



**SCHOOL OF
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**MASTER OF SCIENCE IN
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MASTERS FINAL WORK
INTERNSHIP

**SOCIAL SECURITY SYSTEM IN PORTUGAL: FEASIBILITY AND IMPACT
OF ITS APPROXIMATION TO THE CHILEAN MODEL**

BY RODRIGO ALEJANDRO ANGULO RIVERA

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MODEL**

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**SOCIAL SECURITY SYSTEM IN PORTUGAL:
FEASIBILITY AND IMPACT OF ITS APPROXIMATION TO THE CHILEAN DEFINED
CONTRIBUTION MODEL**

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Abstract: Several Projections of the Social Security System evolution in Portugal indicate it's lacking of sustainability in its present form, hence the need to make corrections to this trend. In contrast some evidence suggests that the Social Security System in Chile is enjoying sustainability. In order to contribute to the national discussion on the way these amends should take place, an insight into the characteristics of both: the Portuguese pension fund system and the Chilean model will be discussed, highlighting their strengths and weaknesses that will allow us to do a cost/benefit analysis for the transition of the current Portuguese system to a system more similar to the Chilean.

Chapter 1. Introduction

As part of the internship proposed by Sociedade de Gestora de Fundos SGF to research on pension reform I came to analyze the experiences in some Latin American countries. The analysis and results of which is presented in this document.

It is no secret that the world's population is ageing, and not only there will be a larger share of elderly people in societies but they will also be accompanied by healthier lives and longer life expectancies. For this reason, services like pension benefits will be under strain as the payment period increase. Portugal is no exception for this demographic phenomenon. According to the United Nations Population Division in 2011 Portugal's share of 60+ population accounted for 24%, the 8th place in the whole world. And in the future the situation is not likely to improve. In 2050 Portugal's share of 60+ population is expected to be 40% only surpassed by Japan with 42%.¹ (Bloom, Boersch-Supan, McGee and Seike 2011).

At a time when a national debate on the sustainability of the current Social Estate is sought, it becomes of importance to promote a reflexive exercise on the way the current Portuguese system of social protection namely the Pay as you Go (PAYG)² should face this challenge of an ageing population and to propose amendments to its current situation and a serious objective discussion of new alternative systems. Particularly because system evolution projections point to its bankruptcy in the short and medium term, predicting the need to introduce amendments that would correct this trend. Process that has started already with the introduction of reforms directed to limit pension expenses e.g. increasing retirement age from 65 to 66 in the general regime³.

¹ Population Ageing: Facts, Challenges and Responses by David E. Bloom, Axel Boersch- Supan, Patrick McGee,

²Pay as You Go: current workers contribute by mandate to Social Security which in turns pays the current retirees their pension benefits

³"Idade da reforma sobe para 66 anos no público e no privado" Catarina Almeida, Jornal de Negócios 7/08/2013 available from goo.gl/PK2wKx

Even though the Portuguese system also has a complementary voluntary pension saving schemes for employers and individuals for pillars 2 and 3, it is still incipient, as of January of 2013 it accounts for around 14 billion EUR in managed assets (Source: Instituto de Seguros de Portugal)⁴, which is still low in a context where the annual income from social security for pensions which is around 8 billion EUR⁵.

The trend of the Portuguese system contrasts with optimistic scenarios of South American models based on that implemented in Chile. Since 1981, Chile has been at the forefront in the area of pension reform, switching from a public pay as you go system of predefined benefits to a defined contribution system of fully funded mandatory IAs managed by the private sector. To a large extent the pension reform has been successful in addressing the problems of the old state supported system and has contributed to an increase in national saving and financial sector development. There is concern however, that the system has not lived up to its expectations: half of retirees face the risk that they are not saving enough for retirement, primarily due to the infrequent contributions to their accounts and their difficulty in obtaining eligibility to apply for social safety net program of minimum pension.⁶ With this thesis in mind both systems are compared, and insight is given to the PAYG current deficit and its outlook, also the capacity of Portugal to afford a possible transition is addressed.

⁴ Total Assets administered by Pension Managers, Instituto de Seguros de Portugal available from <http://goo.gl/eDPWG>

⁵ See section 3.1 Government Analysis

⁶ Chile: Selected Issues : Addressing the Long Run Shortfalls of the Chilean Pension System by Gilbert Terrier, Chris Faulkner-MacDonagh, and Meral Kerasalu, Gustavo Alder and Oya Celasun. International Monetary Fund

In the past there have been several influential works addressing the sustainability of the PayG pension system in its current state, and their solutions are focused on parametric modifications to the system in order to increase its sustainability. To mention a few of them are:

- Sustentabilidade Financeira dos Sistemas Públicos de Segurança Social em Portugal: situação Actual e Análise Prospectiva By Dr. Jorge Miguel Ventura Bravo
- A Reforma das Pensões em Portugal: Uma Análise de Equilíbrio Geral Dinâmico by Alfredo Marvão Pereira and Thomas Arthur Vaughn Professor of Economic
- The Financial Sustainability of the Portuguese Social Security System by Carlos Pereira da Silva

Furthermore, Ventura Bravo's work goes beyond to suggest a mild migration to Defined contribution individual accounts managed by a government entity but whose returns are given by some indication of the performance of the economy and the automatic modifications of pension benefits to link them with retirement age, life expectancy and dependency ratios. In this way drifting away from a capitalization model. A system known as Notional Accounts.

I pretend to add to the national discussion by addressing a different question: Could the Mandatory Defined Contribution Individual Account system (from now on DCIA) improve the pension benefits for current workers when they reach retirement? Is the PAYG sustainable in its present form? Is there any evidence there could be hidden savings which can provide income to fund a transition? Is the government better off or worse off financially (and hence the taxpayers) if they would allow a parallel system of DCIAs? And finally is this parallel system feasible?

When the issue of DCIAs has been raised in the past, one of the most common issues that cast doubt is that of financing the transition, particularly by the government having to finance those who stay in the PayG system and those who are already retired or close to retirement, and as we will see later the recognition of past contributions to social security who opt out of the PayG

system. I pretend to show although where possible savings can be found to allow funding a possible transition.

Chapter 2. Literature Review

For a general view on the phenomenon of population ageing I used a working paper from Harvard's University Program on the Global Demography of Ageing "Population Aging: Facts, Challenges, and Responses. By David E. Bloom, Axel Boersch-Supan, Patrick McGee, and Atsushi Seike.

A thorough understanding of Portuguese PAYG system was attained by consultation of the OECD Pension Country Profile, the Portuguese Social Security Website where there is an array of tools from summaries, to legislation, and a simulator. On the other hand an understanding of Chile's SAP system was attained by looking into the OECD Country Profile and books on the reform of 1981 namely "El Cascabel del Gato" by Jose Piñera Founder and President for the Centre of International Pension Reform in Santiago, Chile.

Portugal's pension system is not an isolated case, quite in the contrary it has many similarities with other countries in Europe namely the southern European countries with whom they share several of its characteristics. In order to study the situation of sustainability of the PAYG I look to works sponsored by APFIPP namely Ventura Bravo 2011. I also I look into theoretical papers (Samuelson 1958) as well as papers on empirical verification of sustainability of the PAYG elaborated for other countries with similar systems put into place Jimeno and Licandro (1994).

As to the Pros and Cons of both systems I use Jose Piñera's "El Cascabel del gato" and a chapter by the same author in "Perspectives of the Welfare State: Giving Back Responsibility to individuals" both favor DCIAs and also to counter this view I use Stiglitz and Orzag's "Rethinking Pension Reform: Ten Myths About Social Security Systems" (September 1999), these juxtaposed positions are very illustrative and give a view where no system is perfect and one should not talk about idealized version of systems but imperfect reality based ones. I have also included Debates between economists and political leaders to illustrate both the different and shared views among professionals in each country, for instance in Portugal Univesidade de Lisboa hosted the debate event "Estado Social. A Segurança Social. Que futuro?" available in goo.gl/tPwjS. For Chile the New York times covered how presidential candidates in 2006 addressed the problems of their new system "Chile's Candidates Agree to Agree on Pension Woes" (New York Times, January 2006).

In the topic of analyzing the Investment Risk as it is transferred to the individual in Defined Contribution systems (with a guaranteed return and an additional government security guarantee) I look into Stiglitz and Orzag (1999), also a celebrated documentary by the PBS "The Retirement Gamble" aired in April 2013⁷. The mentioned works previously all hint on the issue of the shortfalls of investment return, where in this day and age are not living up to expectations having a shortfall that questions the entire industry structure. An alternative positive look into DCIAs is in zooming into the investment strategies behind the investment and for this I introduce the works of John C. Bogle on index plan investing which seems to be a plausible way to go forward. For theoretical approach I use Actuarial Mathematics and Life Contingency Risk by David C. M. Dickinson, Mary R. Hardy, and Howard R. Waters.

⁷ Available in <http://www.pbs.org/wgbh/pages/frontline/retirement-gamble/>

Finally for the topic of longevity I bring up some research found by some studies of Swiss Re particularly "A Mature Market: Building a Capital Market for Longevity Risk" by Kerry McMullan, Daniel Wolonggiewicz and Matt Singleton (2012).

Chapter 3. Methodology and Facts

In this section we will do some calculations using public data in order to analyze:

1. If an individual could do better by saving for her/his retirement by opting out of the PAYG system, taking with her/him part of what is contributed to social security to fund current pensions (which now accounts for 19,1% of salaries) and a recognition for past contributions.
2. Verify that the government's social security system is in deficit, and what does the future outlook of the sub system of pensions in Social Security look like.
3. How contingent benefits related to Pensions offer hidden savings that can improve sustainability.

1. Analysis for the Individual

Individuals in the current PAYGO System contribute (both employer and employee) a total of 19.1% from their salary to finance current retirees, however they also pay an additional 5.82% (Death and Disability technical Benefits) an administrative fee (0,63%) and solidarity contribution (0.83%), for the associated benefits (See Table I Disaggregated Rates for Social Security In Portugal).

Having this in mind an individual could analyze how he could use this money for his own retirement in a properly regulated saving scheme such as the private voluntary schemes that exist today in Portugal. In this exercise we will only look at some case scenarios and discover

which rate of interest could be required by each individual in order to at least perform neutrally when comparing with the PAYGO system.

In this section we will illustrate the case for a person (male) who is joining the labor force in 2013 with an age of 25 years. Some further descriptions of the illustration are:

- Assuming that a person (male) aged 25 in 2013 has on average a salary of 850 EUR a month⁸, we will look into how his IA is funded with monthly contributions (determined by multiplying its annual salary times the contribution rate $t_{contrib1}$ for 13% and $t_{contrib2}$ for 19,1%).
- Considering several delays with 5 year intervals until age 55 we will look into the replacement ratio⁹ from the PAYG system versus that which could be funded by an individual savings account that is, by a defined contribution scheme. At each time interval the person could analyze his situation and decide to opt out (that is to choose voluntarily to leave the PAYG system taking with him a recognition bond from the government that accounts for past contributions) and the right to fund his account with future contributions.
- Several variables will be kept so that we can see the effect on the defined contribution pension benefit:
 - The person's Salary will evolve at 5 different rates (0% or no change, inflation rate i.e. $\pi = 1,9\%$ ¹⁰, $\pi+1$, $\pi+2$ and $\pi+3$). As salary grows so do contributions.
 - The money saved in the IA and managed by a Pension Fund Administrator will earn investment returns each year. The rate of returns used to illustrate the

⁸ "Sustentabilidade Financeira dos Sistemas Públicos de Segurança Social em Portugal: Situação Atual e Análise Prospectiva Lisboa, Dezembro 2012" – Jorge Ventura Bravo (Associação Portuguesa de Estudos sobre Aforro, Investimento e Pensões de Reforma) e APFIPP (Associação Portuguesa de Fundos de Investimento, Pensões e património)

⁹ Replacement Ratio is the relation between pension and last salary

¹⁰ The future annual inflation rate is calculated for the accumulated period of 2013 to 2053 from the annual inflation rates obtained from Ventura Bravo (2012)

status of the individual will range from 1% to 5% in 1% increments. As we will demonstrate later, this is a critical component in the saving capacity of individuals, who are now risk bearers of investment risk. For the last 60 months the annual return for open funds in Portugal have been below 5%¹¹.

- At each time interval a person could opt out meaning that she/he could take out what she/he has contributed to the Social Security in the past at a contribution rate of 19,1% and start to fund her/his IA with this initial sum. The rate at which the government recognizes this Bond will be known as $tcontb$. In our illustration we will use the current 19,1% contribution rate and a default for IAs, which has been used in countries where reform has been put into place.
- The Recognition Bond can be paid by the government at the person's retirement or once the person opts out. If the Bond is paid at the moment of opting out then the recognition bond is cashed by the pension fund administrator and starts capitalization, which is increased by each new contribution to the individual account. If the bond is paid until the person's retirement the Government recognizes a return equal to the inflation rate (π) at 1,9% from the moment of opting out until retirement.
- The Benchmark for the PayG pension has been calculated using the simulator available at www.seg-soc.pt/simulador under the same parameters stated above (that is entryage at 25, initial salary 850 EUR, work history of 40 years, different salary increase rates, etc.)

The Basic Formulas using for the calculation of the DCIA model are:

¹¹ As of August 20, 2013 AFPIPP publishes returns for pension funds available at goo.gl/hnjBXR

1. The Recognition Bond. At each stipulated age with 5 year intervals a person may choose to switch (once the person switches to the DCIA scheme he can not go back to the PAYG system) where the government will recognize her/his past contributions to social security according to the following formula. The Recognition Bond (RB_x^x) of an individual with current age (x) and paid at a current age (x) is assumed as:

$$RB_x^x = \sum_{i=entryage}^{x-1} txcont \cdot W_{entryage} \cdot (1+j)^{i-entryage} \cdot (1+\pi)^{x-i}$$

The Recognition Bond (RB_{rage}^x) of an individual with current age (x) and paid at retirement age ($rage$) is assumed as:

$$RB_{rage}^x = RB_x^x \cdot (1+\pi)^{rage-x}$$

Where:

- The sum is taken the values from entryage up to the age when the individual decides to opt out of the PAYG system. In this work the entryage to the workplace is 25.
- x is the age at which the individual decides to opt out; it takes values at 5-year intervals, that is 25, 30, 35, 40, 45, 50, and 55.
- $txcont$ is percentage of the annual contribution to the individual account . Although the contribution rate can take two illustrative values $txcont1 = 13\%$ and $txcont2 = 19,1\%$, only the latter is used to recognize past contributions. Have in mind that the current contribution to social security for the PAYG system (old age) is of 19,1%.
- π is the inflation rate we assume the government recognizes as a compensation for letting the participant use her/his money to pay for current retirees.
- j is the salary increase rate along the work experience of the individual. For illustration purposes this will take values of 0%, 1.91% (that is the projected average annual inflation

rate π of the period between 2013 and 2053¹²), 2.91% ($\pi+1\%$), 3.91% ($\pi +2\%$), and 4.91% ($\pi +3\%$).

- $W_{entryage}$ is the annual wage of the individual at age *entryage* meaning the age when he starts to work (discounts).
 - We show two possible scenarios depending of the time the recognition bond is cashed: immediately at opt out date or at retirement. It is in the latter that the government assumes to pay a return equal to π for every year until retirement.
2. The Individual Account (*IA*) at retirement age without including the recognition bond would be equal to the value of contributions to the *IA* plus the accrued interest from the date the individual opted out of the PAYG system until retirement age. Contribution is made once at the beginning of the year. The formula would read:

$$IA_{rage} = \sum_{i=x}^{rage-1} txcont \cdot W_{entryage} \cdot (1+j)^{i-x} \cdot (1+r)^{rage-1}$$

However the value of the *IA* at retirement including the RB_x^x or the RB_{rage}^x values, would be equal to:

$$IA_{rage}^{RB_x^x} = IA_{rage} + RB_x^x \cdot (1+r)^{rage-x} \quad \text{and} \quad IA_{rage}^{RB_{rage}^x} = IA_{rage} + RB_{rage}^x$$

Where:

- r is the annual rate of return of the individual account, for illustrative purposes scenarios have been presented with examples of $r=1\%$, $r=2\%$, $r=3\%$, $r=4\%$ and $r=5\%$.

¹² Ventura Bravo (2011)

c. Value of Pension. The sum of the individual account plus the recognition bond (either cashed at opt out or cashed at retirement) gives the total assets saved by the individual at retirement. The individual can then purchase a life annuity from the private insurance market transferring the risk of longevity. By buying a life annuity the individual will receive a life pension in exchange of his life savings. This is a life annuity calculated by monthly installments. For simplification the calculation of the pension will be obtained by dividing the total assets saved by the factor $(12 \cdot a_{65}^{(12)})$. The illustrations will show the value for $a_{65}^{(12)}$ where we assume that it will be possible to acquire a life annuity with 12 annual payments computed with the following assumptions: Mortality Table: GKF45; interest rate: 3%; subscription fee: 1% and a fixed pension benefit giving a value of 14.97 (nowadays this is possible now for one individual coming from a private pension plan)

Results are shown in the following Tables:

1. Table II. Shows at each time interval (ages 25,30,35,40, 45, 50, and 55) the different monthly pension benefit and replacement ratios with PAYG and the ones could be afforded by IAs. The latter will have 5 different scenarios (PDC1, PDC2, and so on) associated to the different rates of returns. Each will have 5 illustrations related to the different salary increase rates. For past contributions 19.1% was used as the contribution rate for the Recognition Bond. For future contributions the contribution rate used is **13% (default)**. A graphic illustration is shown in Appendix 6.
2. Table III. Shows at each time interval (ages 25,30,35,40, 45, 50, and 55) the different monthly pension and replacement ratios with PAYG, versus the 5 different scenarios of rate of returns, and 5 different illustrations of salary increase with the particularity that the for future contributions, the contribution rate is **19,1%**. The recognition bond contribution

rate is 19,1%. Here we can see that at a rate of return of 4% the capitalization scheme surpasses the PAYG results with some exceptions at ages 45 onwards.

