higher *minimum contributif* also exists for people having contributed 120 quarters.

➤ ***Mandatory complementary pension (AGIRC for private sector executives and ARRCO for all private sector workers)***

Complementary schemes for private sector employees are pay-as-you-go point systems that serve defined-contribution pensions. Contributors acquire each year a certain number of points through their own contributions and those of their employer, calculated on the basis of an acquisition rate τ_t applied to a part of their gross wage. The acquisition rate τ_t equals the contribution rate of the scheme divided by 125%⁵. The contribution basis and the contribution rates vary from one scheme to another and according to the wage brackets involved⁶. In 2017, the minimum contribution rate is 7.75% (3.10% for the employees and 4.65% for the employers) in ARRCO and 20.55% in AGIRC (7.81% for the employees and 12.74% for the employers). The purchase price of each point, called “reference wage”, depends on the year considered. In January 2017, it amounted to € 16.1879 in ARRCO and € 5.6306 in AGIRC.

$$\text{Number of points acquired in year } t = \tau_t \times (\text{Gross wage}_t / \text{Purchase price of a point}_t)$$

At retirement, the transformation of accumulated points into a pension benefit is a function of the contributor's age, the contribution length and the selling price of a point at that date. Complementary pension is then calculated as follows:

$$\text{Pension} = \text{Total number of points acquired} \times \text{Value of a point} \times \text{Shortfall coefficient}$$

“Full” complementary pension is granted only to those who qualify for a full basic scheme pension. In case one retires before fulfilling the requirements for a full pension as defined by the CNAVTS, the value of the point is adjusted downwards by means of a “shortfall coefficient” (cf. Table 2.2).

Table 2.2 - Shortfall coefficient applicable to the complementary schemes

Shortfall (quarters)	Coefficient
4	0.96
8	0.92
12	0.88
16	0.83
20	0.78

Source: Agirc-Arrco

Following the 2015 agreement (cf. 1.2), a new system of “solidarity coefficients” and “increase coefficients” is factored into the calculation of the complementary pension benefit and is based on the age at which employees acquire full rights to the basic pension under the CNAVTS

⁵ It will be increased to 127% in 2019.

⁶ From 2019 onwards, the schemes will be merged and there will be only 2 wage brackets: revenues below the social security ceiling (called Tranche 1) and revenues between 1 and 8 social security ceilings (called Tranche 2). The contribution rate for “Tranche 1” will be 7,87% in 2019 and the contribution rate for “Tranche 2” will be 21.59% in 2019.

general scheme will be put in place, starting with the generation 1957. The coefficients work in the following way:

- For individuals who retire less than one calendar year after the age at which they are entitled to a full basic pension, the AGIRC and ARRCO complementary pension benefits are reduced by a solidarity coefficient of 10% for three years or until they turn 67.
- Individuals who retire between one and two years after that age receive their full pension, with no solidarity coefficient or increase coefficient.
- For each additional year that the individual delays retirement, the AGIRC and ARRCO complementary pension is increased for one year by an increase coefficient of 10% (up to a maximum 30%).
- Pensioners exempted from the “general social security contribution” (*Contribution Sociale Généralisée*: CSG) and certain precarious categories of pensioners⁷ are exempted from the solidarity coefficient (but are subject to the increase coefficient). Pensioners paying the CSG at the reduced rate⁸ are subject to the solidarity coefficient but with a 5% reduction instead of 10%.

➤ *Pension in the public service scheme (FPE)*

The calculation of the basic pension for public sector workers is very similar to the one in the CNAVTS:

$$P = \text{ref. wage} \times \text{Min} \left(1, \frac{D}{T} \right) \times t$$

Nevertheless the parameters differ from those of the general scheme in two essential aspects:

- The reference wage taken into account is the wage received the last 6 months (excluding bonuses and other emoluments), as opposed to the average of the best 25 years' wages (including bonuses) in the private sector.
- The pension rate t is 75%. The 2003 reform introduced also a penalty scheme and a premium rate, similar to the ones existing for private sector employees.

As in the main basic scheme, the duration T taken into account in the *pro rata* coefficient is 41.5 years for people born in 1956 (aged 62 in 2018) and will increase up to 43 years for people born in 1973 and after.

Unlike private sector employees, public sector employees did not receive complementary pensions until recently. This is why their basic scheme replacement rate is higher. A complementary pension scheme (RAFP) was introduced in 2005 by the 2003 reform. It is a point system whose contributions are only based on bonuses, within the limit of 20% of total wage. This scheme provides pensions which are much lower than those of the private sector complementary schemes.

⁷ The 30 October 2015 agreement lists the conditions for exemption from solidarity coefficients.

⁸ The standard CSG rate for pensioners is 6.6%. The reduced CSG rate (3.8%) and exemption from CSG are subject to means testing.

For pensioners who meet the requirements for a full pension, an earnings-related minimum pension is guaranteed (called *minimum garanti*). In 2017, its value was € 13 896.72 per year for a 40 year long career.

- ***Non earnings-related minimum pension***

People aged 65 and above (or 62 in case of incapacity or disability) whose revenues (including pension or not) are below a certain ceiling (€ 9 638.42 a year for a single person and € 14 963.65 for a couple in April 2017) are eligible to a minimum pension, named ASPA (standing for “Allocation de solidarité aux personnes âgées” or “minimum vieillesse”) that tops revenues up to the aforementioned ceiling. This ceiling is price-indexed. ASPA-related expenditures amounted to € 3.3 billion in 2015, which represents 1% of the total amount of pension expenditures. In the projection exercise, in order to prevent the ASPA to decline too much relatively to the poverty threshold, the ceiling is indexed on average wages after 2050, when it will account for 50 % of the poverty threshold (60% of the median wage). The impact of this methodological change on the projection results is shown in Table 19 and explained in section 3.6).

- ***Disability pension***

Disability pensions provide a replacement income for people who are completely or partially, temporarily or permanently, unable to work. These pensions are paid by the public health insurance schemes. There are two different earnings-related disability pensions: the “rente Accident du Travail et Maladie Professionnelle (ATMP)” which is granted when the disability is related to work and the “Pension d’Invalidité (PI)” which is granted when it is not work-related. When disabled persons receiving a PI reach the legal retirement age, they become eligible to a full pension: their pension is no longer included in disability expenditures and is transferred into old-age expenditures’ accounts. On the contrary, ATMP is cumulative with an old-age pension. The disability pensions are a fraction of a reference wage (the average of the ten best wages for PI and twelve last months for ATMP), depending on the disability level as exhibited in the following table. It cannot exceed a maximum nor be inferior to a minimum amount.

Table 2.3.a – Benefit formula for a disability pension – Pension d’invalidité

Disability class	Percentage applied to the reference wage	Minimum level per month	Maximum level per month
1st class	30%	€ 282.78	€ 980.70
2nd class	50%	€ 282.78	€ 1 634.50
3rd class	50% + 40% bonus for a third party	€ 282.78+ € 1107.49= € 1 390.27	€1634.50+ € 1107.49 = € 2 741.99

Source: Public administration official website: www.service-public.fr

Table 2.3.b - Benefit formula for a disability pension – Rente Accident du Travail et Maladie Professionnelle

$$P \text{ (annual)} = T \times R$$

$$T = 0.5 \times \text{disability rate} \quad \text{if disability rate} \leq 50\%$$

$$T = 1.5 \times \text{disability rate} - 50\% \quad \text{if disability rate} \geq 50\%$$

$$R = \text{ref. wage} \quad \text{if ref. wage} \leq R^\circ$$

$$R = R^\circ + \frac{\text{ref.wage} - R^\circ}{3} \quad \text{if } R^\circ < \text{ref. wage} \leq 4R^\circ$$

With $R^\circ = \text{€ } 36\,673.29$. Revenues above $4R^\circ$ are not factored into the calculation.

In addition, there is a non earnings-related minimum disability pension (“Allocation aux adultes handicapés” - AAH) to top revenue of all disabled people up to € 810.89 per month in 2017.

- **Indexation**

All basic schemes pensions are price-indexed. Past wages taken into account for the pension calculation are also revalued with the Consumer Price Index (excluding tobacco).

According to the latest agreement, complementary schemes’ pensions (Agirc and Arrco) will be adjusted below the inflation rate (CPI – 1%) from 2016 to 2018.

- **Pension taxation**

Pensions are subject to general social contributions (CSG and CRDS) at a 7.1%, and to two different health contributions: a specific contribution for all pensioners (Casa) at a 0.3% rate and a complementary pensions-only health care contribution at a 1% rate. Pensioners with low revenues can benefit from a reduction of CSG-CRDS (3.8% instead of 7.1%) if they are not eligible to income taxation or from an exemption of CSG-CRDS and Casa if their revenue is below a certain ceiling (€ 10 996 for a single person in 2017 (for 2015 revenues)). In addition, pensions are subject to income taxation.

The average tax rates in 2016 was 10.9%: 4.7% for income taxation and 6.1% for other taxes (CSG-CRDS-Casa).

There is no taxation on ATMP disability pension.

1.2. Recent reforms of the pension system

Up to this year, the French pension schemes have known five main reforms: the 1993 reform in the private sector, the 2003, 2008, 2010 and 2014 reforms that affect both private and public sectors. The effects of these 5 major reforms were already factored into the 2015 projections.

The 1993 reform introduced mainly four changes that reduced the pension level:

- The reference wage is now calculated on the basis of the 25 best wages instead of the 10 best ones;
- Past wages factored into the calculation of the reference wage are price-indexed (and not wage-indexed anymore);
- Pensions have become price-indexed;
- The reference contribution period has been raised from 37.5 to 40 years for private sector employees.

The 2003 reform:

- It planned to semi-automatically increase the contribution period necessary to draw a full pension in line with life expectancy gains. The aim was to keep the ratio between contribution period and average length in retirement constant at its value of 2003 (1.79)⁹. In application of that principle, the reference contribution period has increased from 40 years for generation 1948 to 41.5 years for generation 1957. This mechanism has been replaced by the 2014 reform.
- It created the possibility for people with long careers to retire early and scheduled an increase of the minimum earnings-related pension. The early retirement arrangement for long careers concerns people who started to work before the age of 16 or 20 and who have contributed longer than the reference contribution period. They are entitled to withdraw their pension up to 4 years before the legal retirement age (56 years old). With the legal obligation to study until the age of 16, fewer and fewer people will be eligible to this arrangement.
- A bonus system was introduced (in all schemes) for people postponing their entry into retirement while they have reached the minimum retirement age and they meet the reference contribution period condition. The penalty for early-retirement was gradually decreased from 10% to 5% of pension benefits for private sector workers and was introduced for the public scheme. The reform also introduced the possibility of cumulating a pension and a wage and fostered the development of occupational and voluntary private savings through fiscal incentives.
- A gradual convergence of the public sector schemes toward the private sector one was implemented through three channels: firstly, an increase of the number of contribution years required for entitlement to a full pension (from 37.5 to 40 years); secondly, the creation of a penalty for early retirement and a premium for postponed retirement converging gradually to the value of the parameters in the CNAVTS; finally, the creation of a complementary scheme (RAFP).

⁹ Average length in retirement is defined as the life expectancy at age 60 published five years before by the national statistical agency (Insee). Until 2014, the COR pronounced every year (every 4 years before) a recommendation concerning the reference contribution period that will apply to the concerned generation: everyone is therefore informed at age 55 of the actual reference contribution length that will apply to them.

The 2008 “rendez-vous”:

- The bonus for extra years worked after having reached the required contribution period for a full pension was raised to 1.25% per additional quarter;
- The possibility of drawing concurrently a pension and a wage was fully liberalized for people entitled to a full pension;
- Employers were encouraged to reach quantitative targets for senior workers' employment and discouraged to use retirement as a substitute for layoff.
- The conditions for perceiving the *Minimum Contributif (also called Mico)*, a contributory minimum pension created for people entitled to a full pension, were strengthened. This minimum pension is now means-tested in order to target people with low levels of pension more effectively.

The 2010 reform introduced several new measures aimed at both curbing expenditures and raising revenues:

- It introduced a progressive rise of age boundaries. The earliest retirement age was gradually increased, for all pension schemes, from 60 to 62. Simultaneously, the full pension age went up from 65 to 67. Every generation from generation 1951 to generation 1955 have seen these age limits rise by 4 or 5 months¹⁰. For example, people born in 1956 can claim their pension at age 62 in 2018 and a full pension at 67 in 2023. The early retirement age for long careers has also been increased by 2 years. The 2010 reform, so as the 2008 “rendez-vous” increased the minimum contribution period required for a full pension before the age of 67.
- Exceptions related to fragile workers have been introduced. Some categories of workers are still being granted a full pension at 65 (disabled, mother of 3 children), and people suffering from a professional disease or an accident that resulted in a permanent incapacity of at least 20%¹¹ can still retire at 60 with a full pension. The retirement for long careers is extended to people who started to work before 18; they can retire at age 60, if they meet certain conditions.
- The convergence of pension rules between public and private sectors was strengthened by the decision to remove the possibility of early retirement for parents with 3 children and a 15 year-career in the public sector and the "Cessation Progressive d'Activité" programme in the public sector as well. Rules to compute minimum earnings-related pensions and the contribution rate of civil servants¹² will also converge towards the private sector rules.

The 2014 reform introduced short-term measures (increase of social contributions of both employees and firms by 0.3 point between 2013 and 2017, removal of the 10 % tax exemption

¹⁰ Initially, a 4 month increase by generation was planned between the generations 1951 and 1956 but the 2012 social security budget law planned an acceleration of this increase.

¹¹ 10% under specific disability conditions.

¹² The contribution rate for civil servants will increase from 7.85% to 11.10% by 2020. It amounted to 10.29% in 2017.

on the pension bonus for pensioners with 3 (or more) children, postponement of the pension indexation) but also several long-term measures:

- It introduced a progressive rise of the reference contribution period for a full pension before the age of 67 to 43 years (reached in 2035). This rule replaces the mechanism introduced by the 2010 reform and affect all pension schemes (basic private sector schemes, the public sector scheme, special schemes and 2nd pillar schemes);
- In order to strengthen the governance, a steering committee has been established and has been entrusted with the task to publish a yearly report on the French pension system, including long-term projections. It will make recommendations if there are significant discrepancies with the baseline scenario.

Since the last projection exercise, two new reforms were implemented.

The 30 October 2015 agreement on complementary pension schemes Agirc and Arrco introduced a series of measures related to: (i) the amount of pension benefits paid to retirees, (ii) retirement age, with incentives to postpone retirement, (iii) governance, with the merger of the executive and non-executive schemes, and (iv) social contributions.

- The measures concerning the amount of pension benefits are being implemented from 2016 to 2018; part of the adjustment affects current pension recipients by restricting nominal increases in existing pensions, and part will affect future pensioners by making the pension system less generous in the long run.
- Incentives to remain in employment (“solidarity coefficients” and “increase coefficients”) should raise the effective retirement age and maintain around 100,000 additional persons in the labour force in 2025, thus raising the amount of contributions.
- Merging the AGIRC (executive) and ARRCO (non-executive) schemes in 2019 will simplify the pension system and reduce administrative costs.
- In the new unified scheme, the contribution assessment base will be broadened and certain contribution rates will be increased.

In July 2017, the LURA reform (LURA stands for Liquidation Unique de retraite de base des Régimes Alignés) entered into force. Before the reform, private sector workers who had contributed to several basic schemes over their career (CNAVTS, MSA salaries or RSI) used to receive as many pensions as schemes they had contributed to and each pension was calculated separately. Since July 2017, individuals who are in such a situation¹³ receive only one pension calculated according to one single benefit formula.

- The reference wage is the average of the 25 best annual wages (valorized in line with inflation) across the entire career.

¹³ The reform does not affect individuals who had already retired before July 2017

- An individual can only validate 4 quarters per year: individuals who have contributed to two schemes simultaneously will get a lower pension than what they would have received before the LURA reform.

The LURA arrangement was part of the 2014 reform but the executive order related to its implementation was published only in May 2017.

1.3. Description of the actual "constant policy" assumptions used in the projection

The projections are built upon a “constant policy” principle and based on the legislation and rules as of September 2017. The rates of return of the AGIRC-ARRCO schemes are assumed to remain constant after the last measures of the 2015 agreement are implemented, in 2018.

As mentioned above, the non-contributory minimum pension (ASPA) is indexed to prices up to 2050 and to wages thereafter.

