FRANCE COUNTRY FICHE ON PENSION PROJECTIONS

THE 2015 AGEING REPORT

April 2015

Note: The European System of National Accounts (ESA) 2010 was introduced from September 2014. As decided by the AWG, Member States do not need to update their pension country fiches to reflect the new national accounts. The Commission services will incorporate the ESA2010 revision by updating the GDP series for the base year (2013), and by applying the previous growth rates of both GDP and the pension projections from 2013 onwards throughout the projection horizon.

Table of contents

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.

- *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 become poly-pensioners 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)

	Contributors	Pensioners
CNAVTS	17 733	12 416
CNAVPL	621	228
MSA employees	659	1 944
ARRCO	18 195	10 443
AGIRC	4 014	2 165
FPE	2 071	1 844
CNRACL	2 172	997
Special schemes[1]	491	784
RSI	2 044	1 549
MSA farmers	513	1 555

Source: Social security accounts 2013 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 pension from 2 to 3 different schemes.

- *Contribution*

In 2014, contribution rates to the general basic pension scheme stand at 10.20% of the gross wage below the Social Security Ceiling (1 SSC = 3,129€ per month in 2014) for the employers and 7.05% for the workers in the general scheme.

Besides contributing to the general basic scheme, non-executive workers contribute to ARRCO at 3.05% on the basis of the part of their wage below one SSC (the contribution rate is respectively 4.58% for their employer), and at 8.05% for the part of their wage between one and three SSC (respectively 12.08% for their employer). Non-executive workers also contribute to AGFF at a 0.8% rate (1.2% 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 9.14% (employee) of their gross wage.

- *Retirement age*

The retirement age depends on the behaviour of the new pensioners. It exists a legal / minimum age[2] and incentives to retire later. People can retire when they reach the earliest retirement age (60 years old before the 2010 reform, 62 after for the 1955 generation and the following ones), with a penalty if they do not meet the required contribution period (43 years from the 1973 generation). They can also delay their retirement in order to obtain a full rate 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 1955 and above).

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[1] FSPOIE, SNCF, CNIEG, RATP, CRPCEN, CAVIMAC, ENIM, CANSSM, CNBF

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

People who are allowed to retire with a full-rate pension (above the minimum retirement age and with the necessary contribution period) and who keep working will receive a bonus on their pension.

			2013	2020	2030	2040	2050	2060
Table 1.3 - Statutory retirement age, earliest retirement age and penalties for early retirement								
Private sector (CNAVTS, RSI, CNAVPL)	20 contribution years*	Statutory retirement age**	65,75	67,00	67,00	67,00	67,00	67,00
		Earliest retirement age	60,75	62,00	62,00	62,00	62,00	62,00
		Penalty in case of earliest retirement age	27,50%	25,00%	25,00%	25,00%	25,00%	25,00%
		Bonus in case of late retirement***	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
	40 contribution years*	Statutory retirement age**	61,75	63,75	64,50	65,00	65,00	65,00
		Earliest retirement age	60,75	62,00	62,00	62,00	62,00	62,00
		Penalty in case of earliest retirement age	5,50%	8,75%	12,50%	15,00%	15,00%	15,00%
		Bonus in case of late retirement***	20,00%	16,25%	12,50%	10,00%	10,00%	10,00%
Public sector (FPE, CNRACL)	20 contribution years*	Statutory retirement age**	64,00	67,00	67,00	67,00	67,00	67,00
		Earliest retirement age	60,75	62,00	62,00	62,00	62,00	62,00
		Penalty in case of earliest retirement age	20,00%	25,00%	25,00%	25,00%	25,00%	25,00%
		Bonus in case of late retirement***	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
	40 contribution years*	Statutory retirement age**	61,75	63,75	64,50	65,00	65,00	65,00
		Earliest retirement age	60,75	62,00	62,00	62,00	62,00	62,00
		Penalty in case of earliest retirement age	4,00%	8,75%	12,50%	15,00%	15,00%	15,00%
		Bonus in case of late retirement***	11,25%	16,25%	12,50%	10,00%	10,00%	10,00%

Source: DG Trésor
* We assume that people have accumulated 20 or 40 years of contribution at their earliest retirement age the given year, for instance at 60.75 yo. in 2013. Statutory retirement age is then reached after that year.
** For this table, statutory retirement age corresponds to the automatic full-rate pension retirement age for workers who do not fulfil the contribution period requirement or to the age when workers (above the earliest retirement age) meet the contribution period condition.
*** 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). For instance in 2060, if a private sector employee who has accumulated 40 years at 62 yo. retires at 67 instead of 65 (full rate pension age in his case), his pension will be increased by 10% (which is equivalent to an increase of 5 pp. of the pension rate, 55% instead of 50%).

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 started working young and have validated more than the required time (see detail infra). In the public sector for some special branches, labelled as "active service" (policemen, nurse etc.), the minimum retirement age is 55 years old[3].

In general, there is no gender difference in the eligibility requirements.

- *Level of pension*

- **Rules for calculating pension**

The rules to calculate pensions differ from a scheme to another. We present here only the formula used to calculate the two components of the pension in the private sector (basic 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 years" (up to the social security ceiling, 3,129€ per month in 2014). Wages are valorised by CPI.

• The *coefficient of proratisation 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 1953 (who will be 62 in 2015), *T* equals 41.25 years, this value will increase up to 43 years for people born in 1973.

• The *pension rate t*. The standard rate is 50%.

However, in order to foster senior participation to the labour market, either a deduction or a premium is applied under certain conditions:

- A deduction is applied to the pension rate when the pension is withdrawn before the full pension age *and* when the contribution period is lower than the reference (*D < T*). The deduction is then calculated as Min [Full pension age - 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:

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

- Conversely, a premium applies to the pension for contribution periods obtained beyond the reference *and* after the minimum age. Hence the premium is calculated as Min [Age - Minimum retirement age, (D-T)] multiplied by the premium rate (1.25% per quarter). The new pension *P'* is given by:

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[3] 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.

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

There is a minimum earning-related pension for pensioners meeting the requirements for a full-rate pension (named *minimum contributif*) amounting to 7,547.96€[4] per year in 2014. This minimum is price-indexed.

> ➢ *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%. The contribution basis and the contribution rates vary from one scheme to another and according to the wage brackets involved. In 2014, the minimum contribution rate is 7.63% (3.05% for the employees and 4.58% for the employers) in ARRCO and 20.43% in AGIRC (7.75% for the employees and 12.68% for the employers). The purchase price of each point, called "reference wage", depends on the year considered. In 2014, it is worth 15.26€ in ARRCO and 5.31€ in AGIRC.

Number of points acquired in year t = τ_t × (Gross wage$_t$/Purchase price of a point$_t$)

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

Pension = Total number of points acquired × Value of a point × Shortfall coefficient

"Full rate" in complementary pension schemes is granted to those who qualify for full rate in pension in general scheme. In case one retires before reaching full rate in CNAVTS, the value of a point is adjusted downwards by means of a "shortfall coefficient" (cf. table 1.4).

Table 1.4 - 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

> ➢ *Pension in the public service scheme (FPE)*

The calculation of the basic pension for public-service 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:

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[4] A higher *minimum contributif* also exists for people meeting 120 contribution quarters.

- The reference wage taken into account is the wage (excluding bonuses and other emoluments) received the last 6 months, 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 deduction and a premium rate, similar to that of the private sector.

As in the general scheme, the duration T taken into account in the proratisation coefficient is 41.25 years for people born in 1953 (aged 62 in 2015) 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 (RAFP) was introduced in 2005 by the 2003 reform. It is a point system whose contributions are only based on bonuses, within the limits of 20% of total wage. This scheme provides pensions much lower than those of the private sector complementary schemes.

For pensioners meeting the requirements for a full-rate, an earning related minimum pension can be guaranteed (called *minimum garanti*). In 2014, its value was 11,975.75€ per year for a 40 years career.

- ***Non-earning related minimum pension***

People aged 65 (or at the legal age - 60 before the 2010 reform, 62 after - in case of incapacity or invalidity) whose revenue (including pension or not) is under a certain ceiling (9,503.89€ a year for a single person and 14,755.32€ for a couple in January 2014) are eligible to a minimum pension, named ASPA (standing for "Allocation de solidarité aux personnes âgées" or "minimum vieillesse") that tops their revenue up to this ceiling. This ceiling is price-indexed. The ASPA amounts to 3.1 billion€ in 2013, which represents 1% of the total amount of pension expenditures.

- ***Disability pension***

Disability pensions are 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 pensions: the "rente Accident du Travail et Maladie Professionnelle (ATMP)" is due when the disability is related to work, the "Pension d'Invalidité (PI)" in other case. When disabled with PI reach the legal retirement age, they become eligible to a full rate pension: they cease to be included in the disability expenditures and join the old-age expenditures. As regards the other kind of disability pension, ATMP is cumulative with an old-age pension. The disability pensions are a fraction of a reference wage (the average of the past 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.

Table 1.5a - Parameters to work out a disability pension			
Disability class	Percentage applied to the reference wage	Minimum level per month	Maximum level per month
1st class	30%	281.66€	938.70€
2nd class	50%	281.66€	1,564.50€
3rd class	50% + 40% bonus for a third party	281,66€+ 1,103.08€= 1,384.74€	1,564.50€+ 1,103.08€ = 2,667.58€

Table 1.5b - Parameters to work out a disability pension : Rente Accident du Travail et Maladie Professionnelle

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

$T = 0.5 \times disability\ rate$ if disability rate $\leq 50\%$

$T = 1.5 \times disability\ rate - 50\%$ if disability rate $\geq 50\%$

$R = \text{ref. wage}$ if ref. wage $\leq R°$

$R = R° + \dfrac{\text{ref. wage} - R°}{3}$ if $R° < \text{ref. wage} \leq 4R°$

$R = 2R°$ if ref. wage $> 4R°$

With R° = 36,527.08€.

P (annual) is at least 36,527.08€ and at most 146,108.32€.

In addition, there is a non-earning related minimum disability pension ("Allocation aux adultes handicapés" - AAH) to top revenue of all disabled people up to at least 790.18€ per month.

- *Indexation*

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

According to the latest agreement, complementary schemes pensions (Agirc and Arrco) are under-indexed (CPI – 1%) in 2014 and 2015.

- *Pension taxation*

Pensions are liable to general social contributions (CSG and CRDS) at a 7.1% rate, and to two different health contributions: a specific contribution for pensioners (Casa) at a 0.3% rate and a health care contribution based only on complementary pensions (ARRCO, AGIRC, etc.) at a 1% rate. Pensioners with low revenue can benefit from a reduction of CSG-CRDS (3.8% instead of 7.1%) if they are not liable for income taxation[5] or from an exemption of CSG-CRDS and Casa if their revenue is under a ceiling (10,224€ for a single person in 2014). In addition, pensions are subject to income taxation.

The average tax rates in 2013 was 5.1% for income taxation and 5.8% for other taxes (CSG-CRDS-Casa).

There is no taxation for ATMP disability pension.

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

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

- The reference wage is now calculated on the basis of the 25 best years instead of the 10 best;

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[5] This tax exemption should be reformed by the Social Security Financing law for 2015.

- Past wages included in the reference wage are price-indexed (rather than wage-indexed);
- Pensions become price-indexed;
- The reference length has been raised from 37.5 to 40 years in the private sector.

The 2003 reform:

- It planned to increase semi-automatically the contribution period necessary to draw a full pension in line with life expectancy gains. The aim was to keep constant the ratio between contribution period and average length in retirement at its value of 2003 (1.79)[6]. In application of that principle, the reference length 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 earning-related pension. The retirement for long carriers concerns people who started to work before 16 and 17 and who have contributed more than the reference contribution period. They are entitled to withdraw their pension at the most 4 years before the legal age (56 years old). With the legal obligation to study until the age of 16, fewer and fewer people will be eligible to this plan.
- A bonus is created (in all schemes) for people who postponed their retirement after they reach the minimum age and the reference period. Penalty for early-retirement gradually decreases from 10% to 5% of pension benefits for private sector workers and is introduced for the public scheme. The reform also liberalized the conditions to cumulate 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 to the private sector is introduced 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).

The 2008 "rendez-vous":

- The premium for extra years worked after reaching the full pension contribution period was raised to 5%;
- The possibilities of drawing concurrently a pension and a wage were fully liberalized for people entitled to a full-rate 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 minimum pension created for people entitled to a full-rate pensions, are strengthened. This minimum pension is now means tested in order to target people with low levels of pensions more effectively.

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[6] 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 2010 reform included, besides targeted new resources, several measures:

- It introduced a progressive rise of age boundaries. The earliest retirement age is gradually increased, for all pension schemes, from 60 to 62. Simultaneously, the full rate pension age is rising from 65 to 67. Every generation from generation 1951 to generation 1955 are seeing these age limits rise by 4 or 5 months[7]. For example, people born in 1956 will be able to claim their pension at age 62 in 2018 and a full rate pension at 67 in 2023. The early retirement age for long careers will also be increased by 2 years. The 2010 reform, so as the 2008 "rendez-vous" increased the contribution periods.

- Exceptions dedicated to fragile workers have been introduced. Some categories of workers will still be granted a full rate 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%[8] will still be able to retire at 60 with a full rate pension. The retirement for long carriers is extended to people who started to work before 18 years old; they will able to retire at age 60.

- The convergence of pension rules between public and private sectors was strengthened by closing down two devices previously offered in the public sector: possibility of early retirement for parents with 3 children and a 15 years career and the "Cessation Progressive d'Activité" programme. Rules to compute minimum earning-related pensions and the contribution rate of civil servants[9] will also converge towards the private sector rules.

