



OPINION ON THE SUSTAINABILITY OF THE SOCIAL SECURITY SYSTEM

OPINION 1/19



Autoridad Independiente
de Responsabilidad Fiscal

The Independent Authority for Fiscal Responsibility (AIReF, for its acronym in Spanish) was created with the mission of ensuring strict compliance with the principles of budgetary stability and financial sustainability set out in article 135 of the Spanish Constitution.

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EXECUTIVE SUMMARY

The diagnostic analysis of the sustainability of Social Security is one of the responsibilities of the Independent Authority for Fiscal Responsibility (AIReF).

The Organic Law creating AIReF (O.L. 6/2013) holds it responsible for the analysis of Social Security, both in the short and long term. The evaluation of the budget and monitoring of its execution is complemented with the evaluation of the forecasts made by the Social Security for the revaluation of pensions in the short term. In the long term, AIReF's functions focus on the sustainability analysis and diagnosis of the structural situation of the sub-sector.

To do this, AIReF has developed its own methodological and analytical forecasting framework that attempts to overcome the limitations identified in the evaluations conducted to date.

AIReF has noted the existence of shortcomings in the forecasts and the diagnosis on the sustainability of the Social Security, shared by the analyses carried out to date to a greater or lesser extent. Among the limitations identified it is worth noting the inconsistency between the main determinants of pension expenditure, alongside the lack of methodological transparency, the omission of uncertainty or non-inclusion of a rigorous and consistent analysis of the effects of the reforms adopted. In response to these shortcomings, AIReF has developed a methodological and analytical framework for the assessment of the sustainability of Social Security, which includes long-term forecasts of its main determinants.

Based on its analysis, AIReF notes the existence of a structural deficit in the Social Security Administration of between 1.3 and 1.5 % GDP, which is expected to persist in the future. As a result, it publishes an opinion addressed to the Government.

Upon completion of its analytical and methodological framework, AIReF has carried out a detailed diagnosis of the sustainability of Social Security and its main long-term determinants, including demographics, the labour market and the impact of the reforms adopted. The results of the analysis undertaken by AIReF show the existence of a structural deficit for the Social Security System, understood as the deficit existing once the evolution of revenue and expenditure is adjusted by the dynamics of the economic cycle, that is to say, in a neutral situation or with zero output gap¹. It is estimated that the deficit is between 1.3 and 1.5% GDP and would be maintained in the short term in the absence of additional measures. As a result, once said verification

¹ See below for the reason for this definition and the difference with alternative definitions of structural.

has been made, AIReF publishes an opinion concerning the sustainability of Social Security, in accordance with article 22.6 of its Organic Statute.

In the longer term, AIReF identifies a challenge for the sustainability of Social Security resulting from the increase in pension expenditure associated with the ageing of the population, in line with neighbouring countries. Beyond the next decade, demographic pressures begin to have a significant impact on the expenditure forecasts. Over the next 30 years, this expenditure would increase slightly below 3% GDP in AIReF's baseline scenario, reaching 13.4% GDP in 2048, with a range of 1.4 p.p. at the end of the confidence interval. This evolution is due to two opposing forces. On the one hand, the strong upward pressure of demographic factors and on the other, the compensating effect of the evolution of the labour market, of the 2011 reforms and of the sustainability factor approved in 2013.

Based on its analysis and diagnosis, AIReF makes proposals to improve the sustainability of Social Security, both in the short term to close the structural deficit and to tackle the long-term demographic challenge. These proposals, as well as the forecasts made by AIReF, must be understood as an informed input to help decision-making in the context of social dialogue, through the Parliamentary Commission for Pensions (*Pacto de Toledo*).

In the short term, AIReF considers it to be feasible to close the existing structural deficit in Social Security by means of the assumption of certain expenditure items by the State, which are currently supported by contributions. The structural deficit identified must be considered in the context of the General Government (GG). The distribution of the deficit between sub-systems of the GG is partially determined by administrative and institutional reasons that may lead to inconsistent decisions by each of the sub-systems and artificially limit the possibilities for resolution. Closing the Social Security deficit - caused by the economic crisis and idiosyncratic design problems and not ageing- would reduce the uncertainty regarding the sustainability of the System, which generates distortions in the decision-making process of economic agents, both pensioners and contributors, affecting their saving and consumption decisions and leading to a widespread disaffection with the functioning of the system.

Placing the deficit in the part of the administration that has tools to solve it and view it as a problem of the GG would reduce the uncertainty that exists with respect to the sustainability of Social Security. This way, uncoordinated and inconsistent decisions, such as tax cuts or increases in expenditure in parts of the administration that appear to have a surplus, would be prevented. The short-term social security deficit has its origin in the gravity of the crisis that

caused a collapse of contributions and must be separated from the long-term problems, which are determined by demographics and are not essentially different in Spain than in other neighbouring countries.

To face the long-term challenge, the proposed solution must be feasible, credible and intertemporally consistent, therefore the implications on sustainability and sufficiency must be considered. The political economy of any reform aimed at containing pension expenditure should lead to a prior consideration of feasibility and intertemporal consistency. That is to say, the decision on the future that we adopt today must also be the decision we would take once we had arrived at that moment. In this sense, the adjustment of the system through the revaluation index has been revealed as an expenditure containment strategy, since, once it was time to apply it at its most politically costly extremes, the incentives to undo the reform proved too strong. According to AIReF's estimates, the application of the PRI in the absence of measures to increase income, would have meant a revaluation of 0.25% during the reference period. This would have contained expenditure by an additional 2.1% GDP, reducing pension expenditure in 2048 in the baseline scenario to 11.3% from 13.4%. However, this containment would be at the expense of an 8% reduction in the coverage rate of pensions in respect of wages. This reduction in the coverage rate is explained by the continued loss of purchasing power of pensions during each of the years that it is received², directly affecting the sufficiency of the system. In any case, it is desirable that the government continues to undertake public monitoring of the medium- and long-term budgetary restriction faced by the Social Security System. On the other hand, there are pension revaluation possibilities complementary to the CPI, such as GDP growth, State income or social security contributions that could combine the maintenance of purchasing power with long-term sustainability. The Commission of the *Pacto de Toledo* has yet to specify which rule to apply from 2020.

In the long term, the deepening of the system's parametric reforms is a credible way to improve its sustainability, minimising its impact on sufficiency. An international comparison shows that Spain still has the potential to strengthen the sustainability of the pension system by modifying some of its fundamental parameters ("parameterisation of the system"). In addition, the reforms that affect the parameters used to calculate the initial pension can be implemented in a gradual manner, softening its impact. Finally, its effect is predictable at the individual level for future pensioners, so they can adjust their

² Or in the case of prospective recipients of the maximum pension, during all the time outside the application of the PRI, even before being pensioners.

expectations and adapt their saving and consumption decisions to the new situation in a reasonable time frame, both before and after retirement, increasing the certainty and confidence in the system by putting it on a credible sustainability path.

The deepening of the parametric reform of the system has the potential to achieve sustainability gains similar to the implementation of the PRI, minimising the impact on sufficiency. The deepening of the 2011 reform, which changed parameters such as age, contribution career to be considered or reductions in pension for early retirement, could mean a suitable commitment to improving sustainability without damaging the sufficiency of the system, defined in terms of the rate of coverage as the adequacy of the pension to the needs of pensioners (ratio between the average pension and the average salary). To this end, AIReF proposes to deepen two aspects of the 2011 reform. First, the effective retirement age in Spain (62.4 years) is below the average for the OECD countries (64.3 years) and presents one of the greatest gaps in relation to the legal age, reaching 2.6 years. Second, the reference period for calculating the pension, currently set at 20 years (although converging to the past 25 years in 2022 as a result of the 2011 reform), is below that used by our main neighbouring countries, where use of the full working career is widespread. The impact of this deepening of the parametric reform on expenditure in 2048 could be close to 2% GDP, a figure close to the savings associated with the implementation of the PRI, minimising the impact on the coverage rate.

In addition, any agreed reform should have the maximum political and social consensus and should be implemented in a gradual way, to soften its impact and allow future pensioners to adjust their expectations and adapt their savings and work decisions to the new situation in a reasonable time frame.

In conclusion, AIReF makes the following proposals:

Proposal for short-term improvement: Close the existing structural deficit in Social Security, through the transfer of expenditure responsibilities from the Social Security System to the State, by means of:

- a. *Raising, in relative terms, the contributions intended for common contingencies (payment of pensions) at the expense of those assigned to the State Public Employment Service (SEPE - payment for unemployment).*
- b. *The State's assumption of certain expenditure items currently supported by contributions, such as, among others, the operating costs of Social Security, employment promotion measures consisting in the reduction of contributions, maternity and paternity leave and implicit subsidies to special regimes.*

Proposal for long-term improvement: Adopt measures to enhance the sustainability, equity and sufficiency of the system, by means of, among others:

- a. Deepening of the parametric reform of the pension system that began in 2011, through a combination of measures:
 - Modify the requirements for access to the pension (early or ordinary) to promote an increase in the effective retirement age
 - The increase in the career for calculation of the pension beyond 25 years.
- a. A shift in disability benefits to take better advantage of the work capacity of individuals

SUGGESTION FOR BEST PRACTICE: Reinforce the information obligations of the Social Security Administration on the financial situation of the system and on the impact of reforms.

1 INTRODUCTION

The diagnostic analysis of the sustainability of Social Security is one of the responsibilities of the Independent Authority for Fiscal Responsibility (AIReF). The Organic Law creating AIReF (O.L. 6/2013) holds it responsible for the analysis of Social Security, both in the short and long term. The evaluation of the budget and monitoring of its execution is complemented with the evaluation of the forecasts made by Social Security to decide on the revaluation of pensions in the short term. In the long term, AIReF's functions focus on the sustainability analysis and diagnosis of the structural situation of the sub-sector.

To comply with these functions, AIReF has developed its own methodological and analytical forecasting framework that attempts to overcome the limitations identified in the evaluations conducted to date. AIReF has noted the existence of shortcomings in the forecasts and the diagnosis on the sustainability of Social Security, shared by the analyses carried out to date to a greater or lesser extent. Among the limitations identified it is worth noting the inconsistency between the main determinants of pension expenditure, alongside the lack of methodological transparency, the omission of uncertainty or non-inclusion of a rigorous and consistent analysis of the effects of the reforms adopted. In response to these shortcomings, AIReF has developed a methodological and analytical framework for the assessment of the sustainability of Social Security, which includes long-term forecasts of its main determinants.

Based on its analysis, AIReF notes the existence of a structural deficit in the Social Security Administration and, as a result, publishes an opinion addressed to the Government. Upon completion of the work on the development of its analytical and methodological framework, AIReF has carried out a detailed

diagnosis of the sustainability of Social Security and its main long-term determinants, including demographics, the labour market and the impact of the reforms adopted. The results of the analysis undertaken by AIReF point to the existence of a structural deficit for the Social Security Administrations, understood as the deficit existing once the evolution of revenue and expenditure is adjusted by the dynamics of the economic cycle, that is to say, in a neutral situation or with zero output gap. As a result, once said verification has been made, AIReF publishes an opinion concerning the sustainability of Social Security, in accordance with article 22.6 of its Organic Statute.

In its diagnosis AIReF differentiates between different time horizons, in order to promote economic policy decision-making, both in the short and medium-long term. In the short term, Social Security presents a structural deficit with origin in the economic crisis that began in 2008 and that has carried forward since then. The Social Security System has been institutionally incapable of adapting to the insufficiency of resources caused by the collapse of revenue from contributions during the crisis. In fact, the last economic cycle has closed with a Social Security deficit between 1.3% and 1.5% GDP, which can be considered as structural as a whole, as it is observed at a cyclically neutral time. In the absence of additional economic policy measures, the medium-term forecasts for the System's revenue and expenditure anticipate a maintenance of the deficit situation around the current values. Beyond the next decade, demographic pressures begin to have a significant impact on expenditure forecasts and entail an additional expenditure effort for the System. In fact, in the longer term AIReF identifies a challenge for the sustainability of Social Security resulting from the increase in pension expenditure associated with the ageing of the population, in line with neighbouring countries. Over the next 30 years, this expenditure would increase slightly below 3% GDP in AIReF's baseline scenario, reaching 13.4% GDP in 2048, with a range of 1.4 p.p. at the ends of the confidence interval.

The Opinion presents the conclusions of the analysis carried out by AIReF and the proposals to solve the structural deficit situation. Section 2 identifies the existence of a structural deficit in Social Security. Section 3 presents AIReF's forecasts for pension expenditure for the next 30 years. Finally, section 4 concludes and presents different proposals to advance the correction of the structural deficit.

2 IDENTIFICATION OF THE STRUCTURAL DEFICIT

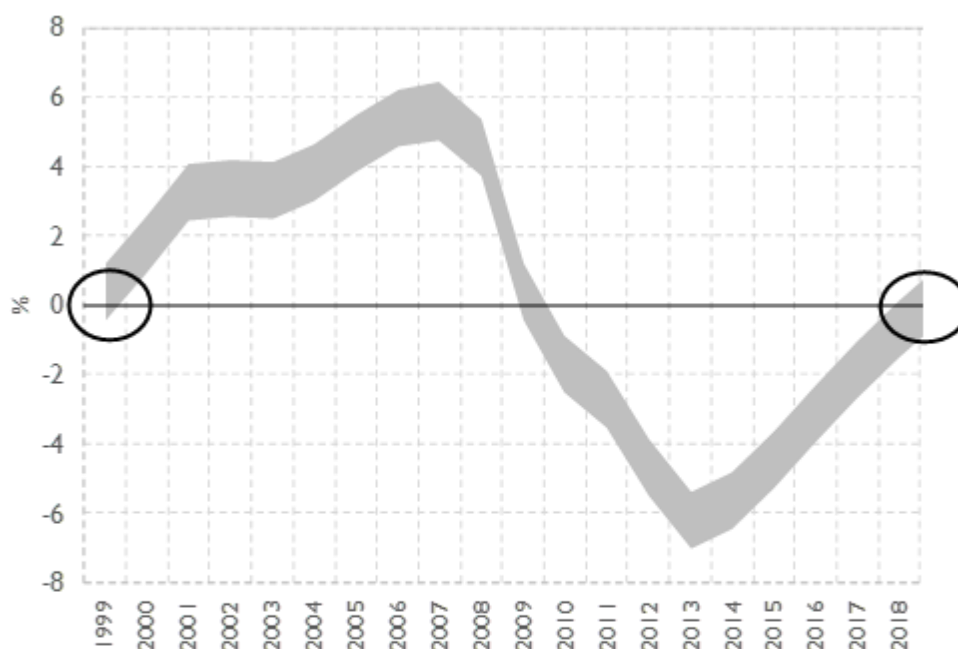
2.1. Structural deficit: definition

Based on Organic Law 2/2012, of 27 April, on Budgetary Stability and Financial Sustainability, the structural deficit of any public administration is defined as the cyclically adjusted deficit, net of exceptional and temporary measures. To identify the existence of a situation of structural deficit in Social Security, the AIReF's analysis was based on the definition included in article 11.2 of said Law. Therefore, the existing deficit is understood as a structural deficit once the evolution of revenue and expenditure has been adjusted for the economic cycle, having previously removed one-off measures or those with a temporary effect.

In early 2019 the Spanish economy closes a cycle that began 20 years ago, returning to a cyclically neutral position, so that the current budgetary situation of the different sub-sectors could be viewed as being structural or cyclically adjusted. On the basis of AIReF's estimation of the cyclical position, the output gap would be closed in early 2019, closing a cycle that began at the end of the 20th century, as can be seen in figure 1.³ The existence of a cyclically neutral point at the beginning of 2019 helps to identify the underlying budgetary or structural situation of each of the sub-sectors. In fact, the revenue and expenditure observed at a point of zero output gap such as the current may be considered to be cyclically adjusted.

³ For more details on the methodology, see AIReF's Working Paper [Estimating Output Gap: A Beauty Contest Approach](#)

FIGURE 1. OUTPUT GAP (%)



Source: AIReF

Note: Interval obtained from revisions of past estimates hence giving a measure of the uncertainty surrounding the current estimate of the OG

2.2. Structural deficit: identification

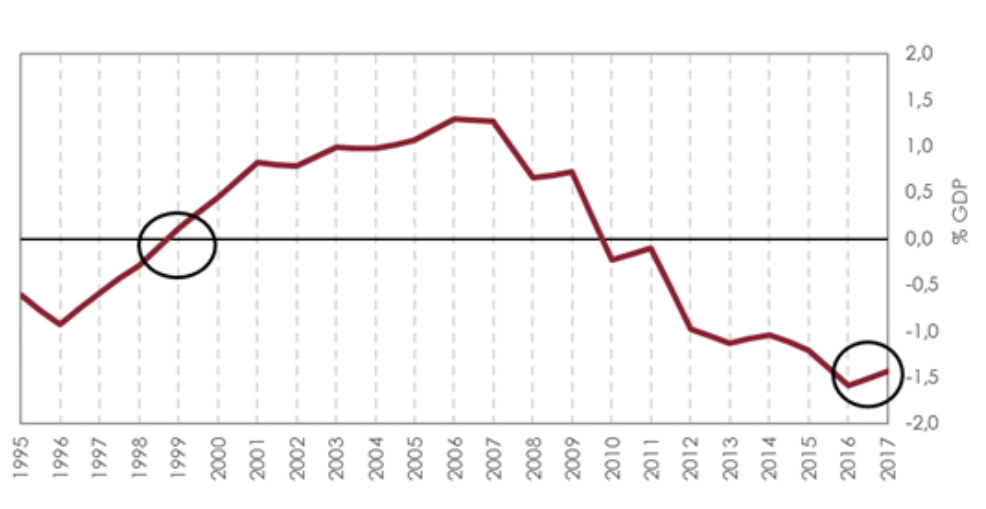
Today Social Security presents a deficit situation close to 1.5% GDP, unlike what was happening at the beginning of the previous economic cycle, when it was balanced. As can be seen in figure 2, at the start of the strong period of expansion that accompanied Spain's entry into the euro zone, Social Security was in a situation of budgetary balance, after the recovery from the crisis of the early '90s. In present day, emergence from the crisis did not lead to a similar recovery of Social Security's net borrowing, but rather a consolidation of the deficit around 1.5%⁴.

