# THE FINANCIAL SUSTAINABILITY OF THE PORTUGUESE SOCIAL SECURITY SYSTEM

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Abstract

This paper analyses the account of the benefits sub-system as well as its impact on the portfolio of Social Security Trust Fund (FEFSS). Section B describes the State's Social Security and the account projections of the benefits sub-system. Additionally, we analyse the actuarial and financial equilibrium of system in short term and in the long term and the Fund assets. Section C presents a simulation which analyses the actuarial balance of a fully-funded capitalisation scheme applied to the general regime of the Social Security system. Section D concludes.

Keywords: social security system, actuarial equilibrium, financial sustainability

JEL classification: G 23; H55

## A. THE MAIN ISSUES CONFRONTING THE SUSTAINABILITY OF THE SOCIAL SECURITY SYSTEM

There is truth in the cliché that society and the economy are in a perpetual state of change. For this reason, social programmes should be regularly reviewed and, if necessary, modernised in order to ensure that they continue to respond to current circumstances and that they anticipate, as broadly as possible, changes which will occur in the short, medium and long term.

When weighed against the scope of these societal and economic changes, and the influential interaction between the two, the question of Social Security's financial sustainability has taken on a wider dimension and relevance for the construction of the EU Economic and Monetary Union. In an environment of globalisation and rivalry among large, multinational, commercial conglomerates, the financing of State pension schemes affects the competitivity of the European economy.

We define the financial sustainability of Social Security as the capacity of the system's contributors and beneficiaries to finance autonomously, without the State having to resort to the national budget or to issuing State debt, the current benefits. Equally, they should be able to maintain the long-term financial equilibrium of the system.

The challenges confronting our social programmes are formidable. Consequently, the role played by actuaries, demographers and statisticians in response to these challenges is inevitably linked to the financial questions.

The financial health of the Social Security system in Portugal has greatly improved since 1995, with the reinforcement of the Social Security Trust Fund (FEFSS[1]). In fact, and in order to reduce the burden on future generations, the Government introduced partial State capitalisation in 1989 with the creation of the FEFSS. This action will generate a level of contributions which, between 2000 and 2012, will exceed the benefits paid out annually during this period. Funds not immediately used to pay out benefits are transferred into the fund for investment in the financial markets. Throughout the period, the return on the investments will serve to reinforce the financial reserves sufficiently to help absorb the

[1] Fundo de Estabilização Financeira da Segurança Social.

expected rising costs as more and more members of the active population go into retirement.

However, the system continues to face substantial financial challenges looming in the near future, which must urgently be addressed. In the long term, the financial gap will be immense. Bridging this gap will call for innovative solutions which can also present opportunities to strengthen the system.

The traditional solutions have concentrated on reducing benefits and increasing contribution rates, but there is no reason why the approach cannot be broadened to include finding ways that allow the active population to benefit from the rate of return on the national economy's capital.

Further to an informed public debate and creative thinking on the well-established link between the underlying principles of the Social Security system and the economic and demographic realities of the 21st century - accompanied by appropriate, up-to-date legislation - the system can continue to play a vital role in the lives of Portugal's citizens.

The vision of partial capitalisation, which was adopted in 2001 with the coming into effect of the new law, constitutes a balance between total capitalisation and a pure distribution system. A changeover to a pure capitalisation system would create an inter-generational injustice, because during the transitional phase, one or more generations would have to pay higher contributions than their predecessors do. In fact, they would have to pay simultaneously for the benefits due to the contemporary pensioners and for the construction of the reserve necessary to finance their own pensions. A pure distribution system would be equally unjust because it would require a brutal increase in the contribution rate to be levied on the active population over the course of the next three decades.

A partially capitalised system is not only a fair balance between the two extreme alternatives, but also it complements the other components of the Portuguese retirement pension system.

This paper analyses the account of the benefits sub-system as well as its impact on the portfolio of Social Security Trust Fund (FEFSS). Section B describes the State's Social Security and the account projections of the benefits sub-system. Additionally, we analyse the actuarial and financial equilibrium of system in short term and in the long term and the Fund assets. Section C presents a simulation which analyses the actuarial balance of a fully-funded capitalisation scheme applied to the general regime of the Social Security system. Section D concludes.

The projections carried out in the paper take into account demographic evolution, which points to the high probability that the proportion of the population aged over 65 will increase by 70% in the years between 2000 and 2050. At the same time, the demographic projections inform us that the proportion of the population aged under 15 will remain constant, decreasing just one percentage point from 20% in 2000 to 19% in 2050. These evolutions also suggest a continual increase in average life expectancy, both at birth and among the oldest members of the demographic age-scale. The proportion of the population aged 75 and over among those aged 65 or over will reach approximately 51% in 2050, compared with 39% in 2000. As a consequence, the dependency ratio of the elderly will evolve from 23% in 2000 to 44% in 2050.

The solvency of the Social Security system has improved significantly, compared with the beginning of the 1990s. In August 2001, the portfolio of financial assets held by the Social Security Trust Fund (FEFSS) stood at approximately 3.492 million euros (700 thousand million PTE, while it is projected that the FEFSS assets should rise to almost 10 million euros (2.000 thousand million PTE) by 2015; this is equivalent to two years of pension payments. On the basis of intermediate economic and demographic projections, the fund will be able to support the system until about 2025 without any need to increase the global rate of contributions.

Whilst Portugal did not experience a true baby-boom similar to that which took place in the countries actively involved in World War 2, the generation born in post-war Portugal, i.e. those today aged between 45 and 55, constitute a much greater weight in the age distribution of the population than any other generation. When this generation reaches the age of retirement, from about 2010 onwards, the pressure on the FEFSS will mount rapidly, since the current income to the system, in the form of contributions and subscriptions, will no longer be sufficient to cover the current outgoings i.e. benefits, administration and management costs, from 2025 onwards. By 2050, the deficit will reach almost 38.5% (2.25% of GDP) of the income received.

The deficit signifies that the actuarial equilibrium of the Social Security system in the next 50 years can only be achieved either by means of a permanent reduction of 0.7% in the growth-rate of benefits expenditure, or of an increase of 10% in the effective contribution rate on incomes. This would result in part from a drive towards greater efficiency in the collection of contributions, but also from raising the legal contribution rate, or from a combination of the two.

The cash-flow forecasts of the deficit indicate that the latter will increase up to levels in excess of 10% of the contributable salaries by the end of this 50-year period, owing essentially to the increased average age of the population provided for

The annual deficits at the end of the projection period of 55 years indicate that the costs are most likely to continue to exceed the contributions on incomes after 2055. Consequently, in order to ensure the system's financial sustainability beyond 2055, it will be necessary to implement further-reaching modifications than strictly those needed just to restore the actuarial balance during the projected period.

Such modifications necessarily include the introduction of an obligatory complementary pension, either in individual or group schemes, combined with the establishment of a ceiling for the State pension.

# B. BALANCE PROJECTION OF THE SOCIAL SECURITY SYSTEM AND TRUST FUND ASSETS

## B.1 INTRODUCTION

In accordance with the terms of Portuguese Law Nr. 17 / 2000, 8th August, which regulates the State's Social Security and welfare provisions, the system comprises three sub-components:

- Citizens' social welfare allowances;
- Family allowances; and
- The benefits system.

The principal objective of the latter is to provide compensation for the loss or reduction of occupational earnings in the event of:

a) Sickness;
b) Maternity, paternity and adoption;
c) Unemployment;
d) Work accidents and occupational sickness;
e) Disability;
f) Old-Age; and
g) Death.

Those legally entitled to benefits under this sub-system are either employees or self-employed. In addition, the unemployed as well as non-working individuals have the option of subscribing to the sub-system.
The benefits system is based on the legal obligation to make contributions and covers the social insurance regimes applicable to employees and the self-employed in general. In order to have access to benefits, two conditions must be satisfied:

- Registration in the system;
- The fulfilment of contribution obligations on the part of workers and, when such is the case, employers.

Protection is provided in the form of pecuniary benefits intended to compensate for loss of earnings and/or the loss of earning capacity. The payment of benefits is dependent on the satisfaction of certain legal conditions.

The Law attributes to the State the duty of ensuring that the public system is efficiently administered and managed and that ancillary systems are properly supervised. The financing of the system must obey the principles of diversification of the sources of income and of selective taxation criteria.

More specifically, the financing of pecuniary benefits which replace occupational earnings is a twofold process, namely:

- through the contributions of employees; and
- through the contributions of employers.

Furthermore, the Law stipulates that there must be a transference into a reserve fund of an amount between two and four percent of the contributions of employees, up to the point at which it the total expenditure on pensions for a minimum period of two years is ensured. In addition, any annual surplus in the benefits system, as well as profits on asset sales and the gains from financial investments, flow into the reserve fund, to be managed under principles of capitalisation.