The 2014 reform included short term measures (increase of social contributions from both employees and firms by 0.3 points between 2013 and 2017, suppression of the 10 % tax exemption 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 full contribution period 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 will 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.

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

The projections are built on a "constant policy" principle and based on the legislation and rules as of September 2014. The rates of return of the AGIRC-ARRCO schemes are supposed constant through time. Regarding minimum pensions, we kept an indexation on prices, accordingly to the law. This is consistent with the treatment of other pensions' indexation.

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[7] 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.

[8] 10% under specific disability conditions.

[9] The contribution rate for civil servants will increase from 7.85% to 10.55% in 10 years.

2. Overview of the demographic and labour forces

2.1. Demographic development

Table 2.1 – Main demographic variables evolution							
	2013	2020	2030	2040	2050	2060	Peak year*
Population (thousand)	65 718	67 799	70 530	72 860	74 362	75 668	2060
Population growth rate	0,4	0,4	0,4	0,3	0,2	0,2	2015
Old-age dependency ratio (pop65/pop15-64)	27,9	33,0	39,4	44,1	43,7	42,9	2041
Ageing of the aged (pop80+/pop65+)	32,0	29,7	32,1	37,1	41,5	42,6	2055
Men - Life expectancy at birth	78,6	79,8	81,3	82,7	84,0	85,2	2060
Men - Life expectancy at 65	18,9	19,6	20,5	21,4	22,2	23,0	2059
Women - Life expectancy at birth	85,0	85,8	87,0	88,1	89,1	90,0	2060
Women - Life expectancy at 65	22,9	23,5	24,3	25,1	25,9	26,6	2060
Men - Survivor rate at 65+	71,1	74,8	79,4	83,2	86,3	88,9	2060
Men - Survivor rate at 80+	34,1	39,6	47,4	54,7	61,4	67,3	2060
Women - Survivor rate at 65+	86,4	88,2	90,3	92,0	93,4	94,6	2060
Women - Survivor rate at 80+	56,5	61,4	67,6	72,9	77,6	81,5	2060
Net migration	52,8	90,2	91,2	84,0	74,2	66,8	2029
Net migration over population change	0,2	0,3	0,3	0,4	0,6	0,5	2049

Source: Commission services based on Eurostat EUROPOP2013 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 2013 to 2060.*

Table 2.1 provides an overview of the demographic development until 2060. The total size of the population will increase until 2060 up to 75 million people, but at a decreasing rate from 2040. 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 relatively to working age population will increase from 27.9 % in 2013 to 42.9 % in 2060. Most of the increase in old-age dependency ratio will occur before 2041: after this date, this ratio is slightly decreasing because the number of 65+ people will stop increasing after the sustained growth until 2041. The "ageing of the aged" ratio, which is defined by the share of people older than 80 years old in population over 65 years old, will first decrease until 2024, then grow up continuously. Among the 65 years old and older group, the age composition will thus change towards a higher share of the elderly (over than 80).

Graph 2.1 – Age pyramid comparison: 2013 vs 2060
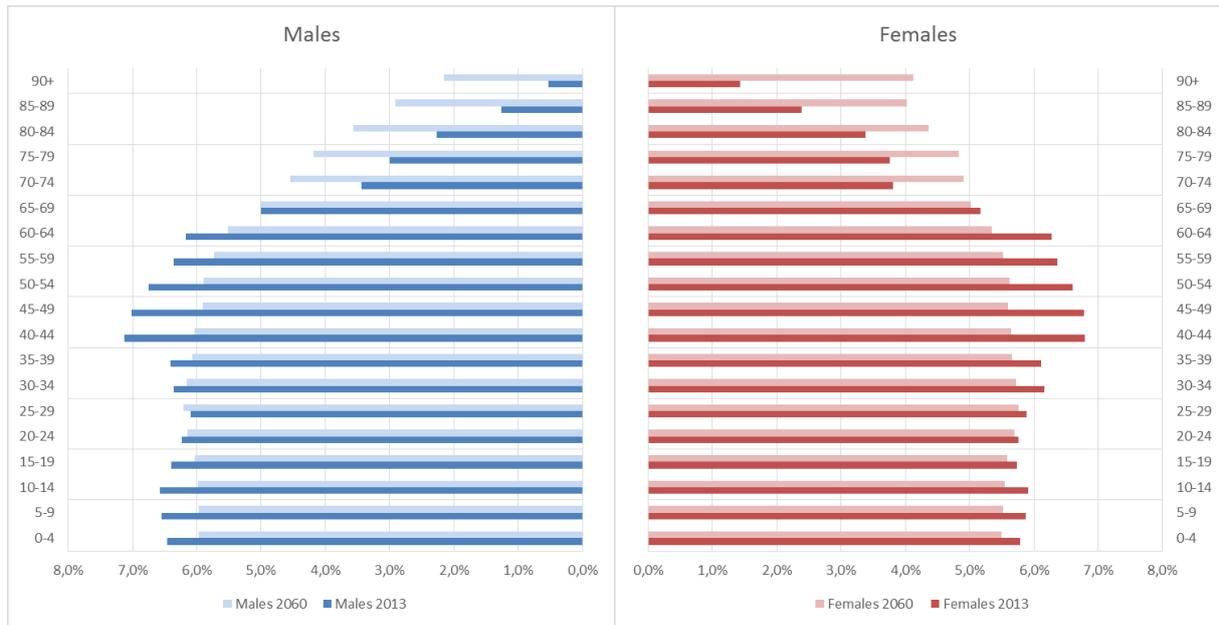
Source: Commission services based on Eurostat EUROPOP2013 data

The main differences between the age composition of the population in 2013 and 2060 are the shares of people over 40 years old and older:

    - The share of people aged between 40 and 64 will be lower in 2060 than in 2013.

    - On the contrary, the share of people aged 65 years old and older will be higher in 2060 than in 2013.

Due to the dynamic fertility, the share of young people will still be high in 2060. As a whole, the age pyramids would be flatter in 2060 than in 2013.

The comparisons between age pyramids in 2013 and 2060 are quite similar between males and females, except that the share of the elderly will be even higher for females than for males in 2060.

2.1. Labour force

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

Table 2.2 – Participation rate, employment rate and share of workers for the age groups 55-64 and 65-74

	2013	2020	2030	2040	2050	2060	Peak year*
Labour force participation rate 55-64	49,2	55,4	63,0	63,6	63,4	63,4	2056
Employment rate for workers aged 55-64	45,8	51,8	59,4	60,5	60,3	60,2	2056
Share of workers aged 55-64 on the total labour force	93,0	93,4	94,2	95,0	95,0	95,0	2043
Labour force participation rate 65-74	4,1	4,0	8,1	9,1	9,2	9,3	2060
Employment rate for workers aged 65-74	4,0	3,9	7,9	8,9	9,0	9,0	2060
Share of workers aged 65-74 on the total labour force	96,2	96,8	97,1	97,5	97,5	97,5	2060
Median age of the labour force	40,0	40,0	40,0	40,0	40,0	40,0	2013

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 2013 to 2060.

The effects of these reforms in France are reflected in the increase of participation rate and employment rate of the elders (see table 2.2). 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 during the time period of the projections: respectively from 49.2 % in 2013 to 63.4 % in 2060 for the participation rate, and 45.8 % to 60.2 % for the employment rate. This trend is also valid for the 65-74 years old. Most of the increase in these rates will occur before 2030 due to the progressive effect of the recent reforms which compel people to retire later.

Table 2.3a – Labour market entry age, exit age and expected duration of life spent at retirement - MEN

	2013	2020	2030	2040	2050	2060	Peak year*
Average effective entry age (CSM) (I)	21,4	21,6	21,6	21,6	21,6	21,6	2019
Average effective exit age (CSM) (II)	61,0	62,3	63,1	63,1	63,1	63,1	2047
Average effective working career (CSM) (II)- (I)	39,6	40,7	41,4	41,5	41,5	41,5	2047
Contributory period	37,9	38,5	34,7	37,0	35,9	35,8	2015
Contributory period/Average working career	95,7	94,6	83,8	89,2	86,6	86,4	2015
Duration of retirement **	22,0	21,9	22,1	23,0	23,9	24,8	2060
Duration of retirement/average working career	55,5	53,8	53,3	55,4	57,6	59,8	2060
Percentage of adult life spent at retirement***	33,8	33,1	32,9	33,8	34,6	35,5	2060
Early/late exit****	1,4	1,2	1,4	1,0	0,9	0,8	2013

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 2013 to 2060. ** 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 2.3b – Labour market entry age, exit age and expected duration of life spent at retirement - WOMEN

	2013	2020	2030	2040	2050	2060	Peak year*
Average effective entry age (CSM) (I)	23,0	23,5	23,5	23,5	23,5	23,5	2016
Average effective exit age (CSM) (II)	61,1	62,3	63,1	63,1	63,1	63,1	2045
Average effective working career (CSM) (II)- (I)	38,0	38,8	39,5	39,6	39,6	39,6	2045
Contributory period	32,7	31,3	31,4	30,7	30,8	32,4	2022
Contributory period/Average working career	86,1	80,6	79,4	77,6	77,7	81,9	2017
Duration of retirement **	26,4	26,1	26,1	26,9	27,7	28,4	2059
Duration of retirement/average working career	69,4	67,2	66,0	67,9	69,9	71,7	2059
Percentage of adult life spent at retirement***	38,0	37,1	36,7	37,3	38,0	38,6	2059
Early/late exit****	0,6	0,5	0,9	0,7	0,6	0,7	2029

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

Driven by the recent pension reforms, the average exit age from the labour market will rise by 2.1 years for men (from 61.0 to 63.1) and 2 years for women (from 61.1 to 63.1, see table 2.3a and 2.3b). Meanwhile, the average effective entry age on the labour market increases slightly by 0.2 for men and 0.5 for women, leading to longer average effective working careers for both men and women[10]. Despite the increase in the legal and statutory retirement ages, the ratio between the duration of retirement and the average working career will rise for men, from 55.5% in 2013 to 59.8% in 2060, reducing the gap with the value of this ratio for women (from 69.4% in 2013 71.7% in 2060).

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[10] The average working career and the contributory period are consistent but should be compared cautiously. First, the schooling level in France increased very fast. The average exit age of studies increased by 4 years within a relatively short period (from generation 1950 to generation 1974). Second, the approach is different between these two concepts. The *contributory period* is computed for each new pensioner according to his/her actual career. Therefore, it is computed by generation. For instance, in 2013, new pensioners are born in 1951 on average. The average exit age of studies for this generation is slightly above 18 (they leave school in 1969). The average contributory period in 2013 is based on this data and not on the average effective entry age for 2013 (21.4 according to the CSM method) which corresponds to people entering the labour market in 2013 (born around 1992). On the contrary, the *average working career* is calculated by mixing several generations and thus represents a virtual career. It considers the average effective entry and exit ages in a given year, whatever the generations concerned.

3. Pension projection results

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

- Old-age pensions

The French pension schemes 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 handicapped 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 2011. 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 € 2011	% of GDP
CNAVTS	99.9	5.0%
CNAVPL	1.1	0.1%
MSA employees	9.8	0.5%
ARRCO	45.3	2.3%
AGIRC	23.1	1.2%
FPE	49.2	2.5%
CNRACL	15.0	0.7%
Special schemes[11]	13.3	0.7%
RSI	14.0	0.7%
MSA farmers	16.0	0.8%

Source: Social Protection Accounts, Drees, 2011 (provisional)

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[11] SNCF, CRPCEN, CAVIMAC, ENIM, CANSSM, CNBF

- Definition of pension expenditure

Table 3.1 - Eurostat (ESSPROS) vs. Ageing Working Group definition of pension expenditure (% GDP)

	2006	2007	2008	2009	2010	2011
1 Eurostat total pension expenditure	**13.1**	**13.1**	**13.4**	**14.3**	**14.4**	**14.5**
2 Eurostat public pension expenditure	**13.1**	**13.1**	**13.4**	**14.3**	**14.4**	**14.5**
3 Public pension expenditures (AWG)	**13.3**	**13.3**	**13.6**	**14.5**	**14.7**	**14.8**
4 Difference (2)-(3)	**-0.2**	**-0.2**	**-0.2**	**-0.2**	**-0.2**	**-0.3**
5 Expenditure categories not in the AWG definition:	-0.2	-0.2	-0.2	-0.2	-0.2	-0.3
5.1 Early retirement benefit (labour market reasons)	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*
5.2 Allowance for adults with handicaps (AAH)	*-0.3*	*-0.3*	*-0.3*	*-0.3*	*-0.3*	*-0.4*

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

In this exercise like in the 2012 one, 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.

Contrary to the 2012 exercise, we include the allowance for adults with handicaps (AAH, 0.4% of GDP) in disability pensions, which was previously in long-term care projections. This allowance is shifted from long-term care to disability pensions due to changes in social protection accounts' classifications, but it is not taken into account yet in ESSPROS data. This shift is consistent with the 2015 long-term care projections run by the Commission services since they are based on the latest version of ESSPROS and thus do not include AAH.

- 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 76% of the global resources available in 2011; the remaining 24% is collected through earmarked taxes, the FSV financial fund and taxes based on all the other types of revenue (capital, replacement revenue…). For disability pensions, contributions represent around two thirds of the resources.

3.2.   Overview of projection results

Gross public pension spending is predicted to decrease from 15.3 % of GDP[12] in 2013 to 12.4 % in 2060, and peak in 2014 and 2025 at 15.3 % GDP, which represents an overall decrease of 2.8 GDP point over the whole 2013-2060 period (table 3.2).

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[12] All the figures expressed in this country fiche are calculated with ESA 1995 GDP levels.

