Towards a Pan-European Pension System: An Initial Approach

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Abstract

Pension systems in the European Union are examined in this dissertation through an extensive statistical analysis of the aggregated figures by country. However, before this detailed, comparative and partial research of the data, a comparative-historical analysis is considered necessary. This analysis also includes the theory of the typologies of pension systems in Europe through the distinct welfare systems operating in each Member country.

The time-spatial-historical study through the basic typology of Esping-Andersen (1990) aims at understanding the welfare and then the pension systems. After the Second World War, the policies pursued and the future envisioned by both academia and politics were based on economic, fiscal and finally demographic-social factors.

The following chapter will present the theory of welfare systems as well as their differentiations depending on time-space-historical, internal and external pressures. The development of policies and guidelines by the governments that have been contributing to the European Union on retirement since 1970 is based primarily on each country's challenges to the survival of systems and then to the well-being of its citizens.

In this dissertation, before the static analysis and the conclusions between the nineteen European countries, there should therefore be an understanding of the development and operation of the systems within the European area. The need for a comparative and historical method on welfare systems is therefore important in order to identify the individual pressures exerted on them. As has been said before, the economic, fiscal and demographic pressures of recent decades have become the main indicators of reforms in Europe in the formulation and implementation of policies.

According to the objectives given, the first chapter will present a brief historical overview of the theory of pension systems and then an in-depth study of the existing theoretical approaches to pension systems as formulated by O. von Bismarck, Sir W Beveridge, M. Friedman and J. Pineras will follow, from the World Bank and finally from the European Union. In addition, the typology of welfare systems will also be included as a basis for the typology of pension systems.

At the end of Chapter 1, we will present the most common standardizations of pension systems according to the international literature as well as an analysis of some concepts and subcategories of pension systems in Europe today. The aim of this subsection is to understand the different components within European countries as well as to explain the prevalence of the Esping-Andersen typology as a guide to the theoretical approach over the last thirty years.

The second chapter will be dedicated to the nineteen European countries. For each state there will be:

a presentation of the general information of the pension system,

a brief historical review of its formation in conjunction with the current situation in accordance with the latest reforms of each country

and finally the challenges facing each country's pension system.

In Chapter 3, a stratigraphic analysis of the total population of the Eurozone countries will be carried out. This will include the distribution of the population by country and the age distribution. There will also be a study of the evolution of the population through projections of the number of employees who pay contributions and retirees who are beneficiaries of the benefits of the insurance system. At the end of the section the ratio between employees and recipients of benefits will be calculated both in each Eurozone country and for the whole Eurozone as well.

Chapter 4 lays the foundations and forms the proposal for a single Pan-European insurance system of the first pillar. This chapter examines different scenarios and versions in order to arrive at the proposed model. The findings in each case are also analyzed and the system with the most efficient characteristics is selected.

Chapter 5 records the result of the possible application of the proposed Pan-European insurance system to the data of a Eurozone country. A comparison is made of the viability of the country's insurance system, as it exists with the proposed one, and the benefits and losses created by this application are recorded.

The last chapter of the dissertation will discuss the possible effects of the implementation of the proposed model and will present thoughts for further research and improvement in the proposal.

Table of Contents

iv

Chapter 1

General Description of European Pension Systems

1. A Brief Historical Review of Welfare and Pension Systems in Europe

The first pension system (old-age pension) was developed and enacted in 1889 in Germany by Chancellor Otto von Bismarck with the aim of maintaining the monarchy and appeasing the working class (Pflanze, 1990: 158). In addition, the SPD (Sozialdemokratische Partei Deutschlands / Social Democratic Party of Germany) held a large share of the working class, something the Chancellor wanted to stop in order to secure a strong state and a less reactionary working class (Whietfield 2000: 74). The Chancellor's plan to weaken the SPD and the working class is not entirely successful. With the end of World War I, the idea of a Bismarck-style public pension system for Germany spread to Europe. Gradually Spain (1919), Italy (1919), Lithuania (1922), Slovenia (1922), Bulgaria (1922), Estonia (1924), Poland (1927), Hungary (1928) and by During the 1930s Greece (1934), Portugal (1935) and Finland (1937) developed welfare and above all retirement programs according to Bismarck's German Conservative-Corporate model in the late 19th century. (Natali, 2008).

In the post-war period and until 1960 all European countries currently in the European Union had types of pension schemes based on the Pay-As-You-Go (PAYG) system. This system was based on the labor force, which is taxed on the earnings of its work and part of it is given to already retired former employees. This is the basic premise of the savings based system. In the savings system, the employee gives part of his profits in order to buy assets that will be sold at the end of his working life (Aslund and Djankov,2017).

1.1. The Otto von Bismarck Pension System

The emperor issued the order written by Bismarck to the parliament, to establish the first system to provide for the disabled elderly. The beginning was made by the Catholic Bishop of Mainz, however the first legislative coverage that officially created the first pension system, at the initiative of Bismarck, came to the fore a few years later, in 1889 (Aspalter 2001: 43; Wilson 1993: 141). Then in 1890 the first national insurance funds were created for employees and in 1891 the Law on Disability and Old Age (Invaliditäts und Alterversicherungsgesetz) came into force. In 1911, compulsory insurance covered all employees employed in occupations known as white-collar workers (Schulze and Jochem 2007: 671). That is, in contrast to the blue collars which still signify the working class in the

literature. In 1912 a separate legislation was introduced for the miners' pensions while in 1913 the retirement age was set at 65 years for employees but only in 1923 for the miners (World Bank 2006: 62). In 1929, on the other hand, the retirement age was lowered to 60 years for unemployed employees (Börsch-Supan and Wilke 2006: 574). The minimum contribution period in 1913 was set at 10 years for men and 6 for women and for people with some form of disability at 20 years (Schulze and Jochem 2007: 671). In 1923 there was a separate insurance and pension scheme which covered the health coverage for all miners the disability and old age insurance (Ratajczak 2004: 241). In 1925 the first retirement insurance companies were created for craftsmen, the self-employed and writers. From 1933, the resources of the pension system began to be used for the implementation of government armaments (Schmähl 2005: 115). Finally, in 1938 insurance began to cover the future retirement of 4.5 million artisans (Steinweis1996, Chapters 2 and 3).

1.2 Sir William Beveridge's Pension System

Beveridge had a different concern than Bismarck. With a liberal ideological basis, Beverdige, in conjunction with the UK's hitherto historic development in social protection, encouraged the creation of the future Anglo-Saxon system. As mentioned above, the United Kingdom from the 17th century set the first laws of the poor as a minimum provision to the economically impoverished of the country (Shave, 2017). This prediction could not be compared to the current welfare state but it was a beginning for Europe before Bismarck. In 1944 Beveridge published his work, 'Full Time in a Free Society' implementation between 1945 and 1948 (Williams and Williams, 2015). Specifically, in 1945 the first legislation on family allowances was adopted and in 1946 on accidents at work and pensions (Hill 2002: 39). The basic state pension was financed through contributions for each insurance group. The contributions were transferred to the National Insurance Fund (NIF), which from the beginning applied the Pay-As-You-Go (PAYG) formula. Employees were categorized according to age, gender, marital status and occupation, while the value of the pension was set at a weekly amount of 24 shillings. Finally, in 1948, the National Health Service was established and the bill on social security was approved (Gorsky, 2008).

1.3 The Pension System of Milton Friedman and José Piñeras

This pension system is essentially the so-called Chilean Model. Implemented by the Chilean Piñeras and inspired by the American Friedman, it came into force in 1980-1981 and was very popular and imitated by many countries not only in Latin America but also by many Eastern, Central and Asian countries. Friedman, who studied at the University of Chicago and for part of his life as a non-Keynesian economist, served as an economic adviser to two American presidents and received the 1976 Nobel Prize in Economics. His influence, however, was extremely great in Pinochet's Chile as well as in its economists (Laursen, 2012).

In 1980 Piñeras, after two years as Minister of Labor and Social Security (1978-1980), submitted to the Chilean government a package of three bills that were to attract interest and be adopted in part by other governments around the world (Skousen 2011 : 48-53; Orenstein 2008: 38 and 75). The first bill required the creation of a mandatory, national system of personal pension accounts. This enactment formed the basis for the subsequent establishment of the Board of Directors for Pension Funds (AFP). The second bill introduced the transition from the old Pay-As-You-Go (PAYG) system to the new system, while at the same time allowing employees to transfer health insurance to the private system, the future Social Security Institution (ISAPRE). The third bill presented the operation of the current system with the establishment of the state Institute for Standardization of Pensions (INP). The INP was intended to service the old system pensions as well as the operation of the Pay-As-You-Go (PAYG) system for those who chose to remain in the old system after May 1, 1981. Yields within twenty years had reached fully satisfactory levels while only 7% chose to remain in the old system (Laursen, 2012).

2. The Management of Pension Systems in the European Union

Since 2000, given the great diversification of the pension systems of the Member States, the European Union has been implementing the so-called Open Method of Coordination (OMC) of its pension systems. Prior to 2000, there were two EU Directives on pensions and pension schemes: First was Community Directive 96/97 / EC of 20 December 1996 amending Community Directive 86/378 / EEC 1986 on the implementation of equality of employees of both sexes in social security. Second was Community Directive 98/49 / EC of 29 June 1998 on the safeguarding of the supplementary pension rights of employed and self-employed persons moving within the European Community. The growth of companies as well as the movement of citizens has brought to the fore the need to move pension and insurance rights within the Union (Natali, 2008; Ende, Ayadi and o'Brien, 2006: 71). The Open Method of Coordination (OMC) of 2000 followed the meeting in Lisbon in October 2000 and the report on the sustainability and adequacy of pensions in June 2000 (Natali, 2008: 226). The Community's Report the same year emphasized that the crucial factor for a secure future for pension systems was not individual reforms but sustainable economic growth and employment. Then in 2001 in Gothenburg the European Council decided on the final details and application of the Open Method of Coordination (OMC) to members' pensions. In 2003, Community Directive 2003/41 / EC of June 3 2003 or the IORP Directive on the activities and supervision of occupational pension institutions was published (Natali, 2008: 190-191). In 2016 the Community Directive 2016/2341 of 16 December 2016 was published which was a continuation of the Community Directive 2003/41 / EC and hence became known as the IORP II Directive. The original Pensions Directive (2003/41 / EC or IORP I) introduced some new rules for occupational pension schemes. The last directive (2016/2341 or IORP II) was

announced in 2014 but entered into force in 2017 with the full transposition of the Directive from the legislative framework of the states until 13 January 2019. Directive 2016/2341 or IORP II aims at better governance and transparency of the Funds while introducing new obligations with the most important one being the risk assessment and documentation in the Member State itself, for the purpose of risk management but also the implementation of an internal control by the Funds.

3. The Classification of Pensions

The Welfare Models of the 20th Century determined many of the classifications of pension systems during the century. The Bismarck German Model and the Beveridge Anglo-Saxon Model defined the first distinction between Pension Schemes according to the obligations of the state in the first and employers in the second. Esping-Andersen in 1990 based on previous classifications in the western world separated the welfare systems as presented in the first section of the chapter. Today, the most common classification of pensions comes from the World Bank and the Organization for Economic Co-operation and Development (OECD). In 2005 the OECD presented a descriptive classification of Pension Systems according to their mandatory nature and not their management. Pensions were initially based on three pillars which were replaced by the OECD at Tiers levels.

The first level is the basic domestic pension which takes into account the country of residence or nationality of the retiree. The second level is based on a professional pension. At this level the pension given is adjusted according to the earnings of the pensioner while he was active in the labor market and practiced a certain category of profession. The third level is the private pension received at the private initiative of the pensioner while he was still active in the labor market.

The third level is usually a long-term protection chosen by the worker in combination - at least in the European Union - with the state pension resulting from the employee's contributions to the state before retirement. It is preferred by people who belong to peculiar professions with non-existent or insufficient pension coverage.

So in a nutshell, the first tier serves as a means of avoiding poverty for the elderly, the second tier focuses on adequate retirement pension, and the third tier aims to provide individuals with the opportunity to save in order to increase their retirement income. Most Western European countries rely entirely on mandatory public repayment schemes known as Pay-As-You-Go (PAYG) schemes (van Gerven 2016; in Shubert et al. 2016: 553) but there are also mixed schemes.

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                          ┌─────────────────────────┐
                          │     Pension Systems     │
                          └─────────────────────────┘
             ╱                        │                        ╲
   First Level              Second Level                 Third Level
Basic Domestic Pension   Professional Pension          Private Pension
(Public Protection System) (Compulsory or Voluntary)    (Voluntary)
      │            │
      ↓            ↓
 Redistributive  Funded System
    System
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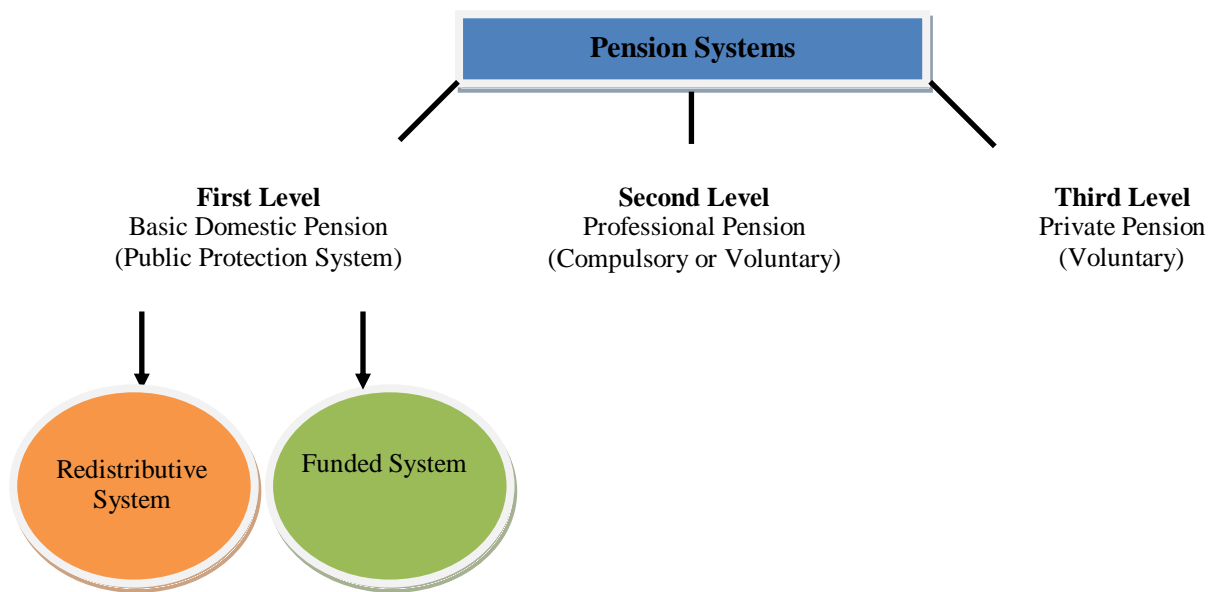
With the presentation of the welfare models and their complex composition, the foundations of every existing pension system in the Nineteen European Member States were given in a simple and understandable way. Each state adopted an initial ideological welfare base and in the course of its history set its own political conditions, also taking into account the respective social expectations and needs. In contrast to the diversity of welfare systems, pension schemes are specific and the terms of their explanation are more socio-economic.

As a rule, pension schemes in Europe are divided into two types: Distributive and Capital retirement schemes. The compositions of the three aforementioned levels also belong to these two categories because each country, according to the welfare model that follows and how it has been formed so far, has the corresponding convergences and deviations with the other states in the welfare or retirement system. Each case is therefore indiscriminately unique, without, however, hindering the future of European integration towards a common pension system.

3.1 Redistributive Pensions

The Redistributive Retirement System can be found mainly but not exclusively in countries that follow the welfare model of Conservative-Corporate states. The system as well as the welfare model are based on the distribution of the contributions of the active employees in

time point A, which cover the pensions in the same time point. The system is therefore based on the stable and adequate replacement of workers leaving the labor market in order to retire from new employees. Here the dependence of both the welfare model and the distributive pension system on the demographic changes is observed.

Redistributive systems are divided into two categories. That of the minimum pensions and those of the basic pensions. Minimum pensions are affected by the years of contribution of the former employee. With the completion of usually twenty (20) to twenty-five (25) years of uninterrupted work, the employee is able to submit his papers for the minimum pension offered by the system. In order to receive the full pension offered by the system, one must fulfill all the conditions that are usually required by completing forty (40) years of uninterrupted work.

In the European Union, despite the differences in pension systems, all countries have some legal coverage that guarantees a minimum pension for the elderly. Despite this forecast, however, the differences in the amount of this minimum pension remain large. Specifically, the European Union has six sub-categories of minimum pensions for the elderly which cover all levels of classification by the OECD and appear in both distributive and Capital pension schemes.

3.2 Funded Pension Schemes

Unlike the Pay As You Go (PAYG) schemes found in Distribution Schemes in the Capital Retirement Scheme[1], employee contributions are invested in a variety of ways to ensure how much - according to life expectancy - will be their future pension. This pension can be full or partial and the investment activity on which they are based, entails risks in terms of the adequate return of the given capital and the available reserve at individual level (Eurostat 2004: 4). By way of illustration, investing in financial products is not stable so it is natural that the final return may cover or fall short of the initial estimates.

  • These funded pension schemes include certain pension subsystems or subcategories, as well as Distribution Systems whose subcategories will be included at the end of the module in the minimum pension subcategories. The subcategories of Capitalized-Financed Systems are:

  • Defined Pension System (DB)

  • Defined Contribution System (DC)

  • Hybrid pension systems.

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[1] https://www.oecd-ilibrary.org/finance-and-investment/oecd-pensions-at-a-glance-2005_pension_glance-2005-en

6

A similar structure of the pension sub-category is the Notional Defined Contribution (NDC) schemes. In this subcategory the financial product's return is controlled to the individual by the government and not by the market although it is based on it. This sub-category is similar to that of fixed benefit systems but without a common collective investment but only an individual claim to the future public budget. This investment is also influenced by government decisions. For example, demographic decisions regarding the amount of contributions according to demographic aging or life expectancy.

3.3 Mixed / Hybrid Retirement Systems

Some countries of the Eurozone follow a mix[2] of the two pension systems. In particular, Estonia, Latvia, Lithuania and Slovakia - countries that have recently joined the Eurozone - follow a combination of the Redistribution and Capitalization System. Also, the majority of Eurozone countries follow the Second Level of pension schemes, that of occupational pensions.

The existence of hybrid systems, between the First and the Second Level, suggests that the risk involved in the pension system balances between the employee and the employer. That is, in defined benefit pension schemes (DB) the risk is borne mainly by the employer while in the defined contribution pension schemes (DC) it is borne by the employee. However, this separation is not absolute as shown in Table 1.

Table 1

Type of Risk	• Defined Benefit Pensions (DB)	• Defined Contribution Pensions (DC)
Investment	Employer	Employee
Inflation	Employer /Employee	Employee
Longevity	Employer	Employee
The market (at a specific point in time)	Employer	Employee
Accrued (From one job to another)	Employee	In this System (DC) the accruals are transferable

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Securing the Right to Retire	Employee	Employee
Employer Insolvency	Employee / Taxpayers	The System (DC) is always fully funded
Salary Replacement Risk	Employer	Employee
Credit/Legal Risk	Employer	Employer

Source: Broadbent, J. et al. (2006).*The Shift from Defined Benefit to Defined Contribution Pension Plans — Implications for Asset Allocation and Risk Management*. (p. 33)[3]

As can be seen, demographic changes, market volatility as well as factors arising from the employees themselves carry a risk, a risk to the responsibility of the employer or the employee to the respective pension system. However, as shown in Table 2, the majority of Eurozone countries follow a country-specific hybrid system.