2. Overview of the demographic and labour forces

2.1. Demographic development

Table 3 – Main demographic variables evolution

	2016	2020	2030	2040	2050	2060	2070	Peak year*
Population (thousand)	66 808	67 959	70 658	73 009	74 435	75 587	77 029	2070
Population growth rate	0,4	0,4	0,4	0,3	0,2	0,2	0,2	2017
Old-age dependency ratio (pop65/pop15-64)	30,4	33,2	40,0	45,1	45,0	43,3	44,8	2047
Ageing of the aged (pop80+/pop65+)	31,1	30,0	32,5	37,6	41,9	43,8	42,2	2062
Men - Life expectancy at birth	79,5	80,2	81,7	83,1	84,3	85,5	86,6	2070
Men - Life expectancy at 65	19,5	19,9	20,8	21,7	22,5	23,3	24,0	2069
Women - Life expectancy at birth	85,6	86,1	87,3	88,4	89,4	90,3	91,1	2069
Women - Life expectancy at 65	23,5	23,8	24,6	25,4	26,1	26,8	27,5	2070
Men - Survivor rate at 65+	85,1	86,1	88,2	90,0	91,5	92,7	93,8	2070
Men - Survivor rate at 80+	60,6	62,6	67,1	71,1	74,8	78,0	80,9	2070
Women - Survivor rate at 65+	92,5	93,0	94,0	94,9	95,6	96,2	96,7	2070
Women - Survivor rate at 80+	78,4	79,6	82,3	84,6	86,7	88,5	90,0	2070
Net migration	53,6	77,0	85,9	77,3	69,2	62,2	55,3	2029
Net migration over population change	0,2	0,3	0,3	0,4	0,6	0,5	0,3	2052

Source: Commission services based on Eurostat EUROPOP2015 data

*Explanatory note: *This column represents a peak year, i.e. the year in which the particular variable reaches its maximum over the projection period 2016 to 2070.*

Table 3 provides an overview of the demographic development until 2070. The total size of the population will increase until 2070 up to 77 million people, but at a decreasing rate from 2035. This global increase of the total population comes mainly from the increase in life expectancies.

The age composition will change towards older people: the “old-age dependency” ratio which is the share of older people (aged 65 and above) relative to the working age population (aged 15 to 64) will increase from 30.4% in 2016 to 44.8% in 2070. Most of the increase in old-age dependency ratio will occur before 2045: after this date, the ratio will be broadly stable until the 2060’s because the number of 65+ people will stop increasing. At the end of the projection period (2060-2070), the number of people aged 65 or above will increase again. The “ageing of the aged” ratio, which is defined by people older than 80 years old as a share of people aged 65 or above, will first decrease until 2025, then increase until 2056, remain broadly stable until 2065 and then decline slightly for the remainder of the projection period. Among the 65 years old and older group, the age composition will thus change towards a higher share of the elderly (over 80).

Graph 1 – Age pyramid comparison: 2016 vs 2070 (% of total population)



Source: Commission services based on Eurostat EUROPOP2015 data

The main differences between the age composition of the population in 2016 and 2070 are the following ones:

- The share of people aged between 25 and 49 will be significantly lower in 2070 than in 2016.
- On the contrary, the share of people aged 69 and above will be higher in 2070 than in 2016.

Due to the dynamic fertility, the share of young people will still be high in 2070. As a whole, the age pyramid would be flatter in 2070 than in 2016.

The comparisons between age pyramids in 2016 and 2070 are quite similar between men and women, except that the share of the elderly will be even higher for women than for men in 2070.

2.1. Labour force

Pension reforms that shift retirement age (both early and statutory) or rise contribution period requirements as well as active labour market policies aim to prolong working life.

Table 4 – Participation rate, employment rate and share of workers for the age groups 55-64 and 65-74

	2016	2020	2030	2040	2050	2060	2070	Peak year*
Labour force participation rate 55-64	53,5	57,2	63,5	66,2	68,1	68,6	68,1	2057
Employment rate for workers aged 55-64	49,7	53,5	59,8	62,5	64,4	64,8	64,4	2057
Share of workers aged 55-64 on the labour force 55-64	92,8	93,5	94,1	94,4	94,6	94,5	94,5	2053
Labour force participation rate 65-74	5,0	5,3	9,2	11,9	14,4	14,7	14,9	2066
Employment rate for workers aged 65-74	4,9	5,2	9,0	11,7	14,2	14,4	14,6	2066
Share of workers aged 65-74 on the labour force 65-74	97,8	97,9	98,1	98,1	98,2	98,2	98,2	2052
Median age of the labour force	41,0	41,0	40,0	40,0	40,0	40,0	40,0	2016

Source: Commission services

Explanatory note: *This column represents a peak year, i.e. the year in which the particular variable reaches its maximum over the projection period 2016 to 2070.

The effects of these reforms in France are reflected in the increase of participation rate and employment rate of the elderly (see Table 4). In line with the rise observed during the past 10 years, participation and employment rates of the 55 to 64 years old will keep increasing until 2060: respectively from 53.5 % in 2016 to 68.6 % in 2060 for the participation rate, and 49.7 % to 64.8 % for the employment rate.

Table 5.a – Labour market effective exit age and expected duration of life spent at retirement – MEN

	2017	2020	2030	2040	2050	2060	2070	Peak year*
Average effective exit age (CSM) (II)	61,9	62,8	63,6	64,5	64,7	64,7	64,7	2042
Contributory period	38,4	38,9	34,2	34,9	34,7	35,2	34,4	2020
Duration of retirement**	21,9	21,4	21,6	22,5	22,5	23,3	24,0	2069
Duration of retirement/contributory period	0,6	0,5	0,6	0,6	0,6	0,7	0,7	:
Percentage of adult life spent at retirement***	33,3	32,3	32,1	32,6	32,5	33,3	33,9	2069
Early/late exit****	9,3	6,9	3,4	1,9	1,6	1,7	1,4	2016

Source: Commission services; Insee, DESTINIE model, calculations: DG Trésor

Explanatory note: *This column represents a peak year, i.e. the year in which the particular variable reaches its maximum over the projection period 2016 to 2070. ** Duration of retirement is calculated as the difference between the life expectancy at average effective exit age and the average effective exit age itself. *** The percentage of adult life spent at retirement is calculated as the ratio between the duration of retirement and the life expectancy diminished by 18 years. **** Early/late exit, in the specific year, is the ratio of those who retired and aged less than the statutory retirement age and those who retired and are aged more than the statutory retirement age.

Table 5.b – Labour market effective exit age and expected duration of life spent at retirement – WOMEN

	2017	2020	2030	2040	2050	2060	2070	Peak year*
Average effective exit age (CSM) (II)	61,8	62,5	63,3	64,1	64,3	64,3	64,3	2047
Contributory period	33,6	33,3	29,7	30,6	29,6	31,9	32,8	2017
Duration of retirement **	26,2	25,6	26,4	26,3	27,1	27,8	28,4	2069
Duration of retirement/contributory period	0,8	0,8	0,9	0,9	0,9	0,9	0,9	:
Percentage of adult life spent at retirement***	37,4	36,5	36,8	36,3	36,9	37,5	38,0	2069
Early/late exit****	11,3	9,2	3,9	2,1	1,7	1,8	1,6	2016

Source: Commission services; Insee, DESTINIE model, calculations: DG Trésor

*Explanatory note: *This column represents a peak year, i.e. the year in which the particular variable reaches its maximum over the projection period 2016 to 2070. ** Duration of retirement is calculated as the difference between the life expectancy at average effective exit age and the average effective exit age itself. *** The percentage of adult life spent at retirement is calculated as the ratio between the duration of retirement and the life expectancy diminished by 18 years. **** Early/late exit, in the specific year, is the ratio of those who retired and aged less than the statutory retirement age and those who retired and are aged more than the statutory retirement age.*

Driven by the recent pension reforms, the average exit age from the labour market will rise by 2.8 years for men (from 61.9 to 64.7) and 2.5 years for women (from 61.8 to 64.3, see Tables 5.a and 5.b). Despite the increase in the retirement age, the ratio between the duration of retirement and the average working career will rise for men, from 57.1% in 2016 to 69.7% in 2060, reducing the gap with the value of this ratio for women (from 78.0% in 2016 to 86.5% in 2060).

3. Pension projection results

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

- Old-age pensions

The French projections cover all public pensions. Both basic and mandatory complementary schemes have been taken into account. Given their low weight in the French pension system, occupational pensions (with contractual agreements between employers and employees) are not covered in the projections. Private mandatory pensions do not exist in France.

The projections cover old-age and early pensions as well as survivors' pensions, the minimum old-age allowance, called "ASPA" (formerly "minimum vieillesse"), and disability pensions paid before and after the minimum retirement age (also including an allowance for disabled adults AAH, and ATMP for adults with a disability due to work and reducing their capacity to work), even though they are part of health expenditures in the French accounting system.

- Pensions schemes

The following table lists the main pension schemes along with the amount of pensions distributed in 2016. Only a global projection of pension expenditures is provided, aggregating all mandatory pension schemes for public, private and self-employed workers. No particular assumption is made about the evolution of the respective shares of the different schemes.

	Billion € 2015	% of GDP
CNAVTS	112,5	5.1%
CNAVPL*	1,4	0.1%
MSA employees	8.4	0.4%
ARRCO	50.4	2.3%
AGIRC	25.1	1.1%
FPE	53.3	2.4%
CNRACL	18.0	0.8%
Special schemes¹⁴	10.9	0.5%
RSI*	13.0	0.6%
MSA farmers*	13.2	0.6%

Source: Social Protection Accounts, Drees, 2015

**basic scheme only*

¹⁴ SNCF, CRPCEN, CAVIMAC, ENIM, CANSSM, CNBF

- Definition of pension expenditure

Table 6 - Eurostat (ESSPROS) vs. Ageing Working Group definition of pension expenditure (% GDP)

	2007	2008	2009	2010	2011	2012	2013	2014
1 Eurostat total pension expenditure	13,1	13,3	14,3	14,3	14,5	14,8	15,0	15,2
2 Eurostat public pension expenditure	13,1	13,3	14,3	14,3	14,5	14,8	15,0	15,2
3 Public pension expenditure (AWG)	13,0	13,2	14,2	14,2	14,4	14,7	15,0	15,1
4 Difference (2) - (3)	0,1	0,1	0,1	0,1	0,1	0,0	0,1	0,1
5 Expenditure categories not considered in the AWG definition, please specify:								
5.1 Early retirement benefits	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1

Source: Eurostat ESSPROS data (July 2014) and Social Protection Accounts, 2011 and 2015

Early retirement benefit values before 2011 are interpolated.

In this exercise like in the 2012 and 2015 ones, we strictly limit expenditures to pensions and take into account disability pensions paid before and after the legal retirement age.

Compared to Eurostat definition of pension expenditures, we do not include early retirement benefits due to labour market reasons (special schemes in which workers receive retirement pensions because they are out of work or otherwise for reasons of labour market policy) that are recorded in unemployment benefits in French accounting and represent a very limited amount of expenditures.

Similarly to the 2015 exercise, we include the allowance for adults with disability (AAH, 0.4% of GDP) in disability pensions, which was previously in long-term care projections. This allowance was shifted from long-term care to disability pensions due to changes in social protection accounts' classifications.

- Pension contributions

Regarding the financing of old-age pensions, only the strictly speaking contributions (i.e. collected on labour income) have been projected, in accordance with AWG guidelines. However, these contributions represent only a part of the global resources available. For old age pensions, it represents around 80% of the global resources available in 2015; the remaining 20% is collected through earmarked taxes, the FSV financial fund and taxes based on all the other types of revenue (capital, replacement revenue...).

3.2. Overview of projection results

Gross public pension spending is predicted to decrease from 15.0 % of GDP in 2016 to 11.8 % in 2070, and peak in 2032 at 15.6 % GDP, which represents an overall decrease of 3.2 GDP points over the whole 2016-2070 period (Table 7).

Table 7 - Projected gross and net pension spending and contributions (% of GDP)

Expenditure	2016	2020	2030	2040	2050	2060	2070	Peak year*
Gross public pension expenditure	15,0	15,0	15,4	15,1	13,8	12,5	11,8	2032
Private occupational pensions	:	:	:	:	:	:	:	:
Private individual pensions	:	:	:	:	:	:	:	:
<i>Mandatory private</i>	:	:	:	:	:	:	:	:
<i>Non-mandatory private</i>	:	:	:	:	:	:	:	:
Gross total pension expenditure	15,0	15,0	15,4	15,1	13,8	12,5	11,8	2032
Net public pension expenditure	13,4	13,4	13,8	13,4	12,3	11,2	10,5	2032
Net total pension expenditure	:	:	:	:	:	:	:	:
Contributions	2016	2020	2030	2040	2050	2060	:	Peak year*
Public pension contributions	11,9	11,8	11,7	11,8	11,7	11,7	11,9	2017
Total pension contributions	11,9	11,8	11,7	11,8	11,7	11,7	11,9	2017

Source: Insee, DESTINIE model, calculations: DG Trésor

*Explanatory note: *Net public pension expenditures are net of taxes on pensions. In accordance with Commission guidelines, tax revenues as a share of pension expenditures stay constant over time. The average tax rate in 2016 was 10.9 %*

***This column represents a peak year, i.e. the year in which the particular variable reaches its maximum over the projection period 2016 to 2070.)*

3.2.1. Overview of pension expenditures (% of GDP) over the projection period

Concerning the 2016-2070 evolution of the ratio between projected pension expenditures and GDP, five periods can be identified (Graph 2):

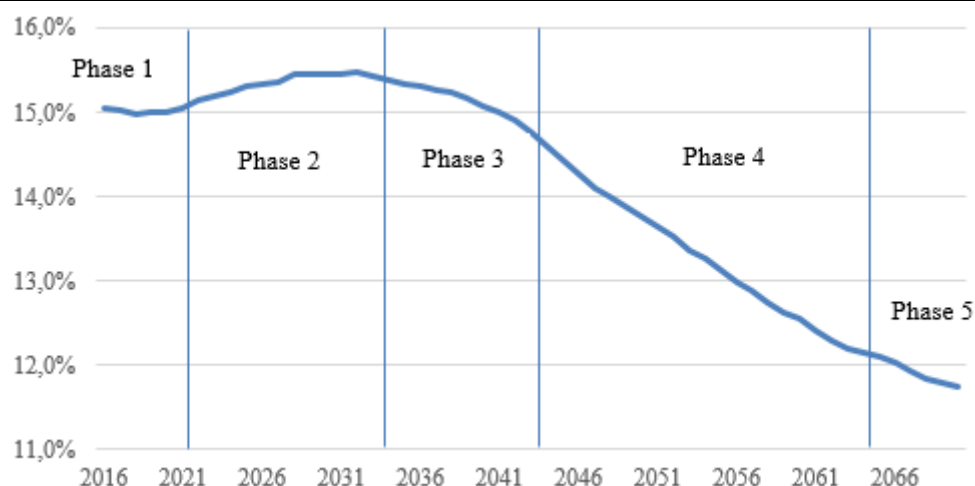
- **Phase 1:** Up to 2020, pension expenditures as a share of GDP will remain stable despite the ageing of the population due to the progressive increase of the retirement age to 62 (2010 reform effect) and relatively strong nominal GDP growth.
- **Phase 2:** From 2021 to 2029, the ratio between pension expenditures and GDP will increase up to 15.5% and then stagnate around this level until 2032. During this period, the number of pensioners and the amount of new pensions is expected to continue raising at a sustained pace.

The ratio of pension expenditures to GDP is expected to decline continuously over the period 2033-2070, to reach 11.8 % of GDP in 2070. This decline can be further broken down into three sub-periods:

- **Phase 3:** From 2033 to 2042, growth in pension expenditures will start showing signs of deceleration which reflects the effect of the 2014 reform which consists in a progressive increase of the minimum contribution period for a full rate pension.
- **Phase 4:** From 2043 to 2063, pension expenditures as a share of GDP are expected to decline due to the slowdown of the ageing process which will prevent the number of people aged 65 and above and hence the number of retirees from growing. Strong nominal GDP growth relative to growth in pension expenditures will also contribute to the sustained decline in the public pension expenditure-to-GDP ratio.

- Phase 5: From 2063 to 2070, pension expenditures as a share of GDP will continue to decline but at a slower pace as the growth rate of people aged 65 and above will accelerate and nominal GDP growth will slightly decelerate.

Graph 2 - Projected pension expenditures (% of GDP)



Source: Insee, DESTINIE model, calculations: DG Trésor

The global decrease of pension expenditures relative to GDP is also predicted in the national projections made by the COR (the French pension advisory council), but the decrease is not expected to be as strong as it is according to the AWG projections due to less favourable demographic conditions (cf. annex D).

3.2.2. Overview of pension expenditures (% of GDP) by types of pension

Old-age earnings-related pension spending (Table 8), as a share of GDP, would go down from 12.1% of GDP in 2016 to 9.9% of GDP in 2070. By shifting the legal and statutory retirement ages, and increasing the minimum contribution period, the 2014 reform contributed to reduce the weight of total pension expenditures in GDP. Moreover, more fragmented careers and later entry into the labour market imply a lower average amount of pensions as well as a lower average replacement rate at retirement.

Survivors' pensions, as a share of GDP, are expected to decline from 1.6% in 2016 to 0.8% of GDP in 2070. The overwhelming majority of survivor pensions' beneficiaries are women: the reduction of the gap between life expectancies of men and women, the relative increase of women employment rates, and the decrease of the number of weddings induce that women will have a lower and time-limited amount of survivors' pensions over the projection period.

Disability pension expenditures (ATMP, "pension d'invalidité" (both earnings-related pensions) and Allocation aux Adultes Handicapés (non earnings-related)), as a share of GDP,

are projected to decline slightly over the time period as the non earnings-related benefit is price-indexed ¹⁵.