The reserve fund of the State Social Security system and other benefits systems are managed by a State institution, accountable to the Portuguese Government and controlled by Parliament.

The objective of this research project is to analyse the benefits sub-system account, in addition to its impact on the portfolio of the reserve fund and other funds, as well as on the financial assets of the State asset-management body.

## B.2 – ACCOUNT PROJECTIONS OF THE BENEFITS SUB-SYSTEM

In this section, we shall examine the benefits sub-system's account over a time-frame of fifty years, with the aim of evaluating this sub-system's sustainability. The balance projections were obtained by means of the Modpens/Portugal[2] model. This model considers three input sets of elements, which are as follows:

1. data relating to economic hypotheses for the period 1998 - 2050;

[2] Model adapted from Modpens/Fedea model.

2. data considering demographic hypotheses for the period 1998 - 2050; and
3. physical and financial data of the Social Security benefits system for the year 1998.

First, we shall describe the model and each of the above-mentioned input data sets.

## B.2.1 – THE MODEL DESCRIPTION

The Modpens/Portugal model analyses the Social Security system's balance. Starting from a base year of this balance, and taking macro-economic and demographic projections into consideration, the model provides estimates of the system's total income and total expenditure for a period of fifty years.

The model is written in Gauss language and was adapted for Portugal by Prof. José A. Herce from the Modpens/Spain model.

## B.2.2 – INPUT DATA

We shall now present a detailed description of the input data.

### 1. Economic Hypotheses

The macro-economic scenario seeks to identify the main trends for the most relevant economic variables for projection purposes and should only be understood as such. Projections are given at constant prices.

In the long term, the real political and economic circumstances are, on the whole, unforeseeable, so the figures presented must be considered as trends.

For the years 1998 and 1999, we studied the available data from the official statistics published by the I.N.E. (Instituto Nacional de Estatística) and the Banco de Portugal

The projected figures are consistent with the forecasts made by the European Commission, the OECD and the Portuguese Ministry of Finance for the years 2000 and

2001. For the period from 2002 to 2050, the data is consistent with forecasts made in earlier studies of the sustainability of the Social Security system in Portugal.[3]

The macro-economic variables considered are:

- The annual growth rate of GDP;
- The annual growth rate of employment;
- The annual growth rate of labour productivity;
- The annual growth rate of real salaries;
- The annual rate of inflation;
- The annual growth rate of unemployment.

The complete macro-economic scenario is presented in an appendix to this paper.

## 2. Demographic Hypotheses

Various demographic hypotheses were established, based on the demographic projections of EUROSTAT, and which determined the population evolution till the year 2050. The variables considered were:

- The Synthetic Fertility Index;
- Life Expectancy; and
- Migration Effects
- .

From the above-mentioned hypotheses, we proceeded to construct tables for the total resident population, by gender and by age-term, for each year of the considered projection period.

### a. The Synthetic Fertility Index (SFI)

In relation to fertility, the SFI was compiled, projecting an increase of average live births per fertile woman from 1.53 to 1.7 children between 1995 and 2025, after which the rate remains constant. The SFI projection is shown in Table 1 below:

[3] The most important study is the Livro Branco da Segurança Social (Government White Paper on Social Security).

**Table 1: Synthetic Fertility Index, 1995-2050**

| Year | 1995 | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SFI | 1.53 | 1.58 | 1.62 | 1.65 | 1.68 | 1.69 | 1.70 | 1.70 | 1.70 | 1.70 | 1.70 | 1.70 |

However, it should be emphasised that this increased fertility rate will not be sufficient to permit generation renewal. In order for the latter to occur, a rate of at least 2.1 births would be necessary.

b. Life Expectancy

We considered an increase of both male and female life expectancy (MLE and FLE). In addition, we postulated that the difference between the two is decreasing, as shown in the table below. Accordingly, the MLE will increase from 70.99 to 78.00 years, that is, 7.01 years average longer life expectancy, between 1995 and 2050. The increased FLE will not be so strong, from an average 78.21 years and reaching an average of 84.00 years, i.e. an increase of 5.79 years. Finally, the difference between MLE and FLE decreases by 7.22 to 6 years.

**Table 2: Life Expectancy**

| Years | 1995 | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MLE | 70.99 | 71.88 | 72.78 | 73.66 | 74.51 | 75.32 | 76.05 | 76.7 | 77.24 | 77.65 | 77.91 | 78.00 |
| FLE | 78.21 | 79.01 | 79.78 | 80.53 | 81.24 | 81.9 | 82.49 | 83.00 | 83.43 | 83.74 | 83.94 | 84.00 |

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c. The Migration Effect

We postulated that the migratory balance will remain positive throughout the projected period.

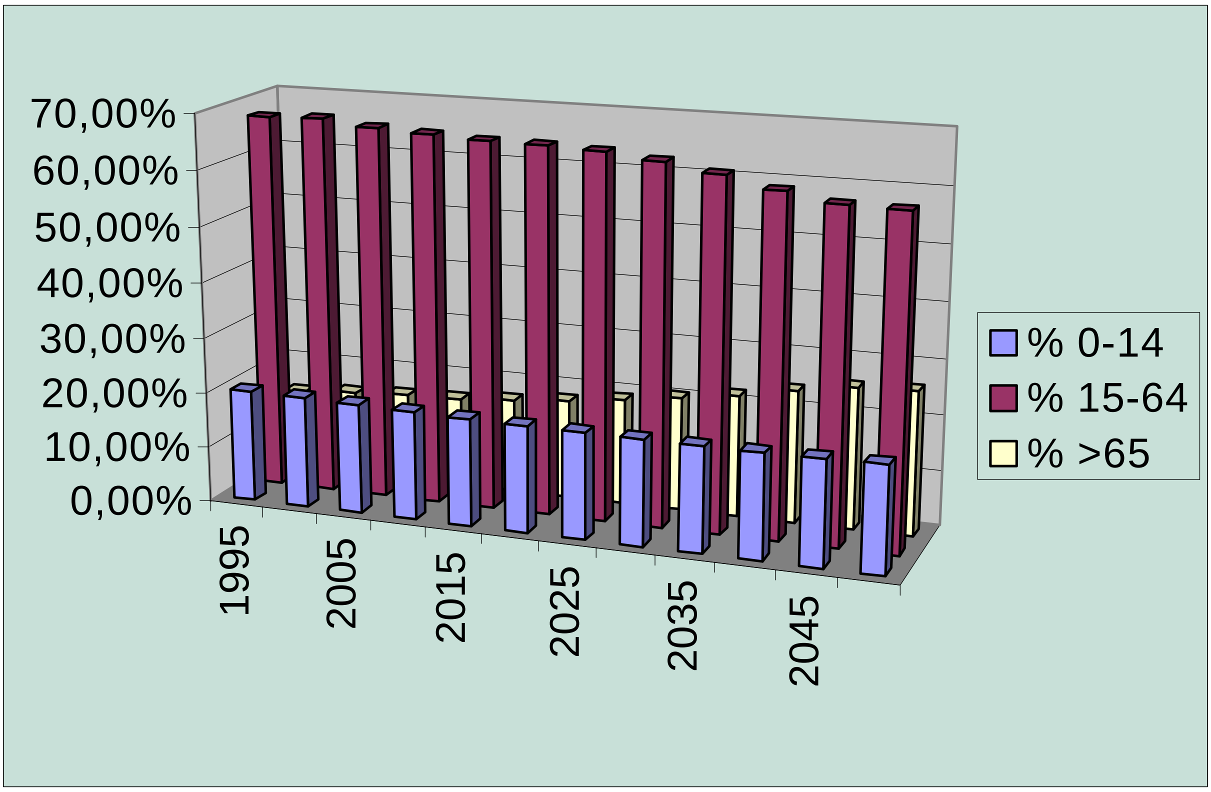
d. Demographic Scenario

The hypotheses referred to above permitted us to obtain the estimated rates for the total residential population for each year, as can be seen in Table 3 below.

