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The sustainability of the pensions system is a concern for both citizens and political decision makers alike. This study shows until when the system will remain financially sustainable and what will be its future cost. Beyond that, it shows at what point will the system cease to be able to provide adequate pensions, avoid sudden cuts of income for pensioners and protect them from poverty. Lastly, it provides an analysis of several pension system reform scenarios and their respective impact.

Financial and Social Sustainability of the Portuguese Pension System

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Coordinated by Amílcar Moreira

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Foreword

This report was commissioned by the Francisco Manuel dos Santos Foundation to the Institute of Social Sciences of the University of Lisbon. The responsibility for the information and views set out in this report lies entirely with the authors and does not, in any way, reflect the views of the entities mentioned below.

This study uses an innovative model for Portugal: DYNAPOR (Dynamic Microsimulation Model for Portugal). DYNAPOR was originally developed as a collaborative endeavour between the Institute of Social Sciences of the University of Lisbon, the University of Southampton, GEP/MTSSS — Office for Strategy and Planning of the Ministry of Labour, Solidarity and Social Security. The Council of Public Finances and the DGSS — Department of Social Security — are also associated members of the consortium. The development of the DYNAPOR project was made possible by funding received from the Calouste Gulbenkian Foundation, which enabled the purchase of the MIDAS_BE model; and the Francisco Manuel dos Santos Foundation which, by funding this study, enabled the development of the DYNAPOR model.

The DYNAPOR model (Moreira, Azevedo, Manso and Nicola 2019, forthcoming) was developed from the MIDAS_BE model (Dekkers et al. 2009, Dekkers et al. 2015, Dekkers and Van den Bosch 2016). The model runs on LIAM2 (De Menten et al. 2014), a Python-based platform developed by researchers from the Federal Planning Bureau in Belgium, CEPS / INSTEAD and the General Inspectorate of Social Security in Luxembourg. In addition to adopting the architecture of MIDAS_BE, a number of key features were maintained. Some simulation processes in the Demographic block — such as family formation and dissolution routines — were retained, or were subject to minimal changes in order to better reflect specific aspects of the Portuguese society — as was the case in mortality, fertility and educational attainment routines (see Moreira, Azevedo, Manso and Nicola 2019, forthcoming). The alignment procedures are largely based on the procedures used in the MIDAS_BE, and were adapted to suit the specificities of the Portuguese context.

The development of DYNAPOR from MIDAS_BE was conducted by a team of researchers coordinated by Amílcar Moreira (Research Fellow at the Institute of Social Sciences, University of Lisbon) and Asghar Zaidi (Senior Research Fellow, Oxford Institute of Population Ageing, University of Oxford and Professor of Social Gerontology, Seoul National University, Korea). The team of researchers included Alda Botelho Azevedo and Luís P. Manso (Research Fellows at the Institute of Social Sciences, University of Lisbon) and Rui Nicola (Doctoral Fellow at the University of Southampton).

In developing DYNAPOR, we received valuable technical advice on modelling and LIAM2-related issues from Doctor Gijs Dekkers (Federal Planning Bureau, Belgium) and Raphaël Desmet, Ekaterina Tarantchenko and Gaëtan de Menten (all at the Federal Planning Bureau Belgium).

We also received critical advice on issues concerning the design of pension benefits, as well essential statistical information from a team of technicians from the GEP/MTSSS, namely Rita Figueiras, Elsa Gomes, Paulo Dias and Andreia José. Finally, we received important

advice from technicians from the Council of Public Finances, namely Noémia Goulart, Carmen Camacho and Ariana Paulo.

While their contribution was essential for the development of the DYNAPOR model, this report is the sole responsibility of the authors.

It should also be mentioned that certain parts of the DYNAPOR model were developed in the context of preparing the doctoral thesis by Luís Manso (PhD in Development Studies at the Lisbon School of Economics and Management, University of Lisbon) and Rui Nicola (PhD candidate / Postgraduate student in Gerontology, University of Southampton), which credits them with sole authorship rights over parts of the DYNAPOR code, namely:

- Rui Nicola was solely responsible for modelling the eligibility, entitlement rules, parametrization and validation of the Old Age Pension (Social Security System), of the Early-Retirement Scheme for Long Careers (Social Security System), Early Retirement for Long-Term Unemployed Persons (Social Security System) and the Social Old Age pension, including the imputation of contributory careers and registered remunerations using administrative data. He was also responsible for preparing the macroeconomic parameters and projections for Portugal, by introducing official data when available and adjusting the convergence period towards the AWG projection figures, as well as setting the parameters table to be run on a constant prices model;
- Luís Manso was responsible for modelling the reform scenario presented in Chapter 5, concerning the introduction of a Swedish-style pension system involving a Notional Defined-Contribution scheme, a Premium Pension and a Guaranteed Pension.

Introduction

The long-term sustainability of the Portuguese Pension System (PPS) has been a recurrent topic of debate in the Portuguese public sphere. The origins of this debate can be traced back to the publication of the White Book on Social Security, in the late 1990s, which projected that by 2020 Social Security would run into financial difficulties (Comissão do Livro Branco da Segurança Social, 1998). These findings inspired two reforms — in 2002 and 2007 — aimed at improving the long--term sustainability of the PPS (see Section 2). This debate gained new momentum following the budgetary adjustment process that started in 2011 and, in particular, an IMF report on how to reform the public sector expenditure in Portugal (IMF, 2013).

As Carolo et al (2018c) show, this issue has become a dividing point in the Portuguese political arena. This means that assessments of a) whether the Portuguese Pension System is financially sustainable, b) whether action is needed to improve its sustainability, or c) the type of reforms that should be introduced are becoming increasingly partisan. The fundamentally ideological underpinning of the debate about the PPS is, in part, a by-product of the dearth of evidence on this topic. In fact, if one excludes a number of studies from national and international institutions (Ministério da Segurança Social, 2006; Ministério da Solidariedade, Emprego e Segurança Social, 2015; European Commission 2012, 2015, 2018), in the last 15 years there has been but a handful of attempts to empirically assess the long-term sustainability of the PPS (Pinheiro and Cunha, 2007; Pereira and Rodrigues, 2007; Bravo, 2012). Bravo et al, 2013, focus specifically on the long-term sustainability of the Civil Servants Scheme.

The obvious limitations derived from the small number of studies on this topic is further compounded by their lack of comparability. For instance, Pereira and Rodrigues (2007) adopt a (macro-level) general equilibrium framework to assess the financial sustainability of the Portuguese Pension System. On the other hand, Pinheiro and Cunha (2007), Bravo (2012) and Serrano (2015) rely on actuarial models. With the exception of Pinheiro and Cunha (2007), the lack of information on the inner workings of each model, and modelling decisions, limits our ability to compare the results produced by these models.

A third and final limitation of the existing evidence on this topic is that existing studies have mainly focused on the financial sustainability of the PPS — thus neglecting its long-term social sustainability, i.e. the future ability of the pension system to provide adequate pensions and protect pensioners against a significant drop in income or the risk of poverty. Admittedly, as attested by the editorial of the 2015 OECD's 'Pensions at a Glance'[1], this problem is not exclusive to the Portuguese pension policy and academic community.

Building on evidence from DYNAPOR, a dynamic microsimulation model of the PPS (see Section 3), this report aims to provide an assessment of the long-term financial and social sustainability of the PPS, and assess how different reform scenarios would impact these different dimensions. The report is structured as follows.

Chapter 1 sets the background for an analysis of the PPS long-term sustainability. Building on an overview of the current structure of the PPS, we examine how pension reforms introduced in recent years reflect concerns about the financial and social sustainability of the PPS. Then, following a brief description of the DYNAPOR model, we specify the key baseline assumptions that will underpin our assessment of PPS sustainability.

Chapter 2 provides an assessment of the financial and social sustainability of the PPS in the period between 2020 and 2070. We begin by mapping out future demand for pensions and how (average) pension benefits will evolve. Then, building on projections about how pension expenditure and contributions are likely to evolve, we assess the financial sustainability of the PPS, and the burden of the pension system on the public purse. We conclude by assessing the long-term social sustainability of the PPS. This exercise will focus on three key redistributive objectives that all pension systems should achieve, namely:

- Securing adequate income upon retirement, which will be measured by comparing the (average) value of pensions with the average wage in the economy;
- Protecting pensioners from a significant drop in income upon retirement, which will be measured by looking at the (average) gross replacement rate of the old-age pension at the time of take-up;
- Protecting seniors from the risk of income poverty, which will be measured by the percentage of pensioners aged 65 plus, with incomes below 60% of the median income.

Acknowledging that the macroeconomic scenario underpinning the projections in Chapter 2 might overestimate future productivity gains, in Chapter 3 we look at what would be the impact for the financial and social sustainability of the Portuguese Pension System if Total Factor Productivity is to grow less than projected in our baseline assessment. For the sake of comparability, we maintain the same set of indicators adopted in the previous chapter.

In Chapter 4, we assess the impact of three possible alternatives for improving the long-term financial sustainability of the PPS under its current architecture, namely:

- Increasing Social Security (and CGA) Contributions;
- Reducing future benefits, by lowering the Pension Accrual Rate;
- Increasing the Standard Age of Retirement.

For the sake of comparability, we maintain the same set of indicators adopted in Chapter 2.

In Chapter 5, we look at reform options that go beyond the current structure of the PPS. More specifically, we assess the impact of introducing a Swedish-like pension system, consisting of a Notional Defined-Contribution Scheme, complemented by a mandatory funded pension scheme, and a guaranteed pension.

In Chapter 6, we discuss our findings by reference to the existing evidence and reflect on what future avenues for policy-making and research in this domain.

Chapter 1

1. Overview of the public pension system

The Portuguese Pension System is based on three pillars (see European Commission, 2014):

- Public Pensions, which include a set of schemes run within Social Security (see .1);
- Occupational Pensions, which include an increasingly marginal set of voluntary pension schemes run by companies and social/professional groups;
- Individual Private Pensions, which comprise individually-funded retirement plans.

In this report, we focus specifically on the Portuguese system's Public Pensions, henceforth referred to as Public Pension System (PPS). As we can see in Table 1.1, Social Security is organised into three key regimes:

- The Contributory Regime[2], which includes a set of contributory pension schemes with defined benefits, funded — on a Pay-As--You-Go basis — by contributions from workers and employers:
  · The employees scheme, which covers private employees and public employees enrolled after 2005;
  · The self-employed workers scheme;
  · And a set of special schemes that cover a set of specific professional groups.
- The Funded Regime[3], which comprises a voluntary Public Capitalisation Scheme;
- The Non-Contributory Regime[4] that covers a set of non-contributory pensions/benefits financed by transfers from the State Budget.

Public sector workers who entered public service before 2005 were covered by a separate pension scheme — the Civil Servants Scheme, or CGA[5], as it was commonly known — which was administered by the Ministry of Finance. This scheme was closed to new entrants after December 31st, 2005 (see Section 1.2). Later, in 2009, it was integrated into the Social Security edifice — as the Convergent Social Protection Scheme. However, given its particular financial situation (with the contributions declining at a much steeper rate than expenditures) and the fact that it abides by very different rules from other Social Security schemes, in this report we will treat the CGA as an autonomous feature in the Public Pension System (see Table 1.1).

As Table 1.1 also shows, the Public Pension System covers a variety of (age-related) social risks. For those individuals contributing to Social Security, the risk of a drop in income after retirement is covered by a defined-benefit contributory scheme: the Old-Age Pension[6]. If they do not comply with eligibility requirements, they are entitled to a non-contributory pension (Social Old-Age Pension[7]). In the event of death, survivors are entitled to a Survivor's Pension[8] that is based on contributions made by the deceased. In the event of an incapacitating condition that prevents a person from working, he/she is entitled to an Absolute Disability Pension[9]. If the incapacitating condition does not prevent that person from working, he/she is entitled to a Partial Disability Pension[10]. If the person is not eligible, he/she will be entitled to a Social Disability Pension[11]. As can be seen in Table 1.1, CGA covers these risks in a very similar way as Social Security.

Table 1.1 Portuguese public pension system

	SOCIAL RISKS				
	Old Age	**Death**	**Disability**	**Dependency**	**Insufficient Income**
Social Security: Contributory Regimea					
Employee Scheme	Old-Age Pension	Survivor's Pension	Absolute Disability Pension		
Self--Employed Scheme			Partial Disability Pension		
Social Security: Non--Contributory Regime[b]	Social Old-Age Pension		Social Disability Pensiong	Dependency Supplementse,[g]	Social Supplements (old age and disability)[f] Solidarity Supplement for Seniors (CSI) Extraordinary Solidarity Supplement (old age and disability)
Social Security: Funded Regime[c]	Publicly Funded--Pension Scheme				
Civil Servants Scheme (CGA)[d]	CGA Old-Age Pension	CGA Survivor's Pension	CGA Disability Pensiong,[h]	Dependency Supplementse,[g]	Social Supplements (old age and disability)[f]

Notes:
a) Sistema Previdencial — Regime de Repartição.
b) Sistema de Proteção Social De Cidadania — Subsistema de Solidariedade.
c) Sistema Previdencial — Regime de Capitalização.
d) Caixa Geral de Aposentações.
e) Dependency Supplements are paid to beneficiaries of Old--Age Pensions and Absolute and Partial Disability Pensions.
f) Social Supplements are paid to beneficiaries of Old-Age Pensions, Survivor's and Absolute and Partial Disability Pensions.
g) Not simulated in DYNAPOR.
h) This benefit was terminated in 2018 and will not be covered in our study.

Other risks are covered by non-contributory benefits (see Table 1.1). Thus, the risk of insufficient income in old age is covered by a combination of three non-contributory benefits:

- Social Supplement[12], which secures a minimum pension[13] for old-age, survivor's and disability pensioners — both in Social Security and CGA;
- Solidarity Supplement for Seniors (CSI), which provides a means--tested safety-net for all individuals over the Standard Age of retirement;
- Extraordinary Solidarity Supplement (CES)[14], which is automatically paid to recipients of the Social Old-Age Pension and Social Disability Pension.

Beneficiaries of contributory pensions are entitled to a non-contributory benefit to cover the additional costs of caring for a dependent adult — the Dependency Supplement[15].

In the following sections we provide a more detailed description of key pension benefits in the Public Pension System, at the start of 2018.

1.1. Social Security

As mentioned above, Social Security contributory pensions are funded by contributions paid by employees, their employers, and by self--employed workers. As we can see in Table 1.2, an employee is required to pay 11% of his/her gross wage to Social Security. The employer is required to complement that with a contribution worth 23.75% of the employees' gross salary. Self-employed workers are also required to pay contributions to Social Security, at a general rate of 29.6% self-employment earnings[16]. The contribution base is determined by reference to 70% of the value of the services provided in the previous year, or 20% of sales — depending on the type of business. The actual

contribution amount is computed by reference to a scale based on the value of the Social Support Index (IAS[17]) — see Table 1.2. This is done by dividing the total earnings by 12. The product of this division is then divided by the value of the IAS. The product of that ratio will be used to determine the contribution amount. However, self--employment earnings under 6 times the IAS are exempt from Social Security contributions (Rodrigues et al, 2017).

Table 1.2 Social security contribution rates (2018)

EMPLOYEES			SELF-EMPLOYED
Employee	Employer	Total	
11%	23.75%	34.75%	29,6%

Contribution Bracket	Contribution Amount
1st	1 × IAS
2nd	1.5 × IAS
3rd	2 × IAS
4th	2.5 × IAS
5th	3 × IAS
6th	4 × IAS
7th	5 × IAS
8th	6 × IAS
9th	8 × IAS
10th	10 × IAS
11th	12 × IAS

Source: Law 110/2009

As we can see in Table 1.3, only a share of Social Security contributions is used to fund old-age, survivor's and Disability Pensions. Still, it is worth pointing out that 58% of these contributions are scheduled to cover the payment of old-age pensions.

Table 1.3 Social security contributions by social risk

Social Risks	Total	Share of Total
Illness	1.41	4%
Professional Illness	0.50	1%
Parental	0.76	2%
Unemployment	5.14	15%
Disability	4.29	12%
Old Age	20.21	58%
Death	2.44	7%
TOTAL	34.75	

Source: Law 110/2009

1.2.1. Old-Age Pension (Social Security)

Eligibility for Old-Age Pension (OAP) is dependent on two criteria. First and foremost, the applicant must have accrued at least 15 years of registered earnings (qualifying period). Secondly, he/she must have reached at least the standard age of retirement. The standard age of retirement is partially indexed to changes in life expectancy at the age of 65, according to the following formula (GPEARI, 2018):

$$m_n = \sum_{i=2015}^{n} (LE_{i-2} - LE_{i-3}) \times 12 \times \frac{2}{3}$$

Where:

m is the number of months to be added to the pensionable age in the reference year;

n identifies the year of pension entitlement;

and *LE* stands for the life expectancy at age 65.

The old-age pension amount is computed according to the following formula (GPAERI, 2018):

$$Pension_{monthly} = Reference\ Earnings \times Pension\ Accrual\ Rate \times Sustainability\ Factor$$

Reference Earnings are based on the salaries that individuals receive over their career and will constitute the basis for computing the individuals' final pension. For individuals registered in the Social Security from 2002 onwards, Reference Earnings are computed by averaging the annual earnings of the best 40 years in the individual's contributory career. For individuals that entered the labour force before 2002, Reference Earnings are a weighted mean computed with reference to the number of years contributing to Social Security before and after 2002:

- For earnings received before 2002, Reference Earnings are computed by averaging the annual earnings of the best 10 years out of the last 15;
- For earnings received after 2002, Reference Earnings are computed by averaging the annual earnings of the best 40 years in the individual's contributory career (GPEARI, 2015).

Once the person's Reference Earnings are established, these are multiplied by a Pension Accrual Rate, which determines the fraction, or percentage, of the person's annual earnings that will be considered for computing the final pension. As we can see in Table 1.4, the OAP Pension Accrual Rate depends on a) the length of the contributory career, and b) the individual's position in the distribution of income. Bearing in mind that the higher the Accrual Rate the more generous the final pension will be, we can conclude that the current OAP rules are designed to favour individuals with longer careers or with lower earnings — namely, those with more than 20 years of contributions.

Table 1.4 OAP pension formula: accrual rates

NUMBER OF YEARS WITH EARNINGS REGISTRATION		
N ≤ 20 years	**N > 20 years**	
P =	**Reference Earnings (RE)**	**Calculation Formula**
RE	£ 1.1 × IAS	P = RE × 2.3 % × N
x 2%	> 1.1 × IAS and £ 2 × IAS	P = (1.1 × IAS × 2.3% × N) + [(RE — 1.1 × IAS) × 2.25% × N]
x N (up to 40)	> 2 × IAS and £ 4 × IAS	P = (1.1 × IAS × 2.3% × N) + (0.9 × IAS × 2.25% × N) + [(RE –2 × IAS) × 2.2% × N]
	> 4 × IAS and £ 8 × IAS	P = (1.1 × IAS × 2.3% × N) + (0.9 × IAS × 2.25% × N) + (2 × IAS × 2.2% × N) + [(RE — 4 × IAS) × 2.1% × N]
	> 8 × IAS	P = (1.1 × IAS × 2.3% × N) + (0.9 × IAS × 2.25% × N) + (2 × IAS × 2.2% × N) + (4 × IAS × 2.1% × N) + [(RE — 8 × IAS) × 2% × N]

Source: Decree 187/20707

Notes:

IAS — Social Support Index

RE — Reference Earnings

N — Number of years contributing to Social Security

Since 2006, the value of the OAP is subject to an adjustment mechanism — the Sustainability Factor[18]:

$$\text{Sustainability factor}_t = \text{Life expectancy}^{\text{age 65}}_{2000} \,/\, \text{Life expectancy}^{\text{age 65}}_{t-1}$$

By pegging the value of the pension to the change in life expectancy at age 65 between 2000 and the year prior to retirement, the Sustainability Factor imposes a penalty on individuals who decide to collect their OAP before the standard age of retirement. This penalty adds to the cuts already foreseen in the regime that regulates the take--up of early OAP benefits (see below).

The OAP is updated every year according to an indexation rule that considers three factors: the growth of the economy (as measured by real GDP growth), changes in prices (as measured by the Consumer Price Index), and the value of the pension, by reference to the IAS (see Table 1.5):

Table 1.5 OAP update rules

	real GDP variation rate < 2%	real GDP variation rate ≥ 2% and < 3%	real GDP variation rate ≥ 3%
Pensions < 1.5 × PSI	CPI change rate	CPI change rate + 20% real GDP variation rate (minimum: CPI change rate + 0.5 percentage points)	CPI change rate + 20% real GDP variation rate
Pensions ≥ 1.5 and < 6 × PSI	CPI change rate — 0.5 percentage points	CPI change rate	CPI change rate + 12.5% real GDP variation rate
Pensions ≥ 6 × PSI	CPI change rate — 0.75 percentage points	CPI change rate — 0.25 percentage points	CPI change rate

Source: Decree 187/2007

Under current rules, there are two options for claiming OAP benefits before the standard age of retirement:

- The 'flexibility scheme', which allows individuals aged 60 and with at least 40 years of contributions to claim the OAP before reaching the standard age of retirement. In addition to the penalty imposed by the application of Sustainability Factor, applicants will be further penalised by a 0.5% cut to the value of the pension for every month of anticipation to the standard age of retirement. Since 2017, a number of measures have been introduced to reduce the penalties imposed on individuals with long contributory careers (see Section 3);
- The 'long-term unemployment scheme', available to individuals aged 57 or over, who have been unemployed from the age of at least 52, and have exhausted all unemployment benefits.

In what can be seen as an incentive for individuals to remain in the labour market for longer, those who postpone the take-up of an OAP beyond the standard age of retirement (up to the age of 70), are entitled to a pension bonus which will increase the final value of their pension. The pension bonus is calculated by reference to the following formula:

$$\textit{OAP Bonus} = \textit{Age of Retirement}^{\textit{months}} - \textit{Standard Age of Retirement}^{\textit{months}}) \times \textit{Montly Bonus Rate}$$

As we can see in Table 1.6, the size of the bonus increases with the length of the contributory career.

Table 1.6 Monthly bonus rate

Contributory Career	Monthly Bonus Rate (%)
15-24	0.33
25-34	0.5
35-39	0.65
≥ 40	1

Source: Decree 187/2007

1.2.2. Disability and Survivor's pensions

As mentioned above (see Table 1.1), within Social Security the protection of those who are unable to work is covered by two (complementary) benefits: the Absolute Disability Pension and the Partial Disability Pension. Eligibility for these pensions is restricted to persons under the standard age of retirement, and with some kind of incapacitating condition. Those diagnosed with permanent incapacity to work are entitled to an Absolute Disability Pension. Those affected by an incapacitating condition which limits their ability to work; who upon returning to work, receive less than a third of their previous earnings, and are not expected to earn more than 50% of their previous salary within the following three years, are eligible for a Partial Disability Pension. The Absolute and Partial Disability pensions are calculated using the same rules used to determine the OAP. If a person is receiving an Absolute (or Partial) Disability Pension before the standard age of retirement, this will be converted into an OAP once they reach that age.

In the event of death, the deceased's spouse (and/or former spouse), his/her children, and his/her parents are entitled to a Survivor's Pension — provided the deceased has more than three years of contributions to Social Security. The duration of the spouse's Survivor's Pension depends on the nature of the relation, the existence of children[19], and on his/her age at the time of death[20]. The duration of the entitlement for children depends on their age, whether they are still in education, or on whether they are disabled. As before, the value of the Survivor's pension is calculated using the same rules used to determine the OAP. Parents and children of the deceased cannot accumulate the Survivor's Pension with other contributory pensions.

1.2.3. Non-Contributory Pensions

As mentioned above (see Table 1.1), the risk of insufficient income in old age is covered by a combination non-contributory benefits:

- Those over the standard age of retirement and who do not qualify for the OAP (i.e. have less 15 years of contributions), and whose incomes are below 40% of the IAS (or 60% if in a couple) are entitled to the Social Old-Age Pension. The value of the Social OAP, and whether this is updated, depends on a decision by the Government. In 2018, the Social OAP stands at €207,01;
- Individuals that qualify for the Social OAP (and also for the Social Disability Pension) are automatically entitled to an Extraordinary Solidarity Supplement (CES). The value of the CES varies by reference to the pensioner's age.

Table 1.7 Extraordinary solidarity supplement

Age	Amount
≤ 70 years	18.02 €
> 70 years	36.02 €

Source: Ordinance 23/2018

- Those receiving a pension from the Social Security Contributory Regime (i.e. OAP, Disability of Survivor's Pension), but whose statutory pension is below a minimum income threshold are entitled to a Social Supplement to cover the difference. As can be seen in Table 1.8, the value of the minimum pension threshold depends on the length of the individuals' contributory career, and is updated every year by the Government:

Table 1.8 Minimum pension thresholds

Contributory Career	Minimum Pension Threshold
< 15 years	269.08 €
15-20	282.26 €
21-30	311.47 €
≥ 31	389.34 €

Source: Ordinance 23/2018

Other risks are covered by non-contributory benefits — both in Social Security and CGA (see Table 1.1). Thus, the risk of insufficient income in old age is covered by a combination of three non-contributory benefits:

- Social Supplement[21], which secures a minimum pension[22] for old age, survivor's and disability pensioners — both in Social Security and CGA;
- Solidarity Supplement for Seniors (CSI), which provides a means-tested safety-net for all individuals above the Standard Age of retirement;
- Extraordinary Solidarity Supplement (CES)[23], which is automatically paid to recipients of the Social Old-Age Pension and Social Disability Pension.

Beneficiaries of contributory pensions are also entitled to a non-contributory benefit to cover the additional costs of caring for a dependent adult — the Dependency Supplement[24].

1.2. The Civil Servants Scheme (CGA)

As mentioned above, CGA has been closed to new entrants since December 31st, 2005, and since 2009 has been integrated into the Social Security edifice. Similarly to Social Security, the CGA works as a defined-benefit, Pay-As-You-Go scheme. Additionally, the individual contributions are set at 11%, where 8% are destined for Old-Age Pension and the remaining 3% for the Survivor's Pension. The employer, on the other hand, contributes 23.75% of the individual's salary.

1.2.4. The Old-Age Pension (CGA)

Unlike Social Security, eligibility for an Old-Age Pension (OAP) in CGA is not solely dependent on an individual's age and contributory career. Thus, a person is eligible for an OAP in one of the following cases:

1. The person has accrued at least 15 years of contributions and has reached the age of retirement, defined as follows:

Table 1.9 Individual age of retirement in the CGA scheme

Years of contribution at 65 years old	Age of retirement
< 41	66 years and 4 months
=> 41 and < 42	66 years
=> 42 and < 43	65 years and 8 months
=> 43 and < 44	65 years and 4 months
=> 44	65 years

Source: CGA (2018)

2. The person has at least five years of contributions and:
   a. Has reached the age limit for his/her position;
   b. Has been declared unable to perform his/her job;
   c. Has been subject to disciplinary action that resulted in forced retirement;
   d. Is covered by specific legislation.
3. The person has, at least, three years of contributions, and has been declared unable to perform any professional activity.
4. Individuals who, on December 31st 2005, were at least 60 years old and had a minimum of 36 years of contributions are allowed to retire whenever they chose to.

Besides closing CGA to new entrants, the 2005 reform set out a new rule to calculate the value of the CGA OAP. Thus, contributors enrolled after 1993 were to have their pensions computed using the same rules as for Social Security pensions. Contributors enrolled before 1993 will have their pensions computed using a formula that combines two factors:

- Contributions paid until December 31st, 2005 (P1) are computed using the CGA's old rules;
- Contributions paid after December 31st, 2005 (P2) are computed using Social Security pension rules.

Table 1.10 Eligibility conditions for CGA OAP pension formulas

Group	Eligibility Conditions
Group A	Enrolled in CGA before October 31st, 1993 and met conditions for retirement by December 31st, 2005
Group B	Enrolled in CGA before October 31st, 1993 and met conditions for retirement between January 1st, 2006 and December 31st, 2007
Group C	Enrolled in CGA before October 31st, 1993 and met NO conditions for retirement by December 31st, 2007
Group D	Enrolled in CGA between September 1st, 1993 and December 31st, 2001, and met conditions for retirement conditions by December 31st, 2005
Group E	Enrolled in CGA between September 1st, 1993 and December 31st, 2001 and met conditions for retirement between January 1st, 2006 and December 31st, 2007
Group F	Enrolled in CGA between September 1st, 1993 and December 31st, 2001 and met NO conditions for retirement by December 31st, 2007
Group G	Enrolled in CGA after December 31st, 2001 and met conditions for retirement by December 31st, 2005 or between December 31st, 2006 and December 31st, 2007
Group H	Enrolled in CGA after December 31st, 2001 and met NO conditions for retirement by December 31st, 2007

Source: CGA (2018)

As we describe in more detail below (see Section 2), since 2005 a number of changes have been introduced to the way the pension formula is calculated for P1. This means that, depending on when the individual started contributing, and the time at which the pension is claimed, a different pension formula will apply (see Table 1.10). For the sake of expediency, we have chosen not to present a full description of the different formulas used. It should be nonetheless mentioned that the CGA OAP is updated using the same rules that apply to SS OAP.

Early-retirement is open to individuals who are at least 55 years old and who have accrued, at least, 30 years of contributions. However, this option involves a financial penalty to the pension that is proportional to the gap between the age of the individual and the standard

age of retirement. Similarly to Social Security, early-retirement is also possible for individuals with long contributory careers, namely:

- Individuals aged 60 and with at least 48 years of contributions.
- Individuals aged 60 who began contributing at age 14 (or younger), and who have been contributing for at least 46 years.

In certain cases, anticipating the time of claiming an early retirement pension involves a cut in the value of the pension. Thus, people belonging to groups A, D and G with (at least) 36 years of contributions in 2005 incur a penalty of 4.5% per year or fraction of anticipation. People from groups A, D and G with less than 36 years of contributions in 2005 incur a penalty of 0.5% of the pension amount per month of anticipation. For other groups, there are no penalties.

1.2.5. The Survivor's Pension (CGA)

As with Social Security, in the event of death the deceased's spouse[25], descendants and dependent parents are entitled to a Survivor's Pension. For the spouse, the pension is attributed indefinitely, while for the descendants, the pension is attributed for as long as they continue to meet the eligibility requirements. The Survivor's Pension amount is calculated by following the same rules used to determine the OAP.

1.2.6. Non-contributory benefits (CGA)

Unlike with Social Security, the range of non-contributory benefits in CGA is quite limited. Still, OAP and Survivor's Pension beneficiaries whose pension is below a given minimum (see Table 1.11) are entitled to a social complement to cover the difference.

Table 1.11 Individual groups and eligibility conditions for different pension formulas

Contributory Career	Minimum Pension Threshold
5-12 years	251.47 €
12-18 years	262.11 €
18-24 years	280.19 €
24-30 years	313.54 €
≥ 30 years	415.44 €

Source: Ordinance 23/2018

2. Pension reforms over the last 20 years

The Portuguese Public Pensions System has changed significantly over the last two decades — as evidenced by the fact that there were three reforms (in 2000, 2002 and 2007) to the Social Security Framework Law. In this section we review the reforms introduced since the turn of the century, both in Social Security and the CGA Scheme, and discuss how these changes reflect concerns about the financial and social sustainability of the Public Pensions System.

2.1. Pension reforms within Social Security

Building on the conclusions of the 1998 Social Security White Paper[26], in 2000 Portuguese authorities enacted a structural overhaul of the Social Security edifice. Thus, Social Security was restructured into three pillars:

- The Contributory Regime, which included insurance-based benefits such as old-age, survivor's and Disability Pensions, and unemployment insurance;

- The Family Protection Regime, which included family-related benefits such as child benefit or parental leave;
- The Non-Contributory Regime, which included means-tested benefits such as the Social Pension or the Social Integration Income.

The financial management of Social Security was also clarified, namely by specifying the different sources of revenue for each regime. Thus, benefits from the Contributory and Family Protection Regimes were to be funded by Social Security contributions payed by workers and employers. Benefits from the Non-Contributory Regime were to be funded by revenues from taxes.

Finally, a reserve fund was created to secure the payment of pension benefits in the event of a financial imbalance in Social Security. The fund was meant to accumulate enough funds to pay for two years' worth of pensions. In 2002, the fund was renamed as the Social Security Financial Stabilization Fund[27] (FEFSS).

Subsequent to the 2000 reform, a number of changes were introduced — which would, directly or indirectly, impact the long-term financial and social sustainability pension system. With a view to strengthening the actuarial nature of the OAP, a new pension formula was introduced in 2002 (see Table 1.12). Under the new formula, the Reference Earnings were to be determined by reference to individuals' full contributory career, up to a maximum of 40 years — and not the best 10 of the last 15 years, as in the past. The new formula was to be implemented by 2016. During the transition period, contributory pensions were to be calculated using the most favourable of a) the new formula or b) a formula that combines, proportionally, the new and old rules.

Acknowledging that the introduction of the new pension formula could harm the pension prospects of low earners, the application of the Pension Accrual Rate was changed to favour individuals in the lower wage brackets. Under the new formula, remunerations were to be accrued as follows:

- 2.3% for the share of wage ≤1.1 × NMW;
- 2.2% for the share of wage >1.1 and ≤4 × NMW;
- 2.1% for the share of wage >4 and ≤8 × NMW;
- 2% for the share of wage >8 × NMW.

In 2003, as part of a package to deal with the impact of an economic recession, access to early-retirement was made easier for unemployed workers[28] However, the potential impact of this measure was limited, as it was only in place until 2005. In fact, what followed was a severe tightening of the pathways into early-retirement. Thus, in 2005 (with some exceptions), access to early-retirement benefits was suspended. The suspension was in place until 2007.

In addition to suspending access to early-retirement benefits, between 2005 and 2008, Portuguese authorities introduced a number of mechanisms to curb the future growth of pension expenditure:

a) In 2006, a new formula for updating the OAP was introduced. Under the new formula, increases in pensions were made dependent upon a) the value of the pension, and b) a function that considers variations in the price index (CPI) excluding housing costs in the previous 12 months and the average real GDP growth in the last two years;
b) The Social Support Index (IAS) was introduced in 2007. The IAS was meant to replace the minimum wage as the basis for updating contributory pensions, and for determining the value

of non-contributory pensions. The introduction of the IAS was designed to reduce pension expenditure in the short-term, as its value was set below that of the national minimum wage[29]; and in the long-term, as it disconnected the value of the pensions from future variations in wages in the economy;

c) Also in 2007, a Sustainability Factor was introduced for all new pensions. This mechanism adjusts the value of early-retirement pension by reference to the ratio between life expectancy at age 65 in the year preceding retirement and life expectancy at age 65 in the base year (2006);

d) In the same year, the transition period for the pension formula introduced in 2002 was shortened from 2016 to 2007;

e) Access to early-retirement was reintroduced. However, the penalty for claiming an early-retirement pension was increased from 4.5% to 6% for every year before the standard age of retirement.

In addition to measures to reduce the growth of future pension expenditure, a pension bonus was also introduced. This was meant to strengthen contributions into the system, and delay individuals' withdrawal from the labour market. Hence, for each month of extra work (without retirement) after reaching age 65, a worker with a contributory career of 40 years is entitled to an extra percentage point in the replacement rate, limited by a retirement age of 70, or upon reaching a maximum gross replacement rate of 92%. In addition to this, if a worker completes a full career and is entitled to retire without penalties before he/she reaches the age of 65, then a bonus of 0.65 percentage points is accrued to his/hers gross replacement rate for each extra month of work.

Following the request of financial assistance by Portuguese authorities to the European Union and the IMF[30], a number of measures were taken to reduce current pension expenditure:

a) Access to early old-age pensions is again suspended (in 2012);

b) The rules for updating the IAS and pension amounts were suspended[31];

c) Annual Leave and Christmas bonuses were suspended for pensioners receiving more than €1 100 per month, and partially suspended for pensioners receiving between €600 and €1 100 per month[32];

d) An Extraordinary Solidarity Contribution[33] (CES) of 10% was introduced in 2010 for pensions above approximately €5 000 per month. In subsequent years, and despite unfavourable rulings from the Constitutional Court, the scope of the CES was extended to cover an increased percentage of pensioners. Thus, the minimum pension amount threshold that exempts pensioners from CES was lowered from €5 030.64 per month to €1 350 (in 2013), and to €1 000 (in 2014). In 2014, and following another unfavourable ruling from the Constitutional Court, the thresholds for higher CES rates were lowered — €4 611 for 25% and €7 126 for 55% (previously, €5 030 and €7 545, respectively);

e) The taxation of incomes from pensions was set to convergence with the taxation of earnings from work (2010), with the gradual elimination of the more generous treatment of pension incomes.

In addition to this, there were also a number of measures to curb future pension expenditure. Thus, the base year for calculating the sustainability factor was pulled back from 2006 to 2000. The effect of this measure was further compounded by the increase in the standard age of retirement to 66.

The end of the period of external financial assistance marked a new stage in pension policy in Portugal. Free from the shackles of the Memorandum of Understanding with international lenders, Portuguese authorities sought to reinstate some of the purchasing power pensioners had lost during the crisis:

- In 2016, the rules for updating pension benefits and the IAS were reinstated;
- In 2017, the Portuguese Government approved an Extraordinary Pension Update[34] for old-age, disability or survivor's pensioners with incomes from pensions below 1.5 times the IAS. The value of the Extraordinary Pension Update was to vary according to whether the pensioner had seen his/her pension updated in the period between 2011 and 2015:
  · Individuals who had had their pension updated during this period were set to receive €6, minus the amount updated under existing rules;
  · Individuals who had not had their pension updated were set to receive €10, minus the amount updated under existing rules;
- A second Extraordinary Pension Update was also introduced in 2018.

In addition to increasing pension benefits, steps were taken to facilitate access to early retirement, namely for individuals with long contributory careers:

- In 2015, access to early-retirement benefits was reinstated;
- In 2017, individuals with very long contributory careers (over 48 years), who began contributing to Social Security before the age of 14 and had at least 46 years of contributions at the age of 60, were exempted from the application of the Sustainability Factor when claiming an early-retirement pension.

Finally, in 2013, a new method for setting the standard age of retirement was introduced. Under this new regime, the standard age of retirement is expected to partially follow the increase in life expectancy, instead of a fixed age for retirement with an adjustment on the pension amount.

2.2. Pension reforms within CGA

As Cunha et al (2009) mention, following the exponential growth in the number of CGA pensioners (and expenditure) in the 1980s, the issue of long-term financial sustainability has been the key concern of policy-makers. Since then, and bearing in mind that CGA beneficiaries have, since the 1970s, benefited from much more generous rules than those covered by Social Security, policy-makers have sought to approximate the CGA rules to those applied to private sector workers. This process began in 1993, with the introduction of legislation whereby new members of the CGA would have their pensions calculated according to the same formula that applied to private sector workers. In the following year, the worker's contributory rate was increased to match that of Social Security.

Since 2005, this process of convergence with Social Security has been significantly accelerated:

- In 2005, the CGA Scheme was closed to new entrants. New public sector workers were to be enrolled in the Social Security system, under equal terms as private sector workers;
- In that same year, the standard age of retirement was scheduled to increase from 60 to 65 (in line with Social Security), at a rate of 6 months per year. The contributory period for a full pension was set

to increase from 36 to 40 years (in line with Social Security) — also at a rate of 6 months per year;

- Also in 2005, contributors enlisted after 1993, were set to have their pensions computed according to Social Security rules. On the other hand, contributors enrolled before 1993 were to have their pensions computed using a formula that combines two factors:
  · Contributions paid until December 31st, 2005 (P1) are computed using the CGA old rules;
  · Contributions paid after December 31st, 2005 (P2) are computed using Social Security pension rules.
- In 2009, the CGA Scheme is formally integrated into the Social Security edifice under a special Contributory Regime: the Convergent Social Protection Regime[35];
- In 2010, employees' CGA contributions were increased from 10% to 11% of the gross salary, in line with Social Security.
- In 2014, employers' CGA contributions were increased from 20% to 23.75% of the workers' gross salary — in line with Social Security.

In parallel with the process of convergence with Social security, CGA pensions were also hit by a number of measures to reduce current pension expenditure, particularly between 2010 and 2014:

- In 2007, the new pensions calculated in P1 were to be calculated by reference to 80% of the last wage in 2005 (adjusted by reference to changes in prices);
- In 2007, new measures were introduced to limit the generosity of the pensions calculated under P1:
  · The application of Sustainability Factors is expanded to the contribution period before 1993;
  · The value of the pension accrued during P1 is limited to 12 IAS;
- As with Social Security, since 2010 CGA pension benefits were frozen and only social complements were updated;
- Access to early-retirement benefits was also suspended.

Table 1.12 Pension reforms, 2000 to 2017

Date	Legal Basis	Description
1999	Decree nr. 9	Defines the rules for early retirement.
	Decree nr. 437	Introduces social complements, and defines the annual bonus for postponing retirement after the age of 65.
2000	Law nr. 17	New Framework Law for Social Security.
2002	Decree nr.35	Introduces a new pension formula that takes into account the whole contributory career, up to 40 years, and a transition period that safeguards acquired pension rights — by which a pensioner will receive the most favourable pension produced from either the new pension formula, or a formula that combines the new and old rules.
	Law nr. 32	New Framework Law for Social Security.
2003	Decree nr. 84	Facilitates early retirement conditions to unemployed individuals aged 58 with long contributory careers (≥30 years).
2005	Law nr. 60	Closes the CGA scheme to new subscribers and establishes convergence of rules with Social Security.
	Decree nr. 125	Suspends access to early retirement, with some exceptions.
	Decree nr. 232	Creates the Solidarity Supplement for Seniors (CSI).
2006	Decree nr. 236	Expands the coverage of CSI.
	Law nr. 53-B	Introduces a new rule for updating pensions, which is indexed to variations in GDP and prices, and differs according to the value of pensions. Creates the Social Support Index, which is set as the reference for the annual update of non-contributory benefits (previously, the reference used was the National Minimum Wage).
2007	Order nr. 106	Defines the IAS amount.
	Law nr. 4	New Framework Law for Social Security.
	Law nr. 52	Adapts the CSA pension formula to converge with Social Security.

Date	Legal Basis	Description
	Decree nr. 187	Introduces the Sustainability Factor. Shortens the transition period of the pension formula introduced in 2002.
	Decree nr. 367	Clarifies the financial management of Social Security.
2008	Law nr. 64-A	Recalculates pension amounts for Social Security old-age and Disability Pensions according to Decree 187/2007 rules, if more favourable.
	Decree nr. 26	Creates the Public Funded Pension Scheme.
	Order nr. 212	Regulates the Public Funded Pension Scheme.
2009	Decree nr. 323	Suspends pension update rules and defines the 2010 updating factors for pensions up to € 1 500.
	Law nr. 10	Allows for the possibility of reducing transfers to FEFSS.
2010	Law nr. 3-B	Changes the eligibility conditions for the Social OAP. Introduces a clause to prevent the decrease in pensions as a result of the application of pension update rules.
	Decree nr. 70	Tightens the means-test for non-contributory benefits.
	Law nr. 55-A (State Budget for 2011)	Introduces an Extraordinary Solidarity Contribution (CES) on pensions. Introduces an extraordinary Personal Income Tax of 3,5% for incomes above the minimum wage. Suspends the pension annual update rule.
2011	Decree nr. 127	Transfer of assets and responsibilities from the banking sector's pension funds to Social Security.
	Law nr. 64-B (State Budget for 2012)	Extends the scope and progressivity of the CES. Temporary suspension of Annual Leave and Christmas pension payments for pensioners receiving over €1 100 ; pensioners receiving between €600 and €1 100 are subject to a partial (and progressive) suspension of Annual Leave and Christmas pension payments.
2012	Decree nr. 85-A	Access to early retirement is suspended, except for long -term unemployed with long contributory careers.
	Law nr. 66-B (State Budget for 2013)	Further extends the scope of the CES by lowering the minimum pension amount threshold that exempts pensioners from CES. Maintains the Extraordinary Personal Income Tax of 3.5% for incomes above the minimum wage.
2013	Decree nr. 167-E	Pushes back the Sustainability Factor base year from 2006 to 2000. Changes the standard age of retirement to 66. Indexes the standard age of retirement to the evolution of life expectancy at age 65.
	Order nr. 378-B	Updates the social complements and maintains freeze on IAS amount.
	Order nr. 378--G	Sets the standard age of retirement to 66 years for 2014 and 2015. Introduces a more generous Sustainability Factor in the transition from the Disability Pension to OAP.
	Law nr. 83-C (State Budget for 2014)	Maintains the CES and the Extraordinary Personal Income Tax of 3.5% for incomes above the minimum wage.
2014	Law nr. 13	Expands the scope of the CES by lowering the threshold that exempts pensioners from the CES (from €1 350 to € 1 000) and lowers the thresholds for higher CES rates.
2015	Decree nr. 8/2015	Repeals Decree nr. 85-A/2012 and reinstates access to early retirement.
2016	Order nr. 65/2016	Sets the value of social complements and the pension updates for 2016 for OAP, Survivor's and Disability pensions for both Social Security and the CGA.
2017	Decree nr. 126--B/2017	Introduces a new regime of access to early retirement for individuals with very long contributory careers. Persons who accrued at least 48 years of contributions, or who began their contributions before the age of 14 years old and have accrued at least 46 years of contributions at the age of 60 are exempted from the application of the Sustainability Factor.
	Order nr. 98/2017	Sets the value of social complements and the pension updates for 2017 for OAP, Survivor's and Disability pensions for both Social Security and the CGA.
	Regulatory Decree nr. 6-A/2017	Introduces an extraordinary pension update for pensioners with incomes from pensions lower than 1.5 * IAS.
2018	Order nr. 23/2018	Sets the value of social complements and the pension updates for 2018 for OAP, Survivor's and Disability pensions for both Social Security and the CGA.
	Regulatory Decree nr. 5/2018	Introduces an extraordinary pension update for pensioners with incomes from pensions lower than 1.5 * IAS.

Source: Nicola (2014)

3. The DYNAPOR model

DYNAPOR is a dynamic microsimulation model[36] of the Portuguese Social Security system, which is being developed from the MIDAS_BE, initially built by the Federal Planning Bureau, in Belgium (see de Menten et al, 2014). The model is built using the LIAM2 platform (de Menten et al, 2014) and allows us to make reliable simulations of the demand for the most relevant pension schemes in the period between 2014 and 2070, and subsequent funding needs. Besides modelling the demand for pensions, DYNAPOR is also able to simulate pension contributions, thus providing valuable evidence on the long-term financial sustainability of the Portuguese Public Pension System. More than just providing reliable long-term simulations, DYNAPOR allows us to simulate the impact and distributive effects of policy reform proposals and of different demographic and economic scenarios.

DYNAPOR is a cross-sectional dynamic microsimulation model that runs on a random (cross-sectional) sample of the Portuguese population, extracted from 2013 round of the European Union's Survey on Income and Living Conditions (EU-SILC). The model is designed to follow an open-population approach (Zagheni, 2014). Thus, in addition to new births, the model considers the possibility of adding new individuals to the sample through immigration. The addition of immigrants to the sample is done through an alignment process (see below) which involves cloning individuals/households (and their characteristics) in the sample to fill quotas of immigrants projected by EUROPOP 2015. The age distribution of immigrants is set in a way not to change the (projected) age distribution of the Portuguese population. The model also allows for individuals to exit the sample in case of death or emigration. In order to moderate the potential impact of migration in pension dynamics, we assume that immigrant individuals/households are the first to be selected to emigrate — i.e. we assume that immigration in Portugal will mostly be of short-duration.

As part of the development of the DYNAPOR model, we conducted a number of recoding and data imputation procedures to our base dataset:

- EU-SILC does not provide information on contributory careers. Making use of administrative data made available to us, each individual aged 15 to 75 was imputed with the average contributory career of individuals with the same age, gender, work-status, and earning decile;
- EU-SILC does not differentiate the age of individuals aged over 80. We imputed the ages of all individuals above that age. The imputation was done via a uniform distribution taking into account the percentage of individuals in each singular age by gender observed in the 2011 Census.
- EU-SILC does not provide information on take-up of the full range of Social Security and CGA pension benefits. Hence, it was necessary to reconstruct a set of key groups, namely:
  · Social Old-Age Pension recipients;
  · Social Security Early (LTU) OAP pensioners;
  · CGA contributors;
  · CGA Old Age pensioners;
  · CGA Early OAP pensioners;
  · CGA Survivor's pensioners;
  · CGA Early OAP pensioners.

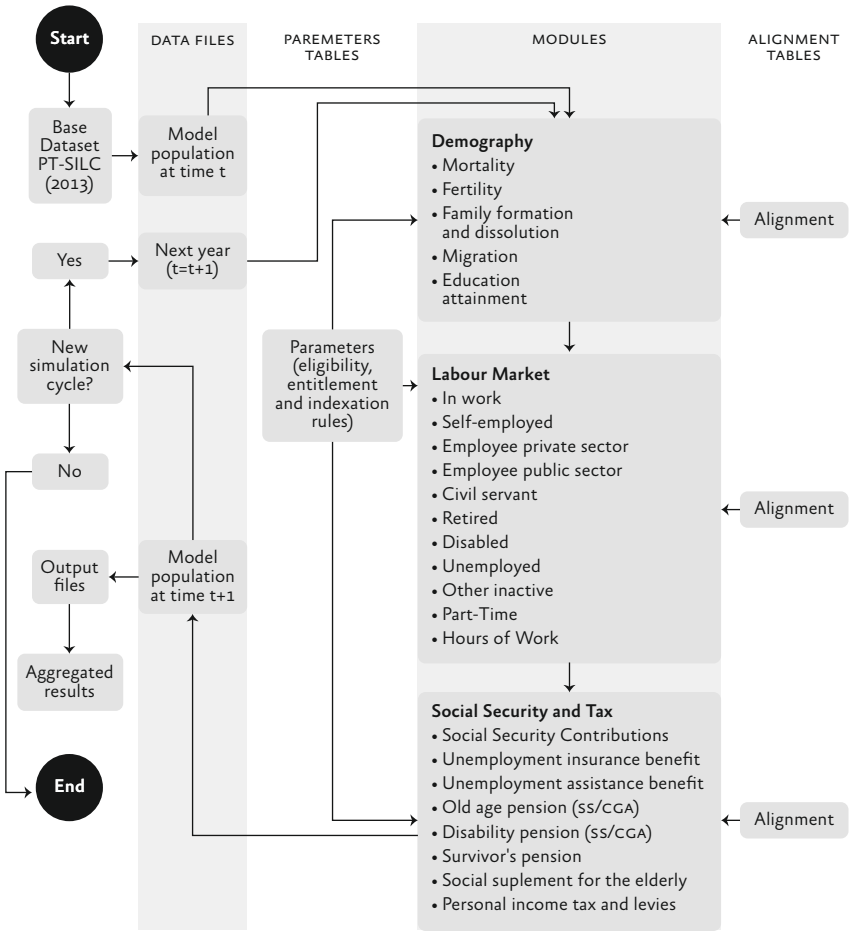
As part of this process, it was necessary to allocate CGA pension benefits to individuals aged 65 or over who had not reported pension benefits. As we show in Chapter 2, this has important implications on our ability to assess how the poverty rate among pensioners who are 65 or over is likely to evolve.

In DYNAPOR, individual changes overtime are simulated through a discrete time modelling approach[37]. This means that, for each year in the life of a person in the base dataset, we estimate the probability that a given event takes place (death, unemployment, take-up of an old-age pension, etc.). The assignment of an event to a given individual in the sample is done through one of the following mechanisms:

- Deterministic behavioural equations. An individual is assigned to experience an event by whether or not he/she complies with a set of conditions. This is typically used to simulate the take-up of Social Security benefits or the application of Social Security contribution or tax rules.
- Probabilistic behavioural equations. An individual is assigned to experience an event according to a set of predictors. This is essentially used to simulate the number of hours worked and changes in wages.
- Alignment process. When the probability of experiencing an event is conditioned by macro-level dynamics, the assignment of events to an individual is done through an alignment process — the 'alignment by sorting' technique (Li and O'Donoghue, 2013)[38]. The use of the alignment process allows us to keep the probabilistic nature of the model, whilst, at the same time, being able to replicate key demographic, labour market and macroeconomic aggregates in the 2018 Ageing Report (see Section 4.3).

Figure 1.1. presents DYNAPOR's general architecture and operational routine assigning attributes to individuals in the base dataset at every simulation run. Firstly, the model simulates the likelihood that each individual will experience the most relevant demographic events (death, having a child, family formation/dissolution, education). After that, the model assigns individuals their labour market status (employee in the private sector, employee in the public sector, civil servant, self-employed, unemployed, retired, out of work due to illness, otherwise inactive). For those in employment, the model computes the number of hours worked and the gross earnings resulting from labour market participation. The simulation run then enters the Social Security block. The first step here is to update the individual's Social Security contributions record. Then, depending on demographic and labour market attributes assigned earlier, the model establishes the eligibility to Social Security benefits and computes the respective amounts. A number of these rules are consigned in the Parameters Table. Finally, in the Taxation block, the model computes the Income Tax liability, Social Security (and CGA) contributions, and determines both gross and net income.

Figure 1.1 DYNAPOR general architecture



Note: This chart and DYNAPOR are based on the general architecture of MIDAS_BE. Dekkers et al, 2008.

At the end of each run, the model produces an output file that registers the attributes for each individual in the base dataset for that year. Subsequent cycles use this file as an input until the simulation period reaches its term. The set of output files with individual information can then be used to generate aggregate information for analysis purposes.

4. Baseline scenario

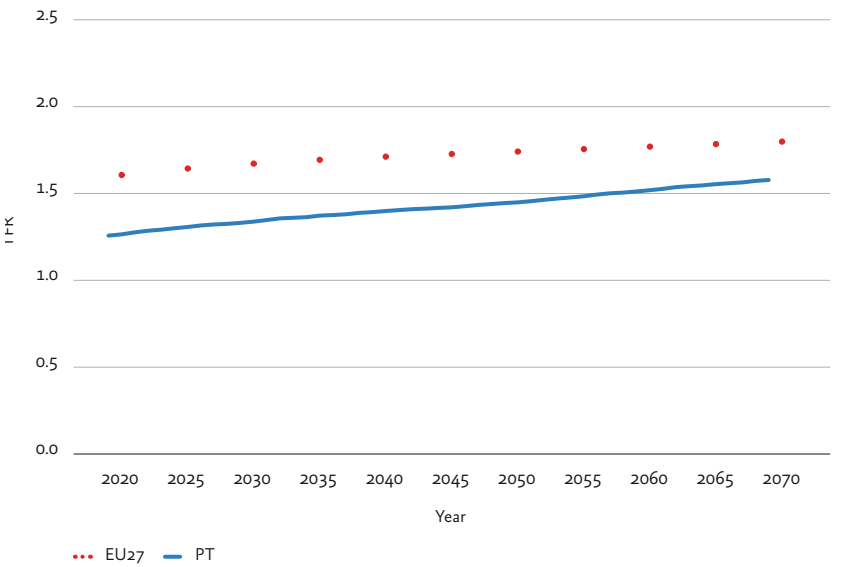
In this section, we describe the key demographic, macroeconomic and policy assumptions that preside over our assessment of the financial and social sustainability of the Portuguese Public Pension System. As mentioned above, our baseline scenario is aligned with the 2018 Ageing Report demographic, labour market and macroeconomic projections. Whenever relevant, we discuss in what way our baseline scenario deviates from these projections[39].

As a start to our endeavour, we look at how some key demographic variables are expected to evolve over the period under analysis. We start by showing how, as a result of changes in fertility and mortality rates, and the impact of migrations, the total population and its age-structure is projected to evolve (Section 4.1). We proceed by describing what we expect to be the key developments in the labour market, namely with regards to the size of the working-age population, participations rates, employment and unemployment rates (Section 4.2). Subsequently, we specify the assumptions about how key macroeconomic aggregates (GDP, labour productivity, wages, prices and interest rates) are expected to evolve during the period under analysis (Section 4.3). We conclude by specifying a set of key modelling assumptions that are specific to the DYNAPOR model (Section 4.4).

4.3. Demographic dynamics

In the same way as the 2018 Ageing Report, our assessment of the long-term sustainability of the Portuguese Public Pension system is based on the 2015 EUROPOP's demographic projections (European Commission, 2017). As Figure 1.2 shows, our baseline demographic scenario is based on the assumption that fertility levels, as measured by the Total Fertility Rate[40], are likely to increase from 1.26 children per woman, in 2020, to 1.58 in 2070 (see Table 1.1, Annex 1). Still, this means that fertility in Portugal will continue to be lower than in the EU27, and well below the fertility replacement level of 2.1 children per woman.

Figure 1.2 Total fertility rate



At the other end of the human life span, we project that — as a result of the projected decline in mortality rates — life expectancy is to increase (see Figures 1.3 and 1.4). Moreover, gender differences in life expectancy are expected to decrease. Thus, in the period between 2020 and 2070, life expectancy at birth will increase by 7.3 years for men (up to 85.8 years), and only by 5.8 years for women (up to 90.3 years) — see Table 2, Annex 1. In the same way, increases in life expectancy at 65 will be higher for men than for women — 4.9 years compared with 4.7 years, respectively — see Table 3, Annex 1. As we can see in Figures 1.3 and 1.4, developments in Portugal are very much in line with the EU27 trend.

Figure 1.3 Life expectancy at birth

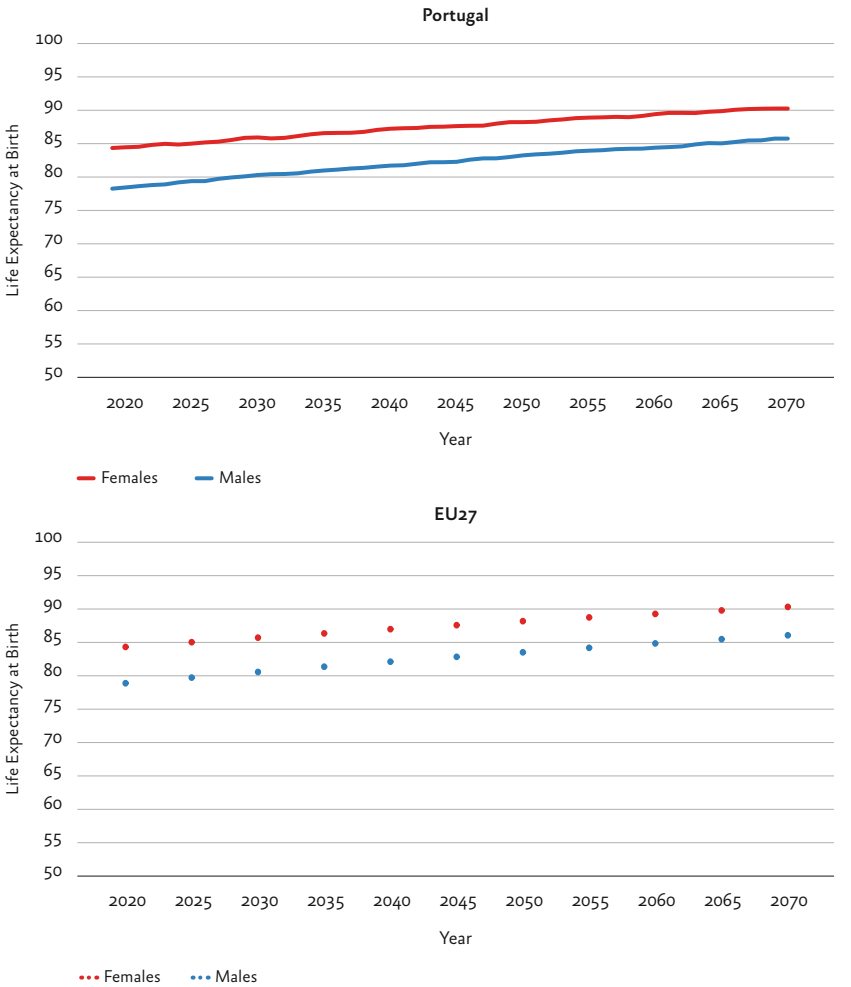


Figure 1.4 Life expectancy at 65

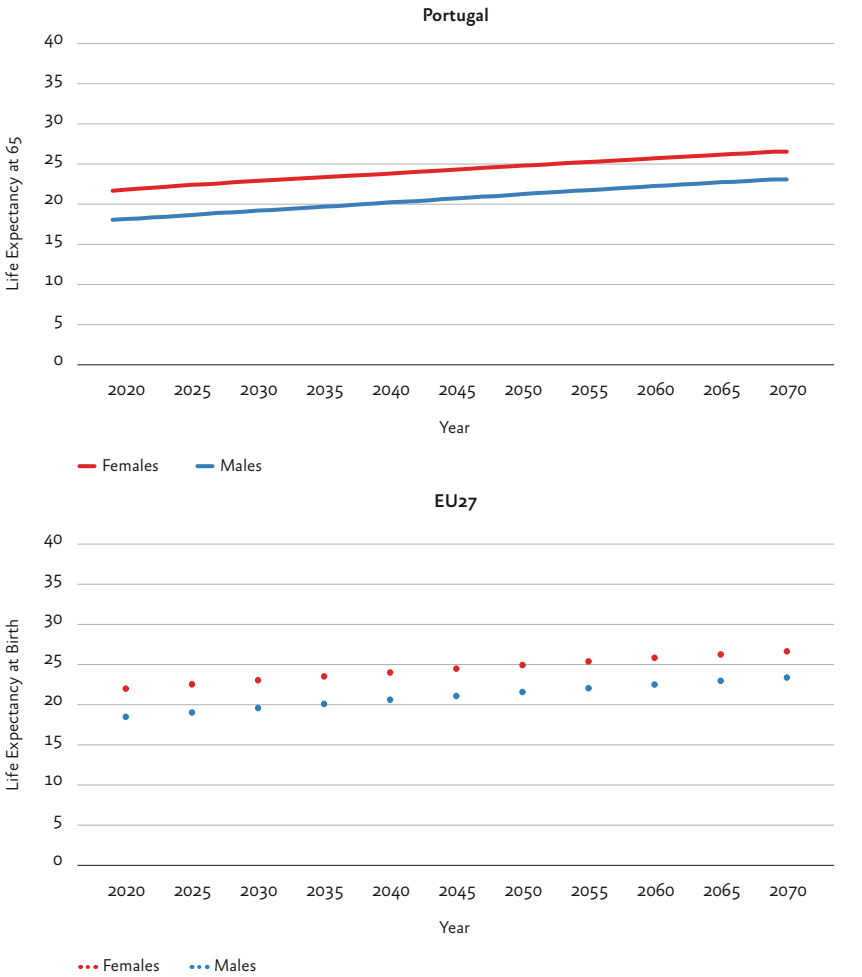
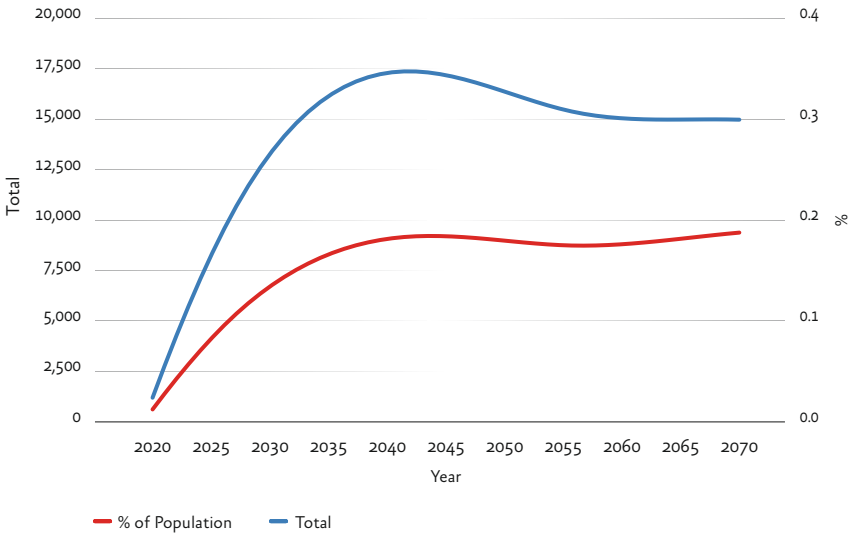


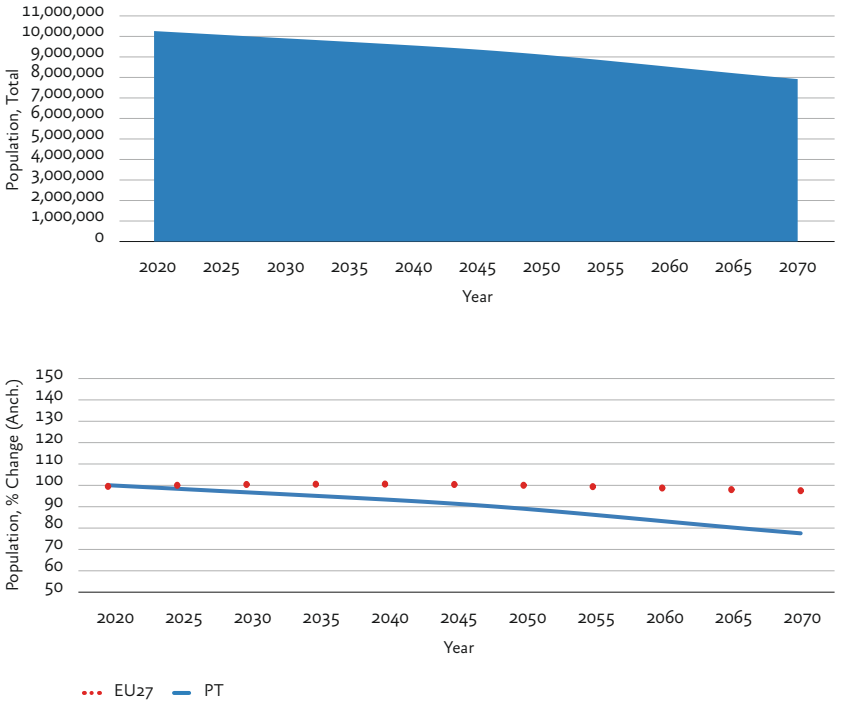
Figure 1.5 Net migration



As we can see in Figure 1.5, we anticipate that migratory flows will add to the growth of the Portuguese population, particularly after 2040 — with average net migration flows of close to 0.2% of the total population (see Table 4, Annex 1). Under current assumptions about the age composition of migratory flows (see Table 1.14) migratory flows are not expected to have a significant impact on the age structure of the Portuguese population.