Table 2

Eurozone Member Country	Level One (A) Universal Coverage, Redistribution System	Level One (B) Mandatory Pensions Defined Contributions (DC) - Capitalization System	Level Two Occupational Pension System
Austria	DB		DC
Belgium		NDC	
France	DB		DC
Germany	DB		DC
Greece	DB		
Estonia	Old: DB	NDC	DC

Eurozone Member Country	Level One (A) Universal Coverage, Redistribution System	Level One (B) Mandatory Pensions Defined Contributions (DC) - Capitalization System	Level Two Occupational Pension System
Ireland	Flat Rate/DB		DC
Spain	Flat Rate		DC
Italy	Old: DB		DC
Cyprus			DB
Latvia	Old: DB	NDC	
Lithuania	Old: DB	NDC	
Luxemburg	• DB		DC
Malta	• DB		
Netherlands	Flat Rate		DC
Portugal	• DB		DC
Slovakia	• DB	NDC	DC
Slovenia	• DB		DC
Finland	• DB		DC

• Source: Broadbent, J. et al. (2006).*The Shift from Defined Benefit to Defined Contribution Pension Plans — Implications for Asset Allocation and Risk Management*. (p. 33)[4]

The existence of mixed / hybrid models was a solution through the historical processes that took place in Europe, in the present case, the biggest changes in the welfare and pension systems occurred after the Second World War. Welfare and pension systems were created, transformed, matured and experimented with in a time of political, social and moral reconstruction of Europe. However, from 1970 onwards, it became apparent that continued growth could no longer be taken for granted as an economic crisis could undermine the efforts

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[4] https://www.bis.org/publ/wgpapers/cgfs27broadbent3.pdf

of welfare states. However, this is best observed in Subsection B by country during this period.

From the above tables some of the risks of each system were summarized with a conclusion that in the case of defined benefits (DB) the participants (employees) are those who are at greater risk. Unlike fixed contribution (DS) schemes, employers face the risk of most of the factors in Table 2. Capital schemes, however, face similar problems and challenges to Distributors for exactly the same reason. They have a lack of performance for different reasons but with the same impact on the beneficiaries. The only difference between the two systems is that the process in capitalization systems is not done directly as e.g. in the Pay As You Go (PAYG) system and this results in it being less perceptible (Barr, 2002)

So knowing the factors and risks of both systems, who was most affected by the recent economic crisis? The answer was given in the early years of the recent economic crisis where an assessment was made of the viability of the components that make up the mixed / hybrid systems in Europe today.

In 2010 the European Council in the Member States 'Joint Report[5] on Social Protection and Social Inclusion hailed the immaturity of fixed contribution (DS) systems as a happy occasion as they had not yet been well established in the Eurozone's Member States welfare systems.The report goes on to predict that people who relied on fixed contribution (DS) systems in the distant future may have some time for their investments to recover at least in part. Unfortunately for those who relied on these schemes in the near future for their retirement coverage, the impact on them will be great because their retirement income will either be greatly reduced or they will be forced to delay their exit from the market and therefore to their retirement.

Finally, the report contains a proposal for the equal sharing of risk in pension schemes between employers and beneficiaries of the schemes. The reason given in the report is for fixed benefit (DB) pension schemes to cease to have a downward trend and therefore the systems of this pillar to be stabilized towards a sustainable future.

3.4 The Six Subcategories According to Goedemé:

The differences between the pension systems in the Eurozone are great, despite the conflicts they present, but not insurmountable. Every European country has at least one system that

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[5] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52010DC0365

provides a minimum income for the elderly. These systems of minimum pensions compose a subcategory which is exceptionally presented by Goedemé (2013) in the collective volume of Marx and Nelson (2013: 109).

Goedemé analyzes six different types of minimum pensions in Europe between Distribution and Capitalization Systems. According to the author, the distinction is made by the eligibility criteria of the beneficiaries and the pension system to which each country belongs.

Table 3

	Redistribution Systems (Contribution System)	Capitalization System (Non-Contribution System)
No Mean or Income Test	Flat-Rate Pension **IE**, UK, CZ, **EE**, **LT**, **LU**, PL (People born before 1949)	Basic Pension DK, NL, SE (Until 2003)
Retirement Test	Minimum Pension BE, BG, CY, EE, FR, GR, HU, LU, LV, MT, PL, PT, RO (since Apr 2009), SI, SK (Until 2003)	Conditional Basic Pension CY, EE, FI, SE (Since 2003), UK (persons aged 80+)
With Mean or Income Test	Pension Supplement AT, CY (Since 2009), ES, GR, IT (Insured before 1996), SI	Social Pension BE, BG, DE (Since 2003), ES, FI (since 2002), FR, GR,HU, IE, IT, LV, LT, MT, PT, SE (Since 2003), SI, UK

Source: Goedemé T. (2013). *'Minimum Income Protection for Europe's Elderly: Whatand How Much has been Guaranteed during the 2000s?'* in Marx I. and Nelson K. eds (2013) *Minimum Income Protection in Flux*, Pelagrave Macmillan New York. (p. 109)

Beneficiary Eligibility Tests:

Means Testing: The assessment of an individual or family about whether they need government assistance.

Income Testing: The size of state aid is based on income criteria that can increase or decrease state aid. There is usually a maximum income for which the beneficiary is eligible for state aid. If the person's income exceeds the limit, then the state aid is stopped.

Pension Test: Pension or state aid is affected by whether the retiree has a second pension, or a form of second pension that increases the total pension amount they receive.

3.4.1 The Six Types of Minimum Pensions:

Minimum Pension Income Systems, With Contributions:

1) Flat Rate Pension: These are the fixed benefits paid to all retirees who have a sufficient contribution history. Fixed pensions are one of the most well-known and common practices that are an integral part of the pension systems of several European countries. In Lithuania and Estonia a key factor in a person's pension is the amount of previous income they received as an employee. Also in Estonia, after 1999, and in Poland, for people born after 1949, the fixed pension is the same for all retirees without counting the factor of years of service in the supporting documents. Finally, in Ireland, a fixed pension is a separate type of pension scheme. (Goedemé 2013; in Marx and Nelson 2013: 110)

2) **Minimum Pension**: The purpose of the Minimum Pension is to supplement the pensions at a predetermined amount with the help of the profits from the profit system of the Pension System. They appear as an integral part of systems where factors such as the pensioner's previous income, his past contributions and finally retirement earnings have similar elements in common with those of fixed pensions.

In Belgium, France, Luxembourg, Latvia and Portugal the eligibility but also the amount of the Minimum Pension depends on the total history of the pensioner's contributions. In 2004, Slovakia, in a restructuring of its pension system, abolished the minimum pension that was part of the pension system under the terms of the income criteria as a factor in calculating pensions.

Naturally, there are differences in the individual countries due to the different terms and supporting documents required in each case, such as that of the systems for different socio-economic groups or professions (eg I.K.A, T.E.B.E. .etc). Countries known for these differences are Belgium, Greece and Portugal. It should be noted here the union of insurance funds in Greece in 2017 under the super-fund EFKA (Unified Social Security Agency) which, however, continues to separate several socio-economic and professional groups in terms of terms and documents.

3) **Pension Supplement**: The Pension Supplement as the term implies aims to supplement the retirement income with either a fixed or a floating amount. In addition to supplementing the individual pension, it can also act as the main replacement for the state pension in some cases. The Pension Supplement covers not only cases of old-age pensions but also the income of

survivors or the disabled and is protected by the relocation of European citizens to other countries of the European Union by Community Directive 98/49 / EC[6].

At a technical level, unlike the Minimum Pension, the Supplementary Pension does not depend only on the history of the contributions and the total amount of the individual's retirement income. On the contrary, the eligibility of the beneficiaries depends on the evaluation of the individual using the Income-testing and means-testing. These tests also take into account individual family resources.

The countries that provide pensioners with a Pension Supplement are Austria, Greece (excluding farmers), Italy (for those insured before 1996), Spain, Cyprus (since December 2009) and finally Slovenia . Slovenia determines the amount of the Supplementary Pension according to the calculation of the contribution history of each person entitled to the Supplement (Goedemé 2013; in Marx and Nelson 2013: 110-111).

3.4.2 Minimum Pension Income Schemes, No Contributions:

At this point it should be noted that in most of the European Union, pension schemes are intended to support the elderly by providing pensions which are based mainly on the age of the beneficiaries and not on the minimum contributions. There are a total of three different types of non-contributory minimum pension schemes:

1) Basic Pension:

In countries such as the Netherlands and Denmark, the Basic Pension implies the meaning of the universal pension for the elderly in the country. This pension is provided without criteria such as those of the previous contributions paid to the state or the current income of the individual retiree. This pension is based on the age of the retiree which is 65 years as well as the total years of residence in the country.

Clearly there are several differences between the two countries. Denmark is conducting a high-income audit and additional means testing in order to approve the Basic Pension. Nevertheless, high incomes exclude 1% of the population while means testing results in receiving a full basic pension of 64% and a reduced one of 26% (Green-Pedersen, 2007: 469; Goedemé 2013; in Marx and Nelson 2013: 112) Finland had a similar basic pension system until the change of its pension system in 2001 where it adopted the Conditional Basic Pension.

2) Social Pension:

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[6] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:31998L0049

Most European countries use Means-Testing to identify the real beneficiaries and to avoid free-rider cases *. The use of public goods and services that are mainly limited are therefore subject to a necessary separation of beneficiaries according to the needs that the state is called upon to meet.

The purpose of the Social Pension is therefore to cover the difference between the threshold in the Means-Testing and the income of the beneficiary's household taken into account. That is, it offers, with some exceptions, the minimum income assistance against poverty since it covers only up to the limit of meeting the basic needs of the individual.

The main problem, as has been observed, is the large differences observed between the Means-Testing which monitors the income and property of the individual but not the main unit of assessment which is the individual himself, the household to which he belongs or the individual family he has. This can be just as potentially positive or negative for the individual beneficiary. Finally, the Social Pension can be found in countries such as Spain and Slovenia where the residence history in the country is taken as a criterion for obtaining it.

3) Conditional Basic Pension:

As mentioned above in the previous five types of pensions, pensions are subject to certain terms and conditions regarding their distribution. Goedemé (2013; in Marx and Nelson 2013: 110-112) completes the description of the systems by stating that, from the Eurozone countries, Estonia, Cyprus and Finland have a basic pension for the elderly over the age of eighty (80) . The eligibility of the beneficiaries in this case includes the living conditions, the years the applicant lives in the country in the case of Finland, etc.

These types of pensions are added to the existing old-age pensions received as the beneficiaries have passed the Pension Test and there are no gradations in the final amount. Finally, the relationship between the Conditional Basic Pensions and the Basic Pensions presented above is similar to the relationship between Fixed Pensions and Minimum Pensions.

The Fixed Pension and the Minimum Pension set a limit below the pensions associated with the beneficiary's earnings as a former employee. That is, the Fixed Pension and the Minimum Pension take into account the existing earnings of the pensioner and set a specific limit as to what they can achieve and under what conditions. On the contrary, the Conditional Basic Pension and the Basic Pension guarantee a minimum limit which acts in addition to and increases the pensioner's salary.

Chapter 2

Analysis of Eurozone Pension Systems by Country

Eurozone countries differ greatly. Through the historical background of the systems we see the history of Europe itself and the great leaps in social security that it made after the two World Wars. It can also be seen that the influence of 19th century regimes prompted significant changes in the 20th and 21st centuries. The configuration of the systems in many cases was slow, hesitant and involved great peculiarities according to the socio-political-economic needs of each country. All European countries have adopted systems inspired by the Bishmarck and Beveridge models to some extent and today face many common challenges with the biggest being the demographic problem in an aging Europe.

1. Austria

1.1 Historical Background and the Present Situation

The public pension system in Austria is based mainly on a pay-as-you-go system (Pay-As-You-Go, PAYG) and consists of various subsystems, mainly for workers (blue collars) and employees (white collars), farmers, the self-employed and civil servants. The history of the pension system, however, is quite long due to the country's connection with Bishmarck's Germany.

- 2000 - Retirement years increased by 1.5 years. At 56.5 for women and 61.5 for men. While the widows now received at the beginning of the pension from the deceased spouse between 0-60% from the previous 40-60%.[7].

- 2003 - The pension institution Pensionsversischerungsanstalt is created by the merger of the institutions Pensionsversischerungsanstalt der Angestellten and Pension sversischerungsanstalt der Arbeiter. That is, workers' and employees' institutions were merged. This resulted in significant changes in the system: A) The complete abolition of early pensions by 2017. B) The reduction, from 2009, of the calculation rate of retirement years from 2.00% to 1.78% for each year of employee contributions . C) The gradual increase of the basic period of calculation of pensians from 15 to 40 years in 2028 with a decrease, however, in women every 3 years for each child they had. D) Penalties and

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[7] ec.europa.eu/social/BlobServlet?docId=5411&langId=en

rewards for each year of retirement increased from 3.0% to 4.2% for each year (Holzmann, 2006).

- 2004a - Introduction of the Pensionsharmonisierungsgesetz reform, which introduced major changes to the pension scheme and amended the regulations on the rights of specific groups before and after 1 January 2005[8].

- 2004b - The operation of the pension corridor begins in combination with the gradual withdrawal of the option of early retirement and the beginning of the operation of a new formula for the indexation of the pension adjustment. In order to achieve all the changes of 2004 the state budget was called to cover the costs by 26% of these changes (Schludi, 2005).

- 2007 - Establishment of early retirement for heavy occupations.

- 2014 - People born after January 1, 1955 apply the old system. The new system applies to people born after 1990 or who started their careers after 2005. Forms of early retirement are also abolished or made less attractive, e.g. Langzeitversichertenregelung, with the last reform implemented in 2014 while there is the abolition of temporary disability pensions for people under 50 years of age. However, these pensions have often been replaced by other forms of early retirement and there has been new legislation to rehabilitate these people.[9][10].

1.2 Challenges

Austria's pension system is still considered reliable and secure at the moment, but demographic changes make it vulnerable in the long run. Raising the retirement age is a difficult move that is not expected to happen in the coming years. Another point that is considered a challenge is the equality between the generations in public spending which is not achieved but major reforms are not expected in the country for several years mainly due to the age group of voters who largely control government decisions on social policy on the pension.

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8 https://www.parlament.gv.at/PAKT/VHG/XXII/I../index.shtml
9 http://irihs.ihs.ac.at/3769/1/IHS_Distributional_and_Incentive_Effects_Final_Report.pdf
10 https://www.help.gv.at/Portal.Node/hlpd/public/content/27/Seite.270000.html

2. Belgium

2.1 Historical Background and the Present Situation

- 1999 - The Mediation Service for Pensions is established (Rubel, 2004a).

- 2001 - The Elderly Fund is established, which aims to invest government bonds to cover extraordinary expenses during the period 2010-2030[11].

- 2003 - The minimum pension allowance for people with mixed careers is introduced [12].

- 2005a - The right to a widow's pension was given to the wives of the self-employed [13].

- 2005b - The contract Contrat de Solidarité entre des Générations is signed. The purpose of the contract is to discourage early retirement and encourage employment after retirement as well as the terms of early retirement for certain groups of the population, for example the unemployed.

- 2006 - Employed retirees between the ages of 62-65 receive tax benefits subject to investment in private pension schemes [14].

- 2008-2012 - In 2011 the age limits for early retirement were changed from 58 to 60, while the number of contributions from 25 years increases to 35 ,while in 2015 the number of contributions increases to 45 years with early retirement at 40 years of contributions and the age limit of 62 years[15].

- 2015a - The retirement age has been raised from 66 to 67 in order to stabilize the pension system [16].

- 2015b - The government now intends to encourage employees through the tax system to also have a personal retirement plan in order to supplement the state pension provided.[17].

2.2 Challenges

Pension reforms have been significantly delayed compared to other countries, with the result that the economic crisis has hit the country and the system. The first concern of the pension system was to reduce early retirement.

The reforms of 2015 did not bring the expected results, mainly due to the economic situation in Europe. There are currently no moves or discussions on any new major and much-needed reform in the country at a time when social security solidarity is proving inadequate and the risk of old age poverty remains a major challenge for the future.

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[11] Strategic Report on Pensions Belgium, 2005
[12] Strategic Report on Pensions Belgium, 2005
[13] ec.europa.eu/social/BlobServlet?docId=5382&langId=en
[14] Strategic Report on Pensions Belgium, 2005
[15] http://www.oecd.org/belgium/Better-Life-Initiative-country-note-Belgium.pdf
[16] http://data.consilium.europa.eu/doc/document/ST-9190-2016-INIT/en/pdf
[17] http://data.consilium.europa.eu/doc/document/ST-9190-2016-INIT/en/pdf

3. France

3.1 Historical Background and the Present Situation

- 2000 - The Pensions Advisory Board was set up.

- 2001 – Employee pension schemes are introduced.

- 2003 - The 2003 reform provided an opportunity to redeem 'lost' quarterly contributions, provided benefits to professionals who had reached or exceeded retirement age, and established a common pension scheme for all pension schemes while implementing individual pension funds (see 3rd pillar) (da Conceição-Heldt. 2007).

- 2004a - It is possible to receive a pension and a paid income with the sole condition that the income comes from two different systems (Rubel, 2004b).

- 2004b - The opportunity is given to use assets for the pension of an individual through the form of corporate or partial pension schemes (See Plan d'Épargne Retraite Populaire and Plan d'épargne pour la retraite collectif) (Rubel, 2004b).

- 2008 - The major reforms for the sustainability of the pension system begin with changes in the operation of the special pension schemes, due to the large deficits, which included among others, civil servants. The years of payment of contributions were increased to 40 while the allowances were reduced and their amount was adjusted according to the evolution of prices[18].

- 2010 - The Socialist Government attempted and succeeded in immediately changing the retirement age. From the 60 years the reform foresaw a gradual increase of two years until 2018 (finally entered into force in 2017) in all areas. Also the full pension was increased from 65 years to 67 with small exceptions related to the duration of employment as well as the nature and intensity of the profession. Finally in the reform were judged the periods of unemployment, maternity leave, etc. as calculable and additionally covered in contributions from the state for the final calculation of pensions[19].

- 2013 - This year's reform focused on increasing the contributions paid by employees and employers and further increased the mandatory contribution years to 43 years with a gradual increase of 3 months every 3 years until 2035. An application was also introduced that took into account the unpleasant working climate which affected pension contributions, other pension plans or employees' salaries, resulting in a change in their work environment or affecting their total years of employment[20].

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[18] ec.europa.eu/social/BlobServlet?docId=6111&langId=en

[19] ec.europa.eu/social/BlobServlet?docId=6111&langId=en

[20] www.oecd.org/els/public-pensions/PAG2013-profile-France.pdf

- 2015 - Supplementary pension schemes were introduced by the social partners in line with the 2013 reform. In the same year, a system of incentives and rewards was also adopted to encourage employees to extend their retirement careers.[21].

3.2 Challenges

France's pension system is relatively generous and largely prevents the poverty of the elderly, but it is also complex, which means that its organization leads to inequality. In order to ensure the viability of the pension system, the respective governments have constantly implemented new measures such as: increasing the pension contributions, increasing the number of years in the insurance contributions and in 2008 they proceeded to reduce the privileges given to certain professional groups. The Hollande government also introduced a complex and bureaucratic mechanism that allowed retirement at the age of 60 if certain criteria and measures were met for each occupational sector. The mechanism proved to be a source of great uncertainty as to what the retirement limits were in each case, and many small and medium-sized enterprises refused to implement it due to its complexity as the 2015 Sarkozy reforms began to be felt with positive effects on the pension system, which is still struggling against its demographic problem, low replacement and long-term viability.

4. Germany

4.1 Historical Background and Present Situation

- 2000 - The green tax was used to subsidize the pension system (Schulze and Jochem, 2007).