**Table 3: Demographic Scenario** (Unit: millions)

| Years | 1995 | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0-14 years | 1783.5 | 1687.3 | 1749.4 | 1801 | 1795.1 | 1718.9 | 1647.8 | 1628.4 | 1647.8 | 1663.3 | 1648.6 | 1611.7 |
| 15-64 years | 6697.5 | 6777.4 | 6772.4 | 6830 | 6861.1 | 6909.9 | 6925.6 | 6867.3 | 6747.1 | 6545.9 | 6365.5 | 6299.6 |
| >65 years | 1431.1 | 1528.2 | 1608.7 | 1661.7 | 1765.1 | 1883.7 | 2021.1 | 2182.1 | 2352.2 | 2567 | 2740 | 2769.8 |
| Pop. Total | 9912.1 | 9992.9 | 10130.5 | 10292.7 | 10421.2 | 10512.6 | 10594.4 | 10677.8 | 10747.1 | 10774.4 | 10754.1 | 10681 |
| % 0-14 | 20.13% | 20.01% | 19.79% | 19.53% | 19.34% | 19.22% | 19.11% | 19.01% | 18.94% | 18.93% | 19.02% | 19.19% |
| % 15-64 | 67.57% | 67.82% | 66.85% | 66.36% | 65.84% | 65.73% | 65.37% | 64.31% | 62.78% | 60.75% | 59.19% | 58.98% |
| % >65 | 14.44% | 15.29% | 15.88% | 16.14% | 16.94% | 17.92% | 19.08% | 20.44% | 21.89% | 23.82% | 25.48% | 25.93% |
| YDI | 26.63% | 24.90% | 25.83% | 26.37% | 26.16% | 24.88% | 23.79% | 23.71% | 24.42% | 25.41% | 25.90% | 25.58% |
| OADI | 21.37% | 22.55% | 23.75% | 24.33% | 25.73% | 27.26% | 29.18% | 31.78% | 34.86% | 39.22% | 43.04% | 43.97% |
| TDI | 48.00% | 47.44% | 49.59% | 50.70% | 51.89% | 52.14% | 52.98% | 55.49% | 59.28% | 64.63% | 68.94% | 69.55% |

**Figure 1: Age Structure in Percentages**

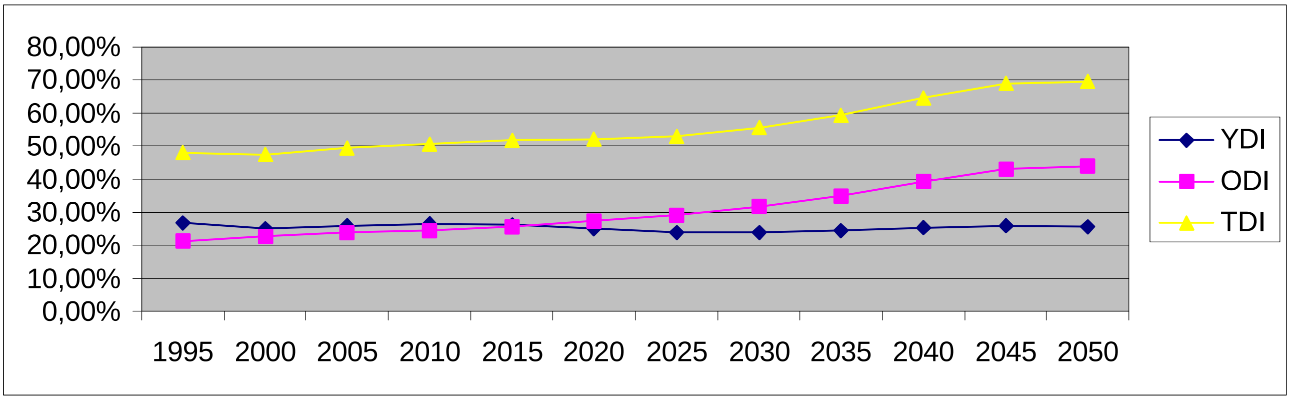



It is possible to observe the main trends of population evolution as follows:

- the maximum number of the total residential population is observed in the year 2040, when it will stand at 10,774,400 people. This represents an increase of 9% compared with the number in 1995; in 2050, there is a slight decrease of 1% compared with 2040;
- the average rate of increase for 5-year periods decreases after 2010, reaching negative values in the last two decades;

- regarding the age groups, we can see that:
  - the age group of 0-14 years decreases steadily till 2040, when it reaches 18.93%;
  - the age group of 15-64 years decreases from 2000 till 2050;
  - on the other hand, the age group of 65 years and over increases significantly from 14.44% to 25.93% in the same period;
- the total dependency index (TDI) increases remarkably, reaching approximately 70%; this can largely be explained by the considerable increase of the old-age dependency index.

**Figure 2: Demographic Indices**




We may deduce from the preceding observations that during the period under study, the population will continue to age.

3. Social Security data tables for the base year, 1998

The Modpens/Portugal model requires as input data the physical and financial data of the Social Security system for a certain year, i.e. the base year. Having opted for the year 1998, we considered, as physical data, the following:

- tables of effective beneficiaries by gender and age groups, including:
  - active beneficiaries of contributing regimes;
  - recipients of payments from contributing regimes for, tuberculosis and maternity;
  - recipients of other payments from all regimes;
  - recipients of unemployment benefit;

- pensioners by contingency (old age, disability and survival) from all regimes;

- tables of the new pensioners by contingency, by age groups and by gender; and
- tables of new old-age pensioners by gender and age(from the age of 50 years till the age of 81 years).

The financial data comprises the following:

- tables of annual earnings in escudos (PTE) of contributing regimes by gender; and
- tables of annual average benefit payments in PTE by age groups and gender, including:
  - benefit payments from contributing regimes for sickness, tuberculosis and maternity;
  - other payments from all regimes;
  - unemployment benefit;
  - pensions by contingency (old age, disability and widowhood) from all regimes.

These tables, as well as information on their construction, are available, on request to the authors.

### B.2.3 – LONG-TERM PROJECTIONS

The principal premises for the obtention of the long-term projections are as follows:

1. we take into consideration the entire contributive career to be in force from 2017 in calculating the pensions;
2. equally, we respect the legal requirement that the minimum value of incapacity and old-age pensions is to reach PTE 40.000 by 2003;
3. we assume that the effective contribution rate is 26.5% for the employees (RGTCO[4]) and 22% for the self-employed (RGTI[5]) for the entirety of the period.

The projections made by the model consider three main aspects of the Social Security system:

- The physical data from the system (the number of active beneficiaries and pensioners);
- Average pensions; and
- The account data (income and expenditure).

[4] General regime for employees.
[5] General regime for self employed.

B.2.3.1 - The physical data.

The physical data of the Social Security system is presented in Table 4 below:

## Table 4: Physical Data

| | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Contributive Regimes - Active Beneficiaries* | | | | | | | | | | | |
| RGTCO | 3,337 | 3,421 | 3,473 | 3,473 | 3,473 | 3,473 | 3,473 | 3,473 | 3,473 | 3,473 | 3,473 |
| RGTI | 588 | 603 | 612 | 612 | 612 | 612 | 612 | 612 | 612 | 612 | 612 |
| RG (BA) | 3,925 | 4,024 | 4,085 | 4,085 | 4,085 | 4,085 | 4,085 | 4,085 | 4,085 | 4,085 | 4,085 |
| *Contributive Regimes – Pensioners* | | | | | | | | | | | |
| RGTCO | 1,543 | 1,703 | 1,819 | 1,947 | 2,070 | 2,169 | 2,298 | 2,453 | 2,631 | 2,763 | 2,789 |
| RGTI | 272 | 275 | 278 | 281 | 284 | 286 | 289 | 302 | 320 | 334 | 338 |
| RG (Ref) | 1,815 | 1,978 | 2,097 | 2,228 | 2,354 | 2,455 | 2,587 | 2,755 | 2,951 | 3,097 | 3,127 |
| *Contributive Regimes – Pensioners by Contingencies* | | | | | | | | | | | |
| Old Age | 1,040 | 1,146 | 1,224 | 1,326 | 1,402 | 1,534 | 1,664 | 1,809 | 1,978 | 2,105 | 2,127 |
| Incapacity | 309 | 347 | 379 | 400 | 438 | 396 | 385 | 388 | 393 | 392 | 386 |
| Widowhood | 407 | 423 | 434 | 444 | 456 | 471 | 494 | 519 | 543 | 563 | 574 |
| Orphanhood | 57 | 58 | 49 | 43 | 41 | 41 | 40 | 38 | 38 | 38 | 38 |
| *Indicators* | | | | | | | | | | | |
| AB_RGTCO/Ret_RGTCO | 2.16 | 2.01 | 1.91 | 1.78 | 1.68 | 1.60 | 1.51 | 1.42 | 1.32 | 1.26 | 1.25 |
| AB_RGTI/Ret_RGTI | 2.16 | 2.19 | 2.20 | 2.18 | 2.15 | 2.14 | 2.12 | 2.03 | 1.91 | 1.83 | 1.81 |
| Ratio BA_RG/Ret_RG | 2.16 | 2.03 | 1.95 | 1.83 | 1.74 | 1.66 | 1.58 | 1.48 | 1.38 | 1.32 | 1.31 |
| *Non-Contributive Regimes – Pensioners* | | | | | | | | | | | |
| Ref. (RNCE+RESSAA) | 516 | 367 | 255 | 175 | 130 | 114 | 108 | 107 | 107 | 107 | 105 |
| *Unemployment* | | | | | | | | | | | |
| Unemployment | 157 | 139 | 122 | 112 | 102 | 95 | 85 | 78 | 73 | 65 | 61 |