The deficit was caused by the collapse in contributions as a result of the crisis, while pension expenditure, whose behaviour is less linked to economic

⁴ This definition is different from that used in Social Security legislation, for example, with respect to the use of the Reserve Fund, which structural deficit is defined as a deficit that will be maintained over three consecutive semesters, regardless of the cyclical position of the economy. On the other hand, elements such as the policies in place at each moment may be conditioned by the short-term situation. The definition used by AIReF is consistent with the one used for the remainder of its analyses and with that used by the European Union in Treaties.

fluctuations, has maintained its growth in real terms. The dynamics of revenue from contributions is deeply linked to the evolution of GDP, since they account for an approximately constant proportion in the absence of regulatory measures on the wage bill, which, in turn, tends to evolve in relation to GDP. During the crisis, revenue fluctuated according to the economic cycle, maintaining its weight on GDP virtually stable, as can be seen in figure 3. On the contrary, expenditure behaves much more independent of the economic cycle, linked to structural and medium-long term trends. As a result, during the crisis pension expenditure continued to grow in real terms at a similar pace to the time of boom, resulting in a significant increase in its weight on GDP (about 4 p.p.), which stabilised once the pace of economic growth recovered.

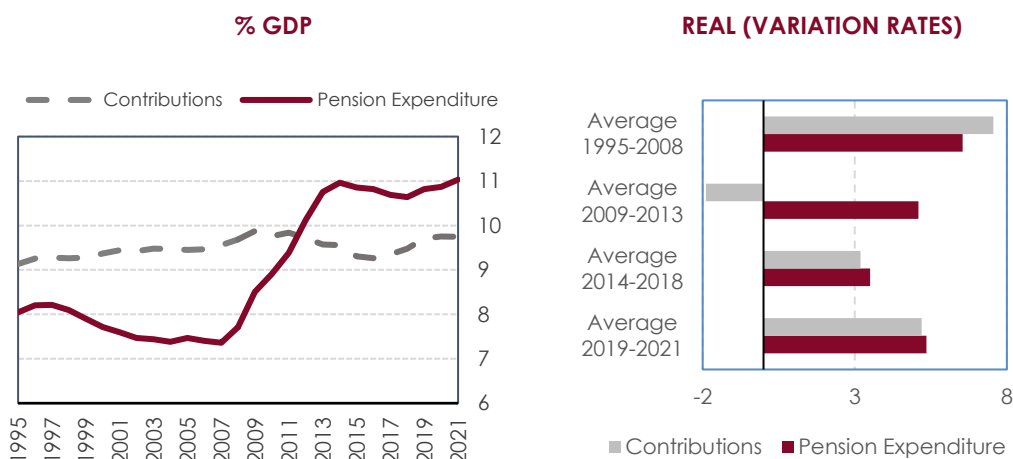
FIGURE 2. NET LENDING/BORROWING OF SOCIAL SECURITY FUNDS



Source: Ministry of Employment Migrations and Social Security and AIReF estimations

Note: 2018 data are AIReF estimations

FIGURE 3. CONTRIBUTORY PENSION AND SOCIAL CONTRIBUTIONS AS % OF GDP AND REAL GROWTH

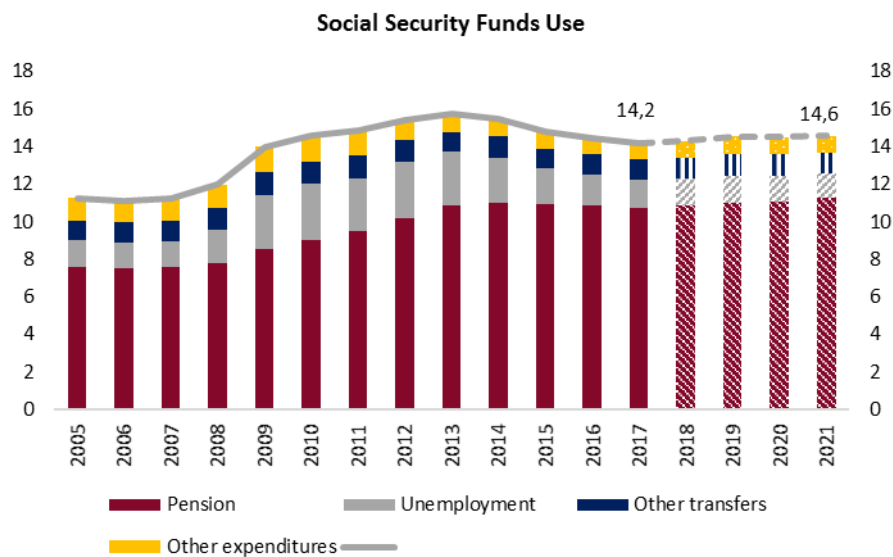
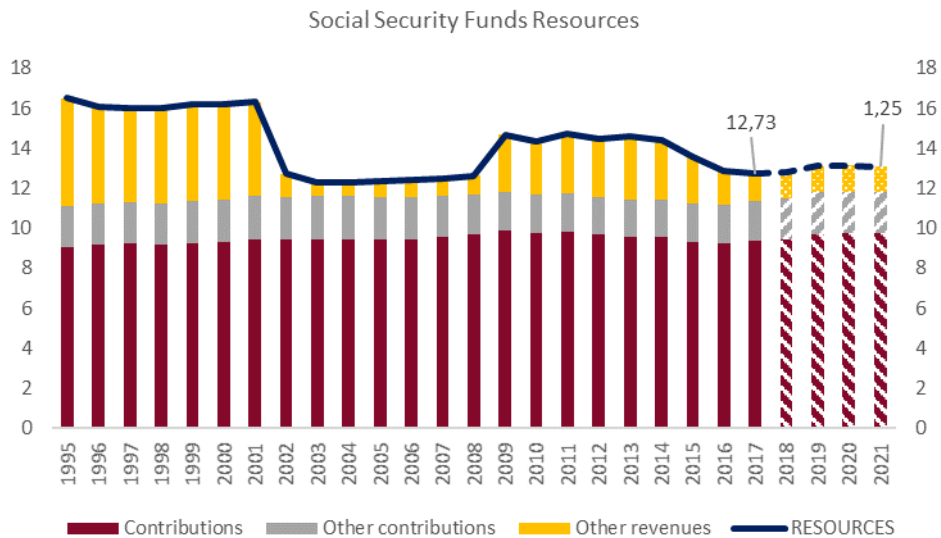


Source: Ministry of Employment, Migrations and Social Security and AIReF estimations
Note: 2018 data are AIReF estimations

BOX 1

When speaking of the Social Security deficit, usually there is talk of the sub-system of the Social Security Funds, in the terminology of National Accounts. This means, among other things, that this result not only includes the deficit of what we might call the Social Security Administration, that is to say, the Managing Entities and Common Services of the Social Security, responsible for the management of the pension and benefits for Retirement, Widowhood or Disability, as well as other benefits such as Family Benefits, but also includes the accounting result of Autonomous Agencies such as the State Public Employment Service (SEPE) and the Wage Guarantee Fund (FOGASA). These agencies manage labour benefits, which in Spanish law are of a separate nature and funding to social security benefits, although this is not necessarily the case and that is why the criteria in National Accounts is to aggregate them, so that international comparisons can be made in comparable terms. However, both types of benefits do not only differ by the agency responsible for their management, but they also have very different nature and dynamics. Unemployment benefits are essentially cyclical and the budgetary result of the SEPE is extraordinarily sensitive to the economic cycle, since this affects not only its revenue from social security contributions but also its expenditure for unemployment benefits. The consequence is that the sensitivity of its results to the cycle is approximately double that of the rest of Social Security. The following chart shows the short-term forecasts of the Social Security Funds drawn up by AIReF to evaluate the Draft Budgetary Plan submitted by the Kingdom of Spain before the European Commission. These include a forecast

for each of the main benefits, as well as contributions. The elasticity of unemployment contributions to the cycle is slightly higher than the rest of Social Security due to the fact that the unemployment contribution is higher among workers with temporary contract, which are most affected by the cycle.



In our model, the behaviour of the labour market is determined by demographic evolution and the tensions that a relative scarcity of labour will cause in the same. This means that the current situation, with an “operating” surplus in unemployment and contributions that exceed expenditure on benefits, will persistently remain in a situation in which the rate of structural unemployment will fall to 7.5%. Despite this, in the long term the situation of the

Social Security Funds will be almost entirely determined by the behaviour of the pension system and by ageing and this is why it is the part in which the greatest modelling effort has been invested. It is expected that the SEPE will maintain a surplus on average and have a small moderating effect on the aggregate deficit⁵ but in no way sufficient to prevent the effects of demographic ageing.

This level of deficit could be slightly corrected (up to 0.2%) in the short-term for structural reasons, on the revenue side. The recent economic recovery was implemented based on a strong real component, with a contained evolution of prices and wages. In the short term the recovery of prices and their subsequent translation to the compensation of employees is expected to materialise. Regarding the historical relationship between contributions and nominal GDP, this wage recovery could mean that in the next few years the growth of contributions could be maintained higher than nominal GDP growth (see figure 4), as there is a certain upward trend in the evolution of the ratio of revenue from contributions to GDP.⁶ To quantify this effect, it is possible to use the existing uncertainty in the estimation of the output gap, as the lower band of the interval means a lengthening of the cycle, with a zero output gap at the end of 2019, which could be associated with the absence of inflationary pressures. This effect would be reinforced by the measures adopted, mainly the 7% increase in the maximum contribution bases for 2019. As a result, the structural component of revenue from contributions is estimated to be between the figure expected for 2018 (9.5% GDP) and that expected for 2019 (9.7% GDP), which would place the deficit between 1.3% and a 1.5% GDP⁷.

On the expenditure side, however, additional pressures are to be expected in the future, once the revaluation of pensions with the CPI is recovered. After the crisis, pension expenditure was stabilised, even slightly reducing its weight on GDP during the years in which the application of the Pension Revaluation Index entailed a growth of 0.25%. However, a return to the revaluation with the CPI in 2018 and 2019 and other measures on minimum and widowhood

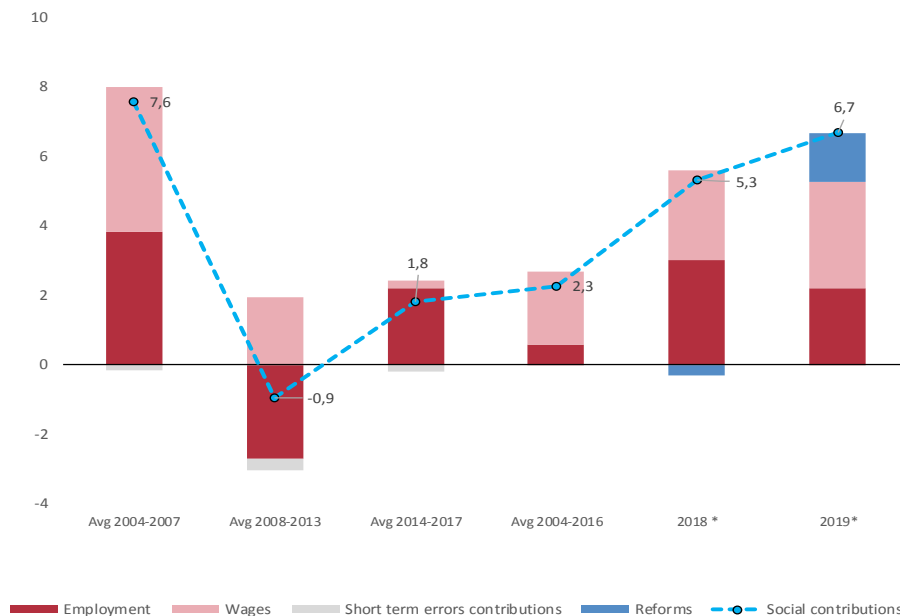
⁵ See Proposal 1 contained in this document.

⁶The long-term elasticity of contributions to changes in nominal GDP is slightly above 1. In particular, if it is estimated in a partitioned way, referring to the elasticity of contributions to their macroeconomic base (compensation of employees) and the elasticity of the latter to GDP, we obtain a long-term elasticity of contributions to nominal GDP of 1.039. These calculations have been made by clearing the series of contributions of the cumulative effect of past measures, to obtain the structural response to changes in the pace of growth of the economy.

⁷ This effect could be reinforced by adopting measures to increase the maximum contribution bases, which would result in a permanent increase in collection.

pensions will add 3 p.p. to the inertial annual growth of pension expenditure in the future, with a growth above nominal GDP.

FIGURE 4. DECOMPOSITION OF THE ANNUAL % CHANGE OF SOCIAL CONTRIBUTIONS BETWEEN EMPLOYMENT, WAGES AND REFORMS



Source: : Ministry of Employment Migrations and Social Security and AIReF estimations
Note: 2018 data are AIReF estimations

The resulting deficit, between 1.3% and 1.5% GDP, can be considered as structural, once the revaluation of pensions with the CPI is recovered. Despite the existing deficit in Social Security accounts, the introduction of the Pension Revaluation Index (PRI) established by Law 23/2013 forced the balance in the medium-long term by construction, by linking the update of pensions to the system's deficit. However, there have been various events that lead to discarding the PRI as a mechanism for revaluation of the most probable pensions and main hypothesis for the development of forecasts in the short, medium and long term. These events are: (i) the measure updating pensions to 1.6% for 2018 and 2019 contained in the last General State Budgets (GSB);⁸ (ii) and the announcement of a majority agreement by the *Pacto de Toledo* last September to link the revaluation to the CPI. Accordingly, the deficit resulting from filtering the evolution of contributions and pension expenditure

⁸ Although AIReF must issue an opinion on the determination of the PRI as it has done to date, the present situation makes its publication unnecessary this year, since the GSB are discontinuing the use of the PRI as an effective revaluation mechanism, although its formal abolition has not yet occurred.

through the effect of the cycle and permanent reforms can be viewed as being structural.

In the longer term, the main challenge for the sustainability of Social Security results from the increase in pension expenditure associated with the ageing of the population, in line with neighbouring countries. In the absence of additional economic policy measures, the medium-term forecasts for the System's revenue and expenditure anticipate a maintenance of the structural deficit situation around estimated values. Beyond the next decade, demographic pressures begin to have a significant impact on deficit forecasts and entail an additional expenditure factor for the System. It is therefore desirable to carry out a detailed analysis of its determinants and the expected evolution of each of them.