3. Table IV. Shows the variant results when the recognition bond is paid at Retirement with Defined Contribution Rate for IA at 13%.
4. Table V. Shows the results when the recognition bond is paid at Retirement with Defined Contribution Rate to IA at 19,1%.

A pending question is that of the future rate of returns, as we have established, if these are over the range of 5% then without a doubt could be better off by saving in an IA even with a reduced contributing rate of 13%, but is this attainable? If we look at the past history of the previous 5 years of current private open pension plans returns have been showing an increasing trend, however at the beginning of that period returns were very low as a result of the euro crisis, impact which is still lasting in the accumulated result. Table VI shows Individual pension plans and Open Collective Private Pension Schemes results in several time spans.

The Pension Fund Industry and the Rate of Return.

Traditionally investment managers receive the money from Pension Fund Administrators and they would try all their skills by buying and selling in order to beat the market, sometimes they hire consultants, or even outsource the financial trading operations, generating commissions in and out in the transactions, so there are periods where returns are high and also there are times where returns are not. Let's remember that looking at the investment market as a whole, as long as the companies produce dividends year in and year out, return is being produced by dividends and earnings growth. On the other hand some stock picker to beat the market means that somebody else has to lose, is a zero sum game except for the brokers and investment managers who earn commissions either way returns go, some day trades will be successful some will not. If you look at average annual returns on stocks over the decades since 1900 for the US you will find

that on average the annual investment return is 9.6% where Dividends and Earnings growth will account for 99% of the annual average investment return, speculation on the other hand will account for 1%. So there must be an alternative where pension funds could be invested in indexed funds, where the funds own businesses, corporations buying interest in each stock in the stock market in proportion to its market capitalization and then holding it forever or until he/she retires (Bogle 2006), or a little bit earlier to allow last years to be out of exposures. These indexes already exist the S&P 500 and the Dow Jones, where stocks are cap weighted (market capitalization weighted) adjusting themselves to stock prices so that you don't have to buy and sell stocks for that reason. The S&P 500 produce on average the 80% of the market value of all US stocks. The Dow Jones has 5000 stocks including the 500 in S&P. If we run the time series of the return from these indexes we shall find for most periods average annual returns of 9% (Bogle 2006). In this way the industry is structured in a way very different from the needs of the retirees, who are not looking for day in a day out gains but instead are looking for long-term investments in companies, which annually give out dividends constantly along the way. This is a global debate which is getting more traction particularly in an era where returns are lacking and commissions for so many brokers, consultants, stock pickers and other helpers do not seem to pay off. A quick algebraic illustration shows the above:

Let's say that there are only 2 investors (Tom and Sam) in the whole economy and only 2 stocks (A and B), so that the wealth of the investors is $W_t + W_s$, and the wealth of each investor is the sum of the value of the number of stocks of A and B.

$$W_T = P_A X_A + P_B X_B \qquad W_S = P_A Y_A + P_B Y_B$$

$$W_T + W_S = P_A (X_A + Y_A) + P_B (X_B + Y_B)$$

Now let's say that a group of advisors convince each of the investors separately to hire them to implement a "winner" investment strategy to beat the market, however they will charge a $c\%$ commission of whatever the amount traded is. The investors engage in trading the stocks, Tom sells $t\%$ of his A stocks to purchase shares of B with the proceeds, Sam on the other hand buys into $t\%$ of Tom's A stocks with the proceeds from his sale of B shares, in a single simultaneous transaction with the respective trading costs of buying and selling shares.

Tom sells $t\%$ of his A shares earning $t\%P_A X_A$ but pays $c\%$ of the same amount as commission. Then buys with his net proceeds $t\%c\%P_A X_A$ shares of B . Sam on the other hand buys $t\%$ of Tom's A shares net of commissions, and sold the respective shares of B of his portfolio.

In this way the new wealth Status of the investors after trading stocks is:

$$\text{The wealth of Tom: } W_T = P_A(1-t\%)X_A + P_B(X_B + t\%P_A X_A / P_B) - 2c\%P_A X_A$$

$$\text{The Wealth of Sam: } W_S = P_A(Y_A + t\%X_A) + P_B(Y_B - t\%P_A X_A / P_B) - 2c\%P_A X_A$$

$$\text{In the process the advisors have acquired wealth too: } W_{Aq} = 4c\%P_A X_A$$

As we add the new joint wealth of the investors we end up with:

$$\begin{aligned} W_T + W_S &= P_A X_A + P_A Y_A + P_B X_B + P_B Y_B - 4c\%P_A X_A \\ &= P_A (X_A + Y_A) + P_B (X_B + Y_B) - 4c\%P_A X_A \end{aligned}$$

Is the state of wealth after trading stocks better than it was when investors kept a portfolio without trading? Evidently if price of stocks (P_A and P_B) remain unchanged the general wealth is clearly diminished, since wealth is transferred directly from investors to advisors (i.e. consultants,

brokers, stock pickers, etc.). However if prices of stocks (P_A and P_B) change, the wealth of the investors as a whole might increase even though their share of it could decrease.

Let's establish that Prices of Stocks of A and B could change in period 2. Then the new prices would be equal to:

$$P_A^2 = P_A + \Omega \qquad P_B^2 = P_B + O$$

In this way the wealth of both investors would be equal to:

$$W_T^2 + W_S^2 = (P_A + \Omega)(X_A + Y_A) + (P_B + O)(X_B + Y_B) - 4c\%(P_A + \Omega)X_A$$

The difference in Wealth between periods 2 and 1 should be positive if after the transactions the joint wealth of both investors is higher.

$$\Delta W : \Omega(X_A + Y_A) + O(X_B + Y_B) - 4c\%(P_A + \Omega)X_A > 0$$

$$\Delta W : \Omega(X_A + Y_A) + O(X_B + Y_B) > 4c\%P_A X_A$$

That is, the net gain from change in prices should be greater than the commissions (sale and purchase). In the long run however the superiority of net gain in prices against the commissions needs to keep on occurring in a zero sum game dynamic, where somebody wins and somebody loses. Almost as if the transaction could cause itself the net gain, only to lead to an speculative dynamic, which could be prevented if investors chose to maintain well diversified portfolios of dividend paying stocks.

3.1 Government Analysis

In the last couple of years the Portuguese economy has been suffering from a low growth rate, last year it even got into the negative numbers, this has been accompanied by a growing

unemployment rate, a situation that comes in hand with the lesser economic activity. Graphs 1 and 2 show the growth and unemployment rates since 2008.

This scenario adversely affects the revenues from social security as contributions and quotations from employers since they correspond to the sum for each working individual of his salary multiplied by the employee's rate of contribution. Hence as the salary base shrinks, so do the contributions to social security.

In addition to this effect there is also an increase in the expenses for social security. For one there is the global ageing effect where people are living longer and hence extending the pension benefit payment period, not to mention the increasing unemployment, which triggers the unemployment benefit increasing the pressure on social security deficit. The latter Issue will not be treated in this work.

The proponents of parametric modifications to the current PAYGO system argue that the policies should be directed to increase employment, economic growth¹³, productivity, salaries, so that the social security can benefit from larger revenues and hence lower deficits. In this mindset the problem of the sustainability of the pension system is treated as part of a bigger and different problem, and where there is little objective evidence of a concrete pathway to resolve it, and much less consensus.

¹³ Estado Social. A Segurança Social. Que futuro? Debate a Universidade de Lisboa available in <http://goo.gl/UGFBsn>

In contrast the problem of pension deficit should be addressed in a more focused targeted approach. In this approach one solution has been put into place related to maintain a balance between revenues and expenses of pensions i.e. an actuarial equilibrium. A second alternative still not addressed is that of structural change of the system.

In an effort to follow the first train of thought where fixing the economy could solve the pension deficit problem, I will try to do some calculations to help us analyze this. Table VII shows the Portuguese current pension deficit for 2012 (that is, only the isolated situation of Old Age Pension excluding disability and survival pensions) compared with a Hypothetical case of full employment. This would mean that in the current situation there would be a deficit of around -4.9 bn EUR for 2012, which comes from subtracting the benefits paid for 2012 (12.5bn EUR) from the revenues of the same year (7.56bn EUR). So continuing with our hypothesis, if in an abstraction of reality we argue that the economy is to grow to its full potential then the employment would grow up to a level where the revenues contributions and quotations will increase significantly to impact in the deficit. If we argue the unthinkable: that the unemployment is reduced to 0%. That is that there is no single person in the whole country with a working age out of work. Then, in this case after subtracting pension benefits (no change since this have no relation with employment) from the revenues we end up with a new deficit of 0.654Bn EUR.

Assuming there is a linear relation between unemployment and revenues of social security (employee and employer contributions Q&C) in this abstraction, we could see that as unemployment decreases up to 0%, the revenue for social security increases in 18% (assuming there is no change in salaries), and hence reduces the deficit in approximately 67% for our abstraction for 2011 obtaining a deficit of approximately 0.654 Bn EUR.

In this abstraction of reality the potential has been capped, we see that the labor force is not large enough if the economy was to absorb every unemployed person. There are just no more people available to generate more income to social security, unless we have new people (younger preferable so that their contributing time is longer) joining the workforce or immigrants, which is not likely to happen the near future. In the same token the economy must keep up its growth so that it can absorb new active population members.

In a scenario of full employment it is likely that salaries could increase, and hence continue to reduce the deficit. Could the increase in salaries make up for the remnant gap of the deficit? If we do the calculations we would require the salaries to increase in one year 7,33% after reaching full employment at current salaries. Recent studies in project salary growth rates in the future at a 2% maximum (Ventura Bravo 2012).

So between the economic environment and the demographic phenomenon, I would say the latter is more significant since even when the economy grows and absorbs employment there will still be an ageing population driving expenses and no more people in working age to be absorbed by the economy and hence produce increased income for the social security.

Furthermore to have a current deficit does not mean that the system is broke nor unsustainable, a rather longer-term perspective should be taken into account. For this longer projection of the deficit we will look at the internal rate of return of the PAYG system that is, the rate at which the present value of cash flows in and cash flows out become zero, i.e. are in equilibrium. In this way by looking at Samuelson 1958 (applied by Jimeno and Licandro to Spain in 1999) we will look into the Portuguese PayGo system to see if it has equilibrium in the long term.

Let's assume that in an economy where there are only two groups of people those in an active state (those younger than retirement age) and in passive state (those older than the retirement age). Every individual lives 2 periods. The number of individuals in passive age comes from the number of people in active age of the previous period N_{t-1} multiplied by the probability that reaches the passive age.

The financial Surplus of the PayGo system at year t , B_t , is given by:

$$B_t = \Gamma(w_t)(e_t)(N_t) - \alpha \sigma (w_{t-1})(e_{t-1})(N_{t-1}) \geq 0 \quad (1)$$

Where:

- B_t is the Surplus
- Γ is the contribution rate allocated to pay for current pensioners
- w_t is the real salary at time t
- e_t is the employment rate for the generation that is born in time t
- N_t people born in period t
- α the replacement ratio
- σ is the probability that the individual survives to become retired and hence start pension time.

In this way the real income at time t is given by the product of the contribution rate Γ , the real salary w_t , and the number of people employed in period t ($e_t * N_t$). On the other hand the expenses are given by the product of the replacement ratio $\alpha * w_{t-1}$ (which accounts for the pension benefit) and the people in passive state given by $\sigma * (e_{t-1})(N_{t-1})$ where σ is the probability of population that reaches or is maintained in passive state. For a positive surplus to occur income should be larger or equal than expenses (if equal surplus is zero). Hence:

$$\Gamma (w_t) * (e_t * N_t) \geq \alpha \sigma (w_{t-1})(e_{t-1})(N_{t-1}) \quad (2)$$

By dividing both sides by $\Gamma \cdot (w_{t-1}) \cdot (e_{t-1}) \cdot (N_{t-1})$ and rearranging we end up with:

$$(e_t/e_{t-1})(N_t/N_{t-1})(w_t/w_{t-1}) \geq (\alpha \sigma) / \Gamma \quad (3)$$

$$(e_t/e_{t-1})(1+n)(1+Y) \geq (\alpha \sigma) / \Gamma \quad (4)$$

On the other hand, if we define a term $(1+r)$ where r is the IRR when the present value of cash flows in and out are equal to zero, then

$$\Gamma (w_{t-1}) + \alpha \sigma \cdot w_{t-1} / (1+r) = 0 \quad (5)$$

Solving for $(1+r)$ lead us to the RHS (right hand side) of our previous equation (4), and by assuming that employment rate remains constant we would have

$$(1+n)(1+Y) \geq (1+r) \quad (6)$$

- Where n is (N_t/N_{t-1}) the rate of growth of the Population and Y is (w_t/w_{t-1}) the rate of growth of salaries.

In the long term the average growth rate of real salaries is given by the growth of productivity which is equal to the GDP growth. In this way if the system is to have equilibrium then the IRR should be smaller or at least equal to the Growth rate of GDP (Samuelson's Classical Proposition)

$$(1+r) \leq \text{GDP growth}$$

We can now look into the Internal Rate of Return having the investments as all contributions in the PAYGO system and the pension benefit as its associated return.

Finding a typical IRR

The Cash Flows for the PAYG system would be the income from contributions of employees and employers (19,1% of salaries) allowing a growth for salaries throughout the professional career of workers, and secondly the expenses would be equal to the sum of payment benefits. For the

illustrative individual aged 25 and starting salary of 850 we can calculate the Internal Rate of Return according to the assumptions made previously and in addition assuming pension benefits do not get indexed to inflation (there is uncertainty as of now if this practice will be carried out).

Table VIII shows the illustration for $j=0.0491$ (See Appendix10):

- the series of cash flows both negative and positive. In the first part of the series from ages 25 to 64 which are the contributions, which grow in magnitude according to the salary increase, in the latter part of the series from ages 65 to 110 payment of benefits remain constant and are equal to the benefits calculated according to the assumptions already established.
- These cash flows are not certain. They depend on the probability that the person survives for them to occur assuming the individual remains active until retirement age with no interruptions. Using the values of the table TV8890 we can multiply each cash flow times the probability that the person is alive given that he is 25 today (number of people alive at each age/number of people alive at 25).
- The cash flows need to be brought to valuation date which is today when the person is 25.
- By using excel function we can find the rate at which the sum of the present value of cash flows is 0. In the example below the IRR where the Present Value of cash flows is 0, is equal to 2,4%.

If we calculate the details of the scenarios used for each salary increase rate j we find the following IRRs:

Table IX. Government Analysis: IRR PayG system Summary of Results

CS1 Annual Sal. Increase			PAYG Monthly Pension	IRR
J	0	850	807.90	2.61%
J1= IPC	0.01909982	850	1,005.11	2.27%
J2= IPC + 1%	0.02909982	850	1,231.27	2.31%
J3= IPC + 2%	0.03909982	850	1,520.03	2.35%
J4= IPC + 3%	0.04909982	850	1,896.96	2.40%

Looking at The work by Ventura Bravo (2011) “Sustentabilidade Financeira dos Sistemas Públicos em Portugal” he projects potential GDP up to the year 2060, in this finding potential GDP is never above 2%. So according to Samuelson’s analysis and the expected evolution of GDP (Ventura Bravo 2011) the IRRs would not be smaller than the GDP growth rate from that same period, hence the system in the future is in disequilibrium. We can also calculate IRR for indexed pension benefits to inflation but that would only support the previous thesis.

3.3. Other Benefits (Death, Disability and Survival).

Currently 5,82% of worker salaries go to Death and Disability Benefits payments (2.31% and 3.51% respectively) for whoever presents claims and is eligible for these benefits. The expenses paid for these two benefits are shown in tables XI and XII (the latter includes survival benefits).

First we should know that some of these benefits are ongoing whilst others are just paid at once. Death Benefit is paid immediately upon death it stands for a small payment to cover the cost of funeral expenses. Disability on the other hand is paid in an ongoing basis for life. What about

Survival? Well this Benefit pays a percentage of the pension benefit for beneficiaries of the dead person when retired for life for the widow or up to adulthood for orphans (18 years of age or up to 25 years of age if still studying), and if active a percentage of the disability pension that the individual would receive if he was disabled.