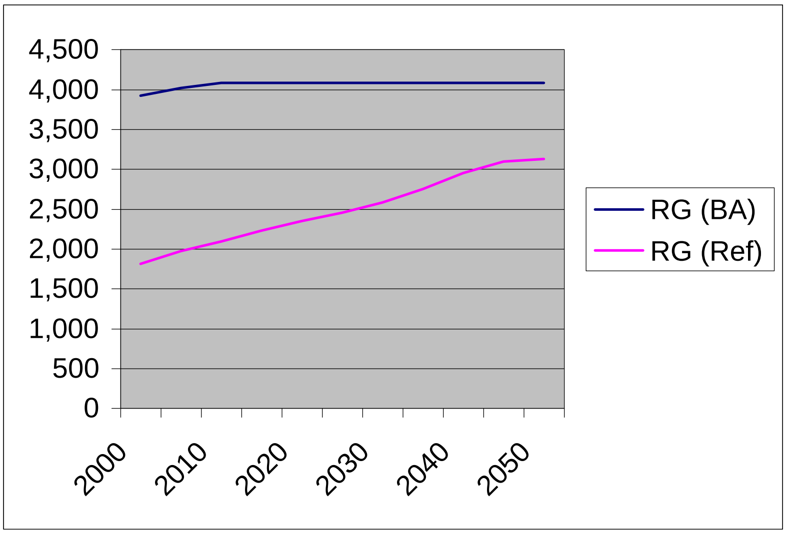
The analysis of the physical data enables us to draw the following crucial conclusions on the Social Security system:

- The rate of growth of the active beneficiaries is small, and the number of active beneficiaries becomes constant at the end of the first decade;
- Unemployment will decline significantly until the economy attains full employment;
- There will be a dramatic increase in the number of pensioners (general regime), reflected in an annual average growth rate of more than 1%.

The structural distinction between the evolution of the pensioners and active beneficiaries seems to be the crucial element for the future disequilibrium of the Social Security system (Figure 3). One ratio that graphically demonstrates this disequilibrium is the ratio

BA_RG / Pens_RG, which decreases from 2.16 to 1.31. The reduction of 40% of this value reveals one of the most intractable threats to its necessary inflow, which the system must overcome for its own survival.

**Figure 3: Evolution of pensioners and active beneficiaries (general regime)**




BA- active beneficiaries, Ref. - pensioners

B.2.3.2 – Average Pensions

The values of the average pensions are presented below in Table 5:

**Table 5: Average Pensions**

| | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Contributive Regimes*** | | | | | | | | | | | |
| **Pension:_Old-Age _New RGTCO** | 71,706 | 82,544 | 104,234 | 126,289 | 91,010 | 103,354 | 117,988 | 134,391 | 150,745 | 162,645 | 175,330 |
| **Pension:_Average_Old-Age RGTCO** | 51,028 | 57,320 | 65,300 | 77,090 | 78,341 | 78,096 | 81,756 | 89,520 | 100,197 | 109,228 | 116,217 |
| **Pension:_Average_Total RGTCO** | 43,310 | 47,183 | 52,610 | 61,192 | 63,281 | 64,916 | 68,817 | 75,537 | 84,477 | 92,256 | 98,279 |
| **Pension:_Old-Age _New RGTI** | 37,001 | 45,499 | 51,557 | 61,939 | 57,024 | 61,431 | 66,179 | 71,293 | 76,803 | 82,739 | 89,133 |
| **Pension:_Average_Old-Age RGTI** | 35,938 | 44,113 | 47,792 | 52,256 | 55,328 | 59,590 | 64,194 | 69,155 | 74,498 | 80,233 | 86,415 |
| **Pension:_Average_Total RGTI** | 29,895 | 35,239 | 37,593 | 40,574 | 42,887 | 46,074 | 49,706 | 53,769 | 58,274 | 62,937 | 67,583 |
| **Pension:_Old-Age _New RG** | 68,748 | 79,388 | 99,744 | 120,808 | 88,116 | 99,784 | 113,578 | 129,021 | 144,454 | 155,848 | 168,001 |
| **Pension:_Average_Old-Age RG** | 48,864 | 55,690 | 63,404 | 74,679 | 76,355 | 76,514 | 80,256 | 87,783 | 98,005 | 106,755 | 113,676 |
| ***Ratios*** | | | | | | | | | | | |
| **Pension:_Ave. O-A / Ave._Sal RG** | 44.10% | 46.10% | 48.70% | 53.20% | 50.50% | 47.00% | 45.80% | 46.50% | 48.10% | 48.70% | 48.10% |
| ***Non-Contributive Regimes*** | | | | | | | | | | | |
| **Pension:_Average_Old-Age RNCE+RESSAA** | 25,191 | 26,567 | 28,674 | 30,836 | 32,998 | 35,513 | 38,260 | 41,209 | 44,400 | 47,812 | 51,474 |

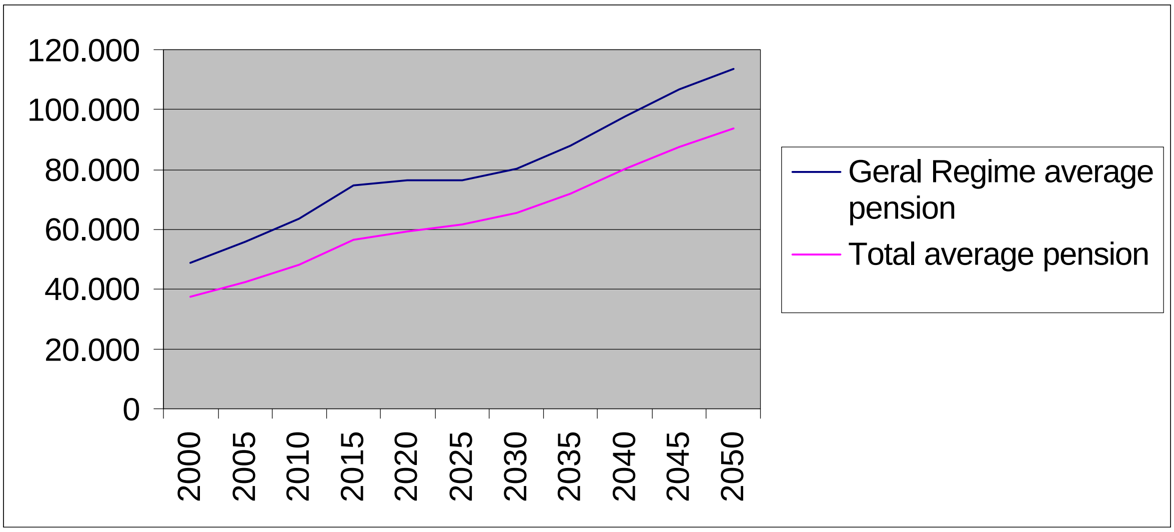
| | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pension:_Average_Total RNCE+RESSAA** | 23,625 | 24,590 | 26,579 | 28,783 | 31,326 | 34,232 | 37,261 | 40,371 | 43,613 | 47,044 | 50,718 |
| ***Global Perspective of System*** | | | | | | | | | | | |
| **Pension:_Average _Global Total** | 37,392 | 42,263 | 48,062 | 56,513 | 59,391 | 61,543 | 65,522 | 71,926 | 80,300 | 87,690 | 93,534 |

Unit Values: monthly average pension in PTE

There seems to be a significant rise in the value of average pensions because of their annual upgrading of their worth and the maturation of the Social Security system. The system's maturation, in the projection period, is reflected in the growth of the substitution rate of the general regime from 43.3% in 2000 to 60.6% in 2050.

The evolution of the average pensions in the Social Security system can be seen in Figure 4, in which the growth of the pension values is clearly identified.