Table 3.2 - Projected gross and net pension spending and contributions (% of GDP)

Expenditure	2013	2020	2030	2040	2050	2060	Peak year**
Gross public pension expenditure	15,3	15,0	15,0	14,1	13,1	12,4	2014
Private occupational pensions	:	:	:	:	:	:	:
Private individual pensions	:	:	:	:	:	:	:
Mandatory private	:	:	:	:	:	:	:
Non-mandatory private	:	:	:	:	:	:	:
Gross total pension expenditure	15,3	15,0	15,0	14,1	13,1	12,4	2014
Net public pension expenditure*	13,6	13,4	13,4	12,6	11,7	11,1	2014
Net total pension expenditure*	13,6	13,4	13,4	12,6	11,7	11,1	2014
Contributions	2013	2020	2030	2040	2050	2060	Peak year**
Public pension contributions	10,8	10,7	10,3	10,3	10,2	10,1	2013
Total pension contributions	10,8	10,7	10,3	10,3	10,2	10,1	2013

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 rates in 2013 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 2010 to 2060.)*

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

Concerning the evolution 2013-2060 of the ratio between projected pension expenditures and GDP, four periods may be identified (graph 3.1):

- Phase 1: Up to 2020, pension expenditures are expected to decrease by 0.3 pt since the 2010 pension reform effect starts to be perceivable: people are progressively compelled to retire later. Furthermore, the dynamic GDP growth driven by the closing of the output gap dwindles automatically the ratio between projection pension expenditures and GDP.

- Phase 2: From 2020 to 2025, the ratio between pension expenditures and GDP increases up to its 2013 level. During this period, the number of pensioners is expected to continue raising and GDP growth is less dynamic (1.3 % versus 1.7 % on average during the previous phase).

The ratio of pension expenditures over GDP is expected to decline continuously over 2025-2060, to reach 12.4 % of GDP in 2060. This decline can be further decomposed in two sub-periods:

- Phase 3: From 2025 to 2040, despite more favourable economic conditions, new pensions remain subdued due to the lasting effects of past reforms (increase in the retirement age, increase in the contribution length) which are visible until around 2040. Moreover, compared to older generations, new pensioners had more fragmented careers and thus are entitled to less dynamic pensions.

- Phase 4: After 2040, past reforms lead to smaller new effects on pension expenditures. This is compensated by the stabilization of the dependency ratio, which lightens the weight of pension expenditures on GDP.

Graph 3.1 - Projected pension expenditures (% of GDP)
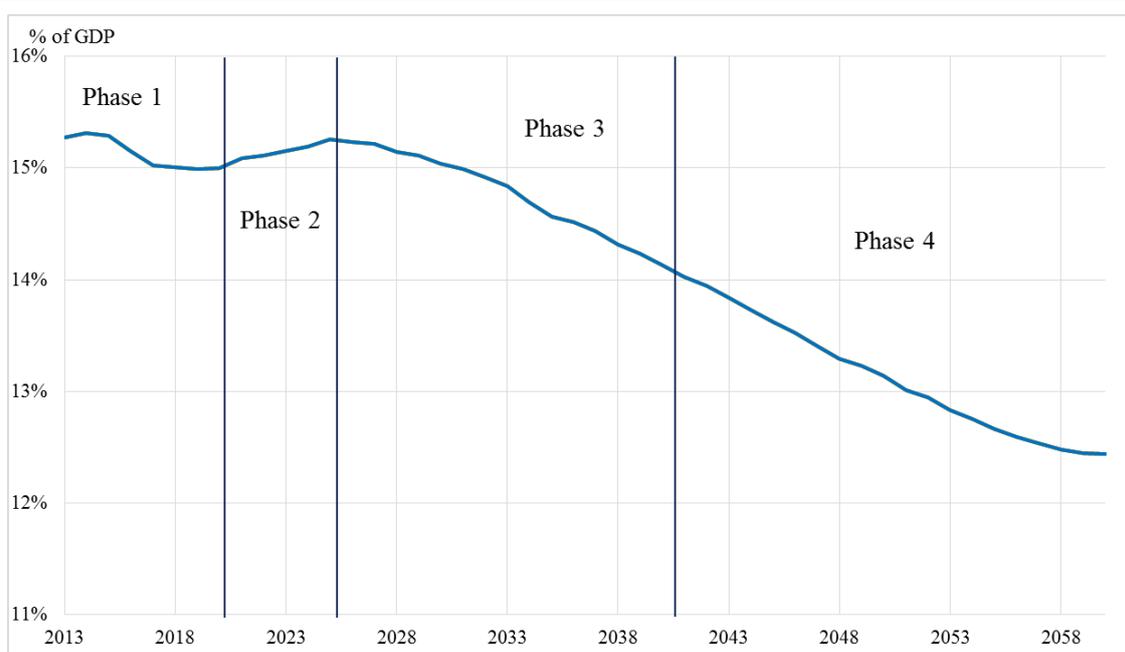
Source: Insee, DESTINIE model, calculations: DG Trésor

The global decrease of pension expenditures to GDP is noticed by other instances like the COR (the French pension advisory council), and Insee (the French statistical institute), but to a lesser extent due to less favourable macroeconomic and demographic conditions (cf. annex D).

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

Focusing on <u>old-age pensions</u> spending (table 3.3), their weight as a percentage of GDP would lower from 12.3% of GDP in 2013 to 10.4% of GDP in 2060. By shifting the legal and statutory retirement ages, and extending the minimum contribution period, the 2014 reforms contributed to reduce the weight of total pension expenditures in GDP. Moreover, more fragmented careers and the late entrance in the labour market entail lowering the average amount of pensions, and the average replacement rates at retirement.

The weight of <u>survivors' pensions</u> which is a percentage of the pension of the deceased husband/wife is reduced from 1.6% in 2013 to 0.9% of GDP in 2060. The overwhelming majority of survivors' 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 marriages induce that women will have a lower and time-limited amount of survivors' pensions over the projection period.

Concerning <u>earning related disability pensions</u> (ATMP and "pension d'invalidité") the level of new earnings related disability pensions grows in line with the average wage. Those pensions are price indexed. Their weight in GDP is stable.

The ratio between <u>non-earning related old-age pensions</u> ("ASPA" or "minimum vieillesse") and GDP is first increasing until 2037 and decreasing to 0.17 %, its 2060 level. The diminishing number of minimum pensioners after 2040 and the price indexation explains the decrease of the relative weight of minimum pensions on GDP after 2037.

Concerning <u>non-earning related disability pensions</u>, the minimum disability pension for disabled people, "allocation aux adultes handicapés" is transformed into old-age one when

statutory retirement age is reached. This pension is price indexed and its weight in GDP decreases.

Table 3.3 - Projected gross public pension spending by scheme (% of GDP)

Pension scheme	2013	2020	2030	2040	2050	2060	Peak year *
Total public pensions	15,3	15,0	15,0	14,1	13,1	12,4	2014
of which earnings related:							
Old age and early pensions	12,3	12,1	12,3	11,6	10,9	10,4	2025
Survivors' pensions	1,6	1,5	1,3	1,2	1,0	0,9	2013
Disability pensions	0,8	0,8	0,8	0,8	0,8	0,8	2021
Other pensions	:	:	:	:	:	:	:
of which non-earnings related (including minimum pension and minimum income guarantee):							
Old age and early pensions ("minimum vieillesse")	0,14	0,18	0,26	0,27	0,22	0,17	2037
Disability pensions ("AAH")	0,40	0,35	0,30	0,26	0,22	0,19	2013
Other pensions	:	:	:	:	:	:	:

Source: Insee, DESTINIE model, calculations: DG Trésor

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

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

$$\frac{\text{Pension Exp}}{\text{GDP}} = \overbrace{\frac{\text{Population } 65+}{\text{Population } 20-64}}^{\text{DependencyRatio}} \times \overbrace{\frac{\text{Number of Pensioners (Pensions)}}{\text{Population } 65+}}^{\text{CoverageRatio}}$$

$$\times \overbrace{\frac{\text{Average income from pensions (Average Pension)}}{\frac{\text{GDP}}{\text{Hours Worked } 20-74}}}^{\text{Benefit Ratio}} \times \overbrace{\frac{\text{Population } 20-64}{\text{Hours Worked } 20-74}}^{\text{Labour Market / LabourIntensity}} \quad [1]$$

For the projection round 2015, two further sub-decompositions have been agreed. The coverage ratio is further split with the scope of investigating the take-up ratios for old-age pensions and early pensions:

$$\overbrace{\frac{\text{Number of Pensioners}}{\text{Population } 65+}}^{\text{CoverageRatio}} =$$

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

The labour market indicator is further decomposed according to the following:

$$\overbrace{\frac{\text{Population } 20-64}{\text{Hours Worked } 20-74}}^{\text{Labour Market / LabourIntensity}} =$$

$$\overbrace{\frac{\text{Population } 20-64}{\text{Working People } 20-64}}^{1/\text{Employment Rate}} \times \overbrace{\frac{\text{Working People } 20-64}{\text{Hours Worked } 20-64}}^{1/\text{Labourintensity}} \times \overbrace{\frac{\text{Hours Worked } 20-64}{\text{Hours Worked } 20-74}}^{1/\text{Career shift}} \quad [3]$$

Graph 3.2 - Evolution of the main driving forces behind the projection results
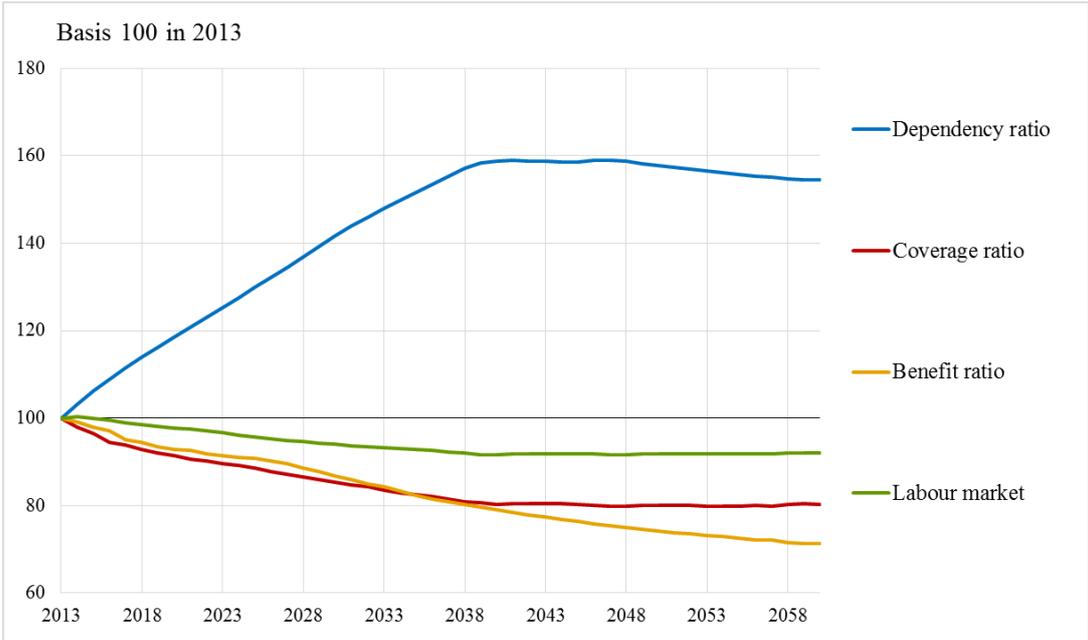
Source: Commission services; Insee, DESTINIE model, calculations: DG Trésor

Following the demographic assumptions, the dependency ratio (population 65+/population 20-64) notably increases up to around 2040 (graph 3.2). It then slightly decreases, contrary to the 2012 exercise's assumptions. Concerning the impact, *ceteris paribus*, of each of the factors considered on the evolution of pension expenditures (table 3.4a), the dependency ratio first pushes up pension expenditures (+7.3 pt. of GDP between 2013 and 2040), and secondly slightly down (-0.4 pt of GDP between 2040 and 2060, phases 3 and 4 of graph 3.1).

The coverage ratio (pensioners/population 65+) regularly decreases until 2040 and then stabilizes to end up at 80% 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 age of labour market entry, leads to a postponement of the retirement age. The coverage ratio dwindles the weight of public pension expenditures on GDP during the first period (table 3.4a; phases 1 and 2 of graph 3.1).

The benefit ratio (average pension by pensioner/GDP per hour worked by the 15-74 population) declines all along the period, to reach in 2060 a level which is almost 30% lower than the current level. The reduction of the benefit ratio expresses the subdued growth pace of the average pension compared to that of the average wage per worker. First pensions are expected to be stall

for a protracted period: the increase in discontinuous careers due to high unemployment rates will not only decrease the average 25 best yearly wages (used to calculate the pension) but also *the coefficient of proratisation* if the individuals do not have the required number of contributed years. Second, pensions are price-indexed. In the meantime, average wage per worker increase in line with labour productivity or GDP per worker. The benefit ratio effect on pension expenditures weight in GDP is negative during the whole horizon of the projection (table 3.4a). Firstly, because of the sluggish average wage growth and the high unemployment rate, pension rights will be quite low until 2035, weighing on pension levels. The upturn in GDP growth starting from 2035 will then automatically lower the benefit ratio. The hardening of rules for pensions induced by the last reforms would also contribute to the decline of the benefit ratio, and of the weight of pension expenditures on GDP.

The labour market indicator (population 20-64/hours worked by the 15-74 population) declines slightly and remains quite stable thereafter. It helps reducing pension expenditure growth (table 3.4a) mainly through an employment effect, and particularly the increase in the working population induced by recent pension reforms.