3

DEMOGRAPHIC CHALLENGE: PENSION EXPENDITURE PROJECTIONS

3.1. Current situation and determinants

The evolution of pension expenditure can be seen as a function of its main determining factors, such as demography, the various institutional elements and the dynamics of the labour market, alongside the interaction between them. If we start from the weight of pension expenditure on GDP, it is possible to break down its growth into the contribution of its main factors⁹. To simplify, AIReF has grouped these factors into 3: demography, labour market and institutional factors (see figure 5). In the case of demography, its contribution can be summed up in the dependency ratio, which reflects the relationship between the population of retirement age and of working age, so that a higher dependency ratio implies higher pension expenditure in relation to the potentially productive population. In the case of the labour market, the main determinants are the activity rate and the level of unemployment, as well as the apparent labour productivity, which together determine the evolution of GDP. Finally, the institutional factors seek to include the main features of the

⁹ The evolution of the ratio of pension expenditure to GDP can be broken down as:

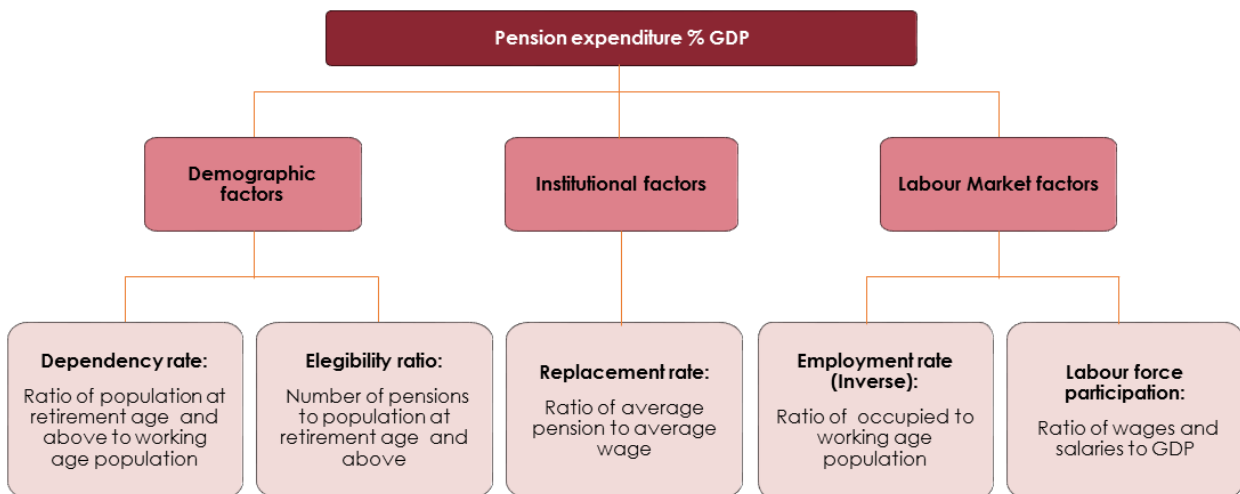
$$\frac{G}{GDP} = \frac{P*N}{GDP}$$
$$= \frac{Pop + 67}{Pop16 - 66} * \frac{N}{Pop + 67} * \frac{P}{W} * \frac{Pop16 - 66}{Pop16 - 66 * Act * (1 - u)} * \frac{W * Pop16 - 66 * Act * (1 - u)}{GDP}$$

Where P is the average pension of the system, N is the number of pensions, Popb+67 is the population resident in Spain aged 67 years or over, Pop16-66 is the population aged 16 to 66 years, Act is the activity rate for this age group, u the corresponding unemployment rate and W the average wage in the economy.

$$\frac{E}{GDP} = \frac{P*N}{GDP} = \text{Dependency ratio} * \text{Elegibility} * \text{Coverage} * \text{Employment} * \text{Labour factor's weight}$$

pension system such as its generosity or coverage and the effective retirement age. These factors are not independent, but interact with each other, especially in the case of the economic cycle and demography.

FIGURE 5. FACTORS THAT INFLUENCE PENSION EXPENDITURE



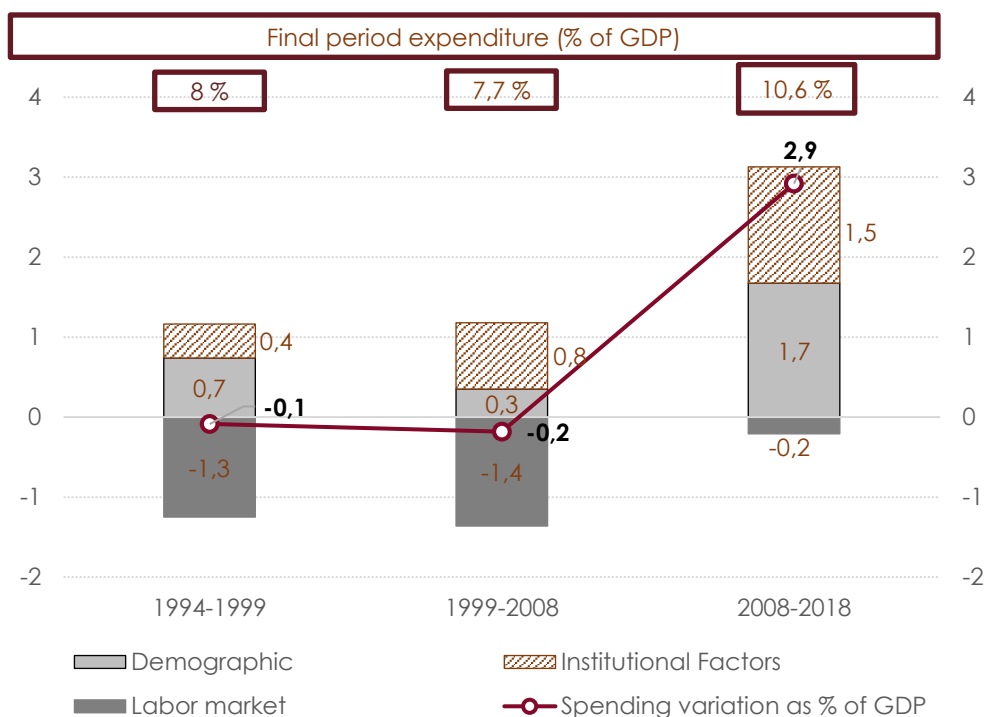
By following this breakdown, it is possible to analyse the evolution over the last 25 years, in which expenditure on contributory pensions over GDP has grown from 8% GDP up to 10.6% in 2018. The evolution of pension expenditure over the past 25 years can be divided into three main periods in order to facilitate analysis of the contributions of the main determinants: economic recovery (1994-1999), cyclical expansion (1999-2008) and crisis plus start of recovery (2008-2018). As can be seen in figure 6, pension expenditure declined slightly between 1994 and 2008 and increased to 3% GDP in the last 10 years. In addition, the contribution of each factor has been different in each period.

Ageing has led to a continuous upward pressure, which was primarily offset by migratory flows between 2000- 2008. Both in the period 1994-99 and 2008-2018, demographic factors drove pension expenditure upwards due to the progressive ageing of the population. In fact, in the 1990s, there was deep concern regarding the sustainability of the system for this reason. However, in the period of economic expansion demography did not drive pension expenditure upwards because the effect of ageing was completely offset by the immigration that took place during the period. In fact, faced with the excess demand in the labour market, the supply of non-resident work increased significantly, allowing high growth rates to be maintained.

The parameterisation of the system, in turn, resulted in a steady increase in expenditure, particularly since the turn of the century. Institutional factors have led to an increase in pension expenditure that is manifested in an increase in the coverage rate (amount of the average pension in relation to the average salary), which has more than compensated for the contraction of the eligibility ratio. This trend is produced by the characteristics and parameters that define the retirement system, leading to a higher coverage rate as contribution careers lengthen and the relative weight of retirement pensions increases over widowhood pensions, which are generally lower.

The impact of the economic cycle was an essential counterweight, through high job creation, to contain the weight of pension expenditure on GDP. The factors of the labour market almost completely offset the growth of pension expenditure, stabilising it below 8% GDP between 1994 and 2008. However, the effects of the crisis made the contribution of this factor reduce significantly between 2008 and 2018.

FIGURE 6. EXPLANATION OF THE CHANGE OF PENSION EXPENDITURE OVER GDP



Source: Social Security, INE and AIReF's estimates

Note: 2018 corresponds to AIReF's estimates

3.2. Forecasts: reasoning behind the methodological approach

Beyond the analysis of recent developments, the breakdown of expenditure into its main determinants allows us to draw an inference with respect to the expenditure forecast in the medium to long term. Following the same breakdown approach, the determinants of pension expenditure can be used to forecast the future. To do this it is desirable to make a detailed analysis of the same and their explanatory factors.

The framework developed by AIReF for the pension expenditure forecasts and its long-term determinants seeks to overcome the limitations identified in the existing approaches. Through a review analysis of the work on forecasting pension expenditure, AIReF has identified a number of common weaknesses, which can be summed up as:

- *Lack of integration between demographic forecasts and macroeconomic and labour market evolution:* this independent consideration of the determinants of pension expenditure generates inconsistencies in forecasting, by not considering the interdependencies and endogenous relationships between the factors.
- *Omission of uncertainty:* Long -term forecasts carry a burden of uncertainty inherent to the time horizon of the exercise. The omission of the stochastic component may lead to a false sense of precision and influences long term economic policy decision-making.

Table 1. Comparative summary of the literature

		AIRcF	Ageing Report 2018	De La Fuente y Garcia (FEDEA)		Bank of Spain		IMF			Díaz-Giménez and Díaz-Saavedra	Conde-Ruiz and González (FEDEA)		
	Publication date	jan-19		oct-17	oct-18	jan-18	dec-18		aug-17			feb-16	jan-12	
	Projection period	2018-2048		2016-2050	2017-70	2015-70	2018-2060		2015-50			2010-50	2011-51	
Pensions	Revaluation	CPI	0.25%	0.25%	CPI	0.25%	CPI	0.25%	CPI	0.25%	0.25%	0.25%	CPI	
	Reform 2011	Yes		Yes	Yes		No	Yes	No	Yes		Yes	No	
	Sustainability Factor	Yes		Yes	No	Yes	Yes	Yes	Yes			Yes	No	
	Base expenditure	10.6% GDP		11.3% GDP	10.6% GDP	11.6% GDP	10.8% GDP		10.6%GDP			10.2%GDP	7.8% GDP	
	2030 expenditure	11.3% GDP	10.2% GDP	11.7% GDP	12% GDP	11.6% GDP	12.8% GDP	11% GDP	-			-	11.6% GDP	
	2048 expenditure	13.4% GDP	11.4% GDP	12.9% GDP	13.5% GDP	12.7% GDP	15.8% GDP	12.5% GDP	22.6% GDP	12.9% GDP	10.6% GDP	9.8% GDP	18.9% GDP	
	Base generosity rate =>2050	57% => 53%	57% => 45%	58% => 37%	42%	-	44% => 44%	44% => 25%	48% => 48%	48% => 35%	48% => 23%	51% => 28%	23.6%	
Demography	Reference for base scenario	AIRcF		Eurostat 2015		Eurostat 2012		Eurostat 2015		INE 2015			INE 2015	INE 2010
	Fertility 2048	1.9		1.9	1.6		1.9		-			-	1.5	
	Life expectancy 2050	86.8		85.9 (M) and 90.3 (F) in 2060		85.9 (M) and 90.3 (F)		87		88.2			-	81(M) and 87 (F)
	Average net migration flow	270 thousand		125 thousand	300 thousand	167 thousand	125 thousand		56 thousand	112 thousand	56 thousand	66 thousand	270 thousand (INE 2005)	
	Dependency ratio 2048	58%		62%	55.4%	-	62%		69.5%	63.4%	69.5%	65%	49%	
Macro	Unemployment rate 2048	7.8%		7.5	7%	7%	7.5		-			-	-	
	Average productivity	1.1%		1.2%	1.5%	1.5%	1.2%		-			1.9%	1.7%	
	Inflation	1.8%		2%	2%	2%	2%		-			2%	-	

For studies other than AIRcF the values are approximate. Presents the replacement rate (starting pension over salary) when the generosity rate is not available

3.3. Forecasts: integrative approach

The approach followed by AIReF adopts an integrative view, linking the forecasts of the main determinants. The integrative approach allows for forecasting of the main determinants of the evolution of pension expenditure, differentiating their individual contributions. This approach offers a coherent view of the different backbones of the long-term forecasts of pension expenditure, such as demography, the labour market and other macroeconomic variables that interact endogenously through various pathways in a stochastic and uncertain context.

The methodology employed by AIReF emphasises the incorporation of uncertainty. For the sake of presenting the forecasts in the most realistic and comprehensive way possible, it is necessary to incorporate the impact of uncertainty while taking into account the long-term horizon considered. To do this, AIReF's methodology takes a stochastic view from an early stage, including the estimation of the confidence intervals associated with the baseline forecasts. Uncertainty is initially incorporated in the forecasts of the determinants based on their historical volatility and is translated to the final pension expenditure forecasts.

A third dimension that has received special attention in the approach implemented by AIReF is micro-simulation of the impact of the reforms adopted in 2011 and 2013. By nature the reforms adopted in 2011 and 2013 have a progressive and growing impact on the determination of pension expenditure. In this sense, the proposed breakdown into demographic, labour and institutional factors highlights the importance of a good estimate of the impact of the reforms, through their effect on variables as important as the coverage rate or the effective retirement age. In order to be able to incorporate their impact in the framework implement, there is a need for a granular assessment through micro-simulation techniques.

3.3.1. Demography

As a starting point for its pension expenditure forecasts, AIReF recently published their demographic forecasts with a breakdown by the three main components, the migratory balance, fertility and life expectancy.¹⁰ Much of the analytical effort invested by AIReF has been concentrated in the generation of its own population forecasts, as an essential factor to explain the future evolution of expenditure. This work has culminated in the publication

¹⁰ See Special Document 2018-1: [Demographic forecasts: an integrated approach](#).

of both the population pyramid forecasts and the basic methodology used.¹¹ The population forecasts by age and sex are generated as a result of the forecasting of its main determinants, the net migratory balance, the number of children per woman and life expectancy (see annex 1 for a summary of the methodology).

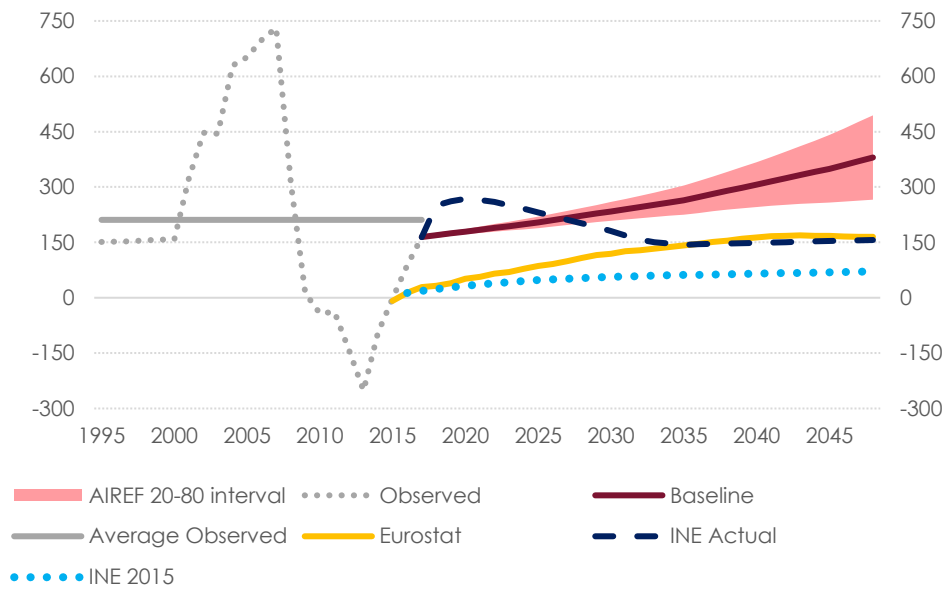
Migration

AIReF has developed a specific model for forecasting the most volatile component of population forecasts: net migration. Given the difficulty of modeling the migration factor and following the identification of simplistic modeling of migration flows by the institutions responsible for carrying out demographic forecasts, AIReF has developed its own model in line with the latest academic developments in this area. The integrated model considers the main determinants of the migration decisions of agents: economic factors, demographic developments (in both the origin and destination country) the importance of the network effect in the destination country (existence of migrant networks) and pre-existing migration policies. The model generates estimates of bilateral migration flows between more than 100 countries.

Based on the estimated model, AIReF forecasts a net inflow for the 2018-50 average of 260,000 people. The estimates obtained from the model estimated by AIReF reflect an increasing flow of net immigration throughout the forecasting period, 2018-2048. In terms of averages, this flow is somewhat higher than the historical average between 1995 and 2017, falling significantly below the figures reached in the period of expansion, which exceeded 700,000 net entries, as shown in figure 5. If we compare with the forecasts of other institutions, AIReF's figures are, on average, above the latest projections from the National Statistics Institute (186 thousand entries, dashed line in figure 7), both standing significantly above those of Eurostat (122 thousand net entries)

¹¹ AIReF has developed an online platform for downloading and viewing the [population results](#), accompanied by two working papers with methodological specifications, one on the [element of migration and the other on fertility and life expectancy](#).

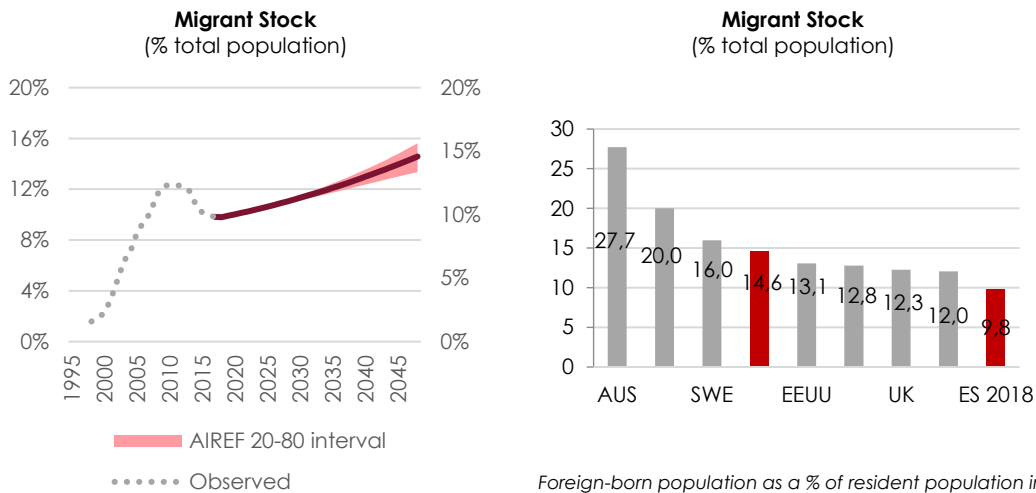
FIGURE 7. NET MIGRATION (THOUSANDS OF PEOPLE)



Source: INE's historical values, 2018-2048 assumptions of AIReF, INE and Eurostat

In 2048 the migrant stock would reach between 13% and 16.1% of the population, in line with the current level in neighbouring countries. The expected average accumulation of flows over the next 30 years means reaching stock in line with the current level of neighbouring countries, as can be seen in figure 8. These levels would be reached starting from the current level of 9.8%, which would rise to between 11.3% and 12.2% in 2033. This evolution would be consistent with global trends, since in the absence of restrictive migration policies, there is expected to be a growing flow of workers from the youngest to the oldest countries as well as from the poorest to the richest. These migration flows could have a positive economic impact beyond the sustainability of the pension system, but could also increase the feeling of rejection. This rejection has less to do with economic costs than with social factors, related to the cultural distance between immigrants and the destination population (M. Tabellini, 2018) and the evidence shows that rejection, to a large extent, arises from a mistaken perception about the nature and characteristics of immigration (Alesina et al. 2018) which opens the door to the possibility of public policies to correct these misconceptions.