The ratio between non earnings-related old-age pensions (“ASPA” or “minimum vieillesse”) and GDP will first increase until 2037 and then slightly decrease to 0.2 % by 2070 (the impact of the change in the indexation mechanism from 2050 onwards (wage instead of CPI indexation) is relatively small (+0.1 GDP point), cf. Table 19).

Table 8 - Projected gross public pension spending by scheme (% of GDP)

Pension scheme	2016	2020	2030	2040	2050	2060	2070	Peak year *
Total public pensions	15,0	15,0	15,4	15,1	13,8	12,5	11,8	2032
of which								
Old age and early pensions:	12,3	12,3	13,0	12,8	11,7	10,7	10,1	2032
<i>Flat component</i>	:	:	:	:	:	:	:	:
<i>Earnings related</i>	12,1	12,2	12,7	12,5	11,5	10,5	9,9	2032
<i>Minimum pensions (non-contributory) i.e. minimum income guarantee for people above 65</i>	0,2	0,2	0,3	0,3	0,2	0,2	0,2	2037
Disability pensions	1,12	1,10	1,02	0,95	0,89	0,88	0,84	2017
Survivor pensions	1,64	1,56	1,46	1,36	1,15	1,00	0,84	2016
Other pensions	:	:	:	:	:	:	:	:

Source: Insee, DESTINIE model, calculations: DG Trésor

3.3. Description of main driving forces behind the projection results

In order to identify more clearly the driving forces behind the projection results, the pension-to-GDP ratio is split into 4 factors:

$$\begin{aligned}
 \frac{\text{Pension Exp}}{\text{GDP}} &= \overbrace{\frac{\text{Population 65 +}}{\text{Population 20 - 64}}}^{\text{DependencyRatio}} \times \overbrace{\frac{\text{Number of Pensioners (Pensions)}}{\text{Population 65 +}}}^{\text{CoverageRatio}} \\
 &\times \overbrace{\frac{\text{Average income from pensions (Average Pension)}}{\text{GDP}}}^{\text{Benefit Ratio}} \times \overbrace{\frac{\text{Population 20 - 64}}{\text{Hours Worked 20 - 74}}}^{\text{Labour Market / LabourIntensity}} \quad [1]
 \end{aligned}$$

The coverage ratio is further split in order to better understand the evolution of the take-up ratios for old-age pensions and early pensions:

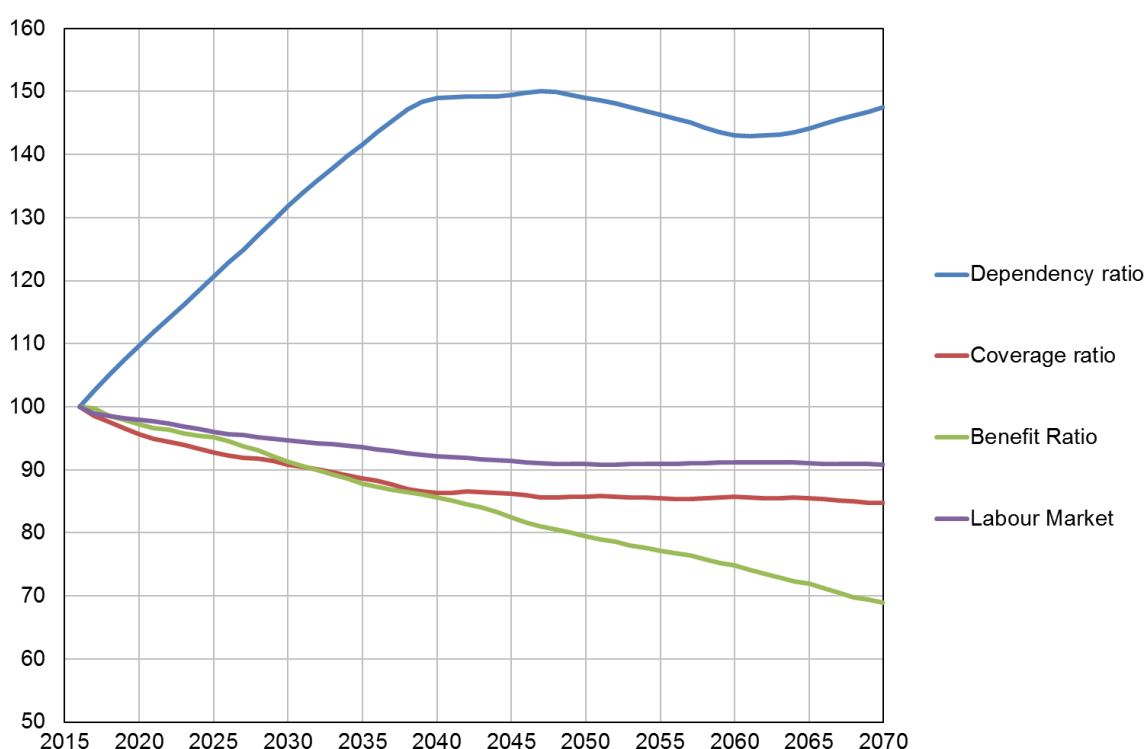
¹⁵ The government has decided to increase the AAH (non-earnings-related disability pension) on an extraordinary basis in November 2018 and November 2019 in order to bring the amount of the benefit to 900 euros by 2019 from 810,89 euros in 2017. The projections do not factor in this extraordinary measure as it had not been adopted by the Parliament at the time the projections were made.

$$\begin{aligned}
& \overbrace{\frac{\text{Number of Pensioners}}{\text{Population 65+}} = \text{CoverageRatio}} \\
& = \overbrace{\frac{\text{Number of Pensioners 65+}}{\text{Population 65+}} = \text{CoverageRatio Old-Age}} + \left(\overbrace{\frac{\text{Number of Pensioners } \leq 65}{\text{Population 50-64}} = \text{CoverageRatio Early-Age}} \times \overbrace{\frac{\text{Population 50-64}}{\text{Population 65+}} = \text{Cohorteffect}} \right) \quad [2]
\end{aligned}$$

The labour market indicator is further decomposed as follows:

$$\begin{aligned}
& \overbrace{\frac{\text{Population 20-64}}{\text{Hours Worked 20-74}} = \text{Labour Market / Labour Intensity}} \\
& = \overbrace{\frac{\text{Population 20-64}}{\text{Working People 20-64}} = 1/\text{Employment Rate}} \times \overbrace{\frac{\text{Working People 20-64}}{\text{Hours Worked 20-64}} = 1/\text{Labour Intensity}} \times \overbrace{\frac{\text{Hours Worked 20-64}}{\text{Hours Worked 20-74}} = 1/\text{Career shift}} \quad [3]
\end{aligned}$$

Graph 3 - Evolution of the main driving forces behind the projection results



Source: Commission services; Insee, DESTINIE model, calculations: DG Trésor

On the basis of the Eurostat demographic assumptions, the dependency ratio (population 65+/population 20-64) notably increases up to 2040 (Graph 3). It slightly decreases over the 2050's and increases again at the end of the projection period. Concerning the impact, *ceteris paribus*, of each of the factors considered on the evolution of pension expenditures (Table 9.a), the dependency ratio pushes up pension expenditures between 2016 and 2040 (+6.2 pp) and at

the end of projection period (+0.4pp between 2060 and 2070). It brings the public expenditure-to-GDP ratio down between 2050 and 2060 (-0.5pp) and is neutral between 2040 and 2050.

The coverage ratio (pensioners/population 65+) regularly decreases until 2040 and then stabilizes to end up at 85% of its original value. This is linked to the increase in retirement ages planned by the 2010 reform, but also to the increase in the full pension contribution period which, associated with an increase in the labour market entry age, leads to higher retirement ages. The coverage ratio mainly reduces public pension expenditures as a share of GDP until 2040 (-2.8pp).

The benefit ratio (defined as the average pension benefit divided by the economy-wide average wage) declines all along the period, to reach in 2070 a level which is 30% lower than the current level. The reduction of the benefit ratio reflects the subdued growth pace of the average pension compared to that of the average wage per worker. First, the increase in discontinuous careers due to high unemployment rates will not only decrease the average of the 25 best yearly wages (used to calculate the pension) but also impact *the prorata coefficient* if individuals do not have the required number of contributed years. Second, pensions are price-indexed while, the average wage per worker increases in line with labour productivity or GDP per worker, hence more rapidly. Finally, changes to the benefit formulae induced by the last reforms will also contribute to the decline of the benefit ratio.

The labour market indicator (population aged 20 to 64/employed population aged 20 to 74) declines over the first 25 years of the projection horizon and remains quite stable thereafter.

Table 9.a - Factors behind the change in public pension expenditures between 2016 and 2070 (in percentage points of GDP) – pensioners

	2016-20	2020-30	2030-40	2040-50	2050-60	2060-70	2016-70	Average annual change
Public pensions to GDP	-0.1	0.5	-0.4	-1.3	-1.2	-0.8	-3.3	-0.061
Dependency ratio effect	1.5	2.9	1.9	0.0	-0.5	0.4	6.2	11.0%
Coverage ratio effect	-0.7	-1.1	-0.9	-0.1	0.1	-0.2	-2.9	-5.5%
Coverage ratio old-age*	-0.1	-0.1	-0.1	0.0	0.0	-0.1	-0.3	-0.6%
Coverage ratio early-age*	-1.0	-0.9	-1.1	-0.1	-0.8	-0.2	-4.2	-7.8%
Cohort effect*	-1.2	-3.0	-2.8	-0.2	1.2	-0.5	-6.4	-12.5%
Benefit ratio effect	-0.4	-0.7	-0.9	-1.1	-0.8	-0.9	-4.8	-8.9%
Labour Market/Labour intensity effect	-0.3	-0.5	-0.4	-0.2	0.0	-0.1	-1.4	-2.7%
Employment ratio effect	-0.3	-0.3	-0.3	-0.2	0.0	0.0	-1.0	-1.9%
Labour intensity effect	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0%
Career shift effect	0.0	-0.2	-0.1	0.0	0.0	0.0	-0.4	-0.7%
Residual	-0.1	-0.2	-0.1	0.0	0.0	0.0	-0.3	-0.1%

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

Source: Commission services; Insee, DESTINIE model, calculations: DG Trésor

As noted before, most of the time, individuals have to contribute both to a basic and complementary schemes, all of them compulsory. Moreover, old-age insurance is organized on a socio-professional principle. It entails two consequences: first, people tend to benefit from more than one pension (basic + complementary) and, second, given their career, they can benefit from more than one basic pension. Therefore, focusing on the number of pensions instead of the number of pensioners (Table 9.b) is not appropriate in the French case because people can cumulate several pensions (cf. Annex A), which is difficult to interpret. In the model, the coverage ratio effect is then positive between 2040 and 2060, mostly due to the fact that the average number of pensions by pensioner increases during the projection period. Indeed, people are more likely to work in various sectors during their careers because of the expected rise in labour mobility, which in turn rises the probability of cumulating several pensions. On the contrary, the benefit ratio effect is even more negative because the average amount of pension is lower than the average amount of pension by *pensioner*.

Table 9.b - Factors behind the change in public pension expenditures between 2016 and 2070 (in percentage points of GDP) – pensions

	2016-20	2020-30	2030-40	2040-50	2050-60	2060-70	2016-70	Average annual change
Public pensions to GDP	-0.1	0.5	-0.4	-1.3	-1.2	-0.8	-3.3	-0.061
Dependency ratio effect	1.5	2.9	1.9	0.0	-0.5	0.4	6.2	11.0%
Coverage ratio effect	-0.5	-0.7	-0.5	0.3	0.5	-0.1	-1.0	-1.9%
Coverage ratio old-age*	0.2	0.2	0.2	0.3	0.5	0.0	1.4	2.5%
Coverage ratio early-age*	-1.5	-1.6	-2.2	0.1	-0.9	-0.4	-6.5	-12.3%
Cohort effect*	-1.2	-3.0	-2.8	-0.2	1.2	-0.5	-6.4	-12.5%
Benefit ratio effect	-0.6	-1.1	-1.3	-1.4	-1.2	-1.0	-6.6	-12.4%
Labour Market/Labour intensity effect	-0.3	-0.5	-0.4	-0.2	0.0	-0.1	-1.4	-2.7%
Employment ratio effect	-0.3	-0.3	-0.3	-0.2	0.0	0.0	-1.0	-1.9%
Labour intensity effect	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0%
Career shift effect	0.0	-0.2	-0.1	0.0	0.0	0.0	-0.4	-0.7%
Residual	-0.1	-0.2	-0.1	0.0	0.0	0.0	-0.4	-0.1%

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

Source: Commission services; Insee, DESTINIE model, calculations: DG Trésor

The benefit ratio (BR - calculated as the average pension compared to the economy-wide average wage) and the replacement rate (RR - calculated as the ratio between the average pension of new pensioners and the average wage at retirement) will both decline during the projection horizon (Table 10). This decline comes from several factors: the rise in the full pension contribution period, the rule used to discount past wages entering into the benefit formula in interaction with an increase in the labour market entry age and more fragmented careers, the development of polypension (when one pensioner cumulates several pensions) that can imply smaller pensions because of the specific rules applied in this situation.

RR are usually calculated individually, by comparing the new pension at retirement with the last wage at retirement¹⁶, and presented through the median replacement rate of the population. They are also often calculated for theoretical or typical careers, for instance an entire career of a private sector employee paid at the average wage. On the contrary in this exercise, RR are *averaged* over all careers and all schemes; they are therefore smaller than the replacement rates exhibited in other reports, and should be interpreted carefully. The BR, calculated by comparing pensions and wages of different generations, is not a replacement rate: its evolution reflects the relative differences in the standards of living of the workers and the pensioners.

Table 10 - Replacement rate at retirement (RR), benefit ratio (BR) and coverage by pension scheme (in %)

	2016	2020	2030	2040	2050	2060	2070
Public scheme (BR)	50%	50%	47%	44%	41%	39%	36%
Public scheme (RR)	51%	62%	56%	50%	43%	40%	38%
Coverage	100,0	100,0	100,0	100,0	100,0	100,0	100,0
Public scheme old-age earnings related (BR)	52%	51%	48%	44%	41%	39%	36%
Public scheme old-age earnings related (RR)	45%	53%	49%	48%	40%	38%	36%
Coverage	79,0	79,6	81,2	82,9	83,6	83,5	84,4
Private occupational scheme (BR)	:	:	:	:	:	:	:
Private occupational scheme (RR)	:	:	:	:	:	:	:
Coverage	:	:	:	:	:	:	:
Private individual scheme (BR)	:	:	:	:	:	:	:
Private individual scheme (RR)	:	:	:	:	:	:	:
Coverage	:	:	:	:	:	:	:
Total (BR)	50%	50%	47%	44%	41%	39%	36%
Total (RR)	:	:	:	:	:	:	:

Source: Insee, DESTINIE model, calculations: DG Trésor

Explanatory note: Coverage of each pension scheme is calculated as a ratio of the number of pensioners within the scheme and the total number of pensioners in the country.

**The public scheme replacement rate is only calculated on defined benefit schemes, point system schemes and survivors' pensions scheme.*

Like in the 2015 exercise, there are two reasons why the number of pensioners is higher than the number of people aged 65 and older (Table 11): on the one hand, some of the pensioners are younger than 65. On the other hand, pensioners living abroad are included, while the demographic projections are limited to the French territory¹⁷.

The number of pensioners increases by 28% between 2016 and 2070, versus 16% only for the employed population (Table 11). The growth of the number of pensioners is mostly concentrated before 2040, in line with the demographic projections. This leads to an increase in the retired-to-employed population ratio between 2016 and 2040, a slight decline between

¹⁶ Nonetheless, the definition of the replacement rate varies over the sources, and especially the definition of the reference wage. There are many different publications which compare the new pension with the last full-time wage, the average last 5 yearly wages, the wage at 50 years old, etc.

¹⁷ As a matter of fact, the sample of the population used to feed the Destinie model includes people living in France only, but pensioners living abroad are included ex-post.

2040 and 2060 and a small increase between 2060 and 2070. The old-age dependency ratio follows the same trend. The system efficiency ratio is expected to decrease over the projection period, mainly due to the evolution of the old-age dependency ratio.

Table 11 – System Dependency Ratio and Old-age Dependency Ratio

	2016	2020	2030	2040	2050	2060	2070
Number of pensioners (thousand) (I)	19 403,2	20 202,8	22 518,8	23 789,9	24 144,7	24 124,4	24 781,1
Employment (thousand) (II)	27 037,5	27 567,3	28 443,0	29 041,5	30 040,3	30 935,5	31 393,2
Pension System Dependency Ratio (SDR) (I)/(II)	71,8	73,3	79,2	81,9	80,4	78,0	78,9
Number of people aged 65+ (thousand) (III)	12 691,5	13 881,0	16 646,2	18 703,2	19 073,7	18 939,2	19 739,6
Working age population 15 - 64 (thousand) (IV)	41 809,1	41 775,0	41 593,1	41 457,0	42 375,2	43 694,0	44 108,2
Old-age Dependency Ratio (ODR) (III)/(IV)	30,4	33,2	40,0	45,1	45,0	43,3	44,8
System efficiency (SDR/ODR)	2,4	2,2	2,0	1,8	1,8	1,8	1,8

Source: Commission services; Insee, DESTINIE model, calculations: DG Trésor

With regard to the age decomposition (Tables 12.a to 13.b), one should note that before the age of 60, the ratio of pensioners to inactive population and total population is below 100% because there are few possibilities to retire before 60. Around 90% of the pensioners younger than 54, and 70% of the pensioners between 55 and 59 years old are disability pensioners. Conversely, this ratio is generally above 100% for individuals aged 60 or above partly because inactive population is estimated on the French territory while pensioners living abroad are still included in the projection (they account for approximately 6% of total pensioners). Moreover, the computation of the pensioners-to-inactive population and pensioners-to-total population ratios by age groups rely on two different data sources. The number of pensioners by age groups is calculated based on national projections (old-age pensions and disability pensions). Inactive and total population figures stem from labour force projections obtained through the CSM method run by the Commission.