We could analyze if the rates charged currently are enough to support the expenses of the contingent benefits Death and Disability, apply its loss ratio, and see if there is a surplus or no. As we see from Table X we can see the historic expenses and revenues for each benefit, without taking into consideration Survival Benefits (Table XI includes the latter). This table shows there is a historic surplus in Disability and Death Benefits. Below a Table X summary of the loss ratios (Losses / Revenue):

Table XII. Summary of Loss Ratios

Year	Loss Ratio (Disability)	Loss Ratio (Death)	Loss Ratio (Death + Survival)	Loss Ratio (Disability &Death)
Avg historical (1975-2011)	84.95%	5.49%	43.24%	37.03%
Avg most recent 20 years (1991-2011)	76.04%	6.45%	55.35%	34.07%
Avg most recent 10 years (2001-2011)	62.23%	6.61%	61.05%	28.69%

Death Benefits.

In table X we can see that there is a surplus, where the historical loss ratio is 5.49%, for the last recorded 20 years is 6.45%, and for the last recorded 10 years is 6,61%. This leaves at least 94% of margin each year on average, or that a rate of 2.17% is available each year for other expenses or investment by social security. The future is uncertain so in any given year expenses may rise

dramatically, for example in case of an epidemic. As an insurable risk it could be transferred and shared to avoid assumption of risk of catastrophic consequences since there are no reserves that can buffer an impact such as these.

Disability Benefits.

Have in mind that disability is an ongoing expense, that means that the rate charged each year pays for the past events who are still alive plus new events. The historical loss ratio of Disability is around 85%, but is getting lower in recent years, the average for the past 20 years is only 73%, and the average for the past 10 years is only 60%. Will this margin be sustained in the future? well it would depend on the rate of accidents and the longevity of disabled individuals. The Social security continues to invest in regulation to make safer workplaces (see the table I for disaggregated rates), so the topic is again longevity even for disabled people. This is an insurable risk which could be shared and transferred.

Survival Benefits.

These benefits are paid to widows and orphans until reaching adulthood (established at 25 years of age) after the death of the participant or retiree. As mentioned before these benefits are ongoing, however if we look at table XI we can see that the rate charged to cover for death benefits is sufficient to cover for death benefits and survival benefits with historic loss ratios below 100%. So there is margin left for the death benefit even when including the survival benefits. Then again this is an insurable risk which can transferred and shared.

Chapter 4. Analysis of Results

Defined Contribution Individual Accounts (DCIAs) Versus Pay as You Go system in Portugal.

When comparing the pension benefits attainable by Defined Contribution Individual accounts versus PAYG current system, we find that:

Although results show a range of salary increase scenarios, these are not expected to be high and should be around 2%, so we should see with particular interest the comparison with salary increase rates j_2 and j_3 (π and $\pi + 1\%$).

With DC contribution rate of 13% in Table II and focusing with the results with j_2 , we can see that a rate of return between 4 and 5% allows the individual account to afford a life annuity which provides a monthly pension better than the one that the PAYG can provide for all time intervals (given that the benefits in the PAYG are not indexed to inflation). Evidently as time passes by the scenarios with high salary increase rates (j_5 in particular) it is more difficult for the rate of return at 4% to provide a better result than the PAYG. We can also see that at lower rates of return, the later the person opts out the better pension benefit he can afford with her/his individual account since the promise of the government of a 19.1% recognition bond weighs a lot making it worth postponing the opting out. However as the rates of return increase this waiting period to opt out becomes less attractive and in some cases is detrimental e.g. j_2

With DC contribution rate of 19.1% in Table III we can see that a rate of return of between 3 and 4% is required now to afford a life annuity, which provides a monthly pension better than the current PAYG system. Currently the private pension fund market in Portugal is able to deliver these results (see Table VI), however with a mandatory private pension fund individual account commissions should decrease significantly allowing for even better returns.

If the Recognition Bond was to be paid at retirement instead of immediately at opt out, then the recognition for past service contributions would not benefit from the rates of returns from investments in individual accounts during the period before retirement, the government would recognize a return rate equal to the inflation rate. What if the funds were to be invested in indexed funds? Could a new system aspire to better returns by shifting to an investment strategy based in indexed funds?

Equilibrium of the PAYG System.

As we saw before there is an annual deficit with the social security old age pension benefit. And it is not an issue of economics per se, where if the economy grew and foster employment the situation will reverse. As shown not even in a scenario of full employment and increase in salaries would the situation change.

What is more critical is not the current situation but the outlook, where we have shown the situation can only be worsened. By analyzing the internal rate of return being below the GDP growth we have shown that the system is in disequilibrium for a person currently aged 25 now with a 40 year working history.

Other Benefits (Death, Disability and Survival)

Disability, Death and Death plus Survival benefits all operate on a profit, even accounting for ongoing payments (Disability and Survival Benefits). Operating on a profit means that the social security can have funds to pay for the current PAYG system deficit or if a reform is to happen social security could contribute to fund part of the transition (current retirees expenses, retirees of those who stay in the PAYG system, Recognition Bonds for those who opt out, and minimum pensions).

In the future this might become a horse race because as longevity takes its effect, disabled retirees and widows (male and female) will live longer, and the ongoing payments will accumulate for the social security putting additional stress to the current rates.

If the PAYG is to be maintained, the surplus of the contingent benefits could be protected by exploring the cost of risk financing mechanisms like the following:

1. About the ongoing claims (disability and survival) there is nothing to do but to continue to fund them (there is some expectation that they will be reduced due to government modifications but it is no sure thing). So part of the rates should be allocated to pay for current and some other part of the rate should be reserved to fund ongoing claims in disability and survival benefits projecting life expectancies for beneficiaries: disabled, widows and orphans (until 25 years old if studying and 27 years old if studying masters degree).

2. For new events of Deaths (including survival) and Disabilities:

a. For Survival Benefit. Buy for each participant life insurance or joint life insurance if life partners are both working, where premiums are paid monthly until retirement and benefits are paid monthly in an ongoing basis until widows die or orphans reach adulthood (25 years of age). The sum insured should amount to the target annual pension benefit for beneficiaries times the number of years the widow's life expectancy plus a margin of statistical error allowing longevity (with no increment in pension), and also times the number of years for orphans to reach adulthood (the initial month it should contain the funeral expenses). It could be arranged also that each participant can choose the sum insured to be paid in a lump sum to the insurer in exchange for a life annuity for the widow. An initial payment should include the funeral benefits. In time Social Security could look into ways to assume more or less risk if it turns out beneficial.

b. Buy Disability insurance with premiums paid monthly, and benefits paid in monthly installments based on a sum insured equivalent to an annual pension times the life expectancy of the individual plus the additional years of life expectancy of the legal life partner or adulthood of orphans

(whichever is larger) and also plus statistical error allowing longevity. Again it could be allowed for the participant to tie in the contract that the sum insured is paid in lump sum to acquire a life annuity with reversion to the widow and orphans (until adulthood or 25 years if still studying). In time Social Security could look into ways to assume more or less risk if it turns out beneficial.

For survival and disability benefits it would seem that transferring risk not entirely is a liability, in terms that the sum insured described above is finite, and in the case life expectancies happen to be larger than what was predicted it could bring pressure. Then again now the situation is much worse since the survival and disability is entirely assumed by social security. Another question would be if in practice some would live shorter lives.

In the case that there is a reform to include Individual Savings Accounts then for new events (deaths and disabilities):

- The sum insured of life and disability insurance for participants could be reduced by the amount in the savings account making it cheaper and hence allowing more margin for social security.

Chapter 5. Other Issues to consider for a transition

The study aims to look into alternative ways to attain sustainability of the pension system, but maintaining certain virtues of the current system.

The PAYG System in Portugal.

There is a notion in Portugal that the PAYGO system is a preeminent part of the Social State (Estado Social) as a consequence part of the victories attained from the “25 de abril” movement in the 70s, which goes hand in hand with an apparent mindset strongly engrained in Portuguese society, where citizens allow the State to play an important role in the economy in hope of

fairness and justice, most importantly and can help those in need (redistribution)¹⁴. Sometimes however these actions are expanded to those who are not in need of this help. This fosters an entitlement state where groups can lobby to get benefits in exchange of votes, making taxpayers pay for someone else's entitlements (for example some government workers).

The relationship between contribution and pension. Firstly the "price" or "contribution rate" of working people has little connection to what the workers themselves will receive when they retire since rules of retirement are continually changed to the downside, affecting for the most part future pensioners not the ones already in retirement.

Helping those who do not need help. Another disadvantage of the current PAYG system is that it assumes that Portuguese (even those educated and working) are not able to save by themselves for their retirement but need the government to do it for them or need the future workers to pay for them.¹⁵ If the government and the political forces could understand that they should focus with the poor, and allow those with capacity to save by themselves to do so, we could see an improvement of the system as a whole. As we have seen before there are some revenues that social security can tap into in order to assist the poor with minimal pensions.

Burden in the youth. The average monthly pension in 2011 was of about 350.52 EUR, and in that same year 30,73%¹⁶ of pensioners received a monthly pension larger than this. In this way if the current pensioners were left unaffected by changes in their retirement benefits there is a lack of

¹⁴ Estado Social. A Segurança Social. Que futuro? Debate a Universidade de Lisboa available in http://www.youtube.com/watch?v=iiF6FYUO14&playnext=1&list=PL8V7jTAr5c_gLSnCjGcRA-A5KUiiMJY0X&feature=results_main

¹⁵ Perspectivas del Estado del Bienestar: devolver responsabilidad a los individuos, aumentar las opciones, January 2000 by Assar Lindbeck, Juan Francisco Jimeno, M^a Teresa López López, Víctor Pérez-Díaz, José Antonio Herce, José Piñera ISBN: 84-89633-99-1 available in <http://www.fundacionfaes.org/es/documentos/libros/show/00280-00> Particular chapter by Jose Piñera is available http://www.fundacionfaes.org/record_file/filename/192/00280-04.pdf

¹⁶ Pensions by range in Euros [http://www.pordata.pt/Portugal/Pensionistas+de+velhice+do+regime+geral+da+Seguranca+Social+total+e+por+escolas+de+pensao+\(em+euros\)-2001](http://www.pordata.pt/Portugal/Pensionistas+de+velhice+do+regime+geral+da+Seguranca+Social+total+e+por+escolas+de+pensao+(em+euros)-2001)

solidarity were currently employed workers are financing high level pensioners, which burdens those low income workers with a heavier weight. This leads to demoralization of workers particularly the young who see an increase in the fiscal pressure, when normally this sector of society is the one that transmits the hope for the rest of society (Piñera 2004).

The Population structure. The Social Security PayGo system is best at achieving its sustainability with population structures which have more working people than retirees, however the case of Portugal quite different, and the situation is foreseen to be worsened with larger retiree population, rising living expectancies and high unemployment.

Longevity Risk. The Social security system assumes the longevity risk in its entirety. According to Swiss Re, the renowned reinsurer, longevity risk might be underestimated each additional year of life expectancy raises pension liabilities by about 4 to 5%.¹⁷

Macroeconomic benefits: National Savings. Some authors argue that PAYG system contributes zero to the national savings rate (Piñera 2004), this does not help the growth of the economy which needs to have savings in order to direct this to worthwhile opportunities. As Martin Feldstein puts it “in a privatized social security system based on mandatory contributions, individuals (and their employers on their behalf) would be required to make contributions to individual accounts... that would be invested through mutual funds into diversified portfolios of stocks and bonds.. for most workers, mandatory contributions to individual savings accounts would add dollar for dollar to national savings and capital accumulation”¹⁸:

Declining Rate of Return. Public Paygo System has a declining rate of return which some might think that it is a fundamental flaw of the system, where early generations received pension benefits but contributed little in their working lives (that is, the system was put in place when they

¹⁷ A Mature Market: Building a capital market for longevity risk (Kerry McMullan, Daniel Wolongiewicz, and Matt Singleton 2012 Swiss Re Europe S.A. UK branch) available in http://www.swissre.com/rethinking/longer_lives/A_mature_market_building_a_capital_market_for_longevity_risk_podcast.html

¹⁷Kerry McMullan, Daniel Wolongiewicz, and Matt Singleton 2012 Swiss Re Europe S.A. UK branch

¹⁸ Martin Feldstein “The Case of privatization”, Foreign Affairs July/August 1997 pages 28-29.

had matured lives), making their rate of return close to infinite, later generations obviously will have a lower rate of return.

However with all its challenges the system has its positive points:

Intergenerational Solidarity. Definitely a virtue of the current system is the solidarity that exists between generations, where working individuals pay for current retirees, who themselves paid for past pensioners.

Redistribution. Another advantage of the Portuguese PAYGO system is that there is a redistributive effect in the calculations of pensions. That is that a person with lower income who contributes to social security will have a slightly larger replacement ratio than a person with a higher income, having them both the same age, and same number of contributing years, with equal salary growth in their working careers, but a different initial salary. This redistribution might be not desirable though, when it is not legitimate, that it is when wealth is not transferred to the poor but to that privileged group who by engaging in lobbying and rent seeking behavior negotiate with politicians to obtain entitlements. In general even with these illegitimate redistributions, the system should not be abolished but rather corrected (Orzsag and Stiglitz 1999).

The Defined Contribution Individual Account System in Chile. The DCIA system in Chile is not exempt from flaws, particularly because one should look at this system not in its idealized version but one should compare both systems as they are in reality. Some difficulties of the system in Chile have been:

The fiscal pressure of additional recognition bonds for those people who were working and contributing to the PAYGO system and decide to move.

The ambiguity of determining the Recognition Bonds which in Chile has a formula and it is not a direct representation to weigh in the contributions to the previous system. In our illustrations we

have applied a recognition bond that recognizes previous contributions with some kind of linearity. In practice formulas have not been that easy to follow and sometimes unclear.

Longevity risk is transferred to the individual if chooses to retire with programmed retirement or to insurance companies with the purchase of whole like annuities. However this risk will be of profound importance in the next decades whoever the risk bearer is. Although i think Social security is the least prepared to face this challenge, since the individual can modify its consumption if he is responsible, the insurance company has risk transfer vehicles and reserves it can put into use, but the government can only raise taxes, and not always.

The preconceived notion that IAs will provide savers with higher rates of return than PAYGO system is not that clear anymore and when the risk bearer is the individual is of great importance. In Chile there is a provision of a guaranteed return and also that as the individual ages his savings are allocated in more conservative portfolios.

The IA pension funds are normally managed by private pension fund managers, and there is a notion that having several of these players competing to manage each persons IAs, would lead to better prices for the consumer in this case lower administrative costs (Orszag and Stiglitz), evidence is mixed for this since in most systems administrative costs vary and sometimes they change through out the time. The fund manager normally charges fees for management out of payroll. A more transparent way would be a very small management fee and premium over rate of return, which is in fact what these companies are paid for.

The positive aspect in Chile is that it has been improved along the years, although still a lot has to be done, particularly for those with insufficient contributions.

Chapter 6. Conclusions

The exercises in the previous sections have shown us that the government and the individual could work together in a risk sharing dynamic, where the individual and the government could

both benefit to improve the sustainability of the pension system. Current contributions to the PAYG system could be allocated in a different way, in search of efficiency, but maintaining solidarity while improving sustainability.

In this way if people decide to Opt Out of the PAYG system after a well thought reform is put into place with proper regulations, the government would need to come up with a series of expenses including:

- Current Pensioners pension benefits
- The Recognition Bonds either paid immediately upon Opt Out or at Retirement
- Future pension benefits for those who remain in the system (those elderly who are above 55 who cannot benefit from longer saving time periods and stay in the system or anyone who decides not to Opt Out for any other reason).
- Minimal pensions for those who have low amount in savings accounts due to lower salaries or unregular contributions due to unemployment or self- employed. For these people the government needs to cover after private pension until minimal pension.
- Longevity, which can stress if life and disability insurance exhausts ahead of projected time.

All of the above require funding, which could be financed by the following vehicles (let's call them the margins):

- The differential between the current contribution rate at the PAYG system for old age 19.1% and the Defined Contribution Rate for Individual Account 13% (default).
- The surplus of the Contingency Benefits Death and Disability after re-insuring part or all of the survival benefit (if the individual is active worker i.e. insurable).
- The solidarity rates that the Social Security already charges and can be maintained.

- Unemployment risk could be transferred to the individual by allowing her/him to finance part or all of the unemployed period by taking a loan on his individual savings account or a collateralized loan from a bank where the collateral is a limit of the individual account savings e.g. 5% with scales according to age if necessary. This means the rate established to cover for this risk could be used alternatively. This leaves a margin for 3,76% which is the technical rate charged today, but lets assume the social security does not transfer the whole risk covering a number of months (e.g. half) if unemployed. In that case there would be a margin smaller than 3,76%.
- The allocation of the sub rates of Administrative, Solidarity and Policy (See Table I) for the benefits of old age, death, disability and survival which accounts for 6.36%.
- Commissions from life (re) insurance contracts.
- Fiscal policy

If on the other hand the PAYG is to be maintained steps 2, 3 and 4 could be implemented to improve the deficit. Although sustainability is still difficult to attain. Unfortunately an exact quantification of the feasibility of transition after reform could not be attained due to lack of data particularly ages of participants, life partners and offspring (at least in age ranges). However there is sufficient evidence that a structural reform needs to be studied in more detail since we have shown the lack of the sustainability of the Current PayG system in its present form and additionally we have shown that transferring investment risk to the individual could result positive (with the necessary regulatory environment that protects the investor) since the power of savings can prove as a more efficient tool to fund future pension benefits than the PAYG system. Particularly some unanswered questions that I suggest could help in this endeavor is to dissect the transition costs and the capacity for Portugal to pay for it by:

Evaluating new revenue (margins) which will provide payment capacity of the transition:

A probable amount accounted from differential margins due to old age (shifting from a 19.1% contribution rate to a 13% for example) that could be called transition tax in hands of social security, for those in capacity to Opt Out (younger than 55).