FIGURE 8. MIGRANT STOCK (% OF TOTAL POPULATION)



Source: INE's historical values, AIReF's assumptions for 2018-2048

Foreign-born population as a % of resident population in 2013, except for Spain

Source: OECD For Spain; INE and AIReF's forecasts
Note: selected countries AUS (Australia), CAN (Canada), SWE (Sweden), USA (United States), DE (Germany), UK (United Kingdom) FR (France), ES (Spain)

The increase in the flow of migrants will be sustained by the insufficiency of the job supply that will emerge in the labour market as a result of a decreasing resident working-age population. Throughout the last cycle the connection between the evolution of the economy and immigration has been highlighted. In fact, since the early 2000s there have been pressures on the labour market due to a growing demand that has not been covered by a declining domestic supply. This inadequacy has been resolved endogenously with the arrival of immigrants. In the future it is expected that these adjustment mechanisms will continue to operate and that the entry of immigrants will meet the excess demand for labour from companies faced with a decreasing domestic labour supply as a result of the decline of the working-age population.

Fertility and life expectancy

The approach used by AIReF for modeling fertility and mortality incorporates information on the long-term behaviour of the agents, beyond a simple projection of recent trends. The traditional models have essentially consisted in a mechanical projection of the most recent trends. Models of this kind can be good in the short term, as they capture the inertia of the series, but in the long term they ignore a lot of relevant information of a structural nature that is not contained in the behaviour of the series and that must be explicitly introduced. This additional information or, in Bayesian terminology, these priors to the future behaviour of the components, can be incorporated in a number

of ways, from a statistical approach, using Bayesian modeling of the components, to an adjustment of the results of the models using an expert's judgement, ad-hoc. For computational parsimony and simplicity, as well as to obtain stochastic modeling of different components, the approach used by AIReF to model fertility and mortality consisted in parametrically modelling the fertility and mortality curves and, in a second step, anchoring the long-term behaviour of both components to the evolution of a number of countries statistically close to Spain economically and socially.¹²

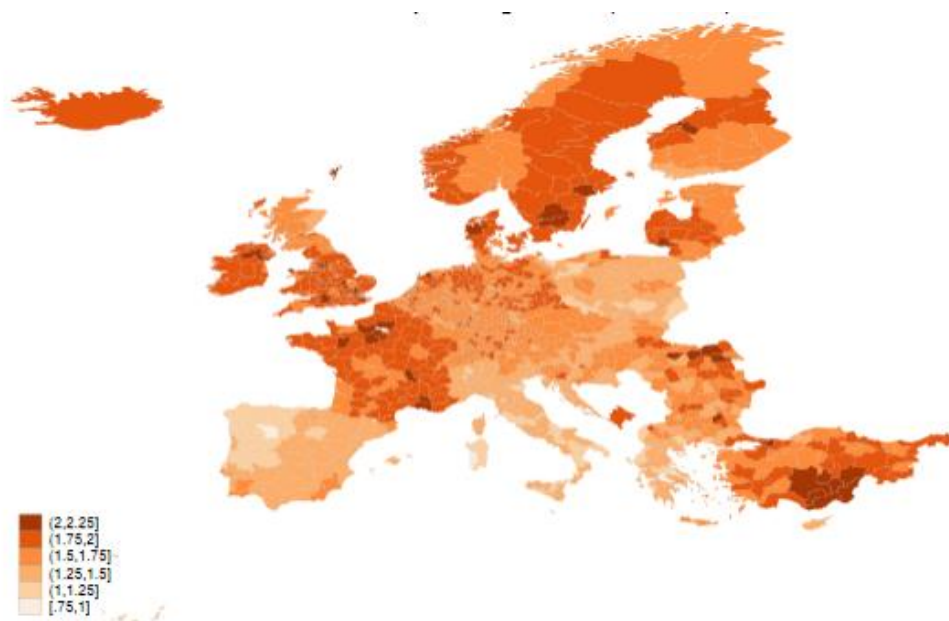
Based on the analysis performed, AIReF expects a convergence of the fertility rate to a range between 1.8 and 2 children per woman in 2048, in line with the long-term trend that has existed since the mid-1990s. The fertility of Spanish women (1.3 children per woman) is currently one of the lowest among developed countries. The low fertility rate is widespread in the various Spanish regions as can be seen in figure 9, in comparison with other European regions.¹³ However, it is foreseeable that there will be upward travel in this variable. On the one hand, the decline that has occurred over the past 10 years (from levels around 1.5 children per woman) has cyclical roots, due to a combination of idiosyncratic factors, related to the crisis, such as the labour market situation or difficulties in the creation of homes related to access to the housing market. AIReF's forecasts present a growing trend in the horizon considered, based on the long-term convergence to the fertility of the countries of our cultural and economic environment.¹⁴ Given the above, the expected evolution would reach a range between 1.8 and 2 children per woman in 2048, well above the INE's projections and in line with Eurostat figures (see figure 10) but with a softer profile.

¹² In particular, a panel of countries of Western Europe was selected that are considered to be deeply related to Spain and that share a history and institutions with our country. The underlying assumption to this selection is that the factors that have led to the recent developments in these countries, however different, are situational and idiosyncratic and that in the long-term the common elements, derived from cultural, institutional and economic similarities, will have a greater importance than the transitional differences that may be conditioning recent behaviour. The INE's fertility survey for 2018 confirms that almost three out of four women would like to have at least two children and, if they do not, this is due to work or economic reasons.

¹³ The Total Fertility Rate is the main measure of the fertility of a society at a moment of time. It is defined as the average number of children a woman would have in a lifetime if the fertility conditions existing at the time of its calculation were maintained. The replacement rate, i.e. the number of children that would keep the population size constant in the absence of migration is slightly higher than 2. The effective TFR in developed countries is lower than this number, in general, while developing countries tend to have much higher rates.

¹⁴ Implicitly, this also implies convergence in the best practices and policies.

FIGURE 9. TOTAL FERTILITY RATES BY REGION (NUTS3), 2016



Source: Eurostat

The hypothesis of conditional convergence implicitly assumes an approximation in best practices and policies. The broad differences between European countries, geographically, culturally and economically close, suggests that there is scope for convergence through the implementation of policies to promote higher birth rates.

In this line, economic literature finds evidence of a positive impact of economic incentives on fertility. At the aggregate level, there seem to be doubts about the effectiveness of policies to promote higher birth rates, in relation to the magnitude of secular trends related to the demographic transition.¹⁵ However, beyond the aggregated results, many studies have documented the power of economic incentives to increase fertility at the microeconomic level, in line with the arguments of economic theory (Becker, 1981).¹⁶ For the most part the incentives originate in family policies with the objective, explicit or implicit, of raising the birth rate by subsidising the associated costs (Milligan, 2005, Cohen *et al.*, 2007, Laroque and Salanie, 2008

¹⁵ IMF (2004)

¹⁶ Becker (1981)

or Raute, 2019)^{17,18,19,20}. In addition, recent work such as that by Klüsener et al. (2013) use impact assessment techniques, in this case, a natural experiment related to the definition of borders between Germany and Belgium after the First World War, to show the importance of family policies by separating their effects from other factors such as social norms or culture²¹. In other cases, incentives (or disincentives) can come directly from the market, for example from excessive temporary employment (Gustafson, 2005, Auer and Dantzer, 2013 and Fernández-Kranz and Lacuesta, 2009 for the Spanish case) or rigidity of the same, which limits the options of part-time work or flexible working hour schemes (Ariza et al. 2003).^{22,23,24,25}

An analysis of European countries confirms the results obtained in the literature, with a positive impact of social policies and the quality of the labour market on fertility. Faced with other studies present in the literature, AIReF sought to jointly analyse the impact of policies and the labour market on the fertility rate at the European level. The econometric results show how, controlling for GDP per capita and the percentage of youth temporary employment, the correlation between expenditure on family policies and fertility is clearly positive and relatively stable over time (see box 2 for more details on the estimate). This analysis suggests that expenditure on social policies seems to have a positive and not negligible effect on the fertility rate but that the quality of the labour market is also an important factor in explaining the differences in fertility between countries. Figure 10 reflects this. The size of the bubbles increases with the rate of fertility in developing countries and in general it can be observed how countries with the best results tend to score high on at least one of the two dimensions. This is the case, for example, of Denmark, with expenditure on family policies of 3.5% GDP, or of Switzerland, with a low rate of youth temporary employment.

¹⁷ Milligan, K. (2005)

¹⁸ Cohen et al. 2007).

¹⁹ Laroque y Salanie (2008)

²⁰ Raute, Anna (2019)

²¹ Klüsener, et al. (2013)

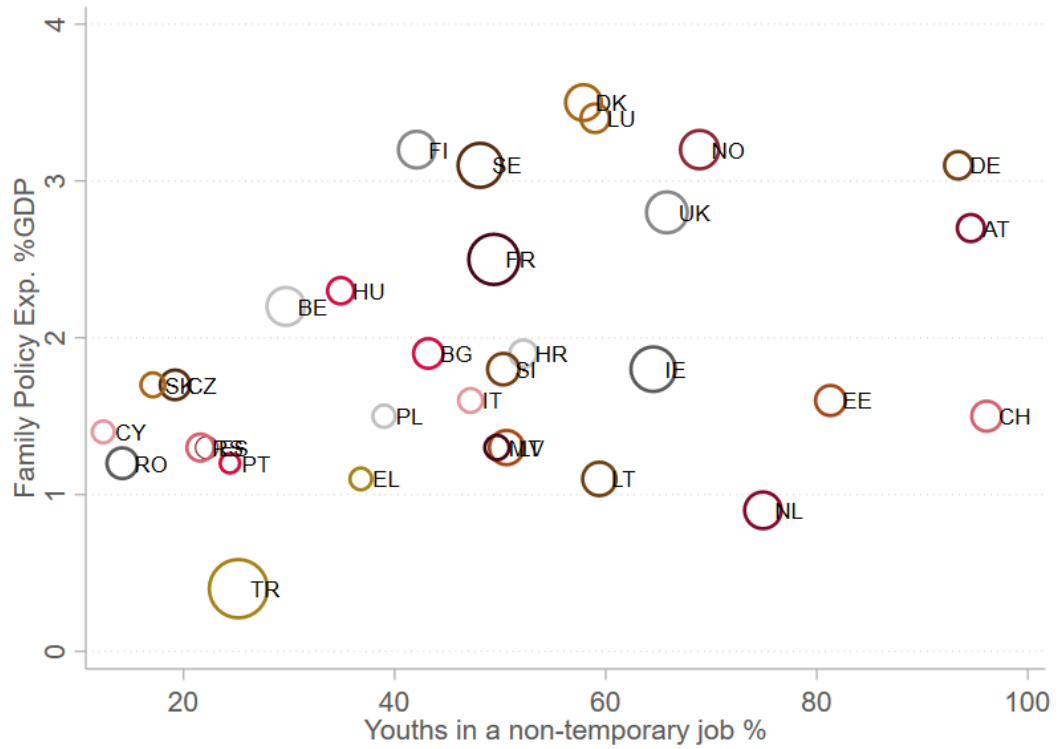
²² Gustafsson S. (2005)

²³ Auer and Danzer (2016)

²⁴ Fernández-Kranz and Lacuesta (2009)

²⁵ Ariza et al. (2003)

FIGURE 10. TOTAL FERTILITY RATES BY REGION (NUTS3), 2016



Source: Eurostat

BOX 2

Eurostat data have been used to estimate a regression between the Total Fertility Rate (TFR) and expenditure on family policies as a percentage of GDP. In particular, a regression between the TFR and the nominal GDP per capita, the rate of youth temporary employment and expenditure on family policies has been estimated.

The effect of temporary employment is negative, with an estimated coefficient of 0.02 for this variable, which would imply that a reduction of 1% of the rate of youth temporary employment would correlate with an increase of 0.02 children per woman on average. A reduction in the rate of temporary employment in Spain by 27 points, reaching the EU average, would be associated with approximately 0.5 additional children per woman.

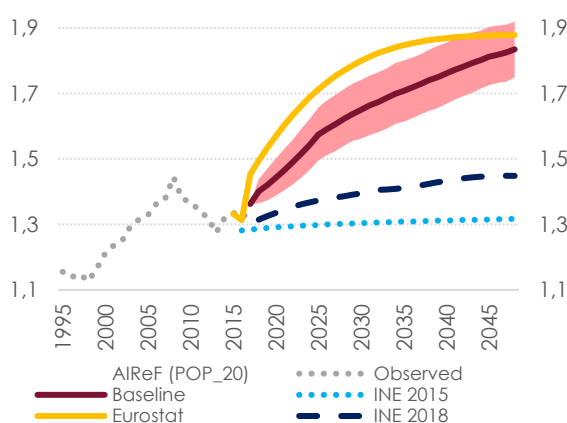
The coefficient associated with expenditure on family policies is approximately 0.08. This means that an increase in expenditure on family policies of 1% GDP is associated with an increase of 0.08 children per woman. An increase of this expenditure in Spain of 1.1% GDP, to reach the EU average, would therefore be associated to 0.1 additional children per woman. In all cases the estimates are significant and robust against different specifications.

These estimates must be subject to a number of precautions. The main, is that correlation does not imply causality. In the case of expenditure on family policies this is very evident, given that against an exogenous increase in the birth rate expenditure on family policies will tend to increase mechanically as it is determined to a large extent determined by the number of children born. AIReF sought to control this problem of reverse causality by using what is known in econometrics as an *instrumental variable*. In this case, expenditure on anti-poverty policies was used as an instrument of expenditure on family policies. The idea is that the type of political motivations that move both are similar and, in the case of the first, is independent of the number of children born. By complying with this exclusion restriction and guaranteeing certain technical conditions, it is possible to estimate the impact of family policies on the fertility rate and give them a causal interpretation. In this case not only the sign and the significance of the estimated coefficient is maintained but this triples its value from the estimate by ordinary least squares, which could be showing that the impact of family policies is even greater than originally estimated.



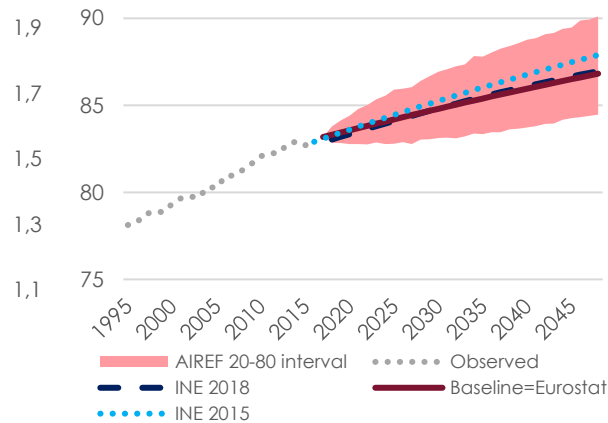
Regarding the evolution of life expectancy, AIReF's forecasts anticipate a stable increase in the coming decades to between 85 and 90 years, without evidence of near limit or asymptote. As in the case of fertility, there is evidence of a reduction in the life expectancy gap between European countries. The determining factor behind this observation is the convergence of these countries not only in economic terms (per capita income) but also of social and health benefits (improvements in living standards at advanced ages). On this basis, AIReF's forecasts anticipate an increase from the current 83.2 years up to a range between 85 and 90 years in the coming decades, in line with the projections of the INE or Eurostat (see figure 12). This result does not point to the existence of an asymptote or limit value for life expectancy in the forecasting horizon, but shows approximately constant gains for this variable during that period.