**Figure 4: Average Pensions**




B.2.3.3 – Account data, income and expenditure

We now consider the data from the projected Social Security system account, which is shown in Table 6:

**Table 6: Projected Account**

| | 2000 | 2005 | 2010 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **General Regime – RGTCO** | | | | | | | | | | | |
| Income | 1302,80 | 1456,70 | 1593,00 | 1716,10 | 1848,70 | 1991,60 | 2145,50 | 2311,30 | 2489,90 | 2682,30 | 2889,60 |
| Expenditure | 935,60 | 1124,80 | 1339,40 | 1668,00 | 1834,10 | 1971,20 | 2213,70 | 2594,40 | 3111,70 | 3568,50 | 3836,90 |
| Admin. Costs | 37,42 | 44,99 | 53,58 | 66,72 | 73,36 | 78,85 | 88,55 | 103,78 | 124,47 | 142,74 | 153,48 |
| **Balance** | 329,78 | 286,91 | 200,02 | -18,62 | -58,76 | -58,45 | -156,75 | -386,88 | -746,27 | -1028,94 | -1100,78 |
| **General regime – RGTI** | | | | | | | | | | | |
| Income | 120,40 | 134,60 | 147,20 | 158,60 | 170,90 | 184,10 | 198,30 | 213,60 | 230,20 | 247,90 | 267,10 |
| Expenditure | 112,90 | 133,40 | 140,40 | 151,70 | 160,10 | 175,70 | 198,40 | 227,00 | 261,20 | 294,10 | 318,50 |
| Admin. Costs | 4,52 | 5,34 | 5,62 | 6,07 | 6,40 | 7,03 | 7,94 | 9,08 | 10,45 | 11,76 | 12,74 |
| **Balance** | 2,98 | -4,14 | 1,18 | 0,83 | 4,40 | 1,37 | -8,04 | -22,48 | -41,45 | -57,96 | -64,14 |
| **Sickness & Maternity – balance** | 123,30 | 137,80 | 150,70 | 162,40 | 174,90 | 188,40 | 203,00 | 218,70 | 235,60 | 253,80 | 273,40 |
| **Other Benefits – balance** | 91,10 | 100,9 | 109,2 | 118,7 | 127,2 | 135,4 | 143,9 | 153,9 | 165,4 | 177,3 | 188,6 |
| **Unemployment** | | | | | | | | | | | |
| Income | 166,30 | 186,00 | 203,40 | 219,10 | 236,00 | 254,20 | 273,90 | 295,10 | 317,90 | 342,40 | 368,90 |
| Expenditure | 117,70 | 113,70 | 107,40 | 106,20 | 104,50 | 104,30 | 101,10 | 99,50 | 100,40 | 97,20 | 97,10 |
| Admin. Costs | 4,708 | 4,548 | 4,296 | 4,248 | 4,18 | 4,172 | 4,044 | 3,98 | 4,016 | 3,888 | 3,884 |
| **Balance** | 43,89 | 67,75 | 91,70 | 108,65 | 127,32 | 145,73 | 168,76 | 191,62 | 213,48 | 241,31 | 267,92 |
| **Contributive Regime – balance ex/VAT social** | 158,7 | 111,9 | 32,9 | -190,3 | -229,1 | -235.3,3 | -342,9 | -590,4 | -975,1 | -1276,6 | -1359,0 |
| **Non-Contributive Regime- balance** | -17,8 | -13,1 | -9,9 | -7,3 | -5,9 | -5,7 | -5,9 | -6,3 | -6,8 | -7,3 | -7,8 |
| **System Overall – balance** | 213,2 | 183,4 | 121,1 | -85,2 | -108 | -97 | -188 | -416,9 | -783,6 | -1064,9 | -1124,9 |

Unit Values: millions PTE

The following conclusions can be drawn from the results shown in Table 6 :

- The average annual growth rates of revenue (1.574%) and expenditure (3.256%) of the general regime show a significant differential (1.681%). This may lead eventually to a continuous and increasing deficit. This can be partly explained by demographic evolution, and also by the growth of the average pensions due to the system's maturation;

- When the balance of the general regime and the global balance of the system become negative, they will never cease to deteriorate. This is not a mere fluctuation caused by the conjuncture effect, rather, it reflects a structural imbalance in the system;
- The financial disequilibrium of the contributing regime will probably occur between 2010 and 2015.

## B.3 – ACTUARIAL EQUILIBRIUM

Similarly to other studies, particularly the Annual Report of the Board of Trustees of the Federal Old-Age and Survivors' Insurance and Disability Insurance Trust Funds (USA), we analysed the actuarial and financial equilibrium of the system in the short term (the next 10 years) and in the long term (the next 50 years).

In fact, by considering the estimates of income and expenditure of the benefits subsystem, as well as those of the reserve fund assets, a set of measurements pertinent to an evaluation of the fund's financial condition can be calculated. These include:

- the fund's growth rate; and
- the reserve fund ratio (i.e. the ratio of fund assets at the beginning of a year to expenditure during the year).

Further to this, we calculated two specific tests of the actuarial and financial conditions: one for the short term (financial adequacy) and the other for the long term (actuarial). The purpose of these tests was to provide objective criteria for determining whether or not the projected financial status of the system is considered satisfactory in each time period. The tests help highlight the need for corrective action when the criteria are not met.

We emphasise, however, that these tests should be considered in conjunction with the initially assumed hypotheses.

### B.3.1 – TEST OF FINANCIAL ADEQUACY IN THE SHORT-TERM PROJECTION PERIOD

In the short term, the financial adequacy of the reserve fund is measured by the fund ratio. The latter represents the proportion of the expenditure in one year that can be paid from the fund's assets at the beginning of that year. When expenditure exceeds income, the fund's assets will be used to make up the difference. Moreover, this demonstrates when measures must be adopted, for later implementation, to stabilise the system.

The conditions required to meet this test are as follows:

- if the reserve fund ratio exceeds 100% at the beginning of the projection period, then it must be projected to remain at or above 100% throughout the 10-year projection period;
- alternatively, if the fund ratio is initially less than 100%, it must be projected to reach a level of at least 100% within 5 years (and not be depleted at any time during this period) and then remain at or above 100 percent throughout the remainder of the 10-year period.

If the test is not met, this is an indication that the system's solvency in the next 10 years is at risk and that action will need to be taken to ameliorate the financial condition of the system, in particular, the reinforcement of the fund.

### B3.2 - TEST OF LONG-TERM FINANCIAL ADEQUACY ACTUARIAL BALANCE IN THE PROJECTION PERIOD

In order to carry out the long-term actuarial test, we calculated the following rates:

- effective income rate, which is the ratio of income (payroll tax contributions)to the taxable payroll for the year;
- effective cost rate, which is the ratio of the cost (expenditure) of the system to the taxable payroll for the year;
- the synthetic effective income rate over a period of years, which is equal to the ratio of (a) the sum of the fund balance at the beginning of the period plus the current value of the total income during the period to (b) the current value of the taxable payroll for the years in the period;
- the synthetic effective cost rate over a period of years, which is equal to the ratio of (a) the sum of the current value of the outgo during the period plus the current value of a targeted fund level at the end of the period equal to the following year's outgoings to[6] (b) the current value of the taxable payroll for the years in the period;
- the difference between the synthetic income rate and the synthetic cost rate period.

The discount rate applied in the calculation of the current values is consistent with the capitalisation rate of the fund's assets. The rate of 2% has been adopted.

The test of long-term actuarial equilibrium is applied to a set of evaluation periods, starting with the first 10 years, continuing with the first 11 years, and so on until it includes the whole 50 years of the projection period. That is, the synthetic effective income and cost rates are calculated for 41 distinct periods, the first comprising the next 10 years and each following period adding one year more.

[6] A targeted ending fund level of 1 year's expenditure is considered to be an adequate reserve for unforeseen contingencies. Thus, in addition to the total expenditure during the projection period, the synthetic effective cost rate includes the cost of reaching and maintaining a fund ratio of 100% by the end of the projection period. It is stressed that the goal, in Portugal's case, is that the fund guarantees to cover all foreseeable pension expenditure for a minimum of two years.

The long-term test is satisfied if, for each of the 41 periods, the actuarial equilibrium is not less than zero.

## B.4 - THE FUND ASSETS

From the projections obtained as described above for the Social Security account, it is possible to simulate the capitalisation fund's assets, but taking into consideration the legal stipulation referred to in B.1, whereby the fund is to be further resourced with 2% to 4% of the active workforce's contributions until the fund can guarantee to cover all pension expenditure for a minimum of two years.

In fact, the amount adopted in the simulated scenarios was 2%. This signifies that in the event that the balance surplus should be insufficient to meet the 2% stipulated, it has been acknowledged that the shortfall would be made good by a transfer from the State budget. As soon as the first negative balance occurs, the injections into the fund will cease and the fund will become operational as a provider to the pensions system.

Furthermore, we took into consideration the fact that the account balance of a year (the surplus) only enters into the reserve fund at the end of the following year. Consequently, the asset value of the reserve fund at the outset of the projection is 616 thousand million PTE, i.e. in the year 2000.

The capitalisation rate applied to the projection is 2%.

Finally, we assumed that all of the balance due from the contributive regime had been transferred to the fund.