- 2001 - The contribution to the pension system now amounted to 19.3% of salaries, 50% of which was paid by the employer and 50% by the employee. In the same year the basic pension system covered 96% of men and 98% of women in the country (Schludi, 2005; Rürup, 2002).

- 2002 - The 2001 reform is being implemented and from now on the contributions to the pension system are now modified according to the demographic data. Also, in order to reduce the pensioners of the 1st pillar (basic state pension), changes were made in the corporate pension systems (2nd pillar) and the individual pension accounts (3rd pillar). In these changes the age of participation was reduced to 30 from 35, the retirement age was set to 60 years and the minimum period of participation in the system was reduced from 10 to 5

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[21] http://drees.solidarites-sante.gouv.fr/IMG/pdf/dd9_en.pdf

years. The main reason for the reforms was that in 2002 the contributions covered only 80% of the basic pension system while the rest was covered by the state budget. (Czajka, 2003).

- 2003 - This year brought several changes, first in the sense of the minimum provision which was for an income paid to people over 65 and which was part of the state welfare and not the pension system. The minimum provision was financed by state revenues (taxes). This year also faced a challenge as the available resources could only cover pensions for half a month. The Rürup report has therefore recommended a number of short-term and long-term actions. The reduction of the annual increase of the already granted pensions, the increase of the retirement age until 2021 from 65 to 67 and among others the introduction of penalties in early retirement (Schmähl, 2005).

- 2004 - It is decided to gradually introduce a tax on all pensions according to the EET formula in the period 2005-2040 (Mattil, 2006).

- 2005 - The law on pension insurance is amended with regard to organizational structures, ie miners, railway workers and seafarers (Mattil, 2006).

- 2006a - The Commission warned the country about the legislation on pension savings accounts and in July of the same year referred the country to the European Court of Justice. [22].

- 2006b - Another correction indicator is introduced in the calculation of pensions between the employee's gross remuneration to the maximum remuneration subject to contribution deductions (Mattil, 2006).

- 2006γ - E-cards are given to retirees in the context of e-government (Mattil, 2006).

- 2007 - It was determined that from 2012 to 2024 the retirement age will be increased from 65 to 67 years and by two months a year between 2024 and 2029. However, for those who have completed 45 years of pension contributions, the retirement age remains at 65 years. (Schulze and Jochem, 2007).

- 2014 - A number of reforms have been launched, which have been widely criticized, with the aim of modifying several arrangements from the previous major reform of the insurance system. Reforms included a 2-year reduction in the retirement age for workers on contributions over the age of 45, the addition of social coverage for housewives with children born before 1992, and improved disability pensions. Changes were also made in the calculation of pensions with the increase of the contribution years by 2 years[23].

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[22] https://ec.europa.eu/taxation_customs/individuals/personal-taxation/pension-taxation_en

[23] https://www.oecd.org/daf/fin/private-pensions/OECD-IOPS_Global-Forum_Keynote-Speech_Felix-Hufeld.pdf

- 2016 - Retirement income increased by 5.03% in the former East Germany and by 4.35% in the former West Germany due to rising wages and high employment rates. The insurance contributions imposed on the pensions, however, kept the net pension incomes low[24].

4.2 Challenges

Germany's pension system has undergone a number of reforms in recent decades with the most recent one in 2014, which aimed to make the pension system more sustainable. In 2018, the OASA in its latest report noted that rising public pension spending, limited retirement savings for a large part of the population, and especially low pensions among women in groups without formal pension coverage were among the biggest problems of the system that need extensive reforms in the near future.

5. Greece

5.1 Historical Background and the Present Situation

- 1999 - The retirement age rises to 65 years. Also the Fund of Professionals and Craftsmen of Greece (TEVE) which was established by law 6364/1934 and was abolished by law 2676/1999 after the merger of the funds, Merchants Insurance Fund (TAE) and the automotorists Pension Fund (TSA) transferred the contributions of the self-employed to this new fund, which in 2007 was finally transformed into the Insurance Organization for Freelancers (OAEE) (Triantafillou, 2007).

- 2001 - The total number of funds was 170, of which 63 paid primary and supplementary pensions. (Triantafillou, 2007).

- 2002 - Expenditure on public pensions amounted to 12% of GDP. In 2002 we also have the reform with law 3029 that established the Actuarial Authority. The responsibility of the organization was: The study of the social security system in the context of long-term economic and financial planning to ensure the social reciprocity, sustainability and actuarial balance of this system. It also introduced the voluntary occupational pension funds, which were managed by the social partners that were the second pillar of the pension system in Greece. Finally, some technical changes were made such as raising the retirement age for all pension funds to 65 years, the period of contributions required for full pension increased from 35 to 40 and the period for calculating pensions also extended from 5 to 10 years. (Owczarek, 2004; Triantafillou, 2007; Holzmann et al 2003).

- 2005 - Eleven former pension systems were transformed by law 3371/2005 into a common pension system for the banking sector, the Bank Employees' Supplementary Fund (ETAT).

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[24] https://www.oecd.org/els/public-pensions/PAG2017-country-profile-Germany.pdf

Also the pension is now calculated based on the average salary for 5 best years within the last 10 years[25].

- 2008 - Law 3655/2008 reorganized the institutions and the pension system by incorporating several funds in IKA-ETAM. The system continued to be funded by employers and employees and social security contributions subsequently funded all branches of social welfare[26].

- 2010 - The first major arrangements of the decade after Memoranda I and II begin.

- A special clause is introduced to limit the increase of pensions to 2.5% of GDP and provides for a fifty-year period of adjustments and parameters if the limit is exceeded. The retirement age increases from 65 to 67 years, while the contributions and the amount of pensions paid in parallel with an incentive and penalties in order to avoid early retirement are revised. Early retirement now becomes more difficult with the introduction of the criterion of payment of contributions 35 years and 40 years from 2015, in order to accept the application for retirement at 60-62 years. Also the calculation of pensions in the future is decided to take into account all the years of employment and not the best 5 of the previous decade. Pensions were also affected by new contributions and reductions. Specifically, a contribution of 3-10% was imposed on pensions over 1,400 euros at the same time as the freezing of pensions for 3 and later 5 years. There was a decrease in the maximum pension income, while the basic and supplementary pensions of certain categories were also reduced.[27].

- 2015 - The next big wave of reforms begins in the middle of the decade with the contribution of Memorandum III. The main goal of the reforms is to save resources and therefore the pension system had to save 0.5% of GDP in 2015 and 1% in 2016. At the same time, the cuts set since 2012 and the 6% contributions on pensions had been deemed unconstitutional, with the result that the reforms of 2015 (Law 4334/2015 on health contributions and medical coverage) focused on the change of the 2012 reforms in order to be recognized as constitutional[28].

- 2016 - Law 4387/2016 abolished all special regulations and consolidated all pension funds under the super-fund EFKA (Single Social Security Institution), which started operating in 2017. According to law 4387/2016 the main pension was divided in two parts, the national basic pension of 384 euros (full) and the distributive pension calculated from the ratio of

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[25] http://www.ggka.gr/english/syntax_05_en.pdf

[26] www.etaa.gr/files/N.3655-08.pdf

[27] http://www.ktpae.gr/pdf/D_7_N_3845_2010.pdf

[28] https://www.minfin.gr/documents/20182/455201/FekA94.pdf/de2d334d-5bd8-47e3-b201-032481c5096b

the average salary to all years of the employee's career, the years of contributions and the percentage of replacement between the generations in the labor market. In addition, new criteria were set for receiving the basic and early pension. The basic full pension required the beneficiary to be 67 years old, to have resided in the country for at least 15 years with a penalty for each year of residence abroad if the beneficiary had resided abroad for less than 40 years. Additional criteria were the minimum years of contributions and the penalties for each year of non-payment under 20 years. The calculation of the pension has also changed on adverse terms especially for employees with multi-year contributions. The rates for calculating pensions have been reduced and with all years of employment being calculated automatically, pensions are also being reduced. This new way of calculating pensions, however, results in the observation of differences between the new and the old calculation system, which difference should be eliminated in 2018 according to the instructions from the International Monetary Fund. It was also decided to gradually abolish the social solidarity allowance for retirees (EKAS) by 2019, to increase the insurance contributions for several occupational categories and to try to reduce the replacement rates. The goal of the 2015 reforms was to achieve a primary surplus of 3.5% of GDP. Based on ELSTAT and Eurostat in 2017 the primary surplus on GDP was 4%[29].

5.2 Challenges

The pension system in Greece is a corporate system based on a number of occupational pension funds which are often covered by social protection expenditures. The relative poverty rate of the population group of 65 years and over, now reaches 7.1%. One in two households also relies on pensions while at the same time about 45% of retirees receive pensions of 665 euros per month which is below the poverty line. Retirees are also highly dependent on the state and most funds were lost in 2009 due to unemployment and declining contributions. Also the demographic problem combined with unemployment make the pension system unsustainable. Since the beginning of the financial crisis, pension funds have periodically faced the prospect of bankruptcy, as the number of people working and contributing to social security is shrinking and at the same time there is an erratic exit from work due to unemployment and low wages while the number of retirees is increasing. In addition, there is no generational equality in the pension system at a time when reforms are not enough but new ones cannot be imposed due to social and political factors. This is because the reforms had a positive effect on primary surplus at the expense of the poverty of pensioners and the pension system which is not considered sustainable.

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[29] https://ec.europa.eu/info/business-economy-euro/economic-performance-and-forecasts/economic-performance-country/greece/economic-forecast-greece_en

6. Estonia

6.1 Historical Background and the Present Situation

- 1999 - The Social Security Council is established and the social tax is now paid to the tax service. The pensions of the first pillar continue to be financed by the state while the first voluntary pension fund starts operating (Leppik and Kruuda, 2003).

- 2001 - The Bank of Estonia establishes the Financial Supervision Authority. The Authority since 2001 is appointed as the supervisory mechanism of the pension funds (Leppik and Kruuda, 2003).

- 2002 - The reward of those who have reached retirement age is introduced, with an increase of 0.9% per month of deferment of the pension they would receive after 63 years. In the same year, the second pillar of the state pension insurance starts operating, while the mandatory contribution on gross earnings was set at 6%[30].

- 2004 - The recording of all the resources of the 1 pillar regarding the individual pension accounts begins [31].

- 2016 - The retirement age is equalized for both sexes at 63 years with the aim of gradually increasing it to 65 years by 2026[32].

- 2017 - Reforms have begun to make the system more flexible, solidary and efficient. It was decided to link retirement age to life expectancy from 2027. The 2017 reform plan included proportionally flexible flexible retirement until 2021, in order to be able to choose the retirement age with benefits for late retirement and pension. New entitlements were introduced for the first pillar after 2037 and with a transitional period between 2020-2036, in addition the indexation adjustment from 2023 was set to depend entirely on social incomes and the number of retirees. Special pensions were also abolished after 2020 with reforms to cover the years until their total abolition. Finally, the plan provided for the abolition of special schemes in the future , such as the possibility of early retirement, for workers in difficult or dangerous jobs.[33].

6.2 Challenges

Estonia 's pension system since 2002 consists of three pillars. Currently only 6% of retirees participate in the compulsory pillar, with the result that current pension benefits depend on the social security contributions paid by current employees in the first pillar. The 3rd at the same time remained on the sidelines in terms of coverage and assets, thus leaving the 2nd pillar to have the greatest control over the country's pension system. Pensions now use the

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[30] https://www.fi.ee/?lang=en
[31] https://www.fi.ee/?lang=en
[32] https://www.fi.ee/index.php?id=19721
[33] https://www.eurofound.europa.eu/observatories/eurwork/articles/estonia-first-steps-towards-a-more-flexible-pension-system

indexation adjustment, which guarantees slight annual increases, 5.7 in 2016, in pensions according to taxation and the cost of living. Unfortunately, despite the increase in pensions, wages are rising faster, resulting in an increase in the poverty rate of the elderly. To address the challenges, the government has begun planning the next reform to increase competition between pension funds and reduce government spending.

7. Ireland

7.1 Historical Background and the Present Situation

- 2000 - The National Pension Reserve Fund is established to finance future pension expenditures after 2025. The fund was to invest its assets in the capital markets of which 20% in bonds and 80% in shares. In 2001, the average pension in Ireland was € 536 a month (Maher, 2004; Skinder, 2004).

- 2002 - The minimum contribution period required for the full pension of the first pillar is increased from almost 35 months to 60 months. It was also possible to transfer contributions between the different pension schemes by reducing the length of stay in one fund from five years to two (Schulze and Moran, 2007).

- 2003 - The operation of the pension mediation service begins[34].

- 2004 - The second pillar consists of 52% of the workers in the country[35].

- 2005 - The new law on social welfare is approved, which extensively regulates family benefits and health, accident, retirement and unemployment insurance.

- The average full and supplementary pension of the first pillar now reaches a total of 717 euros per month (Schulze and Moran, 2007).

- 2006 - It is a milestone year because after analyzing two reports on pensions, the Green Paper on Pensions was published in October 2007. The Green Paper aimed to determine the future of the Irish pension system by 2016 after several proposed reforms[36].

- 2009 - Civil servants' pensions were financed entirely by general tax revenue. In the same year the new law on social welfare and pensions increased the protection of workers in defined benefit plans[37].

- 2011 - It is decided to increase the retirement age gradually in the period 2021-2028 from 67 years to 68. Also in 2011 an annual contribution of 0.6% was imposed on the funds and

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[34] ec.europa.eu/social/BlobServlet?docId=2549&langId=en
[35] ec.europa.eu/social/BlobServlet?docId=2549&langId=en
[36] www.welfare.ie/en/downloads/greenpaper.pdf
[37] http://www.irishstatutebook.ie/eli/2009/act/10/enacted/en/html

assets of private pension funds. In the 2014 budget, this contribution increased to 0.75%. In 2016, it was announced that this contribution would expire in 2015[38].

7.2 Challenges

The Irish pension system is based on three pillars: the public pension, occupational pensions and individual pension schemes. The OECD in 2013 in a review of the Irish pension system stressed that the main challenges for the future for the sustainability of the system were affordable costs, adequacy of resources and coverage of the working population and beneficiaries. For this reason, the imposition of automatic enrollment in supplementary retirement schemes has been widely discussed, under which employers will be required to enroll employees in retirement plans, while employees will be able to leave if they do not wish to participate. The biggest challenge of the system, however, is the lack of replacement of employees due to the intense demographic problem which is predicted to lead the system to a serious crisis of sustainability in the future.

8. Spain

8.1 Historical Background and the Present Situation

- 1999 - 30% of employees now participated in private retirement plans (Boldrin et al., 2004).

- 2001 - The connection of insurance systems and distribution systems for the financing of pension reserves is legislated and enters into force in 2002. In this way the social contributions to the employees over 60 years were reduced by 50% and 100% for the people over 65 years. Retirement conditions are also being relaxed. Finally, in the same year, the law on maternity benefits was amended[39] (Boldrin et al., 2004; Kawiński, 2004b).

- 2002 - The limits of pension contributions were set in all professional groups (Holzmann et al. 2003).

- 2004a - The Royal Decree of 2004 established the Foundation for the Elderly and Social Services, which was responsible for the payment of pension benefits in addition to the main and supplementary pension[40].

- 2004b) - The Toledo Pact of 1995 is revised and the Declaration of Social Dialogue enters into force. This year also many public sector employees decided to join the Operational Pension Funds[41].

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[38]
https://www.pensionsauthority.ie/en/About_Us/Annual_reports/Archive/The_Pensions_Board_Annual_Report_and_Accounts_2011_.pdf
[39] https://www.ssa.gov/policy/docs/progdesc/ssptw/2006-2007/europe/index.html
[40] http://www.seg-social.es/imserso/imserso/i0_quiensomop.html

- 2005 - The legal framework for family benefits is being amended [42].

- 2007 - Banks can now offer pension packages with the basic condition that the contributions do not exceed 8,000 euros per year. Finally this year another Royal Decree placed in the context of social security the self-employed with special conditions of treatment in the pension system[43] .

- 2011 - The first comprehensive reform of the system in times of crisis begins with the help of the social partners. Law 27/2011 gradually increases the age limits between the period 2013-2027 from 65 to 67 years, it gradually increases between 2013-2022 the calculation period for pensions from 15 to 25 years and in addition changed the correlation of the years of contributions and the initial pension amount, with the result that the full pension requires 35 years of contributions[44].

- 2013 - Continuing and enforcing the 2011 reforms, the criteria for early retirement are being reformulated with stricter conditions. Also in 2019, it was estimated that pension income would now be directly affected by life expectancy in the country, which also introduced the annual adjustment of the pension based on inflation. With this new indexation system, Spain has taken into account factors such as social security revenue and expenditure, as well as the number of pension contributions. Furthermore, the 2013 law guaranteed that the contribution rate would never be lower than 0.25 or higher than the consumer price index plus 0.50[45].

8.2 Challenges

Spain's pension system is based on the public pension system and voluntary schemes for which it offers favorable tax breaks. Policies have achieved the goals of preventing old age poverty and fiscal sustainability while also maintaining equality among retirees of different generations although there is no clear burden-sharing between them. The pension system relies heavily on the public budget to cover deficits, and despite cuts in wages and benefits as a result of austerity measures and internal devaluation, retirees have maintained their purchasing power. While many of the figures look positive, the country has a major demographic problem and life expectancy continues to rise resulting in the sustainability of accumulated pension funds in the future when forecasts show an increase in the deficit between pensions and GDP.

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[41] ec.europa.eu/social/BlobServlet?docId=5382&langId=en
[42] ec.europa.eu/social/BlobServlet?docId=5382&langId=en
[43] https://www.ssa.gov/policy/docs/progdesc/ssptw/2006-2007/europe/index.html
[44] https://www.eurofound.europa.eu/observatories/eurwork/comparative-information/national-contributions/spain/social-partners-involvement-in-the-reforms-of-pension-systems
[45] https://www.oecd.org/els/public-pensions/PAG2017-country-profile-Spain.pdf

9. Italy

9.1 Historical Background and the Present Situation

- 2000 - The retirement age is adjusted to 65 for men and 60 for women (Franco, 2002).

- 2001 - 20 years is defined as the minimum insurance period for the provision of a pension in line with the goal of the 1990s reforms.[46].

- 2004 - The Berlusconi reform is introduced with a time frame for the entry into force of the amended social security issues in 2008. The Berlusconi reform introduced: A) The encouragement of deferment of retirement to the participants of the old pension programs. B) The introduction of 35 years of employment in the case of early retirement, before 65 for men and before 60 for women, to provide a pension from the new retirement plan. It also set in the long run the adjustment of the early retirement threshold from 60 to 62 years (Natali and Rhodes, 2005).

- 2005 - The social partners now manage more than 40 closed Italian pension funds, while foreign financial institutions manage almost 90 open pension systems..

- 2007 - In 2007 there were several changes in the insurance system. First there was a tacit agreement where the employee's private pension funds were transferred to an external pension fund as long as there was no objection. The employee could also agree and choose to transfer his consolidated pension contributions to the fund he wished. Only companies with more than fifty employees were excluded from this arrangement as contributions were transferred to selected, professional funds. Finally, the minimum retirement age was increased to 58 years in 2008 with a gradual increase to 60 years in 2011, while adequate employment for early retirement was raised from 35 to 36 years (Ferrera and Jessoula, 2007).

- 2009 - Law 102/2009 set the retirement age for public sector employees at 65 years.

- 2011 - The Monti government has introduced a multilevel reform of the pension system to make the system more viable. One of the reforms was to replace the system of contributions based on employees' wages[47].

- 2012 - Continuing the reforms of 2011, the government replaced all the programs of the country with increasing age limits in the private sector. One of the reforms provided for early retirement under the system contribution period at 41 years and 1 month for women and at 42 years and 1 month for men regardless of age[48][49].