Despite this projected increase in life expectancy and net migration, the low levels of fertility mean that the total population is expected to decline by close to quarter (-22.6%) from around 10.2 million in 2020 to 7.9 million in 2070 (see Table 5, Annex 1). The significance of this drop becomes evident when confronted with the fact that, overall, the total EU27 population is to remain relatively stable during the same period (see Figure 1.6).

Figure 1.6 Total population



In the face of sustained low fertility levels and progressive increase in life expectancy, it is unsurprising that the ageing of Portuguese population will continue, if not steepen — at an even stronger pace than the rest of Europe (see Figures 1.7., 1.8 and 1.9). Thus, by 2070 we project that more than a third of the population (35.9%) will be aged

65 and over — compared to just over 22% in 2020 (see Table 6, Annex 1). In the same period, the portion of very elderly individuals (aged 80 and over) will increase from 6.7% to 15.9%, in 2070 (see Table 7, Annex 1).

Figure 1.7 Age structure and mean age

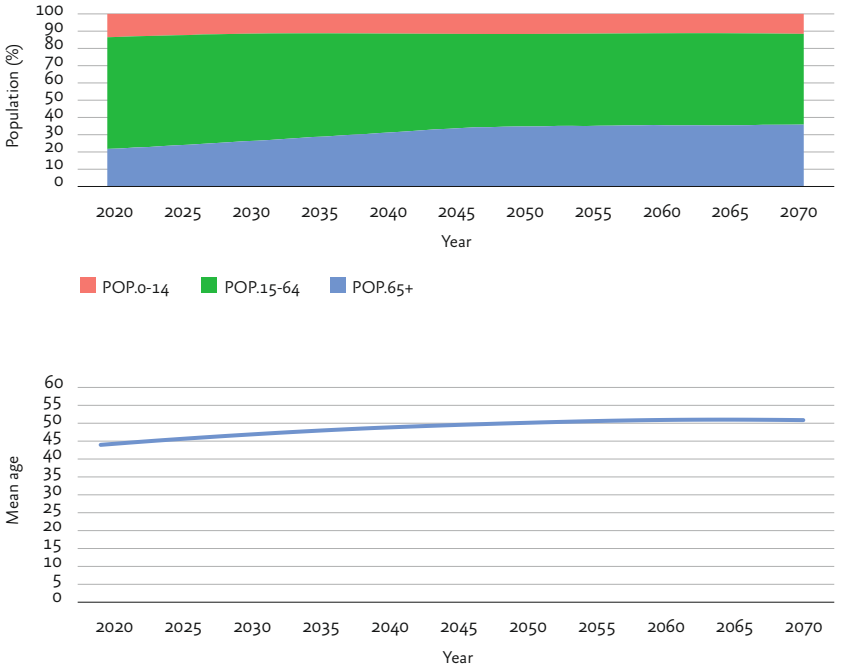
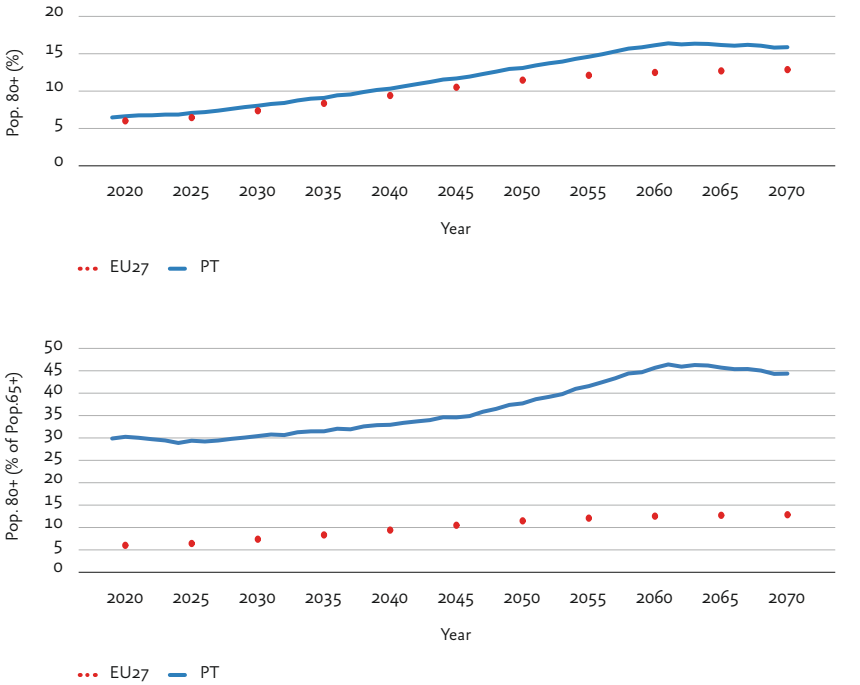
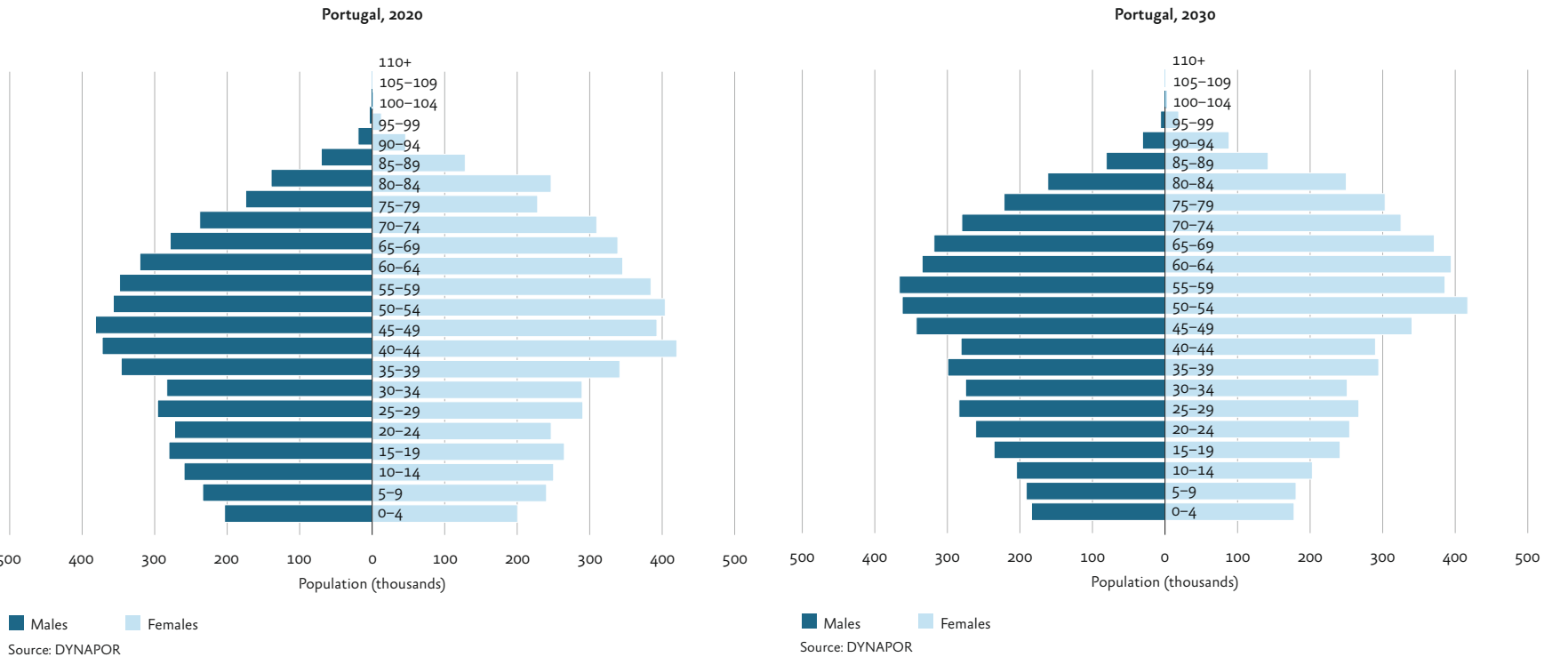


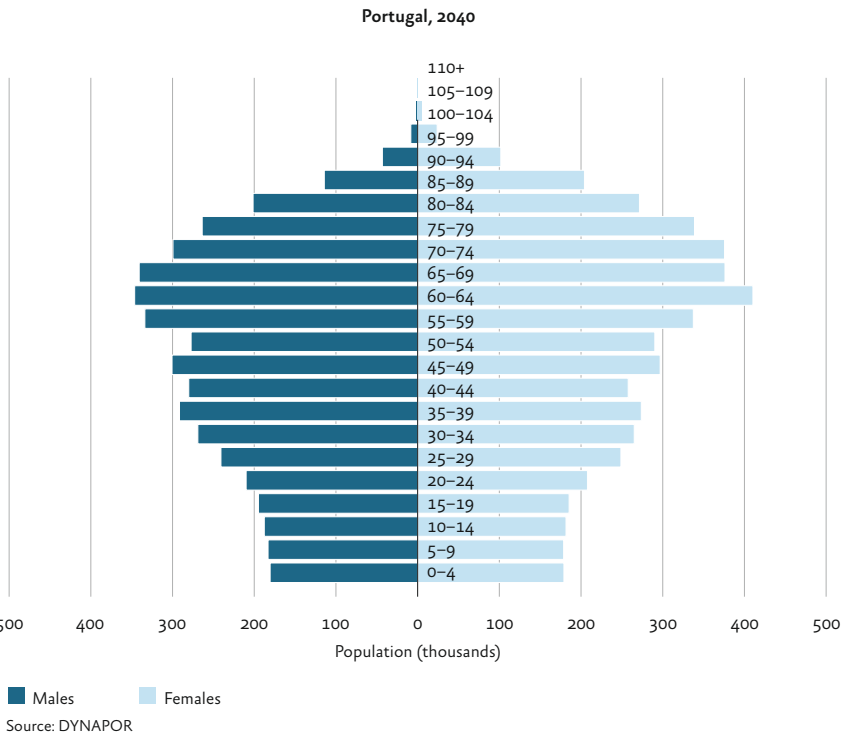
Figure 1.8 Very elderly population (aged 80 and over)



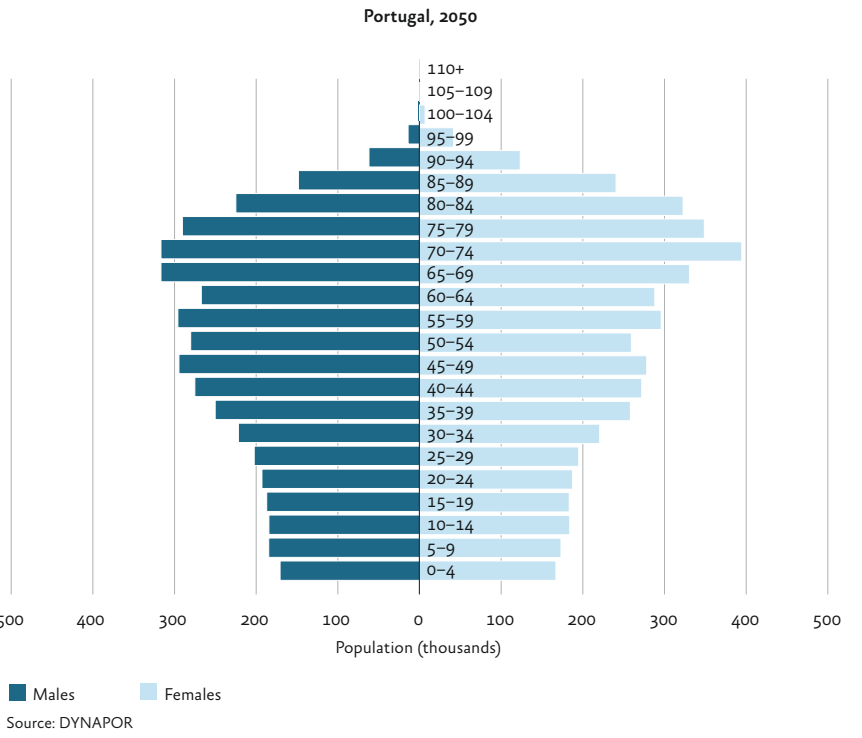
As evidenced by the population pyramids in Figure 1.9, the developments depicted above will produce a slow but clear shift in the nature of the ageing process of the Portuguese population. Whereas, in recent decades, the ageing of the Portuguese population was the product of a decrease in fertility (ageing at the bottom) and an increase in life expectancy (ageing at the top), we project that — under the assumption that the drop in fertility will be reversed — the ageing of the Portuguese population will be mostly driven by a continuous reduction in mortality rates and an increase in life expectancy.

Figure 1.9 Age structure — population pyramids

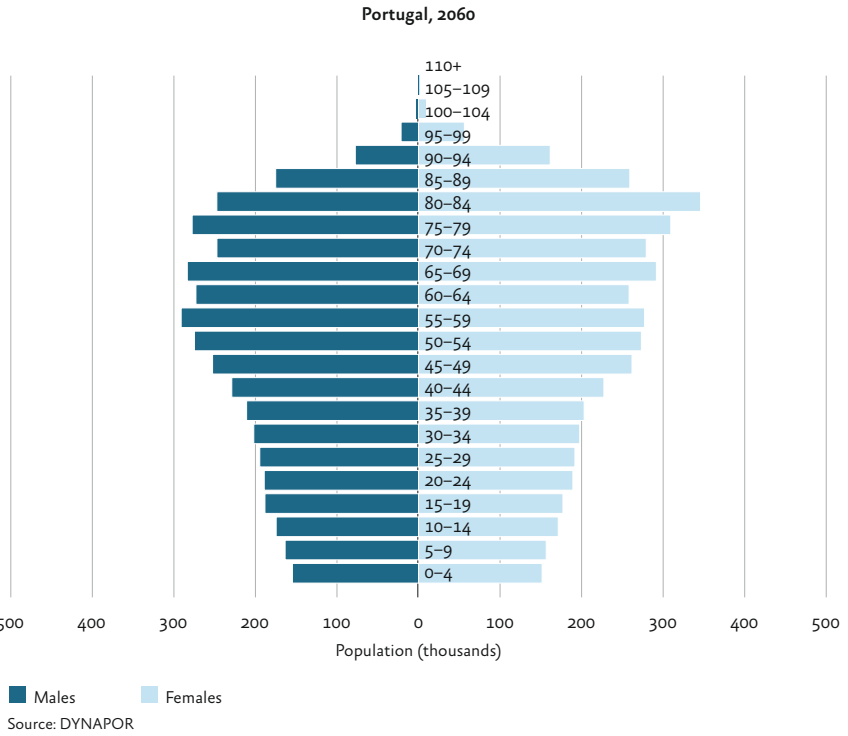




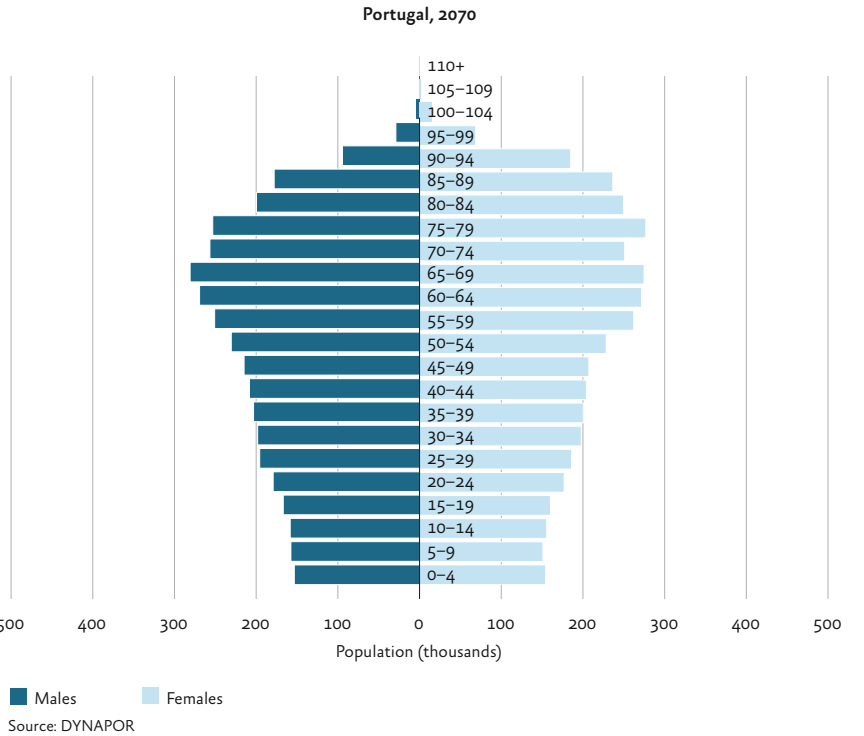
Source: DYNAPOR



Source: DYNAPOR



Source: DYNAPOR



Source: DYNAPOR

Figure 1.10 Old-age dependency ratio

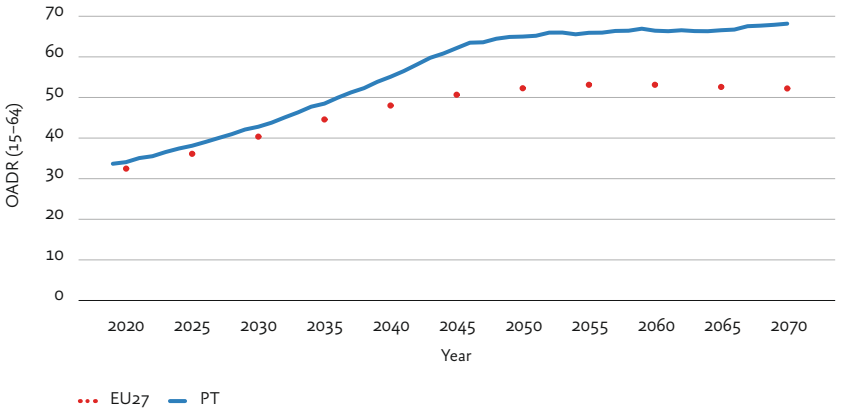
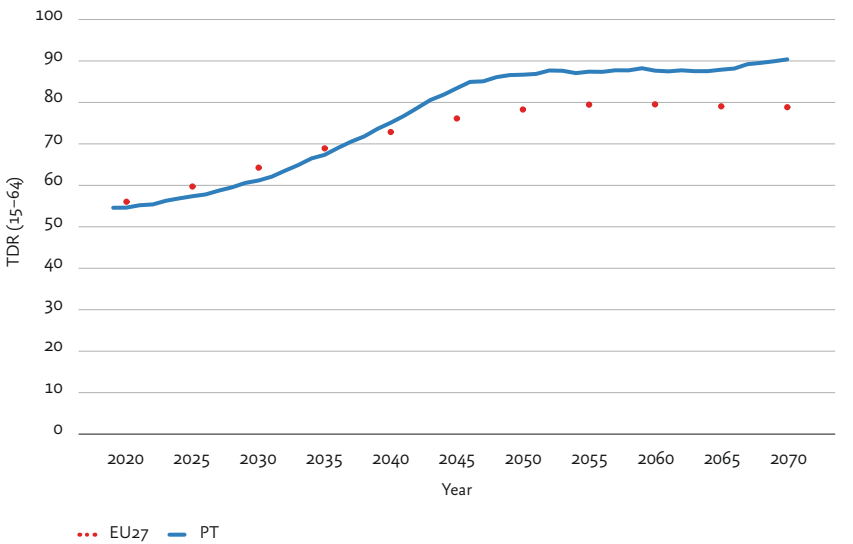
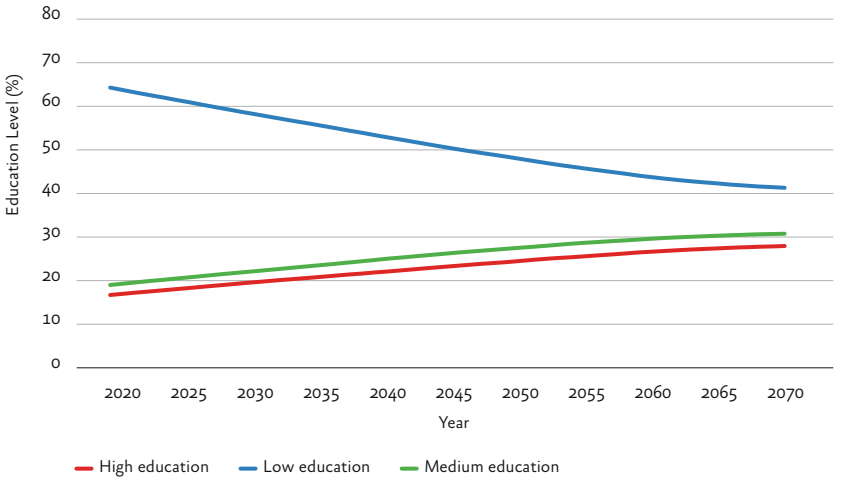


Figure 1.11 Total dependency ratio



While their added-value in studying the long-term sustainability of pension systems is highly debatable, dependency ratios do provide us with very useful metrics to understand the significance of the projected changes in the age structure of the Portuguese population — see Figures 1.10 and 1.12. Using the Old-Age Dependency Ratio[41] as measure of reference, we project that the number of potentially inactive per 100 individuals of working age will increase from 34 in 2020, to 68 in 2070 (see Table 8, Annex 1). If we expand the definition to potentially inactive to cover those aged under 15, as measured by the Total Age Dependency Ratio[42], we predict that the number of inactive persons to every 100 persons of working age will increase from 55 in 2020 to 90 in 2070.

Figure 1.12 Educational level

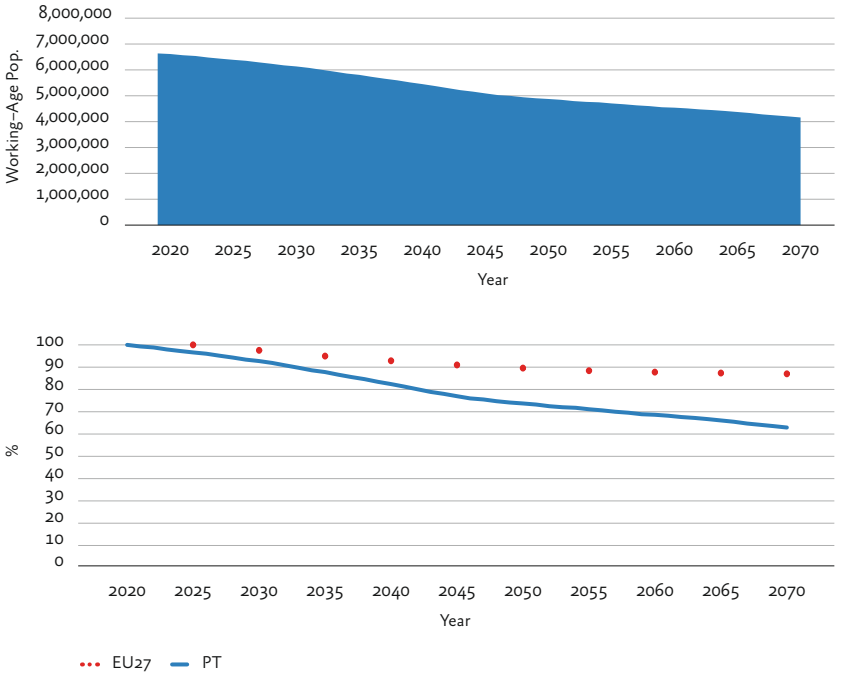


The potential negative consequences of population ageing in the Portuguese economy are likely to be offset by changes to the structure of qualifications[43]. As we can see in Figure 1.12, as the least qualified generations fade away, the percentage of individuals with medium or high qualifications will become ever more representative. Thus we project that the percentage of individuals with medium qualifications will increase from 19.3% in 2010 to 30.8% by 2070. In the same way, the percentage of people who will have completed at least the first stage of tertiary education will increase from 17% to 27.9% in the same period (see Table 9, Annex 1).

4.3. Labour market dynamics

In this section, we describe how — as a result of projected changes in the size and age structure of the Portuguese population, and assumptions about how participation rates are likely to evolve — the supply of labour to the economy will change in the period under analysis.

Figure 1.13 Working-age population



In line with the demographic scenario sketched above (see Section 4.1), we project that the number of individuals of working age (i.e. aged between 15 and 64) will decrease by almost 37.1% in 2070 (see Table 10, Annex 1). The significance of this development becomes even more evident once we consider how the size of the working-age population in Europe is expected to evolve in the same period (see Figure 1.13).

Figure 1.14 Participation rate (15-64)

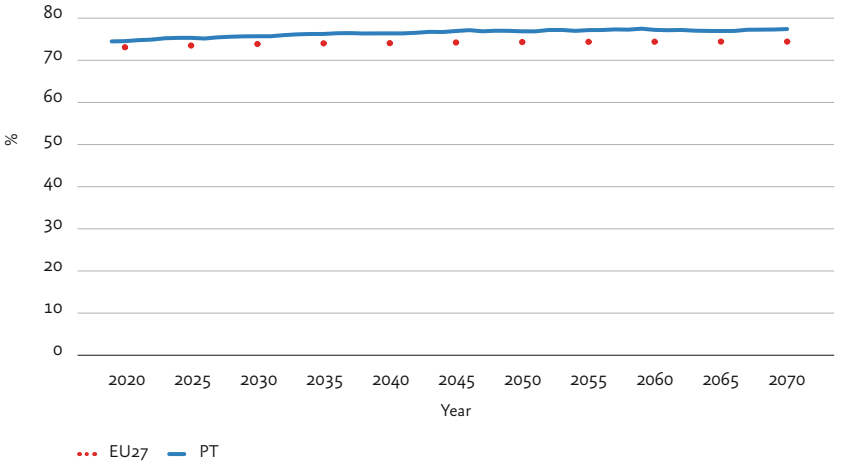
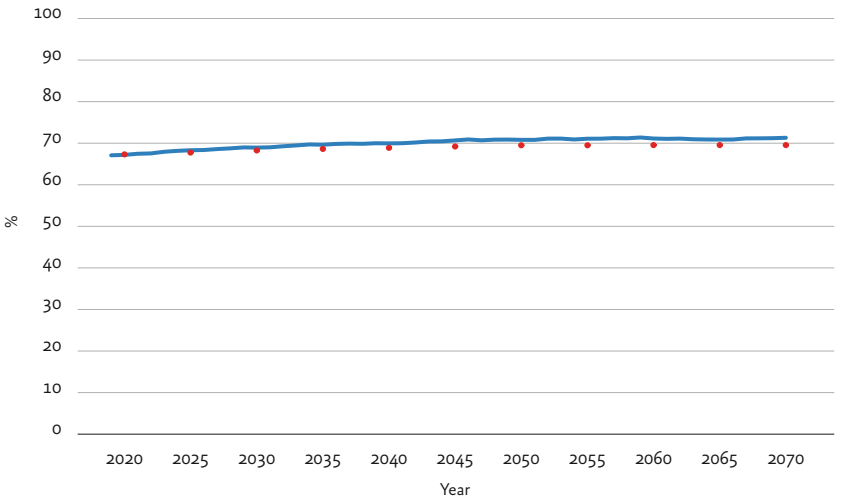


Figure 1.15 Employment rate (15-64)



This decrease in the number of individuals of working age will be slightly offset by a modest increase in participation rates[44] in this age group. As can be seen in Figure 1.14, we project that the participation rate for individuals aged between 15 and 64 will increase from 74.5% in 2020 to 77.4% in 2070 (see Table 11, Annex 1).

This increase in participation rates reflects a fairly positive long-term outlook in the labour market — especially when compared with developments at the EU-level (see Figures 1.15 and 1.16). Thus we project that the employment rate[45] will increase in the period under analysis from 67.2% in 2020 to 71.3% in 2070 (see Table 12, Annex 1). Parallel to this increase in employment rates, we also project that the unemployment rate[46] will decrease over time — from 9.9% in 2020 to 7.9% in 2070 (see Table 13, Annex 1).

Figure 1.16 Unemployment rate (15-64)

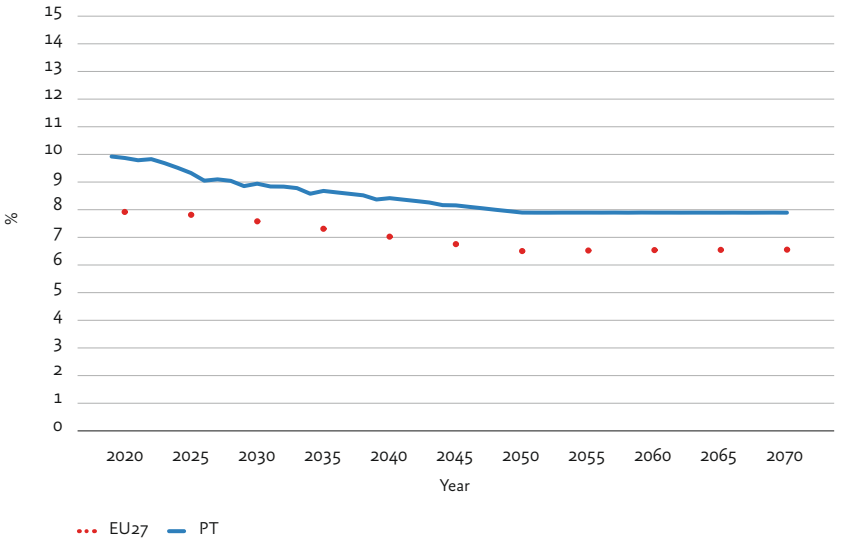
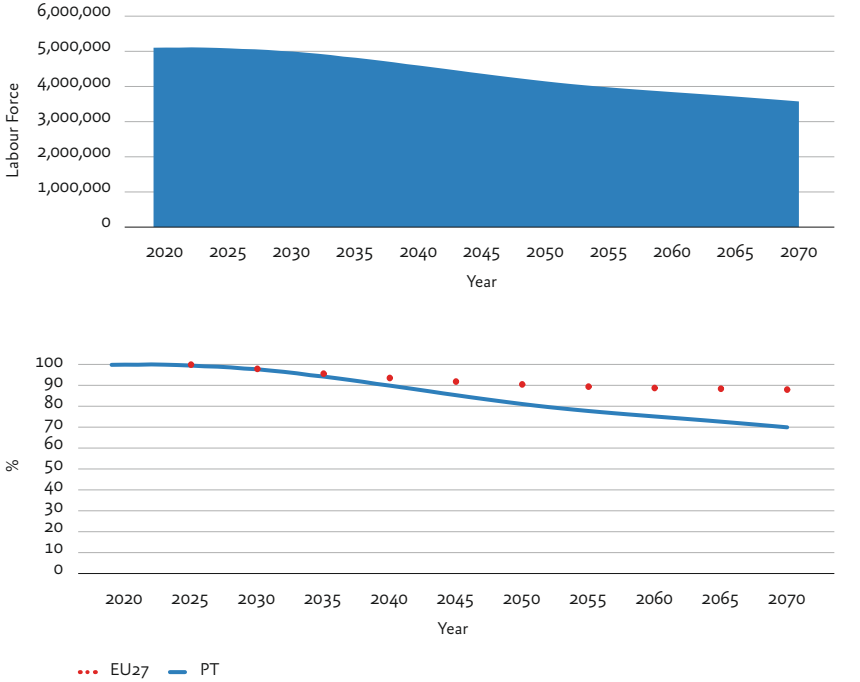


Figure 1.17 Labour force (15-64)



As hinted above, the increase in participation rates will only help to soften the impact of the projected drop in the supply of labour to the economy. As we can see in Figure 1.18, the size of the labour force[47] is expected to decrease by almost 30%, from 5.1 million in 2020 to 3.6 million in 2070 (see Table 14, Annex 1). Again, the significance of these developments becomes clearer when compared with developments in the EU27.

4.4. Macroeconomic assumptions

DYNAPOR is a partial-equilibrium model and is not able to simulate how macroeconomic aggregates are expected to evolve over time (see Moreira et al, 2019). Thus, our assessment of the financial and social sustainability is based on the macroeconomic baseline scenario that underpins the 2018 Ageing Report. The adoption of this macroeconomic scenario is based on two critical assumptions:

- that Total Factor Productivity will evolve in line with the 2018 Ageing Report;
- that both prices and interest rates will evolve in line with the 2018 Ageing Report.

Bearing in mind that changes in demography and labour market dynamics are fundamentally aligned with the 2018 Ageing Report, and the nature of the Production Function (depicted in Table 1.13) adopted by the European Commission (see European Commission, 2017), the previous assumptions allow us to presume that:

- 2018 Ageing Report projections about Labour Productivity can be used to determine the growth of salaries in DYNAPOR;
- 2018 Ageing Report projections concerning key macroeconomic aggregates (GDP, Potential GDP and real GDP) can be used as a standard to assess the long-term performance of the Portuguese Public Pension System.

In the paragraphs below, we describe in more detail the macroeconomic scenario that underpins our assessment of the long-term sustainability of the Portuguese Pension system.

Figure 1.18 GDP & Potential GDP, growth rate

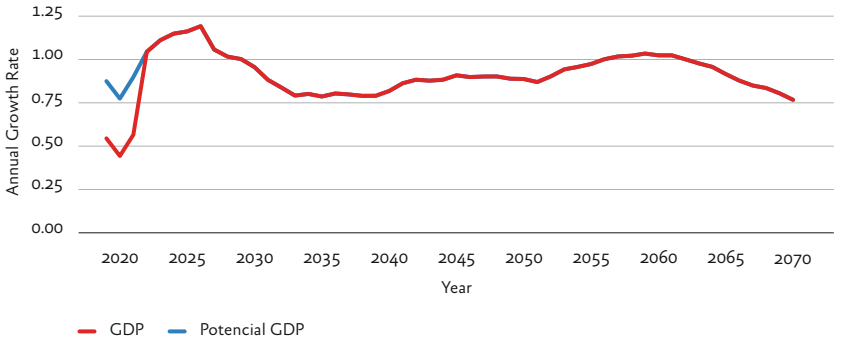


Figure 1.19 Potential GDP, growth rate

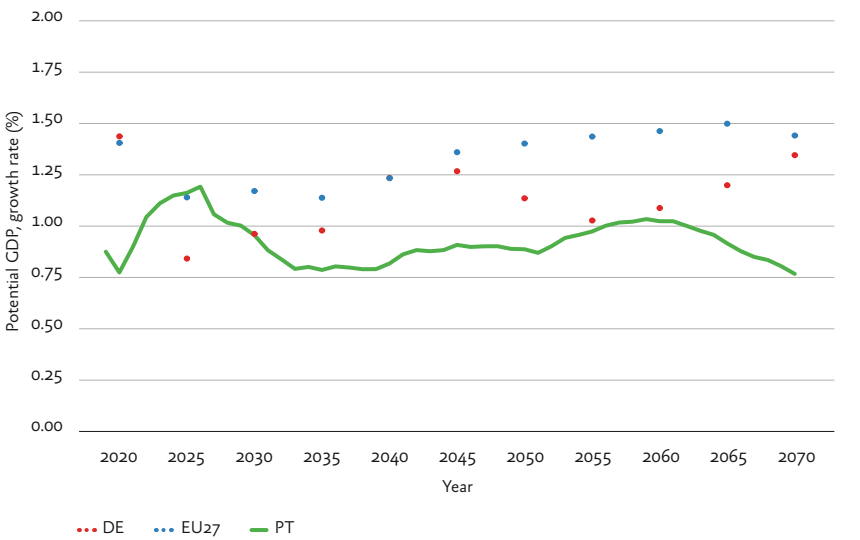


Table 1.13 Potential GDP (and its components), prices and interest rates, period averages

PERIOD	POTENTIAL REAL GDP (GROWTH RATE)A	LABOUR PRODUCTIVITY (GROWTH RATE, PER HOUR)A	TOTAL FACTOR PRODUCTIVITY (GROWTH RATE)A	CAPITAL DEEPENING (CONTRIB. TO LABOUR PROD. GROWTH)A	LABOUR INPUT (TOTAL HOURS WORKED, GROWTH RATE)A	CONSUMER PRICE INDEX	REAL LONG-TERM INTEREST RATE (%)
	1=2+5	2=3+4	3	4	5		
2016--2020	0.8	0.5	0.6	-0.1	0.2	1.4	3
2021--2030	1.1	1.2	0.8	0.4	-0.2	2	3
2031--2040	0.8	1.6	1.0	0.6	-0.8	2	3
2041--2050	0.9	1.8	1.2	0.7	-1.0	2	3
2051--2060	1.0	1.8	1.1	0.6	-0.8	2	3
2061--2070	0.9	1.6	1.0	0.6	-0.7	2	3

a) Source: 2018 Ageing Report

As we can see in Figures 1.18 and 1.19, our long-term macroeconomic scenario evolves in three cycles[48]. Still benefiting from the recovery period following the end of the financial crisis, the first cycle is marked by a period of strong economic growth up to 2026[49], followed by a deceleration all the way to 2035 (see Table 16, Annex 1). Under a scenario of convergence in Total Factor Productivity[50], we anticipate a new period of (gradual) economic revival between 2035 and 2045, followed by a small drop in growth rates in the period up to 2050. This is followed by a new period of economic acceleration (between 2050 and 2060), followed by an overturn of the economic cycle thereafter.

Notwithstanding these cyclical variations, it is important to notice that (potential) GDP growth rates during this period average around 1% (see Table 1.13). As Figure 1.19. shows, this means that the Portuguese economy is projected to grow at a much slower pace than the rest of the European economy.

This pattern of growth reflects, on the one hand, the projected decline in the supply of labour to the economy (see Table 1.13), and a set of (fairly optimistic) assumptions about how Total Factor Productivity is likely to evolve. As we can see in Figure 1.20, Total Factor Productivity is expected to grow significantly in the period between 2020 and 2045 — at a similar pace to that in Germany.

The combination of a shrinking supply of labour and increasing Total Factor Productivity means that Labour Productivity is expected to grow at fairly high levels (see Figure 1.21) — and higher than in the last two decades (see Alves, 2017). Given the assumption (mentioned above) that increases in wages are linked to changes in productivity, this means wages are expected to grow at an accelerated pace in the period under analysis — see Figure 1.21. As we described in detail in Chapters 2 and 3, this will fundamentally shape how the value of pensions, and of pension expenditure, is likely to evolve in the period under analysis.

Figure 1.20 Total factor productivity, growth rate

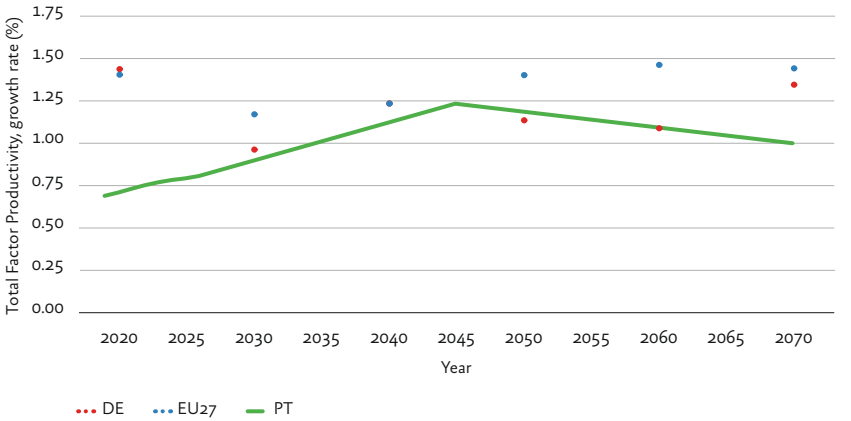
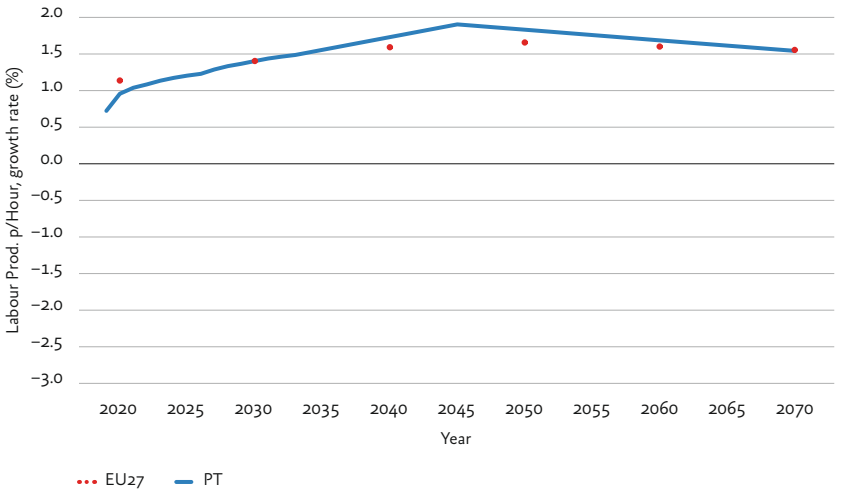


Figure 1.21 Labour productivity per hour and average wages, growth rate



As for inflation, this is expected to converge from country-specific levels at the start of the projection (2014) to 2% by 2021, when the output gap is expected to be closed, and remain stable thereafter (European Commission, 2018). Similarly, real long-term interest rates are expected to converge to 3% (i.e. 5% in nominal terms) within 10 years from the start of projection and remain constant from then on (see Table 1.13).

4.5. Key modelling assumptions

As the previous sections make absolutely clear, the projections that will be presented in this report are fundamentally aligned with the demographic, labour market and macroeconomic scenario that underpins the 2018 Ageing Report. In addition to this, the results presented here are shaped by a set of key modelling assumptions — see Table 1.14.

Table 1.14 Key modelling assumptions

	KEY MODELLING ASSUMPTIONS
Policy-Scenario	• Unchanged Policy Scenario from January 1st, 2018, except for pension and taxation update rules.
Educational Attainment	• New births are assigned an education attainment level according to the distribution of qualifications of the 25-29 age group in the 2011 Census.[51]
Migration	• The age distribution of immigrants is set in a way not to change the age-distribution in Portuguese society.
	• Immigrants are given priority in the selection of individuals to emigrate.
Labour Market Transitions	• Individuals only enter the labour market after completing education.
	• There are no new entries into the Civil Servants status. • There are no labour market transitions out of the Civil Servant status, except when individuals retire.

	KEY MODELLING ASSUMPTIONS
	• The take-up of an old-age pension does not imply an immediate transition into retirement. Only when individuals are not selected into work and are in receipt of an Old-Age Pension do they become retired.
Wages	• Wages grow in line with labour productivity.
Benefit Take-Up	• Individuals start receiving a benefit if, and as soon as, they comply with the eligibility rules, with the following exceptions: · Only 15% of all eligible individuals will be selected to receive Social Security Early OAP, both under the Flexibility Scheme and the Long--Term Unemployment Scheme (unless they are inactive, where full take-up is assumed); · Only 10% of all eligible individuals will be selected to receive CGA Early OAP.
	• The take-up of Absolute and Partial Disability pensions is aligned by reference to administrative and survey data: · The proportion of Disability Pension beneficiaries is set as constant during the period under analysis by reference to the distribution found in the 2013 EU-SILC; · The ratio between Absolute and Partial Disability pensioners is set as constant during the period under analysis by reference to the distribution in 2013, as depicted in the 2013 Social Security Account (Segurança Social, 2014).
	• Emigrants are not awarded pension benefits, even if they have made pension contributions.
Benefit UpDate Rules	• Pension benefits will be updated according to legislation in place on January 1st, 2018, and from 2025 onwards, according to growth in average wages.
	• The IAS will be updated according to legislation in place on January 1st, 2018, and from 2025 onwards, according to growth in average wages. Consequently, from 2025 onwards all benefits indexed to IAS — namely the CSI and Social OAP — will be updated in line with growth in average wages.
Income tax and Pension Contributions Up-Date Rules	• Income Tax, Social Security and CGA contributions brackets will be updated according to legislation in place on January 1st, 2018, and from 2025 onwards, according to growth in average wages.
Prices	• The price deflator for computing real prices is anchored to prices in 2018.

While being equally relevant, some of these assumptions will have a particular bearing on the results presented in this report:

- The assumption that wages will increase with labour productivity means that salaries are expected to grow substantially during the period under analysis (see section 4.3). This will obviously be reflected in the value of future pensions and future pension expenditure;
- The assumption that, from 2025 onwards, pension benefits are to be updated in line with wages means that these benefits (and pension expenditure) will grow at a much faster rate than current rules allow;
- The assumption that individuals, unless they are selected for early--retirement, will only claim their OAP at the standard age of retirement means that:
  a) we might be overestimating the duration of contributory careers, which will be reflected in the value of future pension benefits — and pension expenditure;
  b) we do not allow for individuals in the sample to make use of the OAP bonus that rewards individuals who decide to postpone claiming their pension.
- The assumption that the take-up of an OAP is independent of whether the individual decides to retire from the labour market means that some individuals in the sample will be forced into a period of unemployment or inactivity before being able to claim pension benefits;
- The assumption that only a percentage of eligible, but randomly selected, individuals will take-up early retirement pension benefits means that we might be underestimating/overestimating the typical duration of contributory careers, and of future pension benefits (and expenditure).

Chapter 2
Financial and social sustainability of the public pension system

Building on the set of demographic, labour market and macro-economic assumptions sketched above, in this chapter we examine how the Portuguese Pension System will fare in the long term. We will start by mapping out the future demand for pensions (Section 1). We will then look at how the value of pension benefits is likely to evolve (Section 2) and how this will translate into pension-related spending (Section 3). Then, building on projections as to how pension contributions are likely to evolve in the period under analysis, we will assess the future financial sustainability of the Portuguese Pension System (Section 4). We will conclude by examining the projected social sustainability of the Pension System (Section 5).

1. Projected demand for pensions

As we can see in Figure 2.1, we estimate a steep increase (approximately 22%) in the number of pensioners in the period up to 2045 — from about 2.69 million in 2020, to 3.28 million in 2045 (see Table 1, Annex 2). This is followed by a gradual decrease in the period up to 2070, by which time we forecast that 2.72 million people will be receiving some sort of pension. Taking into consideration that the total population is likely to decline during this period (see Section 4.1, Chapter 1), this means that the share of pensioners within the total population will increase from 26.3% to 34.3%.

Figure 2.1 Total number of pensioners

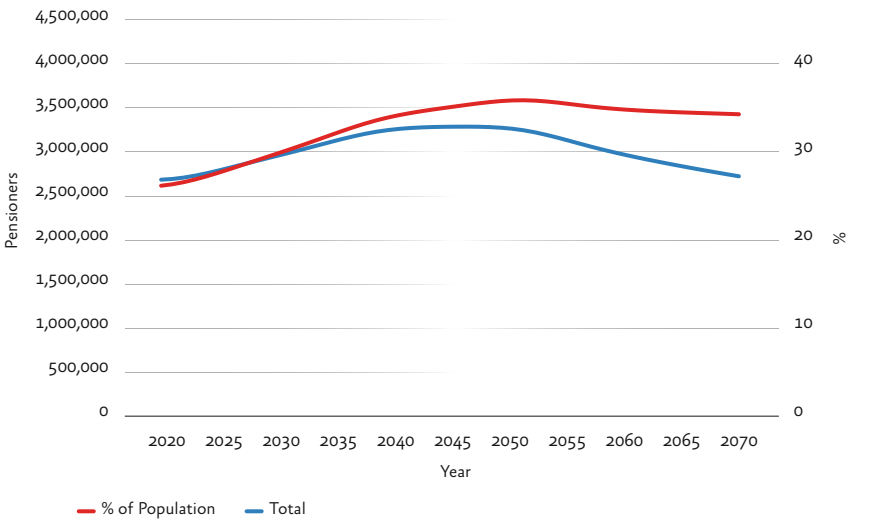


Figure 2.2 Pensioners SS and CGA

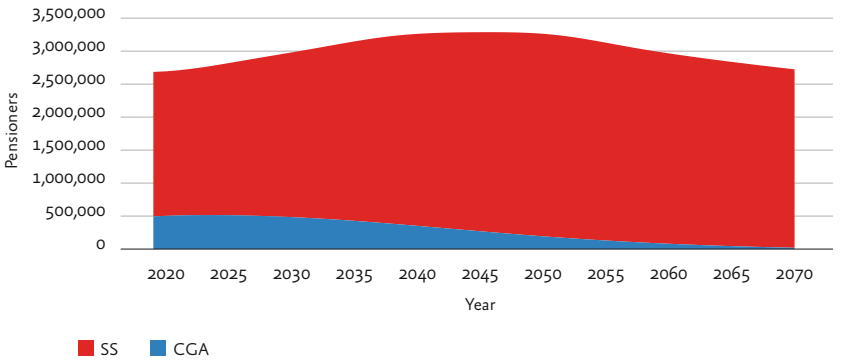
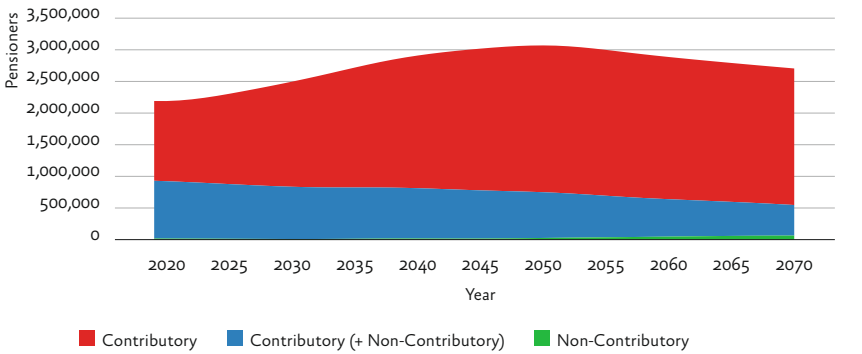


Figure 2.3 SS pensioners: contributory and non-contributory pensions



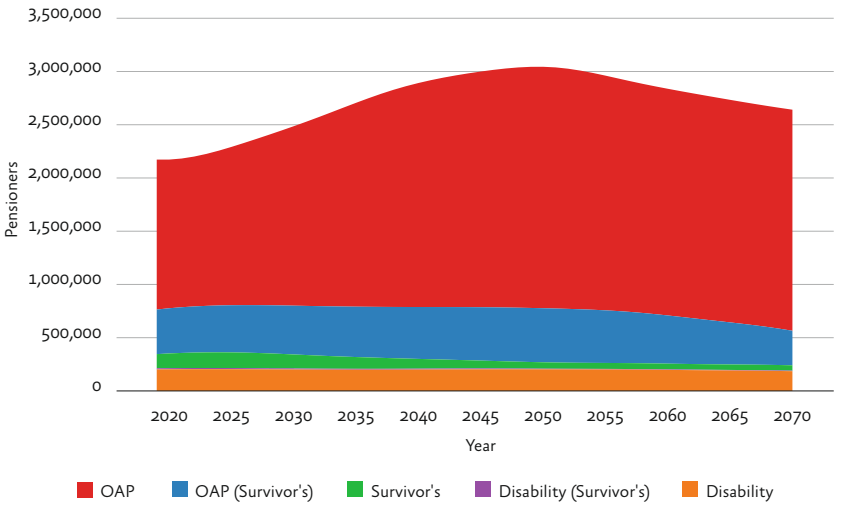
The increase in the total number of pensioners is fundamentally driven by developments in Social Security (see Figure 2.2), where we project the number of pensioners will increase by 23.4% — from 2.19 million in 2020 to 3.07 million in 2050, and then drop to 2.7 million by 2070 (see Table 2, Annex 2). Unsurprisingly, as the system was closed in 2005, the number of CGA pensioners is expected to steadily decrease from about 503 thousand, in 2020, to just over 20 thousand, in 2070.

1.1. Social Security

The projected increase in the number of Social Security Pensioners is the product of two opposing trends (see Figure 2.3). On the one hand, the demand for pensions in the Contributory Regime (Old Age, Survivor's and Disability) is expected to increase from 2.17 million in 2020 to 3.04 million in 2050 — followed by a small drop down to 2.64 million by 2070 (see Table 3, Annex 2). On the other hand, we estimate a gradual decrease in the take-up of non-contributory benefits — from 923 thousand in 2020 to 546 thousand in 2070[52].

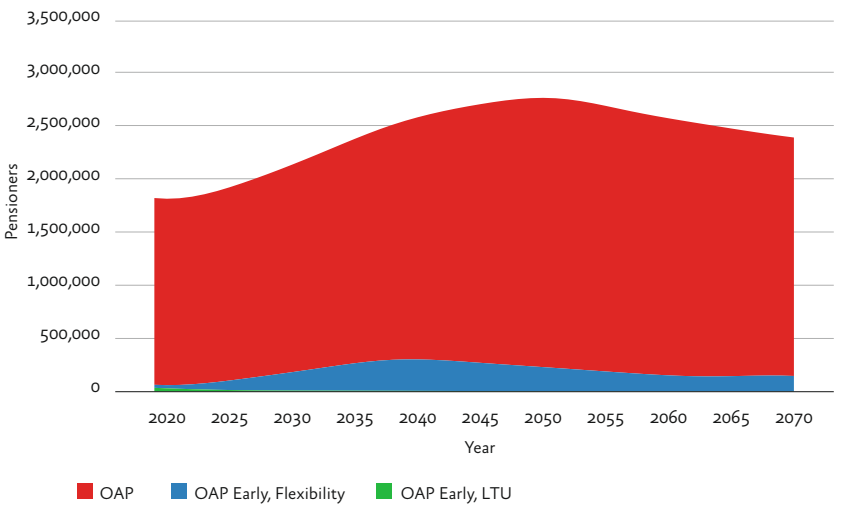
1.2.7. Social Security — Contributory Regime

Figure 2.4 SS Contributory Regime pensioners, by type of pension



The projected growth in future demand for contributory pensions reflects the increase in the number of Old Age Pension beneficiaries (OAP), namely in the period between 2020 and 2050 (see Figure 2.4), which is expected to grow from 1.82 million to 2.77 million (see Table 4, Annex 2) — dropping thereafter to 2.4 by 2070. At the same time, the demand for Survivor's and Disability Pensions is projected to decrease. This is particularly true in the case of Survivor's Pensions, where the demand is expected to decrease by approximately 34% in the period between 2020 and 2070 — from 573 thousand to 379 thousand, respectively (see Table 4, Annex 2). The number of disability pensioners is expected to decrease by around 11%, from 213.9 thousand in 2020 to 190 thousand by 2070.

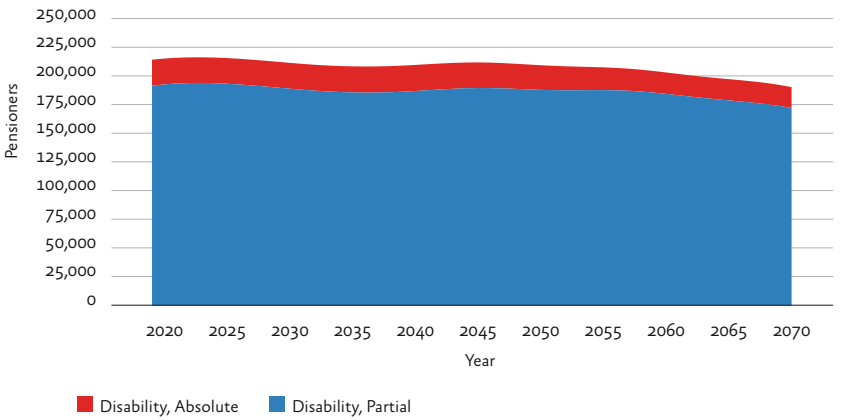
Figure 2.5 SS Contributory Regime old age pensioners, by type of pension



Reflecting the variation in the influx of new pensioners to the system (see Figure 2.1), and our assumptions about the uptake of early--retirement benefits (see Section 4.4, Chapter 1), we estimate that the number of persons claiming a pension before the statutory retirement age (see Figure 2.5) will increase from 30 thousand, in 2020, to 297 thousand, in 2040 — and decrease thereafter –, all the way down to 146 thousand by 2070 (see Table 5, Annex 2).

By contrast, the number of Old Age pensioners who claim a pension before statutory retirement age due to long-term unemployment is expected to decrease sharply during the period under analysis, thus becoming a negligible part of the pension system[53].

Figure 2.6 SS Contributory Regime disability pensioners, by type of pension



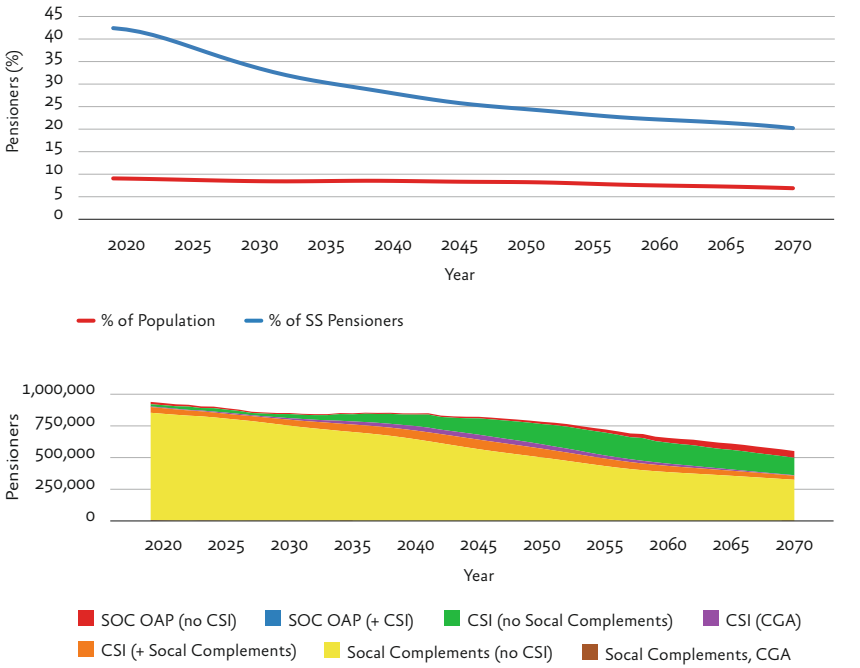
Previously (see Figure 2.4) we showed that the number of Disability Pensioners is expected to decrease in the period under analysis. As we can see in Figure 2.6, this reflects the projected drop in the take-up

of Partial Disability Pensions, which is expected to decrease by 10.6% between 2020 and 2070 — from 192.7 to 172.2 thousand (see Table 6, Annex 2). The number of absolute disability pensioners is also expected to decrease during the period under analysis, from 22.5 thousand in 2020 to 18 thousand in 2070.

1.2.8. Social Security Non-Contributory Regime

As we have shown (see Figure 2.7), the number of beneficiaries in the Social Security Non-Contributory Regime is expected to decrease by approximately 40.2% from 916 thousand in 2020 to 546.9 thousand in 2070. Reflecting the gradual disappearance of large cohorts of individuals with shorter contributory careers who entered the system in its early years, the number of social complement beneficiaries is expected to decline overtime by 60% from 888.8 thousand in 2020 to 355.3 thousand in 2070. At the same time, it is expected that CSI will become the key safety-net of the pension system. Thus, the number of CSI beneficiaries is projected to grow by 153.6% from 68.2 thousand in 2020 to 265 thousand in 2055 — and then dropping to 173 thousand in 2070. The number of individuals receiving a Social Pension amount is expected to remain relatively residual, even if it will increase from 16.9 thousand individuals in 2020 to 53.7 thousand in 2070.

Figure 2.7 SS non-Contributory Regime pensioners



As shown in Figure 2.8, the increase in the number of CSI beneficiaries is mostly led by CSI beneficiaries who currently receive Old Age Pensions, increasing 154.2%, from 56.8 thousand beneficiaries in 2020 to 144.4 thousand beneficiaries in 2070. The remaining CSI beneficiaries represent a marginal part of all beneficiaries.

Figure 2.8 CSI beneficiaries

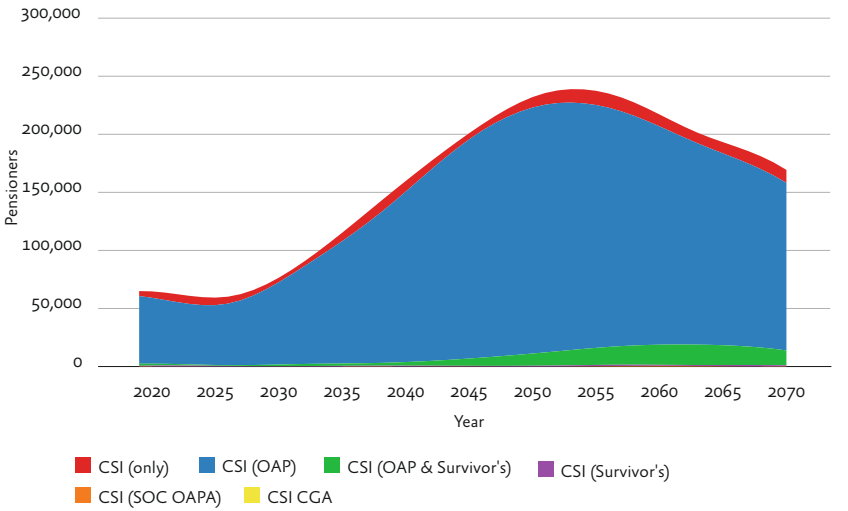
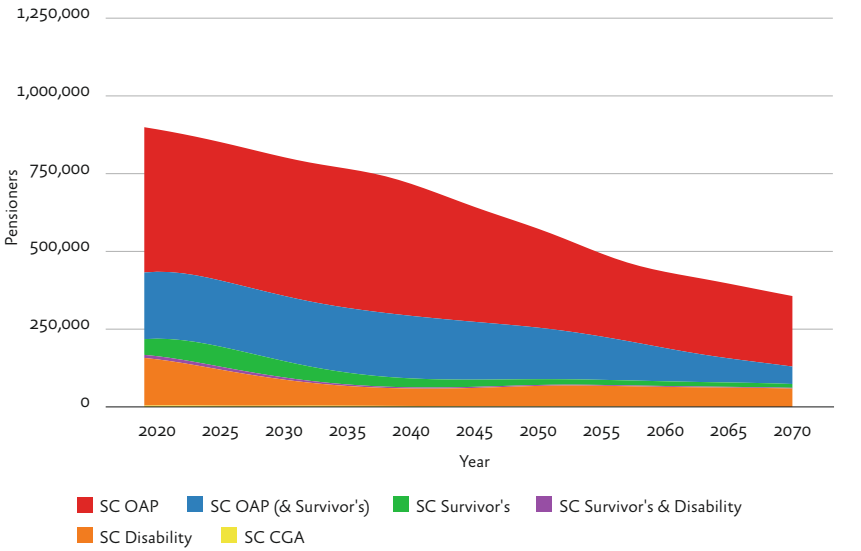


Figure 2.9 SS social complements beneficiaries



As we can see in Figure 2.9, throughout our projections, roughly three quarters of social complement beneficiaries receive a Social Security Old Age Pension or a Survivor's Pension. It should also be noted that the share of social complement beneficiaries receiving an Old Age Pension is expected to increase throughout the period — from 51.3%, in 2020 to 63.6% in 2070 (see Table 10, Annex II). In contrast, the share of social complements beneficiaries receiving other types of benefits is expected to decrease. This is particularly the case for people receiving Survivor's Pensions — which, in 2020, represented 24.1% of social complement beneficiaries — and drop all the way to 15.7% in 2070.

Finally, the relative share of beneficiaries of the Social Security and Civil Servant Regime receiving a social complement is expected to decrease significantly across all types of pensioners. As shown in Figure 2.10, the relative share of individuals receiving an Old Age Pension with a social complement is expected to drop from 36.59% in 2020 to 11.24% in 2070. Similarly, the relative share of individuals receiving a Disability Pension and a social complement is expected to decrease from 73.7% in 2020 to 31.96% to 2070. Finally, the relative share of individuals accumulating a Survivor's Pension with a social complement is expected to increase from 10.73% in 2020 to 13.59% in 2030, followed by a steady decline to 7% in 2070.