For those who stay in the System: Those who are older than 55 calculate their lifetime contribution from their current age (by using life expectancies)

The margin of unemployment insurance, which is partially transferred to the individual.

The margin of Death and Disability technical rates after evaluating (with age ranges of participants) the cost of life and disability insurance

The margin of sub rates (Administrative, Solidarity and Policy) associated with Death, Disability and Old Age.

b. Evaluating the Transition Costs and see if they can be financed by the new revenue (margins).

i. Recognition Bonds for participants (range ages)

ii. Ongoing Benefit Payment (Survival and Disability) by knowing the age of beneficiaries and projecting their life expectancies (in age ranges) and see if they can be financed by the margins found before.

iii. Minimal Pensions of those participants registered in Social Security who is in the risk group.

Other topics of interest should look into investment strategies in indexed funds in Portugal.

Definitely the issue of a structural reform to the Portuguese PayG system should be furthered studied, I hope I have shed some light on which aspects are worth studying to implement a system that is well deserved by All Portuguese.

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Table I. Disaggregated Rates for Social Security In Portugal

Rates	Technical	Administrative	Solidarity	Policy (Investment and Revalorization)	Total
Sickness	1,33	0,03	0,04		1,4
Professional Illness	0,06	0	0,44		0,5
Parenthood	0,72	0,02	0,02		0,76
Unemployment	3,76	0,09	0,12	1,16	5,13
OldAge	19,1	0,48	0,63		20,21
Disability	3,51	0,09	0,12	0,58	4,3
Death	2,31	0,06	0,08		2,45
Total	30,79	0,77	1,45	1,74	34,75

Source: Código dos Regimes Contributivos dos Sistema Previdencial de Segurança Social

Table II. PayGo Vs DCIA Recognition Bond is paid at Opt Out date and Contribution Rate for Individual Account is 13%

Age	CS1F			PDC1	1.00%	PDC2	2.00%		PDC3	3.00%		PDC4	4.00%		PDC5	5.00%				
25	CS1	S65	Pss65	rrss65	Bonus at Op	PDC1	rrDC1	Δ	PDC2	rrDC2	Δ	PDC3	rrDC3	Δ	PDC4	rrDC4	Δ	PDC5	rrDC5	Δ
	0	850.00	807.90	95.05%	0.00	364.46	42.88%	-52.17%	454.77	53.50%	-41.54%	573.27	67.44%	-27.60%	729.48	85.82%	-9.23%	936.26	110.15%	15.10%
	0.0190998	1,811.71	1,005.11	55.48%	0.00	526.43	29.06%	-26.42%	640.84	35.37%	-20.11%	788.61	43.53%	-11.95%	980.55	54.12%	-1.36%	1,231.19	67.96%	12.48%
	0.0290998	2,677.44	1,231.27	45.99%	0.00	648.36	24.22%	-21.77%	779.30	29.11%	-16.88%	946.91	35.37%	-10.62%	1,162.82	43.43%	-2.56%	1,442.57	53.88%	7.89%
	0.0390998	3,941.94	1,520.03	38.56%	0.00	806.69	20.46%	-18.10%	957.71	24.30%	-14.27%	1,149.26	29.15%	-9.41%	1,393.87	35.36%	-3.20%	1,708.22	43.33%	4.77%
0.0490998	5,782.18	1,896.96	32.81%	0.00	1013.17	17.52%	-15.28%	1,188.75	20.56%	-12.25%	1,409.34	24.37%	-8.43%	1,688.52	29.20%	-3.60%	2,044.23	35.35%	2.55%	
30	CS2	S65	Pss65	rrss65	Bonus at Op	PDC1	rrDC1	Δ	PDC2	rrDC2	Δ	PDC3	rrDC3	Δ	PDC4	rrDC4	Δ	PDC5	rrDC5	Δ
	0.000	850.00	807.90	95.05%	10,313.57	391.92	46.11%	-48.94%	491.23	57.79%	-37.26%	621.24	73.09%	-21.96%	791.96	93.17%	-1.88%	1,016.72	119.61%	24.57%
	0.019	1,811.71	1,005.11	55.48%	10,707.48	554.92	30.63%	-24.85%	678.70	37.46%	-18.02%	838.46	46.28%	-9.20%	1,045.55	57.71%	2.23%	1,314.99	72.58%	17.10%
	0.039	3,941.94	1,231.27	45.99%	10,919.69	677.41	25.30%	-20.69%	817.91	30.55%	-15.44%	997.77	37.27%	-8.72%	1,229.17	45.91%	-0.08%	1,528.18	57.08%	11.09%
	0.049	5,782.18	1,896.96	32.81%	11,136.08	836.29	21.22%	-17.35%	997.08	25.29%	-13.27%	1,201.15	30.47%	-8.09%	1,461.61	37.08%	-1.48%	1,795.68	45.55%	6.99%
0.049	5,782.18	1,896.96	32.81%	11,356.72	1,043.36	18.04%	-14.76%	1,228.91	21.25%	-11.55%	1,462.29	25.29%	-7.52%	1,757.67	30.40%	-2.41%	2,133.57	36.90%	4.09%	
35	CS3	S65	Pss65	rrss65	Bonus at Op	PDC1	rrDC1	Δ	PDC2	rrDC2	Δ	PDC3	rrDC3	Δ	PDC4	rrDC4	Δ	PDC5	rrDC5	Δ
	0.000	850.00	807.90	95.05%	21,650.43	421.77	49.62%	-45.43%	523.75	61.62%	-33.43%	654.25	76.97%	-18.08%	821.44	96.64%	1.59%	1,035.82	121.86%	26.81%
	0.019	1,811.71	1,005.11	55.48%	23,539.69	588.59	32.49%	-22.99%	715.86	39.51%	-15.97%	877.03	48.41%	-7.07%	1,081.57	59.70%	4.22%	1,341.56	74.05%	18.57%
	0.029	2,677.44	1,231.27	45.99%	24,606.80	713.25	26.64%	-19.35%	857.73	32.04%	-13.95%	1,039.55	38.83%	-7.16%	1,268.97	47.39%	1.41%	1,559.09	58.23%	12.24%
	0.039	3,941.94	1,520.03	38.56%	25,731.18	874.45	22.18%	-16.38%	1,039.74	26.38%	-12.18%	1,246.34	31.62%	-6.94%	1,505.44	38.19%	-0.37%	1,831.25	46.46%	7.90%
0.049	5,782.18	1,896.96	32.81%	26,915.85	1,083.96	18.75%	-14.06%	1,274.57	22.04%	-10.76%	1,511.12	26.13%	-6.67%	1,805.81	31.23%	-1.58%	2,174.15	37.60%	4.79%	
40	CS4	S65	Pss65	rrss65	Bonus at Op	PDC1	rrDC1	Δ	PDC2	rrDC2	Δ	PDC3	rrDC3	Δ	PDC4	rrDC4	Δ	PDC5	rrDC5	Δ
	0	850.00	807.90	95.05%	34,112.11	454.08	53.42%	-41.63%	552.70	65.02%	-30.02%	674.79	79.39%	-15.66%	825.92	97.17%	2.12%	1,012.95	119.17%	24.12%
	0.0190998	1,811.71	1,005.11	55.48%	38,812.86	627.85	34.66%	-20.82%	752.34	41.53%	-13.95%	905.37	49.97%	-5.51%	1,093.60	60.36%	4.88%	1,325.15	73.14%	17.67%
	0.0290998	2,677.44	1,231.27	45.99%	41,595.61	756.74	28.26%	-17.72%	898.83	33.57%	-12.42%	1,072.74	40.07%	-5.92%	1,285.80	48.02%	2.04%	1,546.98	57.78%	11.79%
	0.0390998	3,941.94	1,520.03	38.56%	44,626.15	922.64	23.41%	-15.15%	1,085.99	27.55%	-11.01%	1,285.00	32.60%	-5.96%	1,527.75	38.76%	0.20%	1,824.15	46.28%	7.72%
0.0490998	5,782.18	1,896.96	32.81%	47,927.28	1,137.36	19.67%	-13.14%	1,326.57	22.94%	-9.86%	1,555.91	26.91%	-5.90%	1,834.35	31.72%	-1.08%	2,172.88	37.58%	4.77%	
45	CS5	S65	Pss65	rrss65	Bonus at Op	PDC1	rrDC1	Δ	PDC2	rrDC2	Δ	PDC3	rrDC3	Δ	PDC4	rrDC4	Δ	PDC5	rrDC5	Δ
	0	850.00	807.90	95.05%	47,810.20	488.90	57.52%	-37.53%	578.41	68.05%	-27.00%	684.98	80.59%	-14.46%	811.75	95.50%	0.45%	962.44	113.23%	18.18%
	0.0190998	1,811.71	1,005.11	55.48%	56,885.04	673.15	37.16%	-18.32%	788.14	43.50%	-11.98%	924.44	51.03%	-4.45%	1,085.93	59.94%	4.46%	1,277.19	70.50%	15.02%
	0.0290998	2,677.44	1,231.27	45.99%	62,513.48	757.50	28.29%	-17.70%	941.27	35.16%	-10.83%	1,097.83	41.00%	-4.98%	1,282.87	47.91%	1.93%	1,501.52	56.08%	10.09%
	0.0390998	3,941.94	1,520.03	38.56%	68,850.48	982.59	24.93%	-13.63%	1,136.21	28.82%	-9.74%	1,317.27	33.42%	-5.14%	1,530.69	38.83%	0.27%	1,782.23	45.21%	6.65%
0.0490998	5,782.18	1,896.96	32.81%	75,990.51	1,206.41	20.86%	-11.94%	1,385.88	23.97%	-8.84%	1,596.72	27.61%	-5.19%	1,844.50	31.90%	-0.91%	2,135.74	36.94%	4.13%	
50	CS6	S65	Pss65	rrss65	Bonus at Op	PDC1	rrDC1	Δ	PDC2	rrDC2	Δ	PDC3	rrDC3	Δ	PDC4	rrDC4	Δ	PDC5	rrDC5	Δ
	0	850.00	807.90	95.05%	62,867.38	526.30	61.92%	-33.13%	601.21	70.73%	-24.32%	686.64	80.78%	-14.27%	783.98	92.23%	-2.81%	894.79	105.27%	10.22%
	0.0190998	1,811.71	1,005.11	55.48%	78,161.28	724.96	40.02%	-15.46%	823.26	45.44%	-10.04%	935.10	51.61%	-3.86%	1,062.27	58.63%	3.15%	1,206.74	66.61%	11.13%
	0.0290998	2,677.44	1,231.27	45.99%	88,096.19	870.55	32.51%	-13.47%	985.10	36.79%	-9.19%	1,115.25	41.65%	-4.33%	1,263.02	47.17%	1.19%	1,430.69	53.43%	7.45%
	0.0390998	3,941.94	1,520.03	38.56%	99,663.23	1,056.29	26.80%	-11.76%	1,190.76	30.21%	-8.35%	1,343.29	34.08%	-4.48%	1,516.20	38.46%	-0.10%	1,712.13	43.43%	4.87%
0.0490998	5,782.18	1,896.96	32.81%	113,150.37	1,294.61	22.39%	-10.42%	1,453.59	25.14%	-7.67%	1,633.60	28.25%	-4.55%	1,837.35	31.78%	-1.03%	2,067.84	35.76%	2.96%	
55	CS7	S65	Pss65	rrss65	Bonus at Op	PDC1	rrDC1	Δ	PDC2	rrDC2	Δ	PDC3	rrDC3	Δ	PDC4	rrDC4	Δ	PDC5	rrDC5	Δ
	0	850.00	807.90	95.05%	79,418.50	566.35	66.63%	-28.42%	621.36	73.10%	-21.95%	681.30	80.15%	-14.89%	746.58	87.83%	-7.21%	817.62	96.19%	1.14%
	0.0190998	1,811.71	1,005.11	55.48%	103,099.50	783.77	43.26%	-12.22%	857.70	47.34%	-8.14%	938.19	51.78%	-3.69%	1,025.76	56.62%	1.14%	1,120.96	61.87%	6.39%
	0.0290998	2,677.44	1,231.27	45.99%	119,205.93	943.06	35.22%	-10.76%	1,030.40	38.48%	-7.50%	1,125.43	42.03%	-3.95%	1,228.76	45.89%	-0.09%	1,341.04	50.09%	4.10%
	0.0390998	3,941.94	1,520.03	38.56%	138,602.76	1,146.06	29.07%	-9.49%	1,250.08	31.71%	-6.85%	1,363.17	34.58%	-3.95%	1,486.05	37.70%	-0.86%	1,619.49	41.08%	2.52%
0.0490998	5,782.18	1,896.96	32.81%	162,018.91	1,406.16	24.32%	-8.49%	1,530.98	26.48%	-6.33%	1,666.59	28.82%	-3.98%	1,813.83	31.37%	-1.44%	1,973.62	34.13%	1.33%	

Contribution rates
 19.1% for PAYG
 13% for Defined Contribution
 19.1% for past Recognition Bond

Table III. PayGo Vs DCIA Recognition Bond is paid at Opt Out date and Contribution Rate for Individual Account is 19.1%