9.2 Challenges

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[46] https://www.cairn.info/revue-francaise-des-affaires-sociales-2006-5-page-223.htm
[47] www.itinerariprevidenziali.it/site/home/biblioteca/../documento32034422.html
[48] www.itinerariprevidenziali.it/site/home/biblioteca/../documento32034422.html
[49] www.oecd.org/els/public-pensions/PAG2013-profile-Italy.pdf

The pension system in Italy has changed considerably in recent years but supplementary pension schemes have not been sufficiently encouraged by fiscal policies and to this day have played a particularly limited role. Nevertheless, their importance seems to be gradually increasing in the pension system. The Monti government (2011) introduced several reforms aimed at the sustainability of pension systems by raising the retirement age and reducing benefit levels for the highest income groups. Thanks to this reform, no further significant system reforms will be needed in the coming years, although the demographic problem continues to threaten the system's viability as new generations enter the labor market later, leading to extremely reduced retirement earnings in next decades. The above, in combination with the large number of unemployed and the lack of resources for welfare policies also complicates the operation of the pension system. In conclusion, the challenge of the pension system is not the lack of resources and poverty of the elderly today but of future retirees.

10. Cyprus

10.1 Historical Background and the Present Situation

- 2000 - The public advisory organization Parliament of Elderly Citizens begins to operate with the aim of serving and dialogue with the country's pensioners.

- 2001 - With the issuance of the Social Map, the Parliament granted special privileges (discounts on transport, medical services, etc.) to people over the age of 63 and also invited them to participate in the public and political life of the country.

- 2002 - An additional supplement to the pension income for the financially weak pensioners is also introduced this year, while the rules for the payment of family benefits with children recipients were also revised[50].

- 2005 - The retirement age of civil servants is subject to a gradual increase between the years 2005-2008 with the aim of 60 years to reach 63[51].

- 2006 - The legal framework of voluntary pension funds operating in the capital market has been expanded [52].

- 2012 - Retirement income benefits have been adjusted and the ratio of pension expenditures to the country's GDP has been improved [53].

- 2015 - Recent reforms have raised the retirement age and contributions to public funds. [54].

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[50] https://www.ssa.gov › Research, Statistics, & Policy Analysis › Program Descriptions
[51] https://www.ssa.gov/policy/docs/progdesc/ssptw/2002-2003/europe/cyprus.html
[52]http://www.cyprus.gov.cy/portal/portal.nsf/gwp.getGroup?OpenForm&access=0&SectionId=government&CategoryId=Legislations&SelectionId=Laws%20regarding%20Work&print=0&lang=en
[53]
http://www.mlsi.gov.cy/mlsi/sid/sidv2.nsf/All/175A9A59E0A59FAEC2257B7F002572C0/$file/2012-12-21%20Cypriot%20Guide%20for%20Bulgarian%20Migrants%20EN%20-%20FINAL.pdf

10.2 Challenges

In Cyprus there has been a significant improvement in the living conditions of some population groups, including citizens over 65 years of age. However, older people over the age of 65 face the highest risk of poverty and the lowest relative average income in the European Union. Pension systems also vary, which puts some population groups at greater risk. Civil servants in various sectors benefit and private sector employees have formal access to the government's social security program, while some are members of capital systems. Private employees also suffered the consequences of mismanagement and the freezing of funds in 2013, which led to drastic losses of accumulated pension funds. Finally, the guaranteed minimum income program and special benefits have partially mitigated the effects of the crisis as they partially replace cuts in benefits and pensions. Retirees, despite constant efforts, still face a high risk of poverty and social exclusion, especially if they live alone of if they are women.

11. Latvia

11.1 Historical Background and the Present Situation

- 1999 - The new law on unemployment insurance was introduced (Kawiński, 2006).

- 2001 - The law that started the operation of the 2nd pillar in the country with the opening of the pension funds that have the ability to invest in the capital markets, is passed, as well as the opportunity to choose whether to join the new system or the old system. The second pillar was initially managed only by the State Social Security Fund and invested only in government bonds. Finally, in the same year, the Finance and Capital Market Commission took over the supervision of the investment companies that served the 2nd and 3rd pillar pension funds (Bite and Zagorskis, 2003).

- 2002 - The principle of indexation of pensions with consumer price index, changed to indexation with a mixed index of consumer prices and calculation of salary increase [55] (Holzmann et al., 2003).

- 2003 - The institutions that managed the resources of the 2nd pillar had the opportunity to choose for their management either the public treasury or the private companies (Kawiński, 2006).

- 2007 - The increase of the contributions to the 2nd pillar started (Kawiński, 2006[56]).

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[54]

http://www.mlsi.gov.cy/mlsi/sid/sidv2.nsf/0/CFC7F0DD3FCB4E94C2257A170036EE4D/$file/Social%20Insurance%20in%20Cyprus.pdf

[55] ec.europa.eu/social/BlobServlet?docId=5382&langId=en

[56] Σύμφωνα με τους στόχους του 2006.

- 2014 - The age limits are gradually increasing and the mandatory pension contribution period has been reduced to 25 years from 30 years. In case of coverage of the mandatory period of pension contributions and delay in claiming the right to retire, the beneficiary had the right to claim retroactively the lost pensions for up to six months[57].

- 2015 - A unified pension system for civil servants in public security services has been introduced. Retirement age of 50 years with compulsory employment in the security sector for at least 20 years including 5 years of employment as a civil servant[58].

- 2016 - The gradual increase of the age limits continues with the sole exception of the early retirement of large families with 5 and more children, and for parents with children with disabilities where the early retirement is set up to 5 years before the official retirement age. Civil servants in certain services, such as the police, etc., acquired the right to early retirement. There have also been some changes in disability pensions and the alignment of old-age and disability pensions. Finally, the social security pension amounting to 64 euros per month was separated from the criteria of age and participation time required for the old-age pension[59][60].

11.2 Challenges

Latvia's state pension system guarantees a publicly provided minimum monthly pension. The amount of the monthly pension depends on the years of employment of the employee but is equal to or greater than 70 euros, ie the social security allowance of the state, but lower than 370 euros which is half of the monthly minimum wage. However, retirees are entitled to a public contribution when their pension is below the minimum wage. According to the Central Statistics Office, the at-risk-of-poverty rate of older people receiving at least one pension continues to rise rapidly each year. The introduction of a three-pillar pension scheme has increased the system's fiscal sustainability and intergenerational equality, with the European Commission's 2012 fiscal sustainability report considering the defined contribution pension scheme as low at risk of sustainability, mainly due to its expected dependence by the funds raised from the 2nd pillar.

12. Lithuania

12.1 Historical Background and the Present Situation

- 2000 - Conditional accumulation of funds in voluntary pension funds is possible. With this move, the systems of the 3rd pillar are established in the country. The laws on accident and sickness insurance are being amended once again. Finally, the retirement years for women

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[57] https://europa.eu/epc/sites/epc/files/docs/../latvia_-_country_fiche_on_pensions.pdf
[58] https://www.perfar.eu/policy/working-life/latvia
[59] https://www.oecd.org/els/public-pensions/PAG2017-country-profile-Latvia.pdf
[60] ec.europa.eu/social/BlobServlet?docId=17994&langId=en

were modified, for the full pension from 27 years to 30 years (Holzmann et al., 2003; Dobravolskas and Buivydas, 2003).

- 2002 - The terms of retirement of the 1st pillar - full pension - are summarized in the completion of the necessary years of employment and in the payment of pension contributions for 15 years. However, the state also provided a pension for people of retirement age who did not meet the criteria for a full pension. At the end of the year, the reform of the 3rd pillar pension system for the operation of individual private pension systems was introduced (Dobravolskas and Buivydas, 2003; Whitehouse, 2007).

- 2003 - The Insurance Supervisory Committee of the Republic of Lithuania is hereby established and will start operating at the beginning of next year. [61].

- 2004 - It is possible to transfer the pension contributions from the 1st to the second pillar and more than 50% of the insured decide to make this transfer in 2004[62][63] (Holzmann et al., 2003; Kawiński, 2006).

- 2009 - The retirement age was set at 60 years for women and 62 years and 6 months for men with annual increases until 2026 and a final age limit for both sexes of 65 years. The annual increases hjowever were finally approved in 2011[64].

- 2012 - There have been changes in the 2nd pillar of the pension system as a forecast for the possible future increase of social contributions from private resources [65].

- 2013 - The contributions to the private savings pension system were reduced to 2%. In addition, the participants in this system were given the opportunity to either stop their private contributions or increase by 2% their contributions to the state social security fund[66].

- 2014 - A new fundraising system was introduced for pensions of people who had not yet reached retirement age but had completed the years of participation to be able to enter into pension accumulation contracts, where their social contributions were transferred to one of the pension funds. In this way the contributions were now calculated within the limit of participation in the system covering the other parameters of the retirement criteria[67].

- 2018 - The years of employment were decided to increase gradually to 35 years by 2027. Also with the law of 2018, pensions now consist of two parts. One depends on contributions and the approved basic pension income from the government and the second part depends on the employee's earnings.

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[61] https://ec.europa.eu/health/archive/ph_determinants/socio../lithuania_rd05_en.pdf
[62] https://ec.europa.eu/health/archive/ph_determinants/socio../lithuania_rd05_en.pdf
[63] https://www.ssa.gov/policy/docs/progdesc/ssptw/2006-2007/europe/index.html
[64] https://europa.eu/epc/sites/epc/files/docs/../lithuania_-_country_fiche_on_pensions.pd.
[65] www.ebrd.com/downloads/news/pension-system.pdf
[66] https://www.ipe.com/lithuanian-parliament-approves-long-awaited-pension-reforms/www.ipe.com/lithuanian-parliament-approves-long-awaited-pension-reforms/48585.fullarticle
[67] ec.europa.eu/social/BlobServlet?docId=12675&langId=en

12.2 Challenges

Lithuania 's pension system does not adequately protect pension beneficiaries from poverty. The majority of the population over the age of 65 is poor or suffering from social exclusion at levels well above the European Union average. During the economic crisis, the country was forced to reduce social spending (including pensions), thus increasing the risk of poverty. However, in 2012 pensions were restored to pre-crisis levels while the state began to compensate retirees over a five-year period for the cuts they had suffered in their retirement incomes. Despite these moves, the country still suffers from high rates of poverty in elders with the first pillar using the Pay-As-You-Go formula being considered unsustainable.

13. Luxemburg

13.1 Historical Background and the Present Situation

- 2000 - The law on civil servants regarding the coordination of pension systems is approved. Also in combination with the law of 2003 and 1954, the limits of compulsory and voluntary retirement were established for civil servants[68].

- 2002 - Rewards with tax breaks are introduced for individuals in individual pension schemes who did not retire at the retirement age [69].

- 2004 - The transfer of surpluses of the basic pension system to the securities portfolio for the purpose of their strategic exploitation was allowed by law [70].

- 2012 - Following recommendations from the social partners, Luxembourg introduced a series of key reforms this year. The tripartite system of financing the pension system was maintained, however, changes were made in the participation rates of each party (state-employees and employers). The age limits were not raised but there was an agreement to increase early retirement in the near future[71].

- 2013 - Last year's reforms came into force, which mainly encouraged the postponement of retirement with various incentives, while encouraging employees to take breaks from work by reducing their monthly contributions by 1/3. Finally, pensions were automatically adjusted for inflation[72].

- 2015 - Vocational rehabilitation programs for people with partial occupational disability due to health problems etc. came into force, in order for older people to remain in the labor market and for those who were more likely to be excluded to enter the labor market[73].

13.2 Challenges

Luxembourg pension programs offer one of the highest replacement rates in the OECD while at the same time providing a particularly high standard of living for older retirees. Poverty in terms of the number of older people is lower than that of family poverty and even more so if poverty in single-parent families is taken into account. Retirees contribute financially to the health insurance system and are also fully taxed without deductions. The country has not adopted a strict austerity policy, but has slightly modified its pension system and some of its general employment rules. However, the OECD and the European Commission have insisted on proposals to reform the system to ensure its long-term

[68] ec.europa.eu/social/BlobServlet?docId=5382&langId=en
[69] http://www.fonction-publique.public.lu/fr/legislation/pensions/loi-26mai1954-texte-coordonne/1954_pensions_fonctionnaires.pdf
[70] http://ec.europa.eu/social/BlobServlet?docId=5432&langId=en
[71] https://www.abbl.lu/content/uploads/2017/../abbl-summary-of-the-pension-reform.pd..
[72] www.pecoma.lu/media/../PECOMA_Newsletter_Pension_reform_010113_English.pd..
[73] https://www.cnap.lu/fileadmin/file/cnap/publications/Publications_CNAP/Brochures/F_Brochure_Pension_de_vieillesse.pdf

viability. The viability of the pension system is based, as in the rest of Europe, on the continuous increase of the population and the replacement of retired workers. The main problem is therefore that the current population growth in the country is due to immigration and its strong economic performance, which is uncertain and will continue indefinitely in the coming years and decades..

14. Malta

14.1 Historical Background and the Present Situation

- 2000 - 40% of retirees received an annual retirement income equal to the minimum wage in the country. Of this population, 21% over the age of 75 were below the line of poverty. The deficit of the basic pension systems in the same year reached 12 million MTL with the state subsidy and 66 million MTL without it (Abela et al., 2003).

- 2003 - The 3rd pillar starts operating in Malta when the accumulation of money in special pension funds was allowed. With this move, the first foundations of the 2nd pillar in the country were laid (Abela et al., 2003).

- 2004 - Following the World Bank report on the challenges of the country's pension system and the urge to raise the retirement age for both to 65 and to create the second pillar, the country at the end of the year proceeded with reforms. Specifically, the White Paper on the elderly was created, which proposed the introduction and operation of the second pillar in the country.[74].

- 2005 - A working group was set up to study the pension system and through a report recommended several necessary changes to the system. The change in the definition of the guaranteed minimum pension to 50% of the average wage, which was based by 70% on the wage growth rates and based by 30% on inflation. The group also recommended the use of the same indicators to all pensions. Other recommendations included a gradual increase in retirement age with penalties in the event of early retirement (reduction of 6% per year), an increase in the income limit subject to contributions, the coverage from the state budget of contributions to people starting university after their 30th year of age, the gradual increase of the necessary years for full pension to 40, the change of the calculation of the pensions from the 20 best years to the best 10 and the introduction of the Financial Services Authority of the country with the aim of creating the 2nd pillar with specific conditions and goals for the next thirty years[75].

- 2005 - According to the recommendations of the Working Group on the Pension System in 2004, major changes were made to the system by raising the age limit for women to 61

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[74] ec.europa.eu/social/BlobServlet?docId=5433&langId=en
[75] ec.europa.eu/social/BlobServlet?docId=5433&langId=en

years and increasing the income limit subject to the payment of pension contributions by about 15-20% until 2014[76].

- 2013 - Maximum tax threshold for supplementary pensions for retirees over 65 is raised [77].
- 2014 - The 3rd pillar is introduced in the country and it is strengthened with tax incentives [78].
- 2015 - The state stops imposing income tax on retirees receiving pensions below the country's minimum wage. In the same year, a report was published on the strategies that the country should follow for the pension system, however it was criticized a lot because it failed to take into account the weaknesses of the system, the proposals and the strengths of the candidates in selecting and understanding the proposed changes.[79]
- 2016 - Pensions have risen slightly and income tax is stopped on retirees earning less than 140 euros a week [80].
- 2017 - A two-year plan to abolish income tax on all pensions under 13,000 euros per year is introduced. Also, the amounts given to the formal care professionals were increased to 140 euros per week, while the elderly who refused to be transferred to nursing homes could be provided with the amount of 5200 euros per year to meet their needs by official care professionals[81].

14.2 Challenges

Malta 's pension system is characterized by the predominance of the first pillar in the form of the payment of public pensions. The second pillar is non-existent while the third was introduced only in 2014. It is based on the Pay-As-You-Go formula as well as a non-compensatory system which has been tested based on budgetary means. Until recently, pensions were not linked to inflation, which affected their true value, although partially corrected, but unfortunately the connection made in recent years can not offset the losses of decades. In addition, the country's low tax ceilings meant that retirees also had to pay income tax on their retirement income at a time when there is no retirement provision for immigrants in the country.

15. Netherlands

15.1 Historical Background and the Present Situation

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[76] ec.europa.eu/social/BlobServlet?docId=5433&langId=en
[77] https://www.oecd.org/countries/malta/43469300.pdf
[78] https://mfin.gov.mt/en/Press_Releases/Pages/PR142662.aspx
[79] ec.europa.eu/social/BlobServlet?docId=14529&langId=en
[80] https://www.imf.org/external/pubs/ft/scr/2016/cr1620.pdf
[81] ec.europa.eu/social/BlobServlet?docId=17915&langId=en

- 2000 - The first pillar received contributions from retirees amounting to 17.9% on their salaries (de Vos and Kapteyn, 2004).

- 2001 - There were now 916 pension funds. 1 was a public limited company, 3 were joint stock companies, 38 were limited liability companies and the rest had the legal status of institutions (Maatman, 2004).

- 2002 - The 1st pillar gives per person who lived alone 869.24 € per month and in the case of two people 1,214 euros (van Riel et al., 2005).

- 2003 - The number of pension funds was reduced to 858 and the value of the total contributions received was 9.6 billion euros (Maatman, 2004; van Riel et al., 2005).

- 2005 - The full gross pension per month of the 1st pillar amounted to 930.17 euros (Anderson, 2007).

- 2006 - The full gross pension of the 2nd pillar amounted to 932.67 euros per month. In the same year, the contribution to the funds was no longer made through income tax and the possibility of saving in the second pillar was introduced, which resulted in tax relief of up to 12% on the annual gross income. The use of the second pillar and tax breaks mainly provided for people who were still in education, had lost their parents or had received an early retirement[82] .

- 2007 - Major changes were made to the 2nd pillar in terms of its operation and management. New recruits needed to be fully informed about the pension system, there was a clearer picture of the need to determine the indexation of pension schemes, there was no more discrimination between pension funds and insurance institutions, pension schemes were reduced from 25 to 21 and finally there was a requirement for pension schemes to use the principles of sound management[83].

- 2013 - It was decided to gradually increase the retirement age from 66 to 67 by 2021. Also, the retirement age for supplementary pensions was set at 67 years from next year[84].

- 2014 - There has been a lot of talk at this time about a large-scale pension reform. Discussions continued until 2016, but to date the reform of the system has been presented only as an intention of the governments. Discussions on the need for a new reform focused on the effects of unequal redistribution and the creation of more flexible pension systems that could give individuals more choice than maintaining collective management pension schemes.[85].

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[82] ec.europa.eu/social/BlobServlet?docId=5443&langId=en
[83] https://www.ssa.gov/policy/docs/progdesc/ssptw/2006-2007/europe/index.html
[84] www.oecd.org/els/public-pensions/PAG2013-profile-Netherlands.pdf
[85] https://www.oecd.org/netherlands/PAG2017-NLD.pdf

- 2016 - There has been a reduction in insurance premiums on voluntary pensions with contracts between employers and employees with a single limit of pension funds being over 100,000 euros [86].

15.2 Challenges

The first pillar reforms in 2012 were aimed at gradually increasing the retirement age to address the demographic problem affecting pension contributions with a view to setting living conditions for raising or lowering the retirement age by 2024. The use and conditions of life expectancy as indicators for calculating the retirement age are expected to be determined in 2019. At the same time the second pillar in the country which is managed and supervised by the social partners includes the occupational pension systems and completes the basic system. The operation of the second pillar is a source of concern for the country's governments and citizens, because the reduction of both interest rates and returns in the financial markets is constantly weakening the pension funds. The third pillar of private pension schemes is currently functioning well.