Figure 2.10 SS Contributory Regime pensioners receiving social complements

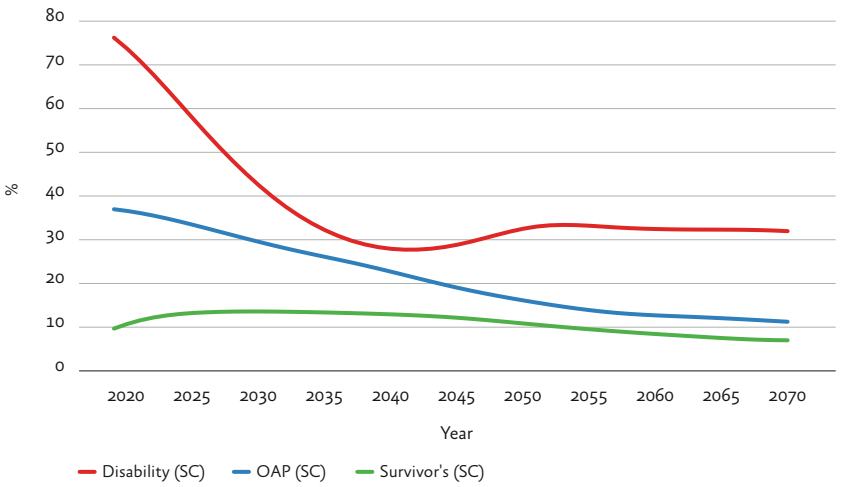
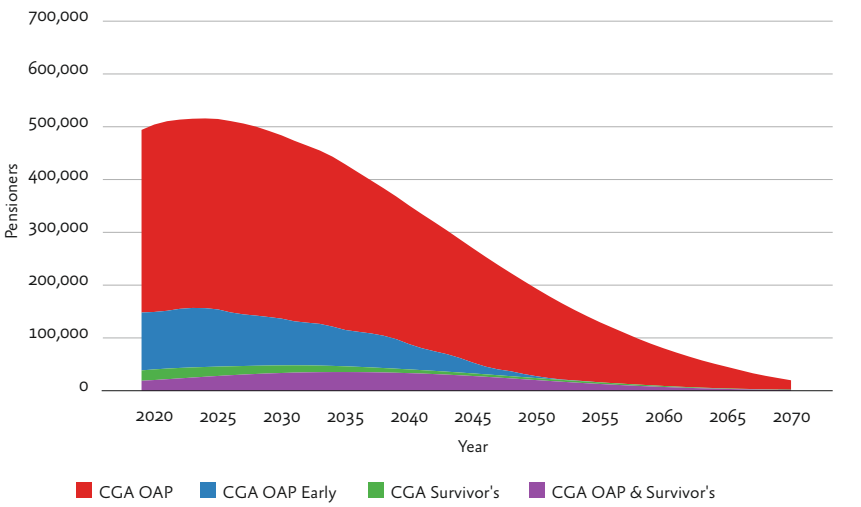


Figure 2.11 Civil servants pensioners, by type of pension



1.1. The Civil Servants Scheme

As expected, our results show an expected decline across all types of pensioners in the Civil Servant Regime, the CGA. As shown in Figure 2.11, the expected decrease in the number of pensioners is mostly led by a sharp decline in the total number of old age pensioners, which decreased from 354.8 thousand beneficiaries in 2020 to just 17.9 thousand in 2070. Furthermore, the number of individuals receiving an early Old-Age Pension from the Civil Servant Regime is expected to decrease steadily from 108.7 thousand in 2020 to 3.5 thousand in 2050, becoming essentially zero from this point onward. Finally, those receiving a Survivor's Pension from the Civil Servant Regime represent a marginal part of the system that will slowly decline over time, representing only 1.52 thousand in 2070.

2. Projected average monthly payments

In this section we describe how average pension benefits are expected to evolve up to 2070. We will start with the pensions from the Social Security System. As shown in Figure 2.12, in real prices, the average OAP is expected to increase from €483 in 2020 to €924 in 2070 (see Table 13, Annex 2), which amounts to an increase of 91.7%. In addition to the assumptions made about how OAP will be updated (see Chapter 1, Section 4.4), an important part of this increase reflects the fact that new pensions entering the system will be substantially higher than current pensions. For instance, in 2020, the average value of new pensions is €20 above the average OAP. In 2070, the average value of new OAP is 29.2% above the average of all OAP (see Table 13, Annex 2).

Figure 2.12 Average monthly pension: OAP, Social Security

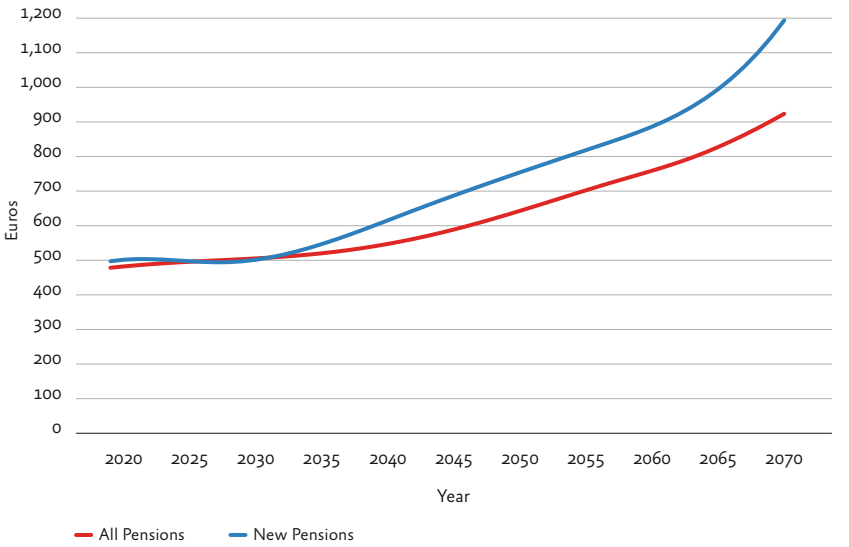
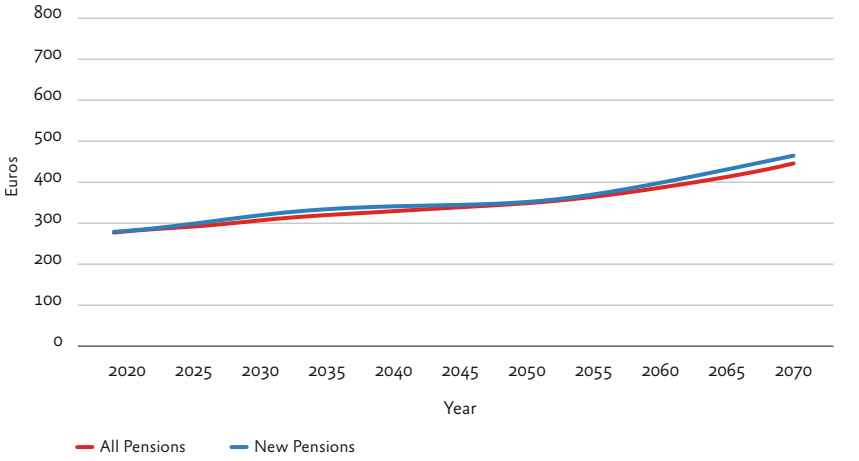


Figure 2.13 Average monthly pension: Survivor's Pension, Social Security

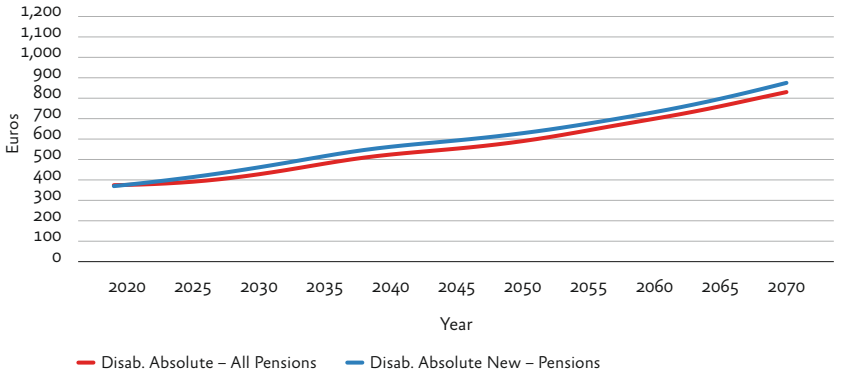


The average monthly Survivor's Pension (see Figure 2.13) is also projected to increase by about 59.2% during the period under analysis — from €280 in 2020 to €446 in 2070 (see Table 14, Annex 2). As before, new Survivor's Pensions are projected to be higher than the pensions under payment. However, the projected difference is considerably smaller than in the case of OAP.

For instance, in 2030, the average value of new Survivor's Pensions will be 4.2% higher than the average value of all pensions under payment (see Table 14, Annex 2). In 2070, the average value of new Survivor's Pensions will be 4.2% higher than the average value of all pensions under payment.

As shown in Figure 2.14, both Absolute and Partial Disability Pension benefits are expected to increase over the period under simulation. Thus, the average Absolute Disability Pension is projected to increase from €376 in 2020 to €830 in 2070, which amounts to a 120.7% increase in the period under analysis. The average Partial Disability Pension is expected to increase at a somewhat higher rate, from €409 in 2020 to €975 in 2070, which represents a 138.3% increase (see Table 15, Annex 2). As in the previous cases, new Absolute and Partial Disability Pension benefits are also projected to be higher than the current pensions under payment (see Table 15, Annex 2).

Figure 2.14 Average monthly pension: Disability Pensions, Social Security



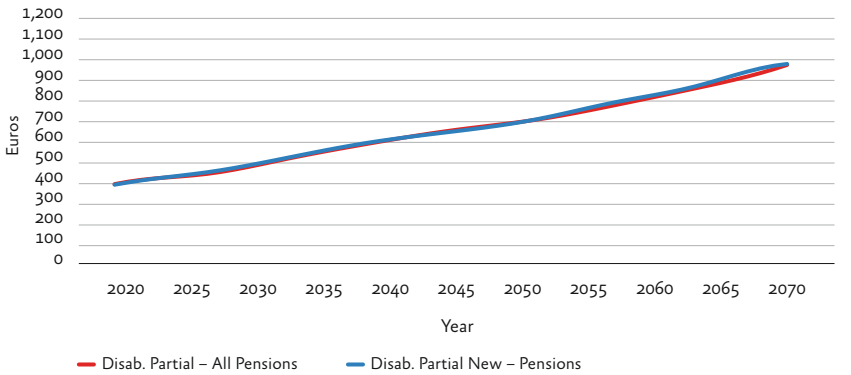
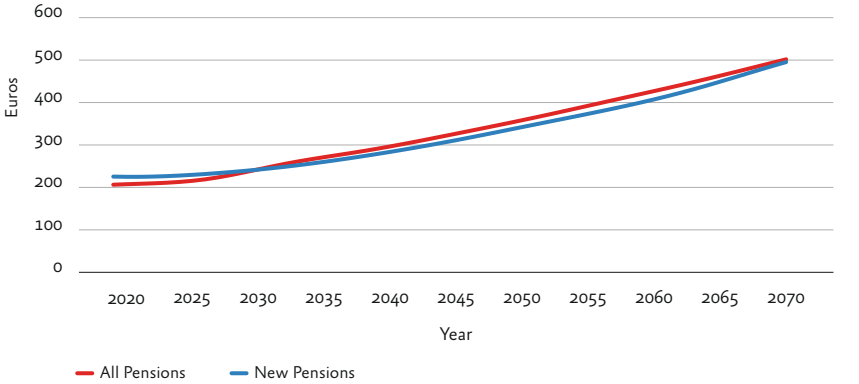


Figure 2.15 Average monthly pension: social Old-Age Pension, Social Security



As the average monthly Social OAP is not subject to the application of a Sustainability Factor, under current assumptions about the indexation of pension benefits (see Chapter 1, Section 4.4), it is expected to increase substantially, from €208 in 2020 to €502 in 2070 — which amounts to an increase of 141.3% (see Table 16, Annex 2). Unlike in previous cases, this increase is not explained by the value of new Social OAP. As we can see in Figure 2.15, from 2030 onwards the value of new Social OAP will remain marginally below the value of all the pensions under payment.

By contrast with developments in Social Security, the average value of CGA OAP is projected to decrease significantly over the period under analysis, from €1304 in 2020 to €470 in 2070 (see Table 17, Annex 2). This reflects the impact of the set of measures introduced in the last two decades to curb the growth of future pension expenditure in this sub-system (see Chapter 1, Section 2.2) — as attested by the significantly lower value of new OAP in the sub-system (see Figure 2.16).

Figure 2.16 Average monthly pension: Old-Age Pension, CGA

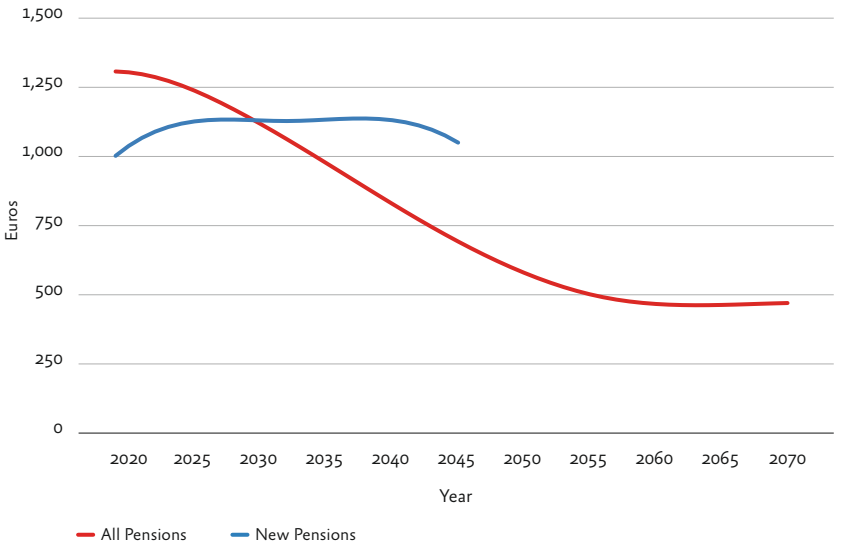


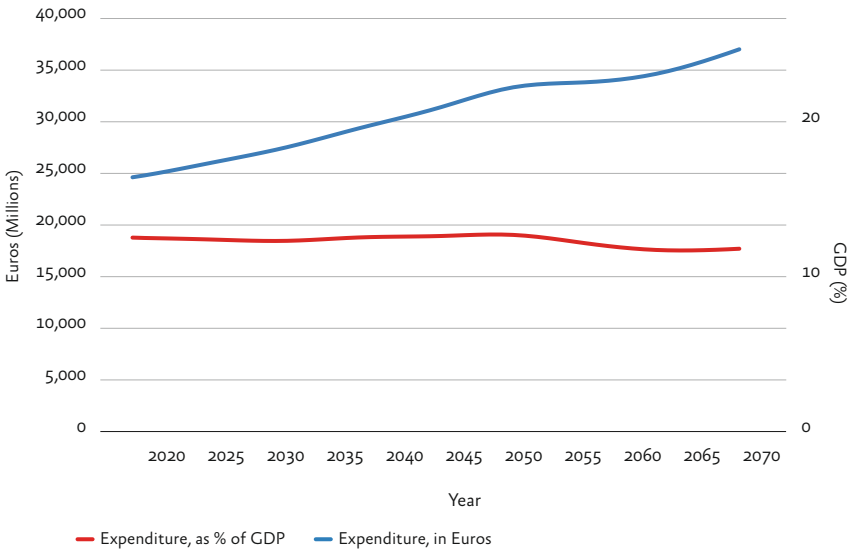
Figure 2.17 Average monthly pension: Survivor's Pension, CGA

The average value of CGA Survivor's Pension, on the other hand, is projected to increase from €411 in 2020 to €576 in 2035, followed by a slow decline until it reaches €270 by 2070 (see Table 18, Annex 2). As we can see in Figure 2.17, the increase between 2020 and 2030 can partly be explained by new pensions which are set at a much higher value than current pensions. Taking as a reference the start of the projection (2020), the average value of new Survivor's Pensions (€638) is 55% above the average value of all CGA Survivor's Pension under payment (€411).

3. Pension expenditure forecast

Having looked at the projected pattern of pension take-up in the period up to 2070, in this section we will describe how this will translate in terms of pension expenditure, both in real prices and as a percentage of GDP. As before, special attention will be paid to changes in Social Security and in the Civil Servants Scheme.

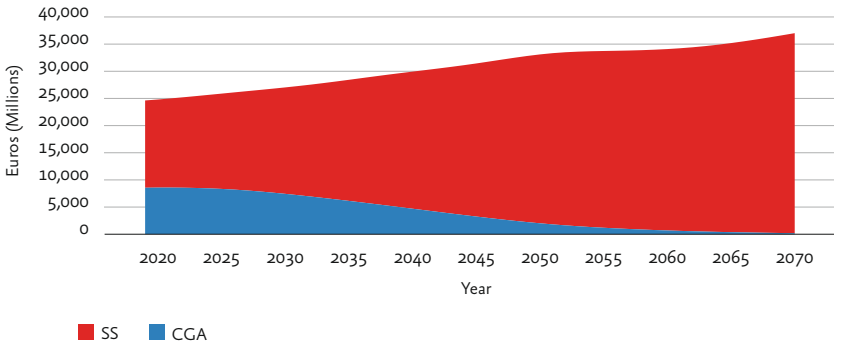
Figure 2.18 Pension expenditure, total

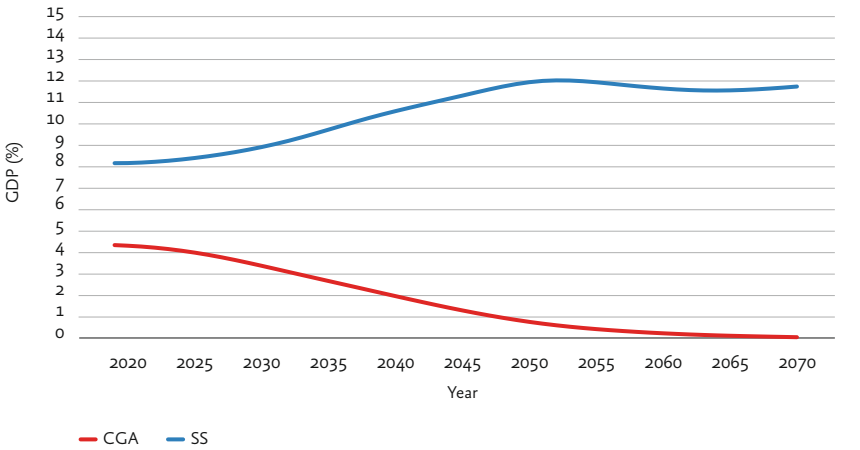


Following from the projected overall increase in pension take--up (see Figure 2.1), we project that in the period between 2020 and 2070 pension expenditure (in real prices) will increase by 49.2% — from 24.8 billion euros to 37 billion euros, respectively (see Table 19, Annex 2). However, as a percentage of GDP, this means that total pension expenditure will increase only from 12.5% in 2020 to 12.72% in 2050 — dropping to 11.8% by 2070.

As Figure 2.19 shows, the overall growth in pension expenditure is the product of two opposing trends. Thus, Social Security pension expenditure is expected to increase from 16.2 billion euros, in 2020, to approximately 36.8 billion euros, in 2070 — signifying an increase from 8.18% to 11.74% of GDP (see Table 20, Annex 2). By contrast, pension expenditure in the Civil Servants' scheme is expected to gradually decrease overtime, from 4.32% of GDP in 2020 to 0.06% in 2070 — which is consistent with the decrease in the number of beneficiaries projected earlier (see Figure 2.2).

Figure 2.19 Pension expenditure, SS and CGA

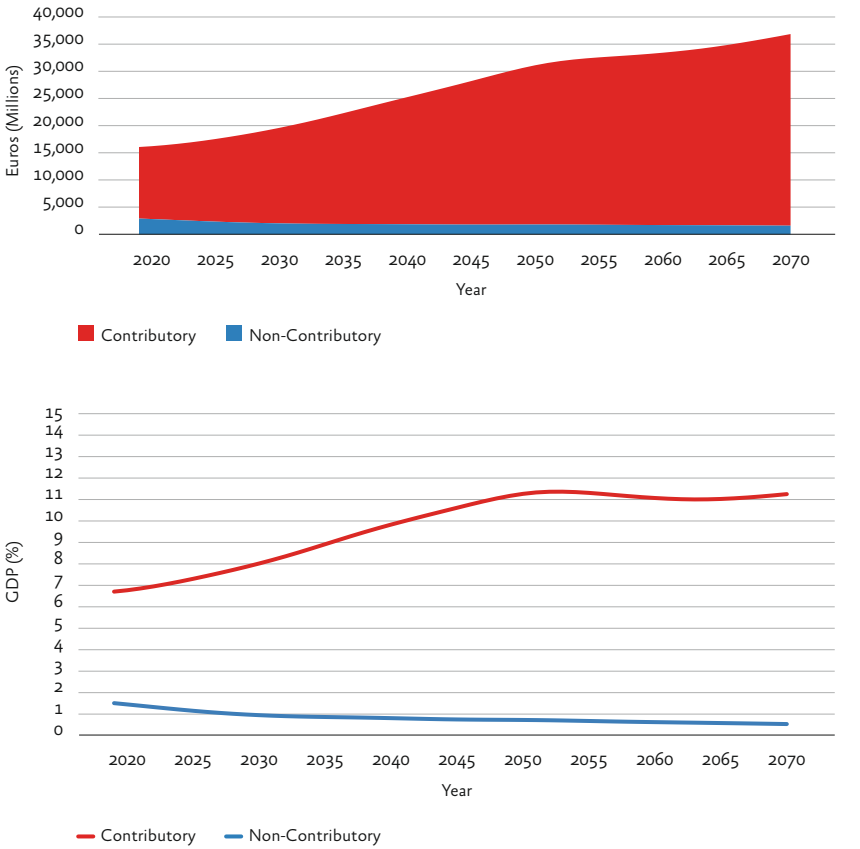




3.1. Social Security System

As we can see in Figure 2.20, the increase in Social Security pension expenditure is fundamentally explained by the rise in pension spending in the Contributory Regime, which (as a percentage of GDP) is expected to increase substantially during the period under analysis — from about 6.75% (or 13.39 billion euros, in real prices) in 2020 to 11.23% (35.2 billion euros) in 2070 (see Table 21, Annex 2). By contrast, and in line with the current assumptions about how the value of non-contributory benefits is updated[54] — we forecast that non-contributory benefit spending will decrease from 1.43% of GDP in 2020 to 0.51% of GDP by the end of the period under analysis.

Figure 2.20 SS pension expenditure: contributory and non-contributory pensions



1.2.9. Social Security Contributory Regime

Unsurprisingly, Old Age Pensions represent the bulk of pension expenditure in the Social Security Contributory Regime (see Figure 2.21). In fact, as it will become evident in the following sections, they explain much of the projected growth in expenditure in the Portuguese Public Pension System. As a percentage of GDP, spending in Old Age Pensions is projected to increase from 5% (or 9.9 billion euros) in 2020 to 9.69% (or 30.39 billion euros) in 2070 (see Table 22, Annex 2).

By contrast, spending in other contributory pensions is expected to remain relatively stable. As a percentage of GDP, expenditure with Survivor's Pensions is expected to decrease from 1.24% (or 2.46 billion euros) in 2020 to 0.76% (or 2.38 billion euros) in 2070. Spending in Disability Pensions (Absolute and Partial) is expected to grow slightly — from 0.50% (or about one billion euros) in 2020 to 0.77% (or 2.43 billion euros) in 2070 (see Table 22, Annex 2).

Figure 2.21 SS Contributory Regime: expenditure, by type of pension

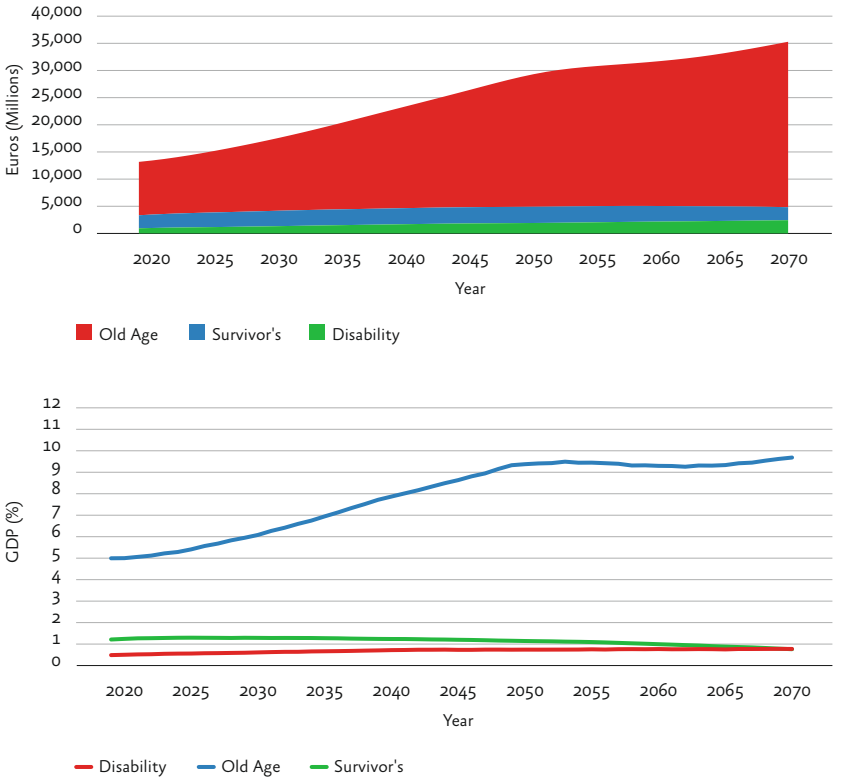
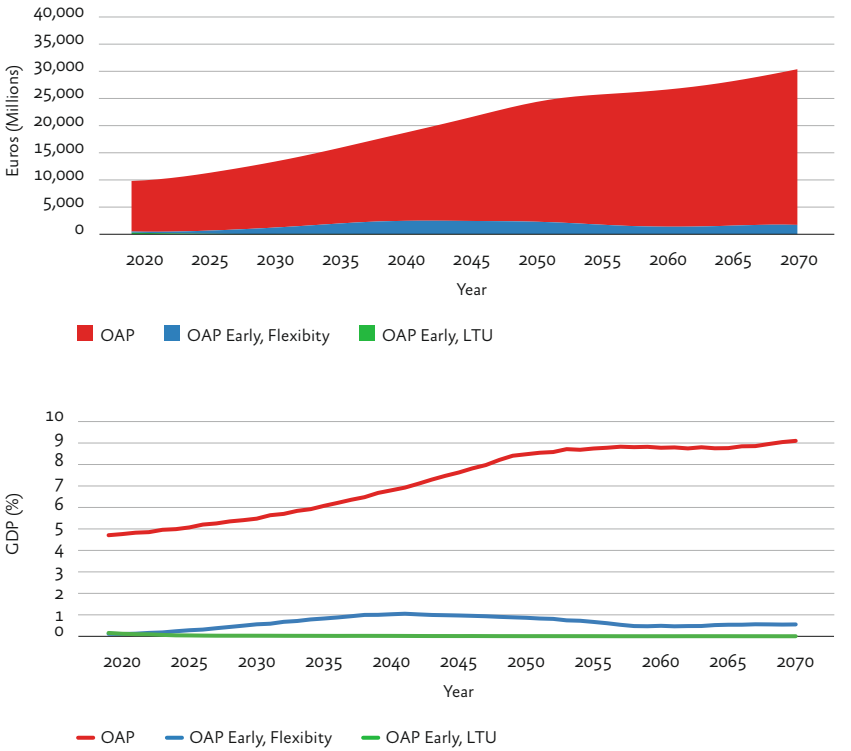
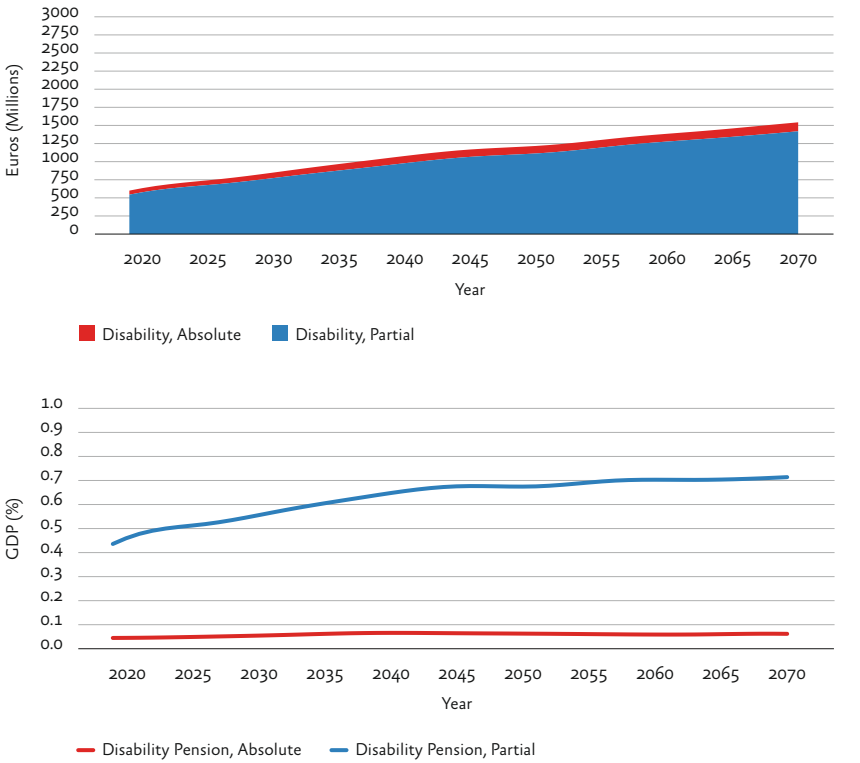


Figure 2.22 SS Contributory Regime: expenditure in Old-Age Pensions, by type of pension



As part of the overall increase in Old Age Pension spending (see Figure 2.21), we project that spending in early Old-Age Pensions for individuals with long contributory careers will more than double in the period between 2020 and 2070 (see Figure 2.22) — from 0.11% (or 220 million euros) to 0.55% (or 1.71 billion euros), respectively (see Table 23, Annex 2). On the other hand, under current assumptions about the take-up of early Old Age Pensions (see Chapter 1, Section 4.4) and reflecting the projected decline in unemployment during the period under analysis (see Chapter 1, Section 4.3), Old Age Pension spending due to long-term unemployment (LTU) is expected to decrease over-time, to the point of becoming an even more marginal feature in the Social Security Pension System (see Table 23, Annex 3).

Figure 2.23 SS Contributory Regime: expenditure in Disability Pensions, by type of pension



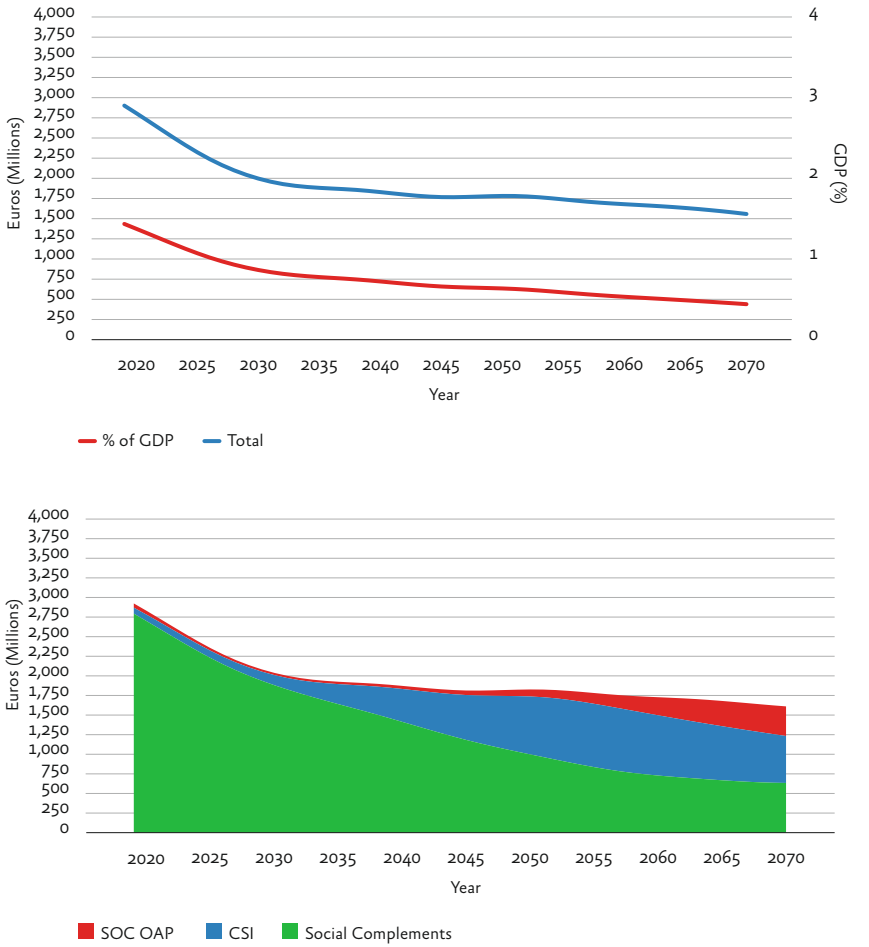
As Figure 2.23 shows, the projected increase in Disability Pensions expenditure reflects the rise in spending in Partial Disability Pensions, namely in the period between 2020 (0.47% of GDP, or about 911 million euros) and 2070 (0.71% of GDP, or 2.23 billion euros). Absolute Disability Pension spending is expected to increase from 0.05% of GDP in 2020 to 0.06% in 2070 (see Table 24, Annex 2).

1.2.10. Social Security Non-Contributory Regime

Reflecting the change in the relevance and internal composition of the financial safety-net provided to pensioners (see Chapter 1.1, Section 1.1), spending in non-contributory benefits is projected to decline from 1.43% of GDP in 2020 (or about 2.83 billion euros) to 0.51% in 2070 (or about 1.60 billion euros) (see Table 25, Annex 2). Also in line with previous findings, spending in social complements is expected to decline from 1.36% of GDP (or about 2.69 billion euros) in 2020 to 0.2% (or 634 million euros) in 2070 (see Table 25, Annex 2).

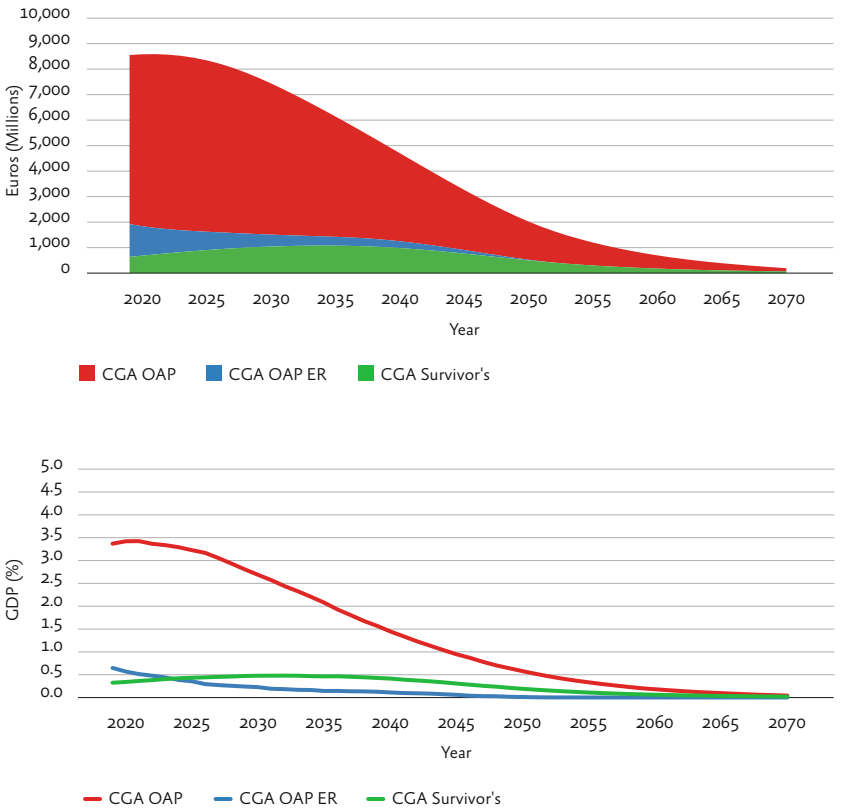
On the other hand, spending in CSI is projected to increase consistently throughout our simulation, going from 0.04% of GDP in 2020 (or 82 million euros) to 0.3% in 2055 (or 808 million euros), and then decline to 0.19% in 2070 (or 599 million euros). Finally, Social Old Age Pension expenditure is projected to increase from 2030 onwards (see Figure 2.24). Thus, spending in Social Old-Age Pensions is projected to increase from 0.01% of GDP in 2030 (or 28 million euros) to 0.12% (or 378 million euros) in 2070.

Figure 2.24 **SS non-Contributory Regime: expenditure, by type of pension/benefit**



3.2. Civil Servants Scheme

Figure 2.25 Civil servants scheme: pension expenditure, by type of pension



In line with the decrease in the number of pensioners mentioned earlier (see Section 1.2, Chapter 2), pension expenditure in the Civil Servants' Scheme is projected to gradually decline until 2070 (see Figure 2.25). Unsurprisingly, much of this decline reflects the drop in statutory Old Age Pension expenditure, which is projected to decline from 3.42% (or about 6.74 billion euros) in 2020 to 0.04% (or 128 million euros) in 2070 (see Table 26, Annex 2). Similarly, expenditure in Early Old Age Pensions is expected to decrease steadily until it stops completely by 2055. Finally, Survivor's Pension spending shows a slight increase from 0.34% of GDP in 2020 (or 681 million euros) to 0.48% in 2030 (or 1 billion euros), followed by a steady decline until it reaches virtually zero (0.02% of GDP) by 2070.

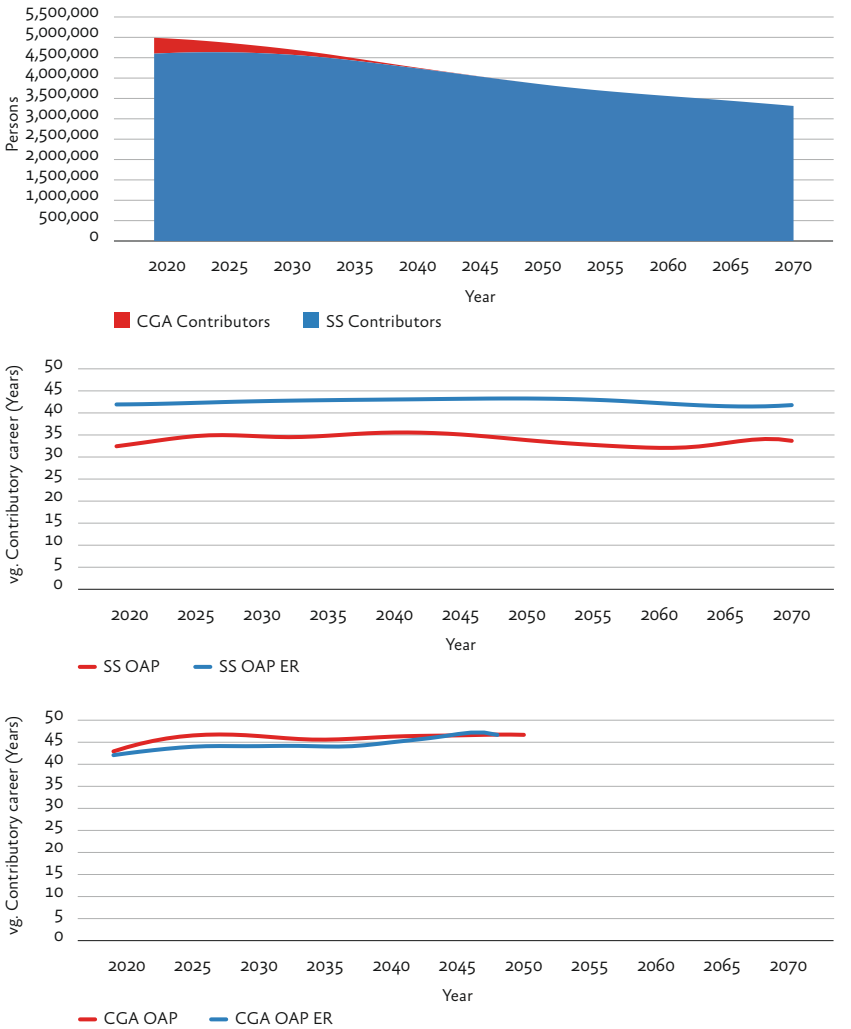
4. Long-term financial and fiscal sustainability

In the previous sections we describe what we project will be the future demand for pensions in the period up to 2070, and the associated patterns of pension expenditure. Building on projections about how pension contributions will evolve in the period under analysis (Section 3.1), in this section we assess the long-term financial and fiscal sustainability of the Portuguese Pension System (Section 3.2).

4.1. Pensions contributions forecast

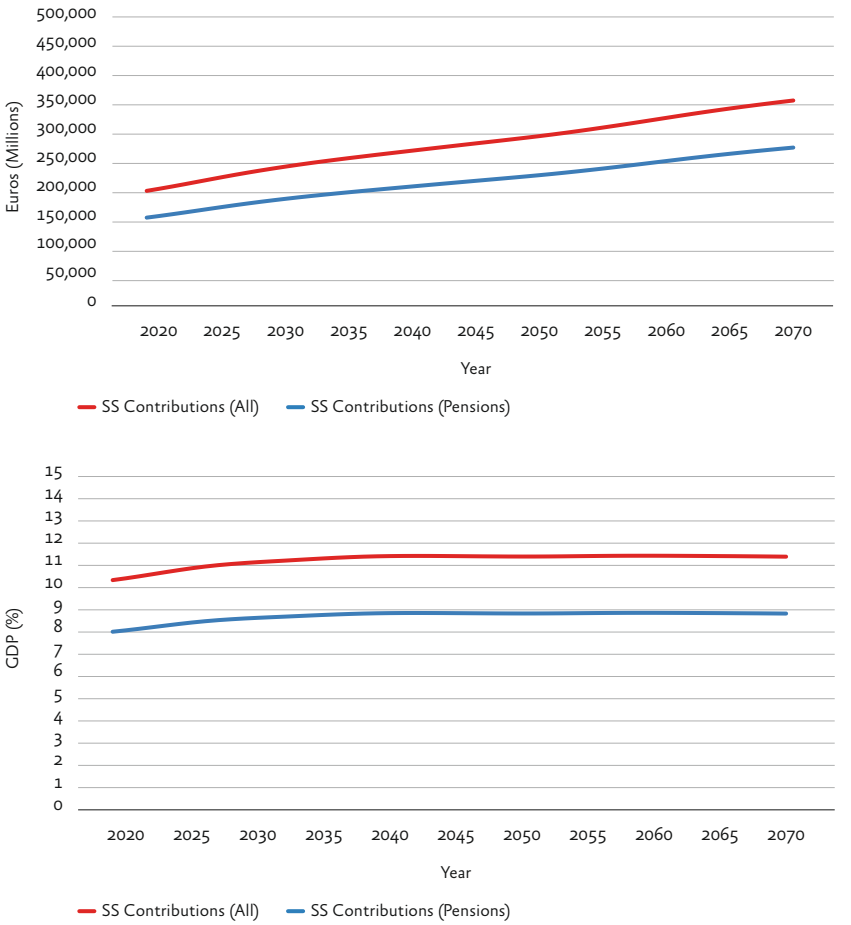
In line with the projected drop in the number of people registered in the labour force, and in employment (see Chapter 1, Section 4.2), the number of pension contributors is expected to decline in the period under analysis (see Graph 2.26). Looking specifically at Social Security, we project that the number of workers paying Social Security contributions[55] will decrease by about 28.1% — from 4.61 million in 2020 to 3.31 million in 2070 (see Table 27, Annex 2). Unsurprisingly, as the system has been closed to new entries since 2006, the decline in the number of contributors is much steeper in the Civil Servants Scheme (see Table 28, Annex 2).

Figure 2.26 Contributors and average contributory career at time of pension take-up



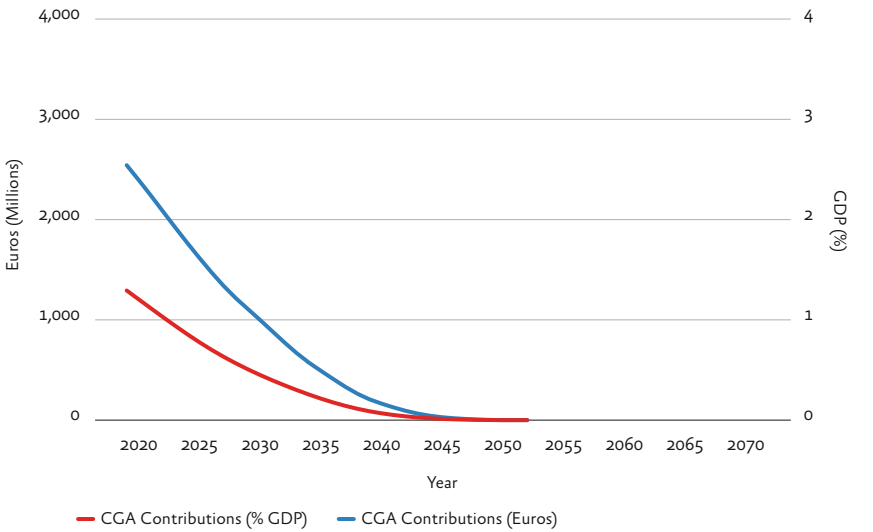
As we can also see in Figure 2.26, efforts to promote longer contributory careers and delay the take-up of pension benefits — such as the introduction of the sustainability factor in 2007 (see Chapter 1, Section 2) — will only be partly successful. Thus, the average contributory career at the time of the take-up of a Social Security Old Age Pension is projected to remain relatively stable throughout the entire simulation, increasing from 34 years in 2020 to 36 years in 2045, and dropping again to 34 by 2070 (see Table 27, Annex 2). Although at a higher level, the same pattern applies to the average contributory careers of early Social Security pensioners, with the difference that it peaks in 2045. While reflecting assumptions about the take-up of pension benefits (see Chapter 1, Section 4.4), the gradual decrease in the length of contributory careers at the end of the period simulated must also be interpreted as a result of an increase in the number of individuals staying longer in education, and thus entering the labour market later.

Figure 2.27 Contributions to Social Security



Given the fairly optimistic assumptions about how labour productivity and wages are expected to develop in the period under analysis, the projected decline in the number of potential contributors mentioned above (Figure 2.26) will not translate into lower pension contributions[56]. In fact, as shown in Figure 2.27, we estimate that pension contributions will increase from 10.4% of GDP in 2020 (or 160 billion euros) to 11.4% (or 277 billion euros) in 2070 (see Table 29, Annex 2). If we only consider the percentage of social contributions that is allocated to the payment of contributory pensions (approximately 77.5% of total contributions), this is expected to grow from 10.4% of GDP in 2020 (or 160 billion euros) to 11.4% (or 277 billion euros) in 2070 (see Table 29, Annex 2).

Figure 2.28 Contributions to the civil servants scheme



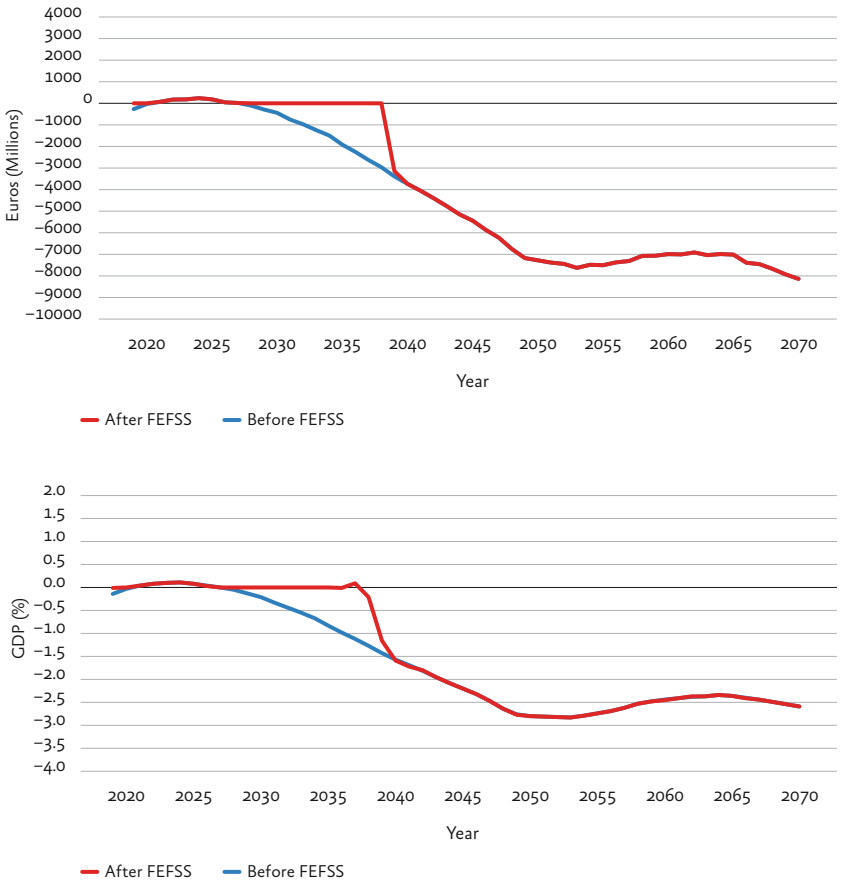
As evidenced in Figure 2.28, the projected growth in wages is not strong enough to counterbalance the steep decline in the number

of CGA contributors (see Figure 2.26). Thus, CGA contributions are projected to gradually decline from 1.2% of GDP (or 2.39 billion euros) in 2020 to its near exhaustion by 2045 (see table 30, Annex 2).

4.2. Financial and Fiscal Sustainability Projection

In the previous sections we have shown that, as a percentage of GDP, Social Security Contributory Pension spending is projected to rise steeply in the period up to 2050 (see Figure 2.20). We have also shown that revenue from social contributions allocated to pensions, while set to increase, will do so at a much slower rate (see Figure 2.27). In light of this, we project a continuous decline in the financial situation of this key segment of the Portuguese Pension System. As we can see in Figure 2.29, this means that the contributory pension branch of Social Security will start to register chronic deficits from 2028 onwards. The size of these deficits is projected to gradually increase until 2050 — by that time, it will amount to 2.8% of GDP. From that point onwards, and reflecting the stabilization of Contributory Pension expenditure (see Figure 2.20) and the gradual improvement of Social Security revenues (see Figure 2.27), we project that the size of the deficits will start to decline. Thus, by 2070, the deficit in the contributory pension branch of Social Security is expected to amount to 2.59% of GDP (see Table 31, Annex 2).

Figure 2.29 Financial balance: SS Contributory Regime, before and after FEFSS



As they are meant to help tackling Social Security financial imbalances (see Chapter 1, Section 1.1), funds from FEFSS could be used to cover for the aforementioned deficits in the contributory pension branch of

Social Security[57]. As we can see in Figure 2.29, transfers from FEFSS would help to postpone the emergence of chronic financial deficits by 11 years — at which time FEFSS funds would be exhausted and large chronic deficits (above 2% of GDP) would arise again (see Table 31, Annex 2).

Figure 2.30 FEFSS (pension-related) funds and transfers

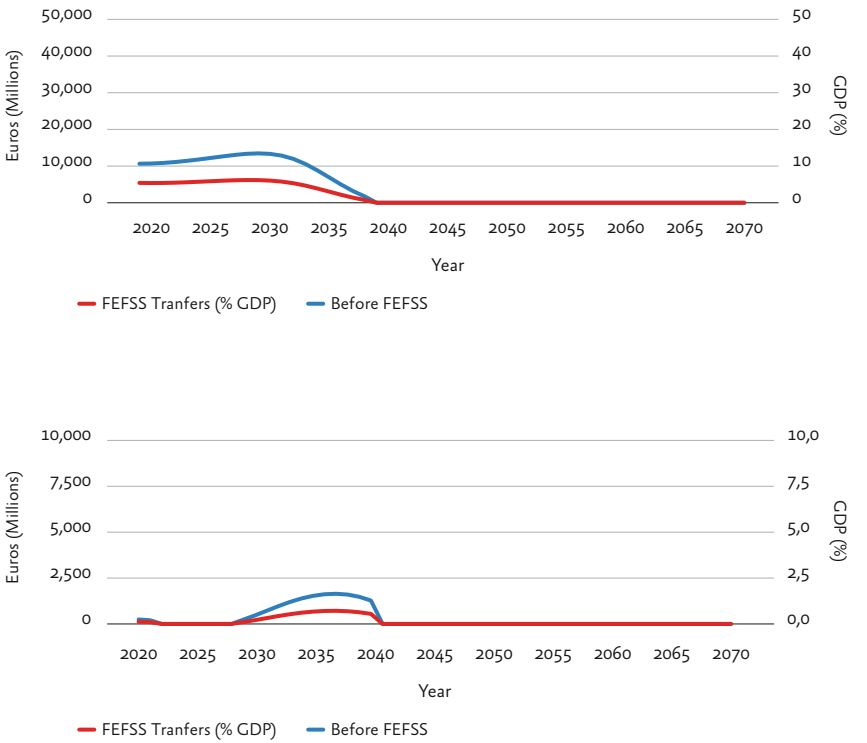
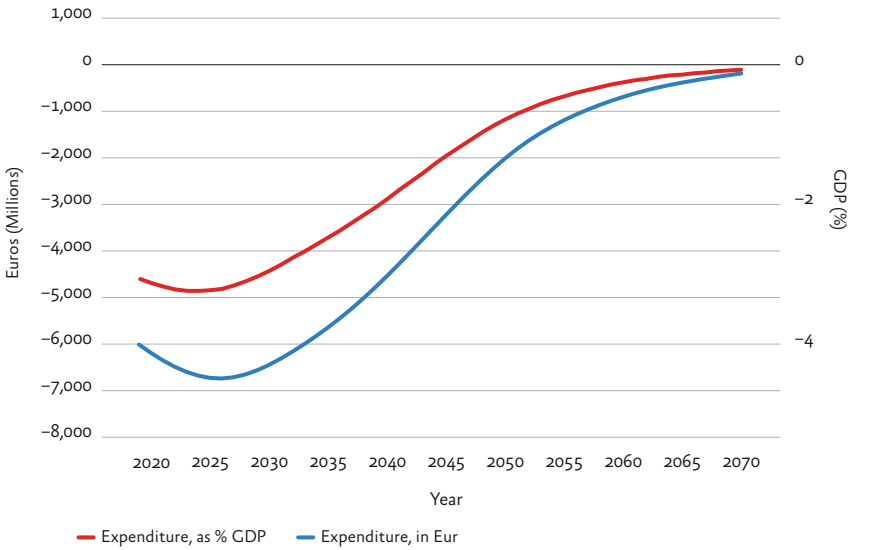
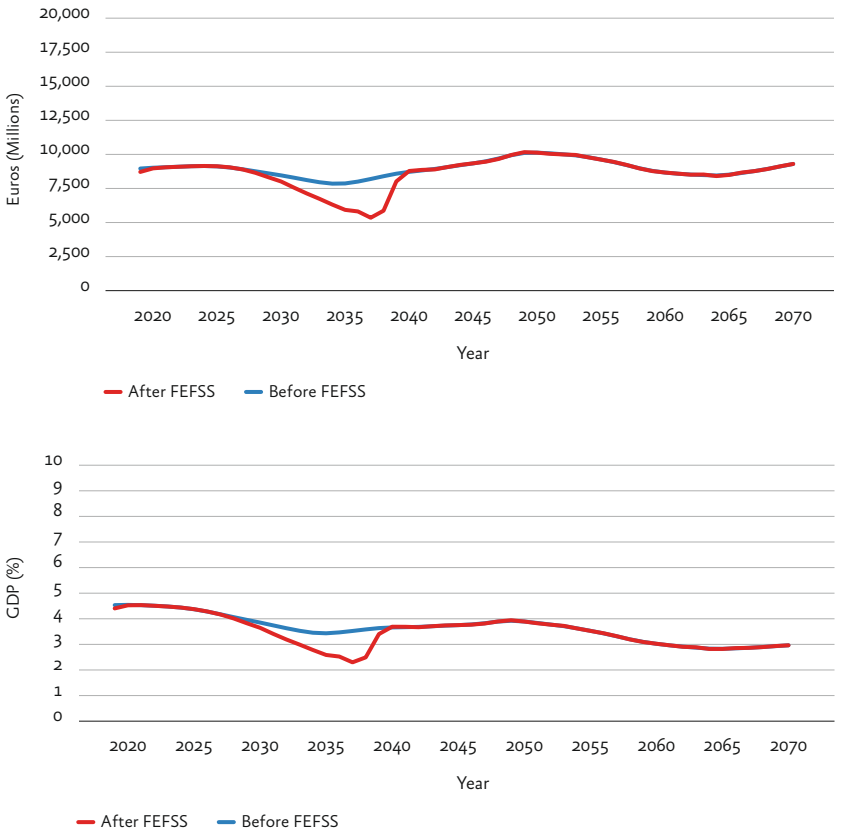


Figure 2.31 Financial balance: CGA



As we can see in Figure 2.31, by 2020 CGA will already be severely underfunded — with a deficit of 3.12% of GDP in 2020 (see Table 33, Annex 2). Still, reflecting the fact that CGA pension-related expenditure will decrease at a quicker rate than contributions, we project that the financial situation of CGA will improve in the period under analysis, namely after 2025.

Figure 2.32 Total fiscal burden



Considering the costs of underfunded pension expenditure from contributory pensions in Social Security and CGA, and the costs of non-contributory Social Security pension-related benefits (CSI, Social Old Age Pension and social complements), we project that the total burden of the Pension System on the public purse will decrease in the period between 2025 and 2035 (from 4.37% of GDP, to 3.43% of GDP), followed by a slight increase up to 2050 (3.89% of GDP). Then, reflecting this decline in Social Security and CGA pension expenditure as a percentage of GDP (see Figures 2.24 and 2.25), we project a gradual decrease in the burden of the Pension System all the way down to 2.96% of GDP in 2070 (see Table 34, Annex 2). Again, the deployment of transfers from FEFSS to cover pension-related deficits in Social Security would allow for a temporary reduction of the Pension System cost in the period between 2028 and 2038 (down to 2.31% of GDP). At the same time, it would lead to an abrupt increase in the burden of the Pension System once FEFSS funds are exhausted.

5. Long-term social sustainability

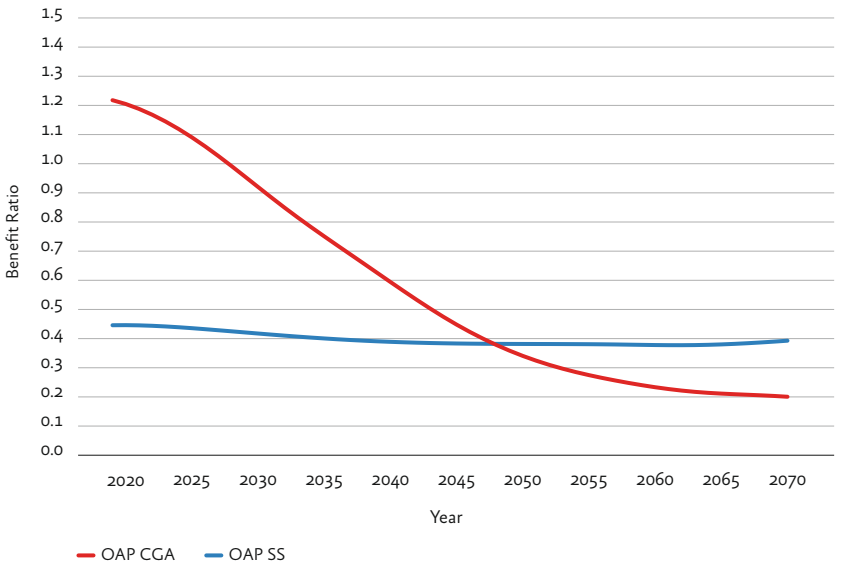
In the previous section, we examined how the Portuguese Pension System is projected to perform with regards to its financial sustainability. In this section, we will examine how it will perform in terms of social sustainability. As an introduction to our analysis, we will start by looking at how average pension benefits are expected to evolve in the period under analysis (Section 7.1). Then, in line with the framework sketched above (see Chapter 1, Section 1), we will assess the projected adequacy of pension benefits (Section 7.2), the ability of pensions to replace income from work (Section 7.3) and to protect seniors against the risk of poverty (Section 7.4).

5.1. Securing an Adequate Income

Building on the analysis of how pension benefits are likely to evolve in the period up to 2070, we will now look specifically at the indicators that measure the long-term social sustainability of the Portuguese Public Pension System. We will start by looking at the adequacy of

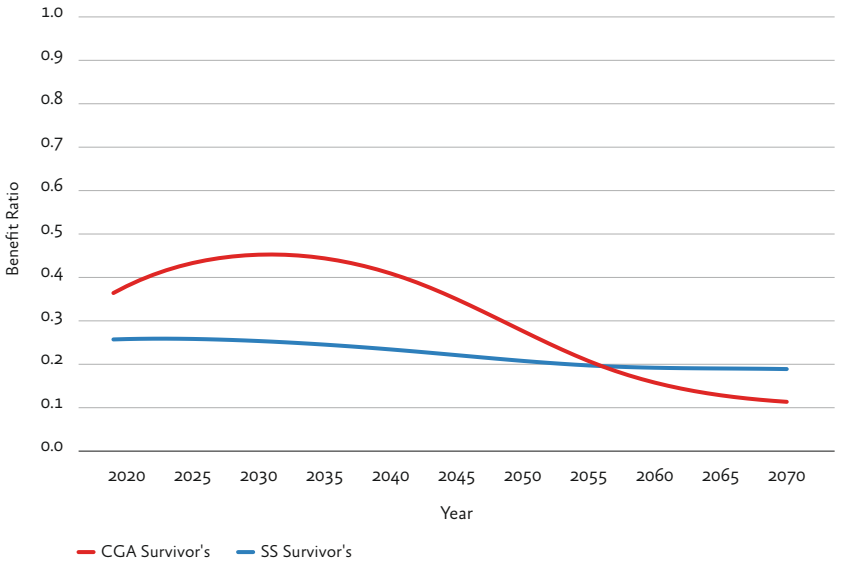
future pension benefits. In line with the analytical framework set above (see Chapter 1, Section 1), this will be done by looking at how the value of pension benefits compares with the value of wages in the economy — as measured by the benefit ratio.

Figure 2.33 Benefit ratio: Old-Age Pension, Social Security and CGA



Despite the projected increase in the value of Social Security Old Age Pensions (see Figure 2.12), we nonetheless project a small drop in the adequacy of this type of pensions. Thus, the Social Security Old Age Pension benefit ratio is projected to decline from 0.45 in 2020, to 0.39 in 2070 (see Table 35, Annex 2). Also unsurprisingly, given the projected drop in the average value of CGA Old Age Pensions (see figure 2.16), the adequacy of his type of benefits is projected to decrease severely in the period under analysis — with the benefit ratio dropping from 1.20, in 2020, to 0.2 in 2070 (see Table 35, Annex 2).

Figure 2.34 Benefit ratio: Survivor's Pensions, Social Security and CGA



In line with the developments described above, we project a small decrease in the adequacy of Social Security Survivor's Pensions — from 0.26 in 2020 to 0.19 in 2070 (see Table 36. Annex 2) — despite a projected increase in their average value (see Figure 2.13). Reflecting the increase in the average value of CGA Survivor's Pensions (see Figure 2.17) in the period between 2020 and 2030, we project that the adequacy of this type of benefit will also increase in this period (from 0.38 in 2020 to 0.45 in 2030), only to decrease all the way to 0.11, in 2070 (see Table 36, Annex 2).