Age	CS1F			PDC1	1.00%	PDC2	2.00%		PDC3	3.00%		PDC4	4.00%		PDC5	5.00%				
25	CS1	S65	Pss65	rrss65	Bonus at Op	PDC1	rrDC1	Δ	PDC2	rrDC2	Δ	PDC3	rrDC3	Δ	PDC4	rrDC4	Δ	PDC5	rrDC5	Δ
	0	850.00	807.90	95.05%	0.00	535.48	63.00%	-32.05%	668.16	78.61%	-16.44%	842.26	99.09%	4.04%	1,071.78	126.09%	31.04%	1,375.58	161.83%	66.79%
	0.0190998	1,811.71	1,005.11	55.48%	0.00	773.45	42.69%	-12.79%	941.55	51.97%	-3.51%	1,158.64	63.95%	8.47%	1,440.66	79.52%	24.04%	1,808.90	99.84%	44.37%
	0.0290998	2,677.44	1,231.27	45.99%	0.00	952.59	35.58%	-10.41%	1,144.97	42.76%	-3.22%	1,391.22	51.96%	5.97%	1,708.45	63.81%	17.82%	2,119.47	79.16%	33.17%
	0.0390998	3,941.94	1,520.03	38.56%	0.00	1,185.21	30.07%	-8.49%	1,407.10	35.70%	-2.86%	1,688.52	42.83%	4.27%	2,047.92	51.95%	13.39%	2,509.77	63.67%	25.11%
0.0490998	5,782.18	1,896.96	32.81%	0.00	1,488.59	25.74%	-7.06%	1,746.55	30.21%	-2.60%	2,070.65	35.81%	3.00%	2,480.82	42.90%	10.10%	3,003.45	51.94%	19.14%	
30	CS2	S65	Pss65	rrss65	Bonus at Op	PDC1	rrDC1	Δ	PDC2	rrDC2	Δ	PDC3	rrDC3	Δ	PDC4	rrDC4	Δ	PDC5	rrDC5	Δ
	0.000	850.00	807.90	95.05%	10,313.57	537.66	63.25%	-31.79%	667.85	78.57%	-16.48%	836.93	98.46%	3.42%	1,057.27	124.38%	29.34%	1,345.19	158.26%	63.21%
	0.019	1,811.71	1,005.11	55.48%	10,707.48	775.68	42.81%	-12.66%	941.23	51.95%	-3.53%	1,153.18	63.65%	8.17%	1,425.78	78.70%	23.22%	1,777.75	98.13%	42.65%
	0.039	3,941.94	1,231.27	45.99%	10,919.69	954.86	35.66%	-10.32%	1,144.65	42.75%	-3.24%	1,385.69	51.75%	5.77%	1,693.38	63.25%	17.26%	2,087.92	77.98%	32.00%
	0.039	3,941.94	1,520.03	38.56%	11,136.08	1,187.50	30.12%	-8.44%	1,406.77	35.69%	-2.87%	1,682.92	42.69%	4.13%	2,032.65	51.56%	13.00%	2,477.82	62.86%	24.30%
0.049	5,782.18	1,896.96	32.81%	11,356.72	1,490.91	25.78%	-7.02%	1,746.22	30.20%	-2.61%	2,064.97	35.71%	2.91%	2,465.36	42.64%	9.83%	2,971.08	51.38%	18.58%	
35	CS3	S65	Pss65	rrss65	Bonus at Op	PDC1	rrDC1	Δ	PDC2	rrDC2	Δ	PDC3	rrDC3	Δ	PDC4	rrDC4	Δ	PDC5	rrDC5	Δ
	0.000	850.00	807.90	95.05%	21,650.43	543.46	63.94%	-31.11%	667.07	78.48%	-16.57%	823.97	96.94%	1.89%	1,023.47	120.41%	25.36%	1,277.44	150.29%	55.24%
	0.019	1,811.71	1,005.11	55.48%	23,539.69	781.89	43.16%	-12.32%	940.39	51.91%	-3.57%	1,139.32	62.89%	7.41%	1,389.64	76.70%	21.22%	1,705.32	94.13%	38.65%
	0.029	2,677.44	1,231.27	45.99%	24,606.80	961.30	35.90%	-10.08%	1,143.78	42.72%	-3.27%	1,371.33	51.22%	5.23%	1,655.94	61.85%	15.86%	2,012.87	75.18%	29.19%
	0.039	3,941.94	1,520.03	38.56%	25,731.18	1,194.17	30.29%	-8.27%	1,405.87	35.66%	-2.90%	1,668.03	42.31%	3.75%	1,993.84	50.58%	12.02%	2,400.04	60.88%	22.32%
0.049	5,782.18	1,896.96	32.81%	26,915.85	1,497.83	25.90%	-6.90%	1,745.28	30.18%	-2.62%	2,049.53	35.45%	2.64%	2,425.13	41.94%	9.13%	2,890.47	49.99%	17.18%	
40	CS4	S65	Pss65	rrss65	Bonus at Op	PDC1	rrDC1	Δ	PDC2	rrDC2	Δ	PDC3	rrDC3	Δ	PDC4	rrDC4	Δ	PDC5	rrDC5	Δ
	0	850.00	807.90	95.05%	34,112.11	552.88	65.05%	-30.00%	665.85	78.34%	-16.71%	804.85	94.69%	-0.36%	975.94	114.82%	19.77%	1,186.52	139.59%	44.54%
	0.0190998	1,811.71	1,005.11	55.48%	38,812.86	792.44	43.74%	-11.74%	939.03	51.83%	-3.65%	1,117.93	61.71%	6.23%	1,336.48	73.77%	18.29%	1,603.64	88.52%	33.04%
	0.0290998	2,677.44	1,231.27	45.99%	41,595.61	972.50	36.32%	-9.67%	1,142.34	42.67%	-3.32%	1,348.62	50.37%	4.38%	1,599.50	59.74%	13.75%	1,904.94	71.15%	25.16%
	0.0390998	3,941.94	1,520.03	38.56%	44,626.15	1,206.08	30.60%	-7.96%	1,404.34	35.63%	-2.93%	1,643.90	41.70%	3.14%	1,933.87	49.06%	10.50%	2,285.37	57.98%	19.42%
0.0490998	5,782.18	1,896.96	32.81%	47,927.28	1,510.49	26.12%	-6.68%	1,743.65	30.16%	-2.65%	2,023.87	35.00%	2.19%	2,361.35	40.84%	8.03%	2,768.53	47.88%	15.07%	
45	CS5	S65	Pss65	rrss65	Bonus at Op	PDC1	rrDC1	Δ	PDC2	rrDC2	Δ	PDC3	rrDC3	Δ	PDC4	rrDC4	Δ	PDC5	rrDC5	Δ
	0	850.00	807.90	95.05%	47,810.20	565.93	66.58%	-28.47%	664.25	78.15%	-16.90%	780.84	91.86%	-3.18%	919.02	108.12%	13.07%	1,082.69	127.38%	32.33%
	0.0190998	1,811.71	1,005.11	55.48%	56,885.04	807.70	44.58%	-10.90%	937.16	51.73%	-3.75%	1,089.84	60.16%	4.68%	1,269.91	70.09%	14.62%	1,482.24	81.81%	26.34%
	0.0290998	2,677.44	1,231.27	45.99%	62,513.48	913.69	34.13%	-11.86%	1,140.30	42.59%	-3.40%	1,318.04	49.23%	3.24%	1,527.05	57.03%	11.05%	1,772.82	66.21%	20.23%
	0.0390998	3,941.94	1,520.03	38.56%	68,850.48	1,224.21	31.06%	-7.50%	1,402.11	35.57%	-2.99%	1,610.56	40.86%	2.30%	1,854.88	47.06%	8.49%	2,141.33	54.32%	15.76%
0.0490998	5,782.18	1,896.96	32.81%	75,990.51	1,530.30	26.47%	-6.34%	1,741.22	30.11%	-2.69%	1,987.45	34.37%	1.57%	2,275.08	39.35%	6.54%	2,611.23	45.16%	12.35%	
50	CS6	S65	Pss65	rrss65	Bonus at Op	PDC1	rrDC1	Δ	PDC2	rrDC2	Δ	PDC3	rrDC3	Δ	PDC4	rrDC4	Δ	PDC5	rrDC5	Δ
	0	850.00	807.90	95.05%	62,867.38	582.61	68.54%	-26.50%	662.30	77.92%	-17.13%	752.99	88.59%	-6.46%	856.11	100.72%	5.67%	973.27	114.50%	19.46%
	0.0190998	1,811.71	1,005.11	55.48%	78,161.28	828.10	45.71%	-9.77%	934.78	51.60%	-3.88%	1,055.80	58.28%	2.80%	1,193.03	65.85%	10.37%	1,348.54	74.43%	18.96%
	0.0290998	2,677.44	1,231.27	45.99%	88,096.19	1,011.89	37.79%	-8.19%	1,137.64	42.49%	-3.50%	1,280.05	47.81%	1.82%	1,441.25	53.83%	7.84%	1,623.62	60.64%	14.65%
	0.0390998	3,941.94	1,520.03	38.56%	99,663.23	1,249.71	31.70%	-6.86%	1,399.13	35.49%	-3.07%	1,568.02	39.78%	1.22%	1,758.82	44.62%	6.06%	1,974.31	50.08%	11.52%
0.0490998	5,782.18	1,896.96	32.81%	113,150.37	1,558.94	26.96%	-5.85%	1,737.88	30.06%	-2.75%	1,939.67	33.55%	0.74%	2,167.21	37.48%	4.67%	2,423.70	41.92%	9.11%	
55	CS7	S65	Pss65	rrss65	Bonus at Op	PDC1	rrDC1	Δ	PDC2	rrDC2	Δ	PDC3	rrDC3	Δ	PDC4	rrDC4	Δ	PDC5	rrDC5	Δ
	0	850.00	807.90	95.05%	79,418.50	602.95	70.94%	-24.11%	660.04	77.65%	-17.40%	722.20	84.96%	-10.08%	789.83	92.92%	-2.13%	863.36	101.57%	6.52%
	0.0190998	1,811.71	1,005.11	55.48%	103,099.50	854.07	47.14%	-8.34%	931.89	51.44%	-4.04%	1,016.50	56.11%	0.63%	1,108.44	61.18%	5.70%	1,208.29	66.69%	11.21%
	0.0290998	2,677.44	1,231.27	45.99%	119,205.93	1,041.62	38.90%	-7.08%	1,134.33	42.37%	-3.62%	1,235.06	46.13%	0.14%	1,344.42	50.21%	4.23%	1,463.10	54.65%	8.66%
	0.0390998	3,941.94	1,520.03	38.56%	138,602.76	1,283.92	32.57%	-5.99%	1,395.33	35.40%	-3.16%	1,516.26	38.46%	-0.10%	1,647.44	41.79%	3.23%	1,789.68	45.40%	6.84%
0.0490998	5,782.18	1,896.96	32.81%	162,018.91	1,598.49	27.65%	-5.16%	1,733.48	29.98%	-2.83%	1,879.85	32.51%	-0.30%	2,038.49	35.25%	2.45%	2,210.34	38.23%	5.42%	

Contribution rates
 19.1% for PAYG
 19.1% for Defined Contribution
 19.1% for past Recognition Bond

Table IV. PayGo Vs DCIA Recognition Bond is paid at Retirement date and Contribution Rate for Individual Account is 13%

Age	CS1F			PDC1	1.00%	PDC2	2.00%		PDC3	3.00%		PDC4	4.00%		PDC5	5.00%				
25	CS1	S65	Pss65	rrss65	Bonus at Op	PDC1	rrDC1	Δ	PDC2	rrDC2	Δ	PDC3	rrDC3	Δ	PDC4	rrDC4	Δ	PDC5	rrDC5	Δ
	0	850.00	807.90	95.05%	0.00	364.46	42.88%	-52.17%	454.77	53.50%	-41.54%	573.27	67.44%	-27.60%	729.48	85.82%	-9.23%	936.26	110.15%	15.10%
	0.0190998	1,811.71	1,005.11	55.48%	0.00	526.43	29.06%	-26.42%	640.84	35.37%	-20.11%	788.61	43.53%	-11.95%	980.55	54.12%	-1.36%	1,231.19	67.96%	12.48%
	0.0290998	2,677.44	1,231.27	45.99%	0.00	648.36	24.22%	-21.77%	779.30	29.11%	-16.88%	946.91	35.37%	-10.62%	1,162.82	43.43%	-2.56%	1,442.57	53.88%	7.89%
	0.0390998	3,941.94	1,520.03	38.56%	0.00	806.69	20.46%	-18.10%	957.71	24.30%	-14.27%	1,149.26	29.15%	-9.41%	1,393.87	35.36%	-3.20%	1,708.22	43.33%	4.77%
0.0490998	5,782.18	1,896.96	32.81%	0.00	1013.17	17.52%	-15.28%	1,188.75	20.56%	-12.25%	1,409.34	24.37%	-8.43%	1,688.52	29.20%	-3.60%	2,044.23	35.35%	2.55%	
30	CS2	S65	Pss65	rrss65	Bonus at Op	PDC1	rrDC1	Δ	PDC2	rrDC2	Δ	PDC3	rrDC3	Δ	PDC4	rrDC4	Δ	PDC5	rrDC5	Δ
	0.000	850.00	807.90	95.05%	10,313.57	421.91	49.64%	-45.41%	487.74	57.38%	-37.67%	571.01	67.18%	-27.87%	676.73	79.62%	-15.43%	811.35	95.45%	0.41%
	0.019	1,811.71	1,005.11	55.48%	10,707.48	586.06	32.35%	-23.13%	675.07	37.26%	-18.22%	786.31	43.40%	-12.08%	925.92	51.11%	-4.37%	1,101.79	60.81%	5.34%
	0.039	3,941.94	1,231.27	45.99%	10,919.69	709.16	26.49%	-19.50%	814.21	30.41%	-15.58%	944.59	35.28%	-10.71%	1,107.17	41.35%	-4.63%	1,310.75	48.96%	2.97%
	0.039	3,941.94	1,520.03	38.56%	11,136.08	868.68	22.04%	-16.52%	993.31	25.20%	-13.36%	1,146.92	29.10%	-9.47%	1,337.19	33.92%	-4.64%	1,573.94	39.93%	1.37%
0.049	5,782.18	1,896.96	32.81%	11,356.72	1076.39	18.62%	-14.19%	1,225.06	21.19%	-11.62%	1,406.98	24.33%	-8.47%	1,630.78	28.20%	-4.60%	1,907.44	32.99%	0.18%	
35	CS3	S65	Pss65	rrss65	Bonus at Op	PDC1	rrDC1	Δ	PDC2	rrDC2	Δ	PDC3	rrDC3	Δ	PDC4	rrDC4	Δ	PDC5	rrDC5	Δ
	0.000	850.00	807.90	95.05%	21,650.43	471.93	55.52%	-39.53%	518.04	60.95%	-34.10%	574.31	67.57%	-27.48%	643.15	75.66%	-19.38%	727.54	85.59%	-9.45%
	0.019	1,811.71	1,005.11	55.48%	23,539.69	643.12	35.50%	-19.98%	709.66	39.17%	-16.31%	790.12	43.61%	-11.87%	887.71	49.00%	-6.48%	1,006.37	55.55%	0.07%
	0.029	2,677.44	1,231.27	45.99%	24,606.80	770.26	28.77%	-17.22%	851.25	31.79%	-14.19%	948.70	35.43%	-10.55%	1,066.32	39.83%	-6.16%	1,208.71	45.14%	-0.84%
	0.039	3,941.94	1,520.03	38.56%	25,731.18	934.06	23.70%	-14.87%	1,032.96	26.20%	-12.36%	1,151.34	29.21%	-9.35%	1,293.54	32.81%	-5.75%	1,464.86	37.16%	-1.40%
0.049	5,782.18	1,896.96	32.81%	26,915.85	1,146.32	19.83%	-12.98%	1,267.47	21.92%	-10.89%	1,411.74	24.42%	-8.39%	1,584.16	27.40%	-5.41%	1,790.89	30.97%	-1.83%	
40	CS4	S65	Pss65	rrss65	Bonus at Op	PDC1	rrDC1	Δ	PDC2	rrDC2	Δ	PDC3	rrDC3	Δ	PDC4	rrDC4	Δ	PDC5	rrDC5	Δ
	0	850.00	807.90	95.05%	34,112.11	515.30	60.62%	-34.42%	545.89	64.22%	-30.82%	581.93	68.46%	-26.58%	624.44	73.46%	-21.58%	674.64	79.37%	-15.68%
	0.0190998	1,811.71	1,005.11	55.48%	38,812.86	697.50	38.50%	-16.98%	744.60	41.10%	-14.38%	799.72	44.14%	-11.34%	864.35	47.71%	-7.77%	940.23	51.90%	-3.58%
	0.0290998	2,677.44	1,231.27	45.99%	41,595.61	831.39	31.05%	-14.94%	890.54	33.26%	-12.73%	959.52	35.84%	-10.15%	1,040.12	38.85%	-7.14%	1,134.46	42.37%	-3.62%
	0.0390998	3,941.94	1,520.03	38.56%	44,626.15	1002.72	25.44%	-13.12%	1,077.10	27.32%	-11.24%	1,163.53	29.52%	-9.04%	1,264.16	32.07%	-6.49%	1,381.58	35.05%	-3.51%
0.0490998	5,782.18	1,896.96	32.81%	47,927.28	1223.36	21.16%	-11.65%	1,317.02	22.78%	-10.03%	1,425.45	24.65%	-8.15%	1,551.27	26.83%	-5.98%	1,697.57	29.36%	-3.45%	
45	CS5	S65	Pss65	rrss65	Bonus at Op	PDC1	rrDC1	Δ	PDC2	rrDC2	Δ	PDC3	rrDC3	Δ	PDC4	rrDC4	Δ	PDC5	rrDC5	Δ
	0	850.00	807.90	95.05%	47,810.20	552.71	65.02%	-30.02%	571.49	67.23%	-27.81%	592.85	69.75%	-25.30%	617.15	72.61%	-22.44%	644.83	75.86%	-19.18%
	0.0190998	1,811.71	1,005.11	55.48%	56,885.04	749.07	41.35%	-14.13%	779.90	43.05%	-12.43%	814.82	44.98%	-10.50%	854.40	47.16%	-8.32%	899.30	49.64%	-5.84%
	0.0290998	2,677.44	1,231.27	45.99%	62,513.48	840.93	31.41%	-14.58%	932.22	34.82%	-11.17%	977.36	36.50%	-9.48%	1,028.43	38.41%	-7.58%	1,086.24	40.57%	-5.42%
	0.0390998	3,941.94	1,520.03	38.56%	68,850.48	1074.47	27.26%	-11.30%	1,126.24	28.57%	-9.99%	1,184.59	30.05%	-8.51%	1,250.45	31.72%	-6.84%	1,324.85	33.61%	-4.95%
0.0490998	5,782.18	1,896.96	32.81%	75,990.51	1307.83	22.62%	-10.19%	1,374.87	23.78%	-9.03%	1,450.28	25.08%	-7.73%	1,535.20	26.55%	-6.26%	1,630.93	28.21%	-4.60%	
50	CS6	S65	Pss65	rrss65	Bonus at Op	PDC1	rrDC1	Δ	PDC2	rrDC2	Δ	PDC3	rrDC3	Δ	PDC4	rrDC4	Δ	PDC5	rrDC5	Δ
	0	850.00	807.90	95.05%	62,867.38	584.81	68.80%	-26.25%	595.01	70.00%	-25.05%	606.21	71.32%	-23.73%	618.52	72.77%	-22.28%	632.05	74.36%	-20.69%
	0.0190998	1,811.71	1,005.11	55.48%	78,161.28	797.70	44.03%	-11.45%	815.55	45.02%	-10.46%	835.11	46.10%	-9.38%	856.56	47.28%	-8.20%	880.08	48.58%	-6.90%
	0.0290998	2,677.44	1,231.27	45.99%	88,096.19	952.54	35.58%	-10.41%	976.42	36.47%	-9.52%	1,002.55	37.44%	-8.54%	1,031.17	38.51%	-7.47%	1,062.51	39.68%	-6.30%
	0.0390998	3,941.94	1,520.03	38.56%	99,663.23	1149.05	29.15%	-9.41%	1,180.93	29.96%	-8.60%	1,215.79	30.84%	-7.72%	1,253.91	31.81%	-6.75%	1,295.61	32.87%	-5.69%
0.0490998	5,782.18	1,896.96	32.81%	113,150.37	1399.92	24.21%	-8.60%	1,442.44	24.95%	-7.86%	1,488.85	25.75%	-7.06%	1,539.55	26.63%	-6.18%	1,594.95	27.58%	-5.22%	
55	CS7	S65	Pss65	rrss65	Bonus at Op	PDC1	rrDC1	Δ	PDC2	rrDC2	Δ	PDC3	rrDC3	Δ	PDC4	rrDC4	Δ	PDC5	rrDC5	Δ
	0	850.00	807.90	95.05%	79,418.50	612.18	72.02%	-23.03%	616.62	72.54%	-22.50%	621.34	73.10%	-21.95%	626.34	73.69%	-21.36%	631.66	74.31%	-20.73%
	0.0190998	1,811.71	1,005.11	55.48%	103,099.50	843.26	46.55%	-8.93%	851.55	47.00%	-8.48%	860.35	47.49%	-7.99%	869.67	48.00%	-7.48%	879.56	48.55%	-6.93%
	0.0290998	2,677.44	1,231.27	45.99%	119,205.93	1011.84	37.79%	-8.20%	1,023.29	38.22%	-7.77%	1,035.42	38.67%	-7.31%	1,048.29	39.15%	-6.83%	1,061.92	39.66%	-6.33%
	0.0390998	3,941.94	1,520.03	38.56%	138,602.76	1226.04	31.10%	-7.46%	1,241.81	31.50%	-7.06%	1,258.51	31.93%	-6.63%	1,276.21	32.38%	-6.19%	1,294.96	32.85%	-5.71%
0.0490998	5,782.18	1,896.96	32.81%	162,018.91	1499.65	25.94%	-6.87%	1,521.31	26.31%	-6.50%	1,544.25	26.71%	-6.10%	1,568.54	27.13%	-5.68%	1,594.26	27.57%	-5.24%	