The pensioners-to-inactive population ratios by age groups are broadly stable over the projection period, except for the age group 60-64. The ratio for the age group 60-64 declines by 20pp between 2016 and 2070. Although we should remain very cautious in the interpretation of this ratio and its evolution given the aforementioned limitations, the evolution of the ratio likely reflects the effect of the 2010 and 2014 reforms that have increased the retirement age and the conditions for being granted a full rate pension. Hence, a larger share of people aged between 60 and 64 is expected to be working in the coming decades. This is also reflected by the evolution of the share of 60 to 64 year old pensioners among the total 60 to 64 year old population which is projected to sharply decrease over the projection horizon. The same trend holds for women (Tables 13.a and 13.b).

The coverage ratio profiles also depend on retirement behaviour assumptions. But as the French pension system is almost actuarially neutral at the margin, the impact of this assumption on public pension expenditures is small (cf. annex E).

Table 12a – Pensioners (public schemes) to inactive population ratio by age group (%)

	2016	2020	2030	2040	2050	2060	2070
Age group -54	12,1	12,0	11,6	11,4	11,6	11,7	11,6
Age group 55-59	81,0	75,0	84,8	75,4	78,1	75,5	72,6
Age group 60-64	99,6	98,0	95,8	84,3	88,1	83,0	77,9
Age group 65-69	112,0	110,4	114,3	115,2	119,6	120,5	118,7
Age group 70-74	107,6	107,2	108,1	109,2	110,1	110,7	110,9
Age group 75+	104,4	105,1	105,9	106,1	105,9	105,8	105,6

Source: Commission services; Insee, DESTINIE model, calculations: DG Trésor

Table 12b – Pensioners (public schemes) to population ratio by age group (%)

	2016	2020	2030	2040	2050	2060	2070
Age group -54	5,4	5,4	5,2	5,2	5,2	5,2	5,2
Age group 55-59	19,7	18,5	18,4	17,4	17,2	16,6	15,9
Age group 60-64	69,5	60,8	49,5	37,8	36,9	34,4	32,4
Age group 65-69	104,6	101,0	96,8	92,2	91,2	91,1	89,8
Age group 70-74	104,6	105,3	105,4	105,4	105,0	105,6	105,7
Age group 75+	104,4	105,1	105,9	106,1	105,9	105,8	105,6

Source: Commission services; Insee, DESTINIE model, calculations: DG Trésor

Table 13.a – Female pensioners (public schemes) to inactive population ratio by age group (%)

	2016	2020	2030	2040	2050	2060	2070
Age group -54	9,4	9,4	8,9	8,6	8,6	8,6	8,4
Age group 55-59	78,9	74,5	80,6	73,9	75,2	70,1	66,5
Age group 60-64	93,7	92,3	96,3	89,3	93,4	89,3	83,9
Age group 65-69	109,6	107,7	111,0	115,5	118,3	119,7	117,2
Age group 70-74	106,3	106,5	107,6	109,0	109,7	110,1	110,9
Age group 75+	103,6	104,6	106,0	106,4	106,2	106,0	105,6

Source: Commission services; Insee, DESTINIE model, calculations: DG Trésor

Table 13.b – Female pensioners (public schemes) to total population ratio by age group (%)

	2016	2020	2030	2040	2050	2060	2070
Age group -54	4,4	4,4	4,2	4,1	4,1	4,0	4,0
Age group 55-59	22,4	20,8	20,1	18,8	18,3	17,0	16,2
Age group 60-64	65,4	59,6	52,4	42,7	42,0	39,7	37,4
Age group 65-69	104,0	99,1	95,9	93,5	91,4	91,8	89,9
Age group 70-74	103,9	105,0	105,3	105,5	104,9	105,2	105,9
Age group 75+	103,6	104,6	106,0	106,4	106,2	106,0	105,6

Source: Commission services; Insee, DESTINIE model, calculations: DG Trésor

The flow of new pension expenditures (public old-age earnings-related pensions for new pensioners) can be broken down as the product of three terms: the average amount of new pensions, the number of new pensioners¹⁸ and the average number of months paid in the first year. The average amount of new pensions can also be analyzed as the product of three terms (table 14.a)¹⁹:

1. the average contribution period of new pensioners ;
2. the value of pensionable earnings of new pensioners computed as the average of the present value of the 25 best annual wages²⁰;
3. the effective average accrual rate for new pensioners There is no administrative accrual rate in the French legislation. Nevertheless, given the average amount of new pensions, the average contribution period among of new pensioners and the value of pensionable earnings of new pensioners, it is possible to estimate ex-post “effective” accrual rates (see annex F).

There is no sustainability factor in the French pension system, therefore this factor remains constant over the projection period.

Table 14.a - Projected and disaggregated new public pension expenditure (old-age and early earnings-related pensions) – Total

	2016	2020	2030	2040	2050	2060	2070
I Projected new pension expenditures (€ mln)	7325,7	7180,8	10805,0	17738,7	25027,8	34799,1	52791,4
II. Average contributory period	34,5	36,1	31,8	32,6	32,2	33,5	33,6
III. Monthly average pensionable earnings (€)	3042,5	2990,4	3603,4	5249,7	7087,2	10373,3	14586,0
IV. Average accrual rate (%)	1,5	1,5	1,7	1,7	1,7	1,6	1,5
V. Sustainability/Adjustment factor	1,0	1,0	1,0	1,0	1,0	1,0	1,0
VI. Number of new pensioners ('000)	619,7	705,0	828,5	747,6	818,6	769,5	858,0
VII. Average number of months paid the first year	7,3	6,1	6,7	8,0	8,1	8,3	8,2
Monthly average pensionable earnings / Monthly economy-wide average wage	106,8%	96,4%	87,2%	92,3%	88,0%	90,7%	89,8%

Source: Insee, DESTINIE model, calculations: DG Trésor

Explanatory note: Monthly average pensionable earnings are calculated as the average of the present value²¹ of the 25 highest annual wages of each individual.

¹⁸ As noted previously, it is common for a French pensioner to receive several pensions due to the design of the pension system. Therefore, we do not use the number of new pensions (as recommended by the Commission) but the number of new pensioners for all the calculations.

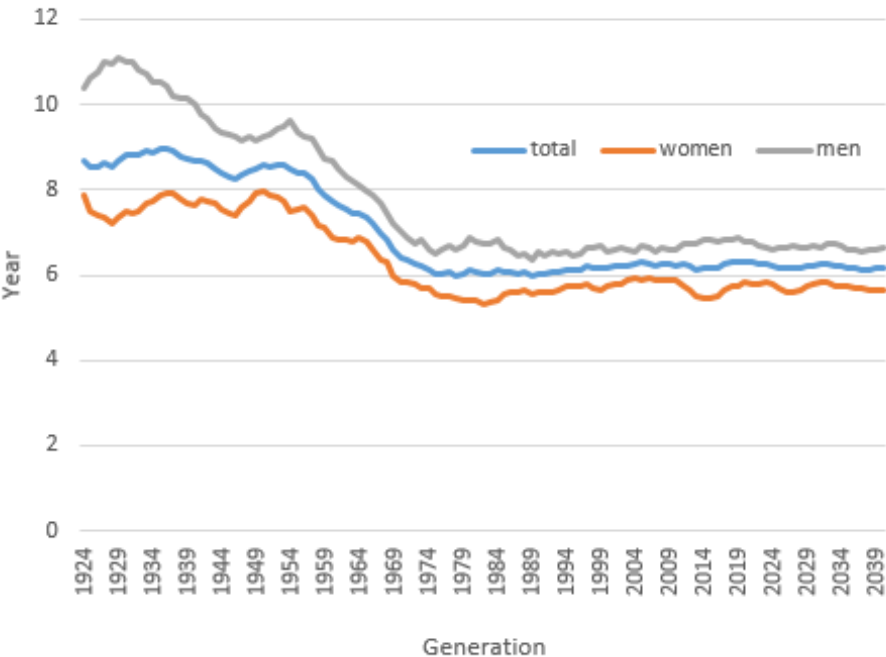
¹⁹ In table 14 (a,b and c), point system schemes pensions are decomposed as if they were computed using the defined benefit schemes formula and added to the decomposition of DB pensions. For the breakdown of new public pension expenditures by type of scheme, cf. annex F.

²⁰ In practice, the reference wage defined in the legislation depends on the sector considered: the 25 best years wage average is used in the general scheme, whereas the whole career wages are used to acquire points in the complementary pension scheme, and in the public service scheme, the reference wage is the last 6-month wage (excluding bonuses). By convention for the new pension decomposition (but not in the pension calculation), the 25 best years wage average has been retained for all pension schemes.

²¹ Past wages are valorized in line with CPI.

1. The contribution period, which equals here the number of years a person earns a labour income, is stable over the horizon of the projection (decreasing for men and increasing for women). The delayed entry in the job market due to the increasing duration of studies (Graph 4.a) balances the increase in the required contribution period. The increase in the duration of education for post-war generations was accelerated by some policy changes, like the increase of the minimum age of mandatory education from 14 to 16 for children born after 1953²². The distribution of ages of the new pensioners does move up for both men and women between 2016 and 2070, reflecting the effects of the recent pension reforms (Graph 4.b).

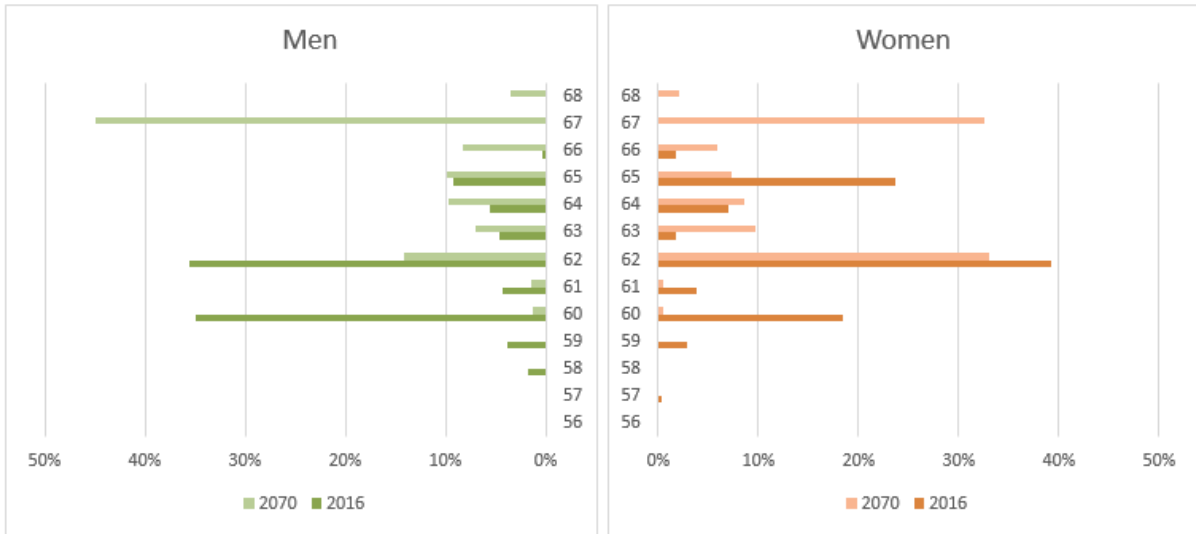
Graph 4.a – Evolution of the average contributory period before the age of 30 by generation – 5-year moving average*



* calculated as the number of years a person earns a labour income before the age of 30
 Source: Insee : Destinie model, DG Trésor

²² [Executive order of 6 January 1959](#)

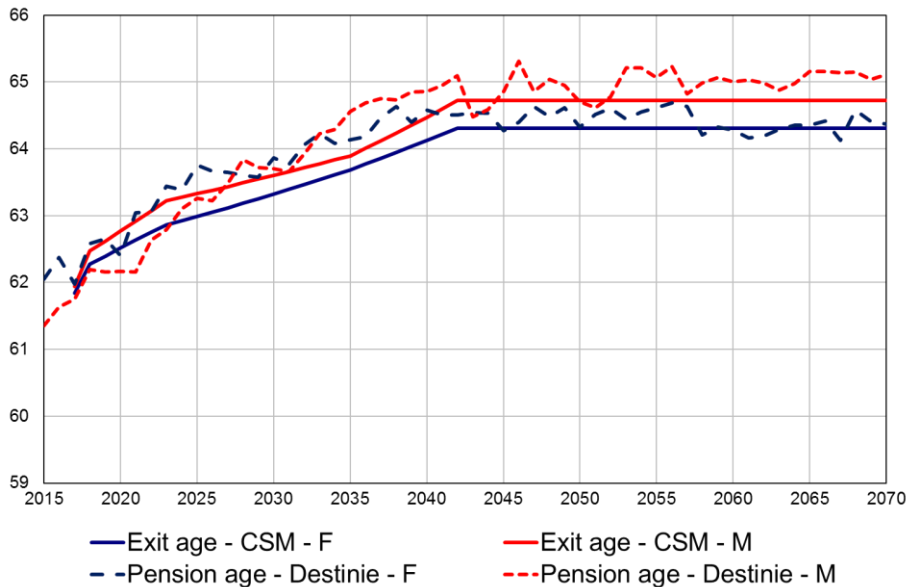
Graph 4.b - New pensioners – Breakdown by age and sex



Source: Insee, DESTINIE model, calculations: DG Trésor

Compared to the 2015 projection exercise, there is a better match between CSM projection of the labour force exit age and the pension age projected by the French microsimulation model (Graph 4.c). The pension age for men is slightly lower than the labor market exit age calculated by the Commission. This is due to the early retirement scheme for long careers which is not factored into the CSM calculation.

Graph 4.c - Average labour market exit age (CSM) vs pension age (Destinie)



Source: Commission services, Insee Destinie model, calculation: DG Trésor

2. Pensionable earnings follow the progression of wages of individuals along their career. The increase of the average amount of monthly pensionable earnings is thus linked to productivity gains.

3. The average accrual rate gives an insight of the ratio between the average replacement rate at retirement, and the average contributory period for the entire career. Its value is higher for women than for men mainly for three reasons:

- a) There is a contributory minimum pension in the private sector as well as in the public one. It is provided by the main pension schemes and it should not be confused with the "Allocation de Solidarité pour les Personnes Âgées", which is a social assistance benefit financed by the public old-age solidarity fund (FSV – Fonds de Solidarité Vieillesse). The contributory minimum pension is attributed to people who meet the conditions for a full pension. It is called "Minimum contributif" (or Mico) for private sector employees, "Minimum garanti" (or Mingar) for public sector employees. This minimum pension benefits to people who have earned low revenues (and/or who have worked part-time). Thus, beneficiaries from this minimum pension have a relatively higher accrual rate, since they receive a higher pension compared to what they have contributed for. A bit less than one fifth of private sector employees are entitled to the contributory minimum. Around two thirds of women are entitled to the contributory minimum against only 4 men out of 10, as women have lower revenues on average. This leads to a higher average accrual rate for women.
- b) Women also tend to benefit more from other redistributive elements than men (especially maternity leave bonuses) which raises their average accrual rate compared to men.
- c) By design, high-wage earners tend to have a lower accrual rate in France as only revenues below the social security ceiling are factored into the calculation of the benefit. Thus, pensions of high-wage earners are lower relative to their wage for workers with high salaries than for low-income earners, which implies a lower accrual rate. Since wages are on average higher for men than for women, it contributes to a lower accrual rate for men.

Finally, the number of new pensioners is not expected to increase significantly over the projection period and is expected to remain close to the number of new pensioners per year observed over the past 10 years (cf. Table 14.a). The population is expected to age at a relatively fast pace over the first half of the projection period (cf. evolution of the old-age dependency ratio) but the effect of the 2014 reform (progressive increase of the minimum contributory period required for being granted a full pension before the age of 67) will keep the number of new pensioners contained²³. During the second half of the projection period (2035-2070), the population ageing process is expected to slow down, keeping the number of new pensioners per year relatively stable.

²³ The projections are made upon the assumption that individuals retire as soon as they are entitled to a full pension.