16. Portugal

16.1 Historical Background and the Present Situation

- 2000 - The retirement age is definitively 65 years for both sexes while the principle of indexation adjustment came into force with an indicator of inflation and the basic salary for their final calculation. Also the calculation of the pension took into account the total years of employment instead of the best years, with a maximum of 40 years.

- 2001 - The average pension was 726 euros and the average contribution to the first pillar was 638 euros per month. The deficit amounted to 2.5 billion euros while the system had raised 3.8 billion euros that year (Stańko, 2004).

- 2002 - The 2nd pillar was favored with the decision to enable the operation of corporate pension systems. In the same year the calculation of pensions taking into account the 40 years of work put into effect a formula that multiplied them by 14. The minimum pension in 2002 amounted to 189.54 euros, in the system of contributions and in the system of non-contributions to 151.44 euros for people up to 70 years with an increase of about 15 euros for people over 70. Finally, the average pension of civil servants was around 930 euros per month[87][88] (Holzmann et al., 2003).

- 2004 - The calculation of civil servants' pensions is now calculated according to 90% of their salary (Chuliá and Asensio, 2007).

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[86] https://www.oecd.org/netherlands/PAG2017-NLD.pdf
[87] ec.europa.eu/social/BlobServlet?docId=5382&langId=en
[88] http://www.oecd.org/portugal/economicsurvey-portugal2004executivesummary.htm

- 2006 - A solidarity allowance for the elderly is introduced with the basic criterion of being over 80 years old. This allowance was planned to be given to people who are 65 years old since 2009. In the same year there were 180 occupational pension funds in the country and at the end of 2006 there were 232 pension funds, 94% of which were with closed funds and most of the funds belonged to the banking sector[89][90] (Pavão Nunes, 2007).

- 2012 - Law 85-A / 2012 suspended early retirement during the financial assistance program [91].

- 2013 - Law 167/2013 stipulated that age limits would be subject to change depending on life expectancy. According to this rule in 2014 and 2015 the limit was 66 years and 2 months and in 2017 it increased by one month[92].

- 2015 - The suspension of early pensions is over but new conditions have been set such as the age limit of 60 years and pension contributions of at least 40 years [93].

16.2 Challenges

The pension plan in Portugal has been at the heart of government policy since the country's 2011 bailout. It was one of the main areas in which the government sought to reduce public spending. Pension policy was also one of the central topics of discussion and planning in the 2015 election campaign. A key element of the Socialist Party and Communist Party campaigns was mainly pensions. Therefore, a major change introduced by the Costa government was an increase in pensions. The 2017 state budget will increase the pensions of several pension schemes, however, demographic and economic problems persist and make this policy controversial for the system's viability.

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[89] https://www.ssa.gov/policy/docs/progdesc/ssptw/2006-2007/europe/index.html
[90] http://www.cga.pt/numeros_EN.asp
[91] ec.europa.eu/social/BlobServlet?docId=7774&langId=en
[92] http://ilo.org/wcmsp5/groups/public/---ed_norm/---normes/documents/publication/wcms_497566.pdf
[93] https://www.oecd.org/finance/private-pensions/42575009.pdf

17. Slovakia

17.1 Historical Background and the Present Situation

- 2000 - Establishment of the Financial Control Bureau while the planning of the 2nd pillar of the pension system in the form of mandatory pension funds for its implementation in 2003 begins. The contributions to the 2nd pillar in the long-term plan of the government were for it to reach 9% in 2025 and for the first pillar to reach 18.5%. In 2003 the contributions reached 24.7% for the first pillar and 3% for the second pillar . Other plans included the creation of a voluntary pension pillar which would increase the years of mandatory participation in the system from 25 to 30 years and the calculation of pensions from being the 5 best years in the previous decade to being the 5 best in the previous thirty years[94] (Chlon et al., 2001; Palmer, 2001; Vagač and Haulíková, 2003; Holzmann et al., 2005).

- 2001 - The pension system of the 1st pillar presents a rather large deficit that requires its coverage from the state budget. In the same year, civil servants and local government officials have the opportunity to participate in the 3rd pillar (Palmer, 2001).

- 2002 - Pension contributions for the unemployed, students, people with disabilities, the military, etc. began to be covered by the state budget. The average pension in 2002 was equivalent to about 40% of the average salary and the retirement age was 60 years for men and for women the legal framework of 1964 still applies. Full pension now requires 25 years of employment and penalties and rewards are introduced for early and late retirement respectively. Each year over the required 25 years was rewarded with 1% of retirement income and early retirement was possible 2 years before retirement age. At the same time widows receive the right to receive their husband's pension if he was over 65 years old. Pensions were finally adjusted using the gross cost-benefit ratio and market prices, and it was further decided that there would be a gradual equalization of the retirement age between 2003 and 2019 at 60 years for both sexes. Finally, the system was mandatory for all employees, professional soldiers, police, secret services and the self-employed with an annual income of more than a certain level [95] (Vagač and Haulíková, 2003; Holzmann et al., 2005; Novysedlak, 2006).

- 2003 - A number of social security reforms were proposed and adopted, which came into force in 2004. The new system covered guaranteed insurance, pension insurance, accident insurance, unemployment insurance and health insurance. Each of the above insurances was financed independently of the others. In addition, a new type of calculation of the 1st pillar

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[94] https://www.ssa.gov/policy/docs/progdesc/ssptw/2006-2007/europe/index.html
[95] ec.europa.eu/social/BlobServlet?docId=5421&langId=en

was implemented. Finally, the system abolished the minimum pension while a new long-term retirement age was decided for both sexes at 62 years[96][97].

- 2004 - This year is one of the most important due to the multitude of reforms in the social welfare system and especially in the pension system.

- • 1st pillar - The operation of the Reserve Solidarity Fund is managed by the Social Insurance Institution and financed exclusively by the employers. The purpose of the fund was to finance the increased receivables and the projected deficits of the following years. Pensions with indexation adjustment were modified by the application of the gross index, which was based by 50% on the inflation rate and by 50% on the nominal earnings growth rate.

- Pillar 2 - The new legal framework for Pillar 2 is introduced, which stipulates the payment of 9% of the fees to its funds at a time when the companies that managed the funds were obliged to dispose of their own assets of SKK 300 million. Until the end of the year, 6 funds managed the pension funds of the 2nd pillar.

- 3rd pillar - The legal framework changes in this case as well. Employees but employers over the age of 18 are entitled to accumulate funds for an additional pension in certain pension funds, which were run by banks or life insurance companies. At the same time all the insurance institutions in the market had to be converted into pension funds. Additional changes were made to the eligibility requirements for the 3rd pillar assembly. The minimum participation in the pillar was increased from 5 to 10 years and the minimum retirement age definitively from 50 years to 55 with the deduction of contributions from personal income tax, a contribution that was reduced by 50%. Finally, the Association of Pension Business Managers is established [98][99](Novysedlak, 2006).

- 2005 - The operation of the 2nd and 3rd pillars started according to the reforms of 2004. The possibility of participating in the 2nd pillar was universal with the sole exception of the employees who were going to retire within the next decade[100].

- 2006 - The Financial Control Office ceased to function and the supervision of the 2nd and 3rd pillars was taken over by the National Bank of Slovakia. Some decisions had to be made by this year. All management companies were required to open three types of pension funds. A) The conservative pension fund, which would invest only in government bonds in the money market, completely avoiding monetary risk. B) The sustainable pension fund, which would invest up to 50% in shares and up to 50% in transactions related to monetary risk. C) The development pension fund, which would invest up to 80% of its resources in

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[96] ec.europa.eu/social/BlobServlet?docId=5421&langId=en
[97] www.ilo.org/dyn/natlex/natlex4.detail?p_lang=en&p_isn=67708
[98] ec.europa.eu/social/BlobServlet?docId=5421&langId=en
[99] www.ilo.org/dyn/natlex/natlex4.detail?p_lang=en&p_isn=71388
[100] ec.europa.eu/social/BlobServlet?docId=2014&langId=en

shares and up to 80% in transactions related to monetary risk. Employees who would retire within the next 15 years could choose between a viable and a conservative fund. Finally, in January 2006, the first two companies managing the 3rd pillar pension funds were registered, while employees up to the age of 47 have the right to choose between subscribing to the mixed pension scheme, which became mandatory in 2012.(Curda, 2006)[101].

- 2009-2010 - Due to the financial crisis, it was decided, after the consent of all representative bodies, to temporarily and gradually increase the rate of pension contributions[102].

- 2011-2013 - The tax incentives until 2014 for the entry of employees in the voluntary supplementary pension system were suspended. In 2014 it was reintroduced but with big changes that did not make them as interesting as they were before 2011[103].

- 2012 - Pension contributions are reduced from 9% to 4% and began to increase again by 0.25% from 2017 on an annual basis with the aim of reaching 6% in 2024. (Bednárik, 2015)

- 2013 - In an effort to increase the resources of pension contributions and better coverage of employees in these working conditions, the payment of pension contributions was required from employment contracts outside of formal employment relationships such as the self-employed and traditional employment contracts in specific employment contexts. (Bednárik 2015) Finally, new entrants to the social security system now automatically register only in the first pillar, but until the age of 35 they can voluntarily apply for membership in the second pillar with a minimum contribution period of 10 years from 2012 (formerly the 2nd pillar required 15 years of contributions) while since 2015 there's no longer required period of stay in the system.

17.2 Challenges

Slovakia introduced a three-pillar pension scheme according to the World Bank categorization in 2004. From 2012 to 2015, the Fico government adopted a series of measures aimed at strengthening the first pillar at the expense of the relatively stronger second pillar. These changes increased the role of the state in retirement benefits for the elderly and gave the public pension system a more distributive character. While these reforms have improved the short-term financial condition of the public pension system, the expected increase in public pension expenditure remains much higher than the European Union average in the long run. In an effort to further weaken the second pillar of retirement, the Fico third government has announced a desire to facilitate the withdrawal of savings from the second pillar of retirement, Ignoring the indexation adjustment rules that have

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[101] ec.europa.eu/social/BlobServlet?docId=5421&langId=en
[102] www.oecd.org/eco/46478358.pdf
[103] https://europa.eu/epc/sites/epc/files/docs/.../slovakia_-_country_fiche_on_pensions.pdf

been in force since 2013, while in 2017 it also granted increases in public pensions. It remains to be seen whether the two-pillar policy reforms will benefit the overall pension system in the future.

18. Slovenia

18.1 Historical Background and the Present Situation

- 2000 - The first non-contributory pension is introduced in 2003. This pension is for people over 68 years of age who have lived in Slovenia for at least 30 years and have not had a substantial income from other sources. In the same year, the Insurance Supervision Service started operating and a trust company, Kapitalska družba, which was founded in 1996, had three main chapters under its control in 2000. A) the first pension fund set up to absorb privatization certificates issued for pension purposes. B) the capital pension fund rooted in the 1992 law which replaced the Voluntary Retirement Fund. C) The Supplementary Pension Insurance Fund established in 1999 (Geroldi and Marano, 2001; Stropnik et al., 2003; Holzmann et al., 2005).

- 2002 - Private companies managed the 16 public pensions with deficits of more than 30% (Stropnik et al., 2003).

- 2003 - The legal framework for health insurance and family allowances was amended and at the same time a new law was introduced on a closed reciprocal pension fund for supplementary pensions of civil servants[104].

- 2005 - The number of employed people in voluntary supplementary pension schemes was 56% of the total population. During the same year, 30% of people aged 55-64 were employed and finally the law on accident insurance was amended[105].

- 2012 - A substantial reform of the pension system has taken place. First, the age limits were raised to 65 for both sexes and to 60 for those who had been employed for at least 40 years. Secondly, additional incentives were introduced for the postponement of the retirement and employment of the already retired elderly[106].

- 2016 - The White Paper was presented containing the overall analysis of the demographic economic and long-term sustainability of the pension system as well as the proposed options available. The presentation was made by the Ministry of Labor, Family, Social Affairs and Equal Opportunities in order to start the discussions for a new reform of the pension system[107].

18.2 Challenges

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[104] www.dpps-mlas.si/pdf/INSURANCE_LAW_IN_SLOVENIA-EJCCL_-_6[1].doc.pdf
[105] ec.europa.eu/social/BlobServlet?docId=2014&langId=en
[106] https://ec.europa.eu/info/sites/info/files/economy-finance/final_country_fiche_si.pdf
[107] ec.europa.eu/social/BlobServlet?docId=19207&langId=en

Slovenia has a traditional pay-as-you-go pension system, whose sustainability in relation to the country's governance and the acute demographic problem suffer from the low percentage of older people who continue to work and postpone their retirement.

19. Finland

19.1 Historical Background and the Present Situation

- 2000 - The age limit for early retirement is raised from 58 to 60 (Lasilla and Valkonen, 2002).

- 2002 - The insurance system has changed some parameters in the operating rules regarding unemployment insurance. During the same year the low pension was around 490 euros with a difference of about 20 euros depending on the community in which the retiree lived (Dietrich, 2004; Whitehouse, 2007).

- 2004 - The branches of the occupational funds were decentralized by the central administration, thus enabling insurance companies, pension fund companies or industrial pension funds to take over their administration. In the same year, the basic average pension reached 1,377 euros per month. Public pensions provided 84% of the funds for retirement income at a time when the national pension insurance subsystem was expected to cover 16% of beneficiaries but only 8% relied solely on the public pension as their sole income[108][109] (Dietrich, 2004).

- 2005 - This year saw the largest reform of the country's pension system until 2014. The first health insurance was introduced and then the Finnish Pension Center was set up, bringing together a number of other pension institutions such as seafarers, farmers and the self-employed. At the same time, under the supervision of the Ministry of Finance, the Pensions Office of the Local Government and the National Council of the Church, the public sector pension system was divided into separate sections for civil servants, priests and local government employees. In addition, national public insurance has now started to be financed by employers.

- Retirement criteria have also changed. The retirement age was made flexible with the possibility of retiring between the ages of 62 and 68 at a time when the calculation of pensions was set at the importance of earnings at different time periods, changing that way the system of the top 10 years. Specifically, the calculation of pensions was done with the following ratio according to salaries per year: 18-52 years - 1.5%, 53-62 years - 1.9% and

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[108] ec.europa.eu/social/BlobServlet?docId=5422&langId=en
[109] aei.pitt.edu/42851/

63-68 years - 4.5%. Finally, special importance in the calculation of pensions was given to the average life expectancy[110][111] (Dietrich, 2004).

- 2006 - Some changes were implemented in the operation of the pension fund, which was also renamed, for local government employees. In 2007 the fund for civil servants was also renamed[112].

- 2007 - An electronic platform for the service of retirees is introduced and also special cards are given to retirees in order to access their retirement income in a modernized and secure way[113].

- 2011 - The first national guaranteed pension is introduced [114].

- 2014 - The second major reform of the pension system is taking place, which came into full force in 2017. Initially, the retirement age according to the decision of the social partners would be increased to 65 years. After 2018 it would also increase by 3 months per year with a maximum retirement age of around 70 years. The part-time in-service pension was set to be replaced by a part-time old-age pension for retirees over 61 years of age. The amount of this pension would be equal to 25-50% of the eligible pension and was not linked to the reduction of working hours of employed retirees. Heavy-duty individuals were able to retire from the age of 63 with a total of at least 38 years of employment in the profession. In addition to the above, rewards were given for the delayed retirement with a 0.4 increase of the pension per month of postponement of the retirement. It was also stated that in the long run and specifically in 2030 the retirement age will continue to change limits which will depend on the life expectancy of each age group. Finally it was decided that the pension contributions will have an annual interest rate of 1.5% for all citizens over 17 years of age and there will be a change in this interest rate after 2025 where the age group between 53 and 62 years has an interest rate on the contributions amounting to 1.7%[115][116].

19.2 Challenges

The Finnish pension system has two pillars: the national pension based on place of residence and a mandatory pension based on the pensioner's previous employment and contributions. Voluntary occupational schemes and private pension savings are not currently being developed to the desired extent. However, about 1/5 of citizens rely on savings, either in specific private pension schemes, in joint savings or in other types of asset

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[110] https://www.ssa.gov/policy/docs/progdesc/ssptw/2006-2007/europe/index.html
[111] https://www.tela.fi/en/front_page
[112] https://www.uef.fi/web/internationalstaff/pension
[113] https://www.suomenpankki.fi/en/Statistics/payments-statistics/
[114] https://www.kela.fi/documents/12099/12170/elakkeelle_eng_verkko.pdf
[115] https://www.etk.fi/wp-content/uploads/Effectsofthe2017earningsrelatedpensionreform.pdf
[116] https://www.etk.fi/wp-content/uploads/agreement_on_2017_earnings_related_pension_reform_final.pdf

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exploitation schemes. With the help of the social partners and governments, all of the pension reforms and policies have brought the country to a level where it has been able to meet retirement benefits and avoid the problem of old age poverty. Nevertheless the problems persist as older women have higher rates of poverty than men due to their short professional careers and because usually these careers are often in low paid positions which affect the final calculation of pensions. An additional problem is the demographic one, with the ever-aging population creating problems in terms of maintaining the workforce and available resources, especially with the economic crisis in Europe which has exacerbated this situation. It therefore makes sense at present for political strategies in the pension system to aim at encouraging the postponement of retirement as much as possible in order to ensure adequate funding for the state pension.

Chapter 3

Descriptive Analysis of Population Data

1 Introduction

A basic condition for submitting a proposal for a single first pillar insurance system in the Eurozone countries and based on the characteristics and historical development of the individual member states, is the analysis of the total population as a whole.

The object of this chapter is the study of population groups with distinct occupational and insurance characteristics. The reference area of the analysis is the geo-economic area of the Eurozone (EU-19).

Initially, a stratified overview of the total general population of the area is carried out. The arrangement of the Member States is based on their population size and its change is considered when the age factor is taken into account.

Sub-populations of interest are then defined and correlation indices of their size are developed. The dynamics of the prices produced are studied using actuarial projection methods.

The processing and graphical representation of the data in this section was implemented with the tools of the Microsoft Excel application.

From the historical background and the mapping of the structure of the insurance systems of the Eurozone that took place in the previous chapters, emerged, based on the particular characteristics of each insurance system, common features, but also common elements as a reference to addressing the existing problems of each system. Of course, this is not a homogeneous whole because to a large extent the proper functioning of the insurance system depends on the current state of the economy and demographic factors of each country. The growth rate of the economy, the debt, the population composition, are some of the factors that directly affect the operation of the country's insurance system.

The purpose of the above research was therefore to investigate whether there is scope for the application of a single model of insurance coverage in the countries under study and to assess the feasibility of such a model.

In this historical background we see efforts to improve or in some countries change their existing insurance systems so that they can be sustainable. In the current situation we observe that the Eurozone countries cover their citizens with three or two pillar insurance systems. Most of the insurance systems of the Eurozone, in their first pillar of organization, apply the distribution system which operates with the method of defined benefits. The countries that apply the capitalization system as the organization of the first pillar of their insurance system are Belgium, Estonia, Latvia, Lithuania and Slovakia. However, its application in these countries is done with the system of fictitious defined contributions (NDC) where the state agent essentially controls the benefits. Also the population of these countries constitutes 6.73% of the total population of the Eurozone.

In conclusion, in order to be able to effectively implement a single insurance system in the euro area, it must belong to the first pillar of insurance, ie be part of the basic pension and be defined benefits in order to be familiar and acceptable.

Another parameter identified by the observation of the above insurance systems is the demographic problem which is located in almost all insurance systems of the euro area countries except Luxembourg. To address this, measures are introduced, which we mentioned with their historical development in the second chapter, with which efforts are made to postpone the start of retirement of workers to a later time in order to fill the financial gap created by the lack of a sufficient number of employees for the balance of the insurance system. Consequently, the evolution of eurozone population data is one of the key parameters that will determine the viability of current and future insurance systems.