Figure 2.35 Benefit ratio: Disability Pensions, Social Security

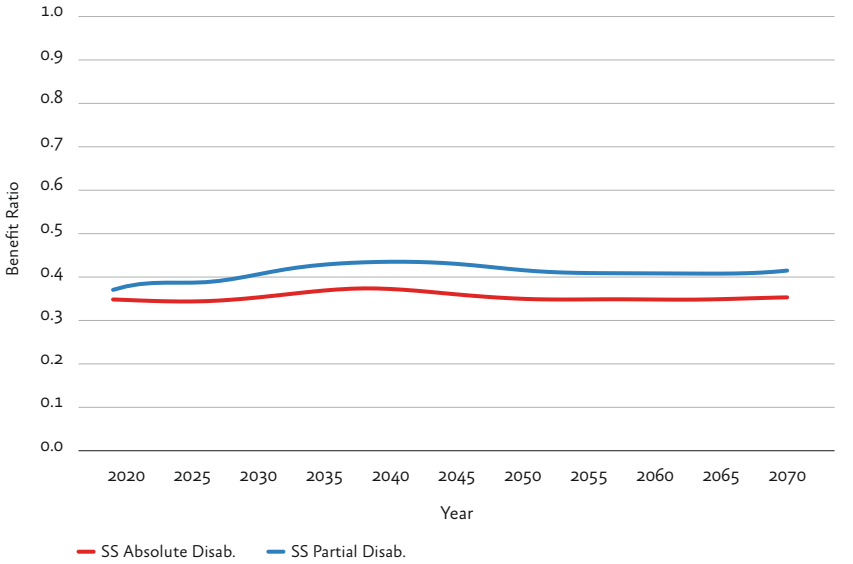
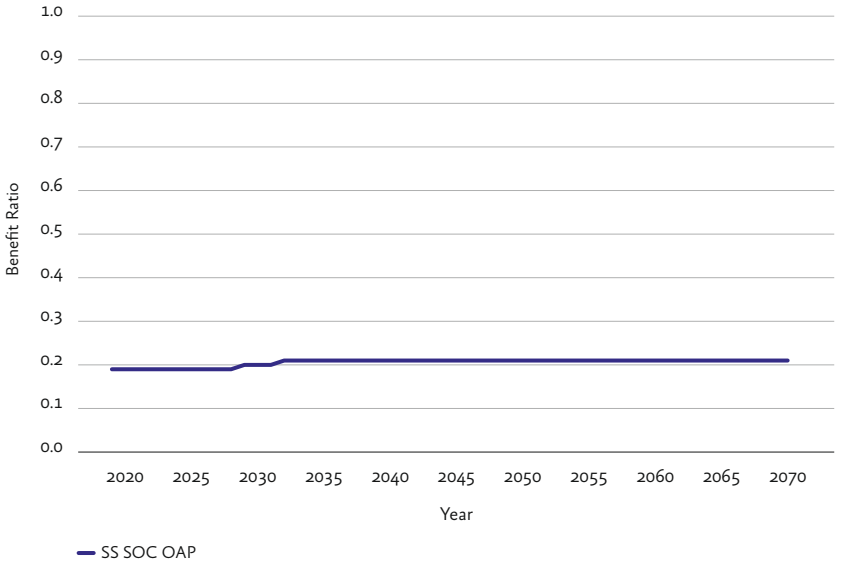


Figure 2.36 Benefit ratio: social OAP, Social Security

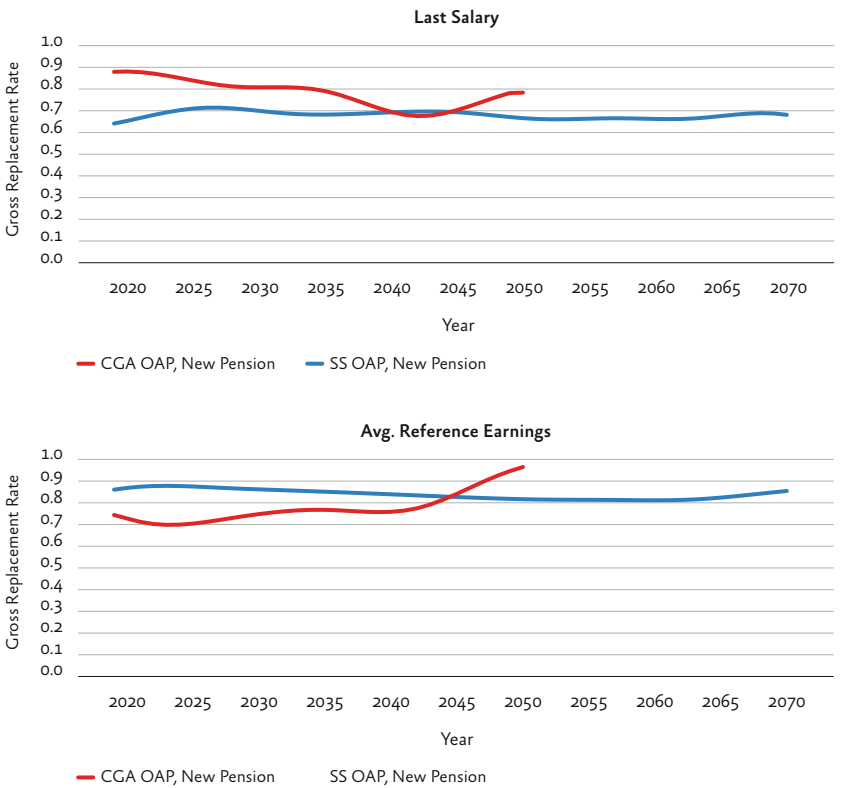


As mentioned above, the average value of Absolute and Partial Disability Pensions is projected to increase in the period up to 2070 (see Figure 2.14). However, as we can see in Figure 2.35, the ability of these pensions to keep up with the developments in the labour market remains relatively stable for Absolute Disability pensions, increasing slightly from 0.35 in 2020 to 0.37 in 2040, and falling back down to 0.35 in 2070. In the same way, the Partial Disability Pensions' benefit ratio is expected to increase from 0.38 in 2020 to 0.44 in 2040, from which point it falls back down to 0.41 in 2070 (see Table 37, Annex 2).

Unsurprisingly, given the assumption that means-tested benefits will be updated in line with changes in average wages (see Chapter 1, Section 4.4), we do not anticipate any significant changes to the adequacy of Social OAP (see Table 38, Annex 2).

5.2. Protection Against a Drop in Income

Figure 2.37 Gross replacement rates: Old--Age Pension, Social Security CGA



Having looked at the adequacy of future pension benefits, we now turn to the second dimension of the social sustainability of the Portuguese Public Pension System, which concerns the ability to avoid a significant drop in income when moving into retirement — as measured by gross replacement rates (see Chapter 1, Section 1). The results presented here depend heavily on the assumptions made about the take-up of Old Age Pensions, and in particular of Early Old Age Pensions (see Chapter 1, Section 4.4).

As depicted in figure 2.37, when considering the last salary earned prior to retirement, the gross replacement rate of Social Security pensioners is expected to increase initially between 0.65 in 2020 and 0.71 in 2030, only to gradually drop down to 0.66 in 2060, and suffers a slight increase in the final years of the simulation, up to 0.68 in 2070. However, when considering average reference earnings, the gross replacement rate of new Social Security pensioners is actually set much higher, starting at 0.87 in 2020 and declining steadily to 0.81 in 2060, only to increase again to 0.85 in 2070 (see Table 39, Annex 2).

On the other hand, the gross replacement rate for CGA Old Age Pensions, considering the last salary earned prior to retirement, is expected to drop steadily from 0.88 in 2020 to 0.69 in 2040, only to rise again up to 0.78 in 2050. On the other hand, when considering average reference earnings, the gross replacement rate for CGA Old Age Pensions decreases from 0.73 in 2020 to 0.70 in 2025, only to increase again to 0.96 in 2050 (see Table 39, Annex 2).

5.3. Protection Against the Risk of Poverty

Figure 2.38 Poverty thresholds

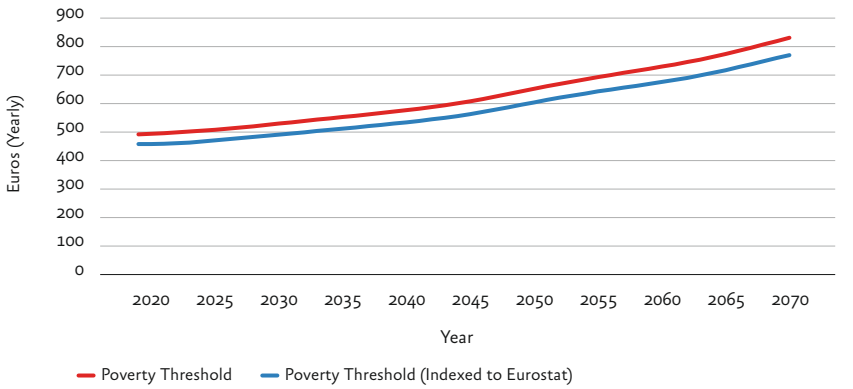
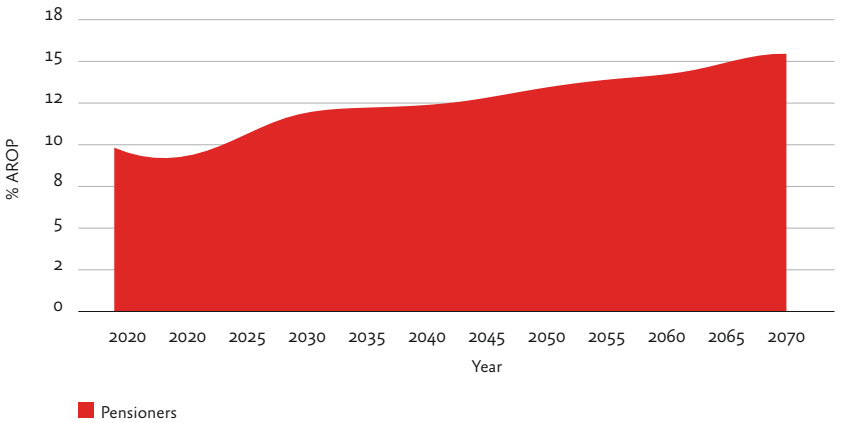


Figure 2.39 At-risk-of-poverty rate, pensioners



We conclude our assessment of the long-term social sustainability of the Portuguese Public Pension System by looking at its ability to protect pensioners from the risk of poverty, as measured by the share of population with incomes below a threshold anchored to the 60% of the median of equalized net income — i.e. after social transfers and taxes — in 2014, and updated by reference to changes in average wages (see Chapter 1, Section 1). As we can see in Figure 2.39, this means that the poverty threshold is expected to increase from €494 in 2020, to €831 in 2070 (see Table 40, Annex 2).

Under the assumption that the poverty threshold will increase in line with average wages, we project that the percentage of seniors subject to the risk of income poverty will increase — from 9.53% in 2020, to 15.46% in 2070 (see Table 41, Annex 2).

Chapter 3
Assessing the impact of lower productivity

As mentioned above (see Chapter 1, Section 4), our baseline projections are based on the macroeconomic scenario adopted in the 2018 Ageing Report. As we have also highlighted (see Chapter 1, Section 4.4), this macroeconomic scenario is based on fairly optimistic assumptions about how total factor productivity, and consequently of labour productivity, will grow in the period under analysis. As it was made evident throughout Chapter 2, this is a particularly relevant issue, as assumptions made about how labour productivity will evolve will influence the future value of wages, and consequently the value of pension contributions, future pensions and, consequently, pension expenditure.

This chapter looks into what would happen if labour productivity were to grow less than predicted in our baseline macroeconomic scenario. With this in mind, we conduct a sensitivity analysis — henceforth referenced to as the 'lower productivity scenario' — whereby we adopt the 2018 Ageing Report's 'lower total factor productivity scenario' (European Commission, 2017). As we can see in Table 15, this alternative macroeconomic scenario assumes that total factor productivity will grow at a much slower rate. Thus, from 2030 onwards, total factor productivity is expected to grow (on average) by 0.4 pp less per year than in the baseline scenario. The contribution of capital deepening to labour productivity growth is also expected to be lower than in the baseline scenario. Under the assumption that there will be no changes in the supply of labour to the economy, this means that labour productivity is expected to grow at a much slower rate than in the productivity scenario — particularly in the period between 2050 and 2070. Naturally, this also means that potential real GDP will grow at a much slower rate during the period under analysis.

Table 15 Lower produtivity, macroeconomic scenario

PERIOD	POTENTIAL REAL GDP (GROWTH RATE)[a]		LABOUR PRODUCTIVITY (GROWTH RATE PER HOUR)[a]		TOTAL FACTOR PRODUCTIVITY (GROWTH RATE)[a]		CAPITAL DEEPENING (CONTRIB. TO LABOUR PROD. GROWTH)[a]		LABOUR INPUT (TOTAL HOURS WORKED, GROWTH RATE)[a]	
	1=2+5		2=3+4		3		4		5	
	Baseline	Low Prod.	Baseline	Low Prod.	Baseline	Low Prod.	Baseline	Low Prod.	Baseline	Low Prod.
2016-2020	0.8	0.8	0.5	0.5	0.6	0.6	-0.1	-0.1	0.2	0.2
2021-2030	1.1	1.0	1.2	1.2	0.8	0.8	0.4	0.4	-0.2	-0.2
2031-2040	0.8	0.5	1.6	1.2	1.0	0.8	0.6	0.4	-0.8	-0.8
2041-2050	0.9	0.2	1.8	1.2	1.2	0.8	0.6	0.4	-1.0	-1.0
2051-2060	1.0	0.3	1.8	1.1	1.1	0.7	0.6	0.4	-0.8	-0.8
2061-2070	0.9	0.3	1.6	1.0	1.0	0.6	0.6	0.3	-0.7	-0.7

a) Source: Ageing Report 2018

1. Impact on average monthly payments

As mentioned above (see Section 1, Chapter 3), lower-than-expected labour productivity gains mean that salary increase will be below that of the baseline scenario. This also means that future pension benefits will grow at a lower rate than projected in the baseline scenario. This is attested by Figure 3.1, which shows that overtime, in the lower productivity scenario, the average value of new Social Security OAP pensions will be increasingly below what is projected in the baseline scenario. Taking as a reference the last year projected (2070), lower-than-expected productivity would reduce the average value of Social Security OAPs by €54 — from €924 in the baseline scenario to €870 in the lower productivity scenario (see Table 1, Annex 3). Naturally, this also signifies that the average value of new Social Security OAPs will be below what is projected in the baseline scenario (see Figure 3.2).

Figure 3.1 Average monthly payment: SS OAP

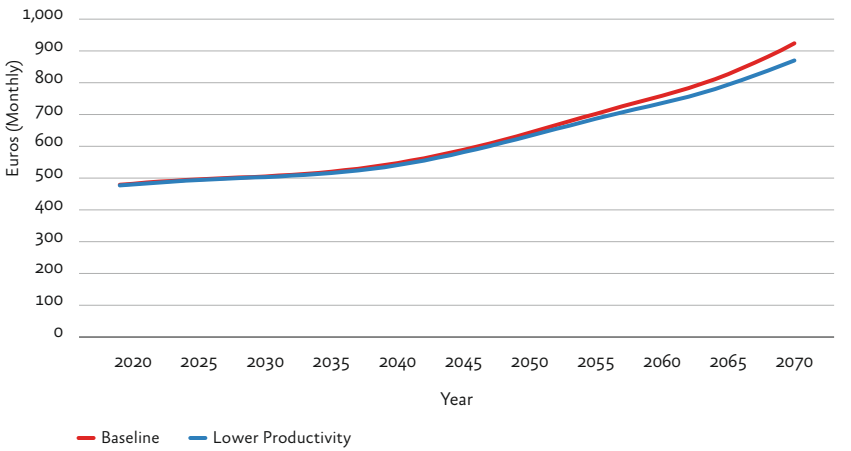
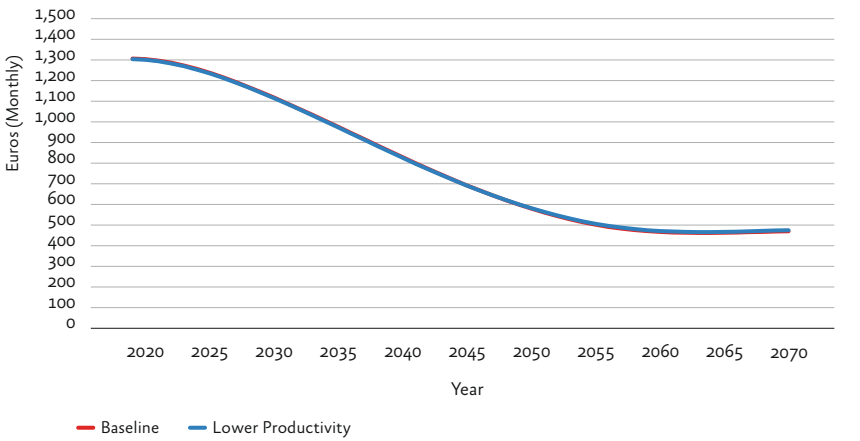


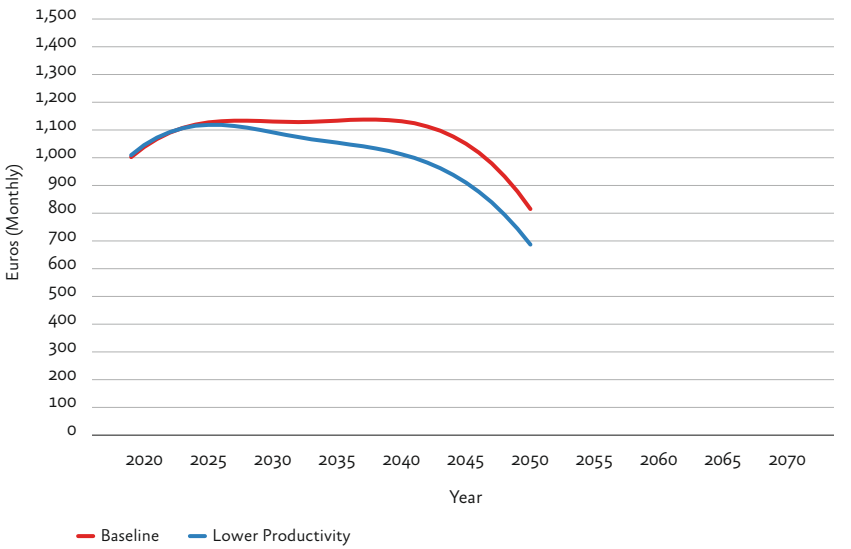
Figure 3.2 Average monthly payment: new SS OAP

Figure 3.3 Average monthly payment: CGA OAP



Just as with Social Security, the average value of new CGA OAPs is also projected to decrease as a result of lower-than-expected productivity gains (see Figure 3.4). Thus, by 2045, the average value of new CGA OAP is expected to be €140 lower than in the baseline scenario — €910, compared to €1050 (see Table 4, Annex 3). However, given the ever-decreasing number of new CGA pensioners, this does not really impact on the overall value of CGA OPAs (see Figure 3.3).

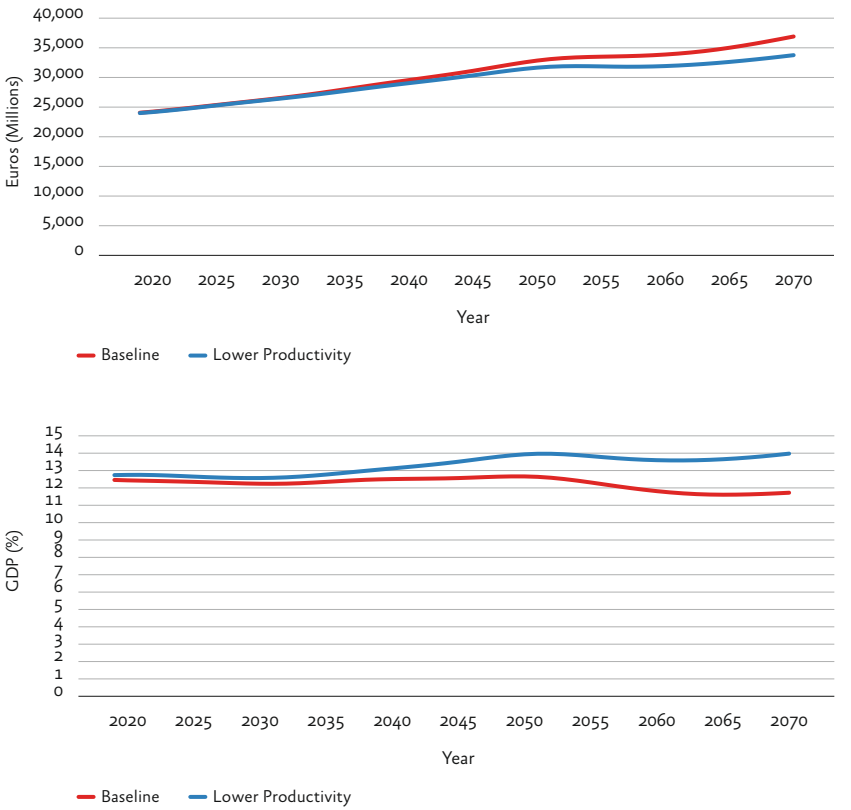
Figure 3.4 Average monthly payment: new CGA OAP



2. Impact on pension expenditure

As we can see in Figure 3.5, lower levels of productivity would significantly increase the cost of the Portuguese Pension System, as a percentage of GDP. Taking as a reference the last year of the projection (2070), lower levels of labour productivity would increase total pension expenditure by 2.2% of GDP — from 11.8% of GDP in the baseline scenario, to 14% in the lower productivity scenario (see Table 5, Annex 3). While they can be counterintuitive at first, these results are easy to explain. Lower labour productivity growth means that salaries will increase at a lower rate than in our baseline scenario. Consequently, the value of future pensions and pension expenditure is also likely to grow at a slower pace than in the baseline scenario. However, this decrease in pension expenditure is smaller than the projected decline in GDP. Consequently, as a percentage of GDP, pension expenditure will actually increase.

Figure 3.5 Total pension expenditure, % of GDP



It is also worth noting that the impact of lower productivity on pension expenditure becomes stronger overtime — which is only to be expected as the impact of lower wages on the calculation of new pensions only becomes obvious in the medium/long term. This helps to explain why CGA pension expenditure, as a percentage of GDP, is not likely to grow (see Table 7, Annex 3). On the one hand, much of CGA pension expenditure is based on entitlements of people with fully-established pension rights. On the other hand, the full impact of lower productivity only takes place when the number of new CGA pensioners is much reduced.

Figure 3.6 SS pension expenditure, % of GDP

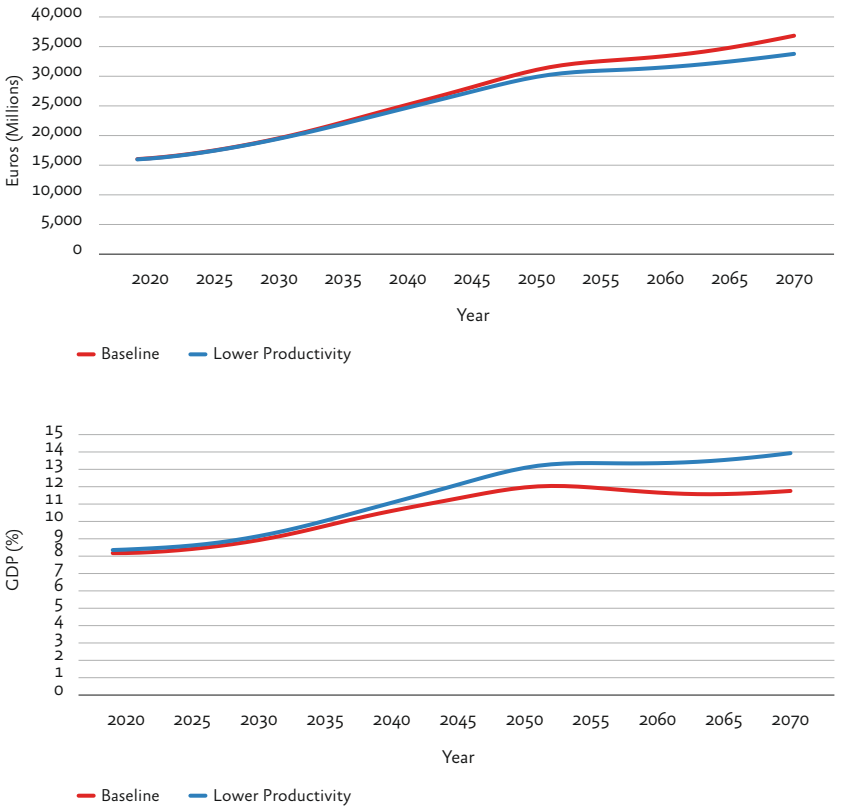
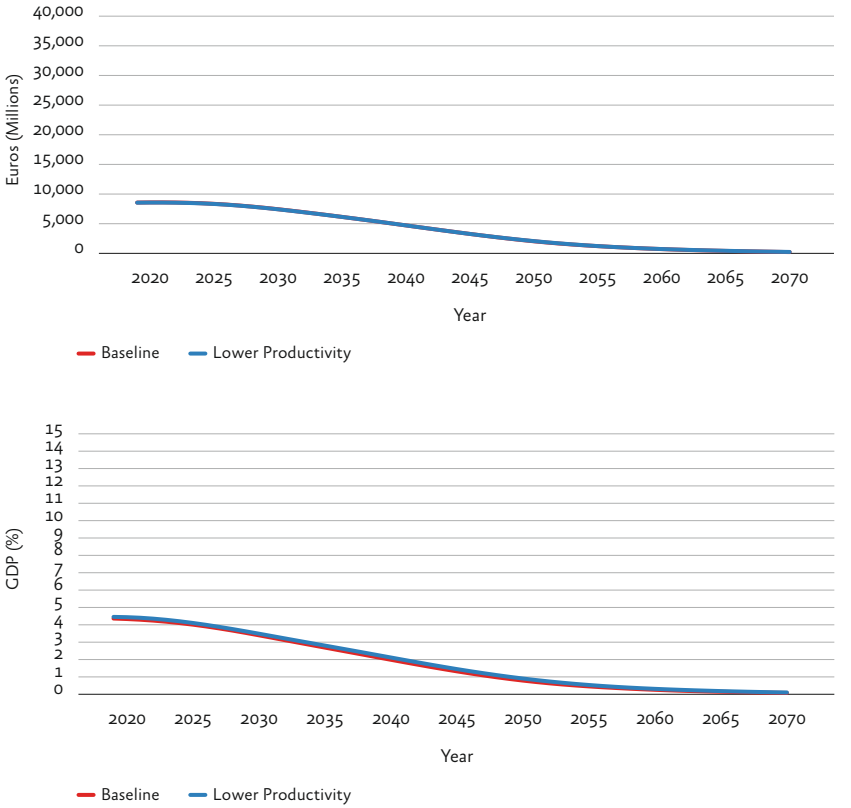


Figure 3.7 CGA pension expenditure, % of GDP



3. Impact on financial sustainability

As mentioned above, because of its impact on wage dynamics, assumptions about labour productivity growth also impact on the size of pension system revenues. As we can see in Figures 3.8. and 3.9, lower-than-expected productivity gains will result in lower pension contributions — both in absolute terms and as a percentage of GDP. For instance, taking as a reference the last year of the projection (2070), in the lower productivity scenario, Social Security revenues would drop from 11.4% to 8.8% (see Table 8, Annex 3).

Figure 3.8 Contributions to Social Security system, % of GDP

Under the prospect of an increase in pension expenditure and a reduction in contributions, it should come as no surprise that lower--than-expected labour productivity growth levels will entail a significant deterioration in the financial sustainability of the Social Security Contributory Regime (see Figure 3.10). For instance, by 2070, the amount of pension expenditure not covered by Social Security contributions would increase from 2.6% of GDP to 5% of GDP (see Table 10, Annex 3).

Figure 3.9 Contributions to CGA, % of GDP

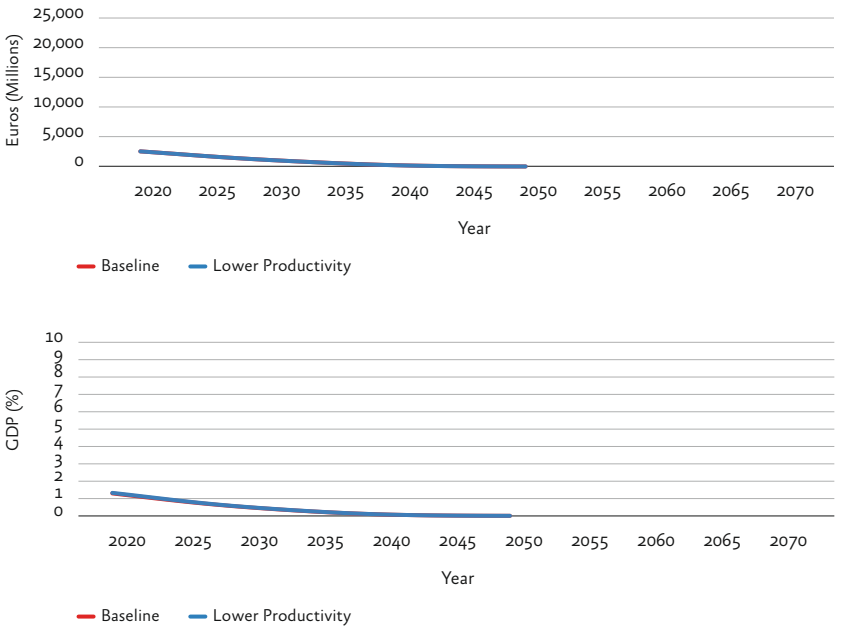
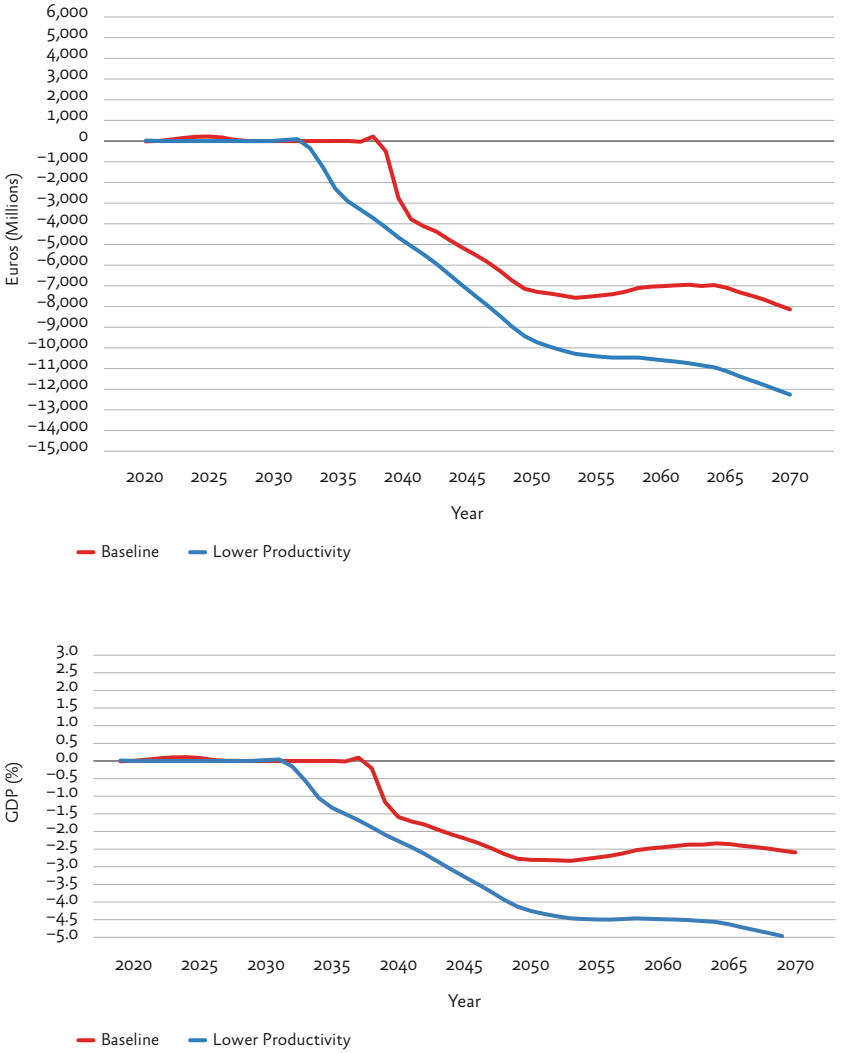


Figure 3.10 Financial balance: SS Contributory Regime after FEFSS, % of GDP



In line with our findings in the previous chapter (see Section 3.2., Chapter 2), the impact of lower-than-expected labour productivity gains on the financial sustainability of the Social Security Contributory Regime is compounded by its effect on the ability of the FEFSS to act as a financial stabiliser of Social Security. As we can see in Figures 3.11 and 3.12, in the lower productivity scenario, the need to use transfers from FEFSS to compensate for deficits in Social Security is brought forward from 2028 to the start of the simulation. This would obviously reduce the ability of FEFSS to accumulate financial assets in order to respond to future deficits and would result in FEFSS funds being depleted significantly sooner– from 2039 to 2033 (see Tables 11 and 12, Annex 3).

Figure 3.11 FEFSS transfers

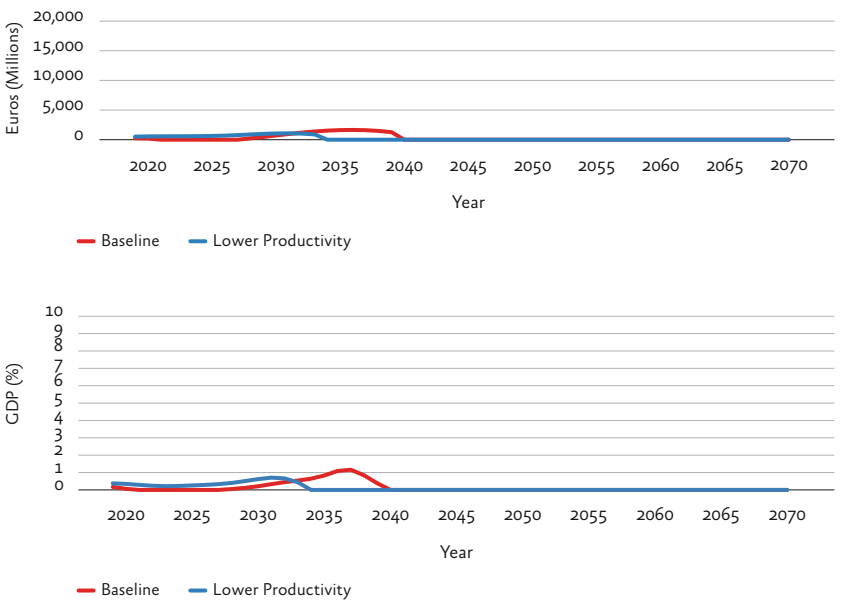
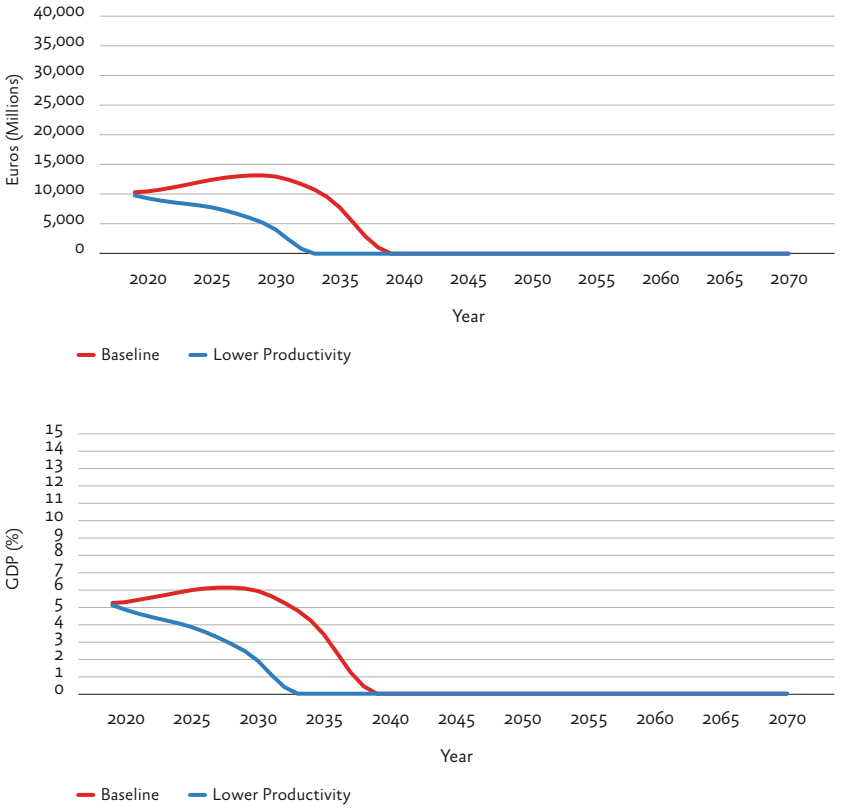


Figure 3.12 FEFSS



In the absence of substantial consequences, both in terms of revenue and expenditure, it is therefore not surprising that CGA's financial situation is not significantly affected by the prospect of lower-than-expected labour productivity gains (see Figure 3.13; and Table 13, Annex 3). Still, given the projected decline of the financial situation of the Social Security Contributory Regime, lower-than-expected productivity

growth will result in a significant increase in the burden that the Public Pension System will impose on the public purse (see Figure 3.14) — in sizable amounts equivalent to the size of the deficit in the Social Security Contributory Regime (see Tables 13 and 14, Annex 3).

Figure 3.13 Financial balance: CGA

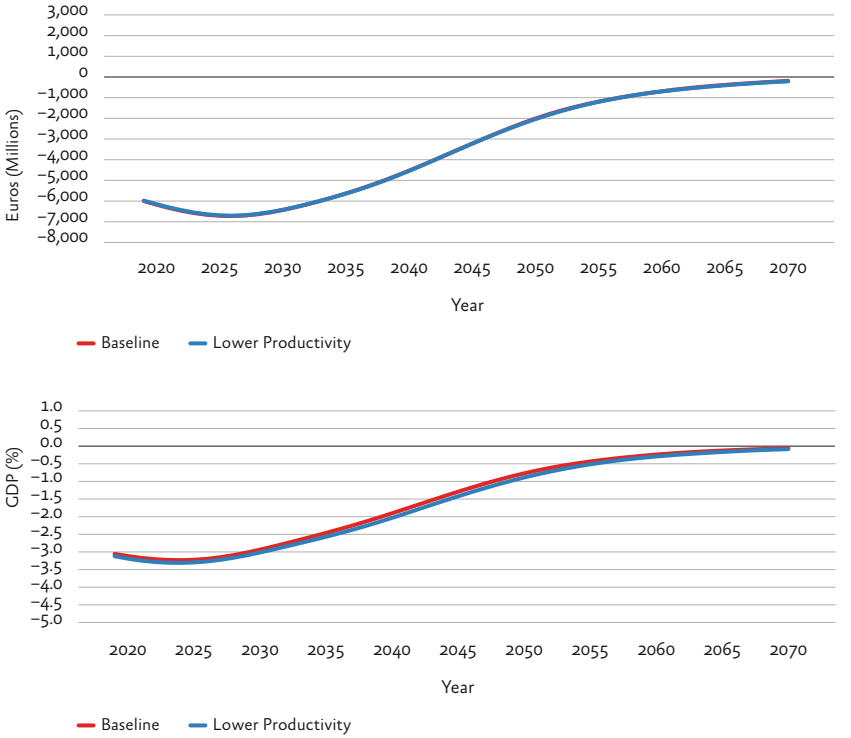


Figure 3.14 Total fiscal burden, after FEFSS, GDP

4. Impact on social sustainability

4.1. Securing an adequate income

As we have just described, lower-than-expected productivity gains are projected to generate lower pension benefits. However, as we can see in Figures 3.15 and 3.16, this will not undermine the adequacy of pensions. In fact, the adequacy of Social Security and CGA pensions is projected to increase — particularly after 2040. For instance, under the lower productivity scenario, the Social Security OAP benefit ratio is projected to increase from 0.44 in 2020 to 0.47 in 2070 (see Table 15, Annex 3). Whilst this can be (admittedly) counterintuitive, it reflects the fact that benefit ratios are calculated by comparing the average value of all pensions (not just new pensions) with the average value of wages in the economy. Hence, they only capture part of the effect of lower-than-expected labour productivity on the adequacy of pensions.

Figure 3.15 Old age pensions (SS), benefit ratio

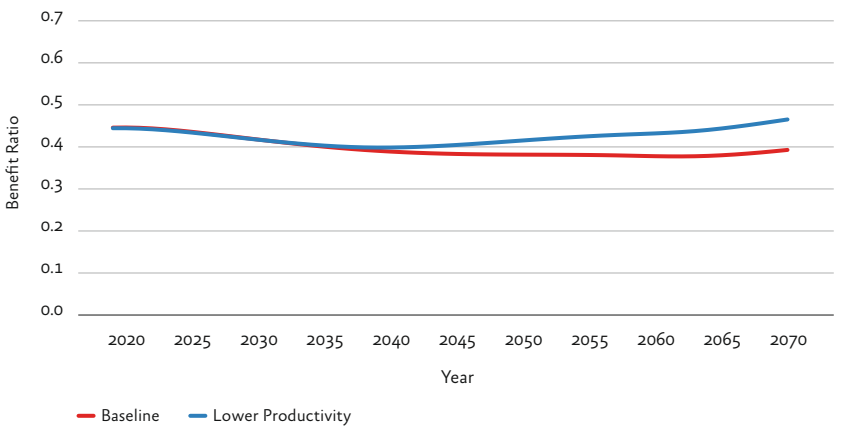
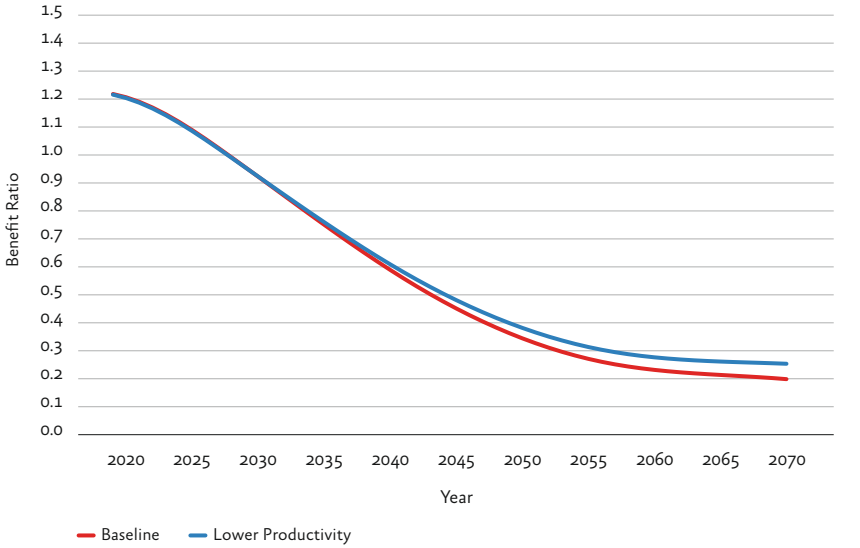
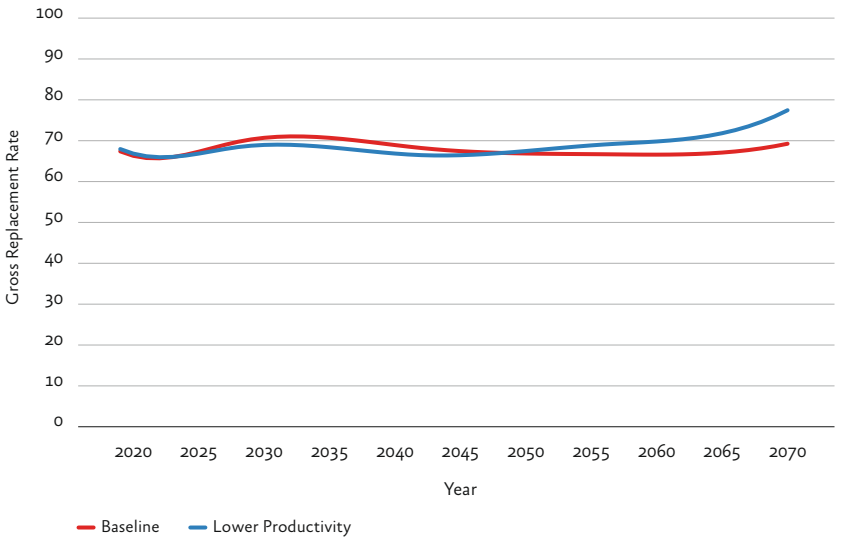


Figure 3.16 Old age pension (CGA), benefit ratio



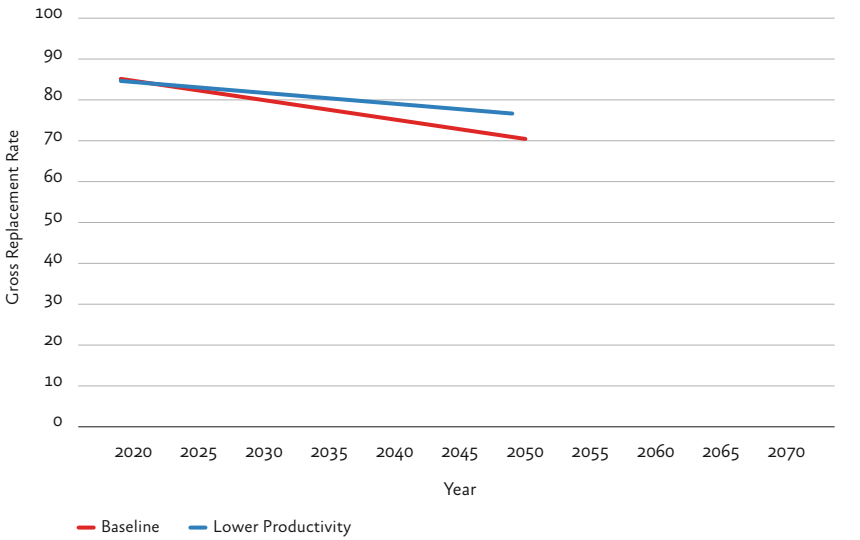
4.2. Protection against a drop in income

Figure 3.17 Old age pensions (SS), gross replacement rates



As we can see in Figures 3.17 and 3.18, lower-than-expected productivity gains will also translate into a noticeable improvement in the gross replacement rates of OAPs. For instance, in the last year of the projection (2070), the gross replacement rate for new Social Security OAPs in the lower productivity scenario would be almost 8% higher than in the baseline scenario — 77.45% against 69.26% (see Table 17, Annex 3). The same trend can be seen in CGA. Thus, by 2045, under this alternative macroeconomic scenario the gross replacement rate of new CGA OAPs is 5% higher than in the baseline scenario — 77.7% against 72.79% (see Table 17, Annex 3).

Figure 3.18 Old age pensions (CGA), gross replacement rates



4.3. Protection against the risk of poverty

As mentioned above (see Chapter 2, Section 4.3), the income poverty threshold adopted in this study is indexed to changes in average earnings. This means that, under a scenario of lower-than-expected gains in labour productivity, this threshold is also likely to be lower than initially projected (see Figure 3.19). Thus, taking as a reference the last year of our projection (2070), the income poverty threshold in the lower productivity scenario is projected to drop from €771 to €503 (see Table 19, Annex 3).

Figure 3.19 Poverty thresholds

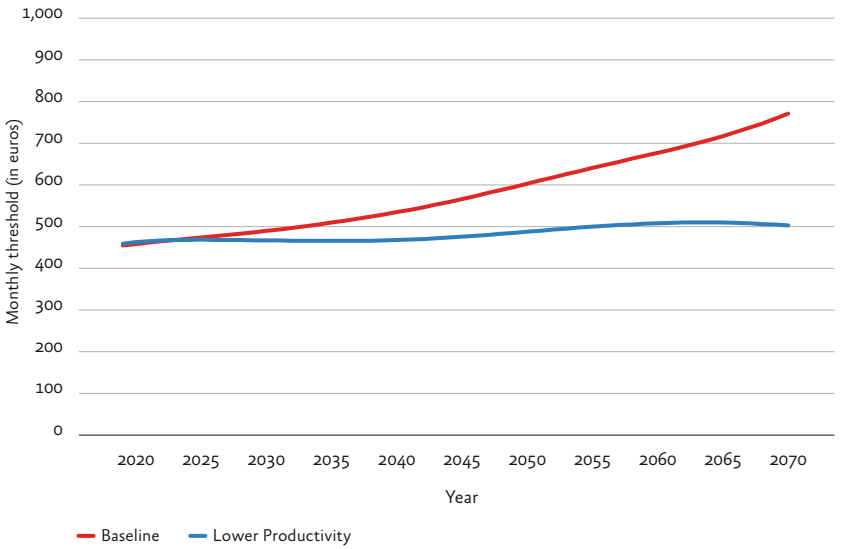
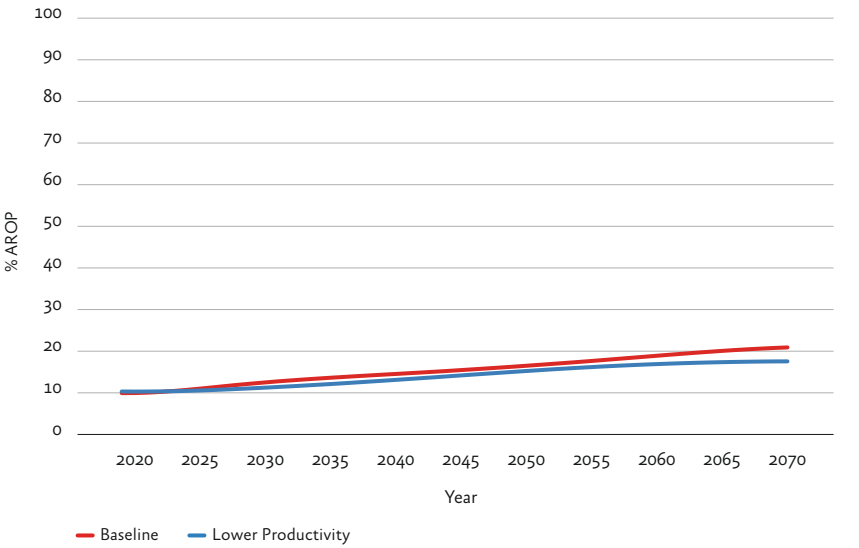


Figure 3.20 Population 65+ at risk of poverty



This explains why, despite lower pension benefits, the lower productivity scenario does not translate into higher levels of poverty among pensioners. In fact, as can be seen in Figure 3.20, pensioner poverty would be much lower — 10.8% compared to 15.5% in the baseline scenario (see Table 20, Annex 3).

Chapter 4
Assessing the impact of parametric reforms

In the previous chapters we have shown that a) in the medium term, the Portuguese Pension System will produce structural financial imbalances, and b) that the extent of those imbalances could be significantly higher if labour productivity fails to grow at the rate projected by the 2018 Ageing Report baseline macroeconomic scenario. Based on this, over the next two chapters we will look into potential alternatives for improving the long-term financial sustainability of the Portuguese Pension System.

As a first step in our endeavour, in this chapter we look at alternatives that could be implemented within the current architecture of the Portuguese Pension System[58]. In the sections below, we specify in more detail the reform scenarios that will be placed under consideration and assess their impact on the financial and social sustainability of the Portuguese Pension System.

1. Reform scenarios

After acknowledging the variety of options available for improving the long-term financial sustainability of pension systems (see IMF, 2013; OECD, 2019), we have selected a set of reform scenarios that:

a) can be easily implemented within the current architecture of the Portuguese Pension System;
b) reflect changes to the parameters of the Portuguese Pension System, rather than changes in external variables (e.g. increase in emigration or fertility levels);
c) signify interventions in both revenue and expenditure sides of the Portuguese Pension System;
d) and, finally, that speak to the current debate about pension reform in Portuguese society (see Bravo, 2012; IMF, 2013; OECD, 2019).

In line with these criteria, in this section we look at the prospective financial (and social) sustainability of the Portuguese Pension System under three reform scenarios, to be introduced by 2025:

- Increasing pension contributions (SSC) — Under this scenario, Social Security and CGA contribution rates, for both workers and employers, would gradually increase by 0.5 pp up to 2.5 pp (see Table 4.1);
- Cutting future pension benefits (PAR) — Under this scenario, the pension accrual rate of Social Security OAP would be gradually reduced between –0.1 pp and –0.5 pp (see Table 4.2). A similar reduction is applied to the pension formula that applies to CGA contributors enrolled after 1995, namely concerning contributions made after December 31st, 2005 (P2) (see Section 1.2.1, Chapter 1);
- Postponing the age of retirement (SAR) — Under this scenario, the age of retirement for claiming a Social Security Old Age Pension would gradually increase by up to four years. As we can see in Table 4.3, the age for claiming an Early Old Age Pension, for individuals

with long contributory careers, would also increase proportionally. No change would be made to the retirement age for the long-term unemployed. With regard to the differences in how the age of retirement (see Table 4.3) is set for CGA beneficiaries, a similar approach would apply.

Table 4.1 Simulated increases in the rate of Social Security contributions

	Social Security			CGA	
Social risks	Employee	Employer	Self-employed	Employee	Employer
Baseline	11%	23.75%	29.6%	11%	23.75%
+ 0.5 pp	11.5%	24.25%	30.1%	11.5%	24.25%
+ 1 pp	12%	24.75%	30.6%	12%	24.75%
+ 1.5 pp	12.5%	25.25%	31.1%	12.5%	25.25%
+ 2 pp	13%	25.75%	31.6%	13%	25.75%
+ 2.5 pp	13.5%	26.25%	32.6%	13.5%	26.25%

Admittedly, there are limits to our ability to simulate the impact of this type of reforms. For instance, increasing pension contributions would raise the cost of labour. This could reduce the demand for labour, which would translate into lower employment levels (see Lichter et al, 2015) and, consequently, reduce the universe of potential contributors[59]. This means that, given the current design of the Portuguese Pension System (See Section 1.1, Chapter 1), the impact of increasing pension contributions could be moderated by its negative impact on employment. As mentioned above (see Section 3, Chapter 1), DYNAPOR is a partial equilibrium model and is not equipped to capture these types of macroeconomic dynamics. Thus, we will assume that increasing pension contributions will not have an impact on employment.

Similarly, there are limits to our ability to simulate the impact of reducing pension accrual rates. When faced with the potential decrease in future income that this type of measure would impose, one likely response would be for individuals to increase their work effort, either by increasing the number of hours worked (or taking up a second job), or by delaying the take-up of pension benefits. Currently, DYNAPOR is not designed to capture this type of behavioural responses. Therefore, we assume that if faced with the prospect of future pension cuts, individuals will not increase their work effort or age at which they are expected to claim their pension in the baseline scenario.

Finally, the effect of increasing the age of retirement depends on whether the economy is able to retain older workers in the labour market. If that is not the case, increasing the age of retirement would expose older workers to a period of forced inactivity, which would reduce potential GDP growth. Alternatively, the absorption of this added labour supply could trigger pressures to lower salaries in the economy, hence lowering contributions into the system. Again, DYNAPOR is a partial equilibrium model and is not equipped to capture these types of macroeconomic dynamics. Thus, we assume that raising the retirement age will not impact on the overall labour market dynamics.

Table 4.2 Simulated reductions in pension accrual rate in Social Security

Reference Earnings (RE)	BASELINE	PAR –0.1 pp	PAR –0.2 pp	PAR –0.3 pp	PAR –0.4 pp	PAR –0.5 pp
£ 1,1 × IAS	P = RE × 2,3 % × N	P = RE × 2,2 % × N	P = RE × 2,1 % × N	P = RE × 2 % × N	P = RE × 1.9 % × N	P = RE × 1.8 % × N
> 1,1 × IAS and £ 2 × IAS	P = (1,1 × IAS × 2,3% × N) + [(RE — 1,1 × IAS) × 2,25% × N]	P = (1,1 × IAS × 2,2% × N) + [(RE — 1,1 × IAS) × 2,15% × N]	P = (1,1 × IAS × 2,1% × N) + [(RE — 1,1 × IAS) × 2,05% × N]	P = (1,1 × IAS × 2% × N) + [(RE — 1,1 × IAS) × 1,95% × N]	P = (1,1 × IAS × 1.9% × N) + [(RE — 1,1 × IAS) × 1,85% × N]	P = (1,1 × IAS × 1.8% × N) + [(RE — 1,1 × IAS) × 1,75% × N]
> 2 × IAS and £ 4 × IAS	P = (1,1 × IAS × 2,3% × N) + (0,9 × IAS × 2,25% × N) + [(RE –2 × IAS) × 2,2% × N]	P = (1,1 × IAS × 2,2% × N) + (0,9 × IAS × 2,15% × N) + [(RE –2 × IAS) × 2,1% × N]	P = (1,1 × IAS × 2,1% × N) + (0,9 × IAS × 2,05% × N) + [(RE –2 × IAS) × 2% × N]	P = (1,1 × IAS × 2% × N) + (0,9 × IAS × 1,95% × N) + [(RE –2 × IAS) × 1.9% × N]	P = (1,1 × IAS × 1.9% × N) + (0,9 × IAS × 1,85% × N) + [(RE –2 × IAS) × 1.8% × N]	P = (1,1 × IAS × 1.8% × N) + (0,9 × IAS × 1,75% × N) + [(RE –2 × IAS) × 1.7% × N]
> 4 × IAS and £ 8 × IAS	P = (1,1 × IAS × 2,3% × N) + (0,9 × IAS × 2,25% × N) + (2 × IAS × 2,2% × N) + [(RE — 4 × IAS) × 2,1% × N]	P = (1,1 × IAS × 2,2% × N) + (0,9 × IAS × 2,15% × N) + (2 × IAS × 2,1% × N) + [(RE — 4 × IAS) × 2% × N]	P = (1,1 × IAS × 2,1% × N) + (0,9 × IAS × 2,05% × N) + (2 × IAS × 2% × N) + [(RE — 4 × IAS) × 1.9% × N]	P = (1,1 × IAS × 2% × N) + (0,9 × IAS × 1,95% × N) + (2 × IAS × 1.9% × N) + [(RE — 4 × IAS) × 1.8% × N]	P = (1,1 × IAS × 1.9% × N) + (0,9 × IAS × 1,85% × N) + (2 × IAS × 1.8% × N) + [(RE — 4 × IAS) × 1.7% × N]	P = (1,1 × IAS × 1.8% × N) + (0,9 × IAS × 1,75% × N) + (2 × IAS × 1.7% × N) + [(RE — 4 × IAS) × 1.6% × N]
> 8 × IAS	P = (1,1 × IAS × 2,3% × N) + (0,9 × IAS × 2,25% × N) + (2 × IAS × 2,2% × N) + (4 × IAS × 2,1% × N) + [(RE — 8 × IAS) × 2% × N]	P = (1,1 × IAS × 2,2% × N) + (0,9 × IAS × 2,15% × N) + (2 × IAS × 2,1% × N) + (4 × IAS × 2% × N) + [(RE — 8 × IAS) × 1.9% × N]	P = (1,1 × IAS × 2,1% × N) + (0,9 × IAS × 2,05% × N) + (2 × IAS × 2% × N) + (4 × IAS × 1.9% × N) + [(RE — 8 × IAS) × 1.8% × N]	P = (1,1 × IAS × 2% × N) + (0,9 × IAS × 1,95% × N) + (2 × IAS × 1.9% × N) + (4 × IAS × 1.8% × N) + [(RE — 8 × IAS) × 1.7% × N]	P = (1,1 × IAS × 1.9% × N) + (0,9 × IAS × 1,85% × N) + (2 × IAS × 1.8% × N) + (4 × IAS × 1.7% × N) + [(RE — 8 × IAS) × 1.6% × N]	P = (1,1 × IAS × 1.8% × N) + (0,9 × IAS × 1,75% × N) + (2 × IAS × 1.7% × N) + (4 × IAS × 1.6% × N) + [(RE — 8 × IAS) × 1.5% × N]

Table 4.3 Simulated increases in statutory age of retirement

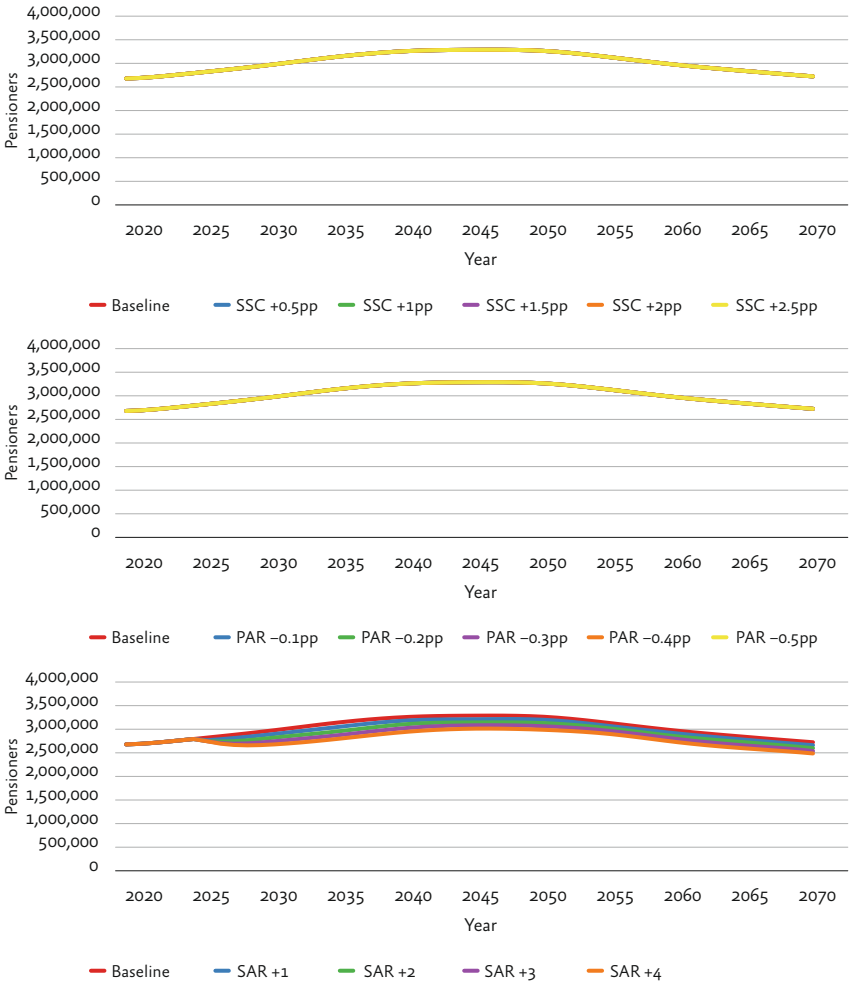
		STATUTORY AGE OF RETIREMENT				
		BASELINE	SAR +1	SAR +2	SAR +3	SAR +4
Social Security						
OAP		66	67	68	69	70
Early OAP		60	61	62	63	64
CGA						
OAP	YEARS OF CONTRIBUTION AT 65					
	< 41	66 yrs, 4 mths	67 yrs, 4 mths	68 yrs, 4 mths	69 yrs, 4 mths	70 yrs, 4 mths
	≥ 41 and < 42	65 yrs	66 yrs	67 yrs	68 yrs	69 yrs
	≥ 42 and < 43	65 yrs, 8 mths	66 yrs, 8 mths	67 yrs, 8 mths	68 yrs, 8 mths	69 yrs, 8 mths
	≥ 43 and < 44	65 yrs, 4 mths	66 yrs, 4 mths	67 yrs, 4 mths	68 yrs, 4 mths	69 yrs, 4 mths
	≥ 44	65 yrs	66 yrs	67 yrs	68 yrs	69 yrs
Early OAP	YEARS OF CONTRIBUTION AT 65					
	cc>=30	55	56	57	58	59
	cc>=31	56	57	58	59	60
	cc>=32	57	58	59	60	61
	cc>=33	58	59	60	61	62
	cc>=34	59	60	61	62	63
	cc>=35	60	61	62	63	64
	cc>=36	61	62	63	64	65
	cc>=37	62	63	64	65	66
	cc>=38	63	64	65	66	67
	cc>=39	64	65	66	67	68

Over the following sections we will assess the impact of introducing these reforms in the financial and social sustainability of the Portuguese Pension System.

2. Impact on the demand for pensions

As expected, increasing pension contributions and reducing the pension accrual rates would not impact on the number of pensioners (see Figure 4.1). Increasing the statutory age of retirement, however, since it would delay the take-up of pension benefits, would reduce the number pensioners in the system. Thus, increasing the statutory age of retirement in one year would reduce the stock of pensioners by 2.28% — from 2.72 million to 2.66 million (see Table 3, Annex 4) — in 2070. Raising the statutory age of retirement to 70 would further reduce the total number of pensioners to 2.48 million — which would amount to a decrease of 8.7%.

Figure 4.1 Total number of pensioners

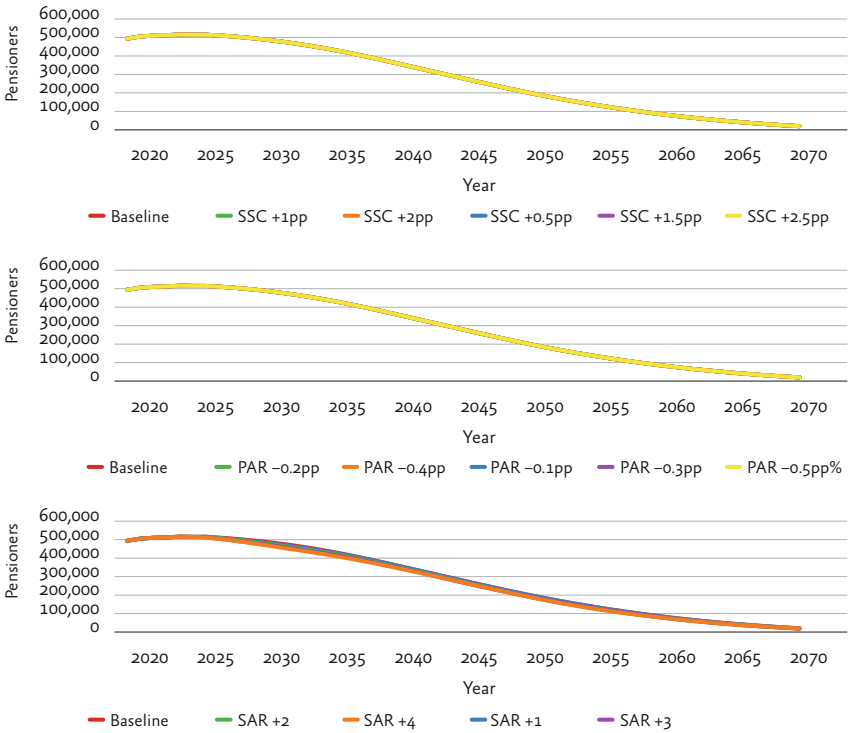


Unsurprisingly, the overall reduction in the total number of pensioners reflects the impact of increasing the statutory age of retirement in Social Security (see Figures 4.2 and 4.3). For instance, by 2070, raising the Social Security statutory age of retirement to 70 would reduce the total number of Social Security pensioners to 2.46 million.

Figure 4.2 SS pensioners

This is not to say, however, that increasing the statutory age of retirement would not have an impact on the stock of CGA pensioners. Looking at 2040, where the effects of this type of reform become more evident (see Figure 4.3), we can see that raising the CGA statutory age of retirement by four years would reduce the stock of CGA pensioners by 3.6% — from 351 to 338 hundred thousand (see Table 9, Annex 4).

Figure 4.3 CGA pensioners



As we can see in Figure 4.5, reducing pension accrual rates, as it is projected to reduce the value of future benefits (see Section 3, in this chapter), will have a significant impact in the internal composition of the stock of Social Security pensioners. Thus, by 2070, reducing Social Security OAP pension accrual rate by 0.1 pp would increase the number of Social Security pensioners receiving non-contributory benefits by 11.6% — from 483 to 539 hundred thousand (see Table 14, Annex 4). A steeper decrease of minus 0.5 pp would, by 2070, increase the number of Social Security pensioners receiving non-contributory benefits by 72.6% — up to 833 hundred thousand.