Table 14.b Number of new pensioners 2004-2015

<i>in '000</i>	Men	Women	All
2004	422	326	748
2005	386	330	716
2006	416	373	789
2007	427	398	825
2008	429	413	842
2009	351	388	739
2010	371	407	778
2011	313	368	681
2012	298	307	605
2013	374	384	758
2014	348	354	702
2015	327	326	653

Source: *La retraite et les retraités, Panoramas de la Drees, 2017*

Table 14.c - Projected and disaggregated new public pension expenditure (old-age and early earnings-related pensions) – MEN

	2016	2020	2030	2040	2050	2060	2070
I Projected new pension expenditure (mln €)	4177,4	4158,8	5682,1	9742,9	15119,5	19738,8	28797,6
II. Average contributory period	38,3	38,9	34,2	34,9	34,7	35,2	34,4
III. Monthly average pensionable earnings (€)	3558,9	3540,1	4236,6	6040,9	8450,9	12383,2	16503,1
IV. Average accrual rate (%)	1,4	1,4	1,5	1,5	1,5	1,3	1,4
VI. Number of new pensioners ('000)	310,4	348,7	386,9	354,1	408,8	379,3	431,7
VII. Average number of months paid the first year	7,0	6,2	6,6	8,5	8,5	8,9	8,6
Monthly average pensionable earnings / Monthly economy-wide average wage	124,9%	114,1%	102,6%	106,2%	104,9%	108,2%	101,5%

Source: *Commission services, Insee Destinie model, calculation: DG Trésor*

Table 14.d - Projected and disaggregated new public pension expenditure (old-age and early earnings-related pensions) – WOMEN

	2016	2020	2030	2040	2050	2060	2070
I Projected new pension expenditure (mln €)	3148,3	3022,0	5122,9	7995,8	9908,3	15060,3	23993,7
II. Average contributory period	30,7	33,3	29,7	30,6	29,6	31,9	32,8
III. Monthly average pensionable earnings (€)	2501,3	2440,6	3031,8	4523,3	5708,4	8420,0	12668,8
IV. Average accrual rate (%)	1,7	1,7	1,9	2,0	1,9	1,9	1,7
VI. Number of new pensioners ('000)	309,3	356,3	441,6	393,5	409,9	390,2	426,3
VII. Average number of months paid the first year	7,6	6,0	6,8	7,5	7,7	7,7	7,8
Monthly average pensionable earnings / Monthly economy-wide average wage	87,8%	78,7%	73,4%	79,5%	70,9%	73,6%	78,0%

Source: Commission services, Insee Destinie model, calculation: DG Trésor

For the breakdown of new public pension expenditures by type of scheme, cf. annex F.

3.4. Financing of the pension system

In 2017, contribution rates to the general basic pension scheme stand at 10.45% of the gross wage below the Social Security Ceiling (1 SSC = € 3 269 per month in 2017) for employers and 7.30% for workers in the main basic scheme.

Besides contributing to the main basic scheme, non-executive workers contribute to ARRCO at a 3.10% rate on the basis of the part of their wage below one SSC (the contribution rate is 4.65% for the employer), and at a 8.10% rate for the part of their wage between one and three SSC (respectively 12.15% for their employer). Non-executive workers also contribute to AGFF at a 0.80% rate (1.20% for their employer) on the basis of the part of their wage below one SSC and at a 0.90% rate for the part of their wage between one and three SSC (respectively 1.30% for their employer)

Executive employees contribute to the general scheme, to ARRCO (with respect to wage up to the ceiling), to AGFF, to another exceptional complementary contribution CET and to AGIRC (for wage between 1 and 8 times the ceiling).

Civil servants' contribution rate is 10.29% (employee) of their gross wage.²⁴ In reality (and not in the projections, cf. infra), the contribution rate of the State is determined and adjusted every year so as to balance the public schemes.

²⁴ The contribution rate for civil servants will increase from 7.85% to 11.10% by 2020.

Table 15 – Financing of the system

	Public sector employees*		Private sector employees**		Self-employed***	
	Basic scheme	Complementary scheme	Basic scheme	Complementary scheme****	Basic scheme	Complementary scheme
in 2017						
NB: 2017 Social Security Ceiling (SSC): 39 228€						
2017 gross minimum wage: 17 763€						
Contribution base	Gross salary (traitement indiciaire + NBI), excluding bonuses	Bonuses, up to 20% of "traitement indiciaire"	Gross annual salary, including some types of bonuses	Gross annual salary, including bonuses	Non-salaried work-related gross income	The contribution rate varies depending on the type of activity
Contribution rate - in %	84,57	10,00	17,75	9,75	10,10	
	Employer	:	10,45	5,85	:	
	Employee	5,00	7,30	3,90	:	
	State	5,00	:	:	:	
	Other revenues					
	Pensions Reserve Fund and Old-age solidarity fund.	Pensions Reserve Fund and Old-age solidarity fund.	Pensions Reserve Fund and Old-age solidarity fund.	Pensions Reserve Fund and Old-age solidarity fund.	Pensions Reserve Fund and Old-age solidarity fund.	
Maximum contribution (annual in 2017)	:	The contribution base cannot be higher than 20% of the gross salary (traitement indiciaire)	There is no ceiling, for revenues above the SSC, the contribution rate amounts to 2,3%	21 438 €	6 896 €	
Minimum contribution (annual in 2017)	:		In order to validate one quarter of a year of contribution (the minimum that can be validated per year), an employee must have earned at least 150 times the hourly minimum wage (1464 euros in 2017) over the year.	:	455 €	

*military excluded

**non-executive employee earning less than the social security ceiling

***self-employed earning less than the social security ceiling, craftsmen, tradesmen and lawyers excluded

****AGFF included

Source: DG Trésor

Only the contributions strictly speaking (i.e. collected on labour income) have been projected, in accordance with AWG guidelines (Table 16). As requested by the Commission, the implicit contribution rates are kept constant in the projection interval: as a result, the share of employer and employee contributions will remain stable. The State also pays a contribution as the employer of civil servants.

The number of contributors is defined as the number of working people; therefore the ratio to employment is always equal to 1.

Table 16 – Revenue from contribution (EUR millions), number of contributors in the public scheme (in 1000), total employment (in 1000) and related ratios (%)

	2016	2020	2030	2040	2050	2060	2070
Public contribution	265 461,7	294 005,3	399 155,1	563 534,5	819 060,5	1 194 640,3	1 750 069,1
Employer contribution	112 104,4	124 612,9	173 089,5	246 977,3	361 710,0	532 797,7	778 871,7
Employee contribution	82 738,4	93 563,1	128 669,3	183 233,6	266 771,9	390 970,5	571 467,3
State contribution	70 618,9	75 829,3	97 396,4	133 323,6	190 578,6	270 872,0	399 730,1
Other revenues	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Number of contributors (I)	26 604,4	26 895,2	27 661,8	28 359,9	29 121,9	30 002,4	30 865,0
Employment (II)	27 037,5	27 567,3	28 443,0	29 041,5	30 040,3	30 935,5	31 393,2
Ratio of (I)/(II)	1,0	1,0	1,0	1,0	1,0	1,0	1,0

Source: Commission services; Insee, DESTINIE model, calculations: DG Trésor

3.5. Sensitivity analysis

In order to assess the sensitivity of pension schemes to different economic assumptions, 10 sensitivity tests have been carried out. Definitions of these sensitivity tests and graphs of the evolution of pension expenditures under these scenarios are given in appendix G.

- Higher life expectancy scenario: public pension expenditures as a share of GDP are 0.5 point higher in 2070 than in the baseline scenario (Table 17). In this scenario, pensioners live longer and earn a pension during a longer period.
- Under the higher productivity scenario, while pension expenditures are driven up in the medium and long term as a result of higher productivity assumption, GDP increases even more, for most pensions are calculated on the basis of the average of the 25 best annual wages of individuals: impact on wages is then only progressively reflected on the final pension's level. Overall, the effect on the public pension expenditure-to-GDP ratio is positive, since in 2070 the ratio is expected to be lower by 1.5 point than in the baseline scenario. On the contrary, under the lower productivity scenario, the public pension expenditure-to-GDP ratio is 1.9 point higher in 2070 than in the baseline scenario.
- Employment scenarios:
 - Higher total employment rate: the public pension expenditure-to-GDP ratio is 0.3 point lower than in the baseline scenario in 2070. Pension expenditures are higher in this scenario as better careers mean workers can retire sooner with a full pension and have acquired more pension rights. As in the higher productivity scenario, the increase in pensions is compensated by a higher GDP due to the higher employment rates.
 - Higher senior employment rate: As in the previous scenario, the increase in pensions is compensated by an higher GDP.
 - Lower total employment rate: the public pension expenditure-to-GDP ratio is 0.2 point higher than in the baseline scenario in 2070.
- Migration-related scenarios:
 - Under the lower migration scenario, the public pension expenditure-to-GDP ratio is 0.5 point higher than in the baseline scenario in 2070.
 - Under the higher migration scenario, the public pension expenditure-to-GDP ratio is 0.4 point lower than in the baseline scenario in 2070.
- Under the low fertility scenario, the smaller cohorts after 2016 lead to a lower labour force after the mid-thirties, which decrease GDP and raise the pension expenditure-to-GDP ratio by 1.9 point.
- Under the TFP risk scenario, the public pension expenditure-to-GDP ratio is higher than in the baseline scenario by 0.9 point in 2070. Pension expenditures and GDP are negatively affected by the lower TFP growth rate, but the effect on GDP dominates.
- The policy scenario links the minimum and statutory retirement age to increases in life expectancy after 2022, when the 2010 reform reach its full effect. The reference contributory

period is unchanged. The increase in the effective retirement age leads to lower pension expenditures, the average pension being slightly higher but served on a shorter period.

Table 17 - Public pension expenditures under different scenarios (deviation from the baseline)

	2016	2020	2030	2050	2070
Baseline	15,0	15,0	15,4	13,8	11,8
Productivity					
Higher TFP	0,0	0,1	0,1	-1,0	-1,5
Lower TFP	0,0	0,0	0,1	1,1	1,9
Demography					
Higher Life expectancy	0,0	0,1	0,1	0,3	0,5
Lower Migration	0,0	0,0	0,1	0,3	0,5
Higher Migration	0,0	0,0	0,0	-0,2	-0,4
Low Fertility			0,0	0,9	1,9
Employment					
Lower Employment rate	0,0	0,1	0,4	0,3	0,2
Higher Employment rate	0,0	-0,1	-0,5	-0,5	-0,3
Higher Employment rate for the elderly	0,0	-0,1	-0,6	-0,6	-0,4
Risk and policy scenarios					
Risk scenario	0,0	0,0	0,1	0,6	0,9
Linking retirement age to life expectancy	0,0	0,0	-0,2	-0,7	-1,6

Source: Insee, DESTINIE model, calculations: DG Trésor

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

Public pension expenditures as a share of GDP are projected to decrease over the projection period (Table 18) as it is projected by French institutions (Conseil d'orientation des retraites, Institut national de la statistique et des études économiques), but to a lesser extent. Compared to the 2015 exercise, the new demographic (higher life expectancy and lower net migration) and macroeconomic (lower productivity growth in the medium-term) assumptions explain the revision (Graph 5.1).

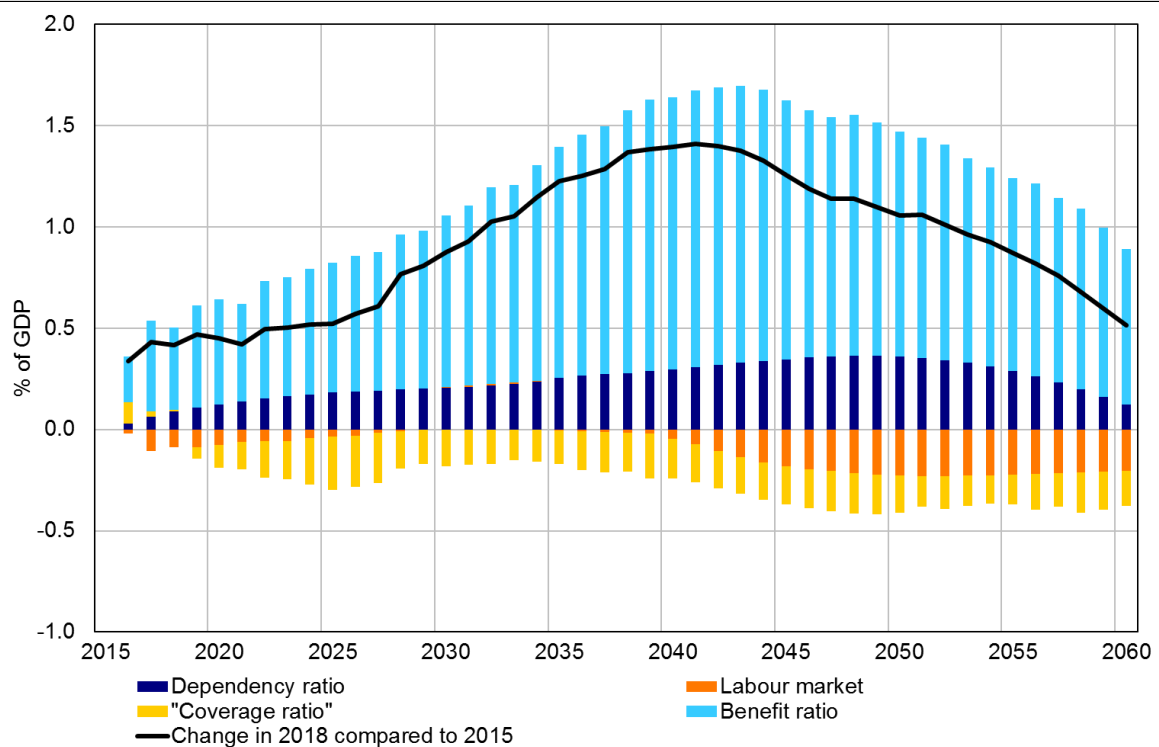
Table 18 - Overall change in public pension expenditure to GDP under the 2006, 2009, 2012, 2015 and 2018 projection exercises

	Public pensions to GDP	Dependency ratio	Coverage ratio	Employment effect	Benefit ratio	Labour intensity	Residual (incl. Interaction effect)
2006 *	1,98	8,69	-1,79	-0,93	-3,52	:	-0,48
2009 **	1,01	8,40	-2,20	-0,51	-4,03	:	-0,66
2012 ***	0,54	9,15	-3,53	-1,23	-3,08	-0,01	-0,76
2015****	-2,76	6,75	1,71	-0,98	-9,36	-0,02	-0,86
2018*****	-3,30	6,16	-1,06	-1,05	-6,59	-0,01	-0,76

Source: Commission services based on French projections

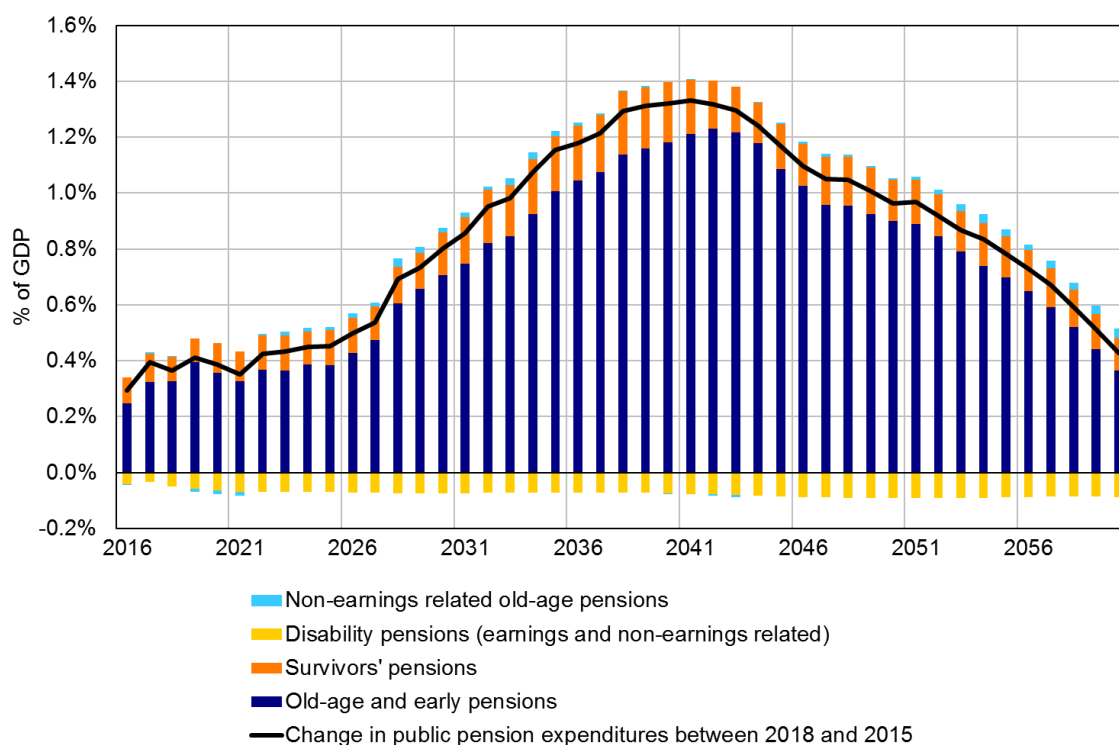
Explanatory note: Please note that the four components do not add up because of a residual component.