FIGURE 11. BIRTHS PER WOMAN



Source: INE's historical values, 2018-2048 assumptions of AIREF, INE and Eurostat

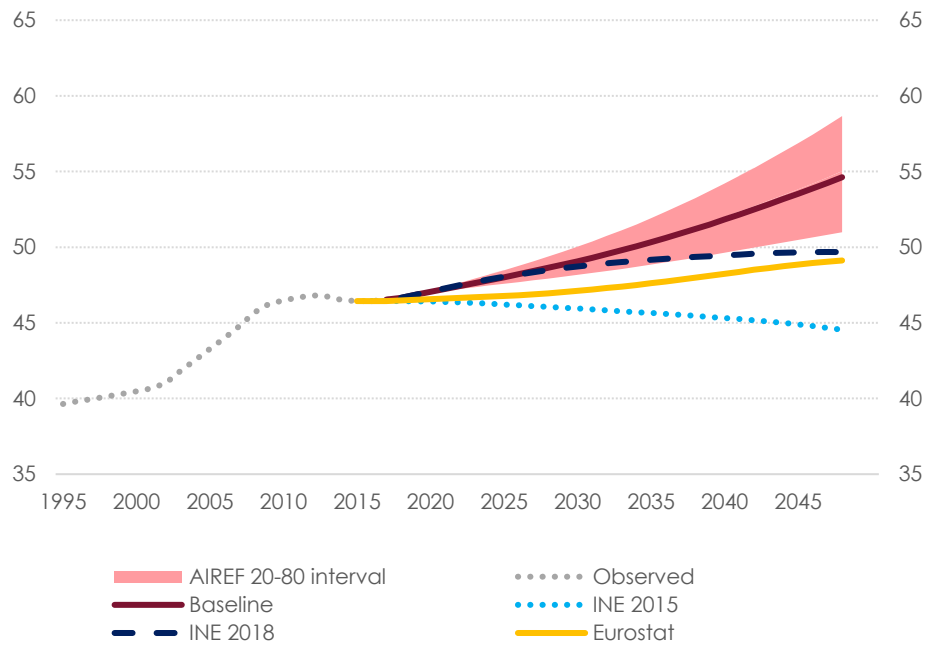
FIGURE 12. LIFE EXPECTANCY AT BIRTH



Source: INE's historical values, 2018-2048 assumptions of INE and Eurostat

Summary of demographic results and comparison

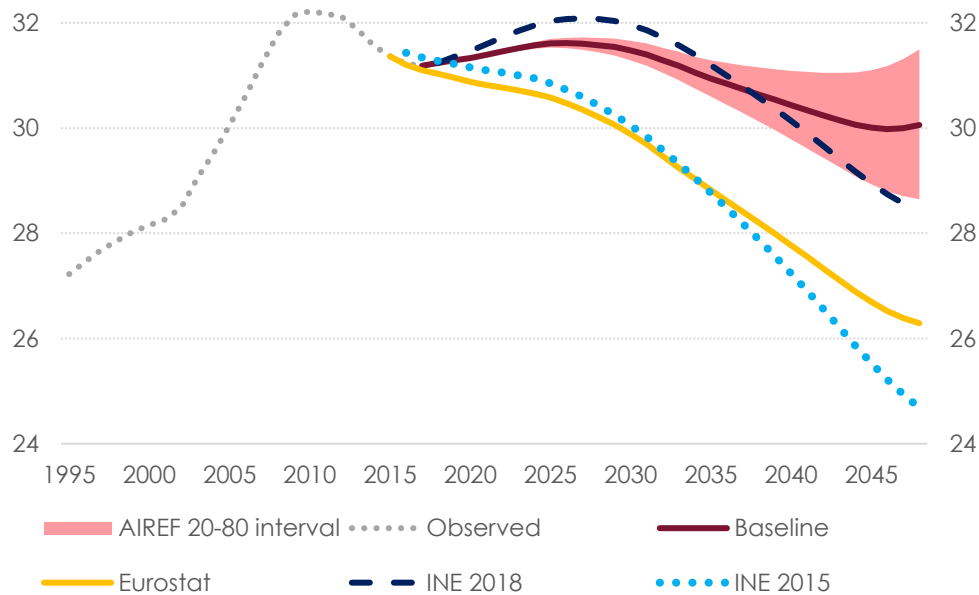
In view of the expected evolution of its main determinants, AIREF believes that the Spanish population will increase between 4 and 13 million over the next 30 years. The expected evolution of the three components analysed implies an increase in the total population to reach 55 million people in 2048 (with a confidence interval between 51 and 60 million). AIREF's forecasts entail a distancing from other current official projections, which define a less marked population growth path. For that year, Eurostat's forecast stands at 49 million. For its part, INE's official projection stood at 44 million, although in the last revision the INE significantly raised its projection up to 49 million, in line with Eurostat and closest to the lower range of AIREF's estimates (see figure 13).

FIGURE 13. TOTAL POPULATION (MILLIONS)


Source: INE's historical values, 2018-2048 assumptions of AIReF, INE and Eurostat

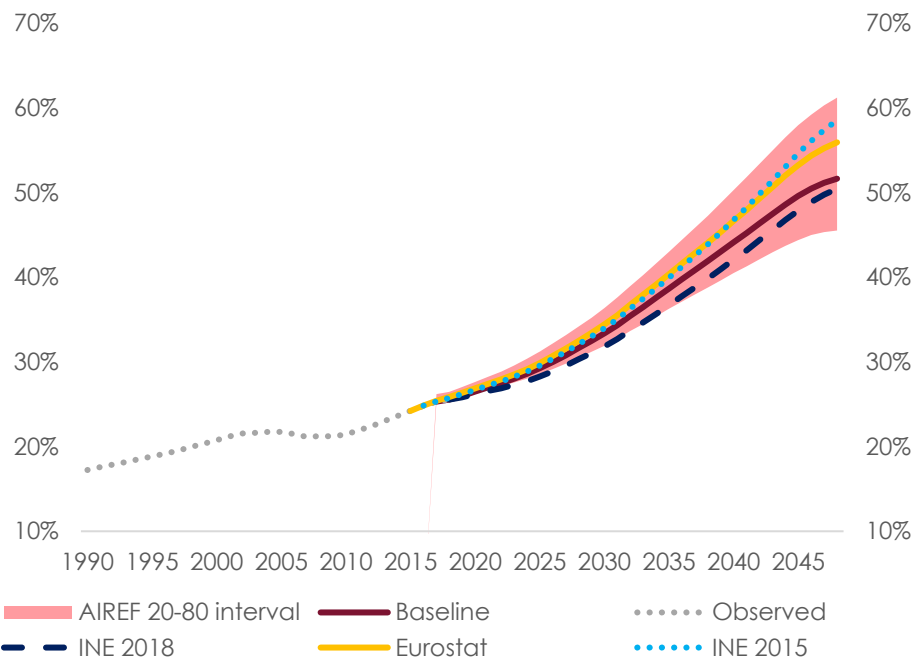
In terms of the breakdown by age, the bulk of the discrepancy with other agencies is in the working-age population, which is relatively stable in AIReF's case and suffers a significant decline in the rest. AIReF forecasts that in 2048 the population between 15 and 74 years will be at a level similar to the current (31 million), with a baseline forecast of 30 million and a range that would include values from 28 to 32 million people (see figure 14). On the contrary, Eurostat forecasts a contraction, which would imply a decline of 5 million people, with the consequent negative effect on the contribution of the labour factor to growth, which should be offset by an additional productivity if we intend to maintain growth rates in line with the historical evidence for Spain. The INE's forecasts have suffered a notable increase in its latest update (made on 15 October 2018), standing near the bottom of AIReF's interval. It is worth noting that the INE's former forecasts anticipated a reduction in the working-age population of 7 million people. This demographic projection implied a passive acceptance of the demographic challenge, where the feedback between demographic pressures and imbalances in the labour market was not accommodated, against the recent evidence.

FIGURE 14. WORKING AGE POPULATION (MILLIONS)



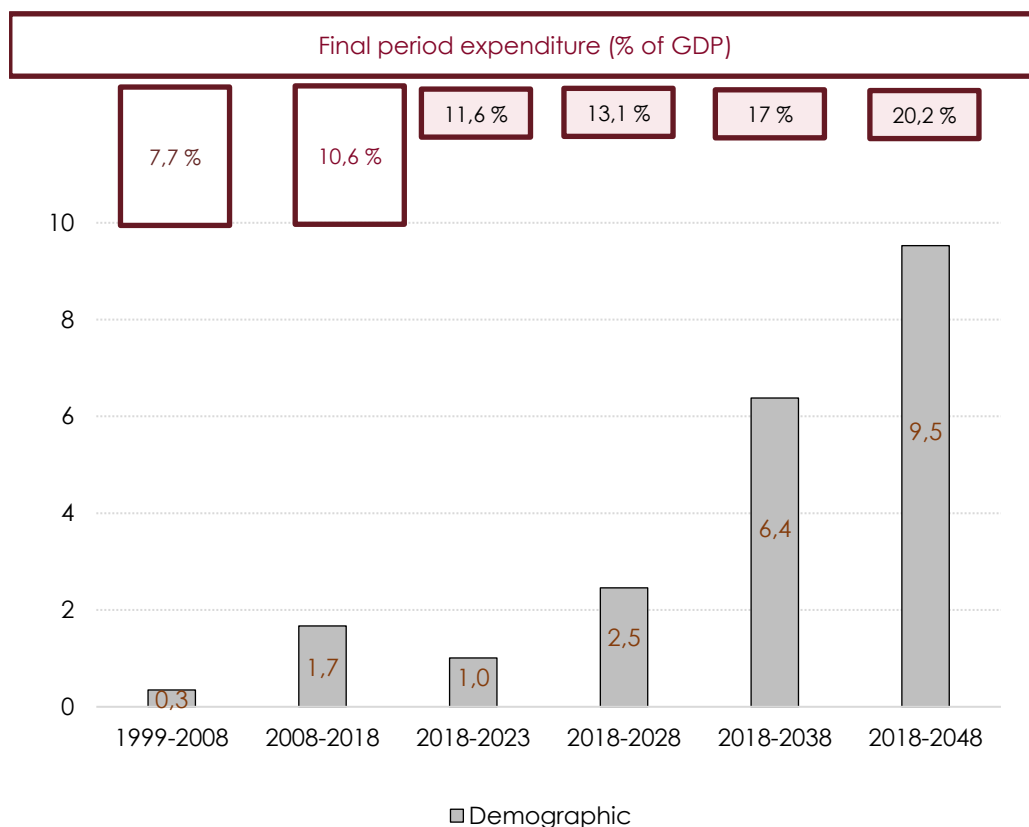
Source: INE's historical values, 2018-2048 assumptions of AIReF, INE and Eurostat

Finally, AIReF's demographic forecasts implied a progressive ageing of the population, with a dependency ratio that doubles from 25% today to a range of between 45-60% in 2048. The translation of the demographic forecasts to the dependency ratio, defined as the ratio of the population aged 67 years and over to the people aged 16 to 66 years, reflects the impact of the progressive ageing of the Spanish population over the coming decades. In fact, the evolution of the population aged over 66 years with respect to the working-age population will double from the current 25% to be slightly above 50% in 2048 in the baseline forecasts, with a range from 45 to 60%. This growing trend is also shared by the INE and Eurostat, although their projections are placed at the top of AIReF's interval

FIGURE 15. DEPENDENCY RATIO


Source: INE's historical values, 2018-2048 assumptions of AIReF, INE and Eurostat

Considered in isolation, the expected evolution of the population will exercise strong upward pressure on pension expenditure, which will be especially significant from 2030 onwards. When we analyse the temporal profile of the population dynamics, two clear stages can be differentiated a priori, before and after the retirement of the bulk of the baby boom generation, which is situated around 2030. The pressure of ageing on pension expenditure will be particularly relevant from then onwards. If we consider this factor in isolation, its contribution to the increase of pension expenditure over GDP would be around 9 p.p. between 2018 and 2048 (see figure 16), with a sharp acceleration in the 2030s and a subsequent stabilisation toward the end of the period.

FIGURE 16. IMPACT OF DEMOGRAPHY ON INCREASED PENSION EXPENDITURE


Source: INE's historical values, 2018-2048 assumptions of AIReF, INE and Eurostat

3.3.2. Labour market

Macroeconomic evolution and more specifically the labour market, detailing the dynamics expected for the activity rate, structural unemployment and productivity, is the second piece of analysis relevant for determining pension expenditure. The population forecasts detailed in the previous section fall within a macroeconomic context and of evolution of the labour market that is closely related to demographic pressures. Therefore, the interaction between both pieces is fundamental to present a coherent picture of the different determinants that affect pension expenditure. In this section, the macroeconomic factor, related to the labour market, focuses on the forecasting of three components; the activity rate, structural unemployment and productivity of the labour factor.²⁶

As in the case of demographic forecasts, the relevant macroeconomic variables are accompanied by an estimate of the inherent uncertainty. The

²⁶ For more details on the methodology and assumptions related to macro and labour market variables, see the accompanying Technical Document: Long-term macroeconomic forecasts.

estimation of the uncertainty that surrounds the projection of the macroeconomic variables is based on the historical behaviour of the shocks that have affected the same (see Annex II for more details on the construction of the intervals).

Activity rate and long-term unemployment

The evolution of the activity rate largely depends on the demography and the impact of the parameterisation of the pension system into the behaviour of economic agents. The activity rate forecasts consider the demographic trends in the various segments of the population and the impact that the parameterisation of the pension system could have. For this reason, the modelling consists of two stages. First, the continuation of the convergence of the activity rate of women to that of men and of young people to pre-crisis levels is assumed. Secondly, the impact of the 2011 pension reform is modelled, which entails an increase in the activity of those aged over 60 years through the delay in the effective retirement age.

As a result of the exercise performed, AIReF forecasts an increase of 1.9p.p. in the activity rate over the next 30 years, putting us around the values that are today the best performers at the European level. As can be seen in figure 17, AIReF forecasts that the closing of the gap between men and women will continue, associated with an increase in the older working-age segments of the population. These assumptions would lead to an increase in the activity rate from 64.6% in 2018 to 66.5% in the baseline scenario in 2048. With this, Spain would stand at values similar to those existing today in countries with higher activity rates at European level (such as Sweden).

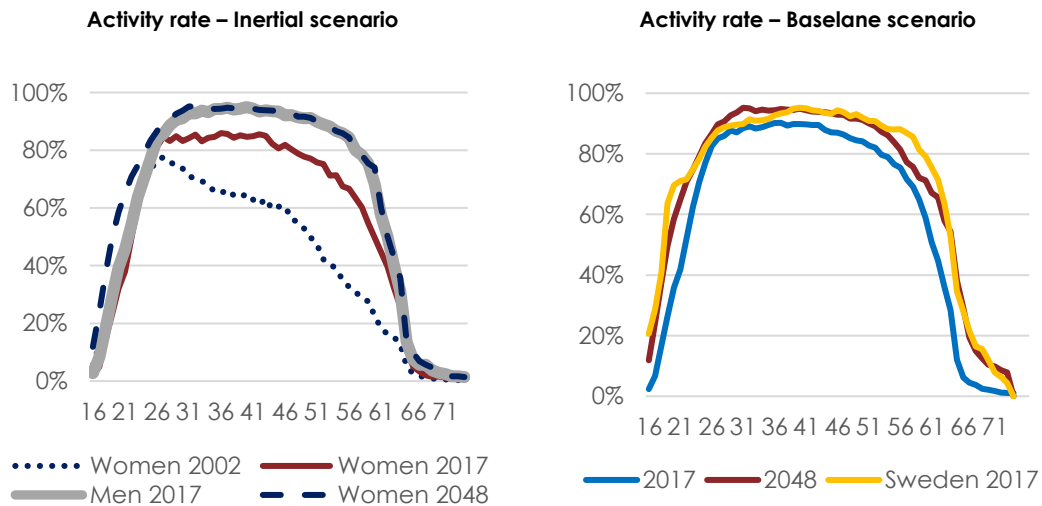
In the field of unemployment, the imbalance between labour supply and demand is reflected in the evolution of structural unemployment, which suffers from a progressive decline, converging at a rate between a 7% and 9%. Scenarios of decline in the working-age population lead to processes of labour shortages and, ultimately, to declines in the rate of structural

unemployment. The economic literature and experiences of other countries support this hypothesis because the imbalance between supply and demand exerts downward pressure on the unemployment rate, as there is a positive correlation between the variation in the rate of unemployment and the change in the working-age population.²⁷ This reasoning allows us to anticipate a decreasing trend in structural unemployment in the Spanish economy,

²⁷ For more details, see the accompanying Technical Document: Long-term macroeconomic scenario.

whose baseline scenario in 2048 stands at 10%, with a range between 8% and 12%, reflecting the uncertainty at this horizon.