Looking at Figure 4.5, the effect of raising the statutory age of retirement for the number of Social Security pensioners receiving non-contributory benefits is not linear. Over an initial period, the impact of raising the statutory age of retirement on the size of the flux of new pensioners coming into the system seems to prevail. Consequently, the number of those receiving non-contributory benefits is expected to decrease. Over a second stage, as the negative effect of raising the statutory retirement age on the value of future pensions becomes more visible (see Section 3, in this chapter), the number of Social Security pensioners receiving non-contributory benefits is expected to increase. Thus, by 2070, raising the statutory age of retirement to 70 would increase the number of Social Security pensioners receiving non-contributory benefits by 13.9% — from 483 to 550 hundred thousand (see Table 15, Annex 4).

Figure 4.4 SS pensioners receiving contributory pensions

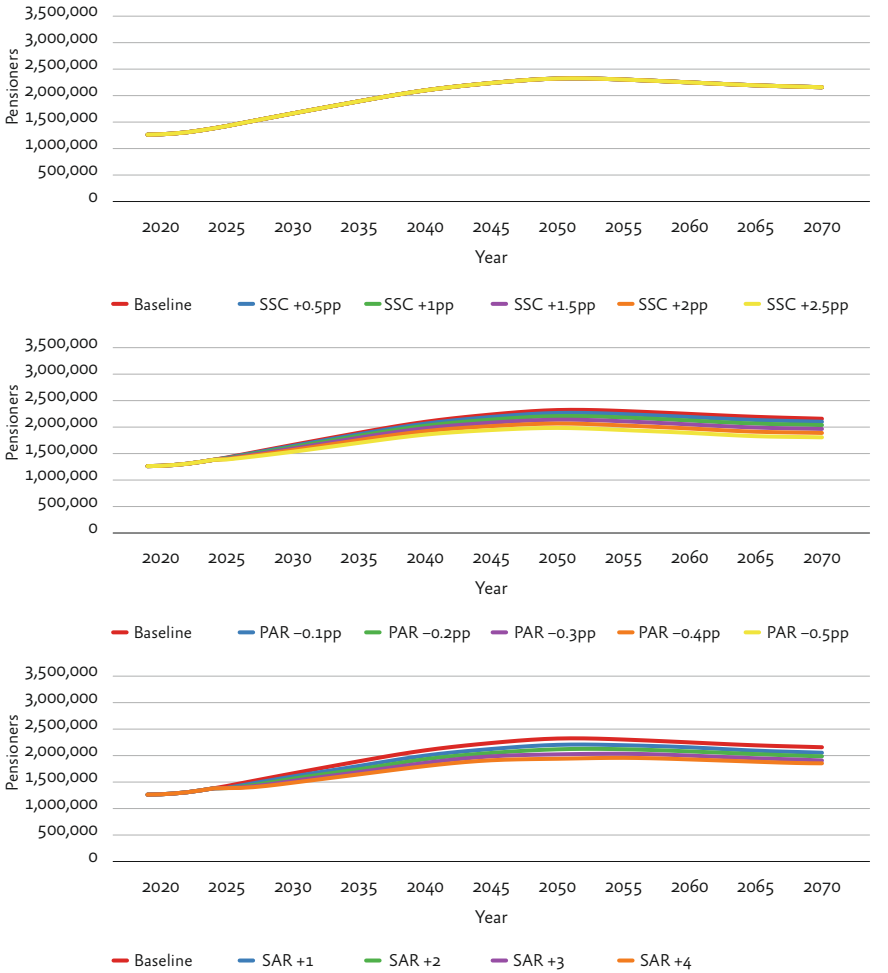
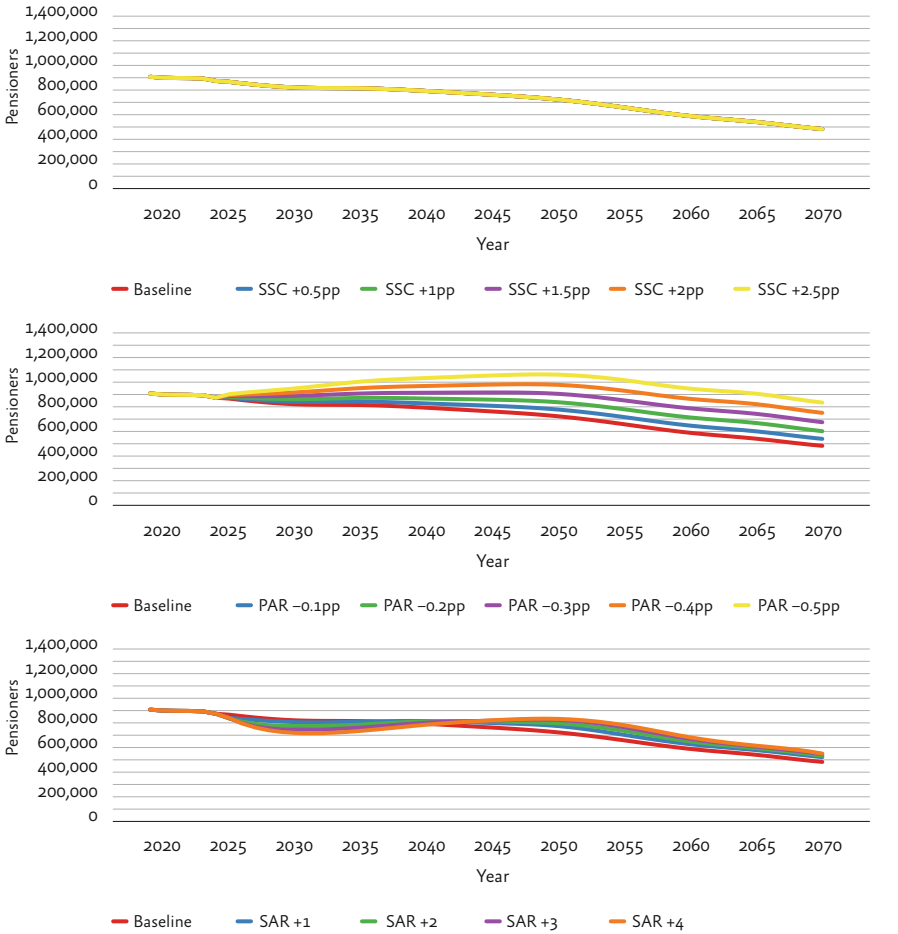


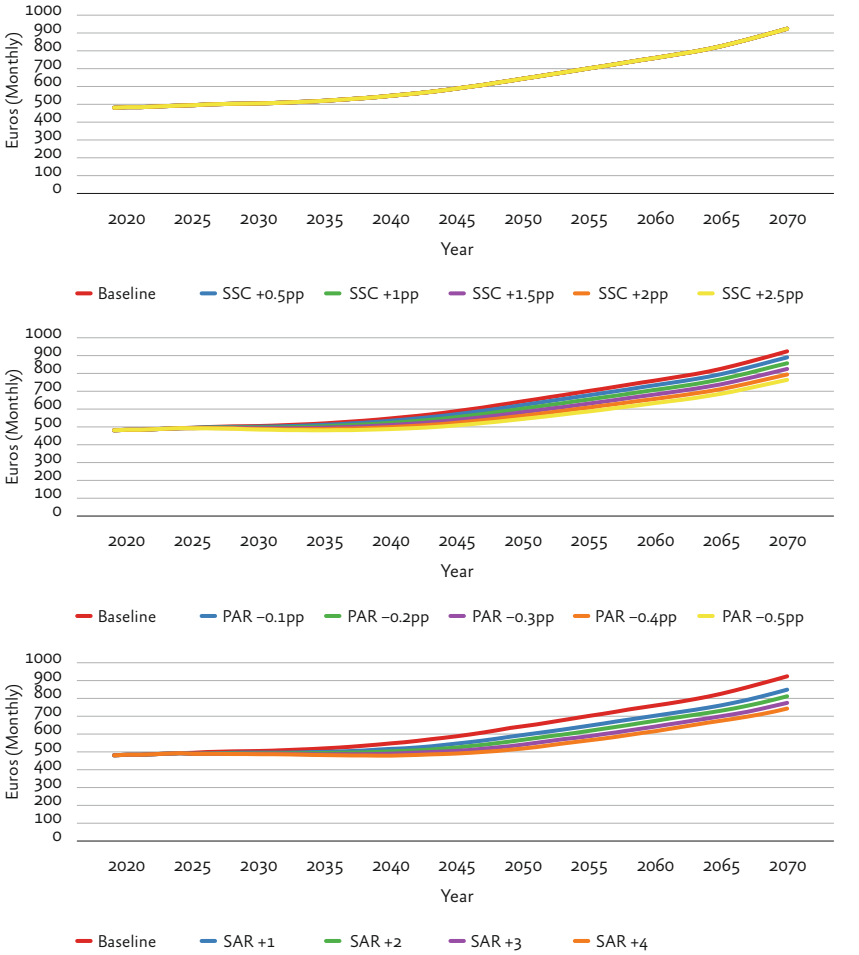
Figure 4.5 SS pensioners receiving non-contributory benefits



3. Impact on average monthly payments

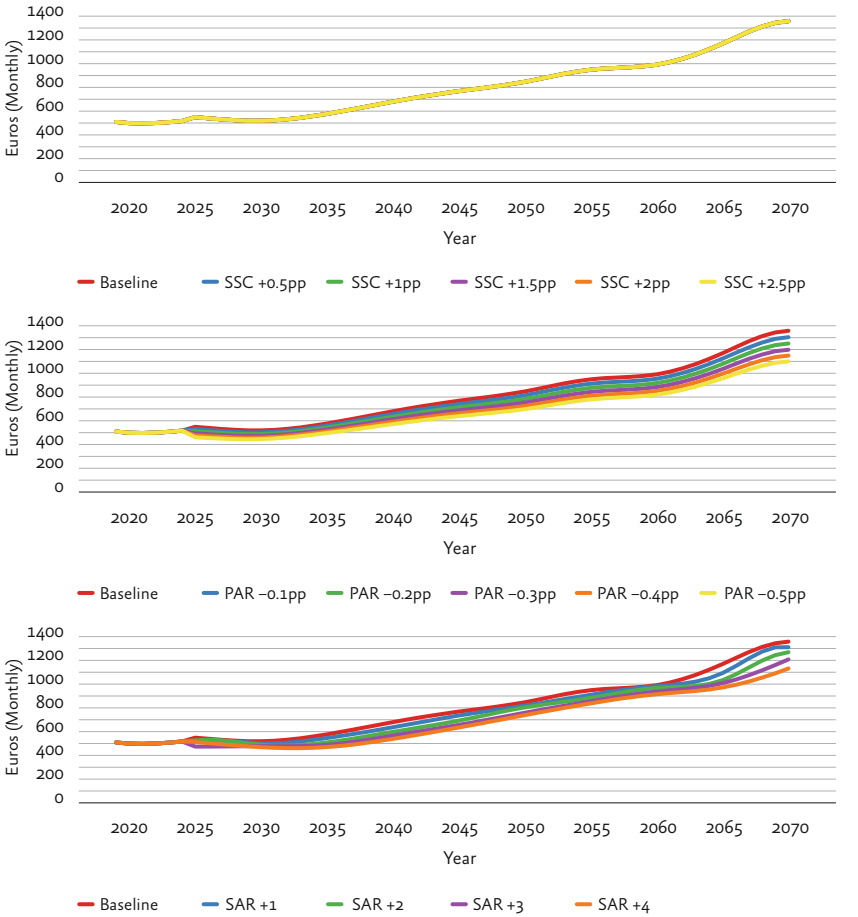
As expected, cutting the SS OAP accrual rate will reduce the value of future benefits (see Figure 4.6). Thus, by 2070, reducing the pension accrual rate by –0.1 pp, would cut the average value of Social Security OAP by 3.6% — from €924 to €890 (see Table 17, Annex 4). A 0.5 pp cut in the pension accrual rate would reduce the average Social Security OAP by 17.3%, down to €764 in 2070. As we can see in Figure 4.7, much of the aforementioned decline can be explained by the effect these reforms will have on the value of new SS OAP pensions. For instance, by 2070, reducing the pension accrual rate by –0.1 pp would cut the average value of new Social OAP by 3.9% — from €1358 to €1304 (see Table 20, Annex 4).

Figure 4.6 Average monthly payment: SS OAP



Increasing the age of retirement would also imply a decrease in the average value of Social Security OAP. For instance, increasing the statutory age of retirement to 67 would produce a 8.1% cut in the average value of the Social Security OAP in 2070 — from €924 to €849 (see Table 18, Annex 4). Increasing the statutory age of retirement to 70 would cut the average value of the Social Security OAP from €924 to €743, i.e. by 19.5% (see Table 18, Annex 4). These drops can be explained by two mechanisms. Firstly, our wage equation assumes that salaries will decrease significantly later in life. This means that, for those in work, delaying the retirement age will reduce the value of the reference remuneration. Secondly, under the assumption that labour market participation rates do not increase in this scenario (see Section 1), increasing the retirement age will force some groups of persons into inactivity before being able to claim a pension. Unsurprisingly, as they do not influence the value of future benefits, raising pension contributions will have no impact on the future value of OAP benefits (see Tables 16 and 19, Annex 4).

Figure 4.7 Average monthly payment: new SS OAP



As evidenced by Figures 4.8 and 4.9, the effects of increasing the age of retirement on the average value of CGA OAP are not linear. Thus, by 2070, increasing the statutory age of retirement to 67 would actually raise

the average value of the CGA from €472 to €514 (see Table 24, Annex 4). If we increase the statutory age of retirement all the way up to 70, we would raise the average value of the CGA from €472 to €649, representing a 37.5% increase. Predictably, the other two reform scenarios will have no impact on the future value of CGA OAP benefits (see Figures 4.8 and 4.9).

Figure 4.8 Average monthly payment: CGA OAP

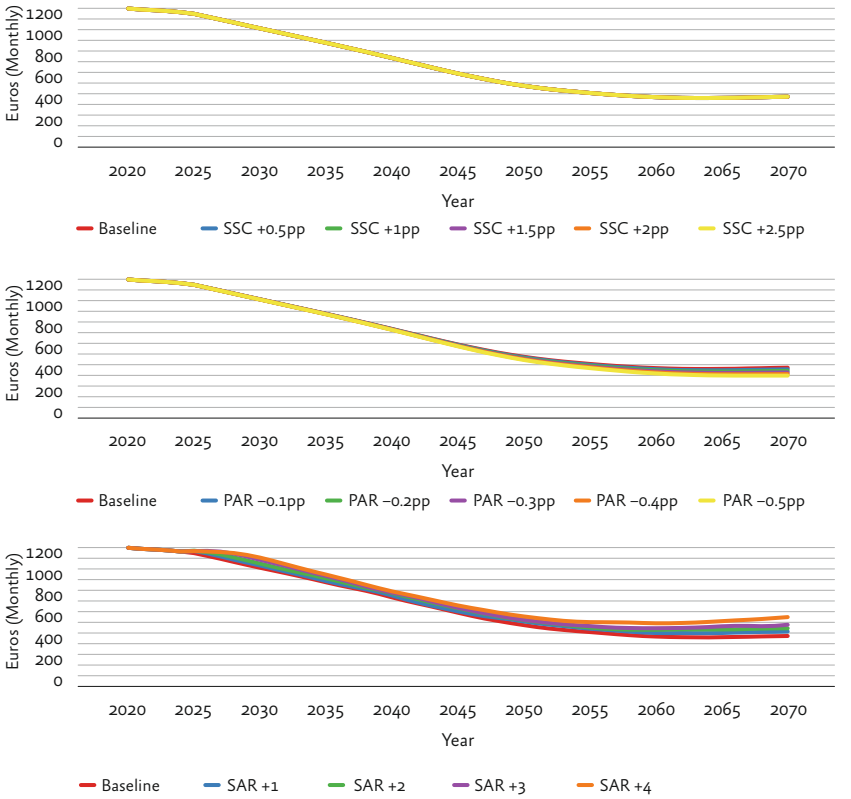
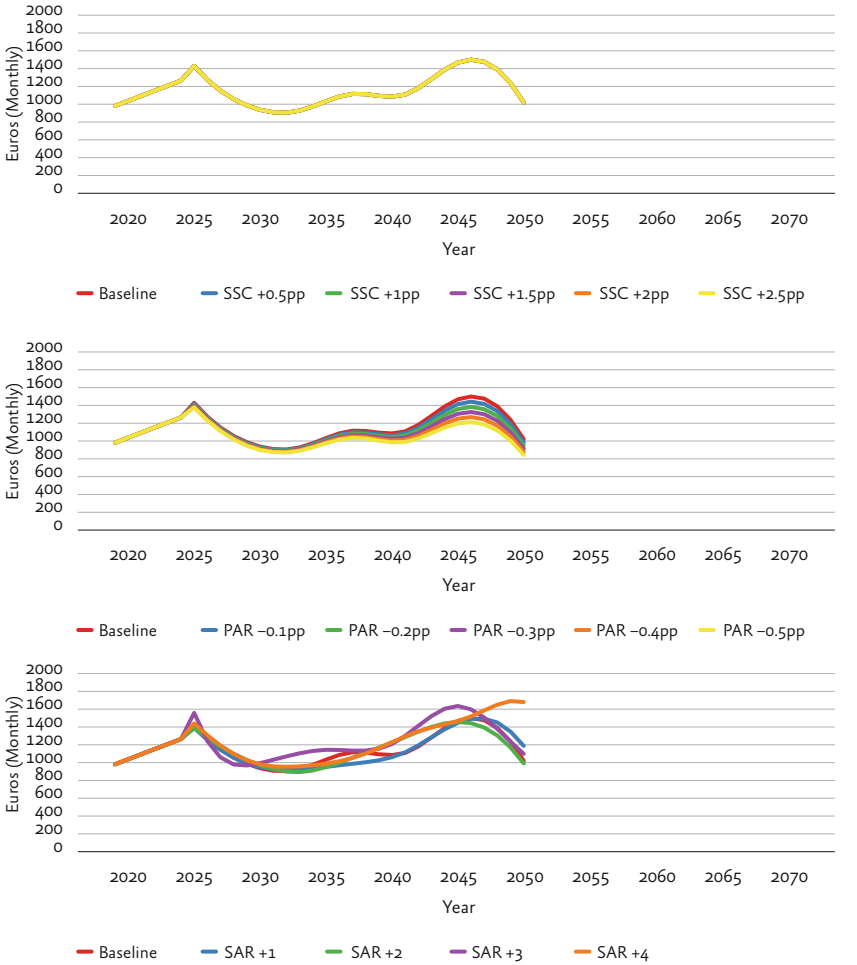


Figure 4.9 Average monthly payment: new CGA OAP



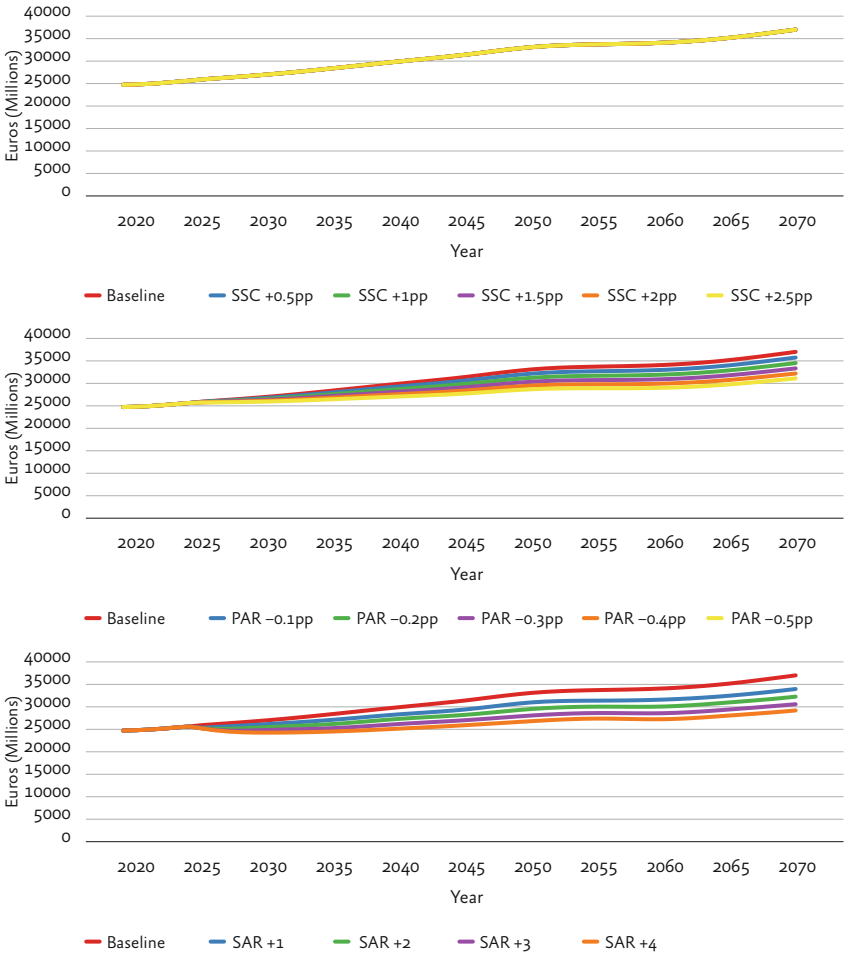
4. Impact on pension expenditure

Having looked at the impact of the reform scenarios on the demand for pensions and the average Old Age Pension amounts provided by the Portuguese Public Pension System, we now look at the potential impact on pension expenditure. As expected, given its effects on the value of future benefits (see Section 3), total pension expenditure is sensitive to the reduction of pension accrual rates (see Figure 4.10). By 2070, a 0.1 pp reduction in Social Security pension accrual rates would cut total pension expenditure by approximately 3.4% — from 37 billion euros to 35.7 billion euros. An even more substantial reduction (-0.5 pp) of Social Security pension accrual rates would cut back total pension expenditure by 15.9% — all the way down to 31.1 billion euros (see Table 29, Annex 4).

As we can also see in Figure 4.10, total pension expenditure is particularly sensitive to increases in the statutory age of retirement — which is to be expected given its projected negative impact on both the number of pensioners and on the future value of pension benefits (see Sections 2 and 3). By 2070, raising the statutory age of retirement to 67 would reduce total pension expenditure from 37 billion euros to 33.9 billion euros. In the same year, elevating the statutory age of retirement to 70 would cut total pension expenditure down to 29.2 billion euros, representing a total reduction of 21% in total pension expenditure (see Table 30, Annex 4).

Unsurprisingly, the reform scenario that is exclusively focused on the revenue side of the Portuguese Pension System has no impact on how pension expenditure is likely to evolve (see Figure 4.12).

Figure 4.10 Total pension expenditure



As illustrated in Figures 4.11 and 4.12, and perhaps unsurprisingly, much of the projected decrease in total pension expenditure is the product of spending cutbacks in Social Security. There are two obvious reasons for this. Firstly, scale matters. Social Security pension expenditure largely exceeds spending in the CGA scheme, so the potential impact of any of the reforms scenarios will be bigger. Secondly, as the number of CGA pensioners decreases over time, the long-term impact of these reforms on CGA will become ever smaller as time progresses.

As an example of this, we project that, by 2040, raising the statutory age of retirement to 70 would reduce Social Security pension expenditure by almost 19% — from 25.2 billion euros to 20.4 billion euros (see Table 33, Annex 4). A similar change in policy would actually increase CGA pension spending by 0.5% — from 4.69 billion euros to 4.71 billion euros (see Table 42, Annex 4).

Figure 4.11 SS pension expenditure

As evidenced in Figure 4.11, cutting SS OAP pension accrual rates will decrease future pension spending in Social Security: by 2070, a 0.1 pp reduction in Social Security pension accrual rates spending by approximately 3.4% — from 36.8 billion euros to 35.5 billion euros. Cutting Social Security pension accrual rates by 0.5 pp would further reduce spending down to 30.9 billion euros, representing a total cut of 15.9% in total Social Security Pension expenditure (see Table 32, Annex 4).

Figure 4.12 CGA pension expenditure

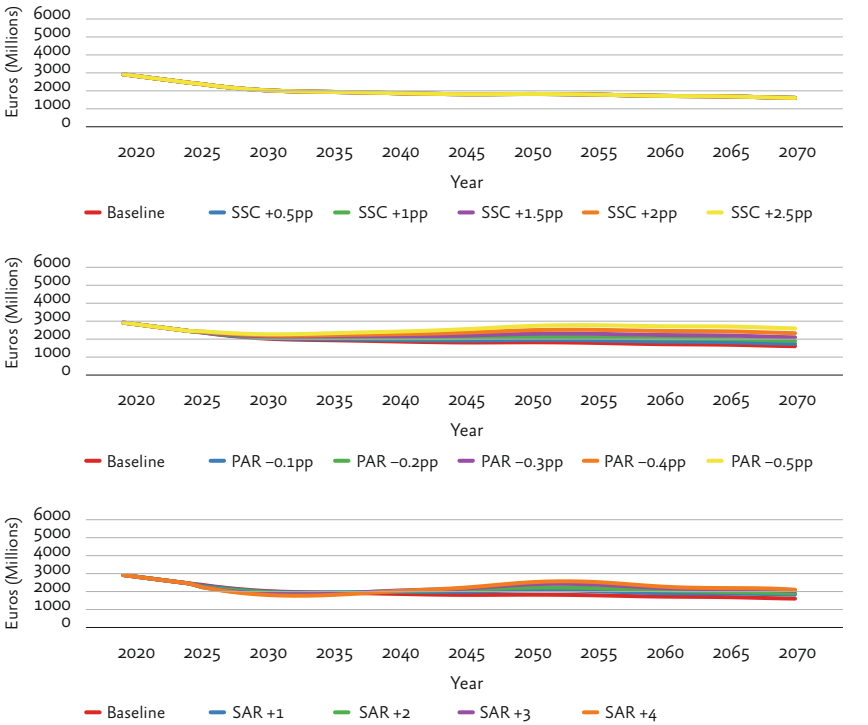
As demonstrated above, reductions in pension accrual rates and increases in the statutory age of retirement are projected to decrease in the average value of pension benefits and prompt an increase in the take-up of non-contributory benefits (see Sections 2 and 3, above). This explains the projected impact of these reform scenarios in pension spending within contributory and non-contributory pension benefits.

As we can see in Figure 4.13, the reduction of pension accrual rates will significantly cut future pension expenditure in contributory benefits. For instance, by 2070, a 0.5 pp cut in pension accrual rates will reduce pension spending from 35.2 billion euros to 28.3 billion euros, representing a reduction of 19.4% (see Table 35, Annex 4). Similarly, raising the statutory age of retirement to 70 would cut back spending in contributory pensions by 23.67% — from 35.2 billion euros to 26.9 billion euros (see Table 36, Annex 4).

Figure 4.13 SS Contributory Regime pension expenditure

These significant spending reductions in contributory pensions are not, however, matched (in size) by increases in spending on non-contributory benefits, which — as evidenced in Figure 4.14 — are rather marginal. For instance, a 0.5 pp reduction in pension accrual rates will only increase spending in non-contributory benefits from 1.6 billion euros to 2.6 billion euros (see Table 38, Annex 4).

Figure 4.14 SS non-Contributory Regime pension expenditure



5. Impact on financial sustainability

Building on the analysis of the projected impact on the demand and value of pension benefits, in this section we look at the impact of a) raising pension contributions, b) reducing pension accrual rates or c) increasing the statutory age of retirement in the long-term financial sustainability of the Portuguese Pension System. As in the previous chapters, we start by looking at the impact of these reform scenarios on revenue and expenditure.

5.1. Impact on pension contributions

As expected, increasing pension contribution rates will significantly increase contribution revenues both in Social Security and in CGA (see Figures 4.15 and 4.16, respectively). For instance, by 2070, increasing the contribution rates by 0.5 pp would increase the Social Security contributions by 2.8% — from 27.7 billion euros to 28.5 billion euros (see Table 43, Annex 4). Raising contributions by 2.5 pp in the same period would increase Social Security contributions to 31.6 billion euros, representing an increase of 14.1% in total Social Security contributory revenue.

Figure 4.15 Contributions to the Social Security system

As expected, reducing the SS OAP pension accrual rate has no impact on Social Security contributions (see Figure 4.15). The fact that our

projections do not show a significant impact of increasing the statutory age of retirement on the amount of Social Security contributions collected reflects the fact that — as mentioned above (see Section 1, Chapter 4) — DYNAPOR is not able to model the labour market response to an increase in the statutory age of retirement. There are, however, some minor effects, namely when measured in terms of absolute expenditure (see Table 45, Annex 4).

Figure 4.16 Contributions to CGA, GDP

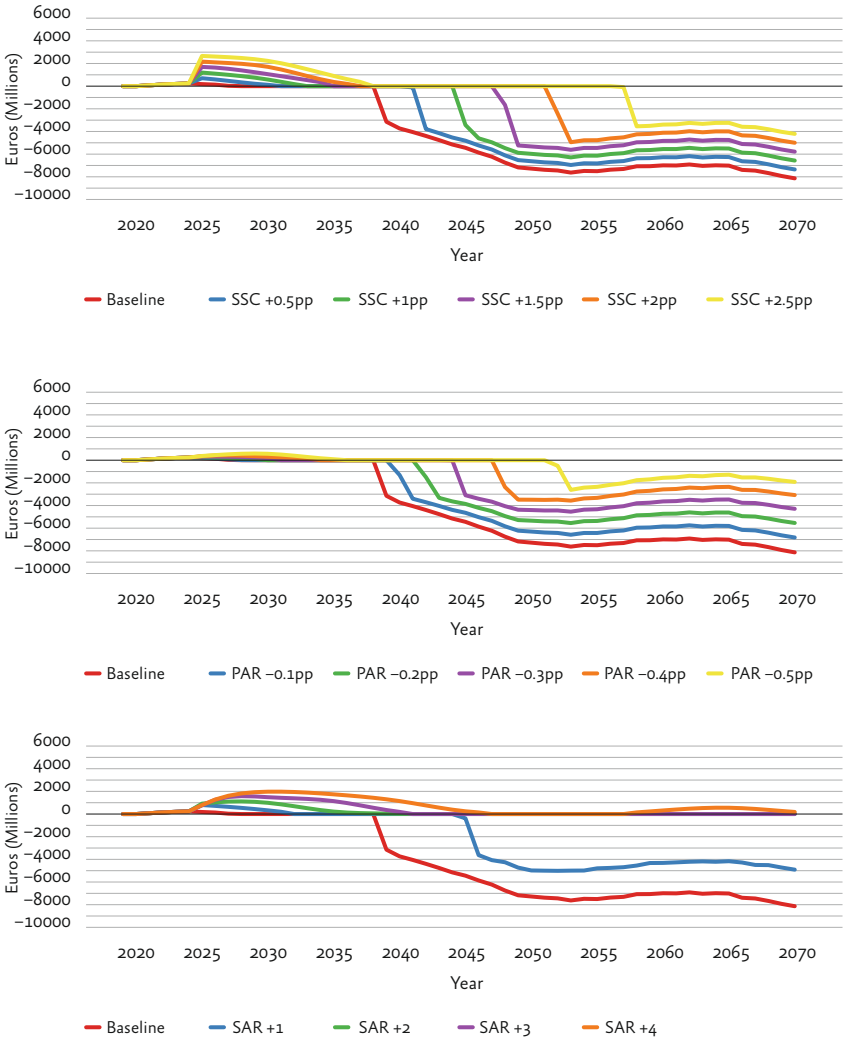
Possibly reflecting the very small pool of CGA contributors (see Section 3.1, Chapter 2), raising contribution rates produces only a marginal effect in CGA contribution revenues (see Figure 4.16), even at the very start of the period under analysis. For instance, by 2035, increasing CGA contribution rates by 2.5 pp would only increase contributions by 70 million euros — from 486 million to 556 million euros (see Table 46, Annex 4). Increasing the statutory age of retirement, however, would produce a larger effect by increasing the contributions by 284 million euros — from 486 million to 770 million euros (see Table 48, Annex 4).

5.2. Financial sustainability projections

As mentioned above, the range of reform scenarios currently under analysis reflects different approaches (increasing revenues, curbing pension expenditure, delaying the take-up of pension benefits) for improving the financial sustainability of the Portuguese Public Pension System. As we will discuss in more detail in the paragraphs below, the ability of the different reform scenarios to improve the financial sustainability of the Portuguese Pension System varies significantly.

As evidenced in Figure 4.17, a 1.5 pp increase in Social Security contribution rates would delay the emergence of structural deficits up to approximately 2047, by which time FEFSS funds would be exhausted. However, further increases in Social Security contributions considered here would be unable to delay the occurrence of structural financial deficits beyond 2070 (see Table 49, Annex 4). As can be seen in Figures 4.18 and 4.19, increases in Social Security contribution rates would only delay the depletion of the FEFSS funds, but they would be unable to ensure its sustainability.

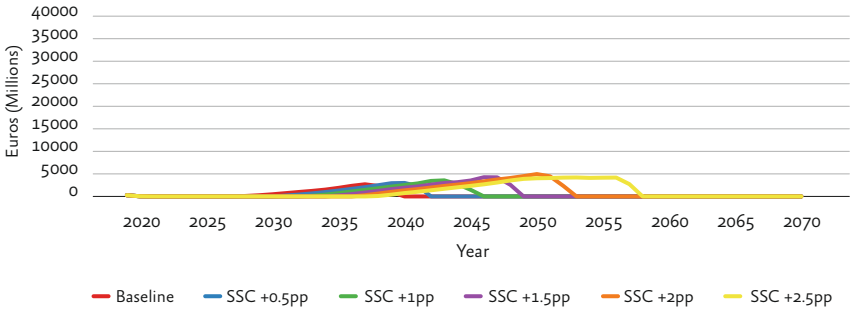
Figure 4.17 Financial balance: SS Contributory Regime, after FEFSS, GDP

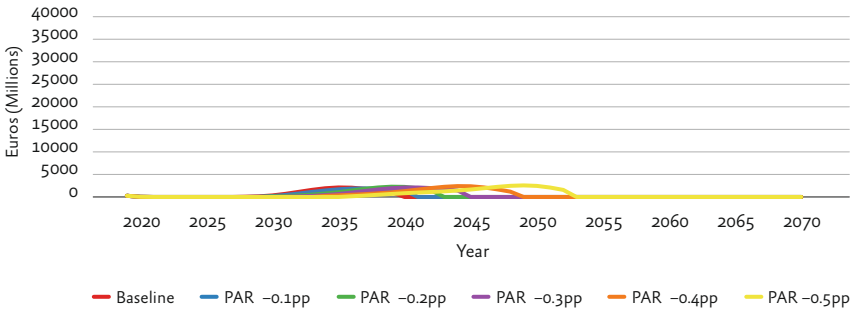


As evidenced in Figure 4.17, it would also take a very significant reduction in the Social Security OAP accrual rates to improve the financial sustainability of the Contributory Regime of Social Security. In fact, not even with a 0.5 pp cut in pension accrual rates would it be possible to prevent the emergence of structural financial imbalances before 2070 (see Table 50, Annex 4). Furthermore, it is interesting to see that the effect of cutting pension accrual rates by 0.5 pp results in greater financial improvements than increasing Social Security contributions by 2.5 pp. At the same time, chronic deficits do emerge earlier. Still, these scenarios are unable to ensure depletion of the FEFSS and long-term financial sustainability of the Social Security Contributory Regime (see Figures 4.18 and 4.19).

As we can see in Figure 4.17, only by raising the statutory age of retirement to, at least 69, would it be possible to postpone the emergence of structural financial imbalances beyond 2070. Contrary to the previous scenarios, this reflects the fact that the surpluses produced by lowering pension expenditure are higher, compared to those that can be achieved by increasing Social Security contributions (see Figures 4.18 and 4.19). It should be noted that, given that DYNAPOR does not simulate the labour market response to increasing the statutory age of retirement, our projection might be underestimating the potential effect of raising the statutory age of retirement in increasing contributory revenues and, consequently, in improving the long-term financial sustainability of the Social Security Contributory Regime.

Figure 4.18 FEFSS transfers





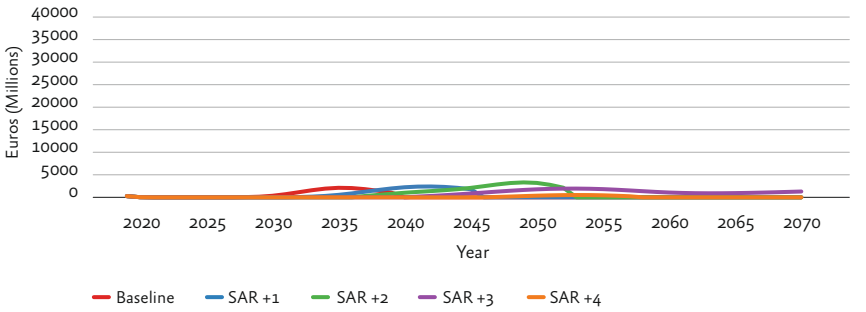
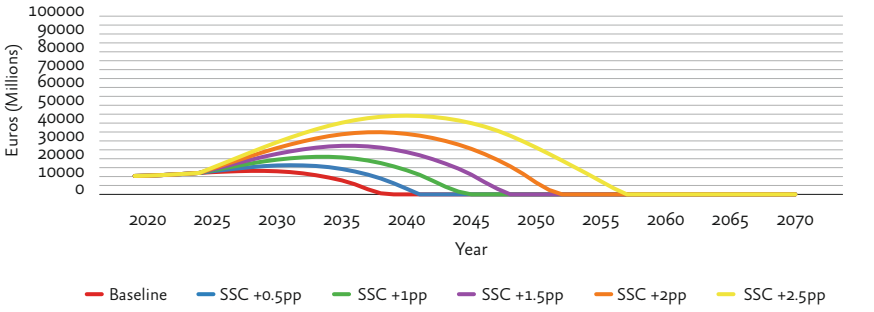
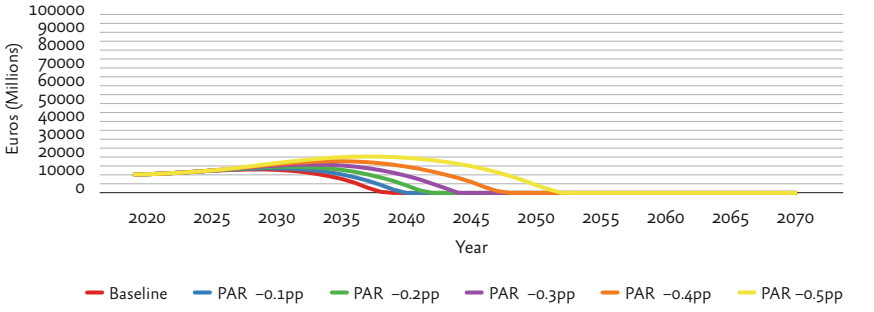
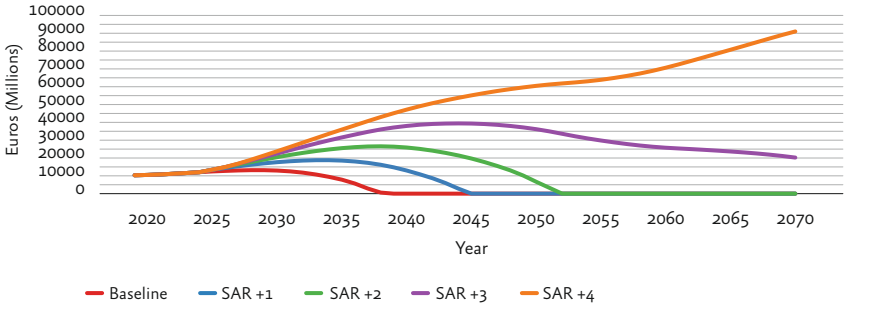


Figure 4.19 FEFSS funds







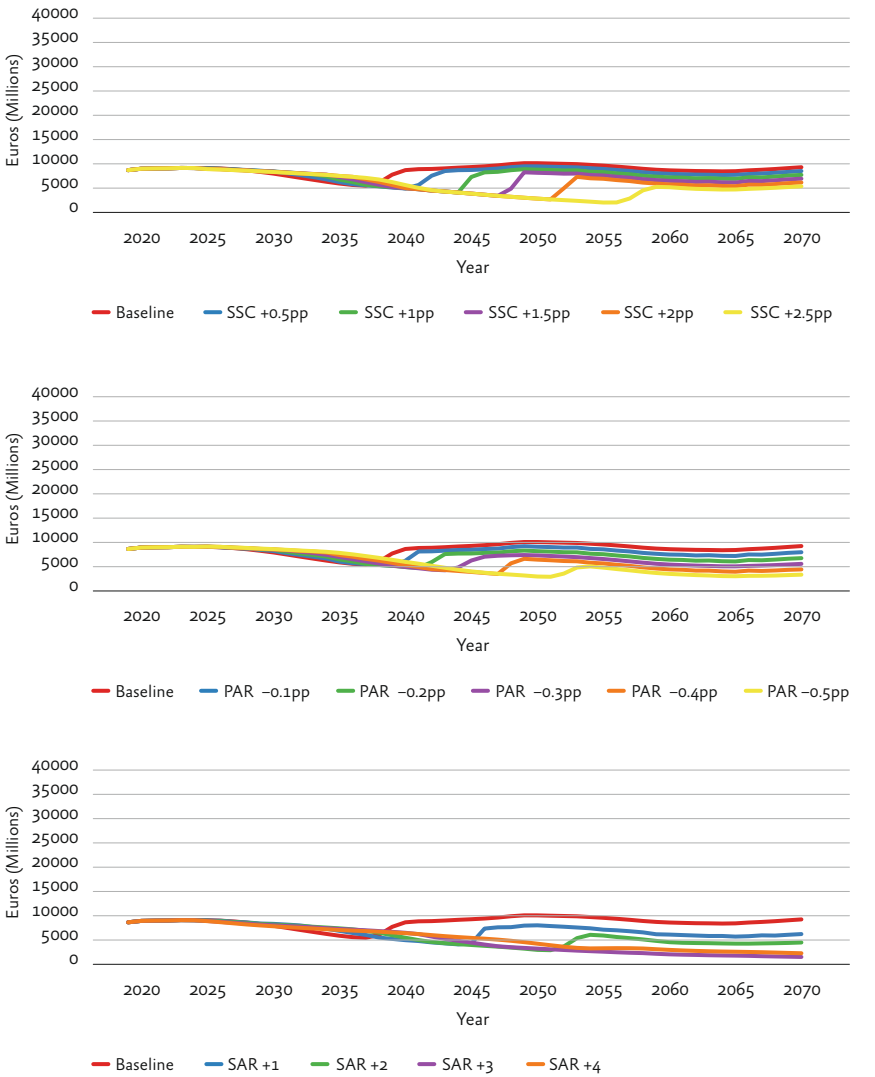
Given the CGA scheme's specific situation, in the sense that a) there are no new entries, b) most of the individuals in the scheme have already amassed a significant part of their contributory career, and c) there is no equivalent to FEFSS in CGA, it is not surprising that none of the three scenarios under consideration has an evident effect in the long-term financial sustainability of the CGA scheme. Still, in the short/medium term, raising the statutory age of retirement would work towards reducing the size of deficits in the scheme. For instance, by 2040, raising the statutory age of retirement to 70 would reduce the deficit in the CGA scheme from 4.5 billion euros to 4.4 billion euros (see Table 60, Annex 4). Increasing CGA contribution rates could also help to reduce the size of the CGA scheme deficits. However, as evidenced in Figure 4.20, the effect is rather marginal, and would be exhausted as soon as the pool of contributors is depleted (see Table 58, Annex 4).

Figure 4.20 Financial balance: CGA

Bearing in mind that the reform scenarios under analysis will have a marginal effect on the size of CGA deficits (see Figure 4.20), and will produce a very limited increase in spending on non-contributory benefits (see Figure 4.14), it is not surprising that the impact of these three scenarios on the size of the pension-related tax burden mirrors their effect on the financial balance of the Social Security Contributory Regime[60]. Thus, in line with our previous findings, we project that only by increasing the statutory age of retirement past 69 years old would it be possible to reduce the burden of the Portuguese Pension System on the public purse until 2070, while ensuring the system's financial sustainability.

According to our previous findings for Social Security, we also project that increasing the statutory age of retirement up to at least 3 years would be the most successful way of reducing the burden of the Portuguese Pension System on the public purse until 2070 (see Table 63 Annex 4). Although to a smaller extent, increasing the contributory rates by 2.5 pp or decreasing the OAP accrual rate by at least 0.5 pp would also reduce pension-related, tax-funded expenditure (see Tables 61 and 62, Annex 4).

Figure 4.21 Total fiscal burden, after FEFSS



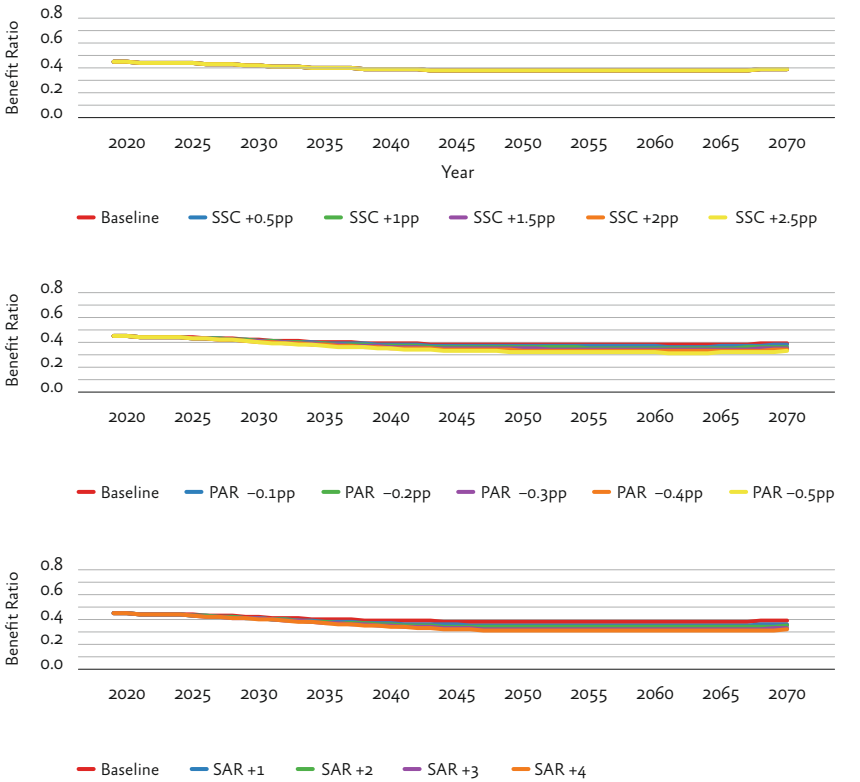
6. Impact on social sustainability

Having looked at the impact of the reform scenarios on the Portuguese Public Pension system's financial sustainability, we now turn to the assessment of the estimated implications for the system's social sustainability. As before, our analysis will focus on three key dimensions: the adequacy of pension benefits (Section 5.1); the ability to replace income from work (Section 5.2); and the capacity to protect individuals against the risk of poverty (Section 5.3).

6.1. Securing an adequate income

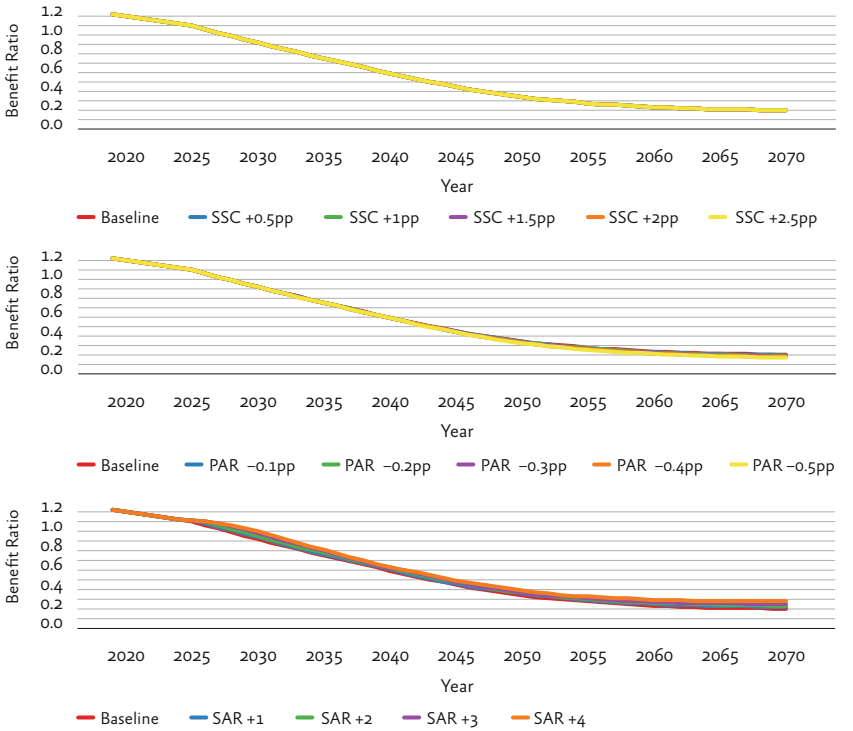
Previously, we have shown that cutting the SS OAP pension accrual rate and increasing the statutory age of retirement will decrease the value of future pension benefits (see Section 3, Chapter 4). It is therefore unsurprising that we anticipate that this type of reforms will have detrimental effects on the adequacy of future pensions (see Figure 4.22). Thus, by 2070, reducing the pension accrual rate by 0.1 pp would reduce the SS OAP benefit ratio from 0.39 to 0.38. Extending the cut of the pension accrual rate to –0.5 pp would further reduce the benefit ratio to 0.33 (see Table 65, Annex 4). Increasing the statutory age of retirement will reduce the adequacy of future SS OAP even further — which is not surprising as, compared with the option of cutting the pension accrual rate, the computation of the value of new pensions is less influenced by salary growth. Thus, increasing the statutory age of retirement to 67 is projected to reduce the SS OAP benefit ratio, in 2070, from 0.39 to 0.36 (see Table 66, Annex 4). Further increasing the statutory age of retirement to 70 is expected to reduce the SS OAP benefit ratio to 0.32. In line with previous findings (see Figure 4.6 and 4.8), increasing pension contributions will have no impact on the adequacy of future pension benefits.

Figure 4.22 Old age pensions (SS), benefit ratio



As we can see in Figure 4.23, and in line with our previous findings (see Figures 4.8 and 4.9), the adequacy of CGA OAP is sensitive (solely) to changes in the statutory age of retirement. Therefore, increasing the statutory age of retirement to 70 is projected to reduce the CGA OAP benefit ratio, in 2070, from 0.23 to 0.14 (see Table 69, Annex 4). Although changes in the accrual rate show some impact, this is mostly marginal.

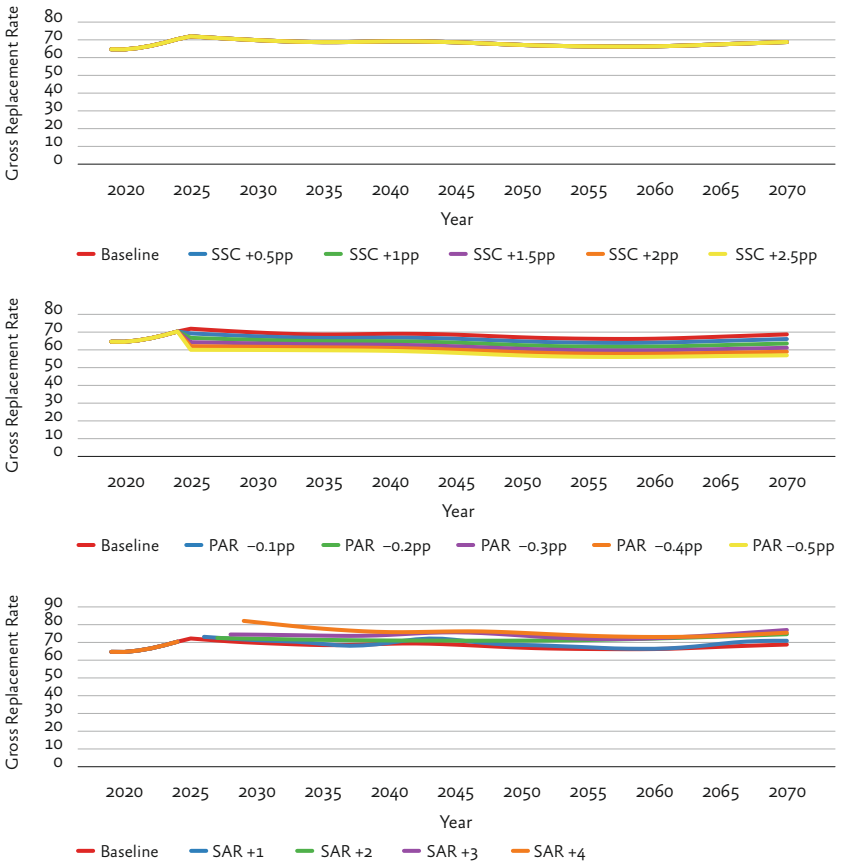
Figure 4.23 Old age pension (CGA), benefit ratio



6.2. Protection against a drop in income

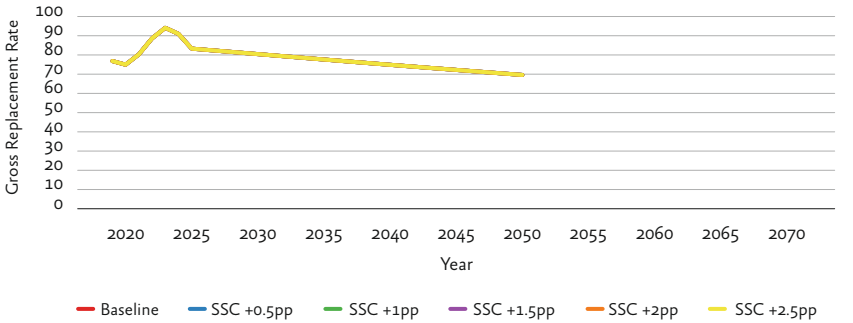
In line with the findings reported above (see Section 3 and 5.1), we project that only reducing the pension accrual rate will negatively impact on the ability of SS OAP benefits to replace work income — a reduction of 0.5 pp in the pension accrual rate would result in a reduction from 68.75% to 56.96% in the gross replacement rate (see Table 71, Annex 4). As evidenced by Figure 4.24, increasing the statutory age of retirement to 69 would actually increase the gross replacement rate of new SS OAP from 68.75% to 79.9% (see Table 72, Annex 4). As before, increasing pension contributions will have no impact on the ability of future pensions to replace income from work.

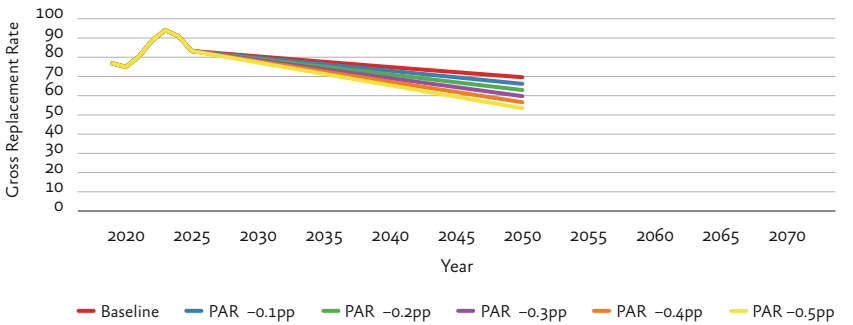
Figure 4.24 Old age pensions (SS), gross replacement rates

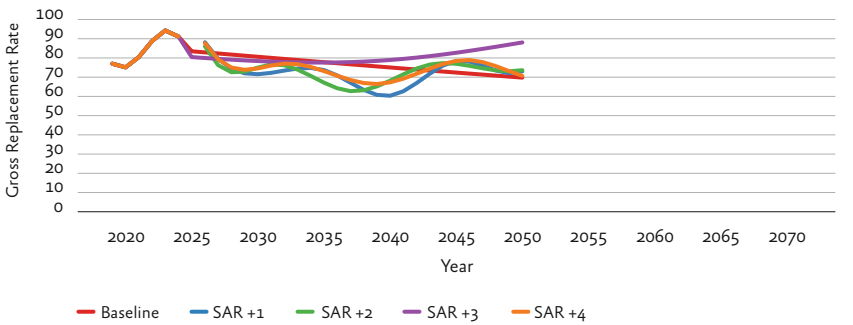


In line with previous findings (see Figures 4.2 and 4.4), the income replacement capacity of CGA OAP is not affected by increases in CGA pension contributions (see Table 73, Annex 4). On the other hand, reducing the pension accrual rate considerably lowers the gross replacement rate of the CGA. For instance, in 2040, a cut of 0.1 pp in the pension accrual rate of the CGA would result in a reduction of the gross replacement rate from 74.88 to 72.95. A cut of 0.5 pp would result in a bigger reduction, reaching 65.39% by 2040 (See Table 74, Annex 4). Finally, increasing the statutory age of retirement produces an impact that is somewhat hard to distinguish.

Figure 4.25 Old age pensions (CGA), gross replacement rates







6.3. Protection against the risk of poverty

In this section we assess the impact of the different reform scenarios in the system's ability to protect pensioners against the risk of poverty. As we've seen before (see Section 5.3, Chapter 2), the analysis of the results should bear in mind the important limitations of DYNAPOR in its ability to measure pensioner poverty.

This being said, our results suggest that increasing pension contributions would marginally increase the percentage of seniors over 65 facing the risk of income poverty (see Figure 4.27). For instance, by 2070, an increase in 2.5 pp in pension contributions would raise the income poverty rate by approximately only 0.5 pp (see Table 79, Annex 4). This comes as a result of the fact that increasing contributions reduces net-disposable income, thus placing more individuals below the poverty line, which, in turn, is expected to increase if contributions are raised (see Figure 4.26 and Table 76, Annex 4).

Similarly, cutting pension accrual rates is also expected to increase the percentage of persons aged 65 and over below the poverty line. For instance, a cut of 0.5 pp in the pension accrual rate would increase the percentage of pensioners aged 65 and over below the poverty line from 15.47% to 18.49%. However, contrary to the effect of increasing pension contributions, decreasing pension accrual rates would actually lower the poverty line — a cut of 0.5 pp would reduce the poverty line from 770 to 718 euros (see Table 77, Annex 4). This would mean that the impact of this scenario would be more detrimental than the previous scenario, since not only would individuals become poorer, but they would be so under a lower poverty line.

Finally, increasing the statutory age of retirement to 70 would result in the highest increase in the poverty rate for pensioners aged 65 and over — from 15.47% to 20.27% (see Table 81, Annex 4). Additionally, the poverty line would be expected to drop even further, to 717 euros (See Table 78, Annex 4), showing perhaps the most detrimental impact of all scenarios.

Figure 4.26 Poverty thresholds

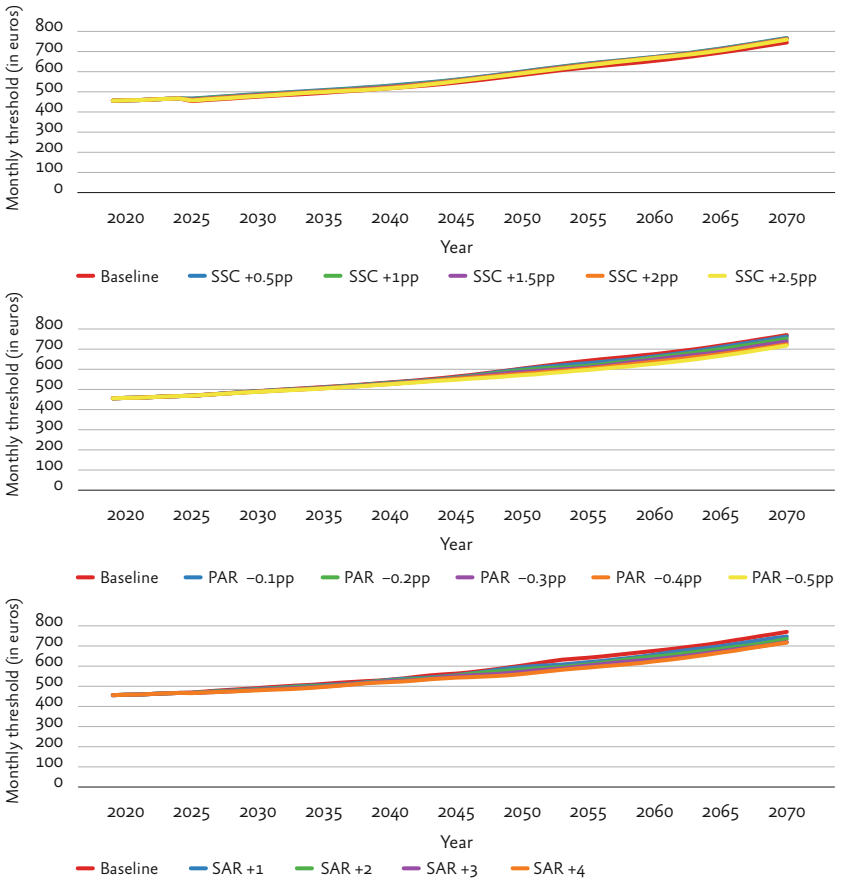
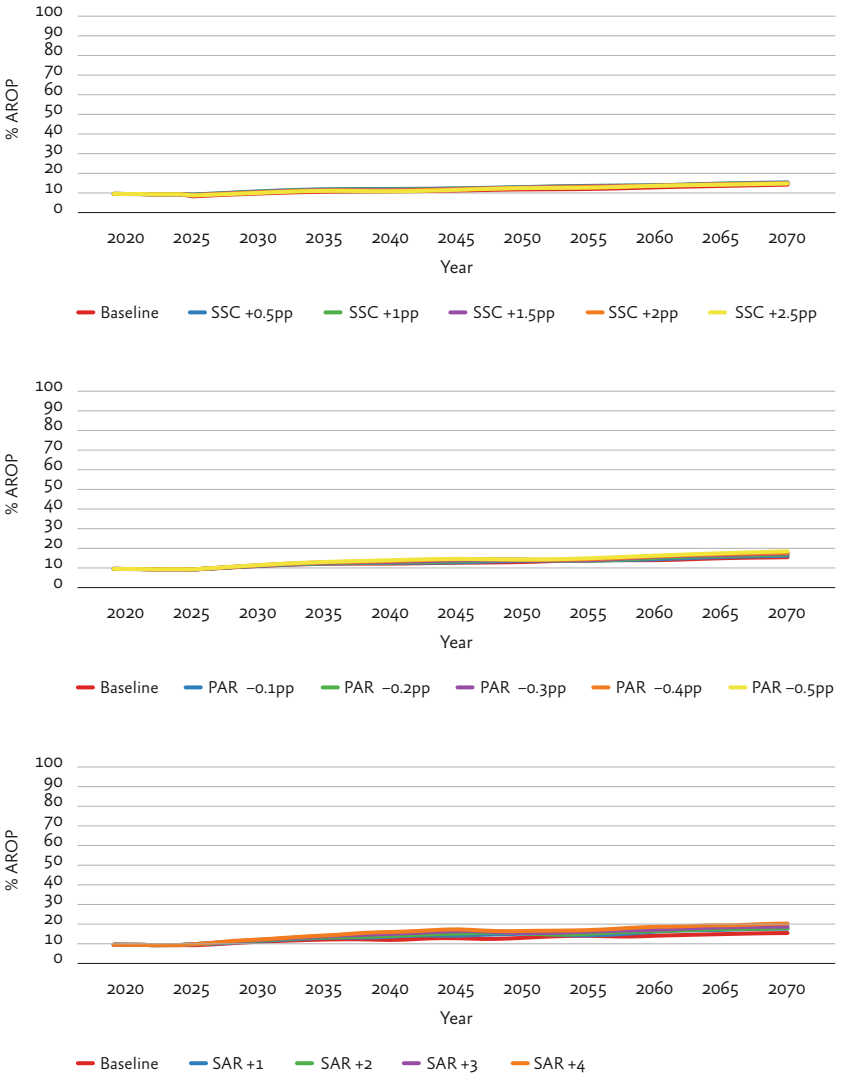


Figure 4.27 Population aged 65+ at-risk-of-poverty



Chapter 5
Assessing the impact of moving towards a notional defined--contribution system

In the previous chapter, we looked at the potential impact of a series of reforms (increasing pension contributions, cutting pension accrual rates, increasing the standard age of retirement) that could be implemented within the current architecture of the Portuguese Pension System. In this chapter, we assess the potential implications of opting for a more systemic approach to pension reform.

One particular option that has attracted a lot of interest in some academic and policy-making circles[61] concerns the adoption of the Swedish model of pension provision, introduced in 2003. The Swedish pension system is structured according to three pillars (OECD, 2017)[62]:

- a (Pay-As-You-Go) Notional Defined-Contribution pension scheme (NDC);
- a (mandatory) Funded Defined-Contribution pension scheme (Premium Pension);
- an income-tested pension top-up (Guaranteed Pension);

The popularity of the Swedish pension system derives from the ability of NDC schemes for curbing the future growth of pension expenditure (Chlo-Domiczak and Góra, 2004; Palmer, 2000; Holzmann, 2017). As they link pension benefits to life expectancy and incorporate an automatic balance mechanism (see Section 1.2.1), NDC schemes are especially designed to adjust the growth of pension benefits to the changing demographic and economic contexts[63].