### B.4. 1 – Assets

As mentioned previously, we assumed the entire contributive career to be in force from 2017, that is, pensions from that year on are calculated on the basis of an average 40 years of contributions.

We also considered an amount transferred to the reserve fund, until the year in which the first negative balance occurs, of at least 2% of the taxable payroll. If the balance surplus exceeds 2%, we transferred this entire surplus. If, on the other hand, the balance surplus is less than 2%, then we add on the difference, assuming that any such shortfall is to be made good by a transfer from the State budget.

The balance referred to in the preceding paragraph is the total balance of the taxable payroll (general regime + sickness benefits + maternity benefits + other benefits + unemployment benefit and social unemployment benefit) exclusive of Value Added Tax.

First, we examined the situation of the assets accumulated in the fund, as follows:

**Table 7: Fund Assets (unit: th. million PTE)**

| | 2000 | 2005 | 2010 | 2011 | 2015 | 2020 | 2025 | 2026 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Contributive regime balance ex. VAT | 158.7 | 111.9 | 32.9 | -3.4 | -190.3 | -229.1 | -235.3 | -251.4 | -342.9 | -590.4 | -975.1 | -1276.6 | -1359 |
| Fund Assets | 616.00 | 1427.48 | 2323.70 | 2403.07 | 2140.03 | 1153.83 | 75.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Balance after the fund | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -174.61 | -342.9 | -590.4 | -975.1 | -1276.6 | -1359 |

The fund’s assets reach their peak of 2,412,300,000 PTE in 2012. The fund will be mobilised for the first time in 2011 and will run out in 2026 (see Figure 5).

The sums which will have to be transferred each year are as follows:

2004: 9.5 thousand million PTE;

2005: 37.2 th. mill. PTE;

2006: 26.8 th. mill. PTE;

2007: 28.8 th. mill. PTE;

2008: 39.1 th. mill. PTE;

2009: 55.5 th. mill. PTE;

2010: 94.1 th. mill. PTE.

**Figure 5: Accumulated Assets of the Fund and Balances of the Benefits Subsystem**

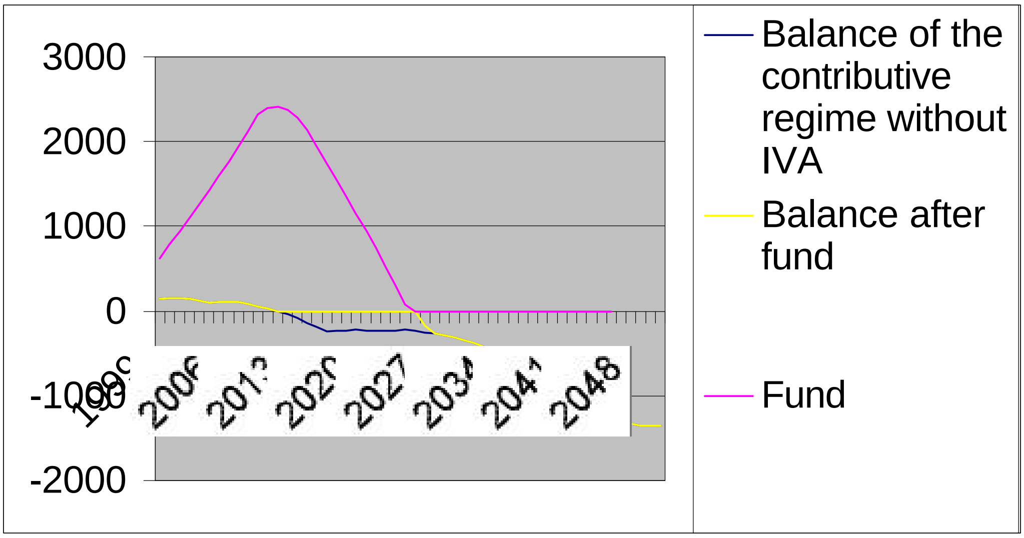



**Table 8: Accumulated Balance**

| | 2000 | 2005 | 2010 | 2011 | 2015 | 2020 | 2025 | 2026 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Accumulated balance of taxable payroll Ex.VAT | 158.7 | 782 | 1177.7 | 1174.3 | 721.7 | -439 | -1591 | -1842.3 | -3056.2 | -5457.1 | -9550.6 | -15433.8 | -22151.7 |
| As % of GDP | 0.81% | 3.43% | 4.45% | 4.30% | 2.37% | -1.27% | -4.08% | -4.61% | -6.99% | -11.17% | -17.66% | -25.85% | -33.60% |
| As % of Income | 9.98% | 44.00% | 60.59% | 59.53% | 34.47% | -19.46% | -65.47% | -74.70% | -116.75% | -193.51% | -314.37% | -471.59% | -628.31% |

Table 8 presents a synthesis of the preceding analysis, providing striking evidence of the system's increasing disequilibrium.

B.4.2 – Financial and actuarial evolution

In order to obtain a better appreciation of the financial and actuarial evolution of the fund throughout the projection period, we calculated he following indicators:

**Table 9: Growth Rate and Ratio of the Fund**

| | 2000 | 2005 | 2010 | 2011 | 2015 | 2020 | 2025 | 2026 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Growth Rate of Fund | - | 12.76% | 8.99% | 3.42% | -6.33% | -14.90% | -75.27% | -100.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Ratio of Fund | 33.27% | 76.01% | 111.59% | 117.59% | 100.02% | 54.57% | 11.43% | 2.77% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |

The following conclusions can be drawn from the indicators above:

- the fund fails to satisfy the demands of the short-term actuarial test. That is, the reserve fund ratio does not attain 100% at the start of the 6th year;
- the fund ratio only manages to reach the level of 100% or over in 2010, remaining at or above this level only until 2015.

The short-term financial adequacy testis not satisfied.

This data points to a weak financial condition on the part of the benefits subsystem. In view of these findings, it is to be recommended that additional steps be taken to reform the system, particularly in reinforcing the fund. However, a higher growth rate for the latter is advisable in order to reach at least a 100% ratio by the start of the 6th year, given that the average growth rate of the fund’s assets in the first 5 years is 18.3%, while needing to be 22.47% in order to pass the short-term test.

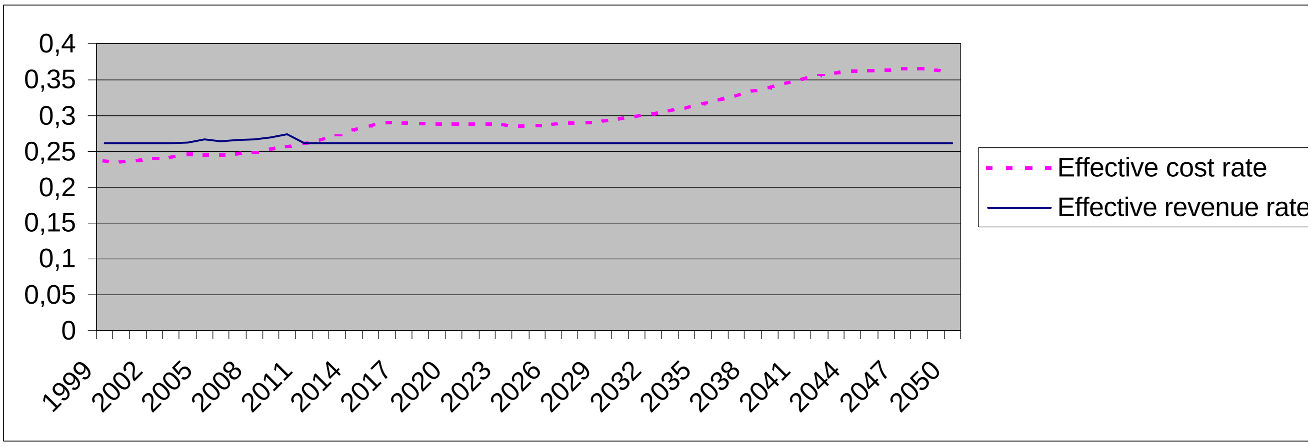
The financial precariousness of the subsystem is evident when we analyse the difference between the effective income rate and the effective cost rate:

**Table 10: Effective Income and Cost Rates**

| | 2000 | 2005 | 2010 | 2011 | 2015 | 2020 | 2025 | 2026 | 2030 | 2035 | 2040 | 2045 | 2050 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Effective Income Rate | 26.10% | 26.64% | 27.36% | 26.10% | 26.10% | 26.10% | 26.09% | 26.10% | 26.10% | 26.10% | 26.10% | 26.10% | 26.10% |
| Effective Cost Rate | 23.49% | 24.45% | 25.65% | 26.14% | 28.47% | 28.75% | 28.62% | 28.76% | 29.51% | 31.56% | 34.47% | 36.27% | 36.15% |
| Difference | 2.61% | 2.19% | 1.70% | -0.04% | -2.37% | -2.65% | -2.53% | -2.66% | -3.42% | -5.46% | -8.38% | -10.18% | -10.06% |

The difference between the above-mentioned rates is negative from 2011, revealing the structural disequilibrium of the system (also see Figure 6 below).