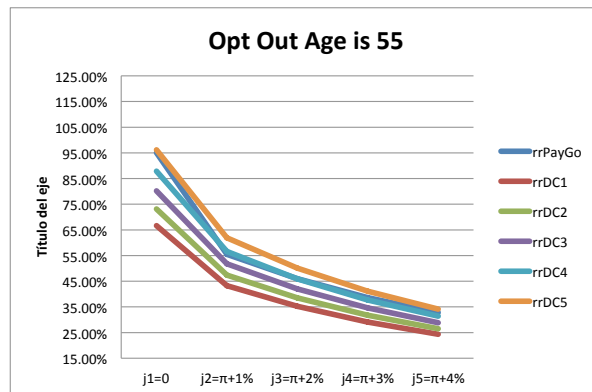
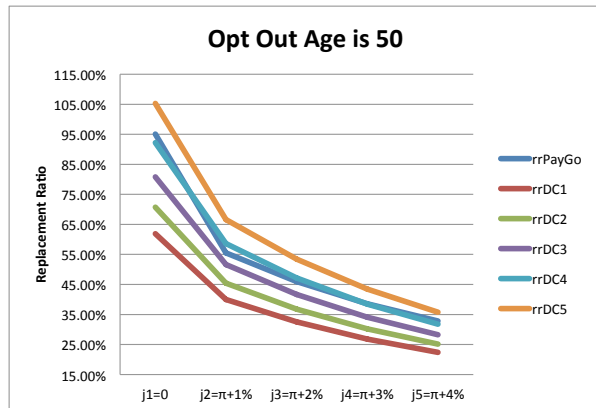
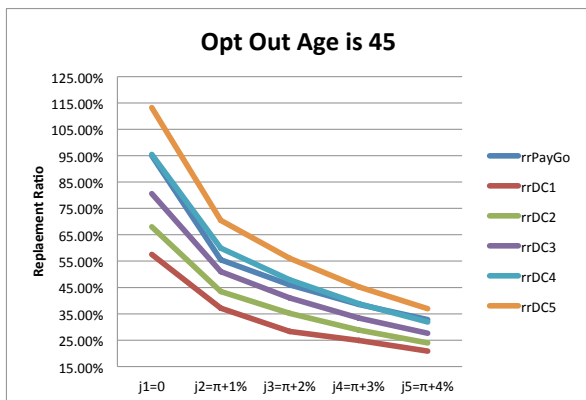
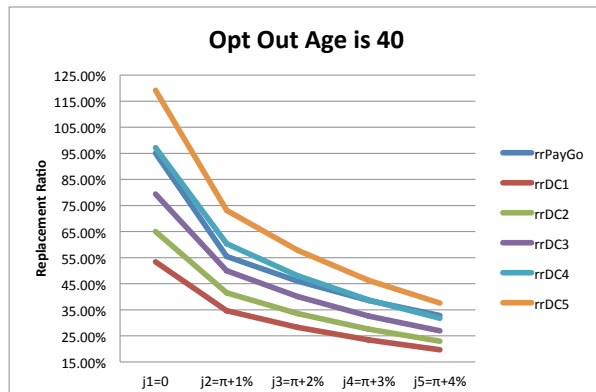
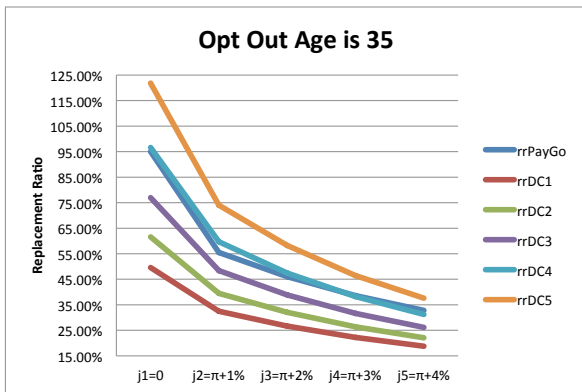
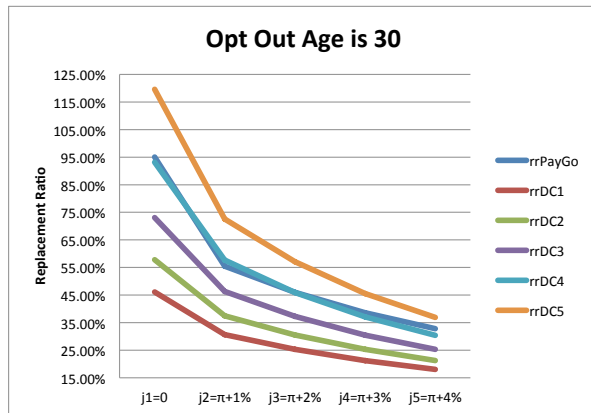
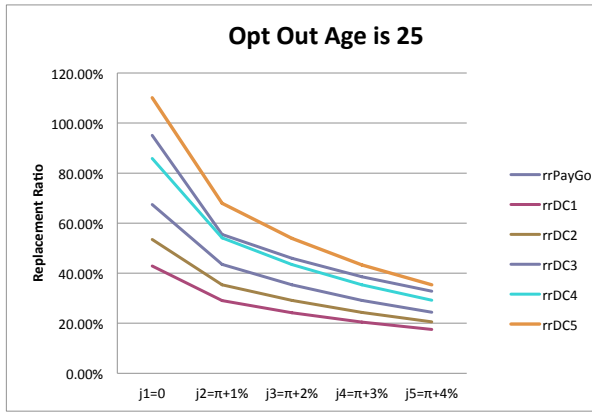
Contribution rates
 19.1% for PAYG
 13% for Defined Contribution
 19.1% for past Recognition Bond

Table V. PayGo Vs DCIA Recognition Bond is paid at Retirement date and Contribution Rate for Individual Account is 19.1%

Age	CS1F		PDC1	1.00%	PDC2	2.00%		PDC3	3.00%		PDC4	4.00%		PDC5	5.00%					
25	CS1	S65	Pss65	rrss65	Bonus at Op	PDC1	rrDC1	Δ	PDC2	rrDC2	Δ	PDC3	rrDC3	Δ	PDC4	rrDC4	Δ	PDC5	rrDC5	Δ
	0	850.00	807.90	95.05%	0.00	535.48	63.00%	-32.05%	668.16	78.61%	-16.44%	842.26	99.09%	4.04%	1,071.78	126.09%	31.04%	1,375.58	161.83%	66.79%
	0.0190998	1,811.71	1,005.11	55.48%	0.00	773.45	42.69%	-12.79%	941.55	51.97%	-3.51%	1,158.64	63.95%	8.47%	1,440.66	79.52%	24.04%	1,808.90	99.84%	44.37%
	0.0290998	2,677.44	1,231.27	45.99%	0.00	952.59	35.58%	-10.41%	1,144.97	42.76%	-3.22%	1,391.22	51.96%	5.97%	1,708.45	63.81%	17.82%	2,119.47	79.16%	33.17%
	0.0390998	3,941.94	1,520.03	38.56%	0.00	1,185.21	30.07%	-8.49%	1,407.10	35.70%	-2.86%	1,688.52	42.83%	4.27%	2,047.92	51.95%	13.39%	2,509.77	63.67%	25.11%
0.0490998	5,782.18	1,896.96	32.81%	0.00	1,488.59	25.74%	-7.06%	1,746.55	30.21%	-2.60%	2,070.65	35.81%	3.00%	2,480.82	42.90%	10.10%	3,003.45	51.94%	19.14%	
30	CS2	S65	Pss65	rrss65	Bonus at Op	PDC1	rrDC1	Δ	PDC2	rrDC2	Δ	PDC3	rrDC3	Δ	PDC4	rrDC4	Δ	PDC5	rrDC5	Δ
	0.000	850.00	807.90	95.05%	10,313.57	567.65	66.78%	-28.26%	664.36	78.16%	-16.89%	786.71	92.55%	-2.49%	942.04	110.83%	15.78%	1,139.83	134.10%	39.05%
	0.019	1,811.71	1,005.11	55.48%	10,707.48	806.82	44.53%	-10.94%	937.60	51.75%	-3.73%	1,101.04	60.77%	5.30%	1,306.15	72.10%	16.62%	1,564.55	86.36%	30.88%
	0.039	3,941.94	1,231.27	45.99%	10,919.69	986.62	36.85%	-9.14%	1,140.95	42.61%	-3.37%	1,332.52	49.77%	3.78%	1,571.38	58.69%	12.70%	1,870.49	69.86%	23.87%
	0.039	3,941.94	1,520.03	38.56%	11,136.08	1,219.89	30.95%	-7.61%	1,403.00	35.59%	-2.97%	1,628.69	41.32%	2.76%	1,908.23	48.41%	9.85%	2,256.07	57.23%	18.67%
0.049	5,782.18	1,896.96	32.81%	11,356.72	1,523.94	26.36%	-6.45%	1,742.37	30.13%	-2.67%	2,009.66	34.76%	1.95%	2,338.47	40.44%	7.64%	2,744.94	47.47%	14.67%	
35	CS3	S65	Pss65	rrss65	Bonus at Op	PDC1	rrDC1	Δ	PDC2	rrDC2	Δ	PDC3	rrDC3	Δ	PDC4	rrDC4	Δ	PDC5	rrDC5	Δ
	0.000	850.00	807.90	95.05%	21,650.43	593.62	69.84%	-25.21%	661.36	77.81%	-17.24%	744.04	87.53%	-7.51%	845.17	99.43%	4.39%	969.16	114.02%	18.97%
	0.019	1,811.71	1,005.11	55.48%	23,539.69	836.43	46.17%	-9.31%	934.19	51.56%	-3.91%	1,052.41	58.09%	2.61%	1,195.79	66.00%	10.52%	1,370.13	75.63%	20.15%
	0.029	2,677.44	1,231.27	45.99%	24,606.80	1,018.30	38.03%	-7.95%	1,137.30	42.48%	-3.51%	1,280.47	47.82%	1.84%	1,453.29	54.28%	8.29%	1,662.49	62.09%	16.11%
	0.039	3,941.94	1,520.03	38.56%	25,731.18	1,253.78	31.81%	-6.75%	1,399.09	35.49%	-3.07%	1,573.02	39.90%	1.34%	1,781.94	45.20%	6.64%	2,033.65	51.59%	13.03%
0.049	5,782.18	1,896.96	32.81%	26,915.85	1,560.19	26.98%	-5.82%	1,738.19	30.06%	-2.75%	1,950.16	33.73%	0.92%	2,203.47	38.11%	5.30%	2,507.21	43.36%	10.55%	
40	CS4	S65	Pss65	rrss65	Bonus at Op	PDC1	rrDC1	Δ	PDC2	rrDC2	Δ	PDC3	rrDC3	Δ	PDC4	rrDC4	Δ	PDC5	rrDC5	Δ
	0	850.00	807.90	95.05%	34,112.11	614.10	72.25%	-22.80%	659.05	77.54%	-17.51%	712.00	83.76%	-11.28%	774.45	91.11%	-3.93%	848.22	99.79%	4.74%
	0.0190998	1,811.71	1,005.11	55.48%	38,812.86	862.09	47.58%	-7.89%	931.29	51.40%	-4.07%	1,012.28	55.87%	0.40%	1,107.23	61.12%	5.64%	1,218.72	67.27%	11.79%
	0.0290998	2,677.44	1,231.27	45.99%	41,595.61	1,047.14	39.11%	-6.88%	1,134.05	42.36%	-3.63%	1,235.39	46.14%	0.15%	1,353.81	50.56%	4.58%	1,492.42	55.74%	9.75%
	0.0390998	3,941.94	1,520.03	38.56%	44,626.15	1,286.16	32.63%	-5.93%	1,395.44	35.40%	-3.16%	1,522.42	38.62%	0.06%	1,670.29	42.37%	3.81%	1,842.79	46.75%	8.19%
0.0490998	5,782.18	1,896.96	32.81%	47,927.28	1,596.50	27.61%	-5.20%	1,734.10	29.99%	-2.82%	1,893.41	32.75%	-0.06%	2,078.27	35.94%	3.14%	2,293.22	39.66%	6.85%	
45	CS5	S65	Pss65	rrss65	Bonus at Op	PDC1	rrDC1	Δ	PDC2	rrDC2	Δ	PDC3	rrDC3	Δ	PDC4	rrDC4	Δ	PDC5	rrDC5	Δ
	0	850.00	807.90	95.05%	47,810.20	629.74	74.09%	-20.96%	657.33	77.33%	-17.71%	688.71	81.02%	-14.02%	724.42	85.23%	-9.82%	765.09	90.01%	-5.04%
	0.0190998	1,811.71	1,005.11	55.48%	56,885.04	883.62	48.77%	-6.71%	928.92	51.27%	-4.21%	980.22	54.11%	-1.37%	1,038.38	57.31%	1.84%	1,104.35	60.96%	5.48%
	0.0290998	2,677.44	1,231.27	45.99%	62,513.48	997.12	37.24%	-8.75%	1,131.25	42.25%	-3.74%	1,197.58	44.73%	-1.26%	1,272.60	47.53%	1.54%	1,357.54	50.70%	4.72%
	0.0390998	3,941.94	1,520.03	38.56%	68,850.48	1,316.09	33.39%	-5.17%	1,392.14	35.32%	-3.24%	1,477.88	37.49%	-1.07%	1,574.64	39.95%	1.39%	1,683.96	42.72%	4.16%
0.0490998	5,782.18	1,896.96	32.81%	75,990.51	1,631.71	28.22%	-4.59%	1,730.22	29.92%	-2.88%	1,841.01	31.84%	-0.97%	1,965.78	34.00%	1.19%	2,106.42	36.43%	3.62%	
50	CS6	S65	Pss65	rrss65	Bonus at Op	PDC1	rrDC1	Δ	PDC2	rrDC2	Δ	PDC3	rrDC3	Δ	PDC4	rrDC4	Δ	PDC5	rrDC5	Δ
	0	850.00	807.90	95.05%	62,867.38	641.12	75.43%	-19.62%	656.11	77.19%	-17.86%	672.56	79.13%	-15.92%	690.65	81.25%	-13.79%	710.53	83.59%	-11.46%
	0.0190998	1,811.71	1,005.11	55.48%	78,161.28	900.85	49.72%	-5.75%	927.07	51.17%	-4.31%	955.81	52.76%	-2.72%	987.32	54.50%	-0.98%	1,021.88	56.40%	0.93%
	0.0290998	2,677.44	1,231.27	45.99%	88,096.19	1,093.88	40.86%	-5.13%	1,128.96	42.17%	-3.82%	1,167.35	43.60%	-2.39%	1,209.39	45.17%	-0.82%	1,255.44	46.89%	0.90%
	0.0390998	3,941.94	1,520.03	38.56%	99,663.23	1,342.46	34.06%	-4.50%	1,389.31	35.24%	-3.32%	1,440.52	36.54%	-2.02%	1,496.52	37.96%	-0.60%	1,557.79	39.52%	0.96%
0.0490998	5,782.18	1,896.96	32.81%	113,150.37	1,664.25	28.78%	-4.02%	1,726.72	29.86%	-2.94%	1,794.93	31.04%	-1.76%	1,869.42	32.33%	-0.48%	1,950.81	33.74%	0.93%	
55	CS7	S65	Pss65	rrss65	Bonus at Op	PDC1	rrDC1	Δ	PDC2	rrDC2	Δ	PDC3	rrDC3	Δ	PDC4	rrDC4	Δ	PDC5	rrDC5	Δ
	0	850.00	807.90	95.05%	79,418.50	648.78	76.33%	-18.72%	655.30	77.09%	-17.95%	662.23	77.91%	-17.14%	669.59	78.78%	-16.27%	677.41	79.69%	-15.35%
	0.0190998	1,811.71	1,005.11	55.48%	103,099.50	913.56	50.43%	-5.05%	925.74	51.10%	-4.38%	938.66	51.81%	-3.67%	952.36	52.57%	-2.91%	966.89	53.37%	-2.11%
	0.0290998	2,677.44	1,231.27	45.99%	119,205.93	1,110.40	41.47%	-4.51%	1,127.22	42.10%	-3.89%	1,145.05	42.77%	-3.22%	1,163.95	43.47%	-2.51%	1,183.98	44.22%	-1.77%
	0.0390998	3,941.94	1,520.03	38.56%	138,602.76	1,363.89	34.60%	-3.96%	1,387.06	35.19%	-3.37%	1,411.60	35.81%	-2.75%	1,437.61	36.47%	-2.09%	1,465.15	37.17%	-1.39%
0.0490998	5,782.18	1,896.96	32.81%	162,018.91	1,691.98	29.26%	-3.54%	1,723.81	29.81%	-2.99%	1,757.52	30.40%	-2.41%	1,793.20	31.01%	-1.79%	1,830.99	31.67%	-1.14%	