In addition to this, NDC schemes bear a number of additional advantages:

- NDC schemes strengthen the link between individual contributions and pension benefits (Simonovits, 2006);
- In doing so, they create an incentive for individuals to remain in the labour market, or to increase their work-effort (Brooks & Weaver, 2006);
- As they allow for a flexible retirement age, NDC schemes increase individual choice over consumption smoothing throughout the life-cycle (Brooks & Weaver, 2006);
- Since there is no real capital accumulation, NDC schemes are better protected against fluctuations in financial markets than Funded Defined-Contributions schemes (Góra and Palmer, 2004);
- NDC schemes provide a feasible and cheaper alternative to the costly transition of a Funded Defined-Contributions option (Brooks & Weaver, 2006).

As we acknowledge this, in this chapter we assess the impact of replacing, in 2025, the current Defined-Benefit (DB) OAP scheme with a Notional Defined-Contribution (NDC) Old Age Pension, complemented by a (mandatory) Funded Defined-Contribution pension

scheme (Premium Pension) and a (Defined-Benefit) income-tested top-up (Guaranteed Pension). The chapter is structured as follows. Firstly, we describe the design features of the NDC, Premium Pension and Guaranteed Pension schemes, and outline how they will be introduced in the edifice of the Portuguese Pension System. Then, we assess how this will impact on the financial and social sustainability of the Portuguese Public Pension System.

1. Reform scenario

In this section, we put forward the key features of an alternative architecture for the Portuguese Pension System that mirrors, as closely as possible, the design of the Swedish pension system. Firstly, we describe the process by which these new schemes would be introduced in the Portuguese Pension System (Section 1.1). Then, we describe in detail the rules governing the three schemes to be introduced: the NDC, the Premium Pension and the Guaranteed Pension (Section 1.2). Finally, we identify the key modelling assumptions that shape our assessment of the impact of this reform scenario (Section 1.3).

1.1. Transition rules

As mentioned above, in this section we describe how the new pension schemes would be introduced in the architecture of the Portuguese Pension System. The methodology proposed below was developed based on five key principles:

- Protection of acquired rights — Changes should not harm the acquired rights of current pensioners, and should protect (as much as possible) the acquired pension rights of individuals close to claiming their pension;
- Parsimony — Changes should be kept to the absolutely necessary;
- Seamlessness — Changes should be easy to implement and avoid unnecessary disturbance to the current architecture of the Portuguese Pension System;
- Equity — Changes should minimize, as much as possible, any detrimental effects on individuals who, for health or labour market reasons, are not able to build contributory careers that would allow them to access a full pension;
- Fiscal prudence — Changes should be done in such a way as to avoid creating new pressures on the public purse, which would have to be paid for by increases in taxation or by adding to public sector debt.

In line with these principles, we propose that the introduction of the new schemes in the architecture of Portuguese Pension System would occur as follows:

- From 2025, the current Defined-Benefit Old Age Pension would be replaced by a Notional Defined-Contribution scheme, complemented by a Funded Defined-Contribution Premium Pension and a Guaranteed Pension. Pensions currently under payment would not be affected by this change;
- In order to protect the acquired pension rights of individuals close to the age of retirement, a 10-year transition period would be allowed. During this transition period, individuals taking up an old-age pension would have their pension computed under the two schemes and receive the highest value between the two. After that period, all new old-age pensions would be calculated under the NDC scheme;
- With the view to facilitate the transition to the new system, early access to NDC OAP benefits for individuals with long contributory careers would continue to be allowed for individuals aged 60 and

with at least 40 years' worth of contributions. However, the penalties for early retirement would be computed according to the rules governing the NDC[64];

- The Survivor's Pension and the Disability Pension would continue to be computed under the existing rules;
- With a view to protecting individuals with shorter contributory careers, and to facilitate the transition to the new system, a number of groups would not be integrated in the NDC scheme, namely:
  · Individuals with less than 15 years' worth of contributions, who would remain eligible for the Social Old Age Pension;
  · Individuals receiving an Absolute or Partial Disability Pension, who would continue to be integrated in the Defined-Benefit OAP once they reached the standard age of retirement;
  · Long-term unemployed, who would remain eligible to the defined--benefit Early OAP.
  Individuals receiving Defined-Benefit OAP and Disability Pensions will remain eligible for social complements.
- The NDC OAP cannot be accumulated with:
  · Defined-Benefit OAP;
  · Defined-Benefit Early OAP pension for Long-Term Unemployed;
  · Absolute or Partial Disability Pensions;
  · Social Old Age Pension;
  · social complements;
  However, it would be possible to accumulate an NDC OAP and the CSI.
- For the purpose of avoiding harming the funding of current pensions, which would have to be compensated by increasing taxes, there would be no changes to the rules concerning pension contributions. This means that:
  · Contributions to the NDC Personal Account would be based on the share (58.16%) of Social Security contributions currently assigned to cover old-age risks (see Chapter 1, Section 1.2.1);
  · There would be no cap on pension contributions — and, consequently, on future benefits;
  · The Premium Pension would be funded by an additional contribution of 2.5% on individual earnings from work. Employers would not be required to contribute to this pension scheme.
- The Swedish pension system includes a Buffer Fund which holds financial surpluses in the pension system and whose assets are used to determine the financial sustainability of the pension system and the indexation of NDC accounts and NDC pension benefits. Taking into account the fact that the Portuguese Pension System already has a facility to deal with financial imbalances — the FEFSS — and to avoid an unnecessary institutional overlap, the NDC Buffer Fund (see Section 1.1.1) would have no funds, and would only constitute a notional feature used to determine the indexation of NDC Personal Accounts and of pension amounts. Potential imbalances between contributions and pension expenditure would be dealt with by the FEFSS.

1.2. The new pension schemes

In the sections that follow, we describe the fundamental features of the new schemes that would be introduced in 2025: the NDC OAP scheme, the Premium Pension and the Guaranteed Pension.

1.2.1. NDC

The NDC scheme proposed here can be described as follows. Every person is assigned an individual notional account — the NDC Personal

Account (NDC^{PA}). The combined assets of all individual accounts constitute a virtual pension fund — the NDC Pension Fund (NDC).

At the start of each year, each NDC Personal Account is accrued with the pension contributions (SSC) paid by the individual and his/her employer during the previous year; and the yield accumulated during that year[65]. The pension contribution is equivalent to the share (58.16%) of the Social Security contributions (SSC) currently assigned to fund old-age related benefits (see Section 1.1, Chapter 1).[66]

The return rate on the NDC Personal Account depends on the long--term financial sustainability of the NDC Pension Fund, as measured by the fund's Balance Ratio (see Equation I, Box I):

1. If the Balance Ratio is higher than 1, which means that the current assets in the NDC Pension Fund surpass its future liabilities, the return rate is determined by an adjustment factor that captures changes in wages in the previous two years — the Earnings Index (see Equation VII, Box I)[67,68];
2. If the Balance Ratio is equal or lower than 1, which means that NDC Pension Fund future liabilities are equal or higher than the assets it holds, the return rate is determined by an adjustment factor that reduces the linkage to wage growth by reference to the size of imbalance between assets and liabilities — the Balance Index (see Equation VIII, Box I);

Once the balance between assets and liabilities is restored, the NDC Personal Account return rate will again be computed by reference to changes in wages.

Box I — NDC Account Accrual Rules

Equation I (NDC account)

$$BR_t > 1, NDC_t^{PA} = (NDC_{t-1}^{PA} * EI_t) + SSC_t$$

$$BR_t > 1, NDC_t^{PA} = (NDC_{t-1}^{PA} * BI_t) + SSC_t$$

Where:

BR_t is the value of the NDC Balance Ratio in the current year
NDC_t^{PA} is the value of the NDC account in the current year
NDC_{t-1}^{PA} is the value of the NDC account at the start of the previous year
SSC_t is the value of all the pension contributions the NDC Personal Account in the current year
EI_t is the value of the NDC Earnings Index in the current year
BI_t is the value of the NDC Balance Index in the current year

Equation II (NDC Balance Ratio)

$$BR_t = \frac{NDC\ Current\ Assets}{NDC\ Future\ Liabilities} = \frac{(\sum SSC_{t-1} \times TD_{t-1}) + BF_{t-1}}{PL_{t-1}^{p} + PL_{t-1}^{w}}$$

Where:

BR_t is the value of the NDC Balance Ratio in the current year
$\sum SSC_{t-1}$, is the sum of all pension contributions paid in the previous year;
TD_{t-1}, captures the NDC Turnover Duration;
BF_{t-1}, captures the Buffer Fund;

PL^{p}_{t-1} is the future pension liability concerning all individuals currently in receipt of an Old Age Pension;
PL^{w}_{t-1} is the future pension liability for all individuals who are to receive pensions in the future

Equation III (NDC Turnover Duration)

$$TD_{t} = \overline{\alpha^{p}_{t-1}} - \overline{\overline{\alpha^{w}_{t-1}}}$$

Where:
TD_{t-1}, captures the NDC Turnover Duration;
$\overline{\alpha^{p}_{t-1}}$, represents the average age of pensioners in the previous year;
$\overline{\overline{\alpha^{w}_{t-1}}}$, represents the average age of all individuals in work in the previous year;

Equation IV (NDC Buffer Fund)

$$\sum SSC_{t-1} > \sum OAP_{t-1,}\ BF_{t-1} = \sum SSC_{t-1} - \sum OAP_{t-1}$$

$$\sum SSC_{t-1} \leq \sum OAP_{t-1,}\ BF_{t-1} = 0$$

Where:
BF_{t-1}, captures the Buffer Fund;
$\sum SSC_{t-1}$, is the sum of all pension contributions paid in the previous year;
$\sum OAP_{t-1}$, is the sum of all Old Age Pensions paid in the previous year;

Equation V (NDC Future Liabilities, Pensioners)

$$PL^{p}_{t} = \sum_{t}^{a} \left(\sum_{t-1}^{m=12} OAP * 12 * LE_{a} \right)$$

Where:
PL^{p}_{t-1} is the future pension liability concerning all individuals currently in receipt of an Old Age Pension;
a, represents the age of the individual;
LE_{a}, represents the life expectancy of an individual age a;
$\sum_{t-1}^{m=12}$, value of monthly Old Age Pension benefits paid in December of the previous year to individuals aged a;

Equation VI (NDC Future Liabilities, Workers)

$$PL^{w}_{t} = \sum_{t}^{a(15-64)} NDC^{PA}_{t}$$

Where:
PL^{w}_{t} is the future pension liability for all individuals who are to receive pensions in the future;
NDC^{PA}_{t} is the value of the NDC Personal Accounts in the current year
a(15-64), individuals aged between 15 and 64;

Equation VII (NDC Earnings Index)

$$\frac{U_{t-1}}{U_{t-2}} \geq 1,\ EI_{t} = \frac{U_{t-1}}{U_{t-2}}$$

$$\frac{U_{t-1}}{U_{t-2}} < 1,\ EI_{t} = 1$$

Where:
EI_{t} is the value of the NDC Income Index in the current year

U_{t-1} is the average earnings of all working individuals in the previous year
U_{t-2} is the average earnings of all working individuals two years ago

Equation VIII (NDC Balance Index)

$$BI_t = EI_t * DBR_t$$

$$DBR_t = 1 + \frac{BR_t - 1}{3}$$

Where:
BI_t is the value of the NDC Balance Index in the current year
EI_t is the value of the NDC Income Index in the current year
DBR_t, is the Damped Balance Ratio
BR_t is the value of the NDC Balance Ratio in the current year

Source: Swedish Pension Agency, 2017.

At the age of 61 — or 60 if the person has at least 40 years of contributions (see section 1.1, above) –, the individual will be able to withdraw the funds from his/her NDC Personal Account[69]. The accumulated notional capital will be converted into an annuity, which is computed by dividing funds in the NDC Personal Account by the forecasted life expectancy for an individual of that age[70,71]. Pension benefits are indexed using the same rules that govern the accrual of NDC Personal Accounts.

As mentioned above, the assessment of the long-term financial sustainability of the NDC Pension Fund, as measured by the Balance Ratio, reflects the balance between the current assets in the NDC scheme and the future liabilities that will fall upon it (see Equation II, Box I). The value of the current assets in the NDC scheme is determined by adding a) the value of all pension contributions (SSC) paid in the last year, multiplied by the turnover duration (see Equation III, Box I), which is the difference between the average age of pensioners and the average age of the working population; b) the funds accumulated in the NDC Buffer Fund (see Equation IV, Box I), which stores the surpluses that might result when pension contributions surpass pension expenditures (see Equation IV, Box I). The NDC scheme liabilities are computed by adding the value of the future pension liabilities of individuals currently receiving an OAP (see Equation V, Box I) and the value of the future pension liabilities of individuals currently in employment (see Equation VI, Box I).

1.2.2. The Premium Pension

As mentioned above, the Premium Pension is a Funded Defined--Contribution pension scheme. As part of this scheme, every person is assigned an individual account — the Premium Pension Account (PPA). Every month, each individual is expected to credit the equivalent of 2.5% of pensionable earnings, in line with current pension contribution legislation (see Chapter 1, Section 1.2.1) to his/her account. Employers are not required to contribute to the Premium Pension scheme. At the start of each year, the Premium Pension Account is accrued with the yield produced by the investments made by the holder. The return rate will depend on how the individual holder will decide to invest the funds in his/her Premium Pension Account[72].

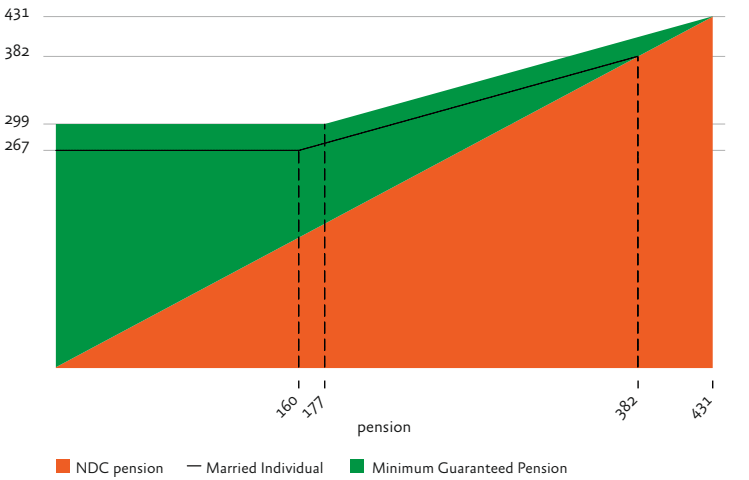
At the age of 61, the individual will be able to withdraw the funds from his/her Premium Pension Account[73]. The account will be converted into an annuity[74], which is computed by dividing funds in the Premium Pension Account by the forecasted life expectancy for an individual of that age[75,76].

1.2.3. Guaranteed Pension

As mentioned above, the Guaranteed Pension is a differential supplement aimed at providing economic security to individuals with shorter contributory careers. In line with the transition schedule sketched above (see Section 1.1), the Guaranteed Pension would cover individuals aged 65 (and over) and with at least 15 years of pension contributions, but whose NDC pension (excluding the Premium Pension) is below a given threshold.

For a person with 40 years of contributions, this threshold is set by reference to the Reference Value of the CSI[77], if single, or 88.5% of that, if married. For NDC pension incomes equal or below 40.1% of CSI Reference Value, if single, or 36.5% of that if married, the value of the top-up decreases in strict proportion to the value of the NDC pension (see Figure 5.1). For NDC pension incomes above that threshold, the value of the top-up is reduced by 48% of the NDC pension. For individuals with less than 40 years of contributions, the top-up is calculated in fortieths of the full Guaranteed Pension[78]. Finally, the Guaranteed Pension is indexed to changes in the CSI Reference Value[79].

Figure 5.1 Guaranteed Pension's Means-Test



1.3. Key modelling assumptions

With a view to adequately model the impact of the changes proposed above, a number of critical modelling assumptions has been made:

- At the start of the transition period (2025), each NDC Personal Account is credited with a notional value equal to all pension contributions paid since entering the labour market until 2012[80], multiplied by an interest rate of 1.8%. For contributions paid between 2013 and 2025, normal accrual rules apply;
- Premium Pension Accounts are not credited with any amount;
- Given the impossibility to model individuals' investment strategies, and in line with the European Commission's baseline macroeconomic

scenario (see Chapter 1, Section 4.3), the annual (real) rate of return of Premium Pension Accounts is set at 3%;

- With a view to better understand how the introduction of the NDC scheme would impact on the value of pension benefits — and on pension expenditure — we assume that individuals will take up their NDC OAP at the same age as they would under the baseline scenario;
- Upon retirement, it is assumed that individuals will withdraw the balance of their pension accounts (NDC and Premium Pension) in full;
- Age-specific life expectancy forecasts used to determine pension annuities in the NDC and the Premium Pension schemes are based on DYNAPOR population projections — and, consequentially, aligned with the European Commission's population projections (see Chapter 1, Section 4.1);
- In line with our baseline scenario (see Chapter 1, Section 4.4), until 2030, the value of the Guaranteed Pension threshold is updated in line with the legislation governing the indexation of the CSI. From 2030 onwards, the value of the Guaranteed Pension threshold is updated in line with changes in wages.

2. Impact on the demand for pensions

As expected, given the assumptions made concerning the timing at which individuals are expected to collect their pension (see Section 1.1), the introduction of the NDC scheme will not have a significant impact on the number of pensioners in the Portuguese population[81]. In the same way, the introduction of the NDC is projected to have but a marginal impact on the total number of Social Security pensioners (see Figure 5.2; and Table 1, Annex V).

Figure 5.2 Total number of pensioners

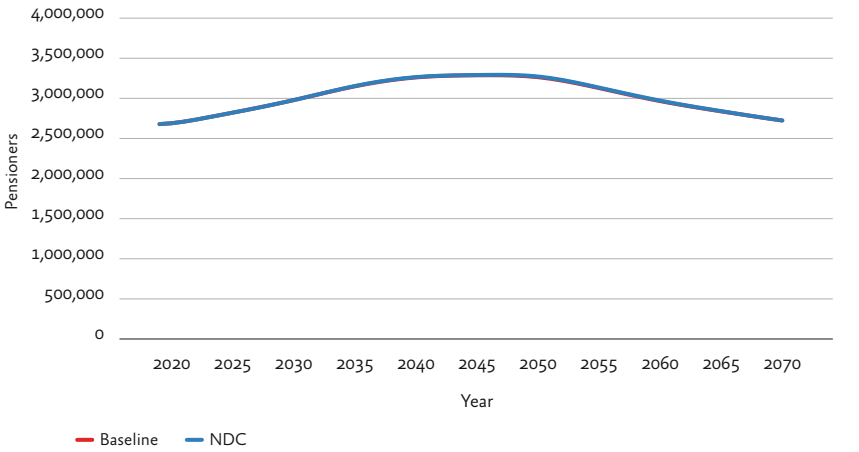
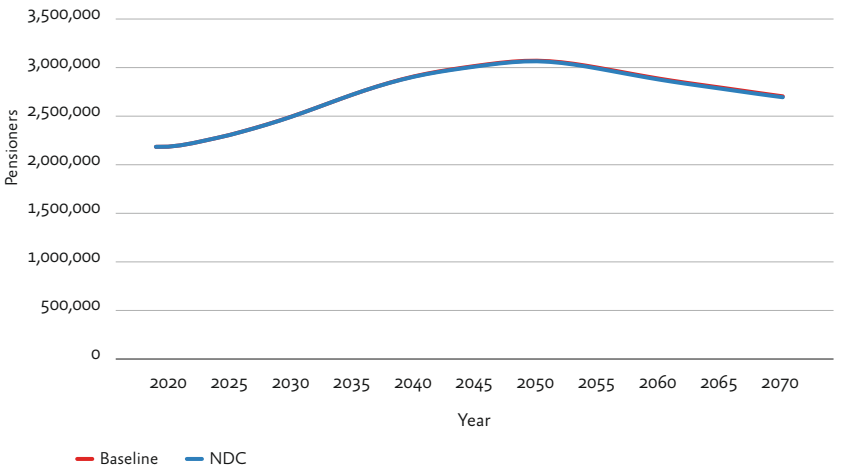


Figure 5.3 SS pensioners



Looking at Figure 5.4, we can clearly observe the impact of the reform scenario sketched above. Following the transition period, the number of NDC pensioners starts to rapidly increase from 18.6 thousand in 2025, to 1.61 million in 2040 and 1.92 million in 2070 (see Table 3, Annex V). In fact, by 2070, the NDC scheme is projected to account for 80.1% of all pensioners in the Portuguese Pension System. Logically, the number of pensioners in the Defined-Benefit OAP is projected to decrease from 1.81 million in 2025 to 474 thousand by 2070 (see Table 3, Annex V). Also in line with our reform scenario, which comprises the possibility of taking up early retirement benefits under de NDC scheme for individuals aged 60 and with 40 years of contributions (see Section 1.1), we project that the number of beneficiaries receiving early-retirement benefits from the Defined-Benefit OAP will rapidly decrease once the transition period is completed (see Table 3, Annex V).

Figure 5.4 SS OAP pensioners

As we can see in Figure 5.5, the introduction of the NDC is expected to have a significant impact on the number of pensioners receiving non-contributory benefits. Reflecting the (expected) adverse impact of the NDC in the value of future pension benefits (see Section 3, below), the number of pensioners receiving non-contributory benefits is projected to increase considerably from 916 thousand in 2020 to 1.84 million in 2065 (see Table 4, Annex 5).

Figure 5.5 SS pensioners, contributory and non-contributory benefits

3. Impact on average monthly payments

As we can see in Figure 5.6, the introduction of the NDC scheme will have a significant impact on the value of future pension benefits. Once the transition period is completed[82], the average monthly value of OAP is projected to grow at a much slower pace than what is projected in the baseline scenario. In the baseline scenario, between 2035 and 2070, the average value of OAP is projected to increase 77.6% — from €520 to €924 (see Table 5, Annex V). Over the same period, the NDC OAP (plus Premium Pension) is projected to increase by 60.6% — from €500 to €803.

As evidenced by Figure 5.6, the impact on the value of pension benefits would be significantly worse were it not for the role of the Premium Pension in complementing NDC OAP benefits. For instance, in 2040, the Premium Pension is projected to add €78 (per month) to the NDC OAP (see Table 5, Annex V). It should also be mentioned that the ability of Premium Pension fund to supplement NDC OAP benefits is likely to increase as the Premium Pension fund matures. Thus, by 2070, the Premium Pension is projected to add €94 (per month) to the NDC OAP (see Table 5, Annex V).

It is also worth noting that, after the transition to this regime is concluded, the average value of the Defined-Benefit OAP is expected to increase at a lower rate than in the baseline scenario. Thus, between 2035 and 2070, the Defined-Benefit OAP monthly average value is projected to increase by 57.3% — from €523 to €823 (see Table 5, Annex V). This is not necessarily surprising. Firstly, it reflects the fact that new pensions entering the scheme are from individuals with lower benefits — namely long-term unemployed or disabled persons (see Section 1.1). More importantly, it reflects the clearing out of higher pensions from the past — as pensioners eventually die.

Figure 5.6 Average monthly payment: SS OAP

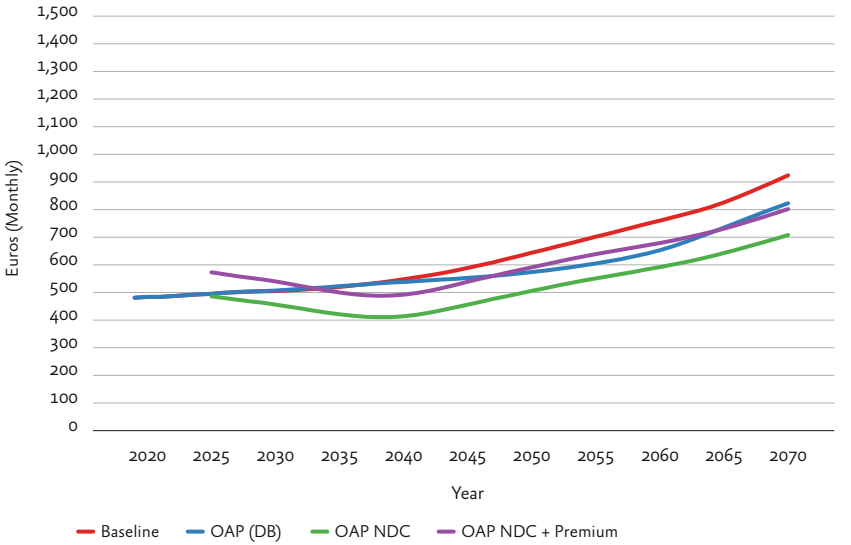
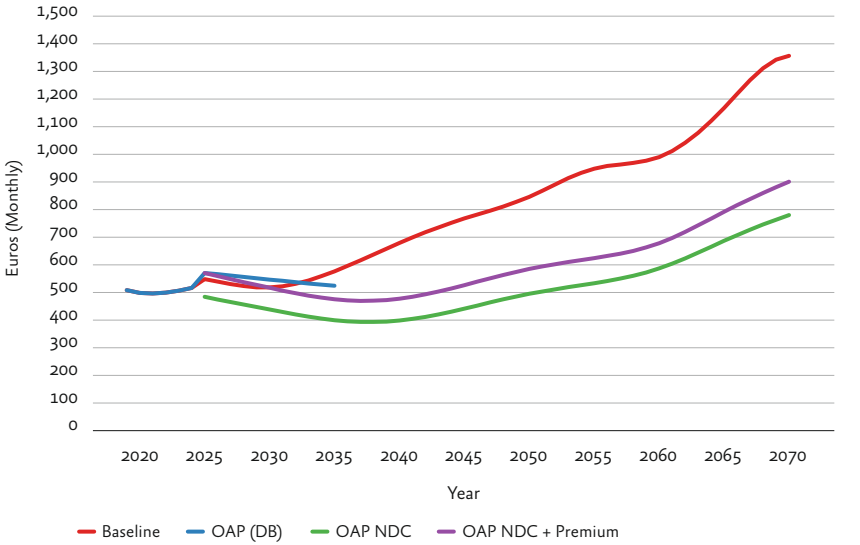


Figure 5.7 Average monthly payment: new SS OAP



The impact of the introduction of the NDC scheme in the generosity of pension benefits is made even clearer when we look at the average value of new OAP pensions (see Figure 5.7). Thus, once the transition period is concluded, the average value of OAP in the baseline scenario is projected to increase 147% between 2025 and 2070 — from €549 to €1358 (see Table 6, Annex V). In contrast, the NDC OAP (plus Premium Pension) is projected to increase 58.1% in the same period — from €571 to €902.

4. Impact on pension expenditure

Reflecting the projected decline in the generosity of OAP benefits (see Section 3), the introduction of the NDC scheme is expected to produce a substantial reduction in future pension expenditure. As in the previous chapter, we assess the impact of the new scheme in absolute terms, i.e. in euros.

Figure 5.8 Total pension expenditure

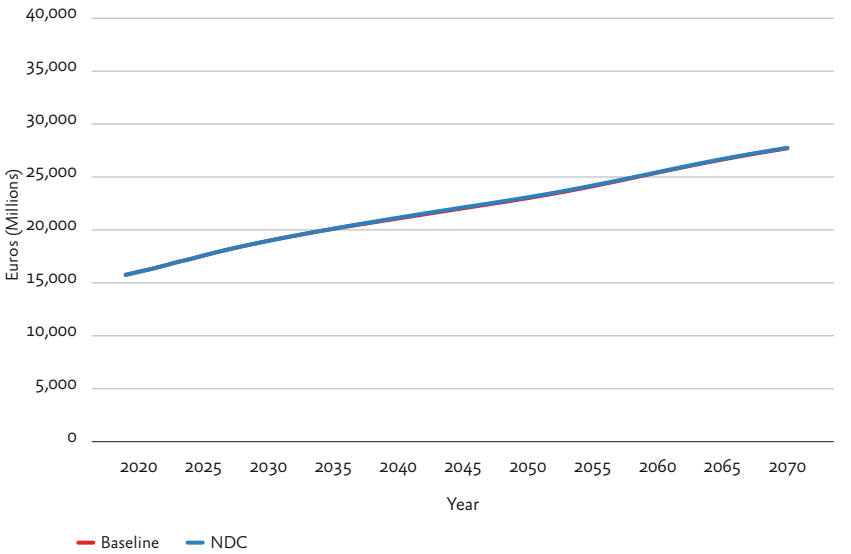
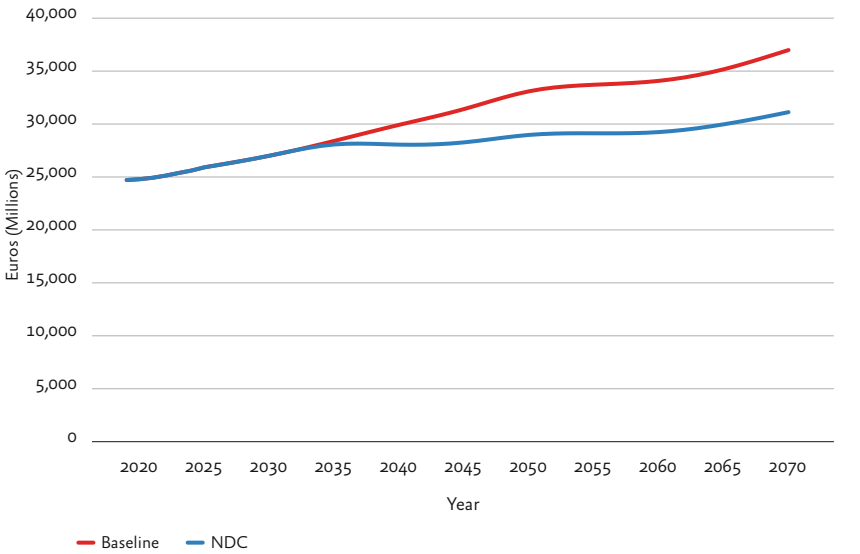


Figure 5.9 SS pension expenditure



As we can see in Figure 5.8, the effect of the introduction of the NDC on pension expenditure is almost immediate. Taking 2070 as a reference, the introduction of the NDC would reduce total pension expenditure by close to 5.86 billion euros — from 37 billion euros (in the baseline scenario) to 31.1 billion euros (see Table 7, Annex V). As expected, this drop is mirrored in the Social Security pension expenditure (see Figure 5.9 and Table 8, Annex V).

In addition to a reduction in future Social Security pension expenditure, the introduction of an NDC scheme would also entail a significant change in the internal composition of pension spending (see Figures 5.10 and 5.11). Thus, in line with the changes in the take-up of pension benefits (see Figure 5.4), we project that spending in NDC OAP will start to increase from 2025 onwards, amounting to 3.84 billion euros by 2040, to 8.87 in 2050, and to 13.6 by 2070 (see table 9, Annex V). Naturally, spending in the defined-benefit OAP will gradually decrease overtime — from 12.69 billion euros in 2035 to 5.35 in 2070.

Figure 5.10 SS expenditure in Old-Age Pensions, per type of pension

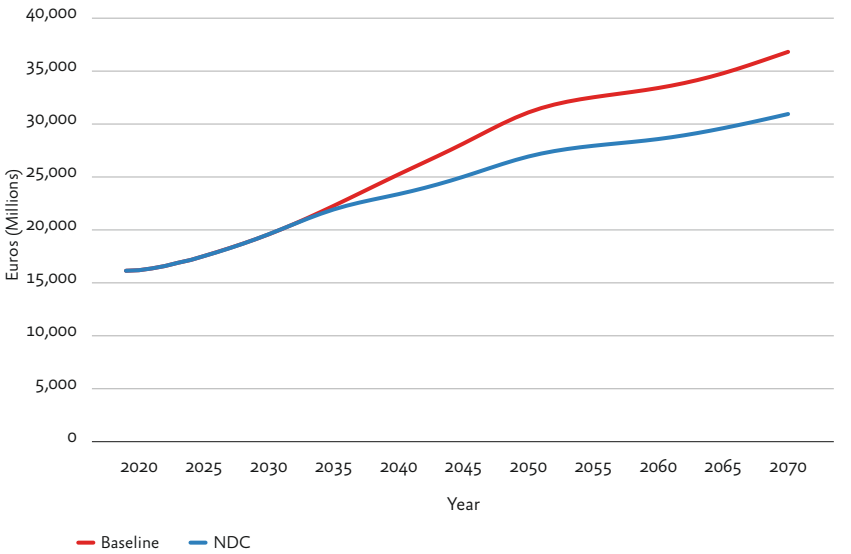


Figure 5.11 SS expenditure, per regime

Curiously, the anticipated substantial increase in the take-up of non-contributory pension-related benefits (see Figure 5.5, Section 2) does not translate into an equally sizable increase in spending in this type of benefits (see Figure 5.11). Thus, by 2070, even if 66.2% of all Social Security pensioners are expected to receive some kind of non-contributory pension-related benefit, spending in this type of benefits will only represent 23% of all pension-related Social Security expenditure (see Table 10, Annex V).

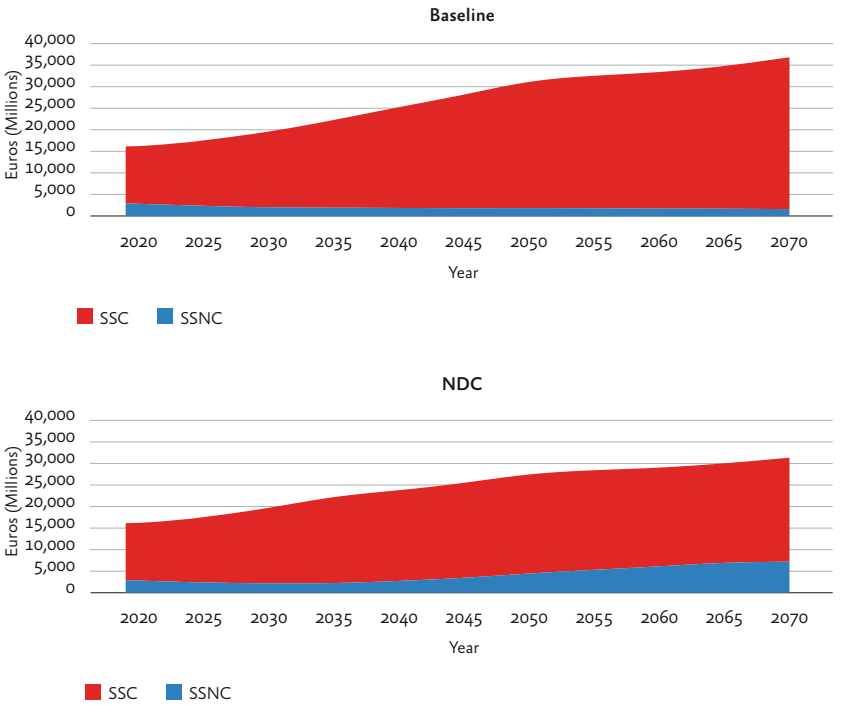
5. Impact on financial sustainability

Having looked at the impact of the introduction of the NDC scheme in the demand and value of pension benefits, in this section we broaden our analysis to focus on the long-term financial sustainability of the Portuguese Pension System. As in previous chapters, we start by looking at the impact on pension contributions (Section 5.1).

5.1. Impact on pension contributions

As expected, given the decision not to set a cap on pension contributions (see Section 1.1), the introduction of the NDC scheme is not projected to impact on contributions to Social Security — see Figure 5.12. Thus, pension contributions are projected to increase in the period under analysis from 16 billion euros in 2020 to 27.7 billion euros in 2070 (see Table 11, Annex V).

Figure 5.12 Contributions to Social Security system

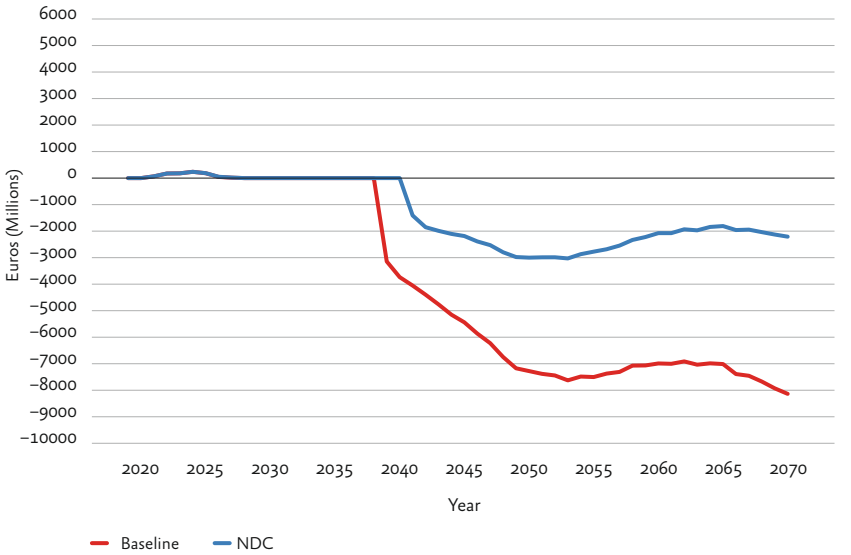


5.2. Financial sustainability projections

With contributions remaining the same, the projected decrease in pension expenditure (see Section 4) means that the introduction of the NDC scheme would significantly improve the financial situation of the Social Security Contributory Regime. It is worth noting that the introduction of the NDC scheme would only postpone the emergence of structural financial imbalances from 2038 to 2040. In this sense, the introduction of the NDC would not be as efficient as other options explored in this study (see Chapter 3).

However, as a by-product of its self-balancing mechanism, the introduction of the new scheme would significantly limit the size of future imbalances. In fact, by 2070, the introduction of the NDC scheme would reduce the size of the deficit of the Social Security Contributory Regime by 73% — from 8.1 billion euros (in the baseline scenario) to 2.2 billion euros (see Table 12, Annex 5).

Figure 5.13 Financial balance: SS Contributory Regime, after FEFSS



As we can see in Figures 5.14 and 5.15, the introduction of the NDC would also reduce the size of the transfers from FEFSS needed to balance out the system (see Figure 5.14). For instance, by 2035, the introduction of the NDC would reduce the size of the FEFSS transfers from 1.9 to 1.58 billion euros (see Table 13, Annex V).

Figure 5.14 FEFSS transfers

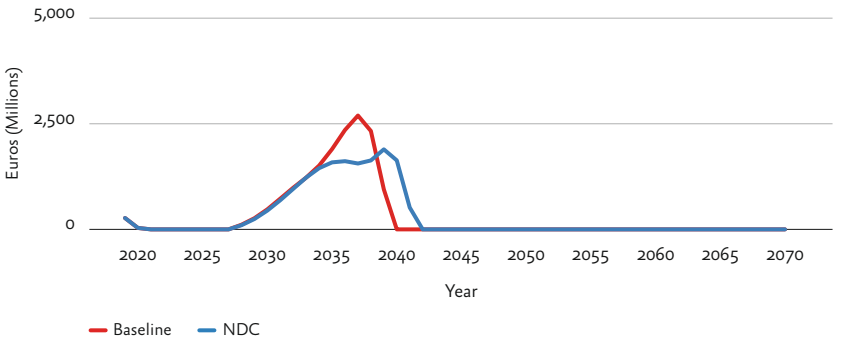


Figure 5.15 FEFSS funds

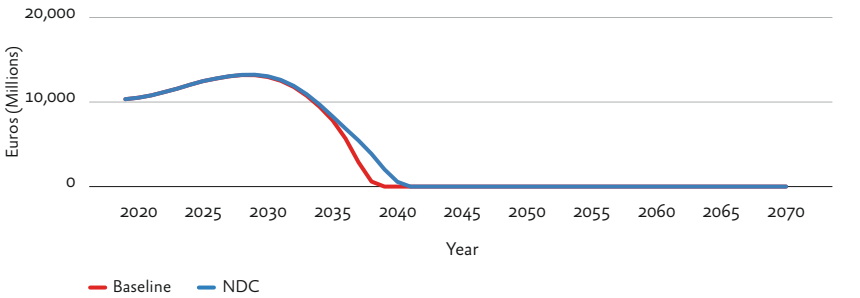
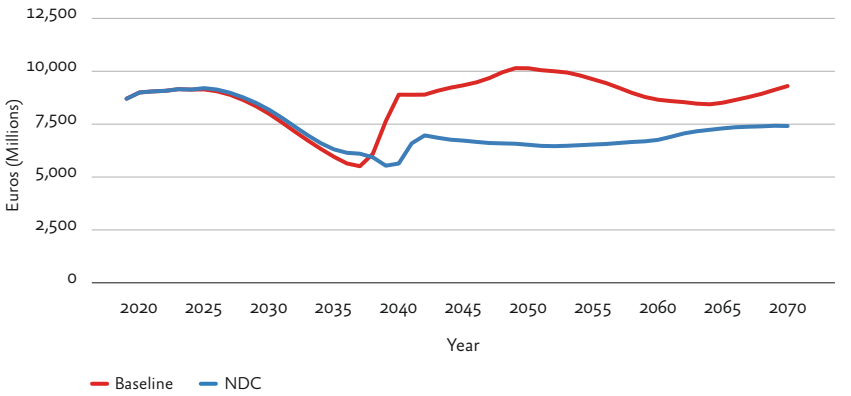


Figure 5.16 Total fiscal burden, after FEFSS



Unsurprisingly, given the projected improvement of the financial situation of the Social Security Contributory Regime (see Figure 5.15), we also estimate a reduction of the fiscal burden associated with the Portuguese Pension System (see Figure 5.16). However, this effect is only temporary. Thus, as a result of the increase in spending in non-contributory benefits (see Section 4), the weight of the pension system on public finances starts to increase from 2060 onwards.

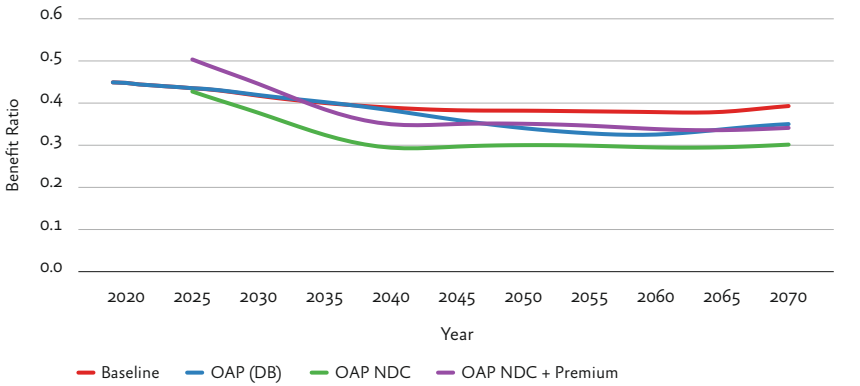
6. Impact on social sustainability

We conclude our analysis by looking at how the introduction of the NDC scheme would impact on the social sustainability of the Portuguese Pension System. As in previous chapters, we focus on three key issues: the adequacy of pension benefits (Section 6.1); the ability of pension benefits to protect individuals against a drop in income upon retirement (Section 6.2); and the ability of pension benefits to protect individuals against the risk of poverty (Section 6.3).

6.1. Securing an adequate income

As shown above, the introduction of the NDC scheme is projected to have a detrimental effect in the value of future pension benefits (see Section 3). Naturally, this will dampen the adequacy of future pension benefits[83]. Taking 2070 as a reference, the benefit ratio of NDC OAP (plus Premium Pension) is projected to be 0.05 below that of the OAP in the baseline scenario — 0.34 compared to 0.39, respectively (see Table 16, Annex V). Again, it is worth mention the important role that the Premium Pension plays in supplementing the NDC OAP (see Figures 5.6 and 5.7). If we were to exclude the Premium Pension, by 2070 the benefit ratio of the NDC OAP would drop all the way down to 0.30 (see Table 16, Annex V).

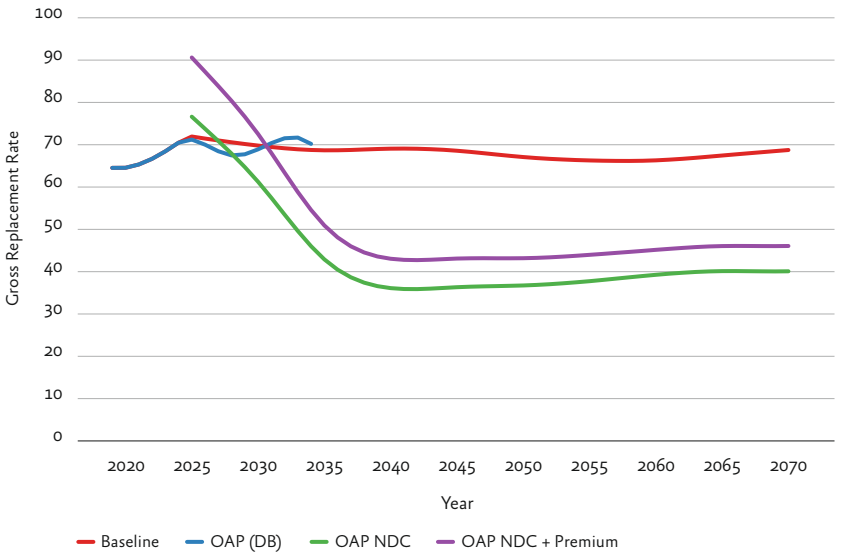
Figure 5.17 Old age pensions (SS), benefit ratio



6.2. Protection against a drop in income

In line with the previous findings, we also find that the introduction of the NDC will significantly reduce the ability of pensions to protect individuals from a drop in income upon retirement. As we can see in Figure 5.18, the impact on the pensions' gross replacement rates is almost immediate. Thus, in 2035 the NDC OAP (plus Premium Pension) gross replacement rate would be set at 50.9 % — well below the OAP gross replacement rate in the baseline scenario, set at 68.7% (see Table 17, Annex V). If we were to exclude the Premium Pension, the gross replacement rate of the NDC OAP in 2040 would further drop to 42.9% (see Table 17, Annex V).

Figure 5.18 Old age pensions (SS), gross replacement rates



6.3. Protection against the risk of poverty

While it is projected to dampen the adequacy of future pension benefits, and to significantly reduce their ability to protect individuals against a sharp drop in income upon retirement, our findings suggest that the introduction of the NDC scheme will not increase the risk of income poverty among pensioners.

Figure 5.19 Poverty thresholds

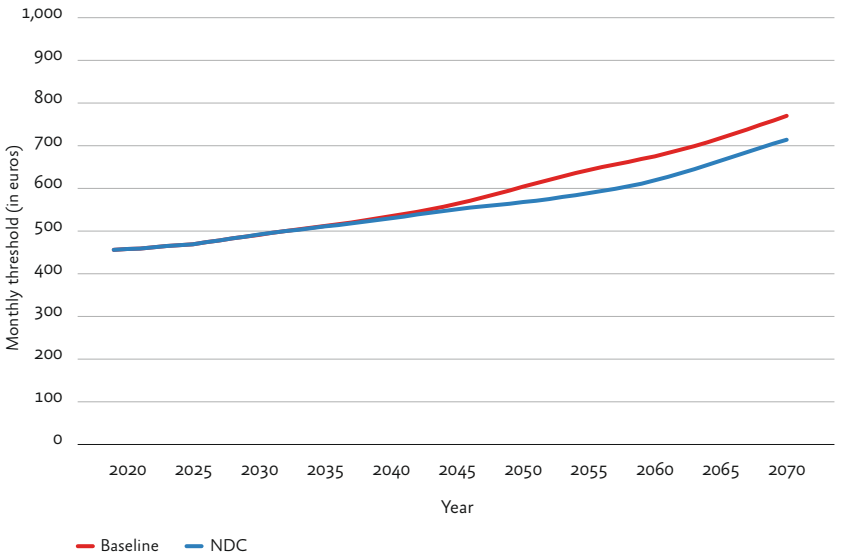
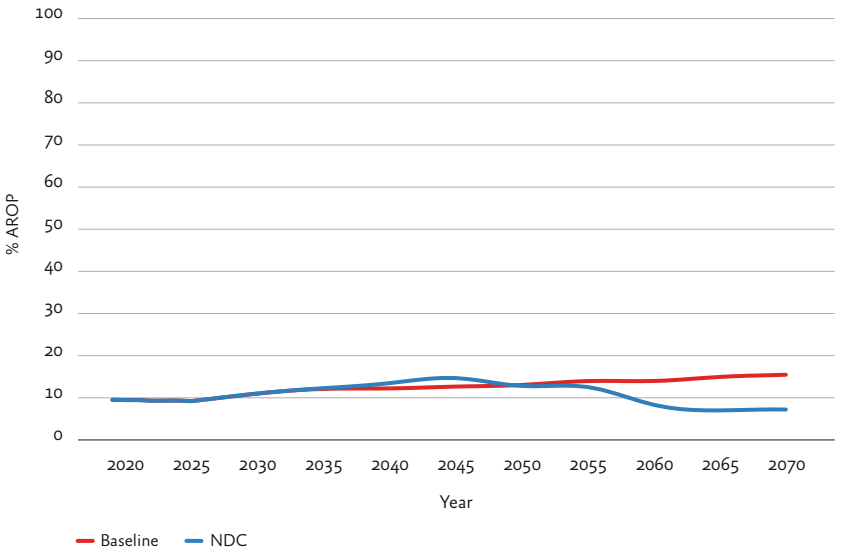


Figure 5.20 Pensioners 65+ at-risk-of-poverty



In fact, within the limitations of the DYNAPOR model in estimating how poverty rates are likely to evolve (see Section 5.3, Chapter 2), we find that from 2045 onwards the percentage of persons aged 65 with incomes below 60% of the median is consistently below what is projected in the baseline scenario (see Figure 5.20). Thus, by 2070, we project that the introduction of the NDC scheme will cut the percentage of seniors with disposable incomes below the poverty line, from 15.47% to 7.21% (see Table 19, Annex V).

This can be explained, on the one hand, by the role played by the Guaranteed Pension in protecting pensioners with lower incomes (see Section 1.2.3), and, on the other hand, by the fact that lower pension benefits will lower the median income which the poverty threshold is pegged to. As we can see in Figure 5.19, by 2070 the introduction of the NDC scheme would lower the poverty threshold from €770 (in the baseline scenario) to €714 (see Table 18, Annex V).

Conclusion

As mentioned at the start of this report, notwithstanding a small number of studies from national and international institutions (Ministério da Segurança Social, 2006; Ministério da Solidariedade, Emprego e Segurança Social, 2015; European Commission 2012, 2015, 2018), and by local scholars (Pinheiro and Cunha, 2007; Pereira and Rodrigues, 2007; Bravo, 2012), the evidence on the sustainability of the Portuguese Pension System is scarce. In this section, we review the main findings produced by this study (Section 1) and critically discuss how they contribute to a deeper understanding of the financial and social sustainability of the Portuguese Pension System (Section 2). We list a number of key recommendations that policy-makers (and other key stakeholders) should take into consideration if they decide to act with a view to strengthening the financial and social sustainability of the Portuguese Pension System. We conclude by identifying a series of substantive and methodological issues that would help to improve our knowledge of the sustainability of the Portuguese Pension System in the future.

1. Key findings

This study relies on evidence produced by DYNAPOR, a dynamic microsimulation model of the Portuguese Pension System. Despite all of its merits, this model is hampered by a number of limitations that need to be taken into account when assessing the significance of the findings presented in this report:

- While it is still the best option for measuring the financial situation of individuals/households and the take-up of welfare benefits, EU-SILC (which DYNAPOR adopts as its database) has serious limitations on how it measures the take up of pension benefits, which require a number of data imputation procedures;
- DYNAPOR does not model a number of sources of income (income from property, income from assets, etc.) and benefits (family benefits, minimum income scheme), which limits our ability to replicate the methodological approach adopted by national and international institutions when measuring poverty;
- Given the lack of suitable data on the nature and composition of migration flows, DYNAPOR is very limited in its ability to study how migration impacts on the sustainability of pension systems;
- DYNAPOR does not model individual responses to changes in pension rules, which limits our ability to study certain reform scenarios, such as increasing (or reducing) the age of retirement, where such responses are likely to occur;
- Currently, the benefit take-up is modelled using deterministic equations, which limits our ability to model both early retirement and the postponement of pension benefit take-up;
- In the same way, DYNAPOR is a semi-equilibrium model. Hence it is not able to capture how changes in the pension system might impact on broader demographic and labour market dynamics.

Despite these limitations, this report makes a significant contribution to the study of the financial and social sustainability of the Portuguese Pension System. Thus, our study shows that:

- As a result of continuous low levels of fertility and a significant increase in life expectancy, Portugal will be faced with the prospect of a decrease in total population (by 23% between 2020 and 2070) and in working-age population (37%). Over the same period, the proportion of people aged 65 and over will increase from 22% to 36%;
- In line with the central macroeconomic scenario assumed by the European Commission (2017), which supports the results of this study, the decline in population of working age will significantly limit the growth potential of the Portuguese economy over the next decades. Thus, average GDP growth rates for the Portuguese economy are expected to vary between 0.8% and 1% — well below the EU27 average growth rate which is expected to grow consistently above the 1% threshold;
- However, even these worrying levels of economic growth will only be possible if the European Commission's relatively optimistic projections concerning the growth of labour productivity and wages in Portugal are to be met;
- The demographic and macroeconomic scenario sketched above will significantly shape the prospects of the Portuguese Pension System. Thus, if current pension rules remain constant, we project that, between 2020 and 2045, the number of pensioners will increase significantly from around 2.7 million to 3.3 million, respectively. Subsequently, as the flow of new pensioners reduces and the older cohorts start to fade away, the number of pensioners is expected to decline gradually to approximately 2.7 million people by 2070;
- Assuming that wages will grow in line with the European Commission projections on labour productivity, we expect a sustained growth in the nominal value of Social Security pensions. For example, at 2018 prices, the average value of Old Age Pensions is expected to rise from € 482 in 2020 to € 924 in 2070 — an increase of 91%. By contrast, in the CGA (the public servants pension scheme), the average value of pensions is expected to decline rapidly;
- While in absolute terms pension expenditure is expected to rise, when measured as a percentage of GDP, we expect that while remaining relatively stable at around 12.5% in the first half of our projection, pension expenditure will decline from 12.7% to 11, 8% between 2050 and 2070;
- Despite the projected decline in the number of people of working age, the growth in labour market participation rates and the wages predicted by European Commission will ensure that, as a percentage of GDP, the value of Social Security contributions will not drop. In fact, over the period under analysis, Social Security contributions are expected grow from 8.1% of GDP, in 2020, to 8.7% in 2070;
- Still, this (slight) increase in contributions will not be sufficient to compensate for the increase in pension expenditure in the Social Security Contributory Regime, which is expected to start to register chronic deficits as early as 2027. If we were to use transfers from the FEFSS, it would be possible to extend the financial sustainability of the Social Security Contributory Regime by 12 years, i.e. until 2038, when the system starts registering deficits again;
- We also show that concerns that it will be necessary to transfer resources from the State Budget to finance the payment of pensions in the future are unfounded. But not for the reasons one might think. In reality, in addition to paying non-contributory pensions in the system, revenues from taxes will be needed to cover the deficits in the CGA. What will happen in the future is that, as the weight of the CGA scheme (which was closed to new subscribers in 2005) on public finances fades away, transfers from the State Budget will be necessary

to cover the deficits of the Social Security Contributory Regime. Still, the volume of transfers needed to ensure the payment of pensions is expected to decrease over time from 4.4 in 2020 to approximately 3% in 2070;

- It should be noted that if productivity and wages do not grow at the pace predicted in the central macroeconomic scenario adopted by the European Commission in its 2018 Ageing Report, the financial situation of the Social Security Contributory Regime is likely to degrade significantly, with the deficit averaging between 4% and 5% of GDP, in the period between 2050 and 2070;
- Although the nominal value of pensions is likely to increase, this will not lead to an improvement in the adequacy of pensions. In fact, we should see a slight deterioration in the value of Old-Age and Survivor's pensions compared to wages;
- In addition, and taking into account the limitations of DYNAPOR in measuring poverty (see above), we anticipate the potential for poverty rates among pensioners (aged 65 or over) to increase (by around 6 percentage points) over the period under analysis;
- Of the reforms range scenarios we assessed, we found that the introduction of a pension system similar to the one Sweden introduced in 2003 would lead to a pronounced improvement in the financial situation of the Social Security Contributory Regime, with a large reduction in the size of deficits in the system. As a consequence, the new system would reduce the need for transfers from State Budget — which by 2070 could signify savings of around 20%;
- The success of the new system in improving the financial situation of the Social Security Contributory Regime would, however, be achieved at the expense of a considerable reduction in the adequacy of pensions and, above all, in the scheme's ability to protect pensioners from an abrupt drop when transitioning to retirement;
- By comparison, the incremental reforms that have been tested seem to offer a more interesting picture of improvement in the financial sustainability of the Social Security Welfare Regime. Firstly, they seem to be more effective at enhancing the role played by the FEFSS in postponing the emergence of chronic deficits in the Social Security Contributory Regime. For instance, increasing the retirement age of Social Security and CGA by three years would extend the life of FEFSS beyond 2070. A Swedish-style pension system would only expand FEFSS by three years. And even raising contributions (of workers and employers) to Social Security by 1.5 percentage points would be more effective in extending the life of the FEFSS;
- Cutting the value of future pensions proves to be a less interesting option to meet the goal of delaying the appearance of chronic deficits in the system. However, as with the Swedish model, the option of cutting the value of future benefits seems to be more effective at reducing the size of future deficits, once FEFSS funds have been extinguished;
- Unsurprisingly, the option of cutting future benefits bears quite negative consequences for the adequacy of pensions in the future, as well as for the system's ability to protect individuals against a steep drop in income upon retirement, and even for the poverty rate among pensioners. By contrast, increasing contributions to the system would have virtually no consequences for their social sustainability.

2. Discussion

In this section, we will try to assess how the results presented earlier compare with the existing evidence on the financial and social sustainability of the Portuguese Pension System. It should be noted, however, that there are limitations to this type of exercise. Firstly, as mentioned above (see Introduction), the evidence on this topic is scarce (Pinheiro and Cunha, 2007; Pereira and Rodrigues, 2007; Bravo, 2012, Serrano, 2015; Ministério da Solidariedade, Emprego e Segurança Social, 2015; European Commission 2012, 2015, 2018). Secondly, the existing studies adopt very distinct methodological approaches (either macroeconomic or actuarial methods) from the approach one we have adopted here, which significantly limits the comparability of the results. Thirdly, because these studies adopt very distinct assumptions about how key demographic and macroeconomic variables will behave, and what rules guide the take-up of pension benefits, this makes it difficult to compare their results — for an example see GEPARI, 2015. Finally, as it is made evident in Table 6.1, these studies vary in terms of their remit, time coverage or selection of indicators — which further limits their comparability.

This being said, we have chosen to compare the results of this study with the projections made by the 2018 Ageing Report (European Commission, 2018) and a study published by the Department of Strategy and Planning of the Ministry of Solidarity, Employment and Social Security (GEP-MSESS) in 2015. While they adopt a very distinct methodological approach, in the sense that both studies present projections based on actuarial models (see GPEARI, 2018 and GEP-MSESS, 2015), they are sufficiently close in time to become comparable. At the same time, they display enough levels of diversity, in terms of the assumptions they make about key demographic and macroeconomic variables, to allow for a discussion of the differences in results.

As expected (see Section 4, Introduction), the demographic and macroeconomic scenario presented in this study is very close to that which underpins the 2018 Ageing Report projections (see Table 6.1). There is also great similarity in terms of how the total number of pensioners is likely to evolve. This contrasts with the more sombre demographic scenario adopted in the GEP-MSESS (2015) study — which would suggest that the demand for pensions would be higher, or the pool of contributors would be smaller than assumed in our study. In the same way, the GEP-MSESS (2015) study assumes a very different macroeconomic scenario, with productivity growing at a steeper rate up to 2040, but slowing down significantly from that point onwards — especially when compared with the 2018 Ageing Report central macroeconomic scenario.

Table 6.1 Comparison of long-term projections

	2020	2030	2040	2050	2060	2070
OLD-AGE DEPENDENCY RATIO						
Moreira et al, 2019	34.1	42.8	55.1	65	66.4	68.2
Ageing Report, 2018	34.9	44.2	56.4	65.4	64.9	67.2
GEP-MSESS, 2015[a]	38.3	48.2	60.6	69.1	66.9	-
LABOUR PRODUTIVITY, PER HOUR (Growth Rate, pp)						
Moreira et al, 2019	1	1.4	1.7	1.8	1.7	1.5
Ageing Report, 2018	1	1.4	1.7	1.8	1.7	1.5
GEP-MSESS, 2015	1.4	1.8	1.9	1.6	1.3	-

	2020	2030	2040	2050	2060	2070
PENSIONERS (Millions)						
Moreira et al, 2019	2.7	3	3.3	3.3	3	2.7
Ageing Report, 2018	2.7	2.9	3.2	3.2	3	2.8
GEP-MSESS, 2015[b]	-	-	-	-	-	-
PENSION EXPENDITURE: TOTAL (% of GDP)						
Moreira et al, 2019	12.6	12.3	12.6	12.7	11.9	11.8
Ageing Report, 2018	13.6	14.3	14.7	13.7	12	11.4
GEP-MSESS, 2015[c]	-	-	-	-	-	-
PENSION EXPENDITURE: SS CONTRIBUTORY REGIME (% of GDP)						
Moreira et al, 2019	6.7	8	9.8	11.2	11	11.2
Ageing Report, 2018[d]	-	-	-	-	-	-
GEP-MSESS, 2015	7	8.3	9.4	10.2	10.3	-
FINANCIAL BALANCE, SS CONTRIBUTORY REGIME (% of GDP)						
Moreira et al, 2019[e]	0	-0.2	-1.6	-2.8	-2.4	-2.6
Ageing Report, 2018[d]	-	-	-	-	-	-
GEP-MSESS, 2015[e]	-0.6	-1.45	-2.3	-2.8	-2.9	-
GROSS REPLACEMENT RATE: SOCIAL SECURITY OAP						
Moreira et al, 2019	0.65	0.70	0.69	0.67	0.66	0.68
Ageing Report, 2018	0.68	0.65	0.61	0.57	0.55	0.55
GEP-MSESS, 2015[f]	-	-	-	-	-	-

Notes:
a) Unlike in the other studies under analysis, where the number of potentially-inactive (i.e. 65+) is divided by the number of potentially-active persons aged 15 to 64, the authors assume that potentially--active persons will be aged between 20 and 64 — which will produce a higher dependency ratio.
b) This study does not present projections on the number of pensioners, but on the number of pensions.
c) This study only covers the Social Security Contributory Regime.
d) This study does not provide specific information on Social Security Contributory Regime.
e) Before any extraordinary transfers from the State Budget or from FEFSS.
c) This study does not provide comparable information concerning Gross Replacement Rates.

As we can see in Table 6.1, our projections concerning how Total Pension Expenditure will evolve in the period between 2050 and 2070 are very much in line with the results of the 2018 Ageing Report. There are, however, important differences concerning the period between 2020 and 2050. In contrast with our projections, suggesting that pension expenditure will remain very much stable during this period, the European Commission predicts a noticeable increase in pension expenditure during this period, with public expenditure peaking by around 2040. These differences can be explained by three orders of factors. The first one concerns the GDP deflator adopted in this study, which is anchored in 2018, and that might therefore lead to lower levels of expenditure as a percentage of GDP. Secondly, as we will show below, this reflects the fact that — given the limitations of our database (see Section 3, Introduction) — our model will under--estimate the pension expenditure in the beginning of our simulation. Thirdly, our model adopts a set of assumptions concerning the take--up of pension benefits that will result in longer contributory careers, and consequently higher gross replacement rates (see Table 6.1). This would explain why, after 2050, pension expenditure does not decline as swiftly as it does in the 2018 Ageing Report.

Finally, our projections concerning the financial sustainability of the Social Security Contributory Regime are broadly in line with the tendency identified in the GEP-MSESS (2015) study. There are, however, some noticeable differences in terms of the size and the pattern of growth of the deficits that are projected to take place. As we can also see in Table 6.1, the GEP-MSESS (2015) study projects a steep deterioration of the financial situation in the Social Security Contributory Regime over the period up to 2040, followed by a more gradual increase in the size of the deficits in this subsystem. This contrasts with our results, which suggest that the size of the deficits

will grow at a slower pace and peak later — around 2050. Besides reflecting different projections about how pension expenditure is likely to grow (see Table 6.1), this might also be explained by the fact that the GEP-MSESS (2015) study adopts a more negative demographic outlook (see above) which would create further financial pressures on the Social Security Contributory Regime.

In conclusion, bearing in mind the limitations of this type of exercise, our analysis would suggest that the differences between the relevant studies on this topic are not sufficient, or relevant enough, as to discredit the results presented here, or to question their significance for future research on the Portuguese Pension System, and any future efforts to the improve its financial and social sustainability.

3. Policy Recommendations

Having concluded the discussion of our findings, in this section we identify a number of policy recommendations which, based on the results of our study, we would argue should be taken into consideration by policy-makers in this area:

- Future efforts towards improving the financial sustainability of the Portuguese Pension System must always take into account its distributive effects, i.e. the system's social sustainability;
- Any reforms in this field should be based on solid, independent and publicly-auditable evidence;
- The Portuguese State should adopt a mechanism of evaluation of the financial sustainability of the Portuguese Pension System that is independent from the Ageing Report, developed by the European Commission, and based on a macroeconomic scenario that better reflects the specificities of the Portuguese economy;
- The results produced by this study concerning the introduction a Swedish-style pension system should not rule out the possibility of assessing alternative modelling approaches (allowing, for instance, the introduction of caps on pension contributions) or evaluating other alternatives for systemic reform — such as, for example, the introduction of a Points System;
- Similarly, any efforts to improve the financial sustainability of the Portuguese Pension System should also consider in what capacity policy levers that sit outside the pension system (such as alternative sources of funding, immigration policy, etc.) could help to improve the financial sustainability of the pension system;
- In the case of reforms of a more incremental nature, particular attention should be given to how these reforms could enhance, or limit, the FEFSS's ability to ensure the financial sustainability of the pension system. It would also be important to improve the regulation of the FEFSS, with a view to boosting its impact on the pension system. Among others, policy-makers should consider the possibility of imposing limits on the use of FEFSS funds, and defining criteria that maximises profitability of the fund's assets;
- Finally, it is essential to take into account that the pension system is a particularly propitious realm for non-linear effects and unforeseen consequences. Therefore, the choice of a reform strategy should be carefully calibrated, looking to maximise the positive effects and mitigate negative results.