Table 3.4a - Factors behind the change in public pension expenditures between 2013 and 2060 (in percentage points of GDP) - pensioners

	2013-20	2020-30	2030-40	2040-50	2050-60	2013-60	Average annual change
Public pensions to GDP	**-0,3**	**0,0**	**-0,9**	**-1,0**	**-0,7**	**-2,8**	**0,3**
Dependency ratio effect	**2,7**	**2,8**	**1,8**	**-0,1**	**-0,3**	**6,9**	**0,1**
Coverage ratio effect	**-1,4**	**-1,0**	**-0,9**	**0,0**	**0,0**	**-3,3**	**-0,1**
*Coverage ratio old-age**	*-0,1*	*0,0*	*-0,1*	*0,0*	*0,0*	*-0,3*	*0,0*
*Coverage ratio early-age**	*-1,9*	*-0,9*	*-1,1*	*-0,4*	*-0,4*	*-4,7*	*-0,1*
*Cohort effect**	*-2,2*	*-3,0*	*-2,6*	*0,2*	*0,7*	*-6,8*	*-0,1*
Benefit ratio effect	**-1,1**	**-1,0**	**-1,3**	**-0,9**	**-0,5**	**-4,9**	
Labour Market/Labour intensity effect	**-0,3**	**-0,6**	**-0,3**	**0,0**	**0,0**	**-1,2**	**0,0**
Employment ratio effect	*-0,3*	*-0,4*	*-0,3*	*0,0*	*0,0*	*-1,0*	*0,0*
Labour intensity effect	*0,0*	*0,0*	*0,0*	*0,0*	*0,0*	*0,0*	*0,0*
Career shift effect	*0,0*	*-0,2*	*0,0*	*0,0*	*0,0*	*-0,2*	*0,0*
Residual	**-0,2**	**-0,2**	**-0,1**	**0,0**	**0,0**	**-0,4**	

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

As noted before, most of the time people 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, in general people 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 pensions instead of pensioners (table 3.4b) is not appropriate in the French case because people can cumulate several pensions, which is difficult to interpret. In the model, the coverage ratio effect is then positive, mostly due to the fact that the average number of pensions by pensioners increase 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 3.4b - Factors behind the change in public pension expenditures between 2013 and 2060 (in percentage points of GDP) - pensions

	2013-20	2020-30	2030-40	2040-50	2050-60	2013-60	Average annual change
Public pensions to GDP	**-0,3**	**0,0**	**-0,9**	**-1,0**	**-0,7**	**-2,8**	**0,3**
Dependency ratio effect	**2,7**	**2,8**	**1,8**	**-0,1**	**-0,3**	**6,9**	**0,1**
Coverage ratio effect	**0,2**	**0,6**	**0,2**	**0,4**	**0,3**	**1,8**	**0,0**
Coverage ratio old-age*	*2,4*	*1,9*	*0,9*	*0,5*	*0,3*	*6,0*	*0,1*
Coverage ratio early-age*	*-2,9*	*-1,4*	*-2,0*	*-0,1*	*-0,4*	*-6,7*	*-0,1*
Cohort effect*	*-2,2*	*-3,0*	*-2,6*	*0,2*	*0,7*	*-6,8*	*-0,1*
Benefit ratio effect	**-2,6**	**-2,5**	**-2,3**	**-1,3**	**-0,8**	**-9,6**	
Labour Market/Labour intensity effect	**-0,3**	**-0,6**	**-0,3**	**0,0**	**0,0**	**-1,2**	**0,0**
Employment ratio effect	*-0,3*	*-0,4*	*-0,3*	*0,0*	*0,0*	*-1,0*	*0,0*
Labour intensity effect	*0,0*	*0,0*	*0,0*	*0,0*	*0,0*	*0,0*	*0,0*
Career shift effect	*0,0*	*-0,2*	*0,0*	*0,0*	*0,0*	*-0,2*	*0,0*
Residual	**-0,3**	**-0,2**	**-0,1**	**0,0**	**0,0**	**-0,7**	

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

The benefit ratio (BR - calculated as the average pension by pensioner 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 3.5). This decline comes from from several factors: the rise in the full pension contribution period, the rule used to discount past wages entering into the pension formula in interaction with an increase in the age of labour market entry and more discontinuous 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 with the last wage at retirement[13], 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 the pensions and the wages of two different populations, is not a replacement rate: its evolution reflects the relative differences in the standards of living of the workers and the pensioners.

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[13] 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.

Table 3.5 - Replacement rate at retirement (RR) and coverage by pension scheme (in %)

	2013	2020	2030	2040	2050	2060
Public scheme (BR)	51,3	50,8	47,4	43,2	40,5	38,9
Public scheme (RR)*	50,6	50,3	47,2	42,9	40,5	39,2
Coverage	100,0	100,0	100,0	100,0	100,0	100,0
Public scheme old-age earnings related (BR)	52,5	51,8	47,6	42,8	40,1	38,7
Public scheme old-age earnings related (RR)	58,3	58,7	54,7	52,5	49,7	48,9
Coverage	70,6	73,9	77,7	79,3	80,2	81,2
Private occupational scheme (BR)	:	:	:	:	:	:
Private occupational scheme (RR)	:	:	:	:	:	:
Coverage	:	:	:	:	:	:
Private individual scheme (BR)	:	:	:	:	:	:
Private individual scheme (RR)	:	:	:	:	:	:
Coverage	:	:	:	:	:	:
Total (BR)	51,3	50,8	47,4	43,2	40,5	38,9
Total (RR)	50,6	50,3	47,2	42,9	40,5	39,2

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 2012 exercise, there are two reasons why the number of pensioners is higher than the number of people aged of 65 and older (table 3.6): a part of pensioners are younger than 65, and, moreover, everyone receiving a pension is counted as a pensioner, which means that pensioners living abroad are included, while the demographic projections are limited to the French territory[14].

The number of pensioners increases by 30% between 2013 and 2060, versus 13% only for the employed population (table 3.6). The growth of the number of pensioners is mostly concentrated before 2040, in line with the demographic projections. This leads to a continuous increase over the projection period in the ratio of pensioners to employment, also known as the pension system dependency ratio. In the same time, the old-age dependency ratio (population 65+/working age population 15-64) increases only until 2040 and declines slightly after this date, due to more favourable demographic assumptions.

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[14] In real, the Destinie model is only based on people living in France to count the number of pensioners and pensions, but pensioners living abroad have been included ex-post.

Table 3.6 – System Dependency Ratio and Old-age Dependency Ratio

	2013	2020	2030	2040	2050	2060
Number of pensioners (thousand) (I)	18 390	19 772	22 011	23 215	23 525	23 759
Employment (thousand) (II)	26 982	27 427	28 460	29 110	29 772	30 509
Pension System Dependency Ratio (SDR) (I)/(II)	**68,2**	**72,1**	**77,3**	**79,7**	**79,0**	**77,9**
Number of people aged 65+ (thousand) (III)	11 688	13 762	16 398	18 364	18 678	18 795
Working age population 15 - 64 (thousand) (IV)	41 844	41 748	41 658	41 677	42 719	43 831
Old-age Dependency Ratio (ODR) (III)/(IV)	**27,9**	**33,0**	**39,4**	**44,1**	**43,7**	**42,9**
System efficiency (SDR/ODR)	**2,4**	**2,2**	**2,0**	**1,8**	**1,8**	**1,8**

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

As regards age decomposition (tables 3.7a-b and 3.8a-b), one should note that before 60 years old 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 years, and 79% of the pensioners between 55 and 59 years old are disability pensioners. Conversely, this ratio is generally above 100% after 60 years old partly because inactive population is estimated on the French territory while pensioners living abroad are still included in the projection.

The computation of the ratios of pensioners over inactive population and pensioners over total population by age groups depends on two different sources. The numbers of pensioners by age groups are calculated with national projections (old-age pensions and disability pensions). The numbers of inactive and total population by age groups stem from labour force projections obtained through the CSM method run by the Commission. Regarding these two age groups, the number of inactive people is much lower in the 55-59 age group than in the 60-64 age-group.

The pensioners/inactive population ratio increases over time for the 55-59 age group. This increase is mostly driven by the two different trends between the stable projected number of disability pensioners and the decreasing number of inactive people in the 55-59 age group. Before 60, most of inactive and pensioners are disability pensioners. For instance, in 2013, 79% of pensioners are disability pensioners, versus 21% for other pensioners (mostly survivors' pensioners[15]). This explains why the ratio of pensioners over inactive is close to 100%.

On one side, the share of inactive people for the 55-59 age group obtained with the CSM model is decreasing until around 2030 as the 2010 and 2014 pension reforms are expected to have an important impact on the participation rate of this age group.

On the other side, the number of disability pensioners in the 55-59 age group remains stable over the projection period[16] as there is no reason to consider that disability rates will change. Indeed, disability rates are directly linked to exogenous variables (workplace accidents for instance) and increase with age (there is a persistency of disability). The number of disability pensioners cannot directly be related to activity rates in an age-group.

These two effects (stable number of disability pensioners and decreasing number of inactive people) lead to a strong increase in the ratio of 55-59 disability pensioners over inactive people

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[15] People can be entitled to a survivor's pension and be active at the same time.

[16] As explained in part 4.3, a macrosimulation model has been used to compute the amount and number of disability pensions, by applying disability rates (as showed in table A2 of the methodological annex) to the population. These rates are extrapolated from the latest available effective disability rates and they only slightly change during the projection horizon.

until 2030 (+30 pp). This is what pushes up the total ratio of pensioners (old-age + disability) over inactive population.

The level of the 55-59 ratio of pensioners over inactive population is higher than the 60-64 one. Starting from 2020, the 55-59 age group ratio of pensioners over inactive population is higher than the 60-64 one. Before 60, most of inactive and pensioners are disability pensioners. This explains why the ratio of pensioners over inactive is close to 100%.

On the contrary, after 60, there is a decrease in the participation rate for other reasons than disability. Some people staying inactive for some time before obtaining the full pension rate are neither old-age pensioners nor disability pensioners[17]. As a consequence, the ratio of pensioners over inactive population is lower than the one of the 55-59 age group.

The share of pensioners among the total population in the age group 60-64 would sharply decrease during the projection horizon as a result of the latest pension reforms. Starting from generation 1955, the minimum retirement age will be 62 instead of 60. People aged 60 will almost all be prevented from retiring. The same trend holds for women (tables 3.8a-b).

The coverage ratios profiles (in particular for the 60-64 age group) depend on retirement behaviour assumptions. Since 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 3.7a – Pensioners (public schemes) to inactive population ratio by age group (%)

	2013	2020	2030	2040	2050	2060
Age group -54	10,3	10,3	9,8	9,4	9,5	9,5
Age group 55-59	87,8	88,2	111,5	112,0	105,3	101,6
Age group 60-64	100,0	90,4	88,5	72,4	70,5	68,1
Age group 65-69	114,2	106,0	111,9	108,0	108,8	109,2
Age group 70-74	106,7	109,4	108,0	109,2	110,2	109,4
Age group 75+	103,4	104,8	106,3	106,0	105,0	105,1

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

Table 3.7b – Pensioners (public schemes) to population ratio by age group (%)

	2013	2020	2030	2040	2050	2060
Age group -54	4,5	4,6	4,4	4,2	4,2	4,2
Age group 55-59	23,6	22,0	22,9	23,0	21,8	21,1
Age group 60-64	75,2	59,2	47,6	38,2	37,4	36,1
Age group 65-69	107,6	99,3	96,8	91,8	92,4	92,6
Age group 70-74	104,7	107,8	105,7	106,0	106,9	106,1
Age group 75+	103,4	104,8	106,3	106,0	105,0	105,1

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

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[17] Disability pensioners only represent 7% of the 60-64 age group pensioners (in 2013).

Table 3.8a – Female pensioners (public schemes) to inactive population ratio by age group (%)

	2013	2020	2030	2040	2050	2060
Age group -54	9,1	9,2	8,9	8,2	8,2	8,1
Age group 55-59	79,1	78,2	102,6	106,5	96,0	90,5
Age group 60-64	92,8	86,3	90,3	76,7	75,8	77,3
Age group 65-69	110,6	105,0	110,0	108,7	109,1	108,4
Age group 70-74	104,9	107,7	107,2	108,8	110,2	109,7
Age group 75+	101,8	103,6	105,7	105,7	104,6	104,8

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

Table 3.8b – Female pensioners (public schemes) to population ratio by age group (%)

	2013	2020	2030	2040	2050	2060
Age group -54	4,3	4,3	4,2	3,9	3,9	3,9
Age group 55-59	24,7	22,0	23,5	23,5	21,7	20,5
Age group 60-64	71,1	57,9	50,1	41,4	41,1	41,8
Age group 65-69	105,6	98,8	95,6	92,9	93,0	92,3
Age group 70-74	103,4	106,5	105,0	105,8	107,0	106,5
Age group 75+	101,8	103,6	105,7	105,7	104,6	104,8

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

As regards the flow of new pension expenditures (public old-age earning-related pension for the new pensioners), they are decomposed as the product of the average new pension multiplied by the number of new pensioners and the average number of months paid in the first year.

There is no administrative accrual rate in the French legislation. Nevertheless, given the average new pension, the average contribution period among new pensioners and the 25 best year average pensionable earnings among new pensioners[18], it is possible to estimate ex-post "effective" accrual rates (see annex F).

The average new pension can also be presented as the product of three terms calculated according to the careers of the individuals (table 3.9a):
1. the average contribution period among new pensioners;
2. the 25 best year average pensionable earnings among new pensioners;
3. the effective average accrual rate among new pensioners.

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

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[18] 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.