Contribution rates
 19.1% for PAYG
 13% for Defined Contribution
 19.1% for past Recognition Bond

PayG Vs DCIA Measure: Replacement Ratio per changes in salary Increase rate and rate of Returns (Entryge is 25)



* Contribution Rate is 13%
Retirement Bond is Paid at Opt Out Age

06-septiembre-2013		Rendibilidade Anualizada					Risco	Classe de	Valor da UP
Nome	12 Meses	24 Meses	36 Meses	60 Meses	104 Sem	260 Sem	de	(Euro €)	
Fundos Poupança Acções (FPA)									
F.P. ESAF PPA	31,34	11,11	-1,87	-2,21	18,35	22,11	5	5.7226	
F.P. PPA Acção Futuro							*	11.9823	

06-septiembre-2013		Rendibilidade Anualizada					Risco	Classe de	Valor da UP
Nome	12 Meses	24 Meses	36 Meses	60 Meses	104 Sem	260 Sem	de	(Euro €)	
Fundos Poupança Reforma (FPR)									
Categoria A - Entre 0% e 5% de Acções									
F.P. BBVA Solidez PPR	2,21	3,48	2,87	2,00	2,49	2,28	2	6.0011	
F.P. PPR Garantia de Futuro							*	7.4083	
F.P. PPR Praemium S							*	14.8389	
Categoria B - Entre 5% e 15% de Acções									
F.P. BPI Vida - PPR	3,68	4,70	1,79	1,43	3,28	3,34	2	7.3376	
F.P. ESAF PPR Vintage	3,50	3,57	3,32	3,66	2,14	1,77	2	10.8293	
Categoria C - Entre 15% e 35% de Acções									
F.P. CVI PPR	4,22	6,52	2,40	2,96	6,02	7,35	3	11.0364	
F.P. PPR 5 Estrelas							*	22.2841	
F.P. PPR BBVA	3,67	5,88	1,79	2,14	6,19	7,13	3	10.6904	
F.P. PPR BNU Vanguarda							*	14.8381	
F.P. PPR Europa							*	9.1296	
F.P. PPR Geração Activa							*	6.0697	
F.P. PPR Platinum							*	6.9889	
F.P. Vanguarda PPR							*	7.1104	
Categoria D - Mais de 35% de Acções									
F.P. Poupança Reforma PPR BBVA Acções	6,07	9,71	1,76		10,70		4	5.3714	
F.P. PPR Praemium V							*	17.9898	

06-septiembre-2013		Rendibilidade Anualizada					Risco	Classe de Risco	Valor da UP
Nome	Comissão de Gestão Vigente	12 Meses	24 Meses	36 Meses	60 Meses	104 Sem	260 Sem	(Euro €)	
Fundos de Pensões Abertos (Adesões Individuais e Colectivas)									
Categoria A - Entre 0% e 5% de Acções									
F.P. Aberto Caixa Reforma Garantida 2022	Max: 3%/ano							*	5.5985
F.P. Aberto Caixa Reforma Prudente	Max: 1%/ano							*	5.7302
F.P. Aberto Horizonte Segurança	0.5%/ano							*	9.3274
F.P. Aberto Protecção 2015	1.5%	5,70	4,02	1,73	0,99	7,43	6,97	3	5.5029
F.P. Banif Reforma Garantida	Max: 0.5%/ano	3,78	4,17			0,23		1	5.5653
F.P. Banif Reforma Sénior	Max 1%/ano	5,17	5,82	3,00		1,46		2	5.5744
F.P. Aberto ES Multireforma Capital Garantido	Max: 2.5%/ano	6,23	5,39	4,81		3,05		2	6.0241
Categoria B - Entre 5% e 15% de Acções									
F.P. Aberto Caixa Reforma Activa	Max: 3%/ano							*	12.1321
F.P. Aberto Espírito Santo Multireforma	Max: 2.5%/ano	4,85	6,24	2,38	3,43	3,79	3,80	2	10.7573
F.P. Aberto Futuro Clássico	Max: 1.40%/ano							*	14.2074
F.P. Banif Previdência Empresas	0.2398%/ano	5,28	5,53	2,74	0,68	3,10	3,67	2	6.6397
F.P. Banif Reforma Activa	Max 1%/ano	5,48	5,45	2,38		3,19		2	5.6618
F.P. Optimize Capital Pensões Moderado	Max: 1.25%/ano	3,67	9,99			5,20		3	5.7467
Categoria C - Entre 15% e 35% de Acções									
F.P. Aberto BBVA PME's	1.5%/ano	3,33	5,88	1,56	2,48	5,95	6,92	3	6.2009
F.P. Aberto Caixa Reforma Valor	Max: 3%/ano							*	5.3494
F.P. Aberto Espírito Santo Multireforma Plus	Max: 2.5%/ano	6,49	6,37	1,98	2,85	5,70	5,99	3	6.1332
F.P. Aberto Horizonte Valorização	0.7%/ano							*	11.2120
F.P. Aberto Reforma Empresa	0.25%/ano	3,03	5,47	2,69	1,98	4,83	4,69	3	10.2129
F.P. Aberto Turismo Pensões	0.5%/ano							*	7.1459
F.P. Aberto VIVA	Max: 1.75%/ano							*	13.4825
F.P. Optimize Capital Pensões Equilibrado	Max: 1.25%/ano	5,79	12,52			6,57		3	5.7742
Categoria D - Mais de 35% de Acções									
F.P. Aberto Horizonte Valorização Mais	1%/ano							*	9.1281
F.P. Aberto Multireforma Acções	Max: 2.5%/ano	15,46	11,47	3,51		16,31	21,04	5	6.4052
F.P. Banif Reforma Jovem	Max 1%/ano	5,88	5,65	0,47		6,00		3	5.2028
F.P. Futuro XXI	Max: 2%/ano							*	11.1481
Outros Fundos de Pensões Abertos									
F.P. Aberto Protecção 2020	1.65%	14,87	6,04	0,87	-0,12	13,74	12,19	4	5.0800
F.P. Optimize Capital Pensões Acções	Max: 1.25%/ano	7,28	13,30			7,28		3	5.7388

06-septiembre-2013		Rendibilidade Anualizada					Risco	Classe de Risco	Valor da UP
Nome		12 Meses	24 Meses	36 Meses	60 Meses	104 Sem	260 Sem	(Euro €)	
Fundos de Pensões Abertos (Adesões Individuais e Colectivas) - Rendibilidades Brutas de Comissão de Gestão									
Categoria A - Entre 0% e 5% de Acções									
F.P. Aberto BPI Garantia		2,49	1,45	1,68	1,19	0,99	1,09	1	11.5407
Categoria B - Entre 5% e 15% de Acções									
F.P. Aberto BPI Segurança		3,76	4,15	3,19	2,59	2,24	2,47	2	17.3437
Categoria C - Entre 15% e 35% de Acções									
F.P. Aberto BPI Valorização		5,64	5,88	4,00	3,31	4,07	4,87	2	16.3423
Categoria D - Mais de 35% de Acções									
F.P. Aberto BPI Acções		8,81	8,92	5,32	4,41	7,09	8,78	3	13.5838

Appendix8

Table VII Current Deficit Situation for Old Age Pensions

	A	B	C
3	year 2011	Age Group	Old Age
4		Population**	10623000
5		Active Population***	5480000
6		% unemployment +	15,30%
7		No. Of Participants	4641560
8		Q&C*	7.555.529,63 €
9		BPI	9.574.259,50 €
10		Results (-ve for deficit)	-2.018.729,87 €

11

12 Hypothetical scenario of Deficit Situation with full employment for 2011

	A	B	C
13	year 2011	Age Group	Old Age
14		Active Population	5480000
15		% unemployment	0
16		No. Of Participants	5480000
17		Q&C	8.920.341,95 €
18		BPI	9.574.259,50 €
19		Results (-ve for deficit)	-653.917,55 €

20

21	Salaries in 2011	39.557.746,75 €	(C8/19,1%)
22	Salaries in Abstraction scenario of Full Employment	46.703.360,98 €	(C17/19,1%)
23	Salaries in Deficit 0 scenario	50.127.013,09 €	(D17-D19)/19,1%
24	%change in salaries (with respect to abstraction)	7,33%	(C23-C22)/C22
25	%change in salaries (with respect to reality)	18,06%	(C22-C21)/C21

BPI Benefits paid to Pensioned individuals only Oldage, excluding Disability and Survival available in <http://goo.gl/c7SPB4>

*Q&C Quotations & Contributions from PORDATA SS (13756317,9) adjusted by multiplying (19,1/34,75) to Total Contributions in 2011 available in goo.gl/WiVif

** Population

IOPS Country Profile Portugal, aceip, WR FACTBOOK CIA

*** Active Population

<https://www.cia.gov/library/publications/the-world-factbook/rankorder/2095rank.html>

+ % Unemployment

<https://www.cia.gov/library/publications/the-world-factbook/fields/2129.html#po>

As unemployment decreases generates employment and hence contributions to Social Security

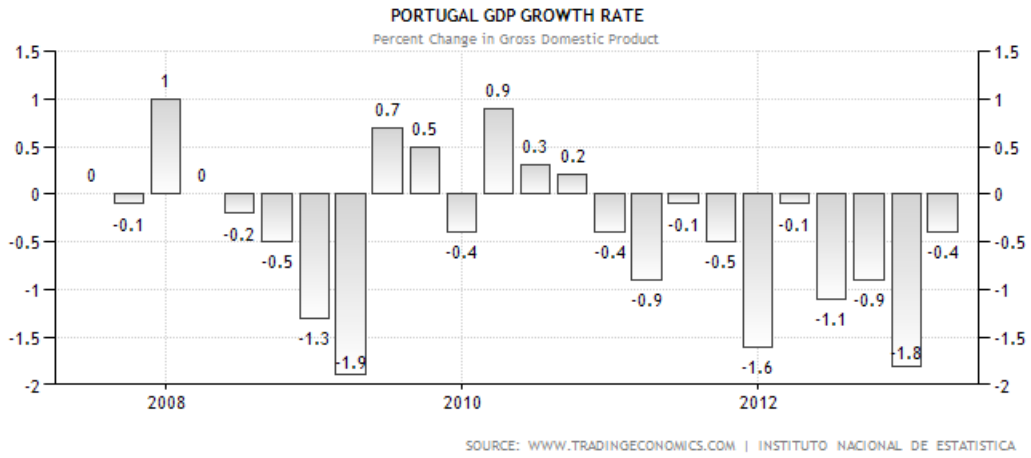
Increase in Revenues

18,06%

Reduction in Deficit

-67,61%

Graphic Illustration of Portugal GDP Growth Rate



Graph Illustration of Portugal Unemployment Rate



Appendix10

Table VIII. IRR for PAYG with Salary increase Rate of J=4.91%

J5	=0,0491		IRR= 2.40%
Age	CashF	σ * CashF	Sum Present Value Cash F
			0.00
25	-1948.20	-1948.2	-1,948
26	-2043.86	-2042.820252	-1,995
61	-10940.54	-10151.16718	-4,321
62	-11477.72	-10583.37901	-4,400
63	-12041.27	-11028.43446	-4,477
64	-12632.50	-11511.5302	-4,564
65	22763.52	20533.78429	7,950
66	22763.52	20360.24245	7,698
67	22763.52	20171.70032	7,447
100	22763.52	341.3143358	58
101	22763.52	221.7735474	37
102	22763.52	138.2334599	22
103	22763.52	82.6169927	13
104	22763.52	47.30861314	7
105	22763.52	26.07743066	4
106	22763.52	13.61564964	2
107	22763.52	6.923211679	1
108	22763.52	3.230832117	0
109	22763.52	1.384642336	0
110	22763.52	0.461547445	0

Table X Income and Expenses of Contingency Benefits (without Survival Benefits)