4. Future directions for research

Notwithstanding the significant contribution that, in the authors' opinion, this study has made towards improving the established knowledge of the long-term financial and social sustainability of the Portuguese Pension System, further advancements are needed on a number of substantial issues, as well as on the tools that should be made available for the study of the Portuguese Pension System.

At a more substantial level, further research is needed on a number of topics that were highlighted by our study:

- First and foremost, more evidence is required on how different macroeconomic scenarios, in particular scenarios that are better representations of the growth potential of the Portuguese economy, will impact on the long-term financial and social sustainability of the Portuguese Pension System;
- Secondly, more research is also needed on how migration will impact on the dynamics of the pension system. In particular, further knowledge is required on how variations in the duration of migration episodes (both inwards and outwards) might impact on pension contributions and future pension entitlements;
- Thirdly, more research should go into further exploring how raising pension contributions, or increasing the retirement age, would impact on employment and salary dynamics — and how this could, in turn, mediate the impact of this type of measures on the financial and social sustainability of the Portuguese Pension System;
- Fourthly, more research should go into options to expand the ability of FEFSS to act as a financial stabiliser of the Portuguese Pension system. In the same vein, and in line with Silva (2017), more research should go into how we can expand the range of sources of revenue to the system;
- Fifthly, more research should also go into exploring what other opportunities for reform — such as making the Public Funded-Pension Scheme mandatory — are currently offered by the Portuguese Pension System;
- Finally, more research is needed on how alternative pension arrangements, such as the Pensions Points system adopted by Germany (see OECD, 2018), could offer an opportunity for improving the financial and social sustainability of the Portuguese Pension System.

In addition to this, further research should also go into the redistributive effects of the Portuguese Pension system. With regards to this topic, research is needed on how the pension system redistributes across income groups and across age groups. Special attention should also be paid to the existence of pension gaps by reference to gender and to individuals labour market history, with a particular focus on individuals in false self-employment or with precarious attachment to the labour market.

Further research should also go to into a number of issues that, given the nature of DYNAPOR (see Sections 3 and 4.4, Chapter 1), we were not able to explore in this study. In particular, more research should go into whether increases in fertility would impact in the long-term financial and social sustainability of the Portuguese Pension System. Furthermore, more information is needed on how different prospects in the qualification of the labour force, and how this translates into salaries and future pension entitlements, will impact on the financial and social sustainability of the Portuguese Pension System.

On a methodological level, further work should go into expanding the ability of the DYNAPOR model regarding the functioning and distributive

effects of the Portuguese Pension System. Of the range of areas where improvements are necessary, we would highlight the following:

- It would be important to upgrade DYNAPOR so as to be able to model some types of incomes (income from property, income from financial assets, etc.) and benefits (family benefits, the minimum income scheme, etc.). This would allow us to strengthen our ability to measure how pensioner poverty is likely to evolve in the future;
- It would be important to upgrade DYNAPOR in order to be able to model private savings, and more specifically private pension savings, with a view to studying if, and how, individuals use this type of financial products, and what distributive effects they will generate among future pensioners;
- Finally, and in line with the previous paragraphs, it would be important to improve how DYNAPOR models the impact of migrations on the Portuguese Pension System, with a view to overcoming the limitations of the approach adopted in this study (see Section 4.4, Chapter 1).

In addition to expanding the capabilities of DYNAPOR, it would be in the general interest to work towards building an ecosystem of simulation models on the Portuguese Pension System, involving demographic simulation models that could produce different demographic scenarios; macroeconomic models that could develop macroeconomic scenarios that better capture the characteristics and dynamics of the Portuguese economy; actuarial models that could provide reliable projections on pension take-up or expenditure; and dynamic micro-simulation models that could assess the distributive effects of the Portuguese Pension System.

DYNAPOR, and this study, are merely the beginning of a long journey.

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Annexes

Annex 1

Table 1 Total fertility rate

YEAR	PT	EU27
2020	1.26	1.61
2025	1.31	1.64
2030	1.34	1.67
2035	1.37	1.69
2040	1.40	1.71
2045	1.42	1.73
2050	1.45	1.74
2055	1.48	1.76
2060	1.52	1.77
2065	1.55	1.78
2070	1.58	1.80

Table 2 Life expectancy at birth

YEAR	PT, MALES	PT, FEMALES	EU27, MALES	EU27, FEMALES
2020	78.44	84.46	78.90	84.33
2025	79.39	85.01	79.73	85.02
2030	80.31	85.93	80.57	85.70
2035	80.98	86.58	81.36	86.34
2040	81.71	87.24	82.12	86.98
2045	82.28	87.63	82.84	87.59
2050	83.25	88.22	83.52	88.18
2055	83.95	88.90	84.19	88.73
2060	84.40	89.42	84.84	89.28
2065	85.04	89.87	85.47	89.80
2070	85.76	90.26	86.06	90.31

Table 3 Life expectancy at 65

YEAR	PT, MALES	PT, FEMALES	EU27, MALES	EU27, FEMALES
2020	18.16	21.82	18.49	22.01
2025	18.65	22.42	19.04	22.54
2030	19.21	22.90	19.59	23.04
2035	19.70	23.37	20.10	23.54
2040	20.24	23.81	20.62	24.02
2045	20.73	24.31	21.09	24.49
2050	21.26	24.81	21.57	24.95
2055	21.74	25.25	22.07	25.39
2060	22.27	25.72	22.52	25.83
2065	22.74	26.17	22.98	26.25
2070	23.08	26.54	23.38	26.65

Table 4 Net migration

YEAR	TOTAL	% OF POP.
2020	218	0.00
2025	7283	0.07
2030	12600	0.13
2035	15258	0.16
2040	17224	0.18
2045	16605	0.18
2050	17152	0.19
2055	15003	0.17
2060	14748	0.17
2065	15986	0.19
2070	14675	0.18

Table 5 Total population

YEAR	PT	PT (Anch.)	EU27	EU27 (Anch.)
2020	10227247	100.00	448657568	99.49
2025	10056168	98.33	450951134	100.00
2030	9886508	96.67	452374165	100.32
2035	9716558	95.01	453189458	100.50
2040	9541837	93.30	453328118	100.53
2045	9341480	91.34	452584231	100.36
2050	9099209	88.97	450772652	99.96
2055	8812183	86.16	448143706	99.38
2060	8507350	83.18	444966014	98.67
2065	8202408	80.20	441810818	97.97
2070	7920044	77.44	439212286	97.40

Table 6 Population by age group and mean age

YEAR	0-14	15-64	65+	AVG.AGE
2020	13.29	64.67	22.04	44.26
2025	12.24	63.54	24.21	45.66
2030	11.41	62.05	26.54	46.89
2035	11.27	59.77	28.96	47.97
2040	11.42	57.12	31.46	48.85
2045	11.60	54.50	33.90	49.54
2050	11.62	53.58	34.80	50.13
2055	11.42	53.38	35.21	50.62
2060	11.21	53.37	35.42	50.92
2065	11.24	53.30	35.46	51.00
2070	11.59	52.54	35.87	50.87

Table 7 Very elderly population (80 and over)

YEAR	PT, % POP.	PT, % 65+	EU27, % POP.	EU27, % 65+
2020	6.66	30.23	6.05	6.05
2025	7.11	29.36	6.48	6.48
2030	8.07	30.39	7.40	7.40
2035	9.11	31.46	8.39	8.39
2040	10.35	32.90	9.44	9.44
2045	11.72	34.56	10.53	10.53
2050	13.11	37.67	11.50	11.50
2055	14.62	41.53	12.13	12.13
2060	16.16	45.61	12.53	12.53
2065	16.19	45.65	12.73	12.73
2070	15.89	44.31	12.88	12.88

Table 8 Demographic dependency ratios

YEAR	PT, OADR	PT, TOADR	EU27, OADR	EU27, TOADR
2020	34.08	54.63	32.48	56.07
2025	38.12	57.38	36.13	59.72
2030	42.79	61.17	40.34	64.28
2035	48.49	67.36	44.58	68.92
2040	55.10	75.11	48.02	72.86
2045	62.17	83.44	50.67	76.14
2050	65.00	86.69	52.27	78.27
2055	65.93	87.42	53.14	79.46
2060	66.44	87.66	53.11	79.54
2065	66.56	87.90	52.59	79.06
2070	68.17	90.38	52.24	78.85

Table 9 Educatio-l level

YEAR	LOW	MEDIUM	HIGH
2020	63.71	19.31	16.99
2025	60.92	20.76	18.32
2030	58.17	22.18	19.65
2035	55.54	23.58	20.88
2040	52.86	25.05	22.10
2045	50.28	26.37	23.35
2050	47.94	27.55	24.51
2055	45.69	28.71	25.60
2060	43.72	29.63	26.65
2065	42.29	30.31	27.41
2070	41.30	30.76	27.94

Table 10 Working-age population (15-64)

YEAR	PT	PT (Anch.)	EU27	EU27 (Anch.)
2020	6613790	100.00	287478428	101.82
2025	6389944	96.62	282347099	100.00
2030	6134236	92.75	275374317	97.53
2035	5807554	87.81	268285248	95.02
2040	5450647	82.41	262255430	92.88
2045	5091228	76.98	256943105	91.00
2050	4875576	73.72	252854154	89.55
2055	4703842	71.12	249716182	88.44
2060	4540045	68.65	247840880	87.78
2065	4371989	66.10	246734834	87.39
2070	4161217	62.92	245569772	86.97

Table 11 Participation rate (15-64)

YEAR	PT	EU27
2020	74.54	73.11
2025	75.33	73.49
2030	75.71	73.85
2035	76.25	74.02
2040	76.39	74.08
2045	76.95	74.23
2050	76.88	74.32
2055	77.17	74.37
2060	77.22	74.41
2065	76.95	74.44
2070	77.41	74.42

Table 15 Employment rate (15-64)

YEAR	PT	EU27
2020	67.19	67.32
2025	68.30	67.75
2030	68.94	68.25
2035	69.63	68.61
2040	69.96	68.88
2045	70.67	69.21
2050	70.81	69.48
2055	71.08	69.52
2060	71.13	69.55
2065	70.87	69.57
2070	71.30	69.55

Table 16 Unemployment rate (15-64)

YEAR	PT	EU27
2020	9.87	7.92
2025	9.33	7.82
2030	8.94	7.58
2035	8.68	7.31
2040	8.42	7.02
2045	8.16	6.76
2050	7.90	6.50
2055	7.90	6.52
2060	7.89	6.54
2065	7.89	6.55
2070	7.89	6.55

Table 17 Labour force (15-64)

YEAR	PT	PT (Anch.)	EU27	EU27 (Anch.)
2020	5106741	100.00	210176769	101.29
2025	5084309	99.56	207509026	100.00
2030	4994327	97.80	203364500	98.00
2035	4816183	94.31	198586920	95.70
2040	4594268	89.96	194287289	93.63
2045	4360991	85.40	190722291	91.91
2050	4144138	81.15	187918388	90.56
2055	3973641	77.81	185703660	89.49
2060	3840143	75.20	184421360	88.87
2065	3713053	72.71	183677904	88.52
2070	3574347	69.99	182760123	88.07

Table 18 GDP & potential GDP, growth rate

YEAR	GDP	POTENTIAL GDP
2020	0.44	0.77
2025	1.16	1.16
2030	0.96	0.96
2035	0.79	0.79
2040	0.82	0.82
2045	0.91	0.91
2050	0.89	0.89
2055	0.97	0.97
2060	1.02	1.02
2065	0.92	0.92
2070	0.77	0.77

Table 19 Potential GDP, growth rate

YEAR	PT	DE	EU27
2020	0.77	1.44	1.41
2025	1.16	0.84	1.14
2030	0.96	0.96	1.17
2035	0.79	0.98	1.14
2040	0.82	1.23	1.23
2045	0.91	1.27	1.36
2050	0.89	1.14	1.40
2055	0.97	1.03	1.44
2060	1.02	1.09	1.46
2065	0.92	1.20	1.50
2070	0.77	1.35	1.44

Table 20 Total factor productivity, growth rate

YEAR	PT	DE	EU27
2020	0.71	1.44	1.41
2025	0.79	-	-
2030	0.90	0.96	1.17
2035	1.01	-	-
2040	1.12	1.23	1.23
2045	1.23	-	-
2050	1.19	1.14	1.40
2055	1.14	-	-
2060	1.09	1.09	1.46
2065	1.05	-	-
2070	1.00	1.35	1.44

Table 21 Labour productivity & average wages, growth rate

YEAR	PT	EU27	AVG. WAGES
2020	0.96	1.14	0.87
2025	1.20	-	1.13
2030	1.40	1.40	1.30
2035	1.56	-	1.49
2040	1.73	1.59	1.67
2045	1.90	-	1.87
2050	1.83	1.66	1.87
2055	1.76	-	1.79
2060	1.69	1.60	1.66
2065	1.61	-	1.60
2070	1.54	1.55	1.52

Annex 2

Table 1 Total number of pensioners

YEAR	TOTAL	% POP.
2020	2693705	26.33
2025	2819622	28.03
2030	2980959	30.14
2035	3147948	32.39
2040	3262411	34.18
2045	3287299	35.18
2050	3263865	35.86
2055	3128138	35.46
2060	2966168	34.81
2065	2837303	34.50
2070	2724106	34.29

Table 2 Pensioners: Social Security & CGA

YEAR	SS	CGA
2020	2190494	503504
2025	2305866	513592
2030	2496313	484717
2035	2720207	427738
2040	2910284	352012
2045	3017401	270074
2050	3070339	193333
2055	2998417	129754
2060	2885506	80754
2065	2792522	44720
2070	2704097	20037

Table 3 Social security pensioners: contributory and non-contributory pensions

YEAR	CONTRIB.	%	CONTRIB. & NON--CONTRIB.	%	NON--CONTRIB.	%
2020	1266998	57.85	905826	41.36	17396	0.79
2025	1427996	61.94	863567	37.46	13934	0.60
2030	1661905	66.55	825443	33.05	9941	0.40
2035	1895881	69.70	809974	29.78	14070	0.52
2040	2096832	72.07	794610	27.31	18145	0.62
2045	2240043	74.21	760923	25.21	17587	0.58
2050	2320030	75.59	722676	23.55	26470	0.86
2055	2304930	76.87	656694	21.90	37007	1.23
2060	2247311	77.86	591015	20.48	47939	1.66
2065	2194919	78.62	538307	19.28	58581	2.10
2070	2158062	79.78	483135	17.86	63824	2.36

Table 4 SS Contributory Regime pensioners, by type of pension

YEAR	OAP	%	OAP (SURV.)	%	SURV.	%	DISAB (SURV.)	%	DISAB	%
2020	1396384	64.27	424423	19.53	138044	6.35	11084	0.51	202831	9.34
2025	1486972	64.88	442873	19.32	147136	6.42	11091	0.48	203795	8.89
2030	1685821	67.80	458264	18.43	131618	5.29	9557	0.38	201220	8.09
2035	1915064	70.76	473070	17.48	110342	4.08	8374	0.31	199392	7.37
2040	2104055	72.75	487370	16.85	91532	3.16	8607	0.30	200508	6.93
2045	2213562	73.79	501264	16.71	73500	2.45	8629	0.29	202727	6.76
2050	2267542	74.49	507696	16.68	59947	1.97	6430	0.21	202591	6.65
2055	2204383	74.44	494018	16.68	55970	1.89	5366	0.18	201402	6.80
2060	2128998	75.02	452654	15.95	53380	1.88	5292	0.19	197400	6.96
2065	2090148	76.46	395021	14.45	51497	1.88	5059	0.19	192053	7.03
2070	2076119	78.61	324591	12.29	50011	1.89	5077	0.19	185366	7.02

Table 5 SS Contributory Regime old age pensioners, by type of pension

YEAR	OAP	%	OAP EARLY, FLEX.	%	OAP EARLY, LTU	%
2020	1761371	96.71	30335	1.67	29603	1.63
2025	1826060	94.63	89982	4.66	13543	0.70
2030	1961310	91.47	174366	8.13	8526	0.40
2035	2120969	88.82	259866	10.88	7187	0.30
2040	2288398	88.31	297319	11.47	5594	0.22
2045	2444470	90.03	266726	9.82	3999	0.15
2050	2544592	91.71	227356	8.19	2713	0.10
2055	2509681	93.00	187139	6.93	1857	0.07
2060	2429370	94.10	150813	5.84	1485	0.06
2065	2340408	94.17	143430	5.77	1373	0.06
2070	2253408	93.89	145718	6.07	887	0.04

Table 6 SS Contributory Regime disability pensioners, by type of pension

YEAR	DISABILITY, ABS.	%	DISABILITY, PRT.	%
2020	22504	10.46	192713	89.54
2025	22367	10.37	193240	89.63
2030	22485	10.64	188929	89.36
2035	22658	10.87	185714	89.13
2040	22714	10.83	186922	89.17
2045	22322	10.54	189510	89.46
2050	21439	10.24	187929	89.76
2055	19830	9.56	187687	90.44
2060	18618	9.17	184439	90.83
2065	18474	9.37	178762	90.63
2070	18069	9.49	172239	90.51

Table 7 SS non-Contributory Regime pensioners

YEAR	TOTAL	% OF POP.	% 65+
2020	916101	9.03	42.11
2025	882817	8.72	38.09
2030	833365	8.45	33.44
2035	829614	8.48	30.30
2040	808785	8.52	27.95
2045	780927	8.33	25.77
2050	745531	8.23	24.43
2055	697499	7.86	23.12
2060	631733	7.50	22.13
2065	602128	7.26	21.39
2070	546958	6.89	20.22

Table 8 SS non-Contributory Regime pensioners, by type of pension

YEAR	OAP GMI (N/CSI)	%	OAP GMI (& CSI)	%	CSI (N/ SC)	%	CSI (& SC)	%	SC (N/ CSI)	%	CSI (CGA)	%	SC (CGA)	%
2020	16861	1.81	66	0.01	18645	2.01	44356	4.77	841805	90.55	5171	0.56	2731	0.29
2025	11168	1.26	44	0.00	23524	2.65	38082	4.29	806392	90.75	9249	1.04	146	0.02
2030	8307	0.98	47	0.01	32482	3.82	47118	5.54	750544	88.22	11944	1.40	364	0.04
2035	7954	0.94	7	0.00	56407	6.65	59274	6.99	700703	82.58	24143	2.85	0	0.00
2040	9504	1.12	31	0.00	90638	10.69	68550	8.09	643142	75.87	35833	4.23	0	0.00
2045	12574	1.53	100	0.01	128910	15.71	75115	9.15	564766	68.81	39256	4.78	0	0.00
2050	17823	2.28	-20	0.00	160082	20.49	69459	8.89	499358	63.91	34595	4.43	0	0.00
2055	24808	3.44	305	0.04	180839	25.08	59316	8.22	431339	59.81	24580	3.41	0	0.00
2060	37838	5.79	587	0.09	164852	25.21	48908	7.48	383659	58.67	18062	2.76	0	0.00
2065	49452	8.12	258	0.04	154547	25.38	40042	6.58	354569	58.23	10087	1.66	0	0.00
2070	53637	9.75	66	0.01	136994	24.91	32090	5.83	323239	58.78	3933	0.72	0	0.00

Table 9 SS CSI beneficiaries

YEAR	CSI (ONLY)	%	CSI (OAP)	%	CSI (OAP & SURV.)	%	CSI (SURV.)	%	CSI (OAP GMI)	%	CSI, CGA	%
2020	5517	8.51	56830	87.68	1619	2.50	778	1.20	72	0.11	0	0
2025	6511	10.95	51586	86.76	724	1.22	610	1.03	29	.05	0	0
2030	3905	5.10	70914	92.59	1390	1.81	342	0.45	36	.05	0	0
2035	7307	6.33	105511	91.39	2010	1.74	615	0.53	7	0.01	0	0
2040	9148	5.72	146976	91.86	3109	1.94	727	0.45	32	0.02	0	0
2045	5323	2.65	188968	93.92	6300	3.13	515	0.26	100	0.05	0	0
2050	9053	3.90	212078	91.27	10549	4.54	695	0.30	-20	-.01	0	0
2055	12251	5.15	209385	88.06	14750	6.20	1073	0.45	305	0.13	0	0
2060	10291	4.73	188224	86.59	17356	7.98	915	0.42	588	0.27	0	0
2065	9651	4.99	165421	85.50	17068	8.82	1070	0.55	257	.13	0	0
2070	11160	6.58	144497	85.22	12875	7.59	961	0.57	69	0.04	0	0

Table 10 SS social complements beneficiaries

YEAR	SC (OAP)	%	SC (OAP & SURV.)	%	SC (SURV.)	%	SC (SURV. & DISAB.)	%	SC (DISAB.)	%	SC (CGA)	%
2020	456930	51.32	214611	24.11	56047	6.3	10131	1.14	148187	16.64	4383	0.49
2025	443787	52.26	212095	24.98	64342	7.58	9520	1.12	115493	13.6	3891	0.46
2030	444707	55.54	209170	26.12	52340	6.54	7102	0.89	83631	10.44	3763	0.47
2035	446325	58.44	207617	27.19	37863	4.96	4878	0.64	63362	8.3	3650	0.48
2040	423372	59.18	200596	28.04	28612	4	3815	0.53	55986	7.83	2967	0.41
2045	368432	57.46	185319	28.9	23032	3.59	3501	0.55	58631	9.14	2252	0.35
2050	317184	55.52	165190	28.92	18614	3.26	2973	0.52	65647	11.49	1673	0.29
2055	265963	54.11	138734	28.23	16379	3.33	2710	0.55	66473	13.52	1234	0.25
2060	244385	56.43	106555	24.61	15057	3.48	2826	0.65	63509	14.67	717	0.17
2065	239658	60.63	77303	19.56	13950	3.53	2567	0.65	61511	15.56	281	0.07
2070	226113	63.6	55952	15.74	12241	3.44	2495	0.7	58628	16.49	97	0.03

Table 11 SS and CGA pensioners receiving social complements

YEAR	% OF OAP	% OF SURV.	% OF DIAB.
2020	36.59	10.73	73.70
2025	33.40	13.25	57.67
2030	29.50	13.59	42.37
2035	26.07	13.36	32.16
2040	22.67	12.93	27.92
2045	19.02	12.15	28.86
2050	16.12	10.84	32.53
2055	13.90	9.52	33.20
2060	12.70	8.44	32.45
2065	12.05	7.52	32.31
2070	11.24	7.00	31.96

Table 12 CGA pensioners, by type of pension

YEAR	OAP	%	OAP, EARLY	%	SURV.	%	OAP (SURV.)	%
2020	354802	70.38	108709	21.56	20130	3.99	20480	4.06
2025	360527	70.05	108242	21.03	17687	3.44	28179	5.48
2030	346911	71.74	88409	18.28	14433	2.98	33807	6.99
2035	313558	73.13	68748	16.03	10844	2.53	35589	8.30
2040	262508	74.79	47871	13.64	7109	2.03	33505	9.55
2045	216655	80.19	20515	7.59	4921	1.82	28096	10.40
2050	165683	85.67	3551	1.84	3815	1.97	20347	10.52
2055	113672	87.60	0	0.00	3103	2.39	12981	10.00
2060	71245	88.51	0	0.00	1937	2.41	7311	9.08
2065	40719	90.03	0	0.00	937	2.07	3570	7.89
2070	17902	89.60	0	0.00	550	2.75	1528	7.65

Table 13 Average monthly pension: OAP, SS

YEAR	ALL PENSIONS	NEW PENSIONS
2020	482	502
2025	496	497
2030	505	502
2035	520	547
2040	547	616
2045	589	687
2050	643	754
2055	702	819
2060	759	886
2065	827	995
2070	924	1194

Table 14 Average monthly pension: Survivor's pension, Social Security

YEAR	ALL PENSIONS	NEW PENSIONS
2020	280	281
2025	292	299
2030	307	320
2035	320	334
2040	329	341
2045	339	345
2050	349	352
2055	365	370
2060	387	399
2065	413	431
2070	446	465

Table 15 Average monthly pension: Disability Pensions, Social Security

YEAR	ABS., ALL PENSIONS	ABS., NEW PENSIONS	PRT., ALL PENSIONS	PRT., NEW PENSIONS
2020	376	376	409	406
2025	391	414	440	447
2030	428	462	492	499
2035	480	517	557	562
2040	524	562	613	615
2045	553	593	661	655
2050	590	629	701	700
2055	643	676	755	767
2060	700	732	820	830
2065	761	797	888	906
2070	830	875	975	979

Table 16 Average monthly pension: social OAP, Social Security

YEAR	ALL PENSIONS	NEW PENSIONS
2020	208	225
2025	216	230
2030	243	242
2035	272	261
2040	297	284
2045	327	312
2050	359	343
2055	393	374
2060	428	408
2065	464	450
2070	502	496

Table 17 Average monthly pension: OAP, CGA

YEAR	ALL PENSIONS	NEW PENSIONS
2020	1304	1038
2025	1238	1127
2030	1118	1130
2035	976	1133
2040	829	1131
2045	692	1050
2050	580	815
2055	502	0
2060	467	0
2065	463	0
2070	470	0

Table 18 Average monthly pension: Survivor's pension, CGA

YEAR	ALL PENSIONS	NEW PENSIONS
2020	411	638
2025	492	671
2030	549	669
2035	576	653
2040	575	615
2045	541	519
2050	463	369
2055	383	292
2060	319	267
2065	278	254
2070	270	253

Table 19 Pension expenditure, total

YEAR	M €	% GDP
2020	24803	12.50
2025	25887	12.41
2030	27029	12.31
2035	28432	12.41
2040	29936	12.57
2045	31440	12.63
2050	33106	12.72
2055	33736	12.38
2060	34090	11.89
2065	35190	11.69
2070	37018	11.80

Table 20 Pension expenditure, SS and CGA

YEAR	SS, M €	SS, % GDP	CGA, M €	CGA, % GDP
2020	16224	8.18	8582	4.32
2025	17544	8.41	8344	4.00
2030	19595	8.92	7435	3.39
2035	22295	9.73	6136	2.68
2040	25238	10.60	4697	1.97
2045	28185	11.32	3256	1.31
2050	31091	11.95	2013	0.77
2055	32545	11.94	1191	0.44
2060	33400	11.65	691	0.24
2065	34807	11.56	383	0.13
2070	36830	11.74	187	0.06

Table 21 SS pension expenditure: contributory and non-contributory pensions

YEAR	CONTRIB., M €	CONTRIB., % GDP	NON-CONTRIB., M €	NON-CONTRIB., % GDP
2020	13390	6.75	2830	1.43
2025	15189	7.28	2355	1.13
2030	17561	8.00	2037	0.93
2035	20368	8.89	1925	0.84
2040	23365	9.81	1873	0.79
2045	26376	10.59	1812	0.73
2050	29262	11.24	1826	0.70
2055	30762	11.29	1784	0.65
2060	31675	11.05	1726	0.60
2065	33126	11.00	1680	0.56
2070	35224	11.23	1607	0.51

Table 22 SS Contributory Regime: expenditure, by type of pension

YEAR	OAP, M €	OAP, % GDP	SURV., M €	SURV, % GDP	DISAB., M €	DISAB., % GDP
2020	9927	5.00	2467	1.24	1001	0.50
2025	11323	5.41	2693	1.30	1171	0.56
2030	13388	6.08	2833	1.29	1340	0.61
2035	15932	6.95	2911	1.27	1526	0.66
2040	18714	7.87	2949	1.24	1701	0.72
2045	21554	8.64	2984	1.20	1842	0.73
2050	24355	9.38	2982	1.14	1919	0.74
2055	25743	9.45	2968	1.09	2051	0.76
2060	26637	9.30	2855	0.99	2184	0.77
2065	28162	9.33	2664	0.88	2302	0.75
2070	30396	9.69	2387	0.76	2433	0.77

Table 23 SS Contributory Regime: expenditure in Old-Age Pensions, by type of pension

YEAR	OAP, M €	OAP, % GDP	OAP EARLY, FLEX, M €	OAP EARLY, FLEX, % GDP	OAP EARLY, LTU, M €	OAP EARLY, LTU, % GDP
2020	9463	4.77	220	0.11	245	0.12
2025	10645	5.09	589	0.28	89	0.04
2030	12148	5.49	1187	0.56	52	0.03
2035	13936	6.09	1942	0.83	54	0.02
2040	16242	6.82	2432	1.03	40	0.02
2045	19105	7.65	2417	0.97	32	0.01
2050	22049	8.50	2283	0.87	23	0.01
2055	23983	8.77	1747	0.67	15	0.01
2060	25240	8.80	1379	0.49	14	0.00
2065	26576	8.79	1575	0.54	15	0.01
2070	28658	9.13	1714	0.55	10	0.00

Table 24 SS Contributory Regime: expenditure in Disability Pensions, by type of pension

YEAR	ABS, M €	ABS, % GDP	PRT, M €	PRT, % GDP
2020	90	0.05	911	0.46
2025	102	0.05	1069	0.51
2030	120	0.05	1221	0.56
2035	142	0.06	1385	0.60
2040	157	0.07	1544	0.65
2045	160	0.06	1682	0.68
2050	164	0.06	1756	0.67
2055	166	0.06	1885	0.69
2060	169	0.06	2015	0.70
2065	183	0.06	2119	0.70
2070	195	0.06	2239	0.71

Table 25 SS non-Contributory Regime: expenditure, by type of pension/benefit

YEAR	NON-CONTRIB., M €	NON-CONTRIB., % GDP	OAP GMI, M €	OAP GMI, % GDP	CSI, M €	CSI, % GDP	SC, M €	SC, % GDP
2020	2830	1.43	49	0.03	82	0.04	2698	1.36
2025	2355	1.13	34	0.02	92	0.05	2228	1.07
2030	2037	0.93	28	0.01	129	0.06	1880	0.85
2035	1925	0.84	30	0.01	256	0.11	1639	0.72
2040	1873	0.79	40	0.02	420	0.18	1413	0.59
2045	1812	0.73	58	0.02	573	0.24	1182	0.47
2050	1826	0.70	90	0.03	739	0.28	998	0.38
2055	1784	0.65	138	0.05	808	0.30	836	0.31
2060	1726	0.60	230	0.08	769	0.26	728	0.25
2065	1680	0.56	322	0.11	690	0.23	668	0.22
2070	1607	0.51	378	0.12	599	0.19	634	0.20

Table 26 CGA pension expenditure, by type of pension

YEAR	OAP, M €	OAP, % GDP	OAP ER, M €	OAP ER, % GDP	SURV., M €	SURV., % GDP
2020	6746	3.42	1154	0.57	681	0.34
2025	6724	3.23	719	0.35	900	0.43
2030	5929	2.69	468	0.23	1038	0.48
2035	4718	2.08	347	0.14	1072	0.46
2040	3453	1.44	266	0.11	978	0.41
2045	2355	0.95	139	0.06	761	0.30
2050	1495	0.58	24	0.01	495	0.19
2055	898	0.33	0	0.00	294	0.11
2060	517	0.18	0	0.00	172	0.06
2065	282	0.09	0	0.00	102	0.03
2070	128	0.04	0	0.00	59	0.02

Table 27 Contributors and average contributory careers, Social Security

YEAR	CONTRIBUTORS	AVG. CC: OAP	OAP ER
2020	4613479	34	42
2025	4632126	35	43
2030	4571046	35	43
2035	4427784	36	43
2040	4236723	36	43
2045	4036965	36	44
2050	3842337	35	44
2055	3683239	34	43
2060	3559158	33	43
2065	3442846	34	42
2070	3315923	34	42

Table 28 contributors and contributory careers, CGA

YEAR	CONTRIBUTORS	AVG. CC: OAP	OAP ER
2020	361932	44	42
2025	230011	46	44
2030	129838	46	44
2035	59969	46	44
2040	18650	46	45
2045	3759	47	47
2050	0	47	0
2055	0	0	0
2060	0	0	0
2065	0	0	0
2070	0	0	0

Table 29 Contributions to Social Security

YEAR	TOTAL, €	TOTAL, % GDP	PENSIONS, €	PENSIONS, % GDP
2020	206816	10.42	160334	8.08
2025	226775	10.87	175808	8.43
2030	244757	11.15	189748	8.64
2035	259208	11.32	200952	8.77
2040	271960	11.42	210838	8.85
2045	284316	11.42	220417	8.85
2050	296708	11.40	230024	8.84
2055	311268	11.42	241311	8.85
2060	327814	11.43	254138	8.86
2065	343752	11.42	266494	8.85
2070	357404	11.39	277078	8.83

Table 30 Contributions to CGA

YEAR	M €	% GDP
2020	2393	1.20
2025	1616	0.78
2030	997	0.45
2035	491	0.21
2040	164	0.07
2045	28	0.01
2050	0	0.00
2055	0	0.00
2060	0	0.00
2065	0	0.00
2070	0	0.00

Table 31 Financial balance: SS Contributory Regime, % of GDP

YEAR	BEFORE FEFSS, M€	% OF GDP	AFTER FEFSS, M€	% OF GDP
2020	−34	-0.03	0	0.00
2025	183	0.08	183	0.08
2030	−442	-0.21	0	0.00
2035	-1917	-0.83	0	0.00
2040	-3735	-1.57	-3735	-1.59
2045	-5440	-2.20	-5440	-2.20
2050	-7277	-2.80	-7277	-2.80
2055	-7503	-2.74	-7503	-2.74
2060	-6990	-2.44	-6990	-2.45
2065	-7013	-2.36	-7013	-2.36
2070	-8136	-2.59	-8136	-2.59

Table 32 FEFSS, funds and transfers

YEAR	FUNDS, M €	FUNDS, % GDP	TRANSFERS, M €	TRANSFERS, % GDP
2020	10699	5.38	201	0.10
2025	12212	5.87	0	0.00
2030	13331	6.05	711	0.32
2035	6914	3.03	1617	0.71
2040	0	0.00	0	0.00
2045	0	0.00	0	0.00
2050	0	0.00	0	0.00
2055	0	0.00	0	0.00
2060	0	0.00	0	0.00
2065	0	0.00	0	0.00
2070	0	0.00	0	0.00

Table 33 Financial balance: CGA

YEAR	M €	% GDP
2020	-6187	-3.12
2025	-6726	-3.22
2030	-6448	-2.94
2035	-5644	-2.46
2040	-4537	-1.91
2045	-3225	-1.29
2050	-2013	-0.77
2055	-1191	-0.44
2060	−691	-0.24
2065	-383	-0.13
2070	-187	-0.06

Table 34 Total fiscal burden, before and after FEFSS

YEAR	BEFORE FEFSS, M €	% GDP	AFTER FEFSS, M €	% GDP
2020	9022	4.54	8976	4.53
2025	9120	4.37	9130	4.38
2030	8461	3.85	8011	3.65
2035	7869	3.43	5929	2.59
2040	8719	3.66	8783	3.69
2045	9339	3.75	9344	3.75
2050	10129	3.89	10128	3.89
2055	9624	3.53	9613	3.53
2060	8665	3.02	8668	3.02
2065	8514	2.83	8494	2.82
2070	9301	2.96	9300	2.96

Table 35 Benefit ratio: OAP, Social Security and CGA

YEAR	SS	CGA
2020	0.45	1.20
2025	0.44	1.09
2030	0.42	0.92
2035	0.40	0.75
2040	0.39	0.59
2045	0.38	0.45
2050	0.38	0.34
2055	0.38	0.27
2060	0.38	0.23
2065	0.38	0.21
2070	0.39	0.20

Table 36 Benefit ratio: Survivor's pensions, Social Security and CGA

YEAR	SS	CGA
2020	0.26	0.38
2025	0.26	0.43
2030	0.25	0.45
2035	0.25	0.44
2040	0.23	0.41
2045	0.22	0.35
2050	0.21	0.28
2055	0.20	0.21
2060	0.19	0.16
2065	0.19	0.13
2070	0.19	0.11

Table 37 Benefit ratio: Disability Pensions, Social Security

YEAR	ABSOLUTE	PARTIAL
2020	0.35	0.38
2025	0.34	0.39
2030	0.35	0.41
2035	0.37	0.43
2040	0.37	0.44
2045	0.36	0.43
2050	0.35	0.42
2055	0.35	0.41
2060	0.35	0.41
2065	0.35	0.41
2070	0.35	0.41

Table 38 Benefit ratio: social OAP, Social Security

YEAR	OAP GMI
2020	0.19
2025	0.19
2030	0.20
2035	0.21
2040	0.21
2045	0.21
2050	0.21
2055	0.21
2060	0.21
2065	0.21
2070	0.21

Table 39 Gross replacement rates: OAP, Social Security and CGA

YEAR	LAST SALARY: OAP, SS	OAP, CGA	AVG. REF. EARNINGS: OAP, SS	OAP, CGA
2020	0.65	0.88	0.87	0.73
2025	0.71	0.84	0.88	0.70
2030	0.70	0.81	0.86	0.75
2035	0.68	0.79	0.85	0.77
2040	0.69	0.69	0.84	0.76
2045	0.69	0.70	0.83	0.84
2050	0.67	0.78	0.82	0.96
2055	0.66	0.00	0.81	0.00
2060	0.66	0.00	0.81	0.00
2065	0.68	0.00	0.82	0.00
2070	0.68	0.00	0.85	0.00

Table 40 Poverty thresholds

YEAR	POVERTY THRESHOLD	POVERTY THRESHOLD (EUROSTAT)
2020	494	458
2025	508	471
2030	530	491
2035	553	512
2040	577	534
2045	608	563
2050	652	604
2055	693	643
2060	730	676
2065	774	717
2070	831	770

Table 41 At-risk-of-poverty rate, pensioners 65+

YEAR	% AROP
2020	9.53
2025	9.41
2030	10.99
2035	12.09
2040	12.28
2045	12.56
2050	13.20
2055	13.78
2060	14.15
2065	14.85
2070	15.46

Annex 3

Table 1 Average monthly payment: SS OAP

YEAR	BASELINE	LOW PROD.
2020	482	480
2025	496	494
2030	505	503
2035	520	516
2040	547	541
2045	589	582
2050	643	633
2055	702	687
2060	759	736
2065	827	794
2070	924	870

Table 2 Average monthly payment: SS OAP (new pension)

YEAR	BASELINE	LOW PROD.
2020	518	520
2025	515	511
2030	523	511
2035	586	567
2040	677	653
2045	768	742
2050	849	821
2055	929	894
2060	1020	964
2065	1159	1068
2070	1394	1253

Table 3 Average monthly payment: CGA OAP

YEAR	BASELINE	LOW PROD.
2020	1304	1301
2025	1238	1235
2030	1118	1115
2035	976	973
2040	829	826
2045	692	691
2050	580	582
2055	502	506
2060	467	471
2065	463	467
2070	470	475

Table 4 Average monthly payment: CGA OAP (new pension)

YEAR	BASELINE	LOW PROD.
2020	1038	1045
2025	1127	1118
2030	1130	1091
2035	1133	1054
2040	1131	1012
2045	1050	910
2050	815	687
2055	0	0
2060	0	0
2065	0	0
2070	0	0

Table 5 Total pension expenditure, euros and % of GDP

YEAR	BASELINE, M €	BASELINE, % GDP	LOW PROD., M €	LOW PROD., % GDP
2020	24803	12.50	24730	12.80
2025	25887	12.41	25817	12.71
2030	27029	12.31	26927	12.63
2035	28432	12.41	28157	12.82
2040	29936	12.57	29436	13.17
2045	31440	12.63	30691	13.55
2050	33106	12.72	31957	13.96
2055	33736	12.38	32156	13.86
2060	34090	11.89	32212	13.63
2065	35190	11.69	32886	13.69
2070	37018	11.80	33985	14.00

Table 6 Social security pension expenditure, euros and % of GDP

YEAR	BASELINE, M €	BASELINE, % GDP	LOW PROD., M €	LOW PROD., % GDP
2020	16224	8.18	16175	8.38
2025	17544	8.41	17495	8.61
2030	19595	8.92	19511	9.15
2035	22295	9.73	22024	10.03
2040	25238	10.60	24735	11.07
2045	28185	11.32	27436	12.11
2050	31091	11.95	29914	13.07
2055	32545	11.94	30956	13.34
2060	33400	11.65	31514	13.34
2065	34807	11.56	32485	13.52
2070	36830	11.74	33776	13.91

Table 7 CGA pension expenditure, euros and % of GDP

YEAR	BASELINE, M €	BASELINE, % GDP	LOW PROD., M €	LOW PROD., % GDP
2020	8582	4.32	8557	4.43
2025	8344	4.00	8323	4.10
2030	7435	3.39	7417	3.48
2035	6136	2.68	6133	2.79
2040	4697	1.97	4702	2.10
2045	3256	1.31	3255	1.44
2050	2013	0.77	2041	0.89
2055	1191	0.44	1200	0.52
2060	691	0.24	699	0.30
2065	383	0.13	401	0.17
2070	187	0.06	209	0.09

Table 8 Social security contributions, euros and % of GDP

YEAR	BASELINE, M €	BASELINE, % GDP	LOW PROD., M €	LOW PROD., % GDP
2020	206816	10.42	160334	8.08
2025	226775	10.87	175808	8.43
2030	244757	11.15	189748	8.64
2035	259208	11.32	200952	8.77
2040	271960	11.42	210838	8.85
2045	284316	11.42	220417	8.85
2050	296708	11.40	230024	8.84
2055	311268	11.42	241311	8.85
2060	327814	11.43	254138	8.86
2065	343752	11.42	266494	8.85
2070	357404	11.39	277078	8.83

Table 9 CGA contributions, euros and % of GDP

YEAR	BASELINE, M €	BASELINE, % GDP	LOW PROD., M €	LOW PROD., % GDP
2020	2392	1.20	2392	1.24
2025	1617	0.78	1617	0.80
2030	987	0.45	983	0.46
2035	492	0.21	483	0.22
2040	161	0.07	153	0.07
2045	30	0.01	28	0.01
2050	0	0.00	0	0.00
2055	0	0.00	0	0.00
2060	0	0.00	0	0.00
2065	0	0.00	0	0.00
2070	0	0.00	0	0.00

Table 10 Financial balance: SS Contributory Regime, after FEFSS, % of GDP

YEAR	BASELINE, M €	BASELINE, % GDP	LOW PROD., M €	LOW PROD., % GDP
2020	7	0.00	4	0.00
2025	175	0.08	0	0.00
2030	0	0.00	50	0.02
2035	4	0.00	−2916	-1.33
2040	-3781	-1.59	−5074	-2.27
2045	-5467	-2.20	−7442	-3.29
2050	-7296	-2.80	−9736	-4.25
2055	-7466	-2.74	-10428	-4.50
2060	-7012	-2.45	-10605	-4.49
2065	-7092	-2.36	-11131	-4.63
2070	-8141	-2.59	-12260	-5.05

Table 11 FEFSS transfer, euros and % of GDP

YEAR	BASELINE, M €	BASELINE, % GDP	LOW PROD., M €	LOW PROD., % GDP
2020	201	0.06	556	0.35
2025	0	0.00	631	0.26
2030	711	0.21	1050	0.62
2035	1617	0.83	0	0.00
2040	0	0.00	0	0.00
2045	0	0.00	0	0.00
2050	0	0.00	0	0.00
2055	0	0.00	0	0.00
2060	0	0.00	0	0.00
2065	0	0.00	0	0.00
2070	0	0.00	0	0.00

Table 12 FEFSS account, euros and % of GDP

YEAR	BASELINE, M €	BASELINE, % GDP	LOW PROD., M €	LOW PROD., % GDP
2020	10490	5.28	9339	4.83
2025	12450	5.97	7795	3.84
2030	12982	5.91	4039	1.89
2035	7765	3.40	0	0.00
2040	0	0.00	0	0.00
2045	0	0.00	0	0.00
2050	0	0.00	0	0.00

YEAR	BASELINE, M €	BASELINE, % GDP	LOW PROD., M €	LOW PROD., % GDP
2055	0	0.00	0	0.00
2060	0	0.00	0	0.00
2065	0	0.00	0	0.00
2070	0	0.00	0	0.00

Table 13 Financial balance: CGA, % of GDP

YEAR	BASELINE, M €	BASELINE, % GDP	LOW PROD., M €	LOW PROD., % GDP
2020	-6187	-3.12	-6162	-3.19
2025	-6726	-3.22	-6705	-3.30
2030	-6448	-2.94	-6434	-3.02
2035	-5644	-2.46	-5649	-2.57
2040	-4537	-1.91	-4549	-2.04
2045	-3225	-1.29	-3227	-1.42
2050	-2013	-0.77	-2041	-0.89
2055	-1191	-0.44	-1201	-0.52
2060	–691	-0.24	–698	-0.30
2065	–383	-0.13	–401	-0.17
2070	–187	-0.06	–209	-0.09

Table 14 Total fiscal burden, after FEFSS, % of GDP

YEAR	BASELINE, M €	BASELINE, % GDP	LOW PROD., M €	LOW PROD., % GDP
2020	8976	4.53	8319	4.30
2030	8011	3.65	7023	3.29
2035	5929	2.59	8724	3.97
2040	8783	3.69	9781	4.38
2045	9344	3.75	10847	4.79
2050	10128	3.89	11971	5.23
2055	9613	3.53	11827	5.10
2060	8668	3.02	11547	4.89
2065	8494	2.82	11807	4.91
2070	9300	2.96	12738	5.25
2020	8976	4.53	8319	4.30

Table 15 Benefit ratio: SS OAP

YEAR	BASELINE	LOW PROD.
2020	0.45	0.44
2025	0.44	0.43
2030	0.42	0.42
2035	0.40	0.40
2040	0.39	0.40
2045	0.38	0.40
2050	0.38	0.42
2055	0.38	0.43
2060	0.38	0.43
2065	0.38	0.44
2070	0.39	0.47

Table 16 Benefit ratio: CGA OAP

YEAR	BASELINE	LOW PROD.
2020	1.21	1.20
2025	1.09	1.09

YEAR	BASELINE	LOW PROD.
2030	0.92	0.92
2035	0.75	0.76
2040	0.59	0.61
2045	0.45	0.48
2050	0.34	0.38
2055	0.27	0.31
2060	0.23	0.28
2065	0.21	0.26
2070	0.20	0.25

Table 17 Gross replacement rate, new SS OAP pensions

YEAR	BASELINE	LOW PROD.
2020	66.30	66.84
2025	67.31	66.84
2030	70.71	68.97
2035	70.70	68.39
2040	68.93	66.85
2045	67.45	66.45
2050	66.87	67.47
2055	66.71	68.85
2060	66.59	69.81
2065	67.09	71.83
2070	69.26	77.45

Table 18 Gross replacement rate, new CGA OAP pensions

YEAR	BASELINE	LOW PROD.
2020	84.64	84.34
2025	82.27	83.01
2030	79.90	81.68
2035	77.53	80.35
2040	75.16	79.03
2045	72.79	77.70
2050	70.43	0.00
2055	0.00	0.00
2060	0.00	0.00
2065	0.00	0.00
2070	0.00	0.00

Table 19 Poverty threshold

YEAR	BASELINE	LOW PROD.
2020	458	463
2025	474	469
2030	490	467
2035	510	466
2040	535	468
2045	566	476
2050	603	488
2055	641	500
2060	677	508
2065	717	510
2070	771	503

Table 20 Population 65+ at risk of poverty

YEAR	BASELINE	LOW PROD.
2020	9.42	9.77
2025	9.86	9.40
2030	10.89	9.60
2035	11.72	10.19
2040	12.34	10.95
2045	12.81	11.62
2050	13.20	12.08
2055	13.63	12.28
2060	14.20	12.16
2065	14.87	11.69
2070	15.53	10.82

Annex 4

Table 1 Total number of pensioners: increase in SSC

YEAR	BASELINE	SSC +0.5pp	SSC +1pp	SSC +1.5pp	SSC +2pp	SSC +2.5pp
2020	2689856	2689856	2689856	2689856	2689856	2689856
2025	2822013	2822013	2822013	2822013	2822013	2822013
2030	2978599	2978599	2978599	2978599	2978599	2978599
2035	3150151	3150151	3150151	3150151	3150151	3150151
2040	3261250	3261250	3261250	3261250	3261250	3261250
2045	3287634	3287634	3287634	3287634	3287634	3287634
2050	3264090	3264090	3264090	3264090	3264090	3264090
2055	3127928	3127928	3127928	3127928	3127928	3127928
2060	2965807	2965807	2965807	2965807	2965807	2965807
2065	2837892	2837892	2837892	2837892	2837892	2837892
2070	2723735	2723735	2723735	2723735	2723735	2723735

Table 2 Total number of pensioners: reduction in the pension accrual rate

YEAR	BASELINE	PAR –0.1pp	PAR –0.2pp	PAR –0.3pp	PAR –0.4pp	PAR –0.5pp
2020	2689856	2689856	2689856	2689856	2689856	2689856
2025	2822013	2822042	2822042	2822039	2822038	2822050
2030	2978599	2978602	2978610	2978618	2978634	2978630
2035	3150151	3150345	3150475	3150572	3150659	3150729
2040	3261250	3261331	3261350	3261460	3261549	3261648
2045	3287634	3287732	3287824	3287852	3287929	3287965
2050	3264090	3264144	3264251	3264371	3264502	3264689
2055	3127928	3128048	3128249	3128536	3128729	3128927
2060	2965807	2966021	2966228	2966334	2966461	2966682
2065	2837892	2838033	2838220	2838382	2838550	2838770
2070	2723735	2723874	2724071	2724435	2724727	2724994

Table 3 Total number of pensioners: increase in statutory retirement age

YEAR	BASELINE	SAR 67	SAR 68	SAR 69	SAR 70
2020	2689856	2689856	2689856	2689856	2689856
2025	2822013	2767148	2748779	2747192	2745063
2030	2978599	2899144	2822273	2744992	2678296
2035	3150151	3056530	2963168	2880893	2804689
2040	3261250	3187588	3111125	3029581	2949389
2045	3287634	3211221	3143864	3083414	3012452
2050	3264090	3200384	3129613	3063396	2988125
2055	3127928	3064698	3014440	2960954	2896808
2060	2965807	2908368	2846004	2789821	2723470
2065	2837892	2776658	2722597	2655078	2593635
2070	2723735	2661522	2599571	2538063	2486359

Table 4 Social security pensioners: increase in SSC

YEAR	BASELINE	SSC +0.5pp	SSC +1pp	SSC +1.5pp	SSC +2pp	SSC +2.5pp
2020	2185795	2185795	2185795	2185795	2185795	2185795
2025	2306701	2306701	2306701	2306701	2306701	2306701
2030	2494355	2494355	2494355	2494355	2494355	2494355
2035	2721960	2721960	2721960	2721960	2721960	2721960
2040	2909719	2909719	2909719	2909719	2909719	2909719
2045	3017151	3017151	3017151	3017151	3017151	3017151
2050	3071038	3071038	3071038	3071038	3071038	3071038
2055	2998055	2998055	2998055	2998055	2998055	2998055
2060	2885050	2885050	2885050	2885050	2885050	2885050
2065	2793136	2793136	2793136	2793136	2793136	2793136
2070	2704078	2704078	2704078	2704078	2704078	2704078

Table 5 Social security pensioners: reduction in the pension accrual rate

YEAR	BASELINE	PAR –0.1pp	PAR –0.2pp	PAR –0.3pp	PAR –0.4pp	PAR –0.5pp
2020	2185795	2185795	2185795	2185795	2185795	2185795
2025	2306701	2306724	2306721	2306716	2306713	2306726
2030	2494355	2494356	2494363	2494370	2494387	2494385
2035	2721960	2722156	2722288	2722386	2722473	2722542
2040	2909719	2909798	2909815	2909926	2910014	2910111
2045	3017151	3017249	3017343	3017370	3017449	3017490
2050	3071038	3071094	3071197	3071318	3071447	3071628
2055	2998055	2998175	2998377	2998664	2998858	2999058
2060	2885050	2885264	2885472	2885576	2885703	2885926
2065	2793136	2793276	2793462	2793625	2793793	2794012
2070	2704078	2704219	2704417	2704780	2705073	2705340

Table 6 Social security pensioners: increase in statutory retirement age

YEAR	BASELINE	SAR 67	SAR 68	SAR 69	SAR 70
2020	2185795	2185795	2185795	2185795	2185795
2025	2306701	2251172	2233915	2234164	2234357
2030	2494355	2420832	2348208	2276369	2214240
2035	2721960	2631139	2544339	2466930	2396083
2040	2909719	2836439	2767620	2688374	2610753
2045	3017151	2942464	2881490	2824323	2752606
2050	3071038	3007296	2946487	2877943	2805608
2055	2998055	2935018	2892884	2837354	2777078
2060	2885050	2828490	2771487	2714096	2649297
2065	2793136	2732138	2680282	2614769	2553046
2070	2704078	2641215	2579941	2518972	2467509

Table 7 CGA pensioners: increase in SSC

YEAR	BASELINE	SSC +0.5pp	SSC +1pp	SSC +1.5pp	SSC +2pp	SSC +2.5pp
2020	505299	505299	505299	505299	505299	505299
2025	514714	514714	514714	514714	514714	514714
2030	484151	484151	484151	484151	484151	484151
2035	428338	428338	428338	428338	428338	428338
2040	351524	351524	351524	351524	351524	351524
2045	270387	270387	270387	270387	270387	270387
2050	193164	193164	193164	193164	193164	193164
2055	129849	129849	129849	129849	129849	129849
2060	80658	80658	80658	80658	80658	80658
2065	44817	44817	44817	44817	44817	44817
2070	20054	20054	20054	20054	20054	20054

Table 8 CGA pensioners: reduction in the pension accrual rate

YEAR	BASELINE	PAR –0.1pp	PAR –0.2pp	PAR –0.3pp	PAR –0.4pp	PAR –0.5pp
2020	505299	505299	505299	505299	505299	505299
2025	514714	514714	514714	514714	514714	514714
2030	484151	484151	484151	484151	484151	484151
2035	428338	428338	428338	428338	428338	428338
2040	351524	351524	351524	351524	351524	351524
2045	270387	270387	270387	270387	270387	270387
2050	193164	193164	193164	193164	193164	193164
2055	129849	129849	129849	129849	129849	129849
2060	80658	80658	80658	80658	80658	80658
2065	44817	44817	44817	44817	44817	44817
2070	20054	20054	20054	20054	20054	20054

Table 9 CGA pensioners: increase in statutory retirement age

YEAR	BASELINE	SAR 67	SAR 68	SAR 69	SAR 70
2020	505299	505299	505299	505299	505299
2025	514714	516392	515066	513455	510960
2030	484151	478305	474128	468705	464118
2035	428338	425213	418774	413805	408560
2040	351524	351208	343544	341134	338662
2045	270387	268765	262344	259249	259833
2050	193164	193156	183154	185391	182522
2055	129849	129649	121535	123687	119734
2060	80658	79906	74540	75612	74167
2065	44817	44566	42287	40517	40593
2070	20054	20038	19538	18765	18837

Table 10 SS Contributory Regime pensioners: increase in SSC

YEAR	BASELINE	SSC +0.5pp	SSC +1pp	SSC +1.5pp	SSC +2pp	SSC +2.5pp
2020	1268779	1268779	1268779	1268779	1268779	1268779
2025	1425390	1425390	1425390	1425390	1425390	1425390
2030	1664143	1664143	1664143	1664143	1664143	1664143
2035	1893077	1893077	1893077	1893077	1893077	1893077
2040	2099684	2099684	2099684	2099684	2099684	2099684
2045	2237691	2237691	2237691	2237691	2237691	2237691
2050	2321973	2321973	2321973	2321973	2321973	2321973
2055	2303050	2303050	2303050	2303050	2303050	2303050
2060	2248940	2248940	2248940	2248940	2248940	2248940
2065	2193693	2193693	2193693	2193693	2193693	2193693
2070	2157420	2157420	2157420	2157420	2157420	2157420

Table 11 SS Contributory Regime pensioners: reduction in the pension accrual rate

YEAR	BASELINE	PAR –0.1pp	PAR –0.2pp	PAR –0.3pp	PAR –0.4pp	PAR –0.5pp
2020	1268779	1268779	1268779	1268779	1268779	1268779
2025	1425390	1418861	1412070	1404800	1396725	1389089
2030	1664143	1644401	1622961	1596258	1568416	1535504
2035	1893077	1865750	1835232	1799126	1755337	1702603
2040	2099684	2064698	2025156	1977939	1922894	1858217
2045	2237691	2191471	2141449	2083098	2018426	1944423
2050	2321973	2267450	2208085	2139725	2067027	1984423
2055	2303050	2244869	2181381	2109204	2030572	1944475
2060	2248940	2190532	2124354	2050361	1973352	1890374
2065	2193693	2133925	2066422	1991675	1912921	1828450
2070	2157420	2100826	2038283	1965471	1889566	1806686

Table 12 SS Contributory Regime pensioners: increase in statutory retirement age

YEAR	BASELINE	SAR 67	SAR 68	SAR 69	SAR 70
2020	1268779	1268779	1268779	1268779	1268779
2025	1425390	1389465	1385874	1388071	1386070
2030	1664143	1605782	1564285	1521747	1488363
2035	1893077	1804613	1741730	1688887	1645531
2040	2099684	1999874	1931502	1862169	1801574
2045	2237691	2124143	2049618	1985337	1911826
2050	2321973	2202705	2118931	2022887	1940254
2055	2303050	2195415	2119804	2034529	1957202
2060	2248940	2155713	2078391	2000146	1927636
2065	2193693	2093081	2027838	1949448	1884587
2070	2157420	2053519	1986228	1907466	1854159

Table 13 SS non-Contributory Regime pensioners: increase in SSC

YEAR	BASELINE	SSC +0.5pp	SSC +1pp	SSC +1.5pp	SSC +2pp	SSC +2.5pp
2020	899787	899787	899787	899787	899787	899787
2025	866616	866616	866616	866616	866616	866616
2030	820774	820774	820774	820774	820774	820774
2035	814371	814371	814371	814371	814371	814371
2040	792091	792091	792091	792091	792091	792091
2045	761842	761842	761842	761842	761842	761842
2050	722531	722531	722531	722531	722531	722531
2055	657914	657914	657914	657914	657914	657914
2060	588358	588358	588358	588358	588358	588358
2065	540766	540766	540766	540766	540766	540766
2070	483053	483053	483053	483053	483053	483053

Table 14 SS non-Contributory Regime pensioners: reduction in the pension accrual rate

YEAR	BASELINE	PAR –0.1pp	PAR –0.2pp	PAR –0.3pp	PAR –0.4pp	PAR –0.5pp
2020	899787	899787	899787	899787	899787	899787
2025	866616	872846	879534	886587	894829	902294
2030	820774	840556	862023	888928	916569	949339
2035	814371	841638	872108	908049	951876	1004701
2040	792091	827161	866766	914050	969299	1033974
2045	761842	807955	857888	916254	980577	1054519
2050	722531	777200	836678	904986	978100	1060793
2055	657914	716015	779438	851555	930031	1016157
2060	588358	646798	712989	787184	864061	946899
2065	540766	600478	667976	742500	821339	905986
2070	483053	539558	602065	674716	750894	833933

Table 15 SS non-Contributory Regime pensioners: increase in statutory retirement age

YEAR	BASELINE	SAR 67	SAR 68	SAR 69	SAR 70
2020	899787	899787	899787	899787	899787
2025	866616	840909	835747	837797	839989
2030	820774	806573	775134	745997	718827
2035	814371	810115	786474	761700	735578
2040	792091	814953	813130	802125	785522
2045	761842	798626	809975	818572	821159
2050	722531	774015	796285	823702	832378
2055	657914	702149	734552	763737	780695
2060	588358	626743	648943	669781	682158
2065	540766	578982	594867	607169	614777
2070	483053	521906	532454	546945	550601

Table 16 average monthly payment, SS OAP: increase in SSC

YEAR	BASELINE	SSC +0.5pp	SSC +1pp	SSC +1.5pp	SSC +2pp	SSC +2.5pp
2020	484	484	484	484	484	484
2025	495	495	495	495	495	495
2030	505	505	505	505	505	505
2035	520	520	520	520	520	520
2040	548	548	548	548	548	548
2045	589	589	589	589	589	589
2050	644	644	644	644	644	644
2055	702	702	702	702	702	702
2060	760	760	760	760	760	760
2065	826	826	826	826	826	826
2070	924	924	924	924	924	924

Table 17 Average monthly payment, SS OAP: reduction in the pension accrual rate

YEAR	BASELINE	PAR –0.1pp	PAR –0.2pp	PAR –0.3pp	PAR –0.4pp	PAR –0.5pp
2020	484	484	484	484	484	484
2025	495	495	494	493	493	492
2030	505	501	497	493	489	485
2035	520	512	504	496	488	481
2040	548	535	523	511	499	488
2045	589	572	555	539	524	509
2050	644	623	603	583	563	545
2055	702	678	654	631	609	587
2060	760	734	708	682	657	634
2065	826	796	767	739	712	686
2070	924	890	857	825	794	764

Table 18 Average monthly payment, SS OAP: increase in statutory retirement age

YEAR	BASELINE	SAR 67	SAR 68	SAR 69	SAR 70
2020	484	484	484	484	484
2025	495	489	489	489	489
2030	505	496	493	490	487
2035	520	500	494	486	482
2040	548	517	503	490	479
2045	588	547	525	506	491
2050	644	595	568	541	519
2055	702	647	618	588	565
2060	760	703	674	642	616
2065	826	761	731	700	675
2070	924	849	812	775	743

Table 19 Average monthly payment, SS OAP (new pension): increase in SSC

YEAR	BASELINE	SSC +0.5pp	SSC +1pp	SSC +1.5pp	SSC +2pp	SSC +2.5pp
2020	499	499	499	499	499	499
2025	549	549	549	549	549	549
2030	519	519	519	519	519	519
2035	577	577	577	577	577	577
2040	680	680	680	680	680	680
2045	769	769	769	769	769	769
2050	847	847	847	847	847	847
2055	949	949	949	949	949	949
2060	991	991	991	991	991	991
2065	1169	1169	1169	1169	1169	1169
2070	1358	1358	1358	1358	1358	1358

Table 20 Average monthly payment, SS OAP (new pension): reduction in the pension accrual rate

YEAR	BASELINE	PAR –0.1pp	PAR –0.2pp	PAR –0.3pp	PAR –0.4pp	PAR –0.5pp
2020	499	499	499	499	499	499
2025	549	530	512	494	477	461
2030	519	503	488	473	459	446
2035	577	560	543	527	511	497
2040	680	657	634	613	592	572
2045	769	741	714	688	663	639
2050	847	815	784	754	725	698
2055	949	913	877	843	811	780
2060	991	954	918	884	851	820
2065	1169	1124	1079	1036	996	957
2070	1358	1304	1251	1198	1149	1100

Table 21 Average monthly payment, SS OAP (new pension): increase in statutory retirement age

YEAR	BASELINE	SAR 67	SAR 68	SAR 69	SAR 70
2020	499	499	499	499	499
2025	549	512	527	474	513
2030	519	502	489	478	469
2035	577	546	509	488	470
2040	680	637	598	567	539
2045	769	736	693	657	635
2050	847	819	804	759	739
2055	949	910	884	856	838
2060	991	983	968	938	915
2065	1169	1093	1033	1008	972
2070	1358	1311	1269	1208	1132

Table 22 Average monthly payment, CGA OAP: increase in SSC

YEAR	BASELINE	SSC +0.5pp	SSC +1pp	SSC +1.5pp	SSC +2pp	SSC +2.5pp
2020	1298	1298	1298	1298	1298	1298
2025	1248	1248	1248	1248	1248	1248
2030	1112	1112	1112	1112	1112	1112
2035	977	977	977	977	977	977
2040	835	835	835	835	835	835
2045	689	689	689	689	689	689
2050	574	574	574	574	574	574
2055	507	507	507	507	507	507
2060	468	468	468	468	468	468
2065	461	461	461	461	461	461
2070	472	472	472	472	472	472

Table 23 Average monthly payment, CGA OAP: reduction in the pension accrual rate

YEAR	BASELINE	PAR –0.1pp	PAR –0.2pp	PAR –0.3pp	PAR –0.4pp	PAR –0.5pp
2020	1298	1298	1298	1298	1298	1298
2025	1248	1248	1248	1248	1248	1248
2030	1112	1112	1111	1111	1110	1110
2035	977	976	975	974	973	972
2040	835	833	831	829	828	826
2045	689	686	682	679	675	672
2050	574	568	562	556	550	544
2055	507	499	491	483	476	468
2060	468	458	448	438	428	418
2065	461	448	436	423	411	399
2070	472	457	442	427	413	398

Table 24 Average monthly payment, CGA OAP: increase in statutory retirement age

YEAR	BASELINE	SAR 67	SAR 68	SAR 69	SAR 70
2020	1298	1298	1298	1298	1298
2025	1248	1268	1271	1267	1267
2030	1111	1132	1150	1185	1206
2035	975	987	1012	1034	1047
2040	834	851	873	878	890
2045	690	703	731	736	758
2050	574	608	620	623	655
2055	509	540	551	565	602
2060	467	500	530	545	591
2065	461	500	533	563	611
2070	472	514	544	577	649