New pension	2013	2020	2030	2040	2050	2060
I Projected new pension expenditure (millions EUR)	8 267,0	7 752,0	10 550,9	14 511,3	21 166,4	30 706,9
II. Average contributory period	35,6	34,6	32,9	33,7	33,3	34,1
III. Monthly average pensionable earnings	2 716,8	2 783,0	3 638,7	5 239,2	6 954,6	9 982,1
IV. Average accrual rates (%)	1,7	1,7	1,7	1,7	1,7	1,7
V. Sustainability/Adjustment factor	1,0	1,0	1,0	1,0	1,0	1,0
VI. Number of new pensioners ('000)	772,4	761,5	800,8	733,1	798,6	828,4
VII Average number of months paid the first year	6,6	6,1	6,3	6,5	6,6	6,5
Monthly average pensionable earnings / Monthly economy-wide average wage	**97,7%**	**86,5%**	**84,0%**	**85,6%**	**79,9%**	**80,8%**

*Source: Insee, DESTINIE model, calculations: DG Trésor*

Scope: New public old-age earning-related pensions (defined benefits schemes and point system schemes).

Explanatory note: The monthly average pensionable earning is defined as the 25 best year average wage valorised to CPI. The pensionable earnings are not uprated when a person is unemployed but bonus periods can be validated meanwhile.

1. The contribution period, which equals here the number of years the person earns a labour income, is stable over the horizon of the projection (slightly decreasing for men, and stable for women). The delayed entry in the job market due to the increasing duration of studies (graph 3.3a[19]) balances the increase in the mandatory contribution period. The distribution of ages of the new pensioners does move up for both men and women between 2013 and 2060, reflecting the effects of the recent pension reforms (graph 3.3b):

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[19] The light grey solid line represents the predicted exit age from studies and the dark line represents the predicted entry age in the labour market. The line with crosses traces the effective exit age from studies (from the French Labour Survey).

Âge de fin d'études prédit —— Âge d'insertion prédit —✱— Âge de fin d'études (enquête emploi)
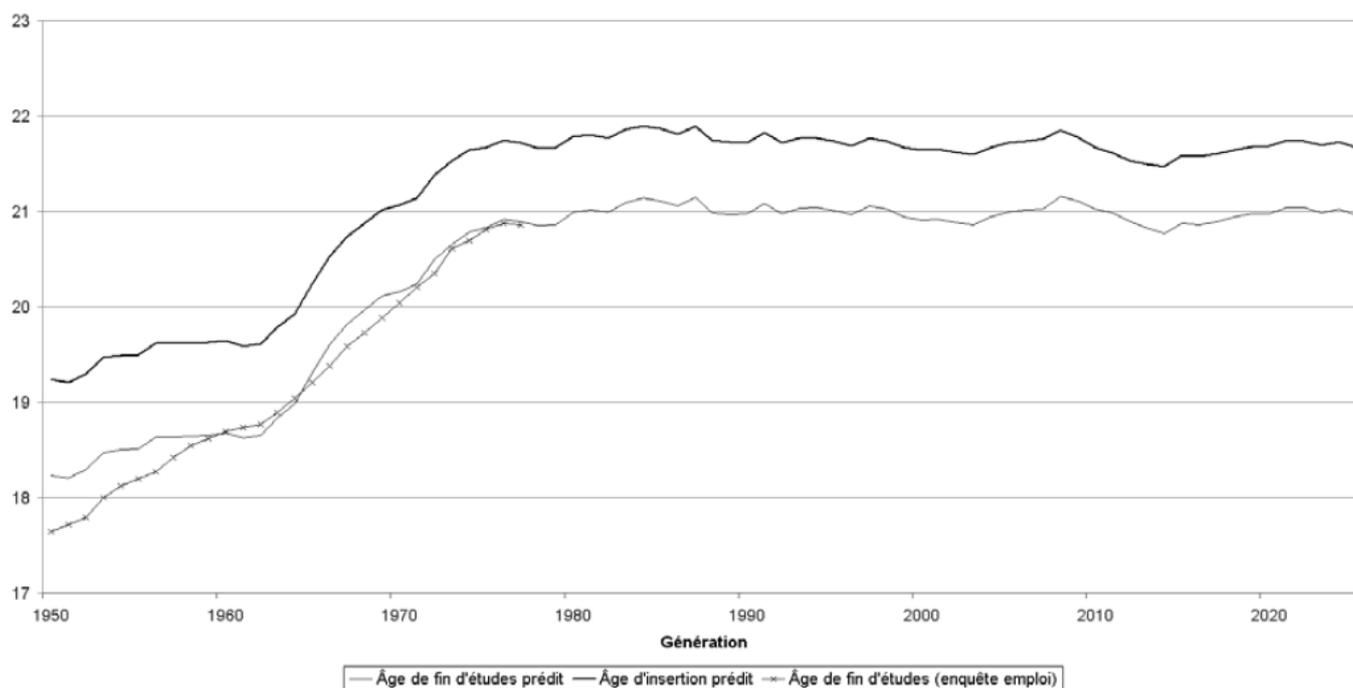
Source: M. Bachelet, A. Leduc, A. Marino, « Les biographies du modèle DESTINIE II : rebasage et projection », Working paper n° G 2014/01, Direction des Etudes et Synthèses Economiques, February 2014

Graph 3.3b - Average age of the new pensioners
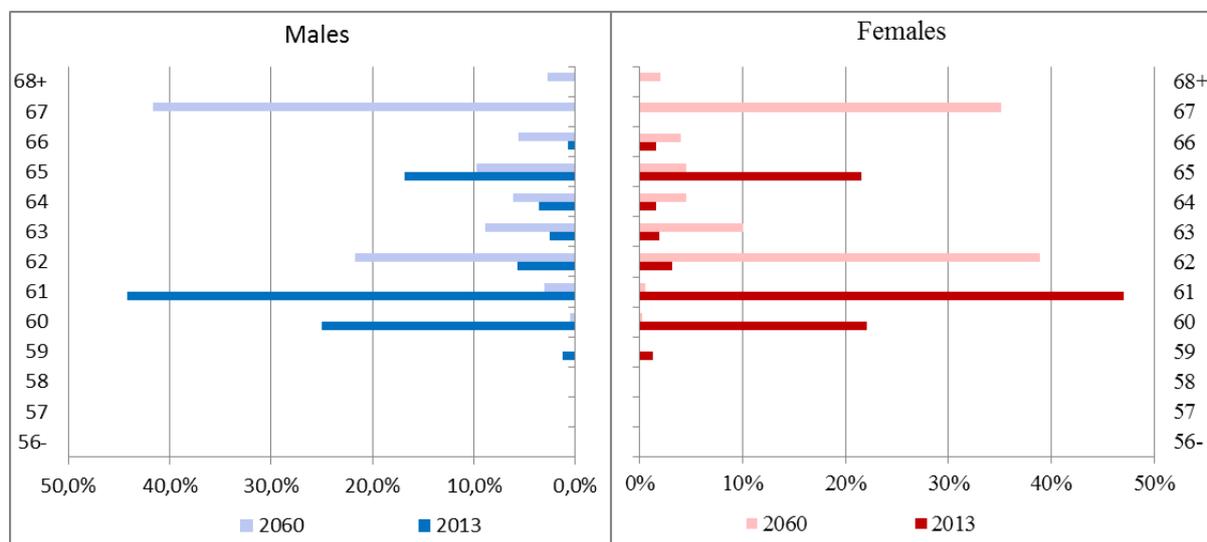
Source: Insee, DESTINIE model, calculations: DG Trésor

2. The 25 best year average pensionable earnings trace back the progression of wages along the career. Its increase is due to productivity gains, though retaining several annual wages valorised with inflation reduces its share on monthly economy-wide average wages. Starting from 2060, this ratio should remain stable, 25 years after the convergence of the productivity gains.

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

    a. There is a minimum contributory pension in the private sector as well as in the public. It is provided by the main pension schemes and it should not be confused with the "Minimum vieillesse", which is a legal minimum financed by the public old-age solidarity fund (FSV – Fonds de Solidarité Vieillesse). This contributory minimum is attributed to people once they have reached the full-rate condition (either through age or through contribution period). This minimum pension is called "Minimum contributif" (or Mico) for private sector employees, "Minimum garanti" (or Mingar) for public sector employees. Its level depends on the contribution period through the so called "coefficient de proratisation", so it could be quite low (but still high relatively to the contribution period). It concerns people whose basic scheme pension (calculated according the standard formula) is under a threshold (630€ per month in 2014 for private sector employees). This minimum pension targets people who earned low revenues (or who worked part-time). Thus, beneficiaries from this minimum pension have a higher accrual rate, since they receive a higher pension compared to what they contributed for. More than one fifth of employees are entitled to the contributory minimum, two thirds of whom are women (since they have lower revenues), which leads to higher accrual rates for women.

    b. Women also benefit more frequently than men from other non-contributory bonuses (especially maternity leaves bonuses) which also raises their average accrual rates.

    c. According to the French pension rules, people with high wages tend to have a lower accrual rates. For instance, pensions paid by the CNAVTS scheme are based on the gross wages under the social security ceiling. Thus, those pensions are lower (compared to their wages) for workers with high wages, which implies a lower accrual rate. Since average wages are higher for male than for female, it also leads to lower accrual rates for males.

Finally, the number of new pensioners would first decrease under the effect of the 2010 pension reform, and then increase anew when the reform's effect dwindles.

Table 3.9b - Projected and disaggregated new public pension expenditure (old-age and early earnings-related pensions) - Male

New pension	2013	2020	2030	2040	2050	2060
I Projected new pension expenditure (millions EUR)	5 051,4	4 110,8	5 199,4	7 991,4	11 515,8	16 738,5
II. Average contributory period	37,9	38,5	34,7	37,0	35,9	35,8
III. Monthly average pensionable earnings	3 159,3	3 338,2	4 090,3	6 129,8	8 296,4	12 177,5
IV. Average accrual rates (%)	1,5	1,5	1,6	1,5	1,5	1,5
V. Sustainability/Adjustment factor	1,0	1,0	1,0	1,0	1,0	1,0
VI. Number of new pensioners ('000)	422,2	351,3	357,8	350,2	384,0	393,5
VII Average number of months paid the first year	6,5	5,9	6,4	6,6	6,5	6,5
Monthly average pensionable earnings / Monthly economy-wide average wage	**113,6%**	**103,7%**	**94,5%**	**100,1%**	**95,3%**	**98,5%**

Source: Commission services; Insee, DESTINIE model, calculations: DG Trésor
Scope: New public old-age earning-related pensions (defined benefits schemes and point system schemes).

New pension	2013	2020	2030	2040	2050	2060
I Projected new pension expenditure (millions EUR)	3 215,3	3 640,4	5 347,0	6 508,6	9 652,4	14 010,0
II. Average contributory period	32,7	31,3	31,4	30,7	30,8	32,4
III. Monthly average pensionable earnings	2 183,3	2 307,6	3 273,8	4 424,6	5 711,7	7 996,4
IV. Average accrual rates (%)	1,9	1,9	1,9	1,9	2,0	1,9
V. Sustainability/Adjustment factor	1,0	1,0	1,0	1,0	1,0	1,0
VI. Number of new pensioners ('000)	350,2	410,2	442,9	382,9	414,6	435,0
VII Average number of months paid the first year	6,6	6,3	6,3	6,5	6,6	6,4
Monthly average pensionable earnings / Monthly economy-wide average wage	**78,5%**	**71,7%**	**75,6%**	**72,3%**	**65,6%**	**64,7%**

Source: Commission services; Insee, DESTINIE model, calculations: DG Trésor
Scope: New public old-age earning-related pensions (defined benefits schemes and point system schemes).

It is also possible to decompose the new public pension expenditures by types of systems (defined benefit schemes and point system in annex F).

3.4. Financing of the pension system

Regarding the financing side of the French pension system (table 3.10), only the contributions strictly speaking (i.e. collected on labour income) have been projected, in accordance with AWG guidelines. 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. State takes also part to the system through the contributions for the public sector pension scheme: its share in total public contribution will slightly decrease until 2060.

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

Table 3.10 – Revenue from contribution (million), number of contributors in the public scheme (in 1000), total employment (in 1000) and related ratios (%)

	2013	2020	2030	2040	2050	2060
Public contribution (millions €, current prices)	223 449	275 981	370 493	538 757	771 494	1 114 419
Employer contribution	*102 342*	*126 629*	*174 067*	*255 790*	*372 741*	*539 861*
Employee contribution	*72 393*	*96 089*	*130 193*	*189 984*	*273 220*	*394 095*
State contribution	*48 713*	*53 263*	*66 233*	*92 983*	*125 533*	*180 464*
Number of contributors (1000) (I)	26 388	26 821	27 171	28 125	28 761	29 443
Employment (1000) (II)	26 982	27 427	28 460	29 110	29 772	30 509
Ratio of (I)/(II)	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, eight sensitivity tests have been carried out. Definitions of these sensitivity tests are given in appendix F.

- Higher life expectancy scenario: public pension expenditures weigh more in GDP than in the baseline scenario (table 3.11). In this scenario, pensioners live longer and earn a pension during a longer period.

- In the higher productivity scenario, if pensions are driven up consequently to the higher productivity assumption, GDP is even more strongly boosted, for most of the pensions are calculated on the basis of the 25 best annual labour incomes: impact on wages is only progressively reflected on the final pension's level. Overall, the effect on pension to GDP is positive, since in 2060 the ratio is expected to reach 11.9% (vs. the 12.4% of the baseline scenario). Symmetrically, in the lower productivity scenario, the decrease in the weight of pensions in GDP is more limited: it is expected to represent 13.2% of the GDP in 2060.

- In the higher employment scenario, pension to GDP ratio in 2060 is expected to be improved compared to the baseline scenario, reaching 12.1% of GDP. As in the higher productivity scenario, the increase in pensions is compensated by a higher GDP due to the higher employment rates.