A	B	C	D	E	F	G	H	I	J	K	L	M	N
Year	Disability (Invalidez)	Death Benefit (Subsidio de Morte e Funeral)	Total Expenses Disability and Death (B+C)	Employee Remunerations	Revenue Disability (3,51%*E)	Loss Ratio (Disability B/F)	Revenue Death (2,31%* E)	Loss Ratio (Death C/F)	Total Revenue (F + H)	Loss Ratio (D&D) (D/J)	Disability Superavit (F - B)	Death Superavit (H - C)	Total Superavit (J - D)
1975	22.805.00 €	1.880.50 €	24.685.50 €	1787186	41.284.00 €	55.24%	62.730.23 €	3.00%	104.014.23 €	23.73%	18.479.00 €	60.849.73 €	79.328.73 €
1976	33.284.80 €	2.683.50 €	35.968.30 €	2077257	47.984.64 €	69.37%	72.911.72 €	3.68%	120.896.36 €	29.75%	14.699.84 €	70.228.22 €	84.928.06 €
1977	43.462.00 €	3.150.90 €	46.612.90 €	2441161	56.390.82 €	77.07%	85.684.75 €	3.68%	142.075.57 €	32.81%	12.928.82 €	82.533.85 €	95.462.67 €
1978	52.384.00 €	3.895.60 €	56.279.60 €	2852702	65.897.42 €	79.49%	100.129.84 €	3.89%	166.027.26 €	33.90%	13.513.42 €	96.234.24 €	109.747.66 €
1979	59.858.50 €	4.392.10 €	64.250.60 €	3370413	77.856.54 €	76.88%	118.301.50 €	3.71%	196.158.04 €	32.75%	17.998.04 €	113.909.40 €	131.907.44 €
1980	90.758.30 €	5.450.70 €	96.209.00 €	4287340	99.037.55 €	91.64%	150.485.63 €	3.62%	249.523.19 €	38.56%	8.279.25 €	145.034.93 €	153.314.19 €
1981	117.313.20 €	7.387.70 €	124.700.90 €	5264432	121.608.38 €	96.47%	184.781.56 €	4.00%	306.389.94 €	40.70%	4.295.18 €	177.393.86 €	181.689.04 €
1982	147.984.30 €	8.598.50 €	156.582.80 €	6556760	151.461.16 €	97.70%	230.142.28 €	3.74%	381.603.43 €	41.03%	3.476.86 €	221.543.78 €	225.020.63 €
1983	185.757.80 €	11.067.70 €	196.825.50 €	7805597	180.309.29 €	103.02%	273.976.45 €	4.04%	454.285.75 €	43.33%	-5.448.51 €	262.908.75 €	257.460.25 €
1984	228.150.50 €	13.984.60 €	242.135.10 €	8717773	201.380.56 €	113.29%	305.993.83 €	4.57%	507.374.39 €	47.72%	-26.769.94 €	292.009.23 €	265.239.29 €
1985	270.471.00 €	15.768.20 €	286.239.20 €	10525519	243.139.49 €	111.24%	369.445.72 €	4.27%	612.585.21 €	46.73%	-27.331.51 €	353.677.52 €	326.346.01 €
1986	325.830.70 €	20.954.80 €	346.785.50 €	12708531	293.567.07 €	110.99%	446.069.44 €	4.70%	739.636.50 €	46.89%	-32.263.63 €	425.114.64 €	392.851.00 €
1987	402.780.80 €	28.519.10 €	431.299.90 €	14949005	345.322.02 €	116.64%	524.710.08 €	5.44%	870.032.09 €	49.57%	-57.458.78 €	496.190.98 €	438.732.19 €
1988	487.420.50 €	35.181.70 €	522.602.20 €	17429488	402.621.17 €	121.06%	611.775.03 €	5.75%	1.014.396.20 €	51.52%	-84.799.33 €	576.593.33 €	491.794.00 €
1989	552.316.30 €	36.492.70 €	588.809.00 €	21166936	488.956.22 €	112.96%	742.959.45 €	4.91%	1.231.915.68 €	47.80%	-63.360.08 €	706.466.75 €	643.106.68 €
1990	659.125.50 €	43.432.40 €	702.557.90 €	25202673	582.181.75 €	113.22%	884.613.82 €	4.91%	1.466.795.57 €	47.90%	-76.943.75 €	841.181.42 €	764.237.67 €
1991	730.930.70 €	58.382.80 €	789.313.50 €	30098533	695.276.11 €	105.13%	1.056.458.51 €	5.53%	1.751.734.62 €	45.06%	-35.654.59 €	998.075.71 €	962.421.12 €
1992	803.408.20 €	75.540.20 €	878.948.40 €	35359749	816.810.20 €	98.36%	1.241.127.19 €	6.09%	2.057.937.39 €	42.71%	13.402.00 €	1.165.586.99 €	1.178.988.99 €
1993	849.788.20 €	79.918.90 €	929.707.10 €	37479970	865.787.31 €	98.15%	1.315.546.95 €	6.07%	2.181.334.25 €	42.62%	15.999.11 €	1.235.628.05 €	1.251.627.15 €
1994	873.767.40 €	88.510.70 €	962.278.10 €	38694503	893.843.02 €	97.75%	1.358.177.06 €	6.52%	2.252.020.07 €	42.73%	20.075.62 €	1.269.666.36 €	1.289.741.97 €
1995	895.102.70 €	98.840.30 €	993.943.00 €	42193368	974.666.80 €	91.84%	1.480.987.22 €	6.67%	2.455.654.02 €	40.48%	79.564.10 €	1.382.146.92 €	1.461.711.02 €
1996	930.770.00 €	109.694.80 €	1.040.464.80 €	45306333	1.046.576.29 €	88.93%	1.590.252.29 €	6.90%	2.636.828.58 €	39.46%	115.806.29 €	1.480.557.49 €	1.596.363.78 €
1997	971.625.10 €	115.953.60 €	1.087.578.70 €	49246770	1.137.600.39 €	85.41%	1.728.561.63 €	6.71%	2.866.162.01 €	37.95%	165.975.29 €	1.612.608.03 €	1.778.583.31 €
1998	1.032.037.80 €	114.443.20 €	1.146.481.00 €	53723267	1.241.007.47 €	83.16%	1.885.686.67 €	6.07%	3.126.694.14 €	36.67%	208.969.67 €	1.771.243.47 €	1.980.213.14 €
1999	1.117.798.20 €	126.242.30 €	1.244.040.50 €	57676929	1.332.337.06 €	83.90%	2.024.460.21 €	6.24%	3.356.797.27 €	37.06%	214.538.86 €	1.898.217.91 €	2.112.756.77 €
2000	1.153.870.70 €	129.986.60 €	1.283.857.30 €	62623588	1.446.604.88 €	79.76%	2.198.087.94 €	5.91%	3.644.692.82 €	35.23%	292.734.18 €	2.068.101.34 €	2.360.835.52 €
2001	1.168.298.70 €	142.333.30 €	1.310.632.00 €	66109734	1.527.134.86 €	76.50%	2.320.451.66 €	6.13%	3.847.586.52 €	34.06%	358.836.16 €	2.178.118.36 €	2.536.954.52 €
2002	1.086.130.90 €	150.574.60 €	1.236.705.50 €	69374237	1.602.544.87 €	67.78%	2.435.035.72 €	6.18%	4.037.580.59 €	30.63%	516.413.97 €	2.284.461.12 €	2.800.875.09 €
2003	1.090.091.20 €	152.246.80 €	1.242.338.00 €	71223111	1.645.253.86 €	66.26%	2.499.931.20 €	6.09%	4.145.185.06 €	29.97%	555.162.66 €	2.347.684.40 €	2.902.847.06 €
2004	1.112.125.40 €	153.934.20 €	1.266.059.60 €	73648365	1.701.277.23 €	65.37%	2.585.057.61 €	5.95%	4.286.334.84 €	29.54%	589.151.83 €	2.431.123.41 €	3.020.275.24 €
2005	1.093.732.80 €	186.568.80 €	1.280.301.60 €	77359117	1.786.995.60 €	61.21%	2.715.305.01 €	6.87%	4.502.300.61 €	28.44%	693.262.80 €	2.528.736.21 €	3.221.999.01 €
2006	1.110.179.10 €	179.438.90 €	1.289.618.00 €	79663125	1.840.218.19 €	60.33%	2.796.175.69 €	6.42%	4.636.393.88 €	27.82%	730.039.09 €	2.616.736.79 €	3.346.775.88 €
2007	1.150.257.50 €	195.271.70 €	1.345.529.20 €	82861257	1.914.095.04 €	60.09%	2.908.430.12 €	6.71%	4.822.525.16 €	27.90%	763.837.54 €	2.713.158.42 €	3.476.995.96 €
2008	1.144.698.40 €	197.444.90 €	1.342.143.30 €	85692385	1.979.494.09 €	57.83%	3.007.802.71 €	6.56%	4.987.296.81 €	26.91%	834.795.69 €	2.810.357.81 €	3.645.153.51 €
2009	1.133.184.30 €	219.585.10 €	1.352.769.40 €	85888377	1.984.021.51 €	57.12%	3.014.682.03 €	7.28%	4.998.703.54 €	27.06%	850.837.21 €	2.795.096.93 €	3.645.934.14 €
2010	1.120.022.00 €	215.488.40 €	1.335.510.40 €	86813942	2.005.402.06 €	55.85%	3.047.169.36 €	7.07%	5.052.571.42 €	26.43%	885.380.06 €	2.831.680.96 €	3.717.061.02 €
2011	1.113.621.80 €	223.362.00 €	1.336.983.80 €	85.759.562.00	1.981.045.88 €	56.21%	3.010.160.63 €	7.42%	4.991.206.51 €	26.79%	867.424.08 €	2.786.798.63 €	3.654.222.71 €

Avg historical

84.95%

5.49%

37.03%

Avg past 20 years

76.04%

6.45%

34.07%

Avg past 10 years

62.23%

6.61%

28.69%

Figures in Thousands of Euros

Source

PORDATA Remunerações dos empregados available in <http://www.pordata.pt/Portugal/Remuneracoes+dos+empregados-2404>PORDATA Despesas por tipo <http://www.pordata.pt/Portugal/Pensoes+da+Seguranca+Social+despesa+total+e+por+tipo-102>

Survival Benefit are analysed separately and not within Death Benefit

Table XI Income and Expenses of Contingency Benefits (Including Survival Benefits)

A	B	C	D	E	F	G	H	I	J	K	L	M	N	
Year	Disability (Invalidez)	Sobrevivência (a todos os regimes)	Death Benefit (Subsidio de Morte e Funeral)	Total Expenses (Disability and Death (B+C))	Employee Remunerations	Revenue (Disability (3,51%*E))	Loss Ratio (Disability B/F)	Revenue Death (2,31%* E)	Loss Ratio (Death C/F)	Total Revenue (F + H)	Loss Ratio (D&D) (D/J)	Disability Superavit (F - B)	Death Superavit (H - C)	Total Superavit (J - D)
1975	22,805.00 €	4,454.30	1,880.50 €	29,139.80 €	1787186	41,284.00 €	55.24%	62,730.23 €	10.10%	104,014.23 €	28.02%	18,479.00 €	56,395.43 €	74,874.43 €
1976	33,284.80 €	10,664.30	2,683.50 €	46,632.60 €	2077257	47,984.64 €	69.37%	72,911.72 €	18.31%	120,896.36 €	38.57%	14,699.84 €	59,563.92 €	74,263.76 €
1977	43,462.00 €	14,637.60	3,150.90 €	61,250.50 €	2441161	56,390.82 €	77.07%	85,684.75 €	20.76%	142,075.57 €	43.11%	12,928.82 €	67,896.25 €	80,825.07 €
1978	52,384.00 €	17,744.10	3,895.60 €	74,023.70 €	2852702	65,897.42 €	79.49%	100,129.84 €	21.61%	166,027.26 €	44.59%	13,513.42 €	78,490.14 €	92,003.56 €
1979	59,858.50 €	21,152.70	4,392.10 €	85,403.30 €	3370413	77,856.54 €	76.88%	118,301.50 €	21.59%	196,158.04 €	43.54%	17,998.04 €	92,756.70 €	110,754.74 €
1980	90,758.30 €	29,383.20	5,450.70 €	125,592.20 €	4287340	99,037.55 €	91.64%	150,485.63 €	23.15%	249,523.19 €	50.33%	8,279.25 €	115,651.73 €	123,930.99 €
1981	117,313.20 €	40,346.90	7,387.70 €	165,047.80 €	5264432	121,608.38 €	96.47%	184,781.56 €	25.83%	306,389.94 €	53.87%	4,295.18 €	137,046.96 €	141,342.14 €
1982	147,984.30 €	50,469.10	8,598.50 €	207,051.90 €	6556760	151,461.16 €	97.70%	230,142.28 €	25.67%	381,603.43 €	54.26%	3,476.86 €	171,074.68 €	174,551.53 €
1983	185,757.80 €	64,749.40	11,067.70 €	261,574.90 €	7805597	180,309.29 €	103.02%	273,976.45 €	27.67%	454,285.75 €	57.58%	-5,448.51 €	198,159.35 €	192,710.85 €
1984	228,150.50 €	80,327.70	13,984.60 €	322,462.80 €	8717773	201,380.56 €	113.29%	305,993.83 €	30.82%	507,374.39 €	63.56%	-26,769.94 €	211,681.53 €	184,911.59 €
1985	270,471.00 €	101,634.50	15,768.20 €	387,873.70 €	10525519	243,139.49 €	111.24%	369,445.72 €	31.78%	612,585.21 €	63.32%	-27,331.51 €	252,043.02 €	224,711.51 €
1986	325,830.70 €	130,615.00	20,954.80 €	477,400.50 €	12708531	293,567.07 €	110.99%	446,069.44 €	33.98%	739,636.50 €	64.55%	-32,263.63 €	294,499.64 €	262,236.00 €
1987	402,780.80 €	158,734.50	28,519.10 €	590,034.40 €	14949005	345,322.02 €	116.64%	524,710.08 €	35.69%	870,032.09 €	67.82%	-57,458.78 €	337,456.48 €	279,997.69 €
1988	487,420.50 €	193,143.50	35,181.70 €	715,745.70 €	17429488	402,621.17 €	121.06%	611,775.03 €	37.32%	1,014,396.20 €	70.56%	-84,799.33 €	383,449.83 €	298,650.50 €
1989	552,316.30 €	222,555.60	36,492.70 €	811,364.60 €	21166936	488,956.22 €	112.96%	742,959.45 €	34.87%	1,231,915.68 €	65.86%	-63,360.08 €	483,911.15 €	420,551.08 €
1990	659,125.50 €	297,253.80	43,432.40 €	999,811.70 €	25202673	582,181.75 €	113.22%	884,613.82 €	38.51%	1,466,795.57 €	68.16%	-76,943.75 €	543,927.62 €	466,983.87 €
1991	730,930.70 €	377,983.60	58,382.80 €	1,167,297.10 €	30098533	695,276.11 €	105.13%	1,056,458.51 €	41.30%	1,751,734.62 €	66.64%	-35,654.59 €	620,092.11 €	584,437.52 €
1992	803,408.20 €	453,649.20	75,540.20 €	1,332,597.60 €	35359749	816,810.20 €	98.36%	1,241,127.19 €	42.64%	2,057,937.39 €	64.75%	13,402.00 €	711,937.79 €	725,339.79 €
1993	849,788.20 €	534,006.40	79,918.90 €	1,463,713.50 €	37479970	865,787.31 €	98.15%	1,315,546.95 €	46.67%	2,181,334.25 €	67.10%	15,999.11 €	701,621.65 €	717,620.75 €
1994	873,767.40 €	590,410.10	88,510.70 €	1,552,688.20 €	38694503	893,843.02 €	97.75%	1,358,177.06 €	49.99%	2,252,020.07 €	68.95%	20,075.62 €	679,256.26 €	699,331.87 €
1995	895,102.70 €	652,347.70	98,840.30 €	1,646,290.70 €	42193368	974,666.80 €	91.84%	1,480,987.22 €	50.72%	2,455,654.02 €	67.04%	79,564.10 €	729,799.22 €	809,363.32 €
1996	930,770.00 €	720,853.10	109,694.80 €	1,761,317.90 €	45306333	1,046,576.29 €	88.93%	1,590,252.29 €	52.23%	2,636,828.58 €	66.80%	115,806.29 €	759,704.39 €	875,510.68 €
1997	971,625.10 €	782,952.40	115,953.60 €	1,870,531.10 €	49246770	1,137,600.39 €	85.41%	1,728,561.63 €	52.00%	2,866,162.01 €	65.26%	165,975.29 €	829,655.63 €	995,630.91 €
1998	1,032,037.80 €	850,006.20	114,443.20 €	1,996,487.20 €	53723267	1,241,007.47 €	83.16%	1,885,686.67 €	51.15%	3,126,694.14 €	63.85%	208,969.67 €	921,237.27 €	1,130,206.94 €
1999	1,117,798.20 €	926,828.30	126,242.30 €	2,170,868.80 €	57676929	1,332,337.06 €	83.90%	2,024,460.21 €	52.02%	3,356,797.27 €	64.67%	214,538.86 €	971,389.61 €	1,185,928.47 €
2000	1,153,870.70 €	1,012,605.70	129,986.60 €	2,296,463.00 €	62623588	1,446,604.88 €	79.76%	2,198,087.94 €	51.98%	3,644,692.82 €	63.01%	292,734.18 €	1,055,495.64 €	1,348,229.82 €
2001	1,168,298.70 €	1,120,457.30	142,333.30 €	2,431,089.30 €	66109734	1,527,134.86 €	76.50%	2,320,451.66 €	54.42%	3,847,586.52 €	63.18%	358,836.16 €	1,057,661.06 €	1,416,497.22 €
2002	1,086,130.90 €	1,196,289.80	150,574.60 €	2,432,995.30 €	69374237	1,602,544.87 €	67.78%	2,435,035.72 €	55.31%	4,037,580.59 €	60.26%	516,413.97 €	1,088,171.32 €	1,604,585.29 €
2003	1,090,091.20 €	1,269,880.30	152,246.80 €	2,512,218.30 €	71223111	1,645,253.86 €	66.26%	2,499,931.20 €	56.89%	4,145,185.06 €	60.61%	555,162.66 €	1,077,804.10 €	1,632,966.76 €
2004	1,112,125.40 €	1,400,322.30	153,934.20 €	2,666,381.90 €	73648365	1,701,277.23 €	65.37%	2,585,057.61 €	60.12%	4,286,334.84 €	62.21%	589,151.83 €	1,030,801.11 €	1,619,952.94 €
2005	1,093,732.80 €	1,440,168.50	186,568.80 €	2,720,470.10 €	77359117	1,786,995.60 €	61.21%	2,715,305.01 €	59.91%	4,502,300.61 €	60.42%	693,262.80 €	1,088,567.71 €	1,781,830.51 €
2006	1,110,179.10 €	1,521,255.20	179,438.90 €	2,810,873.20 €	79663125	1,840,218.19 €	60.33%	2,796,175.69 €	60.82%	4,636,393.88 €	60.63%	730,039.09 €	1,095,481.59 €	1,825,520.68 €
2007	1,150,257.50 €	1,593,986.00	195,271.70 €	2,939,515.20 €	82861257	1,914,095.04 €	60.09%	2,908,430.12 €	61.52%	4,822,525.16 €	60.95%	763,837.54 €	1,119,172.42 €	1,883,009.96 €
2008	1,144,698.40 €	1,681,837.30	197,444.90 €	3,023,980.60 €	85692385	1,979,494.09 €	57.83%	3,007,802.71 €	62.48%	4,987,296.81 €	60.63%	834,795.69 €	1,128,520.51 €	1,963,316.21 €
2009	1,133,184.30 €	1,781,209.00	219,585.10 €	3,133,978.40 €	85888377	1,984,021.51 €	57.12%	3,014,682.03 €	66.37%	4,998,703.54 €	62.70%	850,837.21 €	1,013,887.93 €	1,864,725.14 €
2010	1,120,022.00 €	1,841,948.10	215,488.40 €	3,177,458.50 €	86813942	2,005,402.06 €	55.85%	3,047,169.36 €	67.52%	5,052,571.42 €	62.89%	885,380.06 €	989,732.86 €	1,875,112.92 €
2011	1,113,621.80	1,770,368.00	223,362.00	3,107,351.80 €	85,759,562.00	1,981,045.88 €	56.21%	3,010,160.63 €	66.23%	4,991,206.51 €	62.26%	867,424.08 €	1,016,430.63 €	1,883,854.71 €

Avg historical

84.95%

43.24%

59.80%

Avg past 20 years

76.04%

55.35%

63.56%

Avg past 10 years

62.23%

61.05%

61.52%

Figures in Thousands of Euros

Source

PORDATA Remunerações dos empregados available in <http://www.pordata.pt/Portugal/Remuneracoes+dos+empregados-2404>PORDATA Despesas por tipo <http://www.pordata.pt/Portugal/Pensoes+da+Seguranca+Social+despesa+total+e+por+tipo-102>