2 General descriptive data

2.1 Population composition

The Eurozone comprises nineteen (19) Member States [1] with a total population of 342.8 million [2]. Greece represents 3.1% of its total population, occupying the seventh place. Germany, France, Italy and Spain make up 75.2% of the total population (Table 2.1, Figure 2.1).

Table 2.1. Population of the Eurozone (2020)

Country	Code	Population on January 1, 2020[*]	Percentage	Cumulative percentage
Germany	DE	83,166,711	24.26%	24.26%
France	FR	67,098,824	19.57%	43.83%
Italy	IT	60,244,639	17.57%	61.41%
Spain	ES	47,329,981	13.81%	75.21%
Netherlands	NL	17,407,585	5.08%	80.29%
Belgium	BE	11,549,888	3.37%	83.66%
Greece	EL	10,709,739	3.12%	86.79%
Portugal	PT	10,295,909	3.00%	89.79%
Austria	AT	8,901,064	2.60%	92.39%
Finland	FI	5,525,292	1.61%	94.00%
Slovakia	SK	5457,873	1.59%	95.59%
Ireland	IE	4963839	1.45%	97.04%
Lithuania	LT	2,794,090	0.82%	97.85%
Slovenia	SI	2,095,861	0.61%	98.46%
Latvia	LV	1,907,675	0.56%	99.02%
Estonia	EE	1,328,976	0.39%	99.41%
Cyprus	CY	888,005	0.26%	99.67%
Luxembourg	LU	626,108	0.18%	99.85%
Malta	MT	514,564	0.15%	100.00%
EU-19		**342,806,623**	**100.00%**	**-**

[*]Source: Eurostat. Population on 1 January [TPS00001]. Available from: https://ec.europa.eu/eurostat/databrowser/view/tps00001/default/table?lang=en. Accessed 11/23/2020.
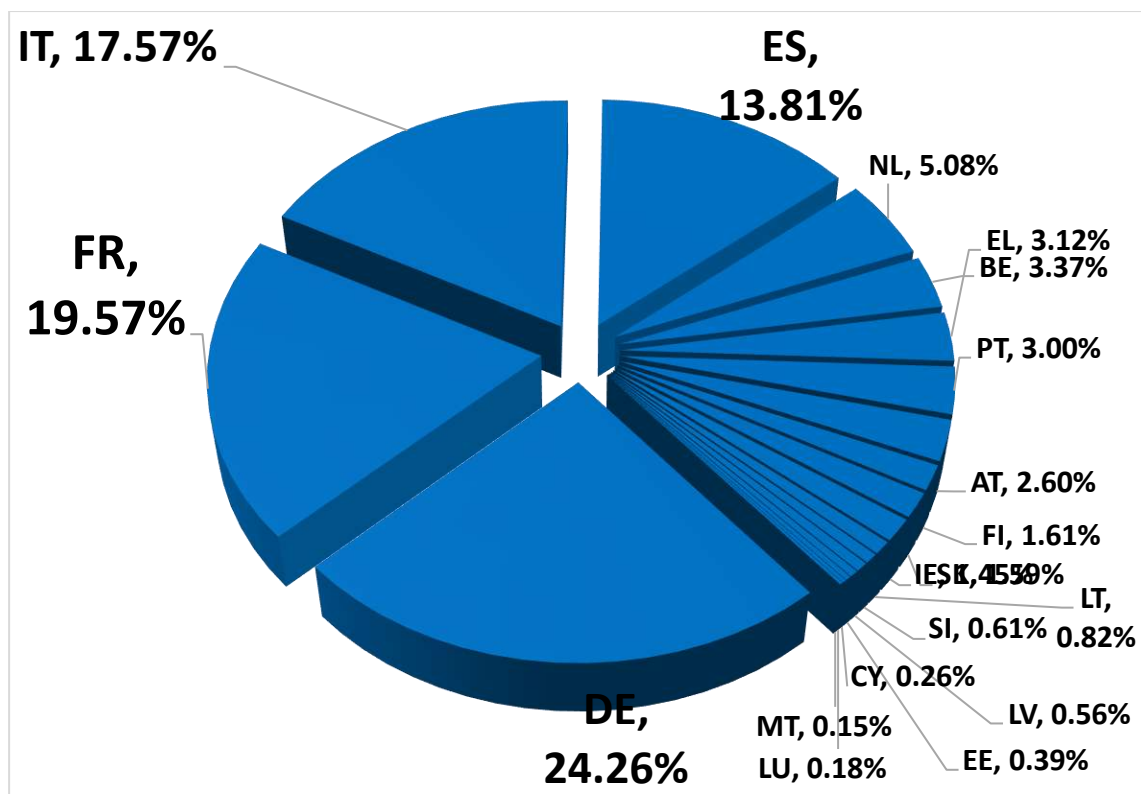
Figure 2.1. EU-19: Population distribution by country

2.2 Age distribution

Demographic composition as well as the age distribution of the population in the euro area countries are among the key factors in controlling the viability of the insurance system. An aging population where workers will not be able to support retirees leads to a weak insurance system with little ability to meet the demands of society. In such a case drastic measures are necessary which may even include the structural change of the existing insurance system. In order to have a picture of the age map of the Eurozone population we examined the population data of the Member States per year and per age starting from the year 1960 to the year 2019.

The calculations were made based on the population data of Eurostat[117] and the lists of Active (employees) Newcomers (future employees) and retirees were created (Annex chapter 3 tables T3.1, T 3.2, T3.3)

We then proceeded to find the average age of the population in each of the countries as well as the average age of the total population of the Eurozone. The percentage of each solar class

[117] Ec.europa.eu. 2022. *Database - Eurostat*. [online] Available at:
<https://ec.europa.eu/eurostat/data/database> [Accessed 8 March 2022].

in relation to the total population of each country was also calculated. The calculation is performed with the following relation.

$$\bar{Y}_j = \frac{\sum_{i=1}^{i=101} y_i \times N_{i,j}}{N_j} = \frac{\sum_{i=1}^{i=101} y_i \times N_{i,j}}{\sum_{i=1}^{101} N_{i,j}} \qquad \qquad (i)$$

$\bar{Y}_j$ *Average age of the population in j country of EU-19*

      $j \in [1, 20]$

      j=1: AT; j=2: BE; j=3: JY; j=4: EE; j=5: FI; j=6: FR; j=7: DE; j=8: EL; j=9: IE; j=10: IT; j=11: LV; j=12: LT; j=13: LU; j=14: MT; j=15: NL; j=16: PT; j=17: SK; j=18: SI; j=19: ES; j=20: EU-19 Total

y_i^m *Central point of age class i:*

      $y_1 = 0.5$ *$i \in [1, 101]$*

      $y_2 = 1.5$ *i=1: age class (0, 1)*

      ...   *i=2: age class [1, 2)*

                             i=3: age class [2, 3)

                             ...