- Another sensitivity test assumes the same augmentation of employment, but entirely concentrated on old-age workers. Firstly, the positive impact of employment on GDP cumulated with a decrease in the number of pensioners reduce the weight of pension expenditures on GDP until 2040. These effects are compensated thereafter by the positive impact on average pension's level of the new pensioners who benefited from favourable economic conditions. In 2060, the ratio of pension expenditures on GDP is 0.7 pt above the baseline scenario. One should mention that this higher employment rate of the elder would in turn decrease unemployment benefits and increase contributions.

- The lower migration scenario is quite similar to the baseline scenario, with a ratio of pension expenditures just above the baseline (+0.1 pt in 2060) driven by a GDP slightly lower.

- In the TFP risk scenario, the ratio of pension expenditures on GDP is higher than in the baseline scenario (+0.9 pt in 2060). Pension expenditures and GDP are negatively affected by the lower TFP growth rate, but the effect on GDP dominates.

- The legislative scenario links retirement age to increases in life expectancy. The effect on the ratio of pension expenditures on GDP is strong: by compelling people to retire later, the pay-out pension period of pension is reduced, therefore lowering the total amount of pension expenditures. Moreover, the effect on GDP is somewhat positive as people work for a longer period.

Table 3.11 - Public pension expenditures under different scenarios (deviation from the baseline)

	2013	2020	2030	2040	2050	2060
Public Pension Expenditure						
Baseline	**15,3**	**15,0**	**15,0**	**14,1**	**13,1**	**12,4**
Higher life expectancy (2 extra years)	-0,1%	0,0%	0,0%	0,2%	0,3%	0,3%
Higher lab. productivity (+0.25 pp.)	0,0%	-0,1%	-0,3%	-0,5%	-0,5%	-0,5%
Lower lab. productivity (-0.25 pp.)	0,0%	0,1%	0,3%	0,6%	0,7%	0,8%
Higher emp. rate (+2 pp.)	-0,1%	-0,3%	-0,4%	-0,4%	-0,3%	-0,3%
Higher emp. of older workers (+10 pp.)	0,0%	-0,3%	-0,4%	0,0%	0,5%	0,7%
Lower migration (-20%)	-0,1%	-0,1%	-0,1%	0,1%	0,1%	0,1%
Risk scenario	0,0%	0,0%	0,2%	0,5%	0,7%	0,9%
Policy scenario: linking retirement age to increases in life expectancy	0,1%	0,0%	-0,3%	-0,7%	-0,9%	-1,3%

Source: Insee, DESTINIE model, calculations: DG Trésor

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

The share of pension expenditures over GDP is projected to decrease over the exercise period (table 3.12) 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 2012 exercise, the changing demographic assumptions, and in particular the lower weight of dependency ratio, explains the downward revision (graph 3.4).

Table 3.12 - Overall change in public pension expenditure to GDP under the 2006, 2009, 2012 and 2015 projection exercises

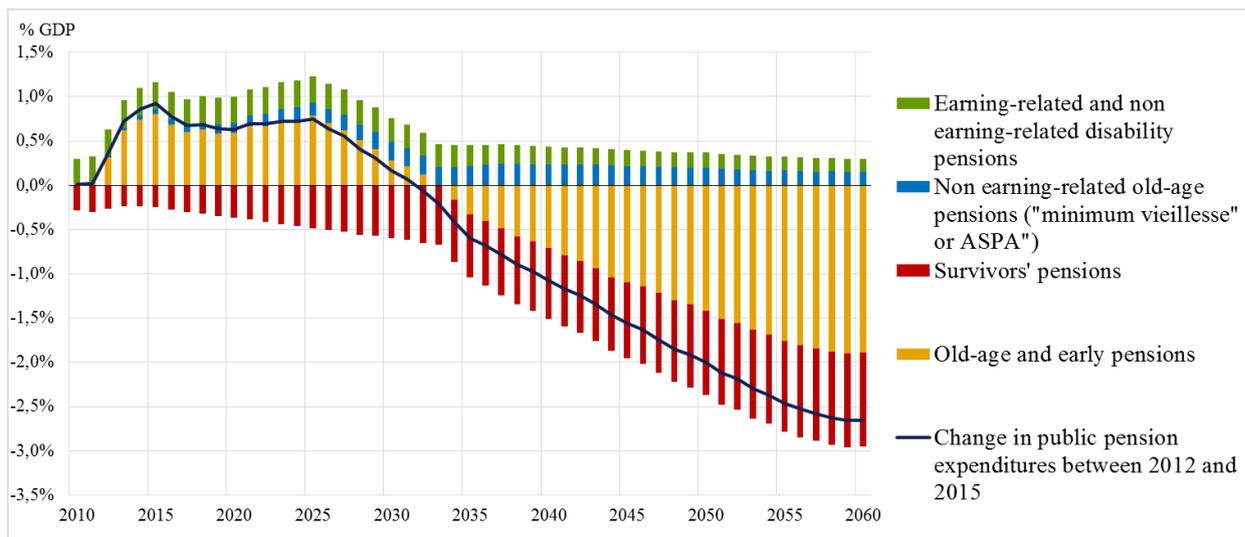|	Public pensions to GDP	Dependency ratio	Coverage ratio	Employment effect	Benefit ratio	Labour intensity	Residual (incl. Interaction effect)
2006 *	1,98	8,69	-1,79	-0,93	-3,52	:	-0,48
2009 **	1,01	8,40	-2,20	-0,51	-4,03	:	-0,66
2012 ***	0,54	9,15	-3,53	-1,23	-3,08	-0,01	-0,76
2015****	-2,83	6,92	-3,25	-1,00	-4,86	-0,02	-0,63

Source: Commission services based on French projections
*Explanatory note: * 2004 - 2050, ** 2007 - 2060, *** 2010 - 2060, **** 2013 – 2060. Please note that the four components do not add up because of a residual component.*
Lecture: In the exercise 2015, the change in public pension expenditure to GDP between 2013 and 2060 (-2.83 pt) is decomposed between a dependency ratio effect (+6.92 pt), a coverage ratio effect (-3.25 pt), a benefit ratio effect (-4.86 pt), a labour intensity effect (-0.02 pt) and a residual effect.

Graph 3.4 - Decomposition of the change (%) in old-age earnings related pension expenditure to GDP between the 2012 and the 2015 exercices

Legend:
- Dependency ratio
- Labour market
- Coverage ratio
- Benefit ratio
- Change in 2015 compared to 2012
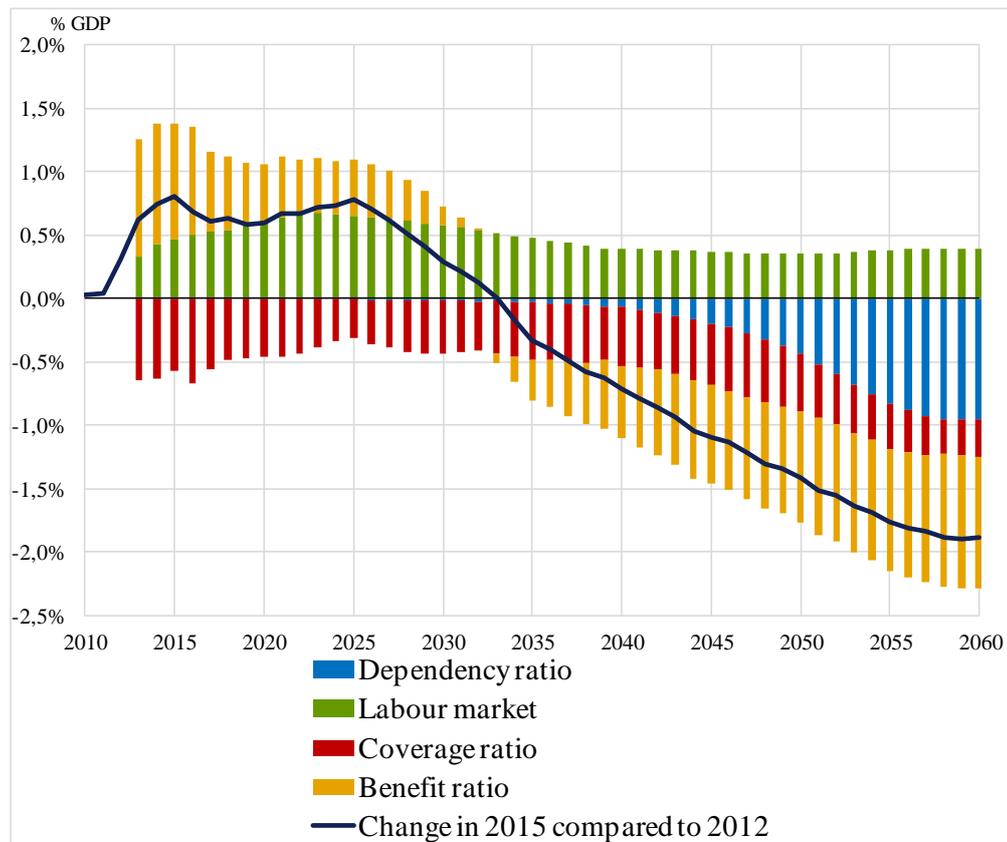
Graph 3.5 - Decomposition of the change (%) in public pension expenditure to GDP between the 2012 and the 2015 exercices - by type

Legend:
- Earning-related and non earning-related disability pensions
- Non earning-related old-age pensions ("minimum vieillesse" or ASPA")
- Survivors' pensions
- Old-age and early pensions
- Change in public pension expenditures between 2012 and 2015

As regards to the difference between the evolution of public pension expenditure with the last exercise (table 3.13), the **last pension reform** lowers pension expenditures in 2060 since the reform is expected to diminish pension because it strengthens the conditions for a full rate pension and people are thus compelled to retire later.

The **change in macroeconomic and demographic assumptions** first pushes up the share of pension in GDP because of the lower than forecasted GDP. In the long run, it accounts for -1.3 pt of GDP of the total revision in 2060. The stabilization of the dependency ratio starting from 2040 lightens the weight of pension expenditures on GDP compared to the previous exercise.

The **improvement in the coverage and in the modelling** between the two exercises is due to the fact that the two models are based on very different approaches: the previous model in 2012 adjusted the COR baseline scenario to AWG baseline scenario by using sensitivity analysis at a macro-level, whereas in the new exercise, the data are completely micro-simulated and reflect individual careers more precisely. The improvement in the modelling lowers the share of pension expenditures in GDP over the projection horizon and accounts for -1.1 pt of the total revision in 2060, for mainly three reasons:

- First, macroeconomic assumptions (unemployment, wages, etc.) are better taken into account compared to the previous exercise, and in particular their "lagged effects". Indeed, pension expenditures are highly dependent on macroeconomic assumptions in France: firstly following the 1993 reform that indexed both pensions and reference wages to inflation, and also through the mechanism of computation of pension that relies on past wages and past contribution period. The lagged effects of productivity growth and unemployment are fully reflected by a microsimulation model because the whole career of the individuals are simulated. Using a microsimulation model ensures that the results are fully consistent with past and present macroeconomic assumptions.

- Secondly, the revision of survivors' pensions (see graph 3.5) account for a large part of the differences between the two exercises. In the previous exercise, the main demographic and economic stylized facts affecting survivors' pension expenditures (reducing gap in life expectancies, relative increase in women employment rate, decreasing marriage rates) were not taken into account. This methodology lead to an overestimation of these expenditures. For this new exercise, the microsimulation model Destinie correctly takes into account these elements, and lead to a decline in survivors' pension expenditures in line with latest publications on this issue. This trend is shared by other French projections[20].

- Third, for the 2015 exercise, expenditures for handicapped people (AAH) have been included in disability pensions, which increased pension expenditures by 0.4% of GDP in 2011. The weight of this allowance is halved over the projection horizon, also explaining the downward revision of pension projections.

Table 3.13 - Decomposition of the difference between the 2012 and the 2015 pension projection – Total public pension expenditures (% of GDP)

	2013	2020	2030	2040	2050	2060
Ageing report 2012	14.6	14.4	14.9	15.2	15.1	15.1
Change in assumptions	+0.7	+0.7	+1.0	+0.2	-0.6	-1.3
Improvement in the coverage or in the modelling	0.0	-0.2	-0.7	-1.0	-1.2	-1.1
Policy related changes	0.0	+0.1	-0.1	-0.2	-0.2	-0.2
New projection	15.3	15.0	15.0	14.1	13.1	12.4

Source: Insee, DESTINIE model, calculations: DG Trésor

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[20] « La projection des pensions de réversion dans l'exercice 2012 du COR », COR, October 2014 (working paper n°12), http://www.cor-retraites.fr/IMG/pdf/doc-2520.pdf).

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 projection[21] was published in December 2014 and was based on the biggest pension schemes projections, and simpler methodologies coordinated by the COR for the smaller schemes. From now on, in order to comply with the 2014 reform, the COR will update its projection every year.

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

For the *2012 Ageing Report*, the French Treasury worked in cooperation with the COR and used their latest projections adapted in order to take into account the 2010 pension reform and to fit the AWG macroeconomic and demographic assumptions.

For the *2015 Ageing Report*, as the Commission requested the use of a microsimulation model, the French Treasury has changed its pension projections method and worked in cooperation with Insee on the Destinie model. This microsimulation model, developed in the 90s, is a reference[22] concerning pension expenditures projections. The Destinie model has been exploited in papers published in professional publications[23] [24] as well as peer-reviewed journals[25] [26]. It has also been used in public reports: for instance, the last public report[27]

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[21] « Actualisation des projections », 16 december 2014 COR meeting, http://www.cor-retraites.fr/article444.html

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

[23] 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.