Graph 5.1 - Decomposition of the change (%) in pension expenditures to GDP between the 2015 and the 2018 exercises (disability pensions excluded)



Source: Commission services, Insee, Destinie model, calculations: DG Trésor

Graph 5.2 - Decomposition of the change (%) in public pension expenditures to GDP between the 2018 and the 2015 exercises - by type of pension

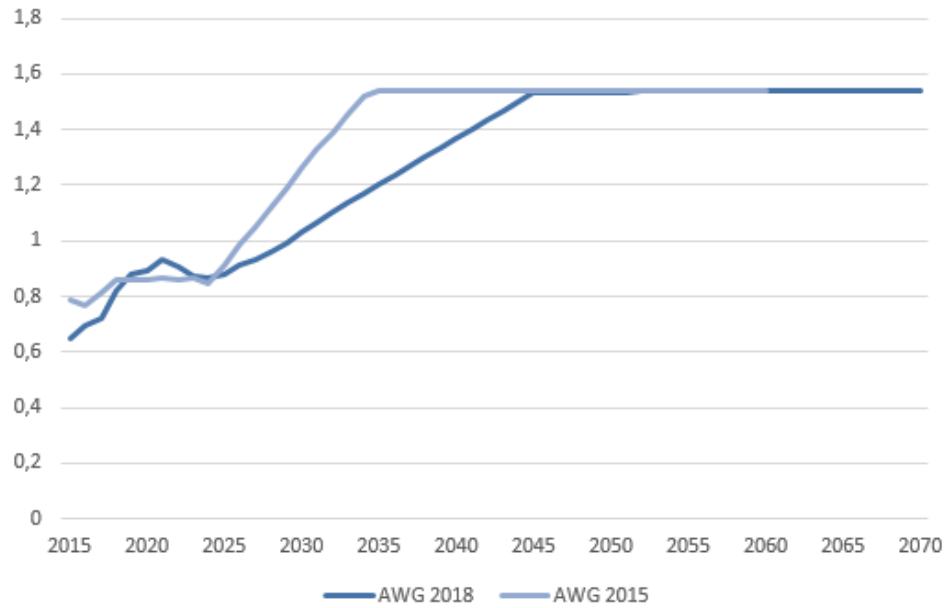


Source: Commission services, Insee: Destinie model, calculations: DG Trésor

Between the two projection exercises, public pension expenditures as a share of GDP have been revised upwards, mainly due to less favourable demographic and macroeconomic assumptions. Nevertheless, the evolution path remains broadly similar between the two exercises with a sharp decline in the public pension expenditure-to-GDP ratio over the second half of the projection period.

With regards to macroeconomic assumptions, lower productivity growth rates up to 2045 result in lower wages and GDP (Graph 5.3). As a result, the benefit ratio is higher than in the previous projection exercise over the whole forecast period, which partly explains the deterioration compared to 2015.

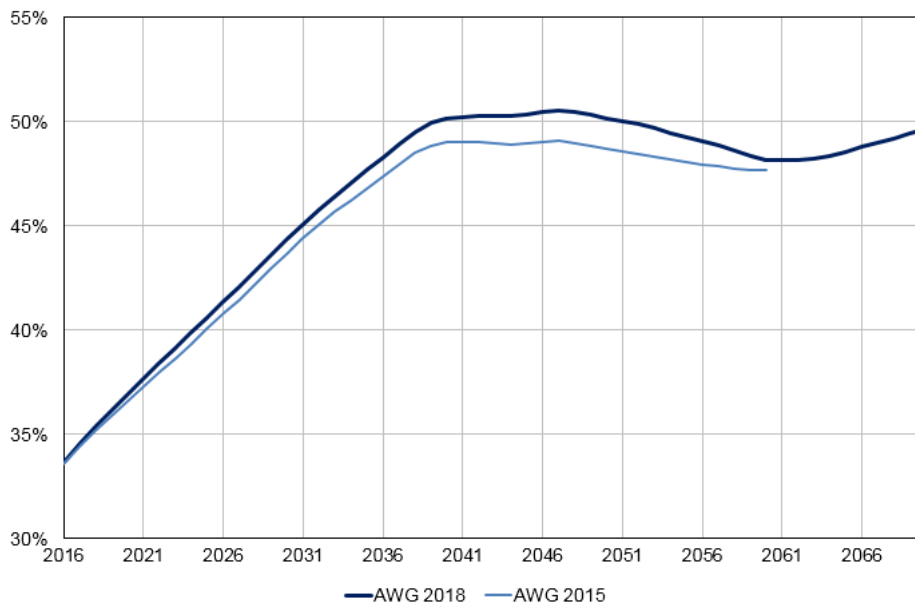
Graph 5.3 - Labour productivity growth – 2018 and 2015 projections



Source: Commission services, DG Trésor

The rest of the deterioration is linked to the dependency ratio which has been revised upwards compared to 2015 due to changes in life expectancy and net migration assumptions (Graph 5.4).

Graph 5.4 - Dependency ratio – 2018 and 2015 projections



Source: Commission services, DG Trésor

Table 19 shows that changes in assumptions are the main drivers of the revision compared to the 2015 projections. Reforms also play a role but to a lesser extent while the changes related to the new indexation rule of the non-contributory minimum pension (ASPA) have only a small impact.

Table 19 - Decomposition of the difference between the 2015 and the new public pension projection (% of GDP)

	2016	2020	2030	2040	2050	2060	2070
Ageing report 2015	14,8	14,6	14,6	13,8	12,8	12,1	:
<i>Change in assumptions</i>	0,1	0,5	1,0	1,5	1,1	0,5	:
<i>Improvement in the coverage or in the modelling</i>	0,2	0,2	0,2	0,2	0,2	0,1	:
<i>Change in the interpretation of constant policy</i>	0,0	0,0	0,0	0,0	0,0	0,1	:
<i>Policy related changes</i>	0,0	-0,3	-0,4	-0,3	-0,3	-0,3	:
New projection	15,0	15,0	15,4	15,1	13,8	12,5	11,8

Source: Insee, Destinie model, calculations: DG Trésor

4. Pension projection model

4.1. Institutional context

Several French institutions have developed pension projection models:

- Since the mid-1990s, the **French statistical institute** (Insee – Institut national de la statistique et des études économiques) has developed a dynamic microsimulation model called “Destinie”.
- The **Ministry of social affairs** recently built up a microsimulation model called “Trajectoire”.
- The **Institut des politiques publiques** (IPP), a scientific partnership between the Paris school of economics (PSE) and the Center for research in economics and statistics (Crest), has developed a dynamic microsimulation model of the pension system called PENSIPP.
- Most **pension schemes** have developed their own projection model. Some of these models project the entire pension system, like Prism created by the main private sector scheme (Cnav – Caisse nationale d’assurance vieillesse);
- The **Conseil d’orientation des retraites** (COR – French pension advisory council) carries out projections on a regular basis. The last projections²⁵ were published in June 2017, using projections from all schemes.

All these projection models are often peer-reviewed, mainly during the working groups set up by the COR.

²⁵ « Evolution et perspectives des retraites en France », 20 June 2017, COR, <http://www.cor-retraites.fr/article493.html>

As for the *2015 Ageing Report*, the French Treasury has worked in cooperation with the French Statistical Office using its dynamic microsimulation model, Destinie. This microsimulation model, developed in the 90s, is a reference²⁶ concerning pension expenditures projections. The Destinie model has been used for scientific studies whose results have been published in professional publications^{27 28} as well as peer-reviewed journals^{29 30}. It has also been used for public and official reports³¹.

With regards to disability pensions, the projection model is the same as the one used for the *2015 Ageing Report*. This projection methodology has been developed by the French Treasury.

4.2. Data used

Old-age and survivors' pensions projection: Destinie

The main input database is the 2010 Household Wealth Survey “Enquête Patrimoine 2010” produced by Insee. Data are collected from more than 20,000 households and provide comprehensive information on the household situation (professional and family biography, income and financial situation, etc.). The model also relies on additional surveys which provide complementary information on the labour market, or the population structure:

- Labour Force Survey (1990-2009, « Enquête emploi en continu »),
- Census (20006-2010),
- « Échantillon interrégime de cotisants » (survey conducted by the Ministry of Social Affairs),
- Training and vocational skills survey (2003, « Enquête formation et qualification professionnelle »).
- So called « Generation surveys » (Enquêtes generation) that focus on early career and transition from school.

Disability pensions:

For disability pensions, the initial profile for recipients and average amount of the disability benefits come from the administrative dataset of the Health insurance schemes which delivers the earning related pensions, and from the CNAF (Caisse nationale des allocations familiales - national family insurance fund) which delivers non earnings-related disability benefits.

4.3. General description of the model

²⁶ Other models like Prism (Cnav), Pensipp (IPP), or Promess (the ancestor of Trajectoire at the Ministry of social affairs) are similar to Destinie Model.

²⁷ Bachelet, M., A. Leduc, A. Marino, « Les biographies du modèle Destinie II : rebasage et projection », Working paper n° G 2014/01, Direction des Etudes et Synthèses Economiques, February 2014.

²⁸ Marino, A., « Vingt ans de réformes des retraites : quelle contribution des règles d'indexation ? », Insee Analyses n°17, April 2014.

²⁹ Blanchet, D., S. Buffeteau, E. Crenner and S. Le Minez, « Le modèle de microsimulation Destinie 2 : principales caractéristiques et premiers résultats », *Economie et Statistique n°441-442*, October 2011.

³⁰ Bachelet, M., M. Beffy, D. Blanchet, « Projeter l'impact des réformes des retraites sur l'activité des 55 ans et plus : une comparaison de trois modèles », *Economie et Statistique n°441-442*, October 2011.

³¹ Rapport de la Commission Moreau pour l'avenir des retraites, « Nos retraites demain : équilibre financier et justice », June 2013.

Old-age and survivors' pensions projection: Destinie

The Destinie model is a dynamic microsimulation model whose main application is the analysis of pension policies and forecasting. In 2010, an updated version has been developed. This model has two separate modules: (a) a generator of demographic and employment biographies and (b) a pension simulator. The model takes accurately into account the household's level and not only the individual's one.

(a) Biography generator

The first module produces full individual (demographic and professional) biographies (except the transition towards retirement) up to 70 years old (or the age of death in case). Using the data from the "Enquête Patrimoine 2010" as a starting point, the professional and family trajectories are projected until 2070 according to transition probabilities estimated on the basis of observed data collected from another source (see data used, 4.2).

For each individual in the sample, many variables are simulated, for instance:

- wage path estimated through wage equations (depending for instance on schooling level);
- kinship ties, which determine survivors' pensions;
- unemployment and inactivity periods based on the estimation of transitions' matrix on the labour market;
- membership to different pension schemes

The sample of the Household Wealth Survey is representative of the French society with regards to:

- age and gender,
- levels of education (by generation),
- composition of households (number of children, birth/age of the mother, etc.).
- activity and unemployment rates by age and gender

Starting from the computed biographies, the model calculates the age of retirement for each individual of the sample, assuming that people retire as soon as they meet the conditions for a full pension.

(b) Pension simulator

The second module is devoted to pension computation. The model is quite flexible and several parameters can be changed: retirement behaviour, indexation of pensions, legislation scenario, etc. For the AWG exercise, pensions have been computed according to the legislation prevailing in 2017.

Disability pensions:

The model used for disability pension projection is a macrosimulation model. It can be compared to those used for Health Care and Long Term Care expenditure projections. The methodology is articulated as follows:

- STEP 1: measure of the age/gender ratio of recipients and age/gender average amount of disability benefits on the latest available dataset.
- STEP 2: calculate number of recipients for each projection year up to 2060 by multiplying the ratio of recipients by the population by age and gender provided by Eurostat.
- STEP 3: multiply the average amount of disability benefits per age/gender on the basis of an indexation assumption.
- STEP 4: multiply the projected average amount of disability benefits by the projected number of recipients to obtain total projected expenditure on disability pensions.

4.4. Assumptions and methodologies applied

Old-age and survivors' pension projection: Destinie

Sample size

The sample is composed of 65 000 individuals in 2017, with a sampling rate close to 1/1000.

Pension calculation

Since there are 35 pension schemes, Destinie covers only the main ones:

- the public sector pension scheme (FPE for civil servants in state administration, military, CNRACL for local administration or hospitals), including the complementary part;
- the private sector pension scheme (the regime general Cnav);
- an aggregate of self-employed pension schemes (like RSI);
- an aggregate of the two point system schemes for the private sector: the complementary pension scheme Agirc-Arrco for managers employed in private sector (Agirc), or private sector employees (Arrco);
- one survivor's pension scheme: this pension groups all survivors' pension schemes, but applies specific rules for private and public sector;
- one minimum pension scheme.

Destinie computes the first pension of the individual and makes it increase under indexation on CPI assumption consistently with the current legislation. In general, indexation rules and parameters can be modified by the user.

Survivors' pensions calculation

Survivors' pensions are also projected using the microsimulation model.

The Destinie model simulates the evolution of the characteristics of individuals and families, and in particular the evolution of the marital status: separations, pairing of singles into couples, births, etc. The model computes an individual probability of getting into a certain state, depending on the previous state and individual characteristics.

Since the Destinie model does not distinguish between marital status, every couple is entitled to survivors' pensions. In real life, it is not the case: marriage provides rights for survivors' pensions, but not the PACS (civil solidarity pact) for instance. As a consequence, the model overestimates a little the projections of survivors' pensions.

The rules related to survivors' pensions differ between pension schemes. For instance, for simplicity reasons, the model Destinie does not split the survivor's pension of a deceased individual between the different former spouses or husbands he/she had (as it is the case in the main pension schemes). Other rules specific to the public sector pension scheme, like the duration of the wedding, children, etc., are not taken into account either.

4.5. Additional features of the projection model

Additional model's characteristics (simulation of careers, simulation of the average exit age of studies and entry age in the labour market, computation of wage equations, etc.) can be found in the 2014 professional publication (in French): Bachelet, M., A. Leduc, A. Marino, « Les biographies du modèle Destinie II : rebasage et projection », Working paper n° G 2014/01, Direction des Etudes et Synthèses Economiques, February 2014.

5. Appendix

A. Methodological annex

Economy- wide average wage at retirement

The average gross wage at retirement is calculated using the average last monthly wage of new pensioners.

Table A.1 – Economy wide average wage at retirement evolution (in EUR thousand)

	2016	2020	2030	2040	2050	2060	2070
Economy-wide average wage	2849,93	3101,43	4130,90	5687,62	8055,48	11440,63	16251,77
Economy-wide average wage at retirement	3550,22	3167,04	4018,92	6223,92	9454,74	14510,23	21111,97

Source: Insee, DESTINIE model, calculations: DG Trésor

Pensioners vs Pensions

The individuals can cumulate several pension schemes depending on their careers: thus, the number of pensioners is lower than the number of pensions.

In the model Destinie, pensioners can receive several pensions:

- Up to three defined benefit pensions (base pension scheme). In reality, there are much more than three pension schemes but for simplification purposes only three categories are distinguished:
 - the public sector pension scheme (FPE for civil servants in state administration, military, CNRACL for local administration or hospitals),
 - the private sector pension scheme (the regime general Cnav),
 - one for other pension schemes (like RSI);
- one point system schemes (complementary pension scheme), for instance, the Agirc-Arrco for managers employed in private sector Agirc, or private sector employees Arrco. The different point system schemes are modeled by one general point system scheme.
- one survivor's pension. Indeed, if the deceased husband or wife had several pensions, the surviving wife or husband may also have the corresponding survivor's pension. We decided to count one survivor's pension at maximum for those individuals.
- one minimum pension.
- one disability pension. After the age of 62, earnings-related disability pensions are considered as old-age pensions. After the age of 65 (age at which it is possible to start receiving the non-contributory minimum pension), we suppose that individuals who used to receive a non-earnings related disability pension also receive an old-age pension.

The ratio of pensions over pensioners raises from 2 in 2016 to 2.3 in 2070. This increase is due to the fact that people are more likely to work in various sectors during their careers, which in turn raises the probability of receiving several pensions.

Table A.3 – Pensions vs pensioners in 1000

	2016	2020	2030	2040	2050	2060	2070
Number of pensioners (I)	19403,17	20202,76	22518,79	23789,91	24144,69	24124,36	24781,05
Number of pensions (II)	39335,47	41628,62	47601,77	51784,56	53763,60	55274,35	57321,01
Ratio (II)/(I)	2,03	2,06	2,11	2,18	2,23	2,29	2,31

Source: Insee, Destinie model, DG Trésor

Disability pensions

There are three types of disability pensions in France. Two of them are earnings-related: the “rente Accident du Travail et Maladie Professionnelle” (ATMP) and the “Pension d’Invalidité” (PI). The last one, “Allocation aux Adultes Handicapés” (AAH) is a non earnings-related minimum disability pension. In France, new disability pensions are aimed at insured individuals under the retirement age (and only one type of disability pension (ATMP) is still being granted after entry into retirement) so the increase of life expectancy has a limited influence on disability pensions. As a consequence, the ratio of the number of recipients over the whole population is supposed to be constant over time. In that sense, the projection looks like the demography scenario of the Long Term Care methodology. The only exception to that rule is related to the pension called “Pension d’invalidité”: as the recipients should be under the legal earliest retirement age, the recipient ratio for age 59 is extended to age 60 and 61 so as to take into account the pension reform which moves this statutory retirement age.