      $y_{100} = 99.5$ *i=100: age class [99, 100)*

      $y_{101} = 100.5$ *i=101: age class 100+*

N_j *Population in country j of the EU-19 countries*

$N_{i,j}$ *Population in i age class of j country of the EU-19*
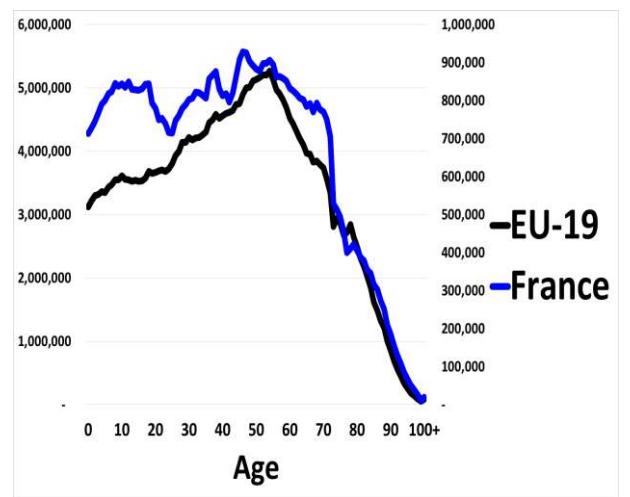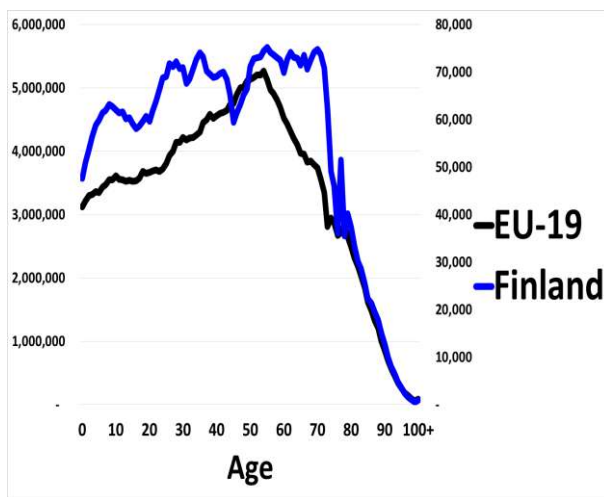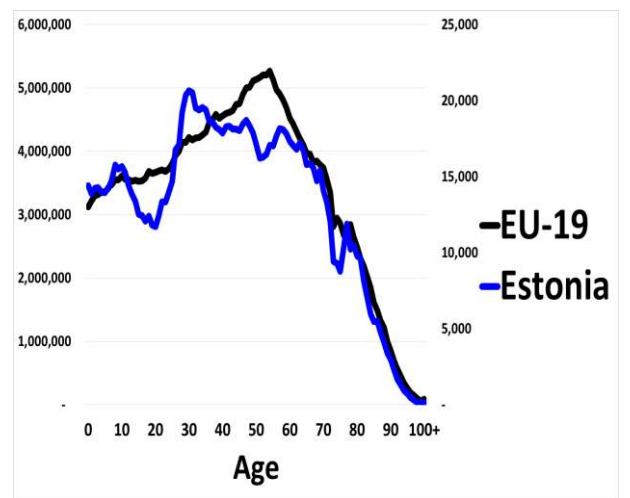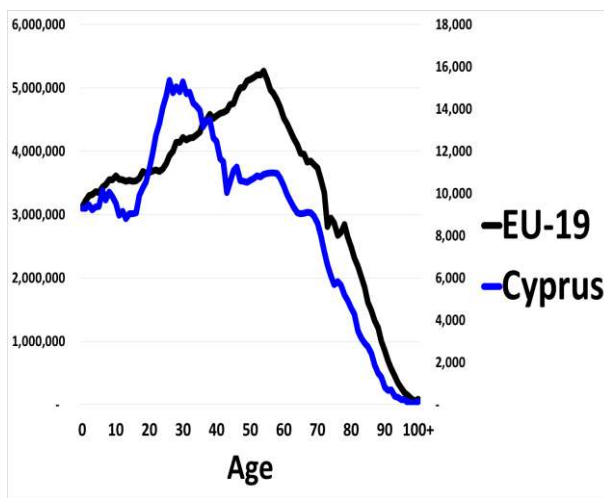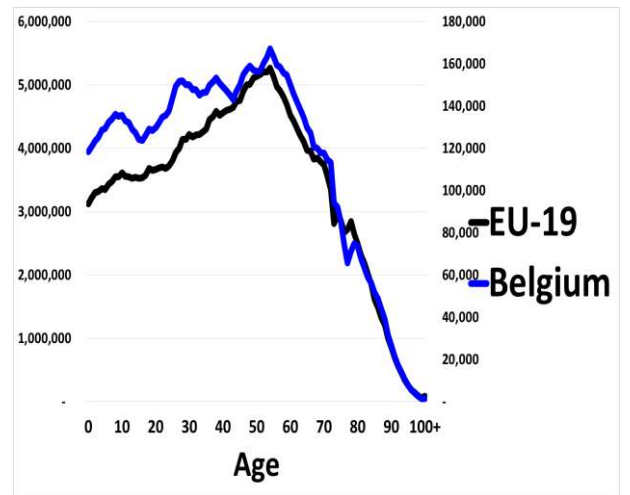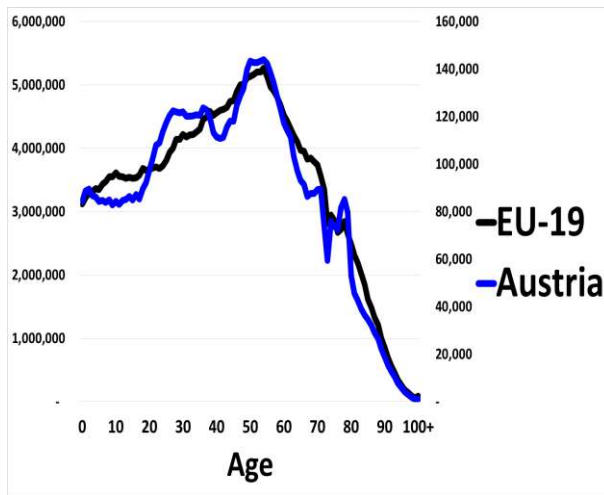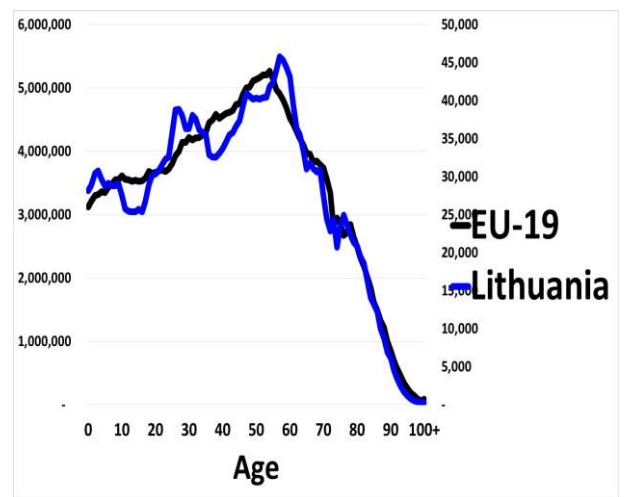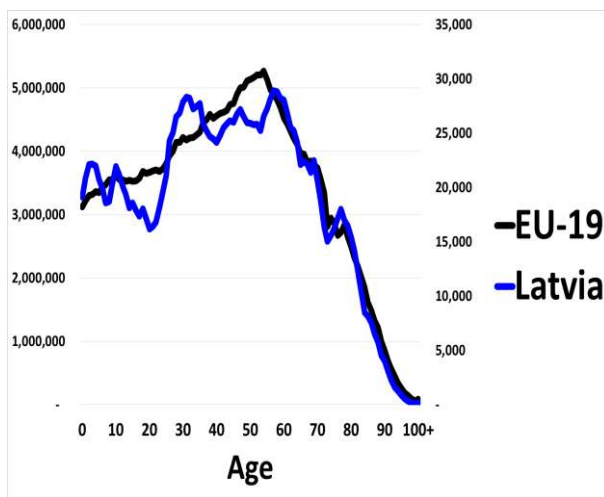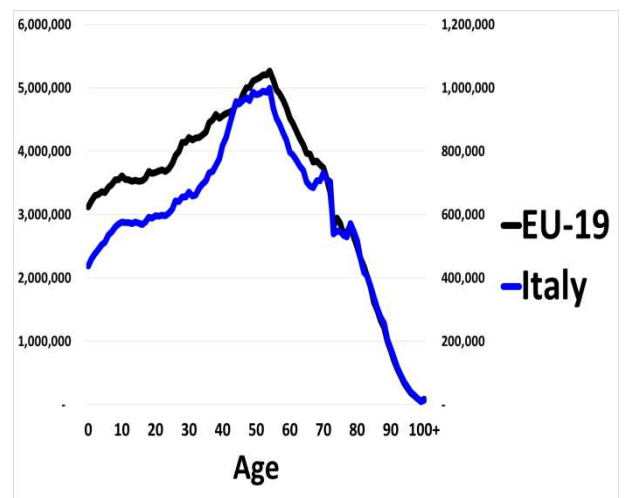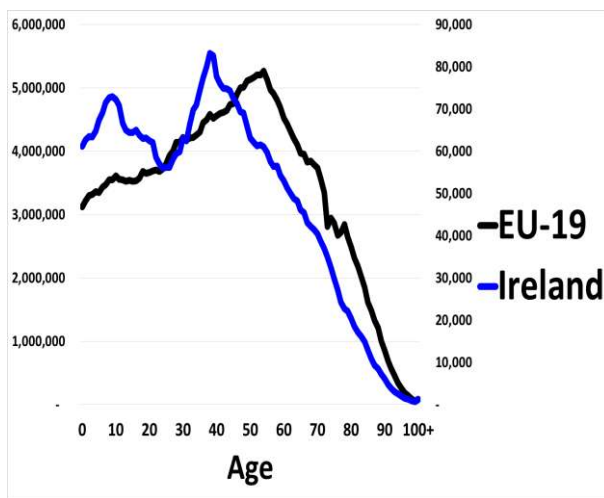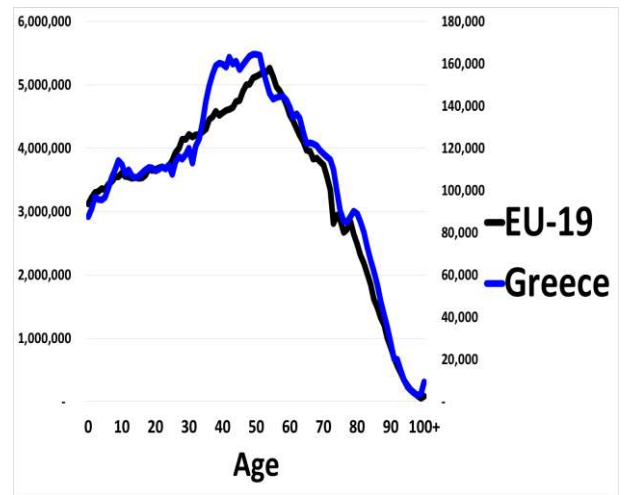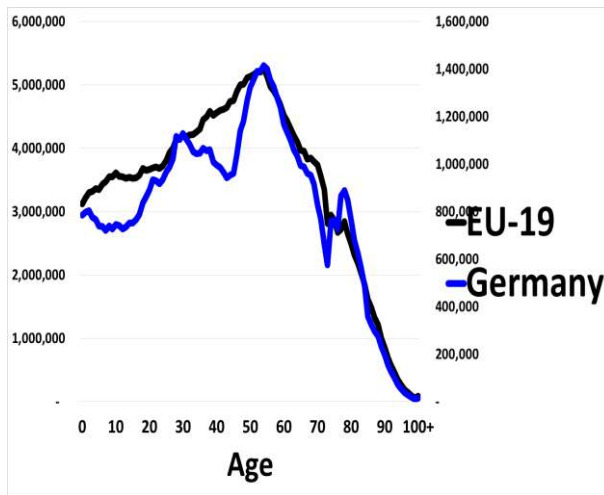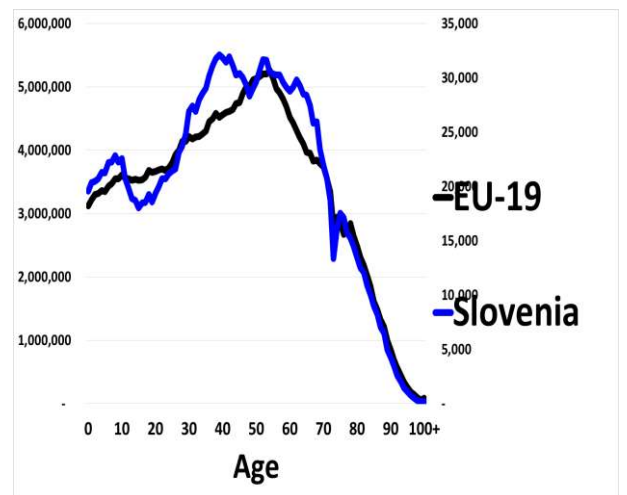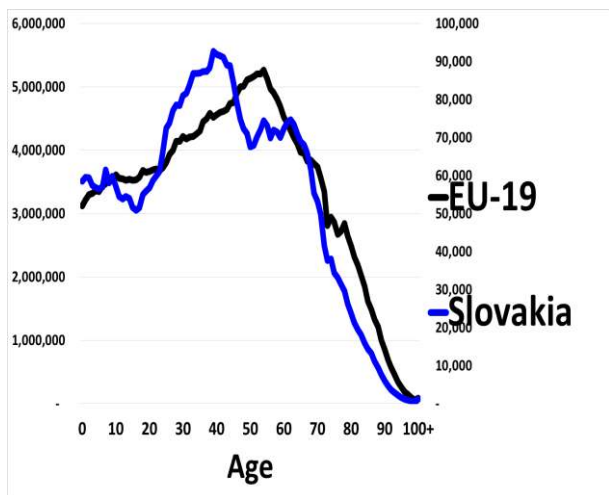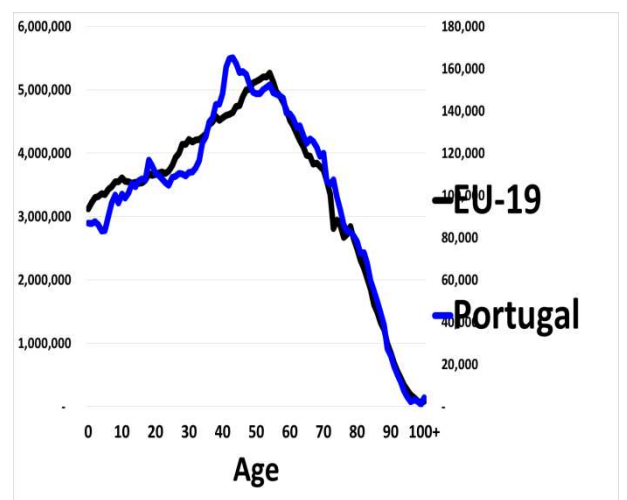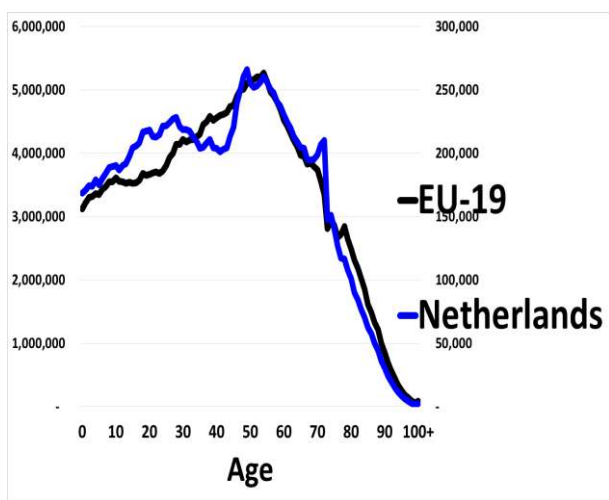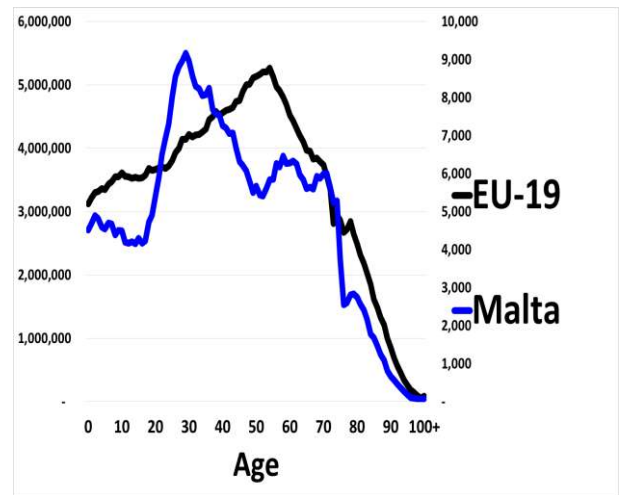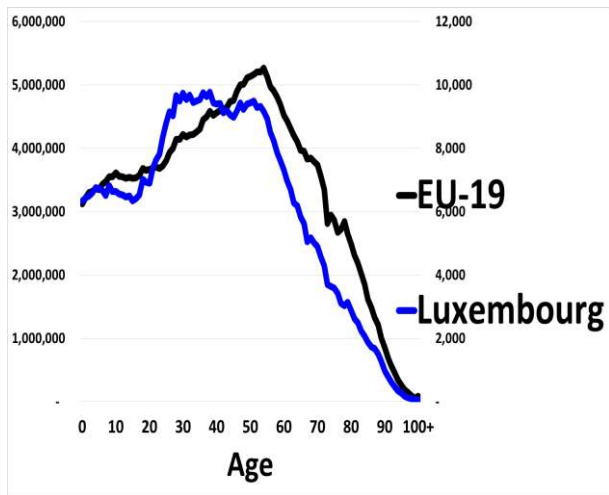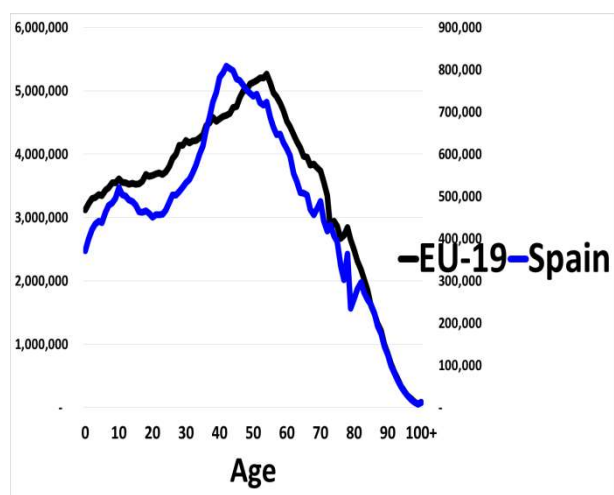
Figure 2.2. EU-19: Age distribution of the population
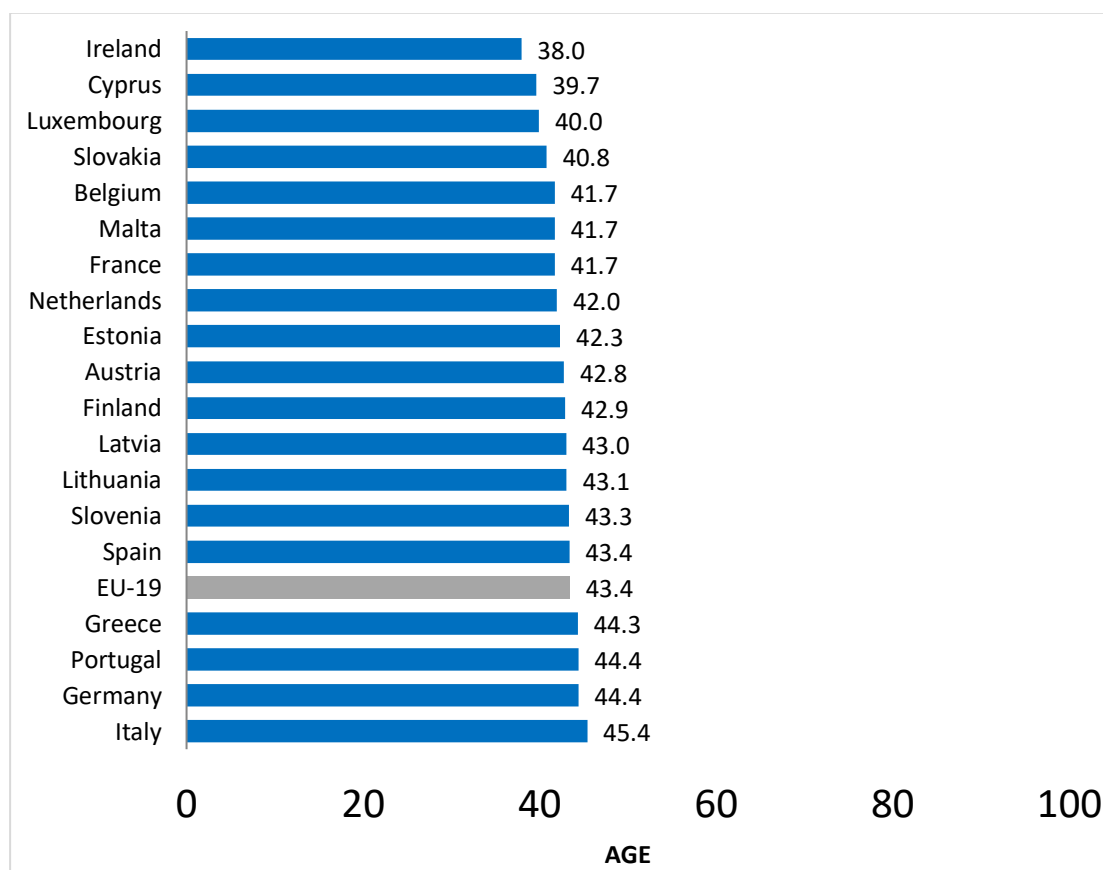
Figure 2.3. EU-19: Middle age distribution
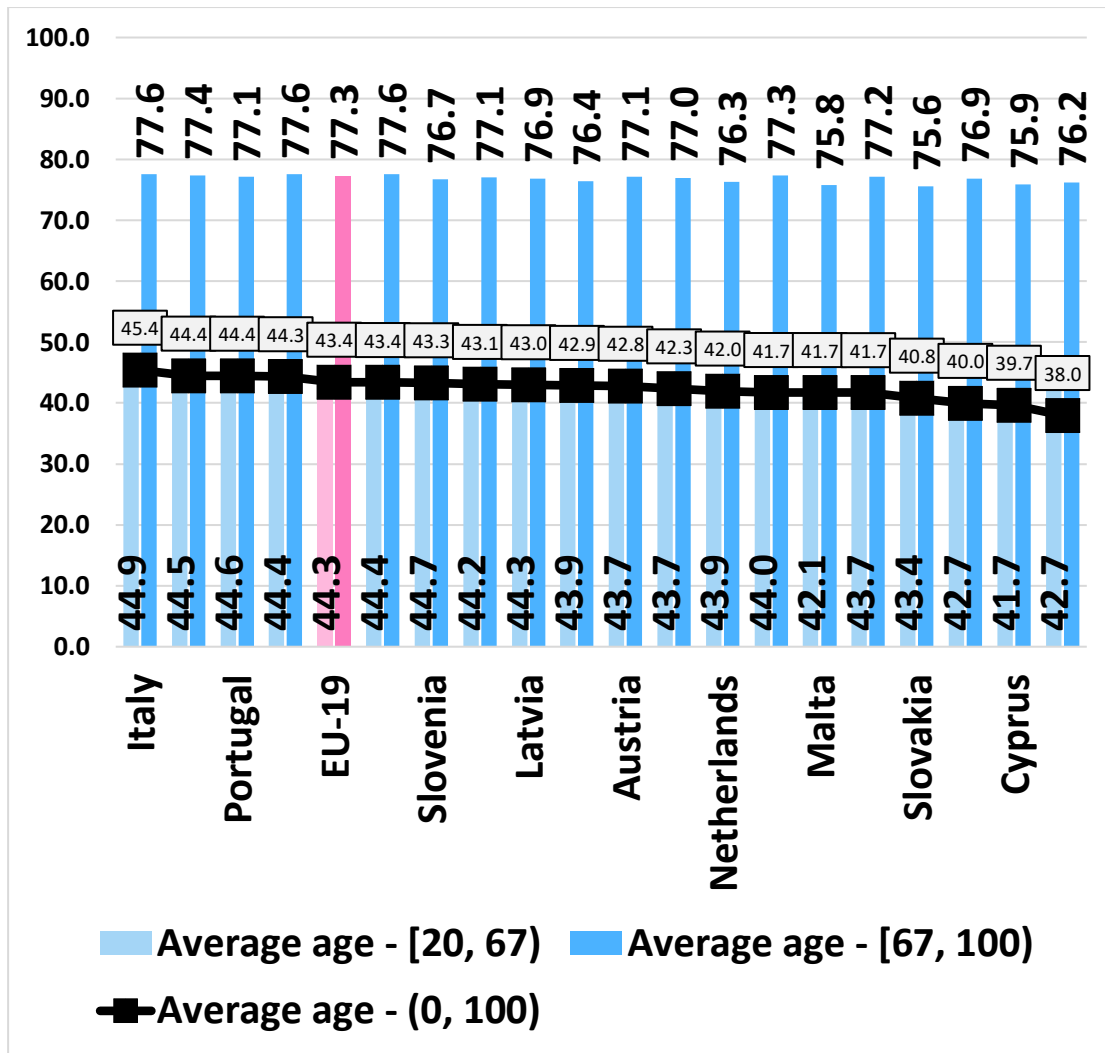
Figure 2.4. EU-19: Average age distribution in the age groups (20,67), (67,100) and (0,100)

From the results of the comparison we observe that the age distribution of the population differs significantly between the Member States of the Eurozone (Figure 2.2). Greece is one of the countries (along with Portugal, Germany and Italy) where the "average age" parameter [numerical ratio (i)] is higher than the corresponding European average (EU-19) (Figure 2.3, 2.4).

The average age of the population is an indicator of the aging population both nationally and overall for the Eurozone. The difference between the two extreme values of the mean in Luxembourg 40.0 and in Italy 45.5 is normalized to the mean value of the euro area at the age of 43.4. Also, the average age of the age group (20.67) shows greater homogeneity between the member countries, compared to the average age of the age group (0.100). In conclusion from the above analysis we observe that with regard to the aging of the population at the level of the euro area, the uniform treatment of the problem with the implementation of an insurance system, has better conditions for sustainability compared to the individual independent insurance systems of member countries.

3 Methodology for calculating population evolution

3.1 Conceptual outline and purpose

In order to study the prospect of creating a common insurance system, it is essential to know the value that the ratio of employees to retirees receives and the evolution of this ratio in all Eurozone countries.

For that purpose, active populations and retired populations are defined as sub-populations of interest and the reference framework for their quantification is defined. The ratio of active - retired (hereinafter "Ratio") is calculated. Its evolution is studied by applying the method of actuarial projections and results are given for a period of forty (40) years (2021-2060). [3]

3.2 Demographic data and assumptions

The active population is considered to be the part of the general population aged 20 to 66 years. It is expressed numerically as a percentage of the general population, which is based on the average employment rate in the European Union (2019) [Annex Chapter 3 Table T3.4]. The population group of retirees includes old-age pensioners and pensioners and includes people aged 67 and over (Annex Chapter 3 Table T3.2). Detailed distribution data of the initial population of people aged 20-66 years by age [6] are presented in the Annex (Annex Chapter 3 Table T3.1).

Table 2.2. Input variables

Population of people aged 20-66 years	209.709.365[118]
Average participation rate at work	73,1%
Initial population of active	153.297.545
Initial population of retirees	80.344.033[119]

3.3 Methodological tools

The development of active and retired people is assessed based on their chances of survival. For the chances of survival and death the mortality tables EAE2012A and EAE2012P (unisex) were used (Annex Chapter 3 Table T3.5). The reference year is 2021.

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[118] Based on calculations on Eurostat data (Annex Chapter 3 Table T3.1)

[119] The initial population of pensioners is the sum of the number of old-age pensioners and pensioners in sixteen (16) euro area countries for the last available year (2018) and the average number of old-age pensioners and pensioners in 2015, 2016 and 2017 of the countries: Germany, the Netherlands and Slovakia, for which there were available data. The relevant calculations are in the Annex (Annex Chapter 3 Table T3.2)

3.3.1 Evolution of the population of active and old-age pensioners

We first define as $\mathbf{Act(x, t)}$ the number of active insured persons of age x at time t, and $\mathbf{p_x^{aa}}$ the probability of a person of age x surviving the following year and from being active to remaining active.

The following relationship applies:

$$Act(x, t+1) = Act(x-1, t) * p_{x-1}^{aa} \qquad (ii)$$

We first define as $\mathbf{Re(x, t)}$ the number of retirees at time t, $\mathbf{p_x^{rr}}$ the probability of a person of age x surviving the following year and from a retiree to remain retired and $\mathbf{q_x^{ar}}$ the probability of a person of age x to survive next year and from active to retire (due to old age).

The following relationship applies:

$$Re(x, t+1) = Re(x-1, t) * p_{x-1}^{rr} + Act(x-1, t) * q_{x-1}^{ar} \qquad (iii)$$

3.3.2 Evolution of new entrants

In the second phase, we calculate the new entrants. Our estimates are based on Eurostat data (Annex Chapter 3 Table T3.3) on the size of the population aged 0 to 19 years. We introduce in our analysis calculations for newcomers for the next 100 years.

We define as $\mathbf{Z(x, t)}$ the new members at time t, $\mathbf{N(x, t)}$ new members entering the period (t-1, t) and assuming to enter the middle of the year with the possibility of remaining active until time t, $\mathbf{p_{x-0.5:0.5}^{aa}}$, as well as the possibility of a new member entering the middle of the year (t-1, t) retiring at time t, $\mathbf{q_{x-0.5:0.5}^{ar}}$.

We adjust the number of active insured persons and retirees of age x, at time t, based on the new entrants according to the following relations:

$$Act(x, t) = Z(x, t) + Act(x-1, t-1) * p_{x-1}^{aa} \qquad (iv)$$

$$Re(x, t) = Re(x-1, t-1) * p_{x-1}^{rr} + Act(x-1, t-1) * q_{x-1}^{ar} + N(x, t) * q_{x-0.5:0.5}^{ar} \qquad (v)$$

3.3.3 Evolution of the population of pensioners

In the third phase, regarding the number of pensioners, we also estimated the number of beneficiaries of pension benefits in case of death of the insured.

We define as $W(x, t)$ the number of widows insured related to the above populations insured at time t, and w_x the probability that a person of age x is married at this age, in order to leave a beneficiary of his pension.

The following relationship applies:

$$W(x, t) = Re(x - 1, t - 1) * p^{rr}_{x-1} * q_x * w_x \qquad (vi)$$

3.4 Index of active to pension beneficiaries (hereinafter Ratio)

Applying the above formulas to the data of each Eurozone country but also to its population as a whole, the Ratio index is obtained. The results are recorded in Table 2.3.