**Figure 6:Effective Income and Cost Rates**



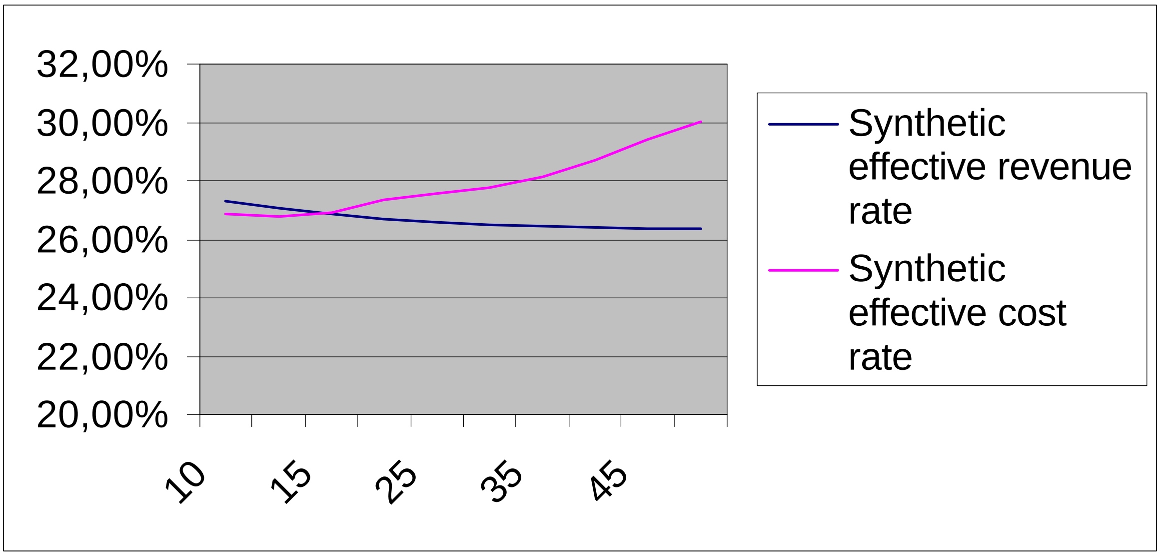

Finally, we shall examine the long-term financial adequacy test. The synthetic effective income rate and the synthetic effective cost rate are presented in Table 11:

**Table 11: Synthetic Effective Income and Cost Rates**

| | 10 | 12 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
|---|---|---|---|---|---|---|---|---|---|---|
| Synthetic effective income rate | 27.28% | 27.08% | 26.89% | 26.69% | 26.58% | 26.50% | 26.45% | 26.41% | 26.38% | 26.35% |
| Synthetic effective cost rate | 26.87% | 26.76% | 26.93% | 27.36% | 27.57% | 27.78% | 28.14% | 28.71% | 29.40% | 30.00% |
| Difference | 0.41% | 0.32% | -0.04% | -0.66% | -0.99% | -1.28% | -1.69% | -2.30% | -3.02% | -3.65% |

Predictably, the test points to a condition of deficit as soon as we consider a 15-year period. This result, together with the elements referred to earlier, emphasises the lack of actuarial equilibrium in the benefits subsystem.

**Figure 7: Effective Synthetic Income and Cost Rates**




B. 5 – CONCLUSIONS DRAWN FROM THE PROJECTIONS

The projection of the Social Security account is conducive to enabling us to state that the Social Security system is conditioned by diverse factors of a demographic nature, as well as its own maturation. These conditioning factors foreshadow the likelihood of a scenario of long-term financial rupture, which is, by nature, structural.

The existing stabilisation fund is not capable, by itself, of resolving the difficulties and neither should this be its goal. However, the fact that all or part of the current Social Security surplus is channelled into a capitalised fund could constitute a means of attenuating the system's long-term financial problems. This is because the procedure guarantees that part of the funds will be used to respect the future financial obligations assumed and that, therefore, these will not be diverted to meet other expenses.

The main conclusions to be drawn from the projection of the reserve fund assets are the following:

- the maximum value of the fund's accumulated assets will be reached in 2012;

- the fund will be mobilised for the first time in 2011 and cannot be used during the next 9 years;
- After the first use, the fund will continue to hold accumulated assets for a minimum period of 14 years, that is, the assets are due to run out between 2025 and 2026.

## C. ACTUARIAL BALANCE OF A FULLY-FUNDED CAPITALISATION SCHEME

In order to confirm the results obtained in Part B of this paper, a simulation was carried out which sought to determine the actuarial balance of a fully-funded capitalisation scheme, applied to the general regime of the Social Security system.

### C.1 - Presuppositions

The presuppositions for the simulation are as follows:

**Populations**

Retired population (which includes old-age, incapacity, survival and orphan pensioners): Based on theModpens projections.

Active population (calculation for old-age, incapacity and survival): ***(see note).***

| **Actuarial Hypotheses** | **Scenario 1** | **Scenario 2** |
|---|---|---|
| **Methods** | | |
| Old-Age | Proj Unit Credit | Proj Unit Credit |
| Incapacity | Proj Unit Credit | Proj Unit Credit |
| Survival | Proj Unit Credit | Proj Unit Credit |
| **Tables** | | |
| Mortality of beneficiaries | PP 79-82 (INE) | PP 79-82 (INE) |
| Mortality of actives | PP 79-82 (INE) | PP 79-82 (INE) |
| Incapacity | EVK 80 | EVK 80 |

**Rates**

| | | |
|---|---|---|
| RVI Technique | 4,0% | 4,0% |
| Growth of pensions | 2,0% | 2,0% |
| Growth of salaries | 2,5% | 2,5% |
| Yield of fund | 5,0% | 5,5% |
| S.S. Revaluation | 1,5% | 1,5% |

**Survival**

| | | |
|---|---|---|
| Table of remarriage | Not applicable | not applicable |
| Age difference between husband and wife | 3 years | 3 years |
| Number of minor dependents | 0 | 0 |
| Percentage of married couples at time of retirement | 50,0% | 50,0% |

**Pensions and contributions**

| | | |
|---|---|---|
| Nr. of pensions paid per annum | 14 | 14 |
| Percentage of reversion rate for survival pensions | 60,0% | 60,0% |
| Contribution rate | | |
| RGTCO | 26,5% | 26,5% |
| RGTI | 22,0% | 22,0% |

***Note:*** according to the data provided by the Modpens model, the number of contributors will remain con from 2010 on.

The results for the two scenarios follow, in accordance with the interest rate used in the actualisations.

To facilitate a reading of the results, the variables are first explained, as follows:

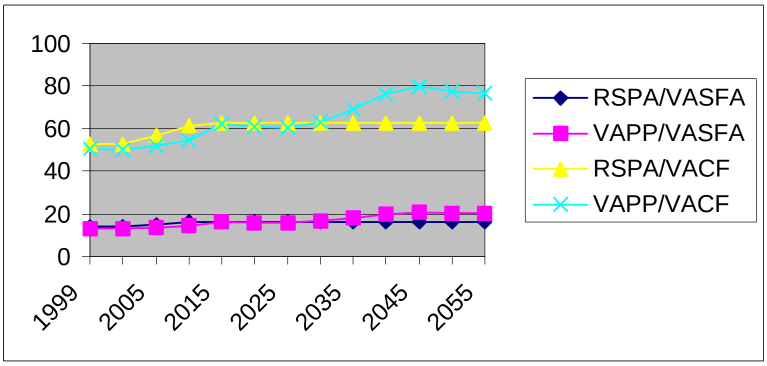
- RSPA represents the current value of the liabilities for past service of active beneficiaries;
- VASFA represents the current value of the future salaries of active beneficiaries;
- VAPP represents the current value of pensions being paid;and
- VACF represents the current value of future contributions.