FIGURE 17. ACTIVITY RATE DEVELOPMENTS



Source: INE (EPA) and AIReF's forecasts

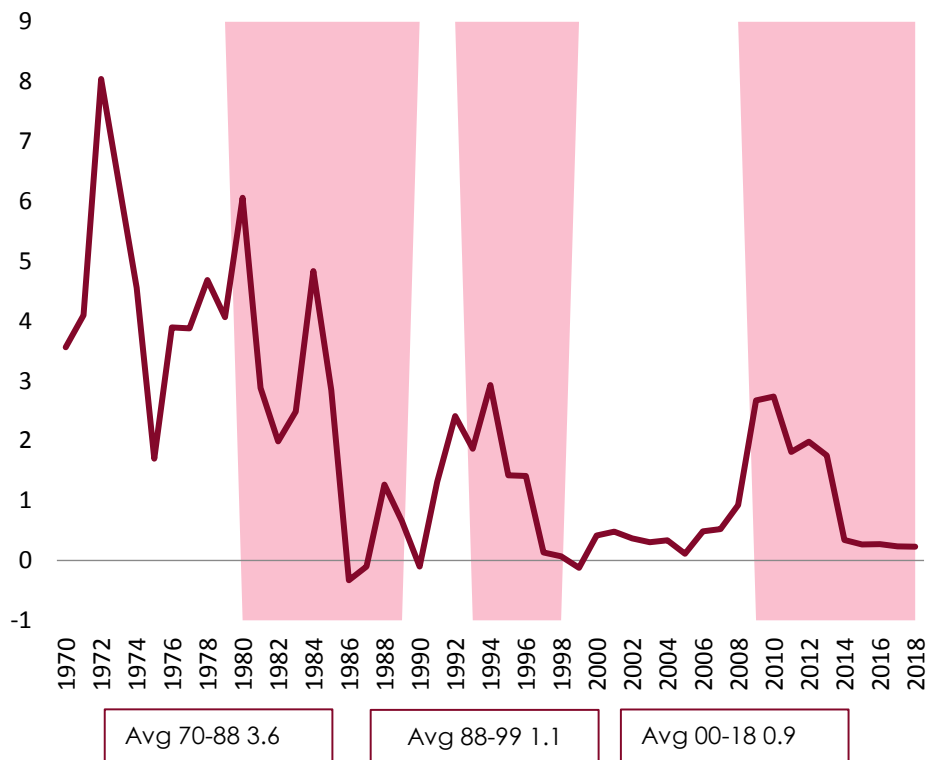
In summary, the expected evolution of the labour market entails an average contribution to growth of 0.6 p.p. in the forecasting horizon. Given the expected evolution of structural unemployment and the activity rate, the labour market situation translates into an average contribution of labour to growth of 0.6p.p. below historical averages over the past 40 years, that have stood slightly above 1 p.p.

Productivity

Two clearly different phases can be identified in the evolution of productivity growth over the past 50 years: high from 1970 to medium from the 1980s and moderate since then. If we look at the evolution of the historical contribution of productivity to growth in the last 3 economic cycles (from the 1970s), there is a structural change in the early 1980s (see figure 18). In fact, average productivities of 3.6% can be observed throughout the first economic cycle (1970-1988), and since then, the contribution of productivity growth has barely exceeded 1 p.p. on average.

FIGURE 18. PRODUCTIVITY OF THE LABOUR FACTOR

(Change in percent)



Source: INE and AIReF

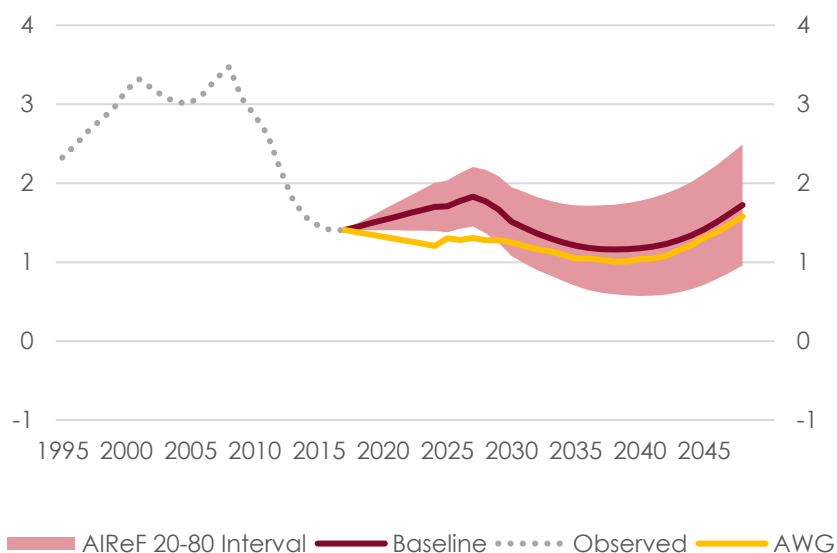
Note: the shaded areas represent years of negative output gap

In the future, the evolution of productivity remains the great unknown, while AIReF forecasts an evolution in line with the long-term historical regularities, 1p.p., against the existence of contradictory determining factors. AIReF assumes that the historical behaviour as an average forecasting assumption is maintained, with a contribution to growth of 1 p.p. This more conservative assumption is adopted because of the existence of empirical evidence and contradictory theories with respect to the main factors. Among the factors where there is no consensus on their long-term effect on productivity we can mention immigration or the ageing process. Special mention should be made of the role of technological changes, an issue that has generated a strong controversy among experts. While some experts believe that future changes will be less relevant than in the past such as Gordon, others believe that the impact of the digital revolution (Mandel - Swanson) or of the improvements due to globalisation (Baldwin) are underestimated.

Summary results of growth and historical comparison

In summary, the expected evolution of the macro and labour market assumptions translates into an average GDP growth of between 1.1 and 2% for the period. As reflected in figure 19, the evolution of GDP due to the assumptions provided for can be divided into three distinct stages. Initially, GDP growth accelerates to reach a peak in 2027 driven by the increase in the activity rate and reduction of unemployment, a point from it which fall to levels close to 1% around 2038. From that point, it grows again until it reaches the 1.8% at the end of the reference period. In average terms, AIReF's baseline scenario supposes a GDP growth of 1.6%, half a point higher than projected by the Ageing Working Group (AWG) of the European Commission (see table 1), and of different composition, since the latter is exclusively based on a productivity growth above historical experience.

The growth estimated by AIReF stands below historical values, reflecting the impact of ageing, which limits the contribution of the labour factor. AIReF's baseline scenario implies a GDP growth of 1.6% in volume and 1% per capita, both below the historical references (see table 1). This lower growth can essentially be explained by a smaller contribution of the labour factor throughout the period mainly due to ageing, a phenomenon that is partially offset by the growth of migratory flows. In this way, the contribution of the labour factor is kept positive throughout the entire period although below its recent past. In terms of productivity, it stands 0.1% below the historical average and also below the forecasts of other institutions, who use it as a closing variable to reach an aggregate growth figure.

FIGURE 19. POTENTIAL REAL GDP


Source: INE's historical values, assumptions for 2018-2048 of AIReF and European Commission

TABLE 1. SUMMARY TABLE OF MAIN MACROECONOMIC RESULTS

	1981-2017	AIReF 2018-2048		AWG 2018-2048
		Baseline	Range	
Activity rate	57.9	65.4	+/- 1	66.3
Unemployment rate	16.7	9.8	+/- 1.1	12.6
A Contribution of labour factor	1.1	0.6	+/- 0.3	-0.1
B Productivity	1.2	1.0	+/- 0.2	1.2
A+B Real GDP	2.3	1.6	+/- 0.5	1.1
GDP per capita	1.4	1.0	+/- 0.4	1.0

Source: INE's historical values, assumptions for 2018-2048 of AIReF and European Commission

As a result, the evolution of the labour market would be maintained as a compensating factor of the increase in pension expenditure, moderating expenditure in 2048 by over 2 p.p. As can be seen in figure 16, the expected evolution of macroeconomic and labour factors implies a limitation to the increase in the ratio of pension expenditure to GDP that came from the demographic factor considered in isolation. This contribution comes from two main routes. On the one hand, labour market factors drive GDP growth, reducing the weight of pension expenditure by denominator, whose dynamics are independent of the medium-term evolution of GDP. On the

other hand, the increase in the activity rate in the higher age cohorts directly reduces pension expenditure.

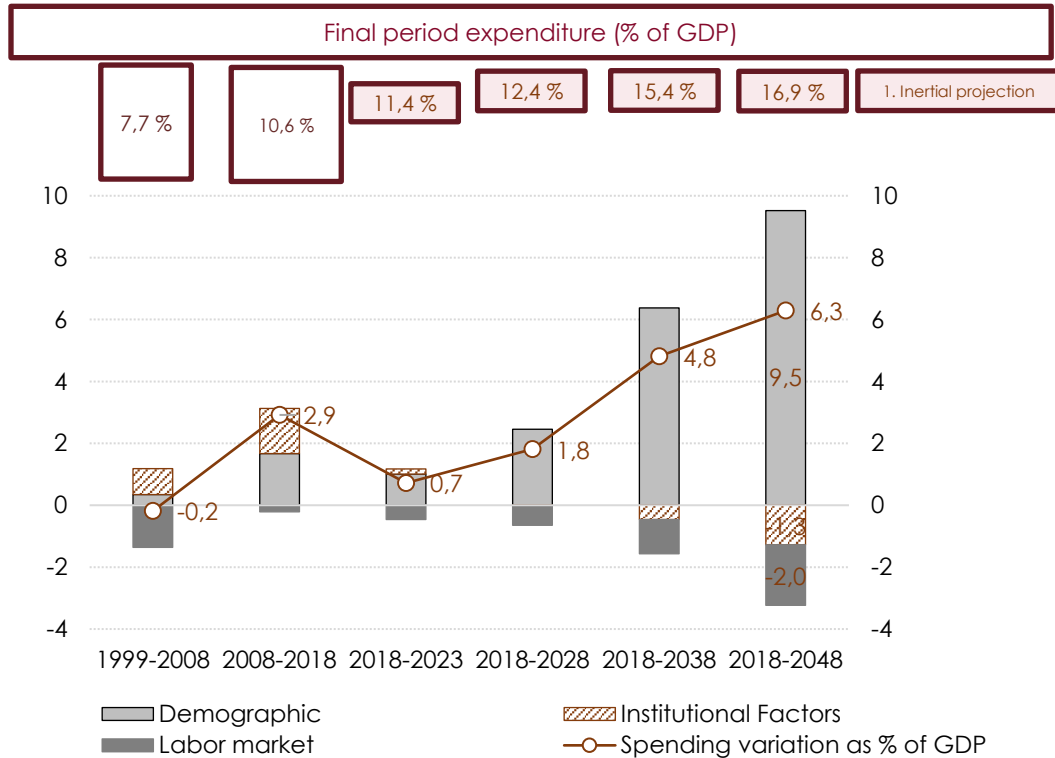
3.3.3. Institutional factors and inertial scenario

It is expected that institutional factors will have a slightly negative effect on pension expenditure in the future. In contrast to what happened in earlier periods, in which the institutional factors placed upward pressure on pension expenditure, AIReF's estimates conclude that they would not have a significant impact on the future evolution of expenditure (see figure 20).²⁸ It is expected that the eligibility ratio will maintain the negative trend observed in the last economic cycle and that the coverage rate will significantly slow its historic pace of growth as the margin to lengthen contribution careers has been cut and pensions are not expected to be revaluated above the CPI, as has happened in the historic period.

Considering the three determinants (demographic, labour and institutional) together, AIReF's inertial scenario forecasts that pension expenditure would reach 16.9% GDP in 2048. The inertial scenario, defined as that which excludes the future impact of the reforms already adopted, will be determined by the sum of the contributions of the three factors developed; demographic, labour and institutional. The upward pressure of demographic factors is only partially offset by developments in the labour market. Without considering the effect of the reforms adopted in 2011 and the Sustainability factor, adopted in 2013, pension expenditures would increase by approximately 6.5% GDP in 2048 (see figure 16). This increase would especially occur from 2030 onwards, when the baby boom generation retires and the demographic component exerts a more significant upward pressure on expenditure.

²⁸ A simulation model by cohort is used to calculate the impact of institutional factors, as well as to estimate and forecast pension expenditure, detailed in the working document that accompanies this Opinion.

FIGURE 20. INERTIAL SCENARIO: IMPACT OF DEMOGRAPHY AND THE LABOUR MARKET ON PENSION EXPENDITURE



Source: historical values of the INE and AIReF's assumptions for 2018 - 2048

3.3.4. Impact of the 2011 and 2013 reforms and baseline scenario

The last step to reach the baseline expenditure forecasting scenario consists in incorporating the impact of the reforms adopted in 2011 and the sustainability factor. Based on the inertial scenario defined previously, the baseline scenario for forecasting pension expenditure includes the impact of the parametric reforms of 2011 and the sustainability factor introduced in 2013. Not included, however, is the impact of the application of the pension revaluation index (PRI) also introduced in the 2013 reform. As noted above, the application of the PRI is not considered to be the most plausible future scenario, as currently there seems to be a political consensus on replacing this mechanism and linking the evolution of pensions to the CPI,²⁹ which is not part of the baseline scenario.

²⁹ Although the exact mechanisms have not yet been established to determine it.

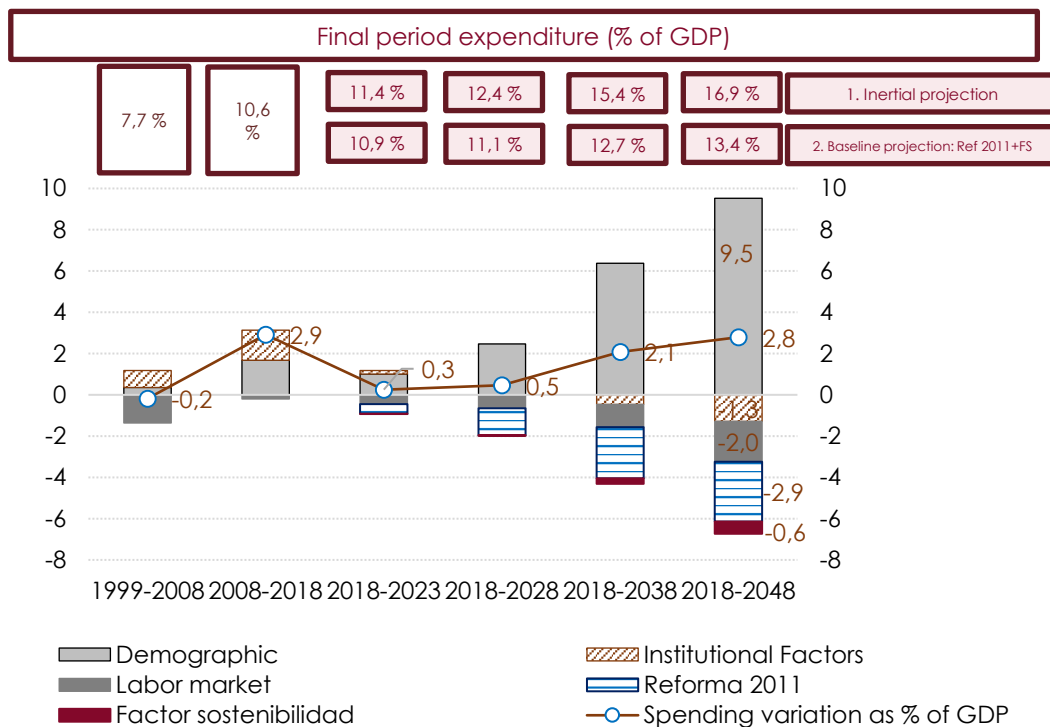
The parametric reforms adopted in 2011 would have an effect of reducing the growth of pension expenditure estimated at 2.9% GDP in 2048. The main measures of the reform of the public pension system adopted in 2011 are the gradual increase of the legal retirement age by two years between 2013 and 2027, to the age of 67; the recognition of long contribution careers, so that it is possible to retire at 65 years with 100% of the pension when a contribution period of 38 and a half years is accredited; the increase in incentives for the voluntary extension of working life beyond the legal retirement age; and the use of the contribution bases in the last 25 years prior to retirement to calculate the regulatory base, compared to 15 prior to the reform. In 2013 the 2011 reform was deepened by delaying the retirement age. For involuntary retirement (arising from termination of work for reasons not attributable to the free will of the worker), the age increases from 61 to 63 years between 2013 and 2027 and requires 33 years of contributions (as before the reform). For voluntary retirement, there is expected to be a gradual increase in the age from 63 to 65 years between 2013 and 2027, and requires a contribution period of 35 years (previously 33 years). Access to partial early retirement is also restricted, by raising the minimum age for 61 to 63 years for long careers (36.5 years or more) and from 61 to 65 for medium careers (between 33 and 36.5 years). These parametric reforms entail a profound change in the operation of the system and involve a considerable reduction in expenditure in the future, about 3.5 p.p.

The entry into force of the sustainability factor in 2023 would contain expenditure by 0.6% GDP. The sustainability factor was defined in the 2013 reform as a mechanism to maintain the contribution of the system for cohorts of retirees with different life expectancies. In principle it should be applied in 2019, but it was subsequently agreed to delay its implementation until 2023. The factor affects only the retirement pensions upon entry, adjusting its amount to the changes observed from 2012 in the life expectancy at 67 years according to the mortality tables of the pensioner population. Note that these tables have not been published by the Social Security Administration, so in this exercise the mortality tables of the INE are used as approximation. The implementation of the sustainability factor implies an additional containment of expenditure of 0.6 p.p. until 2048.

In brief, AIReF's baseline assumes an increase in pension expenditure of 2.8% GDP in 2048, reaching 13.4% GDP. In summary, the expenditure in the baseline scenario increases 2.8 percentage points in the baseline scenario developed by AIReF. This evolution is due to two opposing forces. On the one hand, the strong upward pressure of demographic factors and on the other, the compensating effect of the evolution of the labour market and the 2011

reforms and the sustainability factor approved in 2013, as can be seen in figure 21.