The level of new earnings-related disability pensions grows in line with the average wage. As for non earnings-related benefits, they are price indexed.

Table A.3 – Disability rates by age groups (%)

	2016	2020	2030	2040	2050	2060	2070
-54	5%	5%	5%	5%	5%	5%	5%
55 - 59	14%	14%	14%	14%	14%	14%	14%
60 - 64	6%	8%	8%	8%	8%	8%	8%
65 - 69	2%	2%	2%	2%	2%	2%	2%
70 - 74	1%	1%	1%	1%	1%	1%	1%
75+	1%	1%	1%	1%	1%	1%	1%

Source: Commission services, DG Trésor

Survivors’ pensions

The Destinie model simulates biographic situations, and in particular the evolution of the marital statuses: separation, weddings, births, etc. One should note that the Destinie model does not distinguish between marital statuses: marriage provides rights for survivors’ pensions, but

not the PACS (civil solidarity pact) for instance. Therefore, every couple is supposed to be married, which may result in an overestimation of the number of survivors' pensions.

In the projections, survivors' pension expenditures as a share of GDP decrease (from slightly over 1.6% in 2016 to a bit more than 0.8% in 2070). There are three explanations to this trend:

- the reduction of the gap between life expectancies of women and men: survivors' pensions concern women for an overwhelming majority, and this reduction of the gap between life expectancies might reduce the period of payment of survivors' pensions.
- the relative increase of women employment and participation rates: survivors' pensions are means-tested in the main basic scheme for private sector employees: due to the evolution of women's careers, fewer women are expected to meet the means condition for being eligible to a survivors' pension in the future. Moreover, as survivors' pensions top revenues up to a certain ceiling, women eligible to survivors' pensions in the future are likely to be granted a smaller amount of money on average, as their revenues are expected to be higher on average in the future.
- the decreasing trend of marriage rate: it automatically reduces the number of people eligible to a survivors' pension.

Other explanations (smaller age gap between spouses, increased number of second and third weddings, etc.) might also influence survivors' pensions, but they are not taken into account.

Compared to the 2015 projection exercise, the way the number of recipients of a survivor pension is calculated has been changed : in 2015, the number of pensioners included only pensioners who didn't receive an old-age pension. As a result, the number of pensioners of each category could be added up to get the total number of pensioners, but these figures could not be used to calculate the average survivor pension. In the 2018 projection, for each type of pension, the number of pensioners is the number of pensioners receiving that type of pension: as a result, the numbers of pensioners don't add up. But, the average survivor pension does represent the average additional income received by surviving spouses. These methodological changes do not have an impact on survivor pension expenditures.

The same holds for the number of recipients of the non contributory minimum pension.

Non earnings-related minimum pensions

The ratio between non earnings-related minimum pensions and GDP increases from 0.15% in 2016 to 0.28% at the end of the 2030's, decreases slightly to 0.2% in the following decade and then remains stable around that level over the rest of the projection period. The number of minimum pensions and pensioners increases on average until 2040, is relatively stable between 2040 and 2060 and increases again slightly from 2060 onwards. These variations are mostly related to the evolution of the number of people aged 65+, which will increase at a sustained but decreasing pace in the first half of the projection period, will not increase between 2040 and 2060 and will start increase again from 2060 onwards. Until 2050, the value of the social

assistance benefit is indexed to prices as per the French legislation. After 2050, the minimum pension is indexed to wages, as agreed with the Commission.

Alternative pension spending decomposition

Tables A.4 and A.5 are equivalent to tables 9.a and 9.b. Tables in the body of the country fiche are calculated by dividing into sub-intervals so to have smaller residual effect (interaction effect). Reduction of the residual is not allowed for in the tables A.4 and A.5.

Table A.4 – Factors behind the change in public pension expenditures between 2016 and 2070 using pension data (in percentage points of GDP) - pensions

	2016-20	2020-30	2030-40	2040-50	2050-60	2060-70	2016-70
Public pensions to GDP	-0,1	0,5	-0,4	-1,3	-1,2	-0,8	-3,3
Dependency ratio effect	1,5	3,3	2,6	0,0	-0,9	0,7	7,1
Coverage ratio effect	-0,5	-0,7	-0,4	0,2	0,5	-0,1	-0,9
Coverage ratio old-age*	0,2	0,2	0,2	0,3	0,6	0,0	1,5
Coverage ratio early-age*	-1,5	-1,4	-1,6	0,1	-0,7	-0,3	-5,5
Cohort effect*	-1,2	-2,6	-2,0	-0,1	0,9	-0,4	-5,4
Benefit ratio effect	-0,6	-1,0	-1,1	-1,1	-1,0	-0,8	-5,7
Labour Market/Labour intensity effect	-0,3	-0,5	-0,4	-0,2	0,0	-0,1	-1,4
Employment ratio effect	-0,3	-0,3	-0,3	-0,2	0,0	0,0	-1,0
Labour intensity effect	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Career shift effect	0,0	-0,2	-0,1	0,0	0,0	-0,1	-0,4
Residual	-0,1	-0,7	-1,0	-0,3	0,1	-0,5	-2,4

Source: Commission services, Insee: Destinie model

Table A.5 – Factors behind the change in public pension expenditures between 2016 and 2070 using pension data (in percentage points of GDP) – pensioners

	2016-20	2020-30	2030-40	2040-50	2050-60	2060-70	2016-70
Public pensions to GDP	-0,1	0,5	-0,4	-1,3	-1,2	-0,8	-3,3
Dependency ratio effect	1,5	3,3	2,6	0,0	-0,9	0,7	7,1
Coverage ratio effect	-0,7	-1,0	-0,8	-0,1	0,1	-0,2	-2,7
Coverage ratio old-age*	-0,1	-0,1	-0,1	0,0	0,0	-0,1	-0,3
Coverage ratio early-age*	-1,0	-0,8	-1,0	-0,1	-0,7	-0,2	-3,8
Cohort effect*	-1,2	-2,6	-2,0	-0,1	0,9	-0,4	-5,4
Benefit ratio effect	-0,4	-0,7	-0,8	-0,9	-0,7	-0,9	-4,4
Labour Market/Labour intensity effect	-0,3	-0,5	-0,4	-0,2	0,0	-0,1	-1,4
Employment ratio effect	-0,3	-0,3	-0,3	-0,2	0,0	0,0	-1,0
Labour intensity effect	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Career shift effect	0,0	-0,2	-0,1	0,0	0,0	-0,1	-0,4
Residual	-0,1	-0,7	-1,0	-0,1	0,3	-0,4	-2,0

Source: Commission services, Insee: Destinie model

B. Retirement ages of the French pension system

Generation	Minimum ages for early pension*	Legal age	Full rate pension age**
Before July 1st 1951	56-59	60	65
July 1 st - Dec 31th 1951	56-60	60 + 4 months	65 + 4 months
1952	56-60	60 + 9 months	65 + 9 months
1953	56-60	61 + 2 months	66 + 2 months
1954	56-60	61 + 7 months	66 + 7 months
1955	56+4 months-60	62 months	67 months
1956	56+8 months-60	62	67
1957	57-60	62	67
1958	57+4 months-60	62	67
1959	57+8 months-60	62	67
1960 onwards	58-60	62	67

* Depending on the contribution time of the insured person (going from the reference time + 8 quarters for the youngest retirement age, to the reference time only for the oldest retirement age) and on the age at which people started working.

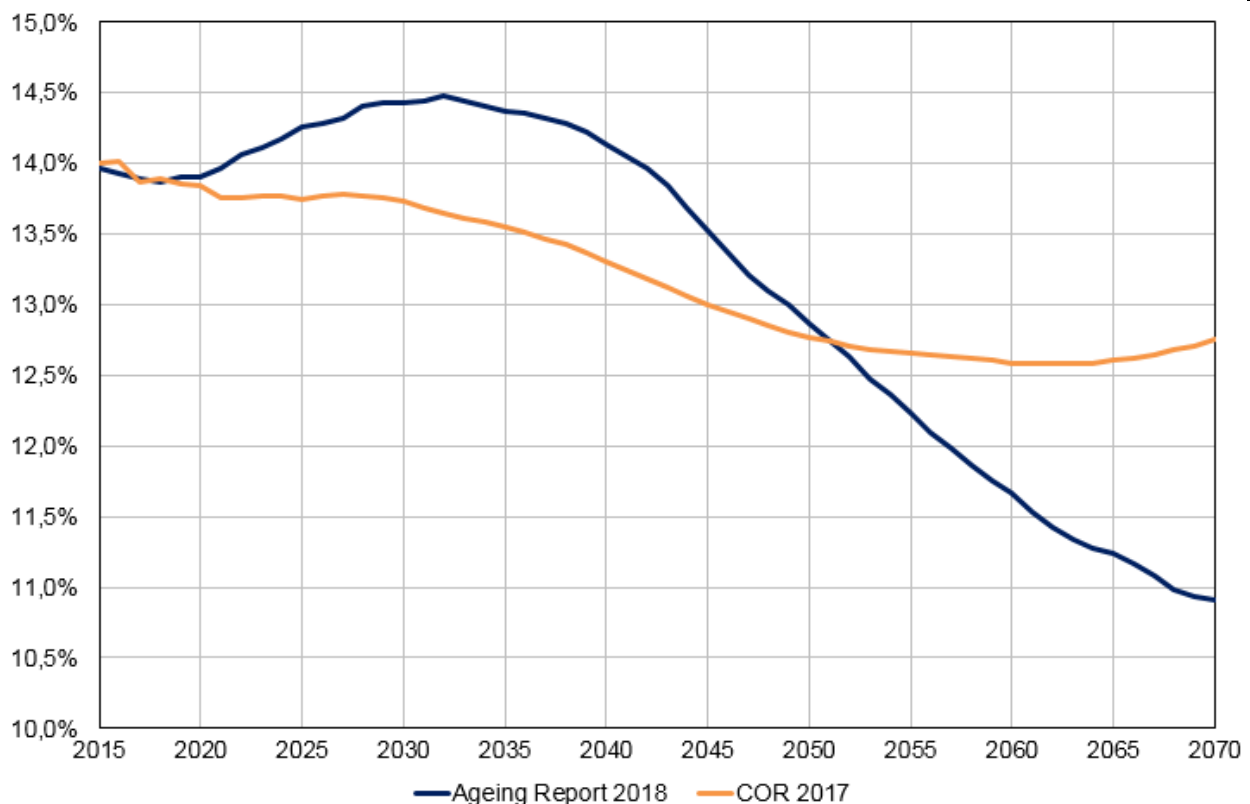
For instance, someone born in 1960 can retire at age 58 only if he/she started working at 16 and has validated 174 quarters; or at age 60 if he/she started working at 18 and has validated 166 quarters; etc.

C. Full pension contribution period

Generation	Required number of contribution years
Before 1948	40 years
1949	40 years and 3 months
1950	40 years and 6 months
1951	40 years and 9 months
1952	41 years
1953 and 1954	41 years and 3 months
1955 to 1957	41 years and 6 months
1958 to 1960	41 years and 9 months
1961 to 1963	42 years
1964 to 1966	42 years and 3 months
1967 to 1969	42 years and 6 months
1970 to 1972	42 years and 9 months
1973 onwards	43 years

D. Pension expenditures projected by other institutions

Graph D.1 - Public pension expenditures (excluding disability) projected by other institutions



Source: Commission services, Insee Destinie model, COR, DG Trésor

We present a decomposition of the differences between the 2018 AWG and the 2017 COR (French pension advisory council) exercises. The benefit ratio and the labour market ratios are slightly different than in the country fiche decomposition, as the figures for the number of hours worked are not available in the COR assumptions. We replaced the number of hours worked by the number of employees³². The factors are the ones below:

$$\text{Dependency ratio} = \frac{\text{Population 65+}}{\text{Population 20-64}}$$

$$\text{Coverage ratio} = \frac{\text{Pensioners}}{\text{Population 65+}}$$

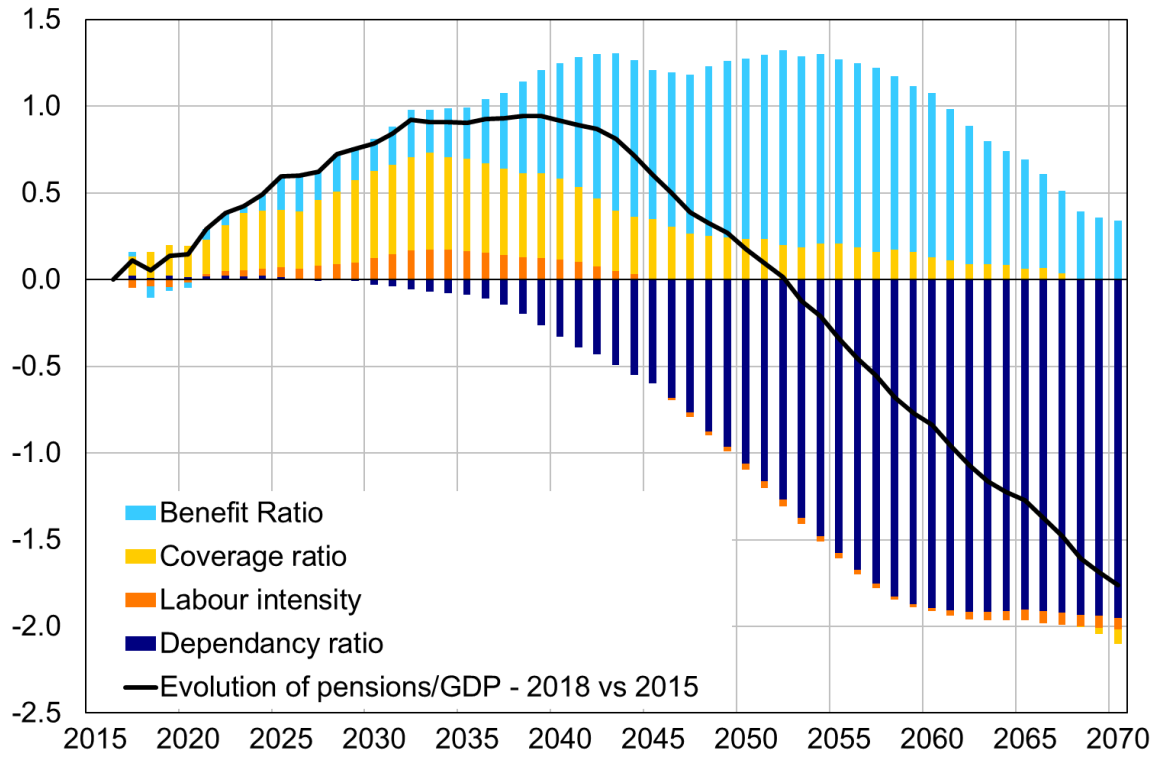
$$\text{Benefit ratio} = \frac{\text{Average pension by pensioner}}{\text{Average GDP per employee}} = \frac{\text{Pension expenditures} / \text{Number of pensioners}}{\text{GDP} / \text{Number of employees}}$$

$$\text{Labour market} = \frac{\text{Population 20-64}}{\text{Number of employees}}$$

³² Thus the small effect of the evolution of the number of hours worked by employee is neglected in this decomposition.

The decomposition of the differences in the public pension expenditures³³ between the AWG and the COR projections is presented in Graph D.2.

Graph D.2 - Differences between the results of the 2017 COR exercise (based on a productivity assumption of 1.5%) and the 2018 AWG exercise (baseline scenario excluding disability pensions)



Source: Insee (DESTINIE model) and COR projections; calculations: DG Trésor
 Explanatory note: Between 2040 and 2060, public pension expenditures decrease by 1.43 GDP pt more in the AWG than in the COR. The dependency ratio, lower in the AWG assumptions, contributes to the decrease by -0.88 pt of the -1.43 pt.

One of the main differences between the two projection exercises stems from demographic assumptions: the French Statistical office projects a higher life expectancy over the projection horizon, especially for men. Based on these assumptions, the dependency ratio will continue to increase significantly after 2040, which is not the case under the Eurostat assumptions.

Over the medium term, differences between the coverage ratios also explain the divergent path of the two projections. These differences come mostly from the fact that the modeling techniques used by the COR and the French Statistical Office are not the same: the COR aggregates projections made by the statistical services of each scheme while the French Statistical Office makes projections based on a sample of households and observed data.

Finally, the evolution of the benefit ratio diverges between the two exercises in the medium and long term, which is due to lower productivity growth rate assumptions in the AWG exercise. The

³³ To be as consistent as possible with the COR projections' field, disability pensions have been excluded, but minimum pensions are included as they are also taken into account in the COR projections.

average wage increases less rapidly in the AWG baseline scenario which leads to a higher benefit ratio than in the COR scenario. At the end of the projection period, new pensions tend to be lower as they are calculated on relatively low wages and thus the effect of the benefit ratio starts declining.

E. Retirement behaviour

The existence of a transition period between active life and effective retirement is documented in France, and the full rate pension plays a central role in the decision of retiring. Thus, most of the new pensioners retire when they reach the full rate condition (either through age or contribution period criteria). For instance, in 2012, less than 8% of new pensioners retired without a full rate pension.

Studies have shown that the French pension system is almost actuarially neutral at the margin. For both the basic private and the public sectors, there is a 5% deduction in case of 1 year earlier retirement. Thus a different assumption concerning retirement behaviour has a very low impact on pension expenditures.