Table 25 Average monthly payment, CGA OAP (new pension): increase in SSC

YEAR	BASELINE	SSC +0.5pp	SSC +1pp	SSC +1.5pp	SSC +2pp	SSC +2.5pp
2020	1038	1038	1038	1038	1038	1038
2025	1430	1430	1430	1430	1430	1430
2030	937	937	937	937	937	937
2035	1033	1033	1033	1033	1033	1033
2040	1085	1085	1085	1085	1085	1085
2045	1468	1468	1468	1468	1468	1468
2050	1020	1020	1020	1020	1020	1020
2055	0	0	0	0	0	0
2060	0	0	0	0	0	0
2065	0	0	0	0	0	0
2070	0	0	0	0	0	0

Table 26 Average monthly payment, CGA OAP (new pension): reduction in the pension accrual rate

YEAR	BASELINE	PAR –0.1pp	PAR –0.2pp	PAR –0.3pp	PAR –0.4pp	PAR –0.5pp
2020	1038	1038	1038	1038	1038	1038
2025	1430	1420	1409	1398	1387	1376
2030	937	930	922	914	907	899
2035	1033	1021	1009	998	986	974
2040	1085	1064	1045	1025	1005	986
2045	1468	1414	1359	1305	1251	1198
2050	1020	985	949	914	879	844
2055	0	0	0	0	0	0
2060	0	0	0	0	0	0
2065	0	0	0	0	0	0
2070	0	0	0	0	0	0

Table 27 Average monthly payment, CGA OAP (new pension): increase in statutory retirement age

YEAR	BASELINE	SAR 67	SAR 68	SAR 69	SAR 70
2020	1038	1038	1038	1038	1038
2025	1430	1390	1387	1559	1441
2030	937	947	971	994	981
2035	1033	952	949	1144	988
2040	1085	1061	1227	1208	1229
2045	1468	1447	1457	1636	1468
2050	1020	1188	991	1098	1680
2055	0	0	0	0	0
2060	0	0	0	0	0
2065	0	0	0	0	0
2070	0	0	0	0	0

Table 28 Total pension expenditure: increase in SSC

YEAR	BASELINE	SSC +0.5pp	SSC +1pp	SSC +1.5pp	SSC +2pp	SSC +2.5pp
2020	24810	24810	24810	24810	24810	24796
2025	25936	25936	25936	25936	25936	25910
2030	27025	27025	27025	27025	27025	27013
2035	28427	28427	28427	28427	28427	28412
2040	29945	29945	29945	29945	29945	29955
2045	31435	31435	31435	31435	31435	31388
2050	33110	33110	33110	33110	33110	33115
2055	33729	33729	33729	33729	33729	33781
2060	34096	34096	34096	34096	34096	34062
2065	35186	35186	35186	35186	35186	35070
2070	37004	37004	37004	37004	37004	36999

Table 29 total pension expenditure: reduction in the pension accrual rate

YEAR	BASELINE	PAR –0.1pp	PAR –0.2pp	PAR –0.3pp	PAR –0.4pp	PAR –0.5pp
2020	24810	24810	24810	24810	24810	24810
2025	25936	25893	25851	25811	25773	25737
2030	27025	26798	26577	26363	26157	25961
2035	28427	28013	27609	27217	26840	26479
2040	29945	29335	28741	28166	27612	27083
2045	31435	30651	29887	29147	28434	27754
2050	33110	32169	31253	30367	29513	28700
2055	33729	32700	31698	30732	29805	28922
2060	34096	33008	31951	30932	29952	29019
2065	35186	34027	32901	31813	30769	29777
2070	37004	35743	34519	33336	32197	31110

Table 30 Total pension expenditure: increase in statutory retirement age

YEAR	BASELINE	SAR 67	SAR 68	SAR 69	SAR 70
2020	24810	24810	24810	24810	24810
2025	25936	25364	25230	25220	25185
2030	27025	26167	25497	24851	24261
2035	28427	27140	26194	25272	24524
2040	29945	28350	27343	26193	25158
2045	31435	29428	28233	27037	25928
2050	33110	30995	29525	28076	26819
2055	33729	31378	30042	28623	27391
2060	34096	31615	30076	28587	27249
2065	35186	32482	30994	29415	28070
2070	37004	33966	32264	30581	29203

Table 31 SS pension expenditure: increase in SSC

YEAR	BASELINE	SSC +0.5pp	SSC +1pp	SSC +1.5pp	SSC +2pp	SSC +2.5pp
2020	16209	16209	16209	16209	16209	16209
2025	17544	17544	17544	17544	17544	17544
2030	19599	19599	19599	19599	19599	19599
2035	22286	22286	22286	22286	22286	22286
2040	25253	25253	25253	25253	25253	25253
2045	28171	28171	28171	28171	28171	28171
2050	31105	31105	31105	31105	31105	31105
2055	32533	32533	32533	32533	32533	32533
2060	33408	33408	33408	33408	33408	33408
2065	34799	34799	34799	34799	34799	34799
2070	36820	36820	36820	36820	36820	36820

Table 32 SS pension expenditure: reduction in the pension accrual rate

YEAR	BASELINE	PAR –0.1pp	PAR –0.2pp	PAR –0.3pp	PAR –0.4pp	PAR –0.5pp
2020	16209	16209	16209	16209	16209	16209
2025	17544	17502	17462	17424	17388	17354
2030	19599	19378	19164	18957	18758	18569
2035	22286	21884	21492	21112	20746	20398
2040	25253	24659	24081	23522	22984	22470
2045	28171	27405	26659	25936	25242	24579
2050	31105	30181	29282	28414	27578	26782
2055	32533	31519	30533	29582	28670	27802
2060	33408	32332	31288	30281	29314	28393
2065	34799	33649	32532	31454	30419	29436
2070	36820	35564	34345	33167	32034	30952

Table 33 SS pension expenditure: increase in statutory retirement age

YEAR	BASELINE	SAR 67	SAR 68	SAR 69	SAR 70
2020	16209	16209	16209	16209	16209
2025	17544	16962	16843	16847	16823
2030	19599	18753	18094	17463	16931
2035	22286	20985	20041	19128	18421
2040	25253	23644	22632	21476	20441
2045	28171	26189	24970	23767	22610
2050	31105	28911	27493	26026	24706
2055	32533	30146	28838	27379	26127
2060	33408	30904	29378	27859	26484
2065	34799	32078	30583	29000	27634
2070	36820	33765	32057	30367	28976

Table 34 SS Contributory Regime, pension expenditure: increase in SSC

YEAR	BASELINE	SSC +0.5pp	SSC +1pp	SSC +1.5pp	SSC +2pp	SSC +2.5pp
2020	13393	13393	13393	13393	13393	13393
2025	15177	15177	15177	15177	15177	15177
2030	17574	17574	17574	17574	17574	17574
2035	20350	20350	20350	20350	20350	20350
2040	23386	23386	23386	23386	23386	23386
2045	26357	26357	26357	26357	26357	26357
2050	29279	29279	29279	29279	29279	29279
2055	30745	30745	30745	30745	30745	30745
2060	31689	31689	31689	31689	31689	31689
2065	33113	33113	33113	33113	33113	33113
2070	35213	35213	35213	35213	35213	35213

Table 35 SS Contributory Regime, pension expenditure: reduction in the pension accrual rate

YEAR	BASELINE	PAR –0.1pp	PAR –0.2pp	PAR –0.3pp	PAR –0.4pp	PAR –0.5pp
2020	13393	13393	13393	13393	13393	13393
2025	15177	15125	15073	15021	14969	14917
2030	17574	17318	17063	16808	16554	16301
2035	20350	19888	19429	18972	18517	18065
2040	23386	22710	22038	21369	20705	20046
2045	26357	25479	24607	23739	22878	22024
2050	29279	28218	27164	26116	25077	24047
2055	30745	29587	28434	27290	26154	25029
2060	31689	30469	29257	28053	26859	25677
2065	33113	31819	30533	29256	27988	26733
2070	35213	33824	32440	31067	29703	28354

Table 36 SS Contributory Regime, pension expenditure: increase in statutory retirement age

YEAR	BASELINE	SAR 67	SAR 68	SAR 69	SAR 70
2020	13393	13393	13393	13393	13393
2025	15177	14622	14564	14585	14561
2030	17574	16757	16142	15581	15122
2035	20350	19027	18115	17249	16607
2040	23386	21669	20603	19412	18405
2045	26357	24196	22870	21599	20389
2050	29279	26839	25267	23620	22182
2055	30745	28126	26652	24998	23602
2060	31689	28997	27323	25662	24213
2065	33113	30185	28599	26873	25442
2070	35213	31931	30169	28341	26878

Table 37 SS non-Contributory Regime, pension expenditure: increase in SSC

YEAR	BASELINE	SSC +0.5pp	SSC +1pp	SSC +1.5pp	SSC +2pp	SSC +2.5pp
2020	2828	2828	2828	2828	2828	2828
2025	2371	2371	2371	2371	2371	2371
2030	2024	2024	2024	2024	2024	2024
2035	1937	1937	1937	1937	1937	1937
2040	1866	1866	1866	1866	1866	1866
2045	1814	1814	1814	1814	1814	1814
2050	1825	1825	1825	1825	1825	1825
2055	1788	1788	1788	1788	1788	1788
2060	1718	1718	1718	1718	1718	1718
2065	1688	1688	1688	1688	1688	1688
2070	1608	1608	1608	1608	1608	1608

Table 38 SS non-Contributory Regime, pension expenditure: reduction in the pension accrual rate

YEAR	BASELINE	PAR –0.1pp	PAR –0.2pp	PAR –0.3pp	PAR –0.4pp	PAR –0.5pp
2020	2828	2828	2828	2828	2828	2828
2025	2371	2380	2391	2403	2418	2435
2030	2024	2060	2101	2149	2204	2269
2035	1937	1996	2064	2140	2229	2333
2040	1866	1949	2043	2153	2278	2424
2045	1814	1927	2053	2198	2364	2556
2050	1825	1962	2118	2297	2500	2735
2055	1788	1933	2099	2292	2515	2773
2060	1718	1862	2031	2228	2455	2718
2065	1688	1831	2001	2198	2430	2702
2070	1608	1740	1905	2100	2331	2598

Table 39 SS non-Contributory Regime, pension expenditure: increase in statutory retirement age

YEAR	BASELINE	SAR 67	SAR 68	SAR 69	SAR 70
2020	2828	2828	2828	2828	2828
2025	2371	2332	2251	2244	2248
2030	2024	1998	1953	1878	1807
2035	1937	1958	1929	1883	1816
2040	1866	1974	2023	2060	2033
2045	1814	1995	2107	2172	2223
2050	1825	2071	2221	2404	2522
2055	1788	2020	2186	2382	2525
2060	1718	1909	2057	2197	2271
2065	1688	1891	1983	2127	2193
2070	1608	1833	1894	2030	2104

Table 40 CGA pension expenditure: increase in SSC

YEAR	BASELINE	SSC +0.5pp	SSC +1pp	SSC +1.5pp	SSC +2pp	SSC +2.5pp
2020	8588	8588	8588	8588	8588	8588
2025	8381	8381	8381	8381	8381	8381
2030	7426	7426	7426	7426	7426	7426
2035	6142	6142	6142	6142	6142	6142
2040	4693	4693	4693	4693	4693	4693
2045	3260	3260	3260	3260	3260	3260
2050	2007	2007	2007	2007	2007	2007
2055	1196	1196	1196	1196	1196	1196
2060	687	687	687	687	687	687
2065	386	386	386	386	386	386
2070	189	189	189	189	189	189

Table 41 CGA pension expenditure: reduction in the pension accrual rate

YEAR	BASELINE	PAR –0.1pp	PAR –0.2pp	PAR –0.3pp	PAR –0.4pp	PAR –0.5pp
2020	8588	8588	8588	8588	8588	8588
2025	8381	8380	8378	8376	8375	8373
2030	7426	7419	7412	7405	7398	7392
2035	6142	6130	6118	6106	6095	6083
2040	4693	4677	4661	4645	4630	4614
2045	3260	3243	3225	3207	3190	3172
2050	2007	1990	1973	1955	1938	1921
2055	1196	1181	1165	1150	1135	1120
2060	687	674	661	649	637	624
2065	386	377	368	359	350	341
2070	189	184	178	173	168	163

Table 42 CGA pension expenditure: increase in statutory retirement age

YEAR	BASELINE	SAR 67	SAR 68	SAR 69	SAR 70
2020	8588	8588	8588	8588	8588
2025	8381	8393	8391	8386	8371
2030	7426	7414	7405	7389	7332
2035	6142	6156	6152	6143	6102
2040	4693	4708	4711	4718	4718
2045	3260	3236	3262	3269	3318
2050	2007	2087	2032	2052	2113
2055	1196	1230	1204	1242	1265
2060	687	711	698	728	764
2065	386	403	411	414	437
2070	189	203	208	210	228

Table 43 SS contributions: increase in SSC

YEAR	BASELINE	SSC +0.5pp	SSC +1pp	SSC +1.5pp	SSC +2pp	SSC +2.5pp
2020	16042	16042	16042	16042	16042	16042
2025	17582	18079	18577	19074	19571	20068
2030	18970	19507	20043	20580	21116	21653
2035	20100	20668	21237	21805	22374	22942
2040	21080	21676	22273	22869	23466	24062
2045	22043	22667	23291	23915	24539	25163
2050	23004	23656	24308	24960	25611	26263
2055	24127	24810	25494	26177	26860	27544
2060	25417	26137	26856	27576	28295	29015
2065	26648	27403	28158	28913	29667	30422
2070	27709	28494	29279	30064	30849	31634

Table 44 SS contributions: reduction in the pension accrual rate

YEAR	BASELINE	PAR –0.1pp	PAR –0.2pp	PAR –0.3pp	PAR –0.4pp	PAR –0.5pp
2020	16042	16042	16042	16042	16042	16042
2025	17582	17582	17582	17582	17582	17582
2030	18970	18970	18970	18970	18970	18970
2035	20100	20100	20100	20100	20100	20100
2040	21080	21080	21080	21080	21080	21080
2045	22043	22043	22043	22043	22043	22043
2050	23004	23004	23004	23004	23004	23004
2055	24127	24127	24127	24126	24127	24127
2060	25417	25417	25416	25418	25417	25418
2065	26648	26649	26649	26650	26649	26648
2070	27709	27710	27708	27708	27708	27708

Table 45 SS contributions: increase in statutory retirement age

YEAR	BASELINE	SAR 67	SAR 68	SAR 69	SAR 70
2020	16042	16042	16042	16042	16042
2025	17582	17577	17566	17553	17539
2030	18970	18917	18875	18826	18772
2035	20100	20065	20021	19961	19893
2040	21080	21076	21065	21036	20992
2045	22043	22053	22046	22053	22039
2050	23004	23015	23021	23012	23022
2055	24127	24136	24120	24133	24122
2060	25417	25412	25411	25411	25413
2065	26648	26646	26661	26636	26659
2070	27709	27702	27712	27708	27712

Table 46 CGA contributions: increase in SSC

YEAR	BASELINE	SSC +0.5pp	SSC +1pp	SSC +1.5pp	SSC +2pp	SSC +2.5pp
2020	2393	2393	2393	2393	2393	2393
2025	1613	1660	1706	1752	1799	1845
2030	994	1022	1051	1079	1108	1137
2035	486	500	514	528	542	556
2040	163	168	173	177	182	187
2045	29	30	31	32	32	33
2050	1	1	1	1	1	1
2055	0	0	0	0	0	0
2060	0	0	0	0	0	0
2065	0	0	0	0	0	0
2070	0	0	0	0	0	0

Table 47 CGA contributions: reduction in the pension accrual rate

YEAR	BASELINE	PAR –0.1pp	PAR –0.2pp	PAR –0.3pp	PAR –0.4pp	PAR –0.5pp
2020	2393	2393	2393	2393	2393	2393
2025	1613	1613	1613	1613	1613	1613
2030	994	994	994	994	994	994
2035	486	486	486	486	486	486
2040	163	163	163	163	163	163
2045	29	29	29	29	29	29
2050	1	1	1	1	1	1
2055	0	0	0	0	0	0
2060	0	0	0	0	0	0
2065	0	0	0	0	0	0
2070	0	0	0	0	0	0

Table 48 CGA contributions: increase in statutory retirement age

YEAR	BASELINE	SAR 67	SAR 68	SAR 69	SAR 70
2020	2393	2393	2393	2393	2393
2025	1613	1617	1632	1648	1669
2030	994	1053	1117	1178	1248
2035	486	532	608	674	771
2040	163	187	205	243	302
2045	29	33	38	39	49
2050	1	1	1	3	2
2055	0	0	0	0	0
2060	0	0	0	0	0
2065	0	0	0	0	0
2070	0	0	0	0	0

Table 49 Financial balance, SS Contributory Regime after FEFSS: increase in SSC

YEAR	BASELINE	SSC +0.5pp	SSC +1pp	SSC +1.5pp	SSC +2pp	SSC +2.5pp
2020	0	0	0	0	0	0
2025	180	700	1199	1698	2167	2667
2030	0	117	582	1057	1705	2230
2035	0	0	0	0	371	901
2040	-3735	0	0	0	0	0
2045	-5440	-4815	-3428	0	0	0
2050	-7277	-6625	-5973	-5321	0	0
2055	-7503	-6820	-6136	-5453	-4770	0
2060	-6990	-6270	-5551	-4832	-4112	-3393
2065	-7013	-6258	-5503	-4748	-3993	-3238
2070	-8136	-7351	-6567	-5782	-4997	-4212

Table 50 Financial balance, SS Contributory Regime after FEFSS: reduction in the pension accrual rate

YEAR	BASELINE	PAR –0.1pp	PAR –0.2pp	PAR –0.3pp	PAR –0.4pp	PAR –0.5pp
2020	0	0	0	0	0	0
2025	180	220	263	324	353	373
2030	0	0	0	180	301	566
2035	0	0	0	0	0	84
2040	-3735	-1309	0	0	0	0
2045	-5440	-4642	-3860	-3094	0	0
2050	-7277	-6298	-5338	-4401	-3489	0
2055	-7503	-6423	-5362	-4329	-3324	-2352
2060	-6990	-5849	-4730	-3638	-2578	-1556
2065	-7013	-5803	-4620	-3468	-2354	-1282
2070	-8136	-6823	-5540	-4292	-3078	-1916

Table 51 Financial balance, SS Contributory Regime after FEFSS: increase in statutory retirement age

YEAR	BASELINE	SAR 67	SAR 68	SAR 69	SAR 70
2020	0	0	0	0	0
2025	180	795	918	770	790
2030	0	325	991	1486	1972
2035	0	0	216	1139	1738
2040	-3735	0	17	189	1142
2045	-5440	–380	0	0	241
2050	-7277	-4980	0	0	0
2055	-7503	-4793	0	0	0
2060	-6990	-4314	0	0	315
2065	-7013	-4165	0	0	555
2070	-8136	-4909	0	0	182

Table 52 FEFSS transfers: increase in SSC

YEAR	BASELINE	SSC +0.5pp	SSC +1pp	SSC +1.5pp	SSC +2pp	SSC +2.5pp
2020	34	34	34	34	34	34
2025	0	0	0	0	0	0
2030	475	0	0	0	0	0
2035	1901	1313	735	223	0	0
2040	0	2992	2532	1944	1353	749
2045	0	0	1465	3539	2950	2350
2050	0	0	0	0	4963	4036
2055	0	0	0	0	0	4161
2060	0	0	0	0	0	0
2065	0	0	0	0	0	0
2070	0	0	0	0	0	0

Table 53 FEFSS transfers: reduction in the pension accrual rate

YEAR	BASELINE	PAR –0.1pp	PAR –0.2pp	PAR –0.3pp	PAR –0.4pp	PAR –0.5pp
2020	34	34	34	34	34	34
2025	0	0	0	0	0	0
2030	345	201	112	0	0	0
2035	2117	1705	1073	653	364	0
2040	0	1439	2237	2098	1304	836
2045	0	0	0	0	2383	1657
2050	0	0	0	0	0	2457
2055	0	0	0	0	0	0
2060	0	0	0	0	0	0
2065	0	0	0	0	0	0
2070	0	0	0	0	0	0

Table 54 FEFSS transfers: increase in statutory retirement age

YEAR	BASELINE	SAR 67	SAR 68	SAR 69	SAR 70
2020	34	34	34	34	34
2025	0	0	0	0	0
2030	345	0	0	0	0
2035	2117	550	0	0	0
2040	0	2238	1018	0	0
2045	0	1799	2104	857	0
2050	0	0	3201	1780	369
2055	0	0	0	1821	452
2060	0	0	0	1069	0
2065	0	0	0	942	0
2070	0	0	0	1294	0

Table 55 FEFSS account, euros and as a PP of GDP: increase in SSC

YEAR	BASELINE	SSC +0.5pp	SSC +1pp	SSC +1.5pp	SSC +2pp	SSC +2.5pp
2020	10506	10506	10506	10506	10506	10506
2025	12469	12964	13462	13957	14452	14946
2030	12957	16231	19485	22747	26012	29270
2035	7835	14238	20739	27235	33731	40225
2040	0	3152	13523	23717	33926	44145
2045	0	0	0	11035	25515	39963
2050	0	0	0	0	6580	26259
2055	0	0	0	0	0	7304
2060	0	0	0	0	0	0
2065	0	0	0	0	0	0
2070	0	0	0	0	0	0

Table 56 FEFSS account: reduction in the pension accrual rate

YEAR	BASELINE	PAR –0.1pp	PAR –0.2pp	PAR –0.3pp	PAR –0.4pp	PAR –0.5pp
2020	10506	10506	10506	10506	10506	10506
2025	12469	12507	12545	12573	12613	12633
2030	12957	13789	14578	15337	16080	16773
2035	7835	10368	12938	15396	17784	20061
2040	0	0	4160	9571	14716	19677
2045	0	0	0	0	6125	14939
2050	0	0	0	0	0	4349
2055	0	0	0	0	0	0
2060	0	0	0	0	0	0
2065	0	0	0	0	0	0
2070	0	0	0	0	0	0

Table 57 FEFSS account: increase in statutory retirement age

YEAR	BASELINE	SAR 67	SAR 68	SAR 69	SAR 70
2020	10506	10506	10506	10506	10506
2025	12469	13417	13424	13434	13450
2030	12957	17665	20478	22488	23809
2035	7835	18547	25540	31558	35978
2040	0	12976	25893	37994	47152
2045	0	0	19714	39336	55155
2050	0	0	6652	36172	60490
2055	0	0	0	29817	63881
2060	0	0	0	25769	70668
2065	0	0	0	23657	80748
2070	0	0	0	20239	91021

Table 58 Financial balance CGA: increase in SSC

YEAR	BASELINE	SSC +0.5pp	SSC +1pp	SSC +1.5pp	SSC +2pp	SSC +2.5pp
2020	-6191	-6191	-6191	-6191	-6191	-6191
2025	-6765	-6718	-6672	-6625	-6579	-6532
2030	-6431	-6402	-6374	-6345	-6317	-6288
2035	-5656	-5642	-5628	-5614	-5600	-5586
2040	-4529	-4524	-4520	-4515	-4510	-4506
2045	-3232	-3231	-3230	-3229	-3228	-3227
2050	-2007	-2007	-2007	-2006	-2006	-2006
2055	-1196	-1196	-1196	-1196	-1196	-1196
2060	–687	–687	–687	–687	–687	–687
2065	–386	–386	–386	–386	–386	–386
2070	–189	–189	–189	–189	–189	–189

Table 59 Financial balance CGA: reduction in the pension accrual rate

YEAR	BASELINE	PAR –0.1pp	PAR –0.2pp	PAR –0.3pp	PAR –0.4pp	PAR –0.5pp
2020	-6191	-6191	-6191	-6191	-6191	-6191
2025	-6765	-6763	-6761	-6760	-6758	-6756
2030	-6431	-6424	-6417	-6410	-6403	-6396
2035	-5656	-5644	-5632	-5620	-5608	-5597
2040	-4529	-4514	-4498	-4482	-4466	-4451
2045	-3232	-3214	-3196	-3178	-3161	-3143
2050	-2007	-1989	-1972	-1955	-1938	-1920
2055	-1196	-1181	-1165	-1150	-1135	-1120
2060	–687	–674	–661	–649	–637	–624
2065	–386	–377	–368	–359	–350	–341
2070	–189	–184	–179	–173	–168	–163

Table 60 Financial balance CGA: increase in statutory retirement age

YEAR	BASELINE	SAR 67	SAR 68	SAR 69	SAR 70
2020	-6191	-6191	-6191	-6191	-6191
2025	-6763	-6775	-6748	-6716	-6692
2030	-6423	-6359	-6283	-6193	-6076
2035	-5652	-5614	-5535	-5456	-5316
2040	-4525	-4514	-4499	-4444	-4406
2045	-3232	-3201	-3222	-3222	-3267
2050	-2014	-2091	-2029	-2050	-2110
2055	-1196	-1232	-1202	-1240	-1262
2060	–687	–706	–699	–733	–755
2065	–386	–406	–407	–413	–440
2070	–189	–204	–206	–215	–228

Table 61 Total fiscal burden, after FEFSS: increase in SSC

YEAR	BASELINE	SSC +0.5pp	SSC +1pp	SSC +1.5pp	SSC +2pp	SSC +2.5pp
2020	8997	8997	8997	8997	8997	8997
2025	9146	9096	9040	8994	8947	8911
2030	7993	8402	8425	8396	8367	8319
2035	5943	6239	6747	7300	7499	7516
2040	8703	4926	4966	4961	5010	5626
2045	9336	8732	7302	3874	3873	3865
2050	10132	9480	8804	8152	2831	2836
2055	9628	8945	8290	7607	6923	2031
2060	8660	7941	7208	6488	5769	5192
2065	8488	7732	6905	6150	5395	4720
2070	9301	8516	7725	6940	6155	5376

Table 62 Total fiscal burden, after FEFSS: reduction in the pension accrual rate

YEAR	BASELINE	PAR –0.1pp	PAR –0.2pp	PAR –0.3pp	PAR –0.4pp	PAR –0.5pp
2020	8997	8997	8997	8997	8997	8997
2025	9146	9141	9151	9173	9175	9199
2030	7993	8289	8535	8572	8632	8675
2035	5943	6096	6549	7052	7454	7897
2040	8703	6286	4980	4992	5353	6052
2045	9336	8534	7775	6331	3975	4081
2050	10132	9165	8248	7380	6507	3032
2055	9628	8626	7623	6631	5728	4862
2060	8660	7557	6500	5492	4497	3573
2065	8488	7260	6138	5124	4018	3090
2070	9301	8034	6812	5636	4492	3412

Table 63 Total fiscal burden, after FEFSS: increase in statutory retirement age

YEAR	BASELINE	SAR 67	SAR 68	SAR 69	SAR 70
2020	8997	8997	8997	8997	8997
2025	9146	9098	9021	8974	8943
2030	7993	8384	8235	8079	7889
2035	5943	6941	7459	7331	7122
2040	8703	5025	5528	6544	6473
2045	9336	4349	4032	4528	5493
2050	10132	8086	3027	3285	4299
2055	9628	7185	5980	2653	3357
2060	8660	6176	4613	2107	3023
2065	8488	5761	4312	1844	2641
2070	9301	6283	4546	1567	2333

Table 64 Benefit ratio, SS OAP: increase in SSC

YEAR	BASELINE	SSC +0.5pp	SSC +1pp	SSC +1.5pp	SSC +2pp	SSC +2.5pp
2020	0.45	0.45	0.45	0.45	0.45	0.45
2025	0.44	0.44	0.44	0.44	0.44	0.44
2030	0.42	0.42	0.42	0.42	0.42	0.42
2035	0.40	0.40	0.40	0.40	0.40	0.40
2040	0.39	0.39	0.39	0.39	0.39	0.39
2045	0.38	0.38	0.38	0.38	0.38	0.38
2050	0.38	0.38	0.38	0.38	0.38	0.38
2055	0.38	0.38	0.38	0.38	0.38	0.38
2060	0.38	0.38	0.38	0.38	0.38	0.38
2065	0.38	0.38	0.38	0.38	0.38	0.38
2070	0.39	0.39	0.39	0.39	0.39	0.39

Table 65 Benefit ratio, SS OAP: reduction in the pension accrual rate

YEAR	BASELINE	PAR –0.1pp	PAR –0.2pp	PAR –0.3pp	PAR –0.4pp	PAR –0.5pp
2020	0.45	0.45	0.45	0.45	0.45	0.45
2025	0.44	0.43	0.43	0.43	0.43	0.43
2030	0.42	0.41	0.41	0.41	0.40	0.40
2035	0.40	0.39	0.39	0.38	0.38	0.37
2040	0.39	0.38	0.37	0.36	0.35	0.35
2045	0.38	0.37	0.36	0.35	0.34	0.33
2050	0.38	0.37	0.36	0.35	0.33	0.32
2055	0.38	0.37	0.35	0.34	0.33	0.32
2060	0.38	0.37	0.35	0.34	0.33	0.32
2065	0.38	0.37	0.35	0.34	0.33	0.32
2070	0.39	0.38	0.36	0.35	0.34	0.33

Table 66 Benefit ratio, SS OAP: increase in statutory retirement age

YEAR	BASELINE	SAR 67	SAR 68	SAR 69	SAR 70
2020	0.45	0.45	0.45	0.45	0.45
2025	0.44	0.43	0.43	0.43	0.43
2030	0.42	0.41	0.41	0.41	0.40
2035	0.40	0.38	0.38	0.37	0.37
2040	0.39	0.37	0.36	0.35	0.34
2045	0.38	0.36	0.34	0.33	0.32
2050	0.38	0.35	0.34	0.32	0.31
2055	0.38	0.35	0.34	0.32	0.31
2060	0.38	0.35	0.34	0.32	0.31
2065	0.38	0.35	0.34	0.32	0.31
2070	0.39	0.36	0.35	0.33	0.32

Table 67 Benefit ratio, CGA OAP: increase in SSC

YEAR	BASELINE	SSC +0.5pp	SSC +1pp	SSC +1.5pp	SSC +2pp	SSC +2.5pp
2020	1.20	1.20	1.20	1.20	1.20	1.20
2025	1.10	1.10	1.10	1.10	1.10	1.10
2030	0.92	0.92	0.92	0.92	0.92	0.92
2035	0.75	0.75	0.75	0.75	0.75	0.75
2040	0.59	0.59	0.59	0.59	0.59	0.59
2045	0.45	0.45	0.45	0.45	0.45	0.45
2050	0.34	0.34	0.34	0.34	0.34	0.34
2055	0.27	0.27	0.27	0.27	0.27	0.27
2060	0.23	0.23	0.23	0.23	0.23	0.23
2065	0.21	0.21	0.21	0.21	0.21	0.21
2070	0.20	0.20	0.20	0.20	0.20	0.20

Table 68 Benefit ratio, CGA OAP: reduction in the pension accrual rate

YEAR	BASELINE	PAR –0.1pp	PAR –0.2pp	PAR –0.3pp	PAR –0.4pp	PAR –0.5pp
2020	1.20	1.20	1.20	1.20	1.20	1.20
2025	1.10	1.10	1.10	1.10	1.10	1.10
2030	0.92	0.92	0.92	0.92	0.92	0.92
2035	0.75	0.75	0.75	0.75	0.75	0.75
2040	0.59	0.59	0.59	0.59	0.59	0.59
2045	0.45	0.45	0.44	0.44	0.44	0.44
2050	0.34	0.34	0.33	0.33	0.33	0.32
2055	0.27	0.27	0.27	0.26	0.26	0.25
2060	0.23	0.23	0.22	0.22	0.21	0.21
2065	0.21	0.21	0.20	0.19	0.19	0.18
2070	0.20	0.19	0.19	0.18	0.18	0.17

Table 69 Benefit ratio, CGA OAP: increase in statutory retirement age

YEAR	BASELINE	SAR 67	SAR 68	SAR 69	SAR 70
2020	1.20	1.20	1.20	1.20	1.20
2025	1.10	1.11	1.11	1.11	1.11
2030	0.92	0.94	0.95	0.98	1.00
2035	0.75	0.76	0.78	0.80	0.81
2040	0.59	0.61	0.62	0.62	0.63
2045	0.45	0.46	0.48	0.48	0.49
2050	0.34	0.36	0.37	0.37	0.39
2055	0.28	0.29	0.30	0.31	0.33
2060	0.23	0.25	0.26	0.27	0.29
2065	0.21	0.23	0.24	0.26	0.28
2070	0.20	0.22	0.23	0.25	0.28

Table 70 Gross replacement rate, new OAP SS pensions: increase in SSC

YEAR	BASELINE	SSC +0.5pp	SSC +1pp	SSC +1.5pp	SSC +2pp	SSC +2.5pp
64.58	64.58	64.58	64.58	64.58	64.58	64.58
71.94	71.94	71.94	71.94	71.94	71.94	71.94
69.80	69.80	69.80	69.80	69.80	69.80	69.80
68.68	68.68	68.68	68.68	68.68	68.68	68.68
69.07	69.07	69.07	69.07	69.07	69.07	69.07
68.58	68.58	68.58	68.58	68.58	68.58	68.58
67.09	67.09	67.09	67.09	67.09	67.09	67.09
66.29	66.29	66.29	66.29	66.29	66.29	66.29
66.31	66.31	66.31	66.31	66.31	66.31	66.31
67.45	67.45	67.45	67.45	67.45	67.45	67.45
68.75	68.75	68.75	68.75	68.75	68.75	68.75

Table 71 Gross replacement rate, new OAP SS pensions: reduction in the pension accrual rate

YEAR	BASELINE	PAR –0.1pp	PAR –0.2pp	PAR –0.3pp	PAR –0.4pp	PAR –0.5pp
2020	64.58	64.58	64.58	64.58	64.58	64.58
2025	71.94	69.31	66.78	64.37	62.14	60.06
2030	69.80	67.68	65.64	63.66	61.76	59.97
2035	68.68	66.77	64.94	63.17	61.43	59.79
2040	69.07	66.93	64.88	62.92	61.11	59.46
2045	68.58	66.29	64.10	62.02	60.11	58.35
2050	67.09	64.84	62.65	60.61	58.71	56.86
2055	66.29	64.03	61.83	59.80	57.91	56.09
2060	66.31	64.09	61.87	59.80	57.88	56.11
2065	67.45	65.05	62.68	60.44	58.39	56.55
2070	68.75	66.13	63.62	61.19	58.97	56.96

Table 72 Gross replacement rate, new OAP SS pensions: increase in statutory retirement age

YEAR	BASELINE	SAR 67	SAR 68	SAR 69	SAR 70
2020	64.58	64.58	64.58	64.58	64.58
2025	72.19	0	0	0	0
2030	69.73	71.24	72.03	74.32	81.31
2035	68.46	69.07	71.40	73.79	77.68
2040	69.23	69.77	71.05	74.23	75.78
2045	68.71	71.39	70.95	75.66	76.18
2050	67.00	68.53	70.97	73.87	75.36
2055	66.26	67.23	71.33	71.94	73.72
2060	66.23	66.38	72.14	72.31	73.03
2065	67.50	69.19	73.28	74.34	73.65
2070	68.76	70.88	74.60	76.96	75.45

Table 73 Gross replacement rate, new OAP CGA pensions: increase in SSC

YEAR	BASELINE	SSC +0.5pp	SSC +1pp	SSC +1.5pp	SSC +2pp	SSC +2.5pp
2020	74.94	74.94	74.94	74.94	74.94	74.94
2025	83.29	83.29	83.29	83.29	83.29	83.29
2030	80.44	80.44	80.44	80.44	80.44	80.44
2035	77.63	77.63	77.63	77.63	77.63	77.63
2040	74.88	74.88	74.88	74.88	74.88	74.88
2045	72.22	72.22	72.22	72.22	72.22	72.22
2050	69.59	69.59	69.59	69.59	69.59	69.59
2055	0	0	0	0	0	0
2060	0	0	0	0	0	0
2065	0	0	0	0	0	0
2070	0	0	0	0	0	0

Table 74 Gross replacement rate, new OAP CGA pensions: reduction in the pension accrual rate

YEAR	BASELINE	PAR –0.1pp	PAR –0.2pp	PAR –0.3pp	PAR –0.4pp	PAR –0.5pp
2020	74.94	74.94	74.94	74.94	74.94	74.94
2025	83.29	83.15	83.16	83.22	83.23	83.23
2030	80.44	79.75	79.11	78.52	77.90	77.28
2035	77.63	76.35	75.06	73.83	72.57	71.33
2040	74.88	72.95	71.01	69.13	67.24	65.39
2045	72.22	69.55	66.96	64.44	61.91	59.44
2050	69.59	66.15	62.92	59.74	56.59	53.49
2055	0	0	0	0	0	0
2060	0	0	0	0	0	0
2065	0	0	0	0	0	0
2070	0	0	0	0	0	0

Table 75 Gross replacement rate, new OAP CGA pensions: increase in statutory retirement age

YEAR	BASELINE	SAR 67	SAR 68	SAR 69	SAR 70
2020	74.94	74.94	74.94	74.94	74.94
2025	83.29	101.00	104.12	80.27	101.40
2030	80.44	71.37	74.81	78.22	74.39
2035	77.63	73.55	66.98	77.43	73.00
2040	74.88	60.17	68.00	78.76	67.13
2045	72.22	78.26	76.78	82.54	78.30
2050	69.59	72.88	73.46	87.90	70.53
2055	0	0	0	0	0
2060	0	0	0	0	0
2065	0	0	0	0	0
2070	0	0	0	0	0

Table 76 Poverty threshold: increase in SSC

YEAR	BASELINE	SSC +0.5pp	SSC +1pp	SSC +1.5pp	SSC +2pp	SSC +2.5pp
2020	443	443	443	443	443	443
2025	454	467	465	462	459	457
2030	476	489	487	484	481	479
2035	495	509	506	504	502	499
2040	518	531	528	525	521	518
2045	546	561	559	556	554	552
2050	584	601	599	597	594	592
2055	622	641	639	637	634	632
2060	654	673	672	670	669	668
2065	695	715	713	711	708	705
2070	745	767	765	763	761	759

Table 77 Poverty threshold: reduction in the pension accrual rate

YEAR	BASELINE	PAR –0.1pp	PAR –0.2pp	PAR –0.3pp	PAR –0.4pp	PAR –0.5pp
2020	458	458	458	458	458	458
2025	469	469	469	469	469	469
2030	491	491	491	490	489	488
2035	512	510	508	507	506	505
2040	535	533	531	529	527	526
2045	564	560	557	555	553	548
2050	604	601	596	587	578	571
2055	643	631	618	609	604	597
2060	675	664	657	649	638	627
2065	718	710	700	687	676	667
2070	770	763	752	738	724	718

Table 78 Poverty threshold: increase in statutory retirement age

YEAR	BASELINE	SAR 67	SAR 68	SAR 69	SAR 70
2020	458	458	458	458	458
2025	469	467	467	467	466
2030	491	487	485	483	480
2035	512	506	502	499	497
2040	533	532	529	526	521
2045	563	555	553	550	543
2050	603	596	584	572	561
2055	642	620	609	603	593
2060	676	657	647	634	624
2065	717	699	686	674	667
2070	770	747	735	719	717

Table 79 Population 65+ at-risk-of-poverty: increase in SSC

YEAR	BASELINE	SSC +0.5pp	SSC +1pp	SSC +1.5pp	SSC +2pp	SSC +2.5pp
2020	8.47	8.47	8.47	8.47	8.47	8.47
2025	8.28	9.16	9.10	8.98	8.88	8.75
2030	9.72	10.81	10.63	10.45	10.27	10.04
2035	10.63	11.86	11.64	11.41	11.25	11.05
2040	10.82	12.04	11.70	11.45	11.23	10.86
2045	11.25	12.34	12.22	12.06	11.83	11.57
2050	11.79	12.98	12.86	12.74	12.59	12.46
2055	12.03	13.60	13.52	13.38	13.05	12.70
2060	12.84	13.93	13.81	13.73	13.66	13.62
2065	13.58	14.76	14.68	14.50	14.38	14.20
2070	14.23	15.41	15.09	15.00	14.92	14.81

Table 80 Population 65+ at-risk-of-poverty: reduction in the pension accrual rate

YEAR	BASELINE	PAR –0.1pp	PAR –0.2pp	PAR –0.3pp	PAR –0.4pp	PAR –0.5pp
2020	9.46	9.46	9.46	9.46	9.46	9.46
2025	9.21	9.23	9.24	9.26	9.28	9.30
2030	11.00	11.10	11.23	11.28	11.38	11.48
2035	12.11	12.27	12.42	12.69	12.88	13.04
2040	12.23	12.58	12.82	13.10	13.55	13.94
2045	12.66	12.91	13.40	13.90	14.42	14.60
2050	13.05	13.70	14.16	14.10	14.20	14.28
2055	13.97	13.82	13.63	13.93	14.48	14.93
2060	13.99	14.42	15.16	15.68	15.91	16.27
2065	14.95	15.61	16.16	16.56	17.01	17.47
2070	15.47	16.17	16.85	17.35	17.71	18.49

Table 81 Population 65+ at-risk-of-poverty:
increase in statutory retirement age

YEAR	BASELINE	SAR 67	SAR 68	SAR 69	SAR 70
2020	9.46	9.46	9.46	9.46	9.46
2025	9.24	9.71	9.77	9.74	9.74
2030	11.01	11.41	11.68	11.98	12.15
2035	12.15	13.01	13.23	13.83	14.23
2040	11.95	13.61	14.01	15.03	15.99
2045	12.83	14.11	15.18	16.44	17.33
2050	13.03	15.12	15.28	15.49	16.50
2055	14.03	14.27	15.13	16.18	16.97
2060	14.08	16.16	16.45	17.16	18.62
2065	14.90	17.07	17.48	18.37	19.41
2070	15.46	17.62	17.99	18.69	20.27

Annex 5

Table 1 Total number of pensioners

YEAR	BASELINE	NDC
2020	2689856	2689856
2025	2822013	2822075
2030	2978599	2978577
2035	3150151	3153993
2040	3261250	3265122
2045	3287634	3291219
2050	3264090	3272379
2055	3127928	3134125
2060	2965807	2971682
2065	2837892	2840655
2070	2723735	2724932

Table 2 Social security pensioners

YEAR	BASELINE	NDC
2020	2185795	2185795
2025	2306701	2306080
2030	2494355	2493174
2035	2721960	2722236
2040	2909719	2906269
2045	3017151	3011012
2050	3071038	3064803
2055	2998055	2989120
2060	2885050	2875284
2065	2793136	2782321
2070	2704078	2694653

Table 3 SS OAP pensioners, per type of pension

	OAP (DB)		OAP (NDC)		OAP EARLY, FLEX.		OAP EARLY, LTU.	
YEAR	BASELINE	NDC	BASELINE	NDC	BASELINE	NDC	BASELINE	NDC
2020	1760536	1760536	0	0	29012	29012	30079	30079
2025	1826958	1811029	0	18608	86357	83832	13580	13577
2030	1958371	1871948	0	106515	176357	159752	9093	9098
2035	2124563	1911011	0	289939	257570	186949	6695	6624
2040	2285894	1741866	0	804014	299298	44641	5962	6022
2045	2444353	1471816	0	1235499	266270	9117	3834	4237
2050	2547371	1163184	0	1612289	226268	1781	2689	2972
2055	2505456	877256	0	1828632	189313	203	1992	1624
2060	2433096	667266	0	1913626	148498	0	1312	2112
2065	2338187	535297	0	1939954	144942	63	1524	2669
2070	2251532	474830	0	1921492	147141	0	953	1651

Table 4 SS pensioners: contributory and non-contributory pensions

	CONTRIBUTORY		CONTRIBUTORY & NON-CONTRIBUTORY		NON-CONTRIBUTORY	
YEAR	BASELINE	NDC	BASELINE	NDC	BASELINE	NDC
2020	1268779	1268779	899787	899787	16308	16308
2025	1425390	1400454	866616	890333	14296	14359
2030	1664143	1636679	820774	848134	9333	9360
2035	1893077	1838350	814371	868228	14734	14760
2040	2099684	1845925	792091	1042497	17524	17736
2045	2237691	1695181	761842	1298395	18056	17793
2050	2321973	1469307	722531	1569653	26260	25598
2055	2303050	1240375	657914	1711571	37244	37245
2060	2248940	1053187	588358	1772877	47596	49369
2065	2193693	937214	540766	1782067	58840	63136
2070	2157420	910632	483053	1715572	64116	68249

Table 5 Average monthly payment: SS OAP

	BASELINE	NDC		
YEAR	OAP (DB)	OAP (DB)	OAP (NDC)	OAP (NDC) + PREMIUM
2020	484	484	0	0
2025	495	495	486	573
2030	505	507	456	540
2035	520	523	421	500
2040	548	538	414	492
2045	589	553	456	539
2050	644	574	506	591
2055	702	605	551	639
2060	760	653	592	679
2065	826	735	643	731
2070	924	823	708	802

Table 6 Average monthly payment: SS OAP (new pension)

	BASELINE	NDC		
YEAR	OAP (DB)	OAP (DB)	OAP (NDC)	OAP (NDC) + PREMIUM
2020	499	499	0	0
2025	549	571	485	571
2030	519	547	439	518
2035	577	525	400	476
2040	680	0	399	478
2045	769	0	442	527
2050	847	0	496	586
2055	949	0	534	625
2060	991	0	588	679
2065	1169	0	688	793
2070	1358	0	781	902

Table 7 Total pension expenditure

YEAR	BASELINE, M. €	NDC, M. €
2020	24810	24810
2025	25936	25933
2030	27025	27030
2035	28427	28092
2040	29945	28074
2045	31435	28288
2050	33110	28991
2055	33729	29145
2060	34096	29258
2065	35186	29991
2070	37004	31142

Table 8 Social security pension expenditure

YEAR	BASELINE, M. €	NDC, M. €
2020	16209	16209
2025	17544	17542
2030	19599	19606
2035	22286	21946
2040	25253	23391
2045	28171	25036
2050	31105	26941
2055	32533	27953
2060	33408	28590
2065	34799	29614
2070	36820	30951

Table 9 SS OAP expenditure, per type of pension

	OAP (DB)		OAP (NDC)		OAP EARLY, FLEX.		OAP EARLY, LTU.	
YEAR	BASELINE, M€	NDC, M€	BASELINE, M€	NDC, M€	BASELINE, M€	NDC, M€	BASELINE, M€	NDC, M€
2020	9481	9481	0	0	223	223	238	238
2025	10650	10547	0	75	574	558	84	84
2030	12133	11694	0	472	1209	1101	58	58
2035	13953	12691	0	1393	1913	1390	48	48
2040	16234	12253	0	3846	2458	234	45	44
2045	19089	10804	0	6274	2412	15	30	34
2050	22096	8982	0	8872	2260	3	23	26
2055	23918	7205	0	10622	1792	0	17	15
2060	25307	5958	0	11560	1325	0	12	19
2065	26524	5389	0	12389	1615	0	17	27
2070	28637	5355	0	13616	1736	0	11	19

Table 10 Social security pension expenditure: contributory & non-contributory

	BASELINE		NDC	
YEAR	SSC, M. €	SSNC, M. €	SSC, M. €	SSNC, M. €
2020	13393	2828	13393	2828
2025	15177	2371	15128	2433
2030	17574	2024	17532	2182
2035	20350	1937	19928	2257
2040	23386	1866	21051	2747
2045	26357	1814	22032	3481
2050	29279	1825	22986	4461
2055	30745	1788	23101	5326
2060	31689	1718	22895	6139
2065	33113	1688	23108	6930
2070	35213	1608	24116	7228

Table 11 Social security contributions

YEAR	BASELINE, M. €	NDC, M. €
2020	16042	16042
2025	17582	17580
2030	18970	18968
2035	20100	20120
2040	21080	21154
2045	22043	22125
2050	23004	23084
2055	24127	24196
2060	25417	25454
2065	26648	26700
2070	27709	27758

Table 12 Financial balance: SS Contributory Regime, after FEFSS

YEAR	BASELINE, M. €	NDC, M. €
2020	0	0
2025	183	186
2030	0	0
2035	0	0
2040	-3735	0
2045	-5440	-2185
2050	-7277	-2999
2055	-7503	-2774
2060	-6990	-2075
2065	-7013	-1809
2070	-8136	-2209

Table 13 FEFSS transfers

YEAR	BASELINE, M. €	NDC, M. €
2020	34	34
2025	0	0
2030	475	446
2035	1901	1586
2040	0	1633
2045	0	0
2050	0	0
2055	0	0
2060	0	0
2065	0	0
2070	0	0

Table 14 FEFSS accounts

YEAR	BASELINE, M. €	NDC, M. €
2020	10506	10506
2025	12469	12471
2030	12957	13042
2035	7835	8289
2040	0	565
2045	0	0
2050	0	0
2055	0	0
2060	0	0
2065	0	0
2070	0	0

Table 15 Total fiscal burden, after FEFSS

YEAR	BASELINE, M. €	NDC, M. €
2020	8997	8997
2025	9141	9203
2030	7987	8180
2035	5957	6308
2040	8893	5638
2045	9338	6721
2050	10141	6523
2055	9619	6536
2060	8654	6757
2065	8514	7301
2070	9302	7412

Table 16 Benefit ratio: SS OAP

YEAR	BASELINE	NDC		
	OAP (DB)	OAP (DB)	OAP (NDC)	OAP (NDC) + PREMIUM
2020	0.45	0.45	0	0
2025	0.44	0.44	0.43	0.50
2030	0.42	0.42	0.38	0.45
2035	0.40	0.40	0.32	0.38
2040	0.39	0.38	0.29	0.35
2045	0.38	0.36	0.30	0.35
2050	0.38	0.34	0.30	0.35
2055	0.38	0.33	0.30	0.35
2060	0.38	0.33	0.29	0.34
2065	0.38	0.34	0.30	0.34
2070	0.39	0.35	0.30	0.34

Table 17 Gross replacement rate, new OAP SS pensions

YEAR	BASELINE	NDC		
	OAP (DB)	OAP (DB)	OAP (NDC)	OAP (NDC) + PREMIUM
2020	64.55	64.55	0	0
2025	71.94	71.22	76.63	90.62
2030	69.8	68.91	61.25	72.54
2035	68.68	0	42.9	50.92
2040	69.07	0	36.11	43.05
2045	68.58	0	36.33	43.1
2050	67.09	0	36.74	43.18
2055	66.29	0	37.75	43.98
2060	66.31	0	39.26	45.16

YEAR	BASELINE	NDC		
2065	67.45	0	40.13	46.05
2070	68.75	0	40.09	46.07

Table 18 Poverty threshold

YEAR	BASELINE	NDC
2020	458	458
2025	469	469
2030	491	492
2035	512	511
2040	535	530
2045	564	551
2050	604	568
2055	643	589
2060	675	619
2065	718	665
2070	770	714

Table 19 Population 65+ at-risk-of-poverty

YEAR	BASELINE	NDC
2020	9.46	9.46
2025	9.21	9.21
2030	11.00	11.02
2035	12.11	12.28
2040	12.23	13.48
2045	12.66	14.68
2050	13.05	12.80
2055	13.97	12.56
2060	13.99	8.33
2065	14.95	7.01
2070	15.47	7.21

Notes

< 1. Editorial by Stefano Scarpetta and Adrian Blundell-Wignall, entitled 'The next frontier for pension policy: Focusing more on social sustainability'. (OECD, 2015).

< 2. Sistema Previdencial — Regime de Repartição.

< 3. Sistema Previdencial — Regime de Capitalização.

< 4. Sistema de Proteção Social De Cidadania — Subsistema de Solidariedade.

< 5. Caixa Geral de Aposentações.

< 6. Pensão de Velhice.

< 7. Pensão Social de Velhice.

< 8. Pensão de Sobrevivência.

< 9. Pensão de Invalidez Absoluta.

< 10. Pensão de Invalidez Relativa.

< 11. Pensão Social de Invalidez.

< 12. Complemento Social.

< 13. Pensão Mínima.

< 14. Complemento Extraordinário de Solidariedade.

< 15. Complemento por Dependência.

< 16. Social Security contributions by self-employed workers will change significantly from January 1st, 2019. However, this will not be simulated in our report.

< 17. Indexante dos Apoios Sociais.

< 18. Fator de Sustentabilidade.

< 19. In the cases where there are no children, the spouse is only eligible if married for over one year, or in a non-marital partnership for over 2 years. In cases where the spouse is divorced or legally separated, entitlement to a pension depends on the existence of a right to receive alimony from the deceased.

< 20. If the surviving spouse is aged under 35, he/she is entitled to a Survivor's Pension for 5 years. If aged over 35, he/she is entitled to a pension indefinitely.

< 21. Complemento Social.

< 22. Pensão Mínima.

< 23. Complemento Extraordinário de Solidariedade.

< 24. Complemento por Dependência.

< 25. Current eligibility criteria for spouses and descendants in the Civil Servant regime are the same as the rules in the Social Security regime. However, it is important to note that different rules apply to deceased beneficiaries that enrolled before the August 31st, 1993 or retired before December 31st, 2005.

< 26. Livro Branco da Segurança Social.

< 27. Fundo de Estabilização Financeira da Segurança Social.

< 28. Under this temporary regime, unemployed individuals aged 58 (or older), who had exhausted 30 months of unemployment benefit, had become unemployed at age 55 (or later), and had, at the age of 55, a contributory career of at least 30 years, were allowed to claim their old-age pension with no penalties.

< 29. In 2007, the national minimum wage was €403 and the IAS was set to €397.86.

< 30. Previously, a number of temporary measures were introduced to limit the negative impact of the 2008 financial crisis. Thus, in 2010, the pension update rule (introduced in 2006) was suspended, as its application in that particular context would result in an actual decrease in the value of pensions under payment. In addition to this, the IAS and the minimum pension thresholds were updated.

< 31. Still, the minimum pension for those with less than 15 years of contributions were discretionarily updated.

< 32. Following a Constitutional Court ruling in 2014, this measure was repealed.

< 33. Contribuição Extraordinária de Solidariedade.

< 34. It is important to note that this update is made by pensioner and not by pension, which means that a pensioner entitled to pensions under both regimes is only eligible for one update on one of those regimes.

< 35. Regime de Proteção Social Convergente.

< 36. For an in-depth overview of dynamic microsimulation and how it compares with other simulation techniques see Zaidi and Rake (2001), Jinjing et al (2014) or Dekkers (2015). For a comprehensive review of the use of dynamic microsimulation models in the field of pensions see Dekkers and Van Den Bosch (2016).

< 37. An alternative possibility would be to use a 'continuous time' modelling approach, which involves estimating (through a survival function) the duration of a given event/state. However, the use of this approach requires the existence of good longitudinal databases (Li and O'Donoghue, 2013; Zaidi and Rake, 2001), which is not the case in Portugal. For that reason, the discrete time approach was adopted.

< 38. This means that individuals are ordered (in a descending order) according to the probability of a given event taking place. Then, based on external aggregate data, we select the percentage or number of individuals with the highest probability of the event occurring (Li and O'Donoghue, 2013).

< 39. For a more detailed discussion about the comparability between the methodology adopted in DYNAPOR and that adopted in the 2015 Ageing Report, see Moreira et al (2019).

< 40. The Total Fertility Rate reflects the 'average number of children a woman would bear of if she survived through to the end of the reproductive age span and experienced at each age a particular set of age-specific fertility rates' (Preston, Heuveline and Guillot, 2001: 95).

< 41. Old-Age Dependency Ratio measures the number of persons aged 65 and over per 100 persons aged between 15 and 64 (Eurostat, 2017).

< 42. The Total Age Dependency Ratio measures the number of persons under 15 years of age and aged 65 and over, who are generally deemed economically inactive, per 100 persons of working age, i.e. aged between 15 and 64 (Eurostat, 2017).

< 43. By lower education we mean individuals who have completed up to lower secondary education (ISCED 2). By medium education we mean individuals who have completed (upper) secondary education (ISCED 3) or post-secondary, non-tertiary education (ISCED 4). By higher education we mean individuals who have completed at least the first stage of tertiary education (ISCED 5) or higher (ISCED 6). This classification is based on the ISCED-1997 classification adopted in the EU-SILC 2013.

< 44. The labour force participation rate is the ratio between the number of people aged 15 to 64 who are active in the labour market (i.e. in employment or unemployed) and the total working-age population, multiplied by 100 (OECD, 2017).

< 45. The employment rate is the percentage of employed persons (i.e. persons that in the reference week performed work — even if just for one hour a week — for pay, profit or family gain) in the population aged 15 to 64 (i.e. of working age) (Eurostat, 2017).

< 46. The unemployment rate is the number of unemployed persons (i.e. out of work in the reference week and actively looking for work) as a percentage of the labour force; in this case, the active population aged 15-64 years old (Eurostat, 2017).

< 47. By labour force we mean individuals aged 15 to 64 who are economically active, i.e. in employment or unemployed (Eurostat, 2017).

< 48. The growth pattern of Potential GDP depicted in Figures 1.18 and 1.19 reflect the specific nature of the methodological approach adopted by the ECP in producing long-term growth projections. Thus, values between 2016 and 2026 are produced using the T+10 methodology, developed by the ECP Output Gap Working Group. Values after 2016 are produced using a Cobb-Douglas Production Function Framework, which assumes that Total Factor Productivity Growth rates are to converge from the estimated value in 2027 to 1% in 2045. In line with the assumption that labour productivity is to converge, by the end of the projection period, with countries with a GDP per capita below the EU27 average in 2016, such as Portugal, the EPC projects higher productivity growth rates in the period between 2027 and 2045, as well as in the period between 2046 and 2070 (see European Commission, 2017).

< 49. Bearing in mind that, due to the impact of the financial and sovereign debt crisis, a number of EU member states have seen significant increases in the their output gap (i.e. the gap between potential GDP and real GDP), they have adopted a corrective mechanism by which, in the period between 2016 and 2026, the real GDP growth rate is assumed to be higher than the potential GDP growth rate — which would enable closing the output gaps by 2023 (European Commission, 2017).

< 50. See Footnote 48.

< 51. Admittedly, this is a fairly conservative approach about future education gains in the Portuguese society. Bearing in mind that increased qualification will be reflected in the value of future salaries, this means that we might be underestimating the impact of education gains in wage progression.

< 52. As we will explain in greater detail below (see Section 1.2.2, Chapter 2), this reflects the decrease in the number of pensioners receiving social complements.

< 53. This might reflect the fact that, in DYNAPOR, individuals who are unemployed for more than a year are likely to be absorbed into inactivity and consequently are no longer eligible for this type of benefit.

< 54. See Chapter 1, Section 4.4.

< 55. Admittedly, this way of measuring the number of contributors to Social Security leaves out two groups of individuals, namely those who are temporally unemployed but who are entitled to Social Security contributions, or who are currently out of work but have a history of contributions to Social Security. However, as it focuses solely on those making effective contributions, the approach adopted here is more suited for the assessment of the financial and fiscal sustainability of Social Security.

< 56. As mentioned above (see Chapter 1, Section 1.1), only a share of Social Security contributions will fund the payment of pensions in the Contributory Regime.

< 57. As mentioned above (see Chapter 1, Section 4.4), only 58.15% of the FEFSS funds are used to cover pension-related deficits.

< 58. Or, as they are commonly referred to in the literature (see Schwarz, 2006), 'parametric reforms'.

< 59. Alternatively, a recent study by Silva (2018) suggests that reducing Social Security contributions could have a positive net effect on employment creation.

< 60. As mentioned above (see Section 3.3, Chapter 2), the total burden of the Portuguese Pension system on the public purse reflects a) the deficit size in the Social Security Contributory Regime, b) in the CGA scheme, and c) spending in Social Security non-contributory pension benefits (both in Social Security and in CGA).

< 61. The transition towards a Swedish-style pension system has been proposed by think tanks (Silva and Goes, 2006) and international organisations (IMF, 2013), and has been the object of academic studies (Serrano, 2014).

< 62. Quasi-mandatory occupational pension plans are also a key feature of the Swedish pension system (see OECD, 2017).

< 63. For this reason, a number of countries — namely Italy, Poland, Latvia and Norway — have introduced NDC schemes into their pension systems (Holzmann, 2017).

< 64. This also means that recently introduced protections for individuals with exceptionally long careers (see Section 1.2.1, Chapter 1) would be eliminated.

< 65. Under the Swedish model, NDC accounts are also credited with distribution of the pension balances of deceased individuals (under 61) of the same age as individual (inheritance gains), minus administration costs (see Ministry of Health and Social Affairs, 2016; Swedish Pension Agency, 2017). However, for the sake of simplicity, we do not consider these features in the design of the NDC scheme.

< 66. Under the Swedish model, the pension contribution is set at 18.5% of the pension base, which is computed by adding pensionable earnings and pensionable amounts of taxable social insurance benefits, minus the contributions paid to Social Security. Furthermore, contributions are subject to a maximum cap (see Ministry of Health and Social Affairs, 2016; Swedish Pension Agency, 2017). As mentioned above, for the sake of simplicity we opted for incorporating current pension contribution rules into the NDC scheme. For the sake of fiscal prudence, we also opted for not introducing a cap on pension contributions.

< 67. Under the Swedish model, the return rate is determined by reference to an adjustment rate, the Income Index, which reflects changes in pensionable income, i.e. earnings and Social Security benefits that are subject to Social Security contributions (see Ministry of Health and Social Affairs, 2016; Swedish Pension Agency, 2017). Given that in Portugal Social Security benefits are not subject to Social Security contributions, we chose to use only changes in wages to determine the return rate on NDC personal accounts.

< 68. In the event that labour market conditions determine a drop in average wages, the Earnings-Index will be equal to 1, so as to not devalue the value of the funds accumulated in the NDC Personal Account (see Equation VIII, Box I).

< 69. Similarly to the Swedish model, the individual can decide to withdraw all the funds, or only a given share of 75%, 50% or 25% (see Ministry of Health and Social Affairs, 2016; Swedish Pension Agency, 2017).

< 70. Under the Swedish model, as a means to smooth the transition to retirement, the pension annuity is credited with an advanced interest rate of 1.6, which is deducted some years after (see Ministry of Health and Social Affairs, 2016; Swedish Pension Agency, 2017). For the sake of simplicity, this feature was not adopted in our study.

< 71. Under the Swedish model, the pension annuity is calculated using annuity divisors, based on the previous five-year unisex mortality tables (see Ministry of Health and Social Affairs, 2016; Swedish Pension Agency, 2017). For the sake of simplicity, in this model we use life expectancy projections produced by DYNAPOR, which — as mentioned above (see Chapter 1, Section 4.1) — are aligned with the Eurostat population projections. Following this decision, and unlike the Swedish pension system (see Ministry of Health and Social Affairs, 2016; Swedish Pension Agency, 2017), there is no need to recalculate pension annuities before the age of 65.

< 72. Under the Swedish model, Premium Pension accounts are also credited with distribution of the pension balances of deceased individuals (under 61) of the same age as individual (inheritance gains), minus administration costs (see Table 2, Annex 6). However, for the sake of simplicity, we do not consider these features in the design of the Premium Pension scheme.

< 73. Under the Swedish model, there is an option to transfer pension entitlements between spouses (see Table 2, Annex 6). For the sake of simplicity this feature was not introduced in our suggested model.

< 74. The Swedish model allows for two alternative forms for withdrawing a pension (see Table 2, Annex 6): the 'transition to traditional insurance', by which funds in the individual account are sold, and the pension is calculated as a guaranteed nominal amount, to which a variable annual complement is added; and the 'fund insurance', by which funds remain in the pension account, and the value of the pension is recalculated at start of each year. Each month, pension assets are sold to fund the value of the pension. For the sake of simplicity, in this study we only adopt the 'transition to traditional insurance' model.

< 75. Under the Swedish model, as a means to smooth the transition to retirement, the pension annuity is credited with an advanced interest rate of 3, which is deducted some years after (see Table 2, Annex 6). For the sake of simplicity, this feature was not adopted in our study.

< 76. Under the Swedish model, the pension annuity is calculated using annuity divisors (see Table 2, Annex 6). For the sake of simplicity, in this model we use life expectancy projections produced by DYNAPOR, which — as mentioned above (see Chapter 1, Section 4.1) — are aligned with the Eurostat population projections.

< 77. Under the Swedish model, Guaranteed Pension threshold is set by reference to the 'price base amount', an indexing tool that captures changes in prices (see Table 2, Annex 6). The design of the Guaranteed Pension means-test reflects the relation between the multiples of the price base amount adopted in the Swedish model (see Table 2, Annex 6).

< 78. This aims to replicate the design of the Guaranteed Pension in the Swedish model, where entitlement to the Guaranteed Pension is not conditioned to pension contributions, but to residence. Thus, to receive a full Guaranteed Pension, an individual must have resided in Sweden for a minimum of 40 years, after the age of 25. For those living in Sweden for less than 40 years, the top-up is calculated in fortieths of the full Guaranteed Pension.

< 79. Under the Swedish model, the Guaranteed Pension is indexed to changes in the price base amount (see Table 2, Annex 6).

< 80. This is computed by multiplying the individual's reference earnings in 2013 by the number of years of contributions made in that year.

< 81. Still, overtime, the introduction of the NDC is projected to produce a very marginal decline in the number of pensioners in the period under analysis (see Table 1, Annex V). Upon further investigation, we have been able to determine that this decline reflects the fact that the introduction of the NDC scheme will change the employment status of certain individuals in the sample from working to retired. This, in turn, will change their probability to be selected in the marriage market, and to be selected to immigrate and (hence) leave our sample.

< 82. As we can see in Figure 5.6, between 2025 and 2035, the average value of NDC OAPs is higher than that of the defined-benefit scheme, which reflects the assumption that during the transition period individuals only take up a NDC OAP if this is higher than that computed under the Defined-Benefit scheme– see Section 1.1. As expected, once the transition period is completed, the value of NDC benefits decrease to values close to those in the defined--benefit scheme.

< 83. As mentioned above, during the transition period individuals only take up a NDC OAP if this is higher than that computed under the Defined-Benefit scheme — see Section 1.1. Logically, during this period, the adequacy of NDC OAP will be higher than OAP in the Defined-Benefit Scheme.

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