C.2 - Scenario 1 - 5%

**Table 12: Actuarial Balance - 5,0%**

| Year | RSPA/VASFA | VAPP/VASFA | RSPA/VACF | VAPP/VACF |
|---|---|---|---|---|
| **1999** | 13,81% | 13,16% | 52,72% | 50,24% |
| **2000** | 13,79% | 13,07% | 52,64% | 49,89% |
| **2005** | 14,89% | 13,58% | 56,83% | 51,82% |
| **2010** | 16,02% | 14,31% | 61,15% | 54,61% |
| **2015** | 16,44% | 16,23% | 62,77% | 61,95% |
| **2020** | 16,44% | 15,96% | 62,77% | 60,93% |
| **2025** | 16,44% | 15,80% | 62,77% | 60,31% |
| **2030** | **16,44%** | **16,55%** | **62,77%** | **63,15%** |
| **2035** | 16,44% | 18,03% | 62,77% | 68,83% |
| **2040** | 16,44% | 19,99% | 62,77% | 76,29% |
| **2045** | 16,44% | 20,88% | 62,77% | 79,70% |
| **2050** | 16,44% | 20,28% | 62,77% | 77,43% |
| **2055** | 16,44% | 20,08% | 62,77% | 76,63% |

**Figure 8: Actuarial Balance - 5,0%**




At an interest rate of 5%, we can conclude that in 2030, the ratio of the current value of pensions being paid, as opposed to the current value of future pensions will surpass the ratio of liabilities for past service of active beneficiaries to the current value of future contributions. With the passing of the years, this difference is increasingly aggravated. This result leads us in turn to conclude that from 2030 on, the equilibrium of the actuarial balance of the general regime will cease to be guaranteed, this scenario becoming more accentuated with time.

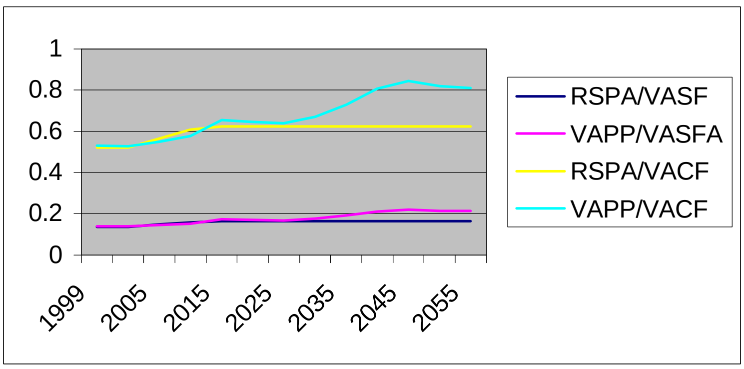
C.3 - Scenario 2 - 5,5%

**Table 13: Actuarial Balance - 5,5%**

| Year | RSPA/VASF | VAPP/VASFA | RSPA/VACF | VAPP/VACF |
|---|---|---|---|---|
| **1999** | 13,65% | 13,93% | 52,11% | 53,18% |
| **2000** | 13,63% | 13,83% | 52,03% | 52,81% |
| **2005** | 14,75% | 14,37% | 56,31% | 54,85% |
| **2010** | 15,91% | 15,14% | 60,73% | 57,81% |
| **2015** | **16,34%** | **17,18%** | **62,39%** | **65,58%** |
| **2020** | 16,34% | 16,90% | 62,39% | 64,50% |
| **2025** | 16,34% | 16,72% | 62,39% | 63,84% |
| **2030** | 16,34% | 17,51% | 62,39% | 66,86% |
| **2035** | 16,34% | 19,09% | 62,39% | 72,87% |
| **2040** | 16,34% | 21,15% | 62,39% | 80,76% |
| **2045** | 16,34% | 22,10% | 62,39% | 84,37% |
| **2050** | 16,34% | 21,47% | 62,39% | 81,97% |
| **2055** | 16,34% | 21,25% | 62,39% | 81,12% |

We find that the application of an interest rate raised by 0.5% negatively affects the disequilibrium of the general regime after 15 years, by virtue of the heightened sensitivity of the variable interest rate calculations. Thus, a state of disequilibrium now occurs in 2015 and continues to worsen significantly with each passing year.

**Figure 9: Actuarial Balance - 5,5%**




Therefore, we can observe that the financial difficulties foreseen by the Modpens model for the benefits subsystem, i.e. the appearance of the first negative balance between 2012 and 2015, are indeed confirmed by this simulation. On the other hand, the long-term actuarial-equilibrium test described above in Part B. had already permitted us to conclude that the consideration of a period of at least 15 years pointed to a state of actuarial disequilibrium in the subsystem.

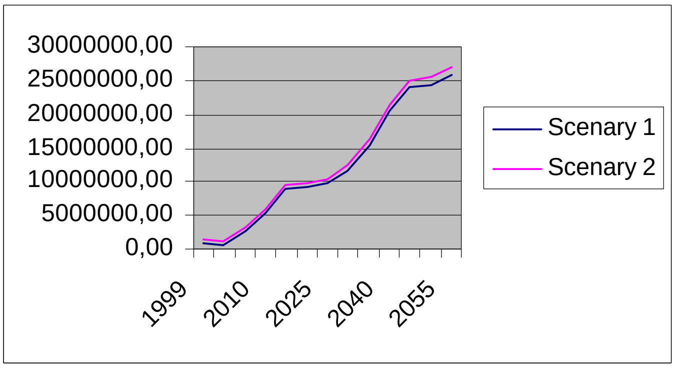
Our final calculation was of the balance of the actuarial balance, defined as: VAPP+RSPA-VACF.

Table 14 and Figure 10 below clearly reveal the increasing difficulties of the system, since the balance grows exponentially.

**Table 14: Balance of Actuarial Balance**

| | Scenario 1 | Scenario 2 |
|---|---|---|
| **1999** | 791257.62 | 1338539.37 |
| **2000** | 695088.31 | 1257039.68 |
| **2005** | 2657180.80 | 3241212.90 |
| **2010** | 5293712.40 | 5883708.80 |
| **2015** | 8946422.90 | 9562471.10 |
| **2020** | 9240483.20 | 9904136.90 |
| **2025** | 9692097.90 | 10407054.60 |
| **2030** | 11728728.00 | 12498951.80 |
| **2035** | 15403303.90 | 16233051.10 |
| **2040** | 20507182.20 | 21401058.90 |
| **2045** | 24020898.60 | 24983854.30 |
| **2050** | 24495716.20 | 25533111.10 |
| **2055** | 25862940.40 | 26980536.60 |

**Figure 10: Balance of actuarial balance**




D. CONCLUSION

The projection of the Social Security account is conducive to enabling us to state that the Social Security system is conditioned by diverse factors of a demographic nature, as well as its own maturation. These conditioning factors foreshadow the likelihood of a scenario of long-term financial rupture, which is, by nature, structural.

The existing stabilisation fund is not capable, by itself, of resolving the difficulties and neither should this be its goal. However, the fact that all or part of the current Social Security surplus is channelled into a capitalised fund could constitute a means of attenuating the system's long-term financial problems. This is because the procedure guarantees that part of the funds will be used to respect the future financial obligations assumed and that, therefore, these will not be diverted to meet other expenses.

In order to confirm the results above, a simulation was carried out which sought to determine the actuarial balance of a fully-funded capitalisation scheme, applied to the general regime of the Social Security system.

Therefore, we can observe that the financial difficulties foreseen by the Modpens model for the benefits subsystem, i.e. the appearance of the first negative balance between 2012 and 2015, are indeed confirmed by this simulation. On the other hand, the long-term actuarial-equilibrium test described above in the section B had already permitted us to conclude that the consideration of a period of at least 15 years pointed to a state of actuarial disequilibrium in the subsystem.

BIBLIOGRAPHIE

*Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and the Federal Disability Insurance Trust Funds* (1999, 2000).

Anuário Estatístico da Segurança Social, (1998, 1999, 2000), IGFSS.

Arcanjo, M. M. (1991), *Análise e Avaliação dos Sistemas de Segurança Social: Um Modelo Aplicado a Portugal*, Tese de Doutoramento, ISEG-UTL.

Bohn, H. (1999), Social Security and Demographic Uncertainty: The Risk Sharing Properties of Alternative Policies, *Working Paper Series* 7030, NBER, Inc.

CISEP, CIEF, FEDEA (1997, 2000), *REFORMA DO SISTEMA DE SEGURANÇA SOCIAL: Cenários Prospectivos de Estruturação e Financiamento*.

Conta da Segurança Social (1998, 1999), IGFSS.

Estatísticas da Segurança Social (1998, 1999), IGFSS.

Kessler, D. (1988) The Four Pillars of Retirement, *The Geneva Papers on Risk and Insurance*, *13*, No.49, October, pp. 342-349.

Lei n.º 17/2000 de 8 de Agosto, Diário da República – I Série – A pp.3813-3825.

Livro Branco da Segurança Social (1997), Ministério do Trabalho e Solidariedade Social.

McHale, J. (1999), The Risk of Social Security Benefit Rule Changes: Some International Evidence, *Working Paper Series 7031I*, NBER, Inc.

World Bank Policy Research Report (1994), *Averting the Old Age Crisis, Policies to Protect the Old and Promote Growth*, Oxford University Press.

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