FIGURE 21. BASELINE SCENARIO: EXPLANATION OF THE INCREASE IN PENSION EXPENDITURE IN AN INERTIAL SCENARIO WITH REFORMS

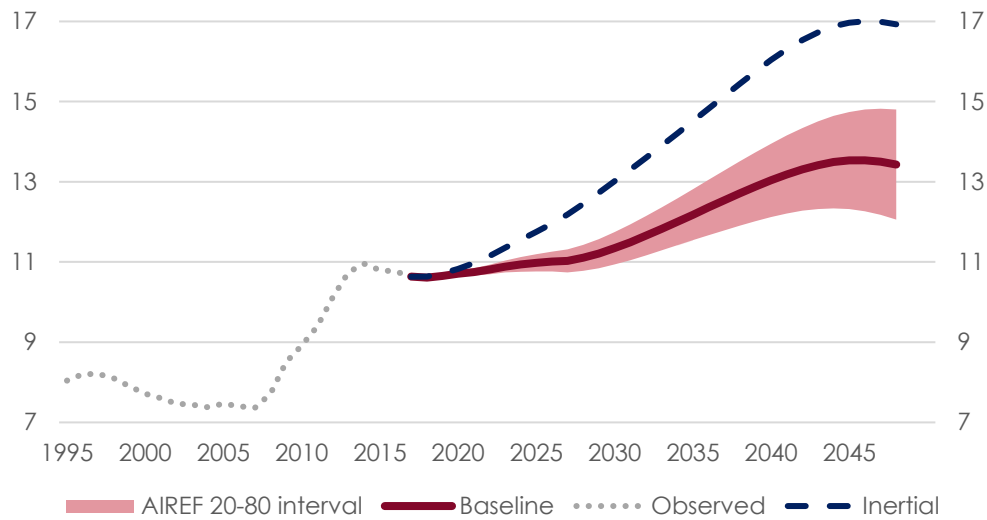


Source: historical values of the INE and Social Security, AIReF's assumptions ofr 2018-2048

3.4. Forecasts: main results

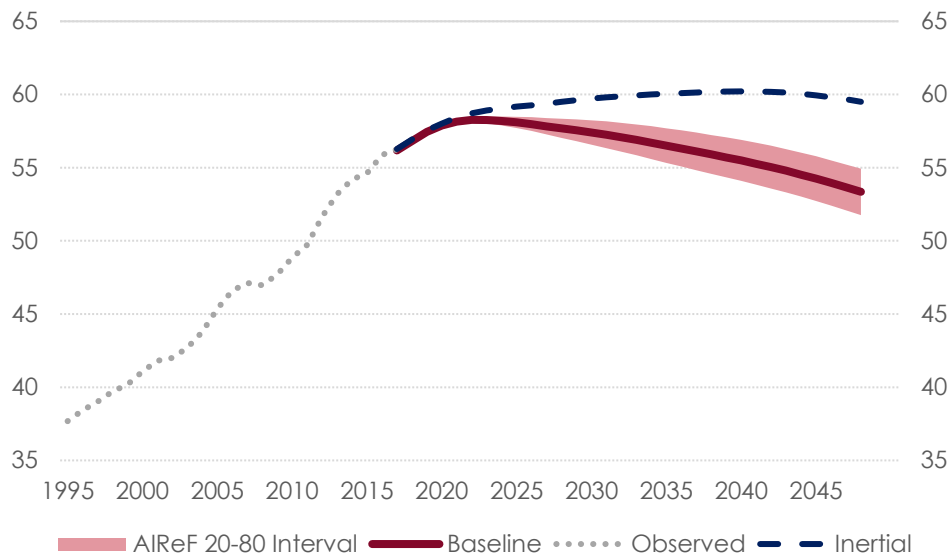
The evolution of pension expenditure over GDP in AIReF's baseline scenario is moderate up to the 2030s, to accelerate from then to reach 13.4% GDP in 2048, with a confidence interval between 12.1% and 14.8% GDP. Following the contribution of its main determinants, the expected evolution of pension expenditure is moderate until 2028 (see figure 22). From then, the growth of pension expenditure would accelerate due to the retirement of the baby boom generation, stabilising from the mid-2040s. This evolution entails an average annual growth of pension expenditure of 4.2%, derived from an average annual increase in the number of pensions of 1.5% and of the average pension of 2.6%. In turn, the growth of the average pension can be explained by the evolution of the replacement effect and an average annual revaluation in line with the CPI of 1.8%. This growth in pension expenditure is partially offset through a significant denominator effect, thanks to an average GDP growth of 1.6% in real terms and 3.4% in nominal terms.

FIGURE 22. PENSIONS EXPENDITURE (% OF GDP)



Source: historical values of the INE and Social Security, AIREF's assumptions of 2018-2048

The coverage rate, defined as the average pension over the average wage, presents a slightly declining trend from values of 57% to reach 53% in 2048. The coverage rate can be taken as an approximation in average terms to the sufficiency of the pension system interpreted as the extent to which the pensions fulfil their function to ensure an adequate standard of living and in accordance with that of wage earners. From a historical perspective, the coverage rate has been growing steadily over the past 30 years, the result of a more mature labour market with more complete contribution careers and the parameterisation of the system. Once the first effect has been expended and the effect of the parameterisation by the 2011 reforms and the sustainability factor has been contained, there would be a declining trend in the coverage rate, although very gradual, to a level similar to that reached in 2013 (see figure 23).

FIGURE 23. BENEFIT RATIO % (AVERAGE PENSION/WAGE)


Source: historical values of the INE and Social Security, AIReF's assumptions ofr 2018-2048

3.5. Forecasts: sensitivity exercises

Beyond evaluating the uncertainty inherent in the forecasts of the variables considered, a sensitivity exercise can be performed to assess the impact of changes in the main assumptions. To complete the analysis performed, an exercise was performed to assess the sensitivity of expenditure against changes in its main assumptions. This exercise provides an approximation to the impact of policies aimed at affecting the determinants of expenditure. In this way, an increase of average migration flows of 50,000 people would entail 0.4% less pension expenditure over GDP at the end of the period (see table 2). The increase in fertility would also entail a lower pension expenditure over GDP (0.1% per each additional 0.1 children per woman in 2048), while the increase in life expectancy would raise it (0.1% per each 3.4 additional years in 2048). A higher productivity growth would positively affect the containment of expenditure (0.3% less expenditure per each additional 0.2% of average productivity growth). In the same sense improvements in the contribution of the labour market would have an effect through a higher activity rate (0.2% per each additional 2 p.p. of activity at the end of the horizon) and lower unemployment (0.3% per each 2.5 p.p. less unemployment in 2048).

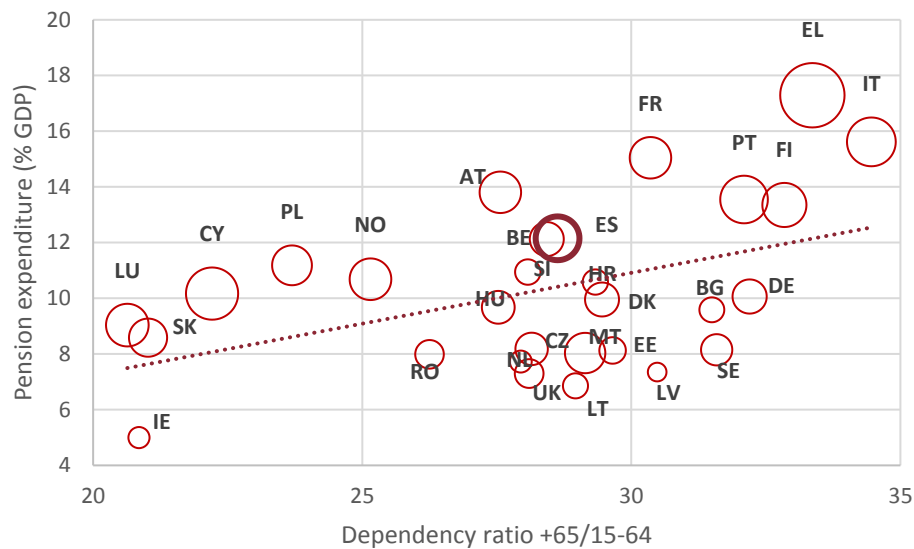
TABLE 2. SENSITIVITY OF PENSION EXPENDITURE TO CHANGES IN THE MAIN FACTORS

	<i>Pension expenditure</i>		
	<i>2018</i>	<i>2033</i>	<i>2048</i>
Expenditure over GDP	10.6	11.8	13.4
Δ Net immigration + 50,000 per year 2018-48		-	-0.4
Δ Fertility + 0.1 children per woman in 2048		-	-0.1
Δ Life Exp. + 3.4 years in 2048		-	0.1
Δ Productivity +0.2 p.p. in 2018-2048		-0.2	-0.3
Δ Activity +2 p.p. 2048		-0.1	-0.2
↓ Unemployment -2.5 p.p. in 2048		-0.1	-0.3
Source: historical values of the INE and Social Security, AIReF's assumptions for 2018-2048			

3.6. Forecasts: international comparison

In terms of a comparison at European level, Spain is among the countries that spend more on pensions than what is implied by their dependency ratio, derived from their comparatively high coverage rate. There is a positive relationship between the degree of population ageing and pension expenditure over GDP, as can be seen in figure 24. Spain is situated above the trend line, with a coverage rate above average (size of the bubbles).

FIGURE 24. PENSION EXPENDITURE AND AGEING, 2016



Source: Eurostat

The baseline expenditure scenario for 2048 would be below that implied by the ageing forecasting, maintaining the coverage rate. A stylised exercise allows us to derive the pension expenditure that Spain would have in 2048 according to its population pyramid forecasted from the relationship between both derived from the figure above³⁰. The expenditure in 2048 would be slightly above 20% GDP. However, both institutional factors and the expected evolution of the labour market place Spain well below 13.4% GDP in 2048, maintaining the coverage rate, in a situation similar to that enjoyed by the Netherlands or Sweden today.

³⁰ Equation that defines the dotted regression line.

4 CONCLUSIONS AND PROPOSALS

4.1. Conclusions

Based on its analysis, AIReF notes the existence of a structural deficit in the Social Security Administration and, as a result, publishes this Opinion addressed to the Government. The diagnosis derived from the pension expenditure forecasts points to the existence, in the absence of additional measures, of a situation of structural deficit for the Social Security Administrations.

In its diagnosis AIReF differentiates between different time horizons, in order to promote economic policy decision-making, both in the short (next 5 years) and medium-long term (next 30 years). The short-term problem corresponds to the present system deficit and has an origin essentially linked to the economic cycle, to the crisis, and to the institutional incapacity of the system to adapt in the short term to the insufficiency of resources caused by the collapse in contributions. In the long term, AIReF identifies a challenge for the sustainability of Social Security resulting from the increase of pension expenditure associated with the ageing of the population, which will begin to be significant from the 2030s, with the retirement of the baby boomers, as can be seen in table 3.

Based on its analysis and diagnosis, AIReF makes proposals to improve the sustainability of Social Security, both in the short term to close the structural deficit and to tackle the long-term demographic challenge. These proposals, as well as the forecasts made by AIReF, must be understood as an informed input to help decision-making in the context of social dialogue, through the *Pacto de Toledo*.

TABLE 3. EVOLUTION OF PENSION EXPENDITURE AT DIFFERENT TIME HORIZONS

Scenario	Year	Expenditure (% GDP)		Coverage rate	Increased expenditure (% GDP)
		Value	Range		
Inertial	2048	16.9		60	6.3
Administration	2018	10.6		57	
	2023	10.9	+/- 0.1	58	0.3
	2028	11.1	+/- 0.3	58	0.5
	2038	12.7	+/- 0.8	56	2.1
	2048	13.4	+/- 1.4	53	2.8

Source: historical values of the INE and Social Security, AIReF's assumptions for 2018-2048

4.2. Proposal for short-term reform

In the short term, AIReF considers it to be feasible to close the existing structural deficit in Social Security by means of the assumption of certain expenditure items by the State, which are currently supported by contributions. The structural deficit identified in the short term implies a limited risk for the sustainability of Social Security as it must be seen in the context of the General Government (GG). It is feasible to close the deficit through the transfer of resources from other parts of the administration, reducing uncertainty with respect to the sustainability of the System, which generates distortions in the decision-making process of economic agents, both in pensioners and contributors, leading to sub-optimal consumption levels and to a widespread disaffection with the functioning of the system. The transfer of the deficit from one administration to another can be carried out to the extent that the State assumes the financing of certain expenditures of the Social Security System that are currently supported by contributions.

The social security deficit in the short term largely has its origin in the gravity of the crisis that started in 2008 and its impact on employment, which led to a collapse of social contributions while pensions, indexed to the CPI, continued to increase at the same rate. The inability of the Social Security system to adapt its revenue to this reality led to the accumulation of important deficits that have not been corrected and that have been revealed as structural once the cycle ended. This situation must be separated from the long-term problems of the pension system, which are determined by demography and that are not essentially different in Spain than in the rest of our neighbouring countries.

Place the deficit in the part of the administration that has tools to solve it and view it as a problem of the GG and not something inherent to Social Security.

Avoid the various administrations making decisions in an uncoordinated manner and that prove to be incoherent such as tax cuts or increases in expenditure in parts of the administration that appear to have a surplus separately. The budgetary differentiation between sub-sectors of the administration makes sense to the extent that it corresponds to a real autonomy of each of them to manage revenue and expenditure. When this is not the case, the demarcation will be artificial and will lead to suboptimal economic policy decisions. The handover of expenditure responsibilities from the Social Security system to the State could be implemented, among others, through two mechanisms:

- 1. Raising, in relative terms, the part of social contributions intended for common contingencies (payment of pensions) at the expense of those assigned to the State Public Employment Service (SEPE - payment for unemployment).**

An anomaly of our social contributions system is the bias in favour of unemployment contributions. Of the nearly 36 contribution points, almost 8 points are allocated to unemployment benefits. This implies that the contributory part of benefits paid by the SEPE is always in surplus, even in times of crisis with higher level of unemployment, and that, at the present time, the SEPE has an overall surplus of around 1.5 billion euros.

In international terms, the unemployment contribution is comparatively high in Spain and has remained stable independent of the evolution of the economy. Compared to an average of 3.8% in neighbouring countries,³¹ the unemployment contribution rate in Spain would be 7.05% for permanent contracts and 8.30% for the temporary contracts. This level has remained stable, regardless of the moment in the cycle and secular evolution. In addition, the forecasted demography will make the weight of the unemployment contingency lose importance with regard to those linked to ageing.³²

A reform option in the short term would be to articulate the coverage of the Social Security system deficit by increasing the contribution rate for common contingencies and lowering the rate for contributions for unemployment. In practice, the elimination of the bias in favour of unemployment contributions could be a solution to the structural deficit

³¹ Average of France, Austria, Greece, Holland, Germany, Sweden, Finland and Italy.

³² In the future it is foreseeable that there will be a lower weight of the unemployment benefit compared to the benefits linked to the ageing of the population such as retirement.

in Social Security. This reform would be implemented through an increase in the current contribution rate for common contingencies (28.30% in the General Regime) offset by a reduction in the contribution rate for unemployment³³. Each point of unemployment contribution reflects approximately 3,000 million in collection³⁴, so that, in order to obtain 10.4 billion euros, it would have to move 3.5 points. This change is clearly justified through the establishment of a system similar to that of the Social Security System, so that unemployment contributions would fund contributory benefits (11 billion), while non-contributory benefits (6.4 billion) and subsidies (2.3 billion) would be permanently funded by the State. The Social Security System would be in balance while the SEPE would have a deficit of 9 billion euros that would be financed by transfers from the Central Administration, as has been happening in recent years. This proposal has the advantage that it could be revised each year, transferring part of the contribution from one contingency to the other, without the real economy being affected as the total quota would not change.^{35,36}

A transfer of certain Social Security expenditures, until now financed with contributions. In addition, the Social Security deficit would be closed through funding of certain Social Security expenditure items by the Central Administration. In this case, there would be a permanent system for funding the operating expenses of Social Security (about 4 billion), certain measures for the promotion of employment and temporary reduction of contributions (some 2 billion) and of subsidies implicit to special regimes (about 1 billion today) that would always be covered by a transfer from the State.

³³ Given that some regimes, notably for the self-employed, do not contribute for the contingency of unemployment, the common contingencies rate should not rise or a net increase in collection should not be assumed. The calculation was exclusively made with the regimes that have the contingency covered.

³⁴ The change in the rate should occur within the same quota (from employer's contribution to employer's contribution, for example) so that it would be truly neutral and would not affect the distribution of burdens between the worker and the company.

³⁵ Given that some regimes, notably for the self-employed, do not contribute for the contingency of unemployment, the common contingencies rate should not rise or a net increase in collection should not be assumed. The calculation was exclusively made with the regimes that have the contingency covered.

³⁶ The change in the rate should occur within the same quota (from employer's contribution to employer's contribution, for example) so that it would be truly neutral and would not affect the distribution of burdens between the worker and the company.