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

[25] 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.

[26] 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.

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

regarding pension ordered by the French Government and published in June 2013 relied on the Destinie model.

As regards disability pensions, the projection model is the same as the one used for the *2012 Ageing Report*. This projection model 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 Weatlth 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 carreer 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-earning disability benefits.

4.3. General description of the model

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.

(a) Biography generator

The first module produces full individual biographies (demographic and professional) except the transition towards retirement) up to 70 years old (or the age of death in case). Using the "Enquête Patrimoine 2010", the professional and family trajectories are simulated until 2060 according to transition probabilities estimated from other data (see data used, 4.2).

For each individual in the sample, many variables are simulated, for instance:
- schooling level
- the 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 sampling of the individuals from the Household Weatlth Survey is driven so as to make it stick to the real structure in terms of demographic and macroeconomic path assumptions (observed data in the past, underlying assumptions in the future):
– Population by age and gender,
– Levels of education (by generation),
– Types of households (number of children/household, birth/age of the mother, etc.).
– Activity and unemployment rates by age and gender

Starting from the computed biographies, Destinie simulates the age of retirement for each individual of the sample, assuming that people retire as soon as they reach full pension rate (either by the statutory retirement age or by the contribution period).

(b) Pension simulator

The second module is devoted to pensions 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 2014 (including the 2014 pension reform).

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' pensions projection: Destinie

Sample size

The sample is composed of 64 000 individuals in 2013.

Pensions 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, who were not simulated separately in the previous projection, are now microsimulated.

The Destinie model simulates biographic situations, 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 rule of survivors' pensions differ according to the 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). Some conditions of the public sector pension scheme, like the duration of the wedding, children, etc., are neither taken into account.

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 defined by the average last monthly wage of new pensioners. The ratio between the economy wide average wage and the one at retirement remains broadly stable during the whole period, around 1.1.

Table A.1 – Economy wide average wage at retirement evolution (in thousands euro)						
	2013	**2020**	**2030**	**2040**	**2050**	**2060**
Economy-wide average wage	33.4	38.6	52.0	73.5	104.4	148.3
Economy-wide average wage at retirement	33.5	33.9	45.8	69.5	97.2	141.0

Source: Commission services; 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 real, 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 modelized 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. Before the earliest legal retirement age, the number of pensions equals the number of pensioners since people cannot cumulate two disability pensions. After the earliest legal retirement age, we suppose that people who still have disability pensions also have a retirement pension.

The ratio of pensions over pensioners raises from 1.6 in 2013 to 2.3 in 2060. This increase is due to the fact that people are more likely to work in various sectors during their careers, which in turn rises the probability of cumulating several pensions.

Pension taxation

Pensions are liable to general social contributions (CSG and CRDS) and to two different health contributions: a specific contribution for pensioners (Casa) and an additional contribution on complementary pensions (Agirc, Arrco, etc.).

Pensioners with low revenue can benefit from a reduction of CSG-CRDS (3.8% instead of 7.1%) if they are not liable for income taxation[28] or from an exemption of CSG-CRDS and Casa if their revenue is under a certain ceiling (10,224€ for a single person in 2014). There is no taxation on ATMP disability pension and non-earning related pensions.

In 2013, the average tax rate was 10.9%. This calculation has been done on the latest exhaustive administrative data about incomes and taxation. The decomposition of the average tax rate is 5.1% for income taxation and 5.8% for other taxes (5.2% for CSG, 0.4% for CRDS, 0.2 for Casa). As agreed with the Commission, this tax rate is supposed constant over time to keep the share of tax revenues in pension expenditures stable.

Disability pension

There are three kind 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-earning minimum disability pension. In each case, a profile by age and gender is elaborated for 2013 with number of recipients and average amount of disability benefits. In France, new disability pensions are for people under the retirement age (and only one kind of disability pension can remain after) so the increase of life expectancy has a limited influence here. 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-earning benefits, those pensions are price indexed.

Table A.2 – Disability rates by age groups (%)						
	2013	2020	2030	2040	2050	2060
Age group -54	4.1%	4.0%	3.8%	3.8%	3.9%	3.9%
Age group 55-59	19.2%	19.2%	19.3%	19.3%	19.3%	19.3%
Age group 60-64	9.9%	12.2%	12.2%	12.2%	12.2%	12.3%
Age group 65-69	7.0%	7.1%	7.1%	7.1%	7.1%	7.2%
Age group 70-74	7.1%	7.1%	7.1%	7.2%	7.2%	7.3%
Age group 75+	6.4%	6.5%	6.7%	6.6%	6.6%	6.5%

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[28] This tax exemption should be reformed by the Social Security Financing law for 2015.

Survivors' pensions

The Destinie model simulates biographic situations, and in particular the evolution of the marital status: separations, pairing of singles into couples, births, etc. One should note that the Destinie model does not distinguish between marital status: 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 overestimate the projections of survivors' pensions.

In the projections, the weight of survivors' pensions expenditures in GDP decreases (1.6% in 2013 and 0.9% in 2060). 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 the survivors' pensions.

- the relative increase of women employment and participation rates. As a matter of fact, survivors' pensions are means tested in the *régime général*: this improvement of women's careers reduces the probability that they fit the means conditions for being eligible for survivors' pensions. As the survivors' pensions top revenues to a certain ceiling, if women are eligible to survivors' pensions, the amount of this pension is reduced when their revenues are higher.

- the trend of decrease of marriage rate, which in turn limits the number of people who can benefit from survivors' pensions.

Other explanations (the reduction of the gap between ages of married people, the increase of remarriages, etc.) might also influence survivors' pensions, but they are not taken into account.

The trend of our projections of survivors' pensions is consistent with the trend of the 2012 projections of the Conseil d'Orientation pour les Retraites (COR).

Non-earnings related minimum pension

The ratio between non-earning related minimum pension and GDP is stable around 0.5% until 2040 and then starts decreasing to reach 0.35% in 2060. The number of minimum pensions and pensioners starts diminishing after 2040. Thanks to the increase in the standard of living of the retirees, less people are eligible to a minimum pension. After 2040, the minimum pensions price indexation and the more dynamic GDP growth contribute to the decrease of the weight of minimum pensions on GDP.

Contribution

The average contribution rate is calculated for each pension scheme (private, public, others) and, in accordance with Commission guidelines, these contribution rates are kept constant over the projection horizon. For instance, the contribution rate in the private sector (*régime général* CNAV) is 24.1%, shared between employers (60% of the rate, i.e. 14.3%) and the employees (the remaining 40% of the rate, i.e. 9.8%). These average contribution rates are consistent with calculations of other organizations like the COR.

Public pension contributions are generally paid on the basis of the salary of the working population up to a certain level Social Security Ceiling, SSC, which equals 3,129 € per month in 2014), except for the public pension scheme where contributions are only index-related salary (i.e. salary without bonuses and other emoluments). The contribution rates are applied to the contribution base. For simplicity reasons, the average economy-wide wage is assumed to be under the SSC.

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 1st- 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.

*** This includes the acceleration in the 2012 social security budget law.*

For instance, someone born in 1960 can retire at age 58 only if he started working at 16 and has validated 174 quarters; or at age 60 if he 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 instances

Graph D.1 - Total pension expenditures projected by other instances
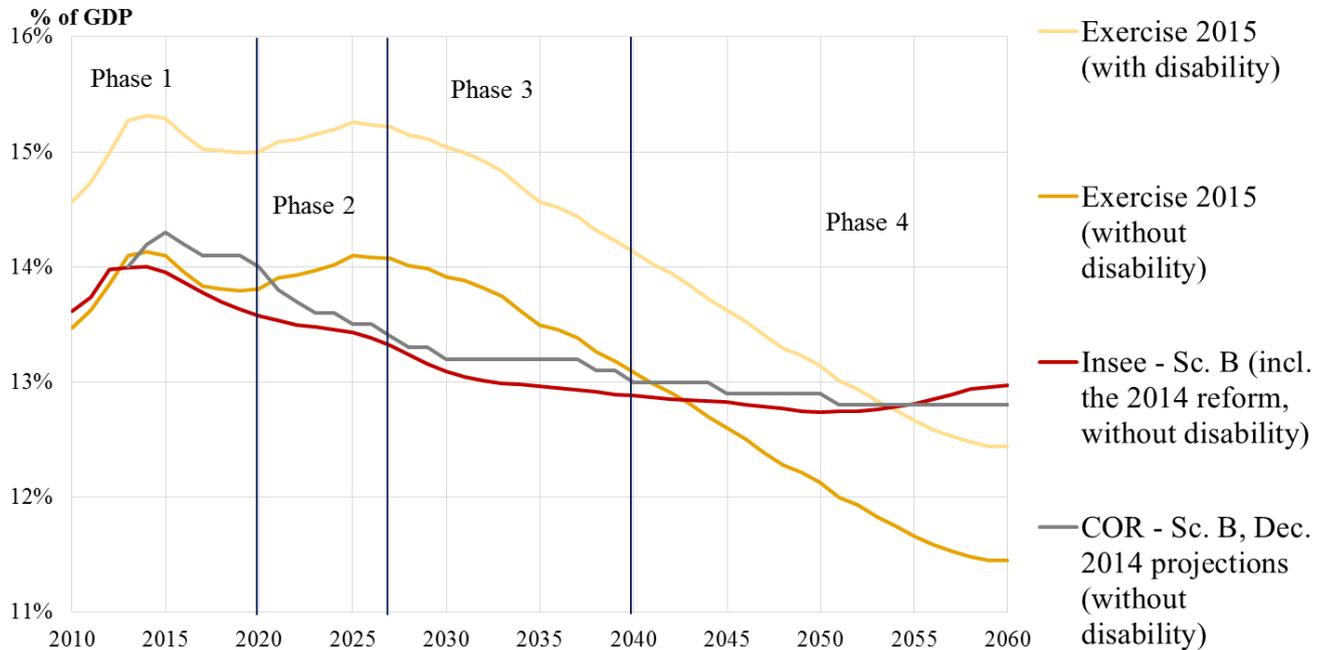
Destinie's results are similar to the COR's ones with similar demographic and close macroeconomic assumptions[29], as showed in the article by Marino[30] (see graph D.1). The two trends are very similar, considering that Destinie was used in the Insee exercise, whereas the COR relies on a hybrid methodology[31].

We present a decomposition of the differences between the 2015 AWG and the 2014 COR 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 employees[32]. The factors are the ones below:

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

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

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

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[29] Short-term macroeconomic assumptions are slightly different between these two exercises, as Insee projections relied on December 2013 macroeconomic assumptions, which were actualized meanwhile for the last COR exercise. Demographic assumptions are the same (Insee 2010 population projections).

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

[31] Conseil d'orientation des retraites, « Le champ et les hypothèses des projections », document n°3, December 2014.

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

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

The decomposition of the differences in the public pension expenditures[33] between the AWG and the COR projections is presented in table D.2 below:

Table D.2: Differences between the COR exercise (scenario B) and the AWG exercise (baseline scenario excluding disability pensions) of the decompositions of the evolution of pension expenditures

	2013-2020	2020-2040	2040-2060	Total
Public pensions to GDP (GDP point)	**-0,29**	**0,28**	**-1,43**	**-1,45**
Dependency ratio	-0,14	-0,02	**-0,88**	-1,05
Coverage ratio	0,22	0,01	-0,05	0,18
Benefit ratio	**-0,71**	-0,06	-0,41	-1,18
Labour market	0,33	**0,34**	-0,09	0,58
Residual	0,00	0,00	0,00	0,01

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.

Three periods can be identified:
- On the short term (2013-2020), macroeconomic assumptions are the main drivers of the differences between the AWG and the COR exercises for pension expenditures as a share of GDP. Especially the closure of the output gap is different in the AWG exercise and lead to a more dynamic labour productivity growth on the short term.
- On the medium term (2020-2040), pension expenditures increase more in the AWG exercise mainly due to higher unemployment rates.
- During the last two decades, the dependency ratio has the strongest effect and explains around 1 GDP point. The benefit ratio also has a negative impact, due to the lasting effects of lower wage growth and higher unemployment during the first two periods.

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[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.
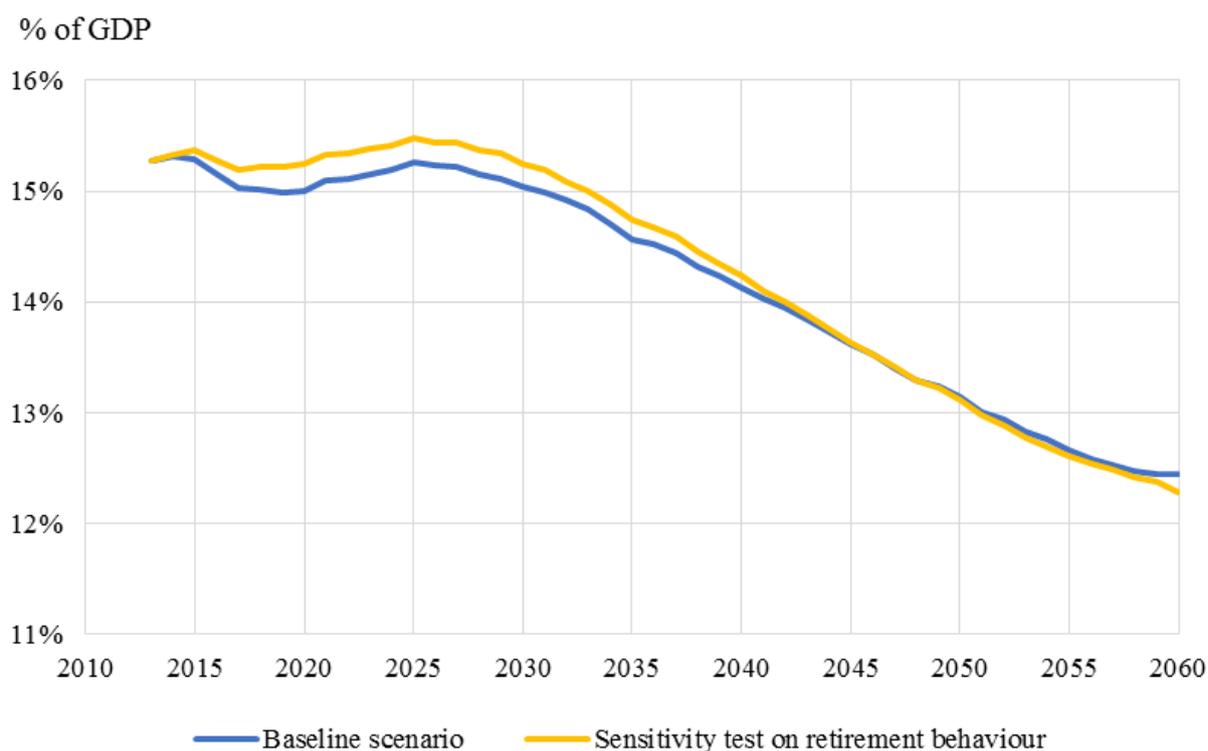
E. Alternative retirement behaviour scenario

As requested by the Commission services, Insee estimated the impact of the retirement behaviour assumption on pension expenditures projections through an alternative scenario.