For these reasons, the full rate approach is commonly preferred in the different pension projection exercises (COR, Ministry of social affairs, Cnav, etc.).

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

Table F.1 – Decomposition of new pension expenditures: computation of the main variables

New pension expenditures P	$P = \sum_{i=1}^N p_i$ where p_i is the annual pension of the new pensioner i provided by Destinie.
Number of new pensioners N	Provided by Destinie.
Average contributory period (in years) \bar{d}	$\bar{d} = \frac{1}{N} \sum_{i=1}^N d_i$ where d_i is the number of years of a positive wage for the new pensioner i (whose complete wage series is provided by Destinie).
Average number of months paid the first year \bar{m}	$\bar{m} = \frac{1}{N} \sum_{i=1}^N m_i$ where m_i is the number of months of pension paid to the new pensioner i the first year (provided by Destinie).
Defined benefits schemes	
Monthly average pensionable earning \bar{w}	Computed using the 25 best year wages (series provided by Destinie) as $\bar{w} = \frac{1}{N} \sum_{i=1}^N w_i$ where $w_i = \frac{1}{25} \sum_{t=0}^T I_{w_{i,t}} w_{i,t} (1 + v_t)^{T-t}$ and v_t is the CPI and $I_{w_{i,t}} = 1$ if $w_{i,t}$ is one of the 25 best yearly wages of the individual i .
Average accrual rate \tilde{a}	Computed so as to resolve $P = N \times \bar{d} \times \bar{w} \times \bar{m} \times \tilde{a}$. Thus \tilde{a} is close but not equal to $\bar{a} = \frac{1}{N} \sum_{i=1}^N a_i$ where a_i is defined by: $\frac{p_i}{m_i} = \sum_{t=0}^T w_{i,t} (1 + v_t)^{T-t} a_i^{34}$.
Point system schemes	
Total pensions points at retirement \bar{p}	$\bar{p} = \frac{1}{N} \sum_{i=1}^N p_i$ where p_i is the number of pensions points acquired by new pensioner i at retirement (provided by Destinie, Agirc points are converted into Arcco points using the respective points value in both schemes).
Point value V	Service value in the Arcco scheme
Point cost K	Purchase value in the Arcco scheme multiplied by the adjustment factor applied to contributions (125% then 127% after 2019)
Adjustment factor $\bar{\tau}$	Computed so as to resolve $P = N \times \bar{p} \times \bar{V} \times \bar{m} \times \bar{\tau}$. Thus $\bar{\tau}$ is close but not equal to 1.

³⁴ With this definition: $p_i = m_i \times d_i \times w_i \times a_i$.

Table F.2 - Projected and disaggregated new public pension expenditure (old-age and early earnings-related pensions) - Defined-benefit schemes

	2016	2020	2030	2040	2050	2060	2070
I Projected new pension expenditure (mln €)	4986,7	5255,5	7975,9	12898,3	18485,6	27032,3	41993,1
II. Average contributory period	34,5	36,1	31,8	32,6	32,2	33,5	33,6
III. Monthly average pensionable earnings (€)	3042,5	2990,4	3603,4	5249,7	7087,2	10373,3	14586,0
IV. Average accrual rate (%)	1,0	1,1	1,3	1,3	1,2	1,2	1,2
V. Sustainability/Adjustment factor	1,0	1,0	1,0	1,0	1,0	1,0	1,0
VI. Number of new pensioners ('000)	619,7	705,0	828,5	747,6	818,6	769,5	858,0
VII. Average number of months paid the first year	7,3	6,1	6,7	8,0	8,1	8,3	8,2
Monthly average pensionable earnings / Monthly economy-wide average wage	106,8%	96,4%	87,2%	92,3%	88,0%	90,7%	89,8%

Source: Insee, DESTINIE model, calculations: DG Trésor

Table F.3 - Projected and disaggregated new public pension expenditure (old-age and early earnings-related pensions) - Point systems

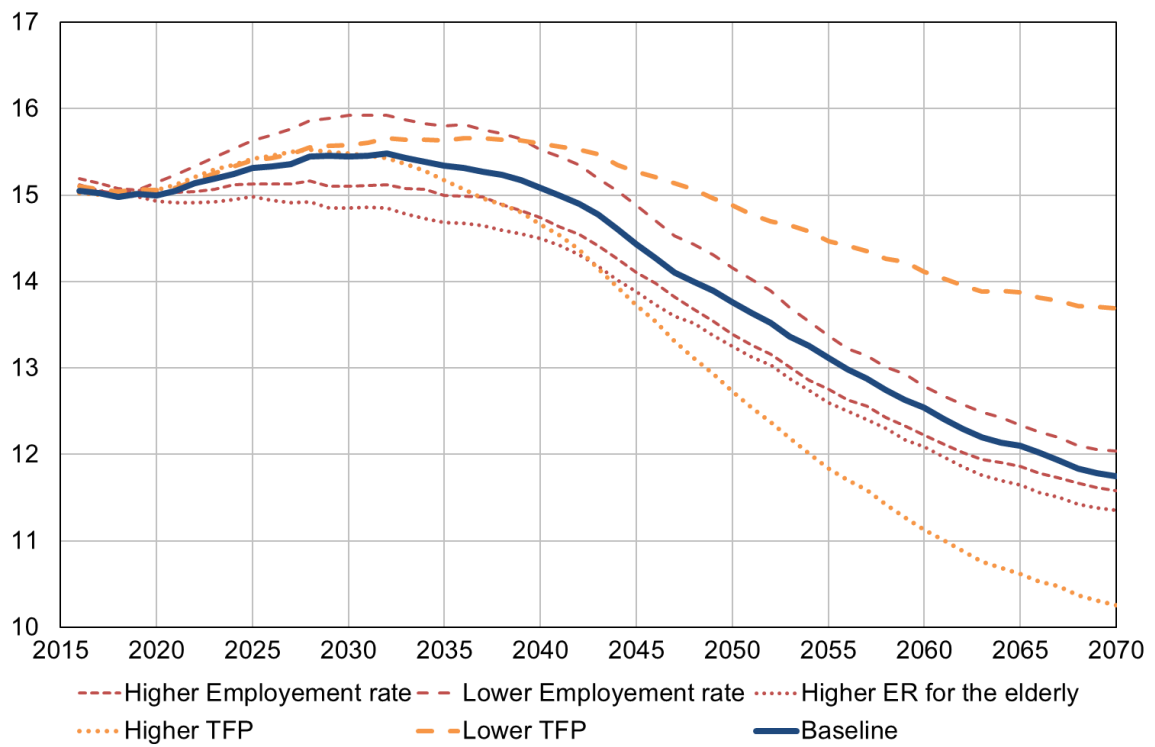
	2016	2020	2030	2040	2050	2060	2070
I Projected new pension expenditure (mln €)	2339,0	1925,3	2829,1	4840,4	6542,1	7766,7	10798,3
II. Average contributory period	24,6	24,5	22,7	22,8	24,9	23,8	24,5
III. Total pension points at retirement (by pension)	5778,1	5070,5	4389,7	5495,5	5079,2	5324,1	5432,8
IV. Average accrual rate (V/K)	0,5	0,5	0,5	0,5	0,5	0,5	0,5
Point value (V)	0,1	0,1	0,1	0,2	0,2	0,2	0,3
Point cost (K)	19,6	21,7	26,4	32,2	39,3	47,9	58,4
VI. Number of new pensioners ('000)	536,7	579,3	712,6	665,6	780,4	730,1	818,6
VII. Average number of months paid the first year	7,38	6,04	6,64	7,99	8,10	8,29	8,29

Source: Insee, DESTINIE model, calculations: DG Trésor

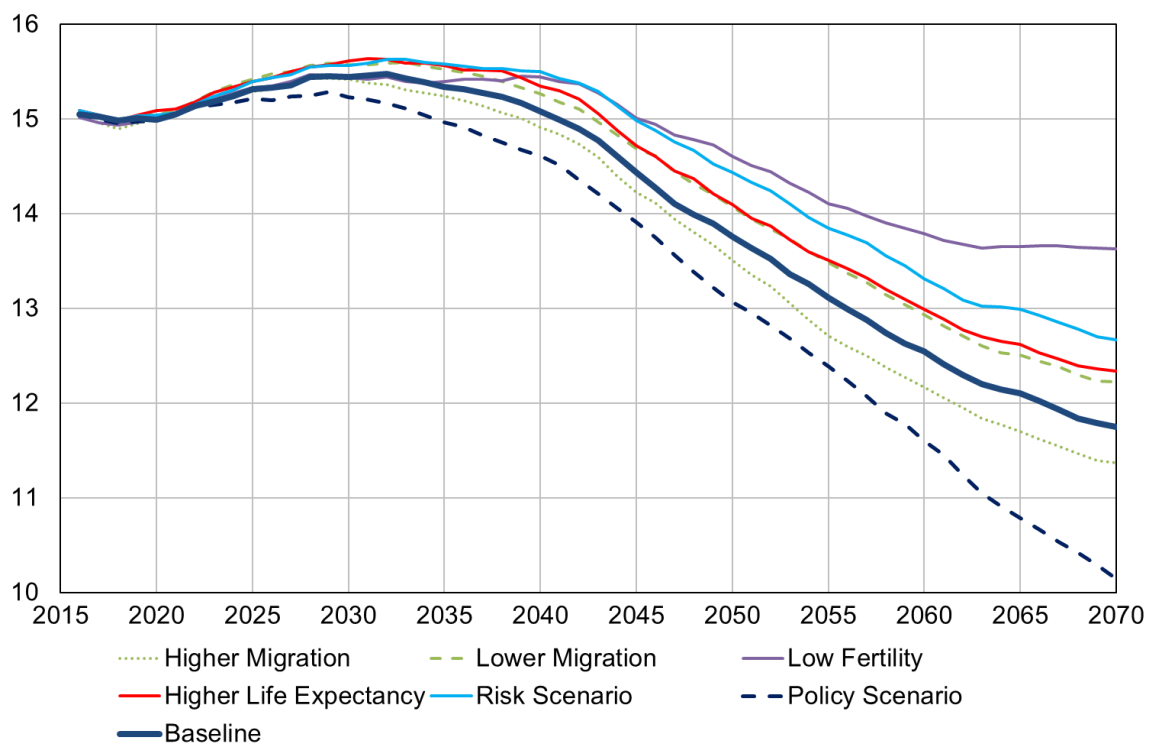
G. Overview of the sensitivity tests

Sensitivity test		Definition
1	Higher life expectancy	Increase of life expectancy at birth of two years by 2070 compared with the baseline projection.
2	Higher total factor productivity growth	Total factor productivity growth is assumed to converge by 2045 to a steady-state growth rate which is 0.4 percentage points higher than in the baseline scenario. The increase is introduced linearly during the period 2026-2045
3	Lower total factor productivity growth	Total factor productivity growth is assumed to converge by 2045 to a steady-state growth rate which is 0.4 percentage points lower than in the baseline scenario. The increase is introduced linearly during the period 2026-2045
4	Higher employment rate	The employment rate is 2 p.p. higher compared with the baseline projection for the age-group 20-64. The increase is introduced linearly over the period 2018-2030 and remains 2 p.p. higher thereafter. The higher employment rate is assumed to be achieved by lowering the rate of structural unemployment (the NAWRU).
5	Higher employment rate of older workers	The employment rate is 10 p.p. higher compared with the baseline projection for the age-group 55-74. The increase is introduced linearly over the period 2018-2030 and remains 10 p.p. higher thereafter. The higher employment rate of this group is achieved through a reduction of the inactive population.
6	Lower employment rate	The employment rate is 2 p.p. lower compared with the baseline projection for the age-group 20-64. The increase is introduced linearly over the period 2018-2030 and remains 2 p.p. lower thereafter. The higher employment rate is assumed to be achieved by lowering the rate of structural unemployment (the NAWRU).
7	Higher migration	A scenario whereby net migration flows are 33% higher than in the baseline scenario over the entire projection horizon
8	Lower migration	A scenario whereby net migration flows are 33% lower than in the baseline scenario over the entire projection horizon
9	TFP risk scenario	TFP growth would converge to 0.8% with convergence to the target rate in 2045 from the latest outturn year, i.e. 2016.
10	Legislative scenario	This scenario links retirement age to increases in life expectancy.

Graph G.1 – Pension expenditures under various scenarios (% of GDP)



Graph G.2 – Pension expenditures under various scenarios (% of GDP)



H. Panorama of the main pension schemes

	RETRAITE DE BASE	RETRAITE COMPLÉMENTAIRE
> SALARIÉS		
Salariés de l'agriculture	Msa MUTUALITÉ SOCIALE AGRICOLE	
Salariés de l'industrie, du commerce et des services	CNAV RÉGIME GÉNÉRAL DE LA SÉCURITÉ SOCIALE	ARRCO RETRAITE COMPLÉMENTAIRE DES SALARIÉS
Agents non titulaires de l'État et des Collectivités publiques		AGIRC RETRAITE COMPLÉMENTAIRE DES CADRES
Personnel navigant de l'aviation civile		IRCANTEC
Salariés relevant d'entreprises ou de professions à statut particulier		CRPN
	BANQUE DE FRANCE, RETRAITE DES MINES, CNIEG (GAZ-ÉLEC.), CRPCF (COMÉDIE FRANÇAISE), CRPCEN (CLERCS ET EMPLOYÉS DE NOTAIRES), ENIM (MARINS), OPÉRA DE PARIS, PORT AUTONOME DE STRASBOURG, CRP RATP, CPRPSNCF.	
> FONCTIONNAIRES		
Fonctionnaires de l'État, magistrats et militaires	SERVICE DES RETRAITES DE L'ÉTAT	RAFP RETRAITE ADDITIONNELLE
Agents de la fonction publique territoriale et hospitalière	CNRACL CAISSE NATIONALE DE RETRAITES DES AGENTS DES COLLECTIVITÉS LOCALES	
Ouvriers de l'État	FSPOEIE FONDS SPÉCIAL DES PENSIONS DES OUVRIERS DES ÉTABLISSEMENTS INDUSTRIELS DE L'ÉTAT	
> NON SALARIÉS		
Exploitants agricoles	Msa MUTUALITÉ SOCIALE AGRICOLE	
Artisans, commerçants et industriels	Rsi RÉGIME SOCIAL DES INDÉPENDANTS (FUSION AVA ET ORGANIC)	
Professions libérales	CNAVPL CAISSE NATIONALE D'ASSURANCE VIEILLESSE DES PROFESSIONS LIBÉRALES RETRAITE DE BASE + COMPLÉMENTAIRE + SUPPLÉMENTAIRE SELON LES SECTIONS PROFESSIONNELLES CRN (NOTAIRES), CAVOM (OFFICIERS MINISTÉRIELS), CARMF (MÉDECINS), CARCDSP (DENTISTES ET SAGES-FEMMES), CAVP (PHARMACIENS), CARPIMKO (INFIRMIERS, KINÉSITHÉRAPEUTES...), CARPV (VÉTÉRINAIRES), CAVAMAC (AGENTS D'ASSURANCE), CAVEC (EXPERTS-COMPTABLES), CIPAV (ARCHITECTES ET PROFESSIONS LIBÉRALES DIVERSES).	
	CNBF (AVOCATS) CAISSE NATIONALE DES BARREAUX FRANÇAIS	
Artistes, auteurs d'œuvres originales	CNAV RÉGIME GÉNÉRAL DE LA SÉCURITÉ SOCIALE	IRCEC RETRAITE COMPLÉMENTAIRE
Patrons pêcheurs embarqués	ENIM	
Membres des cultes	CAVIMAC CAISSE D'ASSURANCE VIEILLESSE, INVALIDITÉ ET MALADIE DES CULTES	ARRCO RETRAITE COMPLÉMENTAIRE DES SALARIÉS

Source: GIP info retraite, www.info-retraite.fr

I. Administrative data on new pensioners by age groups

Table 2.1 shows the number of new old-age pensioners by age group and sex across all pension schemes for the year 2015, produced by the statistical office of the Ministry for Solidarity and Health, DREES. These numbers are estimated using administrative data collected from the 15 largest pension schemes on a yearly basis and a survey of pensioners made in 2012 and demographics data from 2015. An adjustment on the margin is used to reconcile the data sources.

In 2015, most of pensioners took up their their old-age pensions between age 60 and 62. The minimum pension age is 62 since 2017 and the possibilities of early-retirement will be reduced by the increase of the contributory period needed for a full pension (cf. 1.2), so fewer retirement before 62 are expected in the near future. Men tend to retire before women, as their higher employment rate enable them to complete the required contributory period at a younger age.

Table 2.1. – Number of new pensioners by age group in 2015 – old-age pensions (1000s)

Age group	Total	Female	Male
50 - 54	7.0	2.3	4.7
55 - 59	37.0	14.3	22.7
60	130.4	47.1	83.3
61	118.6	62.6	56.0
62	127.0	72.8	54.2
63	30.5	14.3	16.2
64	17.3	8.0	9.3
65	83.8	58.2	25.6
66-70	37.8	20.2	17.6

Source: DREES, les Retraites et les retraités 2017, Eurostat

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