In this way, the current Social Security deficit of about 17.4 billion would be eliminated and the proposal could be realised by a modification of the General State Budget Law and a change in the General Social Security Law (LGSS). The sum of the two proposed reforms involves complete elimination of the Social Security deficit, quantified at €17.4 billion, of which some 10.4 billion would come from higher contributions for common contingencies and about 7 billion from transfers from the State to cover other expenditure items. The proposal for reform could be achieved with minimal legislative changes. The contribution rates set for the different contingencies and social security regimes are regulated annually in the General State Budget Law and are specified in greater detail in the annual order implemented by the legal norms on contribution to Social Security, unemployment, protection for cessation of activity, the Wage Guarantee Fund and vocational training. With regard to the financing of certain expenditure items by the General State Budget, this should be done through a modification of the LGSS.³⁷

Finally, based on its analysis and diagnosis of the situation in the short term, AIRcF proposes:

Close the existing structural deficit in Social Security, through the transfer of expenditure responsibilities from the Social Security System to the State, by means of:

- a. *Raising, in relative terms, the contributions intended for common contingencies (payment of pensions) at the expense of those assigned to the State Public Employment Service (SEPE - payment for unemployment).*
- b. *The State's assumption of certain expenditure items currently supported by contributions, such as, the operating costs of Social Security, certain measures for employment promotion and temporary reduction of contributions, maternity and paternity leave and implicit subsidies to special regimes.*

4.3. Proposal for long-term reform

In the long term, to cope with the increase in pension expenditure, the solution must be feasible, credible and intertemporally consistent. Beyond policy considerations related to the imposition of additional revenue measures or measures to reduce other public sector expenditure items, it is worth exploring

³⁷ However, as background to the State transfer not intended to finance non-contributory benefits, the GSB law for 2018 included a transfer from the State to the Social Security system as a transfer to support its budgetary balance.

the scope for the containment of pension expenditure.³⁸ The political economy of any reform aimed to contain pension expenditure should entail a prior consideration of feasibility and intertemporal consistency, that is to say, the decision on the future that we adopt today must also be the one that we would take once we had reached that moment in time. According to AIReF's estimates, the application of the PRI in the absence of measures to increase revenue, would have meant a revaluation of 0.25% during the reference period. This would have contained expenditure by an additional 2.1% GDP, reducing pension expenditure in the baseline scenario from 13.4% to 11.3%. However, this containment would be at the expense of a 9% reduction in the coverage rate of pensions. In this sense, the adjustment of expenditure via the quasi-freezing of benefits has been revealed to be a not politically sustainable expenditure containment strategy. On the other hand, there are proposals for revaluation complementary to the CPI that allow pensioners to maintain purchasing power, such as growth of GDP, State revenue or social contributions. The Commission of the *Pacto de Toledo* has yet to specify which rule to apply from 2020.³⁹

In the long term, the deepening of the system's parametric reforms is a credible way to improve its sustainability, minimising its impact on sufficiency.

An international comparison shows that Spain still has the potential to strengthen the sustainability of the pension system by modifying some of its fundamental parameters ("parameterisation of the system"). In addition, the reforms that affect the parameters used to calculate the initial pension can be implemented in a gradual manner, softening their impact. In addition, its effect is predictable at the individual level for future pensioners so they can adjust their expectations and adapt their saving and consumption decisions to the new situation in a reasonable time frame, both before and after retirement, increasing the certainty and confidence in the system by putting it on a credible sustainability path. Finally, any agreed reform should have the maximum political and social consensus

AIReF presents a simulation oriented to improve sustainability without affecting sufficiency. To this end, it proposes to deepen two aspects of the 2011 reform; a delay in the effective retirement age and an extension of the period of the contribution career. The deepening of the 2011 reform, which changed

³⁸ Any measure for additional revenue, either through higher contributions or the main taxes must take into account the impact on domestic demand, both through the behaviour of households, companies and job seekers. From the point of view of the State's expenditure, it is also necessary to consider the scope to reduce other State expenditure items to offset the increase in pensions, which appears to be limited.

³⁹ See Weaver (2003) and Bosworth and Weaver (2011).

parameters such as age, contribution career to be considered or reductions in pension for early retirement, could mean a suitable commitment to improving sustainability without damaging the sufficiency of the system, defined in terms of the rate of coverage as the adequacy of the pension to the needs of pensioners (ratio between the average pension and the average salary). In particular, the combined effect of an increase in the effective age of exit from the labour market and an increase in the contribution career can entail an additional cost containment factor in the long term, without affecting the sufficiency of the system.

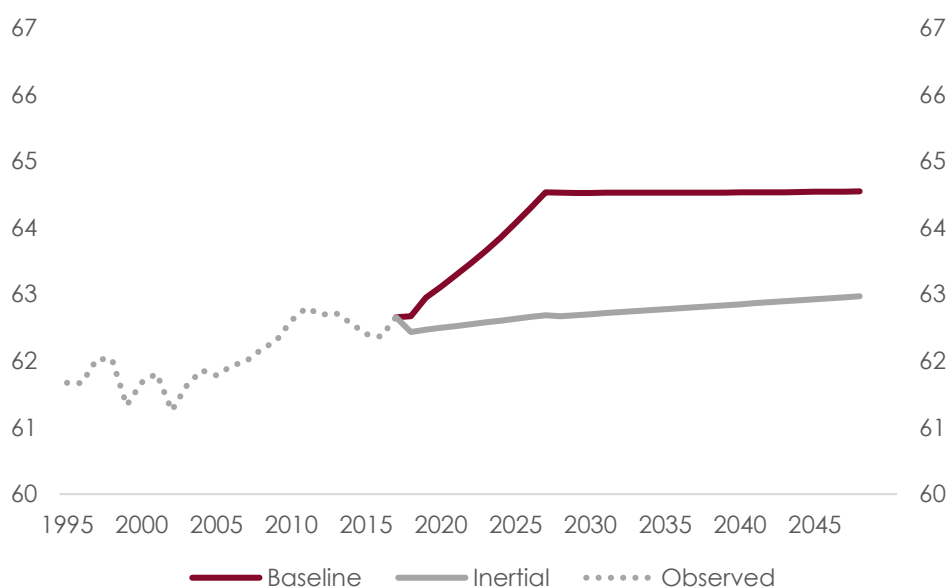
In this sense, AIReF's proposal focuses on two components.

- 1. Delay the effective retirement age by 1 year.** The effective retirement age in Spain in 2018 is 62.7 years compared to a legal age slightly above 65 years. In 2027, it is expected to reach 64.5 years, at the end of the transitional period included in the 2011 reform, with a legal age set at 67 years. There is an imperfect correspondence between the legal age and the effective age, as can be seen in table 4, as there are many situations of accessing retirement before the legal age. Therefore, it is possible to reach an increase in the effective age through different routes that do not necessarily imply a widespread increase in the legal age. In the exercise carried out, an increase of 1 year in the effective age, from 64.5 years in 2027 to 65.5 in 2048, is simulated. This measure would result in a further expenditure containment of between 0.4 p.p and 1.2 p.p. in 2048 and a slight improvement of between 1 p.p. and 3 p.p. in the coverage rate with respect to the baseline scenario. This modification would be in line with the trends in neighbouring countries (table 4).

TABLE 4. NEW PENSIONS BY AGE

Retirement discharges 2018	New pensions	
Age	Number	%of new pensions
Before 65 years	142.688	46%
Ordinary age 65 years	67.060	21%
Ordinary age 65.5 years	74.003	24%
Retirement Age Delayed	27.233	9%

Source: State Secretary for Social Security

FIGURE 25. EFFECTIVE AGE OF EXIT FROM THE LABOUR MARKET (BOTH SEXES)


Source: OECD's historical values, AIReF's assumptions for 2018-2048

TABLE 5. INTERNATIONAL COMPARISON OF RETIREMENT AGE

	Effective age of exit from the labour market 2016	Legal retirement age (age of early retirement)			
		2016	2020	2040	2060
Spain 2016	62.4				
Spain 2048 (Baseline)	64.6	65 (63)	65.8 (63)	67 (63)	67 (63)
Spain 2048 (Increase in Age)	65.9				
Germany	63.2	65.3 (63)	65.8 (63)	67 (63)	67 (63)
France	60.2	65.8 (60.8)	67 (62)	67 (62)	67 (62)
Italy	61.7	66.3	66.8	68.4 (65.4)	70 (67)
Sweden	65.2	67 (61)	67 (61)	67 (61)	67 (61)
United Kingdom	63.9	65 (65)	66 (66)	66.7 (66.7)	68 (68)

Source: OECD (exit age) and European Commission (retirement age)

- 1. Increasing the contribution career considered for calculating the pension from 25 years in the baseline scenario up to 35 years in 2027 would contain pension expenditure by 0.5 p.p. GDP in 2048.** The international evidence shows that there is room to increase the contribution career, which is comparatively low. The coverage rate would be reduced by 2% in relation to the baseline scenario. Various reforms, including those of 2011, have expanded the number of years

considered to calculate the regulatory base of the pension. This measure would strengthen the contributive nature of the system and incentivise contributions throughout the working life. The latter is especially relevant when there is scope to decide the contribution base as in the Special Scheme for Self-employed Workers. On the other hand, a review of the systems in neighbouring countries allows us to appreciate that considering the entire working career is the most common case (table 5). The calculation of the effect of extending the contribution career to the entire working life would require the use of data that is currently only available to Social Security Administrations, therefore it was not possible to simulate the effect of the measure.

TABLE 6. INTERNATIONAL COMPARISON OF THE REFERENCE PERIOD USED TO COMPUTE THE PENSION BENEFIT

Reference period used to calculate the pension	
Spain	Last 25 Years (2022)
Germany	Full career
France	The best 25 years
Italy	Full career
Netherlands	Years of residence
Portugal	Last 40 Years
Sweden	Full career
United Kingdom	Years contributed

Source: European Commission

The combination of both measures would contain the pension expenditure over GDP by between 0.8p.p. and 1.6p.p. in 2048, leaving the coverage rate between 53% and 55%. Both measures can be combined in varying degrees to achieve the desired level of expenditure restraint and system sufficiency. table 7 shows the final impact with respect to the baseline scenario considered, where the pension expenditure over GDP would end up at 12.6%, 2 p.p. above the level of 2017. Once the short-term deficit has been solved, these reforms can be addressed together and work toward achieving the broadest political and social consensus possible.

Finally, based on its analysis and diagnosis of the existing challenge in the long term, AIReF proposes:

Adopt measures to enhance the sustainability, equity and sufficiency of the system, by means of, among others:

a. Deepening of the parametric reform of the pension system that began in 2011, through a combination of measures:

- Modify the requirements for access to the pension (early or ordinary) to promote an increase in the effective retirement age
- The increase in the career for calculation of the pension beyond 25 years.

a. A shift in disability benefits to take better advantage of the work capacity of individuals

TABLE 7. EVOLUTION OF PENSION EXPENDITURE AT DIFFERENT TIME HORIZONS

Scenario	Year	Expenditure (% GDP)		Replacement ratio	Deficit	Debt in-crease
		Value	Range		% GDP	% GDP
Inertial scenario	2048	16,9		60	6,4	112,3
Central scenario	2018	10,6		57		
	2023	10,9	+/- 0.1	58	0,4	2,4
	2028	11,1	+/- 0.3	58	0,6	4,8
	2038	12,7	+/- 0.8	56	2,2	19,0
	2048	13,4	+/- 1.4	53	2,9	48,7
Retirement age change (1)	2048	12,8		55	2,3	31,3
Increase in career years (2)	2048	12,9		51	2,4	41,4
Parametric reforms (1+2)	2048	12,5		54	2,0	26,5
CPI indexation 0,25%	2048	11,3		45	0,8	5,8

4.4. Suggestions for best practice

There is scope to improve the transparency on the evaluation of the government regarding the financial health of the system. The hypothetical suppression of the pension revaluation index should not dilute the obligations of information and forecasting of Social Security, in particular, those contained in the General Social Security Law with respect to the PRI and the sustainability factor. Thus, among its reporting obligations, the government should continue to prepare and publish official medium and long-term revenue and expenditure forecasts for the pension system (article 55), publish the mortality tables of the pensioner population for the calculation of the sustainability factor (article 211) and develop, as soon as possible, a report on the impact of the 2013 reforms on the adequacy and sufficiency of the Social Security System (twenty-second additional provision).

For this reason, AIReF makes the following suggestion for best practice:

Reinforce the information obligations of the Social Security Administration on the financial situation of the system and on the short- and long-term impact of reforms.

PRESIDENT OF THE INDEPENDENT AUTHORITY
FOR FISCAL RESPONSIBILITY

A handwritten signature in black ink, which appears to be 'JL Escrivá', is centered below the title.

José Luis Escrivá

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Annex I: Methodology underlying the population projections

The methodology followed by AIReF to prepare its projections combines the classical framework of the component method with specific probabilistic models for the main inputs of said method (fertility, survival and migration). In this way, we have the granularity provided by the first (e.g. breakdown of the population by age and sex) alongside an econometric approach that allows us to generate probabilistic scenarios and incorporate relevant economic information into the projections. This methodology is briefly described below, which can be found in AIReF (2018), Fernández-Huertas and Lopez-Molina (2018) and Osés and Quilis (2018) for a more detailed discussion.

Fertility

The component method requires the expected value of the number of children per woman, for each age group, as the input. The fertility curves were modelled in two stages. In the first, a parametric curve was adjusted for each year of the exponential family to the fertility data observed by cohort, differentiating between foreign nationals and Spanish nationals. The three parameters that these curves depend on can be identified by an intensity factor, one that reflects the average age of maternity and another that measures the dispersion of the number of children around this average age. These three parameters give rise to a bell shape, a reflection of the actual distribution of observed fertility. These curves and their corresponding parameters are estimated for each year from which data are available, giving rise to a time series vector for these parameters. This vector is modelled through a multivariate model that incorporates both the contemporary interaction between intensity, modal age and dispersion as its dynamics (common and idiosyncratic). This model, once estimated, allows the stochastic parameters to be projected through Monte Carlo simulation, generating the corresponding confidence intervals. The simulated trajectories of the parameters, inserted in the cross-section fertility formula, give rise to the complete projections of the number of children per woman for each age group and the corresponding aggregate variables: average number of children per woman, modal age, etc.

As the horizon of these projections is high, it is especially useful to identify the structural elements that determine the dynamics of the fertility curves as clearly as possible, excluding temporary transient elements. A way to carry out said identification is to add the information that has been recorded in other countries on the same demographic phenomenon. It is this objective that gives rise to the second stage of the procedure, in which a factor model is estimated for countries that are part of the selected panel, extracting the

main components included in most of the aggregate fertility behaviour of all countries. In this way, the very detailed and specific information of a single country (Spain) is combined with the aggregate information (average number of children per woman) of a panel of European countries geographically, culturally and economically close.

In the case of the average number of children per woman, a bivariate model presents a good sample adjustment, being sufficient to include most of the series dynamics. These two factors have a fairly intuitive interpretation, since the former represents the general aggregate fertility dynamics in all the countries in the sample and its trend, while the second reflects differences between the Nordic countries and the countries of southern Europe. The first factor is that used to anchor the behaviour of Spain in the long term, so that the number of children per woman resulting from the projections of the multivariate model estimated for the various parameters converges asymptotically to the expected value for this factor.

Survival

The methodology adopted for the life expectancy forecast is very similar to that used in the case of the number of children per woman. Similarly, a model is estimated in two stages. In the first, a potential parametric function that approximates the survival curves is estimated, defined as the complementary event of mortality. The parameters of these curves over time can be interpreted as time series that have been modelled and projected in time together using Monte Carlo simulation. In a second step, the common mortality factors of a panel of European countries were extracted, as for fertility, and the first common factor is used as an anchor to condition the long-term forecasts. Again, the ultimate purpose of this two-step procedure consists of incorporating, in a computationally feasible way, elements of economic and cultural convergence at the international level in the projection of survival in Spain.

Migratory flows

AIReF's immigration forecasts rest on a gravity model that estimates the bilateral migration flows for all countries around the world using a sample with a high temporal coverage.

The main determinants of the probability to migrate between each pair of countries considered in the forecast are the fixed factors (such as the geographical distance or similarity of languages, histories and cultures), the demographic structure of each country, the economic conditions measured

through the level of GDP per capita and a network effect, approximated by the number of immigrants born in the country of origin and resident in the country of destination. The demographic forecasts are obtained from the UN demographic scenarios and from IMF economic scenarios. The model's bilateral approach allows expected immigration and emigration flows to be generated separately through aggregation.

These projections implicitly assume the maintenance of migration policies applied in the estimation period. Finally, the confidence intervals associated with the projections have been obtained through simulation by bootstrap resampling.

Annex II: Estimation of uncertainty concerning the macroeconomic environment and labour market

The estimation of the uncertainty that surrounds the projection of the macroeconomic variables is based on the historical behaviour of the shocks that have affected the same, encapsulated in its contemporary matrix of variances and covariances. Technically, it uses a multivariate model of time series to quantify such matrix and, through Monte Carlo simulation, generate the percentiles that define the uncertainty at the different forecasting horizons.

The series involved in this exercise are: the unemployment rate, the rate of participation, the growth of apparent labour productivity defined as the ratio between GDP (Gross Domestic Product) and the number of full-time equivalent jobs and the population aged 16 years or over in terms of the LFS (Labour Force Survey). The sample used has a quarterly frequency, available since 1980, and the data source is the database of the REMS model (BDREMS).

The multivariate time series model used is a Bayesian Autoregressive Vector (BVAR). The prior used, of Minnesota type (Litterman, 1984; Karlsson, 2015), is calibrated with little restriction, in order to minimally condition the estimation of the variability of the shocks. In particular, no prior is imposed on the estimation of the covariance matrix, which is carried out jointly. Finally, 10,000 Monte Carlo simulations are conducted to calculate the percentiles that quantify the uncertainty at the different forecasting horizons.



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