This scenario was produced by the Destinie model under the same macroeconomic and demographic assumptions as the AWG baseline scenario but with a different retirement behaviour assumption. The careers of the individuals are identical in both projections. The only difference lies in the decision of retiring. In the baseline scenario, people wait to obtain a full-rate pension (either through age or validated period) consistently with observed retirement behaviour whereas in the alternative scenario they retire as soon as they leave the labour market, provided they reach the minimum legal retirement age.

In terms of total public pension expenditures, the results are close to those of the baseline scenario (see graph E.1). This comes from the actuarial neutrality of the French pension system and can be presented through two factors: the coverage ratio and the average pension.

Graph E.1 – Estimation of the retirement behaviour assumption on public pension expenditures

Source: Insee, DESTINIE model, calculations: DG Trésor

Effect of the retirement behaviour assumption on the coverage ratio

In both scenarios, the ratio of the number of pensioners over total population for the age group 60-64 decrease in line with past reforms (raise of the minimum retirement age in particular, see dashed line in the graph below) but the different retirement assumptions imply differences in the number of pensioners and thus in the coverage ratios.

In the baseline scenario, the full-rate retirement behaviour assumption translates into lower coverage ratios of the 60-64 over the projection horizon. Under this retirement behaviour assumption, people stay inactive for some time before retiring in order to obtain a higher pension consistently with current observed behaviour. Once they leave the labour force, these 60-64 year old people are not entitled to public social benefits before they retire. Indeed, people who are not actively looking for a job are not entitled to major social minimum incomes, except for the one provided to people suffering from a strong handicap ("Allocation Adultes Handicapés" – which has been added in this projection exercise comparing to the previous one). Besides, most of the social benefits are based on the households' revenues.

In the alternative scenario, inactive people retire as soon as they reach the minimum retirement age. Thus, the ratio of the number of pensioners over inactive population for the 60-64 age group is close to 100% over the projection horizon (see graph E.2, solid yellow line).

Thus, in the alternative retirement behaviour, pensioners are more numerous (+900 000 in 2060) and the ratio of pensioners over total population is higher. This also translates into a one year lower average effective retirement age.

**Graph E.2 – Estimation of the retirement behaviour assumption on the coverage ratios**
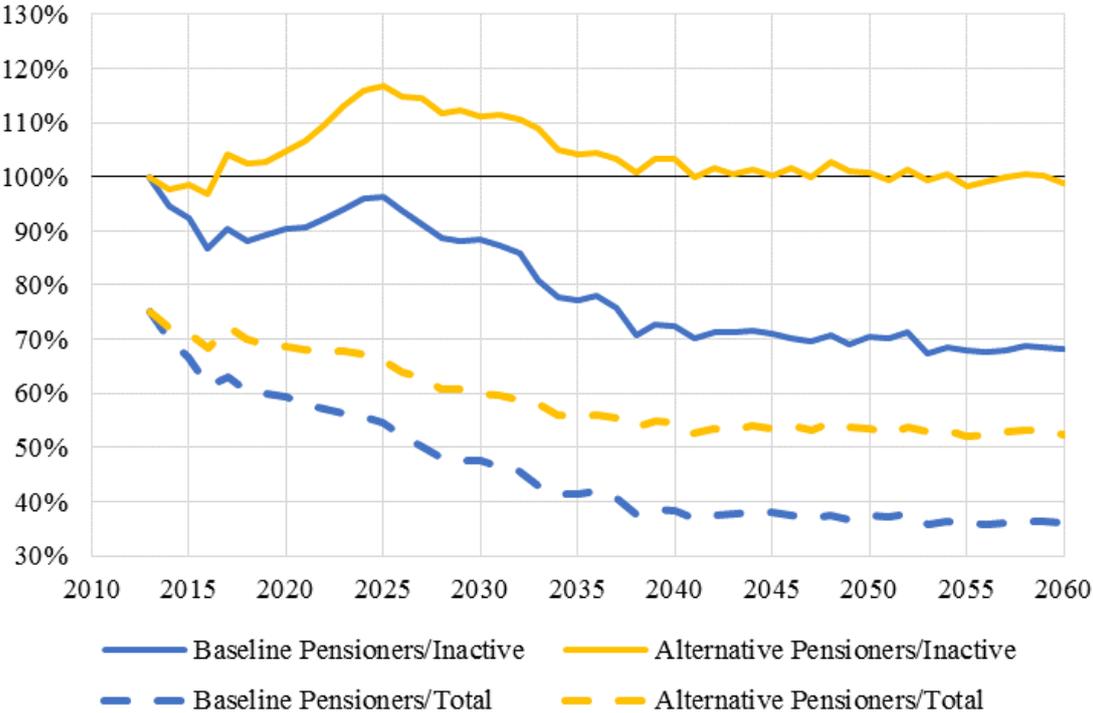
Source: Commission services; Insee, DESTINIE model, calculations: DG Trésor

Effect of the retirement behaviour assumption on the average pension

The coverage ratio effect is compensated by the "décote" mechanism which leads to lower benefit ratios and replacement rates than in the baseline questionnaire (-2.4pp in 2060 for the benefit ratio and -3.6pp for the replacement rate in the sensitivity test compared to baseline scenario). The French pension system is defined so as to be actuarially neutral at the margin for pension

expenditures[34]: pensioners who retire earlier in the alternative scenario than in the baseline scenario receive a lower pension.

Graph E.3 – Replacement rate at retirement
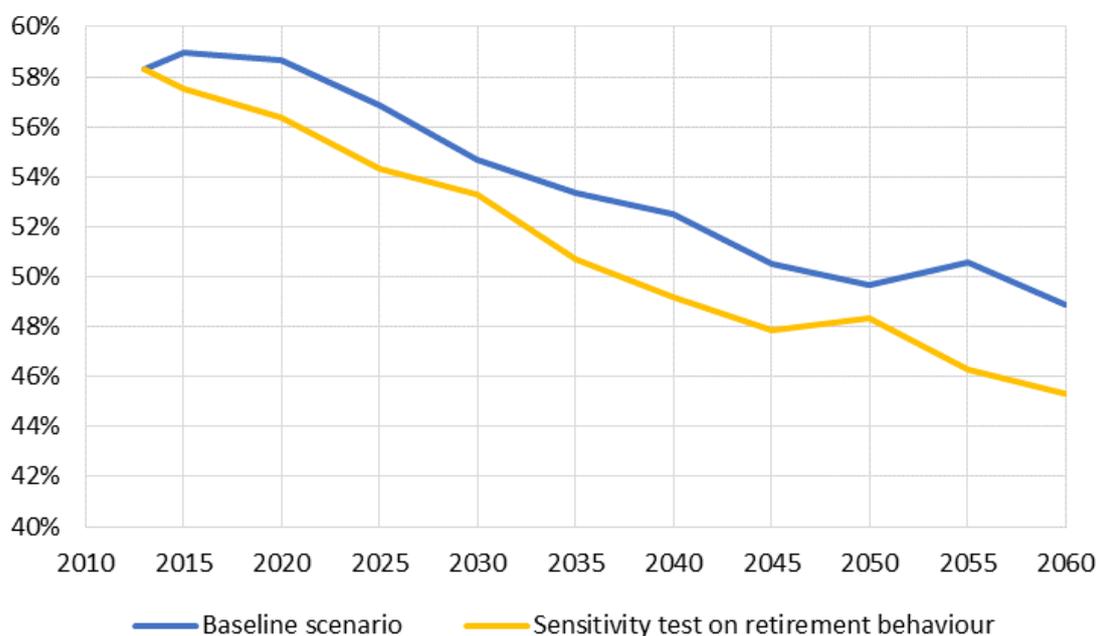
Source: Insee, DESTINIE model, calculations: DG Trésor

All in all, pensioners are more numerous (+900 000 in 2060) but receive lower average pensions (-5% by 2060). Public pension expenditures are slightly higher between 2018 and 2045 (up to 0.3pp of GDP in 2020), and turns lower after 2045 (down to -0.2pp of GDP in 2060) when the average pension effect grow stronger.

Retirement behaviour assumption in other French pension projection exercises

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 proved 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 have a very low impact on pension expenditures as shown by the alternative retirement behaviour scenario produced by Destinie for this exercise (see graph E.1).

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

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[34] « Modulations de la retraite selon l'âge de départ : principes directeurs et évolutions depuis les années 1980 », K. Briard and S. Mahfouz, Economie et Statistique n°441-442, 2011.

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).
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: $\frac{p_i}{m_i} = \sum_{t=0}^{T} w_{i,t}(1 + v_t)^{T-t} a_i$[35].

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

New pension	2013	2020	2030	2040	2050	2060
I Projected new pension expenditure (millions EUR)	6377,6	5993,1	7828,7	10634,1	15408,2	22700,3
II. Average contributory period	35,6	34,6	32,9	33,7	33,3	34,1
III. Monthly average pensionable earnings	2716,8	2783,0	3638,7	5239,2	6954,6	9982,1
IV. Average accrual rates (%)	1,3	1,3	1,3	1,3	1,3	1,2
V. Sustainability/Adjustment factor	1,0	1,0	1,0	1,0	1,0	1,0
VI. Number of new pensioners ('000)	772,4	761,5	800,8	733,1	798,6	828,4
VII Average number of months paid the first year	6,6	6,1	6,3	6,5	6,6	6,5
Monthly average pensionable earnings / Monthly economy-wide average wage	97,7%	86,5%	84,0%	85,6%	79,9%	80,8%

Source: Insee, DESTINIE model, calculations: DG Trésor

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[35] With this definition: $p_i = m_i \times d_i \times w_i \times a_i$.

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

New pension	2013	2020	2030	2040	2050	2060
I Projected new pension expenditure (millions EUR)	1 359,8	1 036,6	1 460,9	2 535,0	3 749,7	5 545,8
II Number of new pensions (in 1000)	554,7	614,3	640,0	623,6	701,6	721,4
III Total pension points at retirement	5 104,8	4 193,7	4 691,0	5 782,7	6 009,6	6 916,4
IV Average pension points accumulated per year	*175,4*	*145,7*	*164,6*	*207,3*	*228,2*	*262,7*
V Actual and virtual contributory period	*29,1*	*28,8*	*28,5*	*27,9*	*26,3*	*27,3*
VI Point value	0,1	0,1	0,1	0,2	0,2	0,2
VII Sustainability/adjustment factors	1,0	1,0	1,0	1,0	1,0	1,0
VIII Average number of months paid the first year	6,6	6,2	6,4	6,6	6,6	6,5

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 2060 compared with the baseline projection.
2	**Higher labour productivity**	A scenario with labour productivity growth being assumed to converge to a productivity growth rate which is 0.25 percentage point higher than in the baseline scenario. The increase is introduced linearly during the period 2016-2025 and remains 0.25 p.p. above the baseline thereafter.
3	**Lower labour productivity**	A scenario with labour productivity growth being assumed to converge to a productivity growth rate which is 0.25 percentage point lower than in the baseline scenario. The decrease is introduced linearly during the period 2016-2025 and remains 0.25 p.p. below the baseline thereafter.
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 2016-2025 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	**Lower employment rate**	The employment rate of older workers (55-74) is 10 p.p. higher compared with the baseline projection. The increase is introduced linearly over the period 2016-2025 and remains 10 p.p. higher thereafter. The higher employment rate of this group of workers is assumed to be achieved through a reduction of the inactive population.
6	**Lower migration**	A scenario with 20% less migration compared with the baseline projection.
7	**TFP risk scenario**	TFP growth would converge to 0.8% with convergence to the target rate in 2035 from the latest outturn year, i.e. 2013, and the period of fast convergence limited to 5 years, i.e. until 2040.
8	**Legislative scenario**	This scenario links retirement age to increases in life expectancy.

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 / **AGIRC** RETRAITE COMPLÉMENTAIRE DES CADRES
Agents non titulaires de l'État et des Collectivités publiques ▶		+	**IRCANTEC**
Personnel navigant de l'aviation civile ▶		+	**CRPN**
Salariés relevant d'entreprises ou de professions à statut particulier ▶	**BANQUE DE FRANCE, RETRAITE DES MINES, CNIEG** (GAZ-ELEC.), **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'ETAT**	+	**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), **CARCDSF** (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

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