In the reference year we observe that the ratio shows a minimum value in France (1.60) and a maximum (2.92) in Malta. We also observe that the ratio indicator evolves in the form of a "U" shape (Figure 2.3). The prices for Greece are consistently lower than those for the EU-19 (Table 2.3, Figures 2.5-2.10).

$$Ratio_t = \frac{Act(x, t)}{Re(x, t) + W(x, t)} \qquad (vii)$$

Table 2.3. Output variable: Summary of the 'Ratio' Index

| Country | Code | Year t | | | | |
		2021	2030	2040	2050	2060
Greece	EL	1.642	1.543	1.589	1.644	1.821
Austria	AT	1.943	1.692	1.559	1.712	1.770
Belgium	BE	2.250	1.970	1.929	2.094	2.255
Cyprus	CY	2.745	2.354	2.251	2.313	2.050
Estonia	EE	2.052	1.725	1.766	1.892	1.868
Finland	FI	1.793	1.551	1.621	1.894	1.986
Germany	DE	1.987	1.643	1.457	1.635	1.738
Ireland	IE	2.783	2.505	2.451	2.327	2.361
Italy	IT	1.656	1.559	1.524	1.601	1.832
Latvia	LV	1.887	1.584	1.621	1.804	1.850
Lithuania	LT	1.771	1.513	1.512	1.747	1.923
Luxembourg	LU	1.710	1.699	1.769	1.935	1.901
Malta	MT	2.920	2.194	2.085	2.028	1.704

				Year t		
Country	**Code**	**2021**	**2030**	**2040**	**2050**	**2060**
Netherlands	NL	2.471	1.984	1.735	1.864	2.003
Portugal	PT	1.805	1.595	1.543	1.547	1.723
Slovakia	SK	2.252	1.829	1.840	1.876	1.880
Slovenia	SI	1.607	1.389	1.447	1.590	1.732
Spain	ES	2.329	2.058	1.860	1.650	1.751
France	FR	1.603	1.586	1.760	2.104	2.393
EU-19		**1.908**	**1.705**	**1.645**	**1.760**	**1.921**
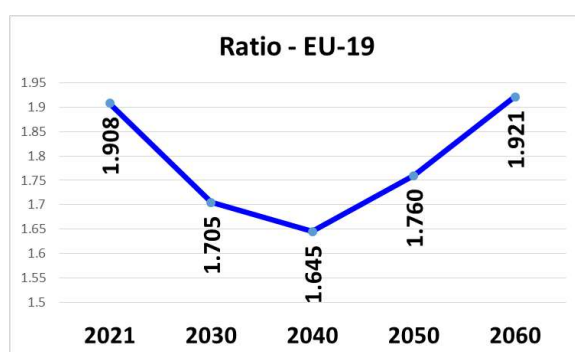
Figure 2.3. 'Ratio' index price projections: 2021-2060
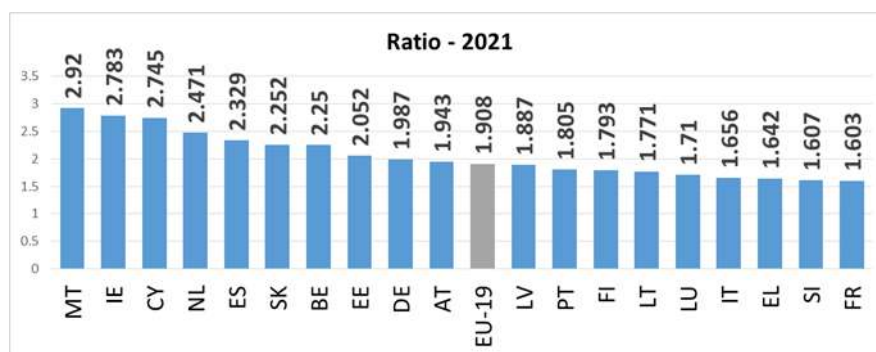
Figure 2.4. EU-19: 'Ratio' index, t = 2021
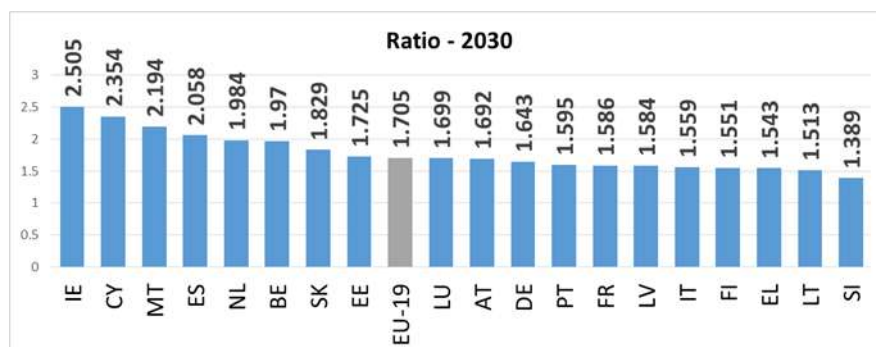
Figure 2.5. EU-19: 'Ratio' index, t = 2030
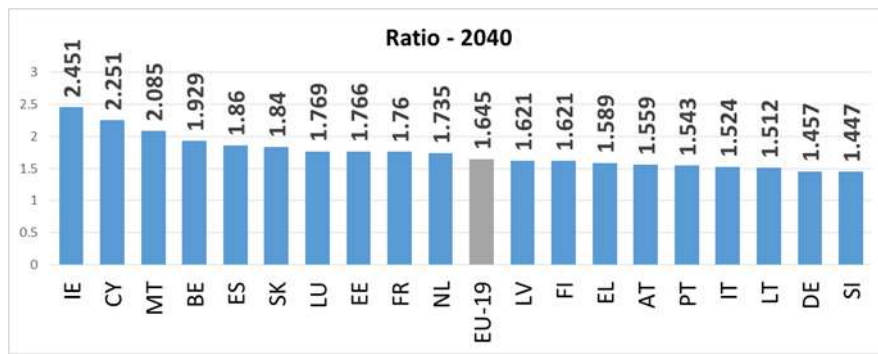
Figure 2.6. EU-19: 'Ratio' index, t = 2040
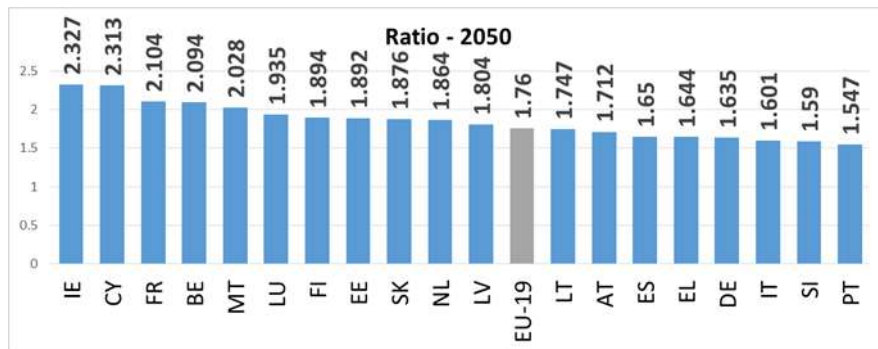
Figure 2.7. EU-19: 'Ratio' index, t = 2050
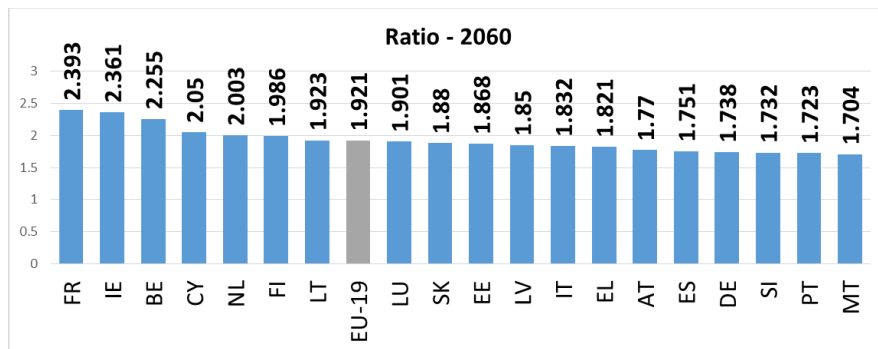
Figure 2.8. EU-19: 'Ratio' index, t = 2060

Chapter 4

European Social Security Agency:

Model for Calculation of Insurance Contributions – Benefits

4.1 Introduction

Chapter 3 emphasized the methodological approach of the vital importance for the viability of the redistributive social security systems, the issue of the relative size and the dynamics of the population of the active insured. Actuarial methods were used to calculate the projections of the 'Dependency Ratio', as the ratio of active to retirees. A total of twenty (20) time series data were generated, which concern the nineteen (19) countries of the Eurozone and its entire population.

According to the data of the formed chronological order of the ratio under study for the whole Eurozone, there is a tendency of continuous improvement for a period of at least thirty years after the lapse of the next fifteen years (Figures 4.1a and 4.1b). This expected demographic development marks the creation of more favorable aging risk management conditions in the geographical area under study, highlighting, in this light and the burden of growing aging [1], the urgent need for continuous feedbacks with efficient financial mechanisms.
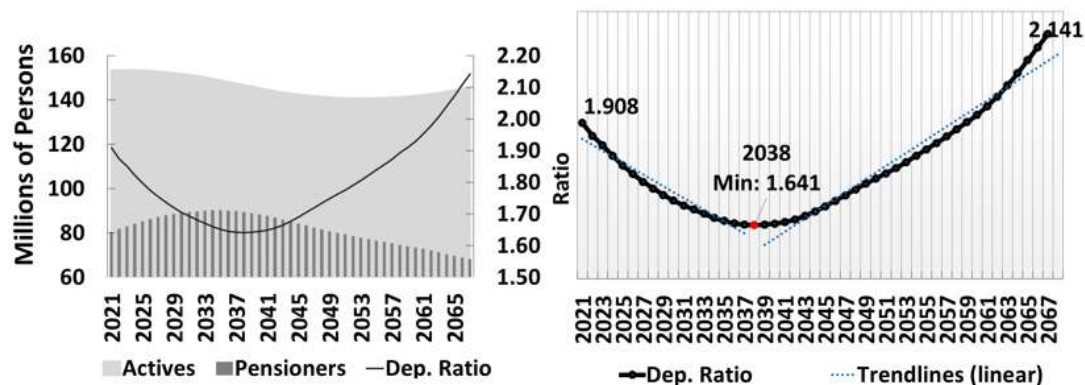
Figure 4.1a. Active Insured, Pensioners and Dependency Ratio Comparatives (Eurozone, 2021-2068)

Figure 4.1b. Dependency Ratio: Overview and trend (Eurozone, 2021-2068)

In this context, this chapter is presented with the aim of instrumentalizing the research results of the previous section towards the development of a theoretical model, which aims to produce an optimal estimator of the European average monthly insurance contribution to be paid to the European Social Security Agency.

The following paragraphs describe the proposed computational model and list the generated observations in tables and diagrams. The data processing was performed using the tools of Microsoft Excel application.

4.2 Description of Theoretical Model

4.2.1 Aim

This model is a procedure for calculating the optimal monthly insurance contribution in favor of the European Social Security Agency (hereinafter referred to as the "Fund)", which will ensure the lifetime provision of a flat fixed pension, equal ('flat') between European countries (Euro-19) and will arise by satisfying the conditions (a) of maintaining the redistributive character of the pension benefit system and (b) of producing balanced results on the basis of a PAYGO benefit system. It is expressed as the following function:

$$C_{mon} = f\left[\overline{P}_{mon}(t_0)\right]$$

Όπου:

C_{mon} : The amount of the single average monthly European insurance contribution based on the single European pension scheme

$\overline{P}_{mon}(t_0)$: The 'flat' amount of the lifetime monthly European pension benefit with year of commencement t_0

4.2.2 Methodology

4.2.2.1 The dependent variable

The variable C_{mon} is the single target price of the insurance contribution, which is expressed in euros and is further divided by 1/3 to the employee and by 2/3 to the employer.

4.2.2.2 **Quantitative definition of the monthly benefit**

The   'flat'   amount   of   the   European   monthly   retirement   benefit, $\overline{P}_{mon}(t)$, is set at five hundred euros (twelve payments per year) with a sensitivity analysis.

The projection data of the 'Dependency Ratio' indicate the date 01/01/2038 as the starting time limit (t_0) for the payment of the monthly pension (Figure 4.1b). Setting the sixty-seventh (67th) year as the age threshold for access to retirement benefits forms the initial age class of the active, which will contribute to the new pension system. Based on what has already been discussed in Chapter 3, the active population includes the age class [20, 66]. Calculations for demographic variables are based on the mortality table set out in the previous chapter.

In this calculation procedure, the projected rate of transfer of the monthly pension benefit to the beneficiaries due to death, which is set at 80%, has been taken into account, as the most aggravating - for the Fund - approach based on the percentage set by the existing provisions for the Greek insurance system [ν. 4611/2019 (A.73)] [2].

4.2.2.3 **Return of Fund reserves**

The proposed computational model produces results for three different retirement investment return scenarios: 2.0%, 3.0% and 4.0%. This approach is realistic and clearly more conservative than the reality if we take into account: (a) the annual comparative data of Greece (9.4%) - average O.E.C.D 2019, in terms of the real net percentage of return on pension plans ('Average Real Investment Rate of Return of pension plans - Net of investment expenses), weighted average by the assets (9.7%) or non (8.0%) (Figure 4.2) and (b) the average performance data of five-year Greece and selected OECD countries, which range between 4% and 7% (Figure 4.3.) [3].

Figure 1.13. Annual real investment rates of return of retirement savings plans, net of investment expenses, 2019

In per cent

A. Selected OECD countries

Country	Value
Ireland	18.5
Netherlands	13.7
Belgium	13.4
Chile	11.9
Iceland	11.6
Colombia	11.1
Israel	10.8
Finland	10.5
Mexico	10.2
Switzerland	10.2
United States	10.1
Denmark	10.1
Weighted average	9.7
Greece	9.4
Austria	9.2
Norway	8.1
Simple average	8.0
Spain	7.7
Turkey	7.4
Latvia	7.4
Portugal	7.4
Lithuania	7.1
Canada	6.7
Estonia	6.6
Luxembourg	6.0
Italy	5.5
Hungary	5.2
Australia	4.6
Slovenia	3.9
Slovak Republic	3.3
Germany	3.1
Czech Republic	-1.4
Poland	-2.2

B. Selected other jurisdictions

Jurisdiction	Value
Costa Rica	11.8
North Macedonia	10.1
Peru	10.0
Liechtenstein	9.8
Hong Kong (China)	9.1
Armenia	8.7
Romania	7.1
Kosovo	7.1
Croatia	7.0
Dominican Republic	6.3
Serbia	6.1
Weighted average	6.0
Russia	4.9
Egypt	4.8
Indonesia	4.8
Maldives	4.8
Simple average	4.4
Uruguay	3.8
Bulgaria	2.8
Albania	2.8
Thailand	2.2
Guyana	2.0
Malawi	1.3
Kazakhstan	1.0
Pakistan	0.9
Suriname	0.9
Nigeria	-0.5
Zambia	-1.5
Angola	-9.9

Note: Please see the methodological notes at the end of the report.
Source: OECD Global Pension Statistics.

Figure 4.2. Illustration of: "Figure 1.13. Annual real rate of return on net investment of reserve pension plans, 2019 ". Download from: PENSION MARKETS IN FOCUS 2020 (pp.28). Source: OECD (2020), Pension Markets in Focus 2020, www.oecd.org/finance/pensionmarketsinfocus.htm [3]

Table 1.1. Nominal and real geometric average annual investment rates of return of retirement savings plans over the last 5, 10 and 15 years, and over the longest period possible

In per cent

	Nominal				Real				Longest period possible
	5-yr average (Dec 2014 - Dec 2019)	10-yr average (Dec 2009 - Dec 2019)	15-yr average (Dec 2004 - Dec 2019)	Average over the longest period possible	5-yr average (Dec 2014 - Dec 2019)	10-yr average (Dec 2009 - Dec 2019)	15-yr average (Dec 2004 - Dec 2019)	Average over the longest period possible	
Selected OECD countries									
Australia	7.7	8.3	7.0	6.9	6.0	6.1	4.5	4.4	(Jun 2002- Jun 2019)
Austria	3.4	4.0	3.4	3.3	1.8	2.1	1.5	1.4	(Dec 2001 - Dec 2019)
Belgium	5.1	6.0	5.7	5.0	3.3	4.1	3.7	3.1	(Dec 2001- Dec 2019)
Canada	6.5	7.2	6.8	6.4	4.6	5.4	5.0	4.4	(Dec 2001 - Dec 2019)
Chile	6.9	7.0	7.0	7.4	3.8	3.7	3.6	4.2	(Dec 2001 - Dec 2019)
Colombia	8.0	9.1	10.7	11.5	3.2	5.1	6.2	6.7	(Dec 2001 - Dec 2019)
Czech Republic	0.9	1.6	2.0	2.2	-1.0	-0.2	-0.2	0.2	(Dec 2001 - Dec 2019)
Denmark	4.7	6.4	5.8	6.0	4.0	5.1	4.2	4.4	(Dec 2001 - Dec 2019)
Estonia	2.9	3.6	2.6	3.0	0.9	1.2	-0.5	-0.1	(Dec 2002 - Dec 2019)
Finland	5.4	..	..	6.1	4.7	..	..	5.1	(Dec 2011 - Dec 2019)
Germany	3.5	3.9	3.9	4.0	2.2	2.6	2.5	2.5	(Dec 2001 - Dec 2019)
Greece	5.1	..	..	4.9	4.7	..	..	5.0	(Dec 2013 - Dec 2019)
Hungary	5.1	..	..	6.8	2.7	..	..	4.7	(Dec 2011 - Dec 2019)
Iceland	7.5	7.7	7.6	7.7	5.1	4.7	2.8	3.2	(Dec 2001 - Dec 2019)
Ireland	6.5	..	..	6.5	6.0	..	..	6.0	(Dec 2014 - Dec 2019)
Israel	5.2	5.9	..	5.7	5.1	4.9	..	4.2	(Dec 2005 - Dec 2019)
Italy	2.3	3.1	3.2	3.3	1.7	2.0	1.8	1.7	(Dec 2001 - Dec 2019)
Korea	..	..	..	4.2	..	..	..	1.8	(Dec 2002 - Dec 2018)
Latvia	2.4	3.3	3.1	3.4	0.5	1.5	-0.5	-0.3	(Dec 2001 - Dec 2019)
Lithuania	3.7	..	..	4.0	1.6	..	..	2.1	(Dec 2010 - Dec 2019)
Luxembourg	2.5	3.6	..	2.6	1.0	1.9	..	0.8	(Dec 2005 - Dec 2019)
Mexico	5.0	6.6	6.4	6.4	1.0	2.5	2.3	2.3	(Dec 2004 - Dec 2019)
Netherlands	6.3	8.0	6.5	6.0	4.7	6.2	4.8	4.3	(Dec 2001 - Dec 2019)
New Zealand	..	..	..	4.7	..	..	..	2.1	(Mar 2001- Mar 2013)
Norway	5.4	6.0	5.9	5.9	2.9	3.9	3.7	3.8	(Dec 2001 - Dec 2019)
Poland	1.6	..	..	1.6	0.2	..	..	0.2	(Dec 2014 - Dec 2019)
Portugal	3.0	3.0	3.6	3.9	2.3	1.8	2.3	2.3	(Dec 2001 - Dec 2019)
Slovak Republic	2.3	2.2	..	1.7	1.0	0.6	..	-0.2	(Dec 2006 - Dec 2019)
Slovenia	4.2	4.8	..	5.9	3.2	3.5	..	4.2	(Dec 2006 - Dec 2019)
Spain	2.6	3.5	..	2.9	1.7	2.3	..	1.7	(Dec 2007 - Dec 2019)
Sweden	..	..	..	5.2	..	..	..	4.2	(Dec 2010 - Dec 2018)
Switzerland	3.8	4.2	3.7	3.2	3.7	4.2	3.4	2.8	(Dec 2001 - Dec 2019)
Turkey	10.9	9.0	12.6	12.6	-1.1	-0.8	2.9	2.9	(Dec 2004 - Dec 2019)

Figure 4.3. Display of: "Table 1.1. Nominal and real geometric means of annual return on investment of pension savings plans during the last 5, 10 and 15 years, as well as for the longest possible period ". Download from: PENSION MARKETS IN FOCUS 2020 (pp.29). Source: OECD (2020), Pension Markets in Focus 2020, www.oecd.org/finance/pensionmarketsinfocus.htm [3]

4.2.2.4 **Adjustment to inflation**

Annual H.I.C.P[120] data were used to generate inflation-adjusted results from Eurostat [4] and the projections were produced, as shown in Figure 4.4. Table 4.1 shows the result of the algorithmic estimate of the average inflation rate until 2071.

Table 4.1. Estimate of average inflation rate (%) during the period 2021-2070 for the Eurozone

Reference Period	Exponential smoothing algorithm	Linear smoothing algorithm	Winters_Holt_method
2021 -2070	1.9956	1.9085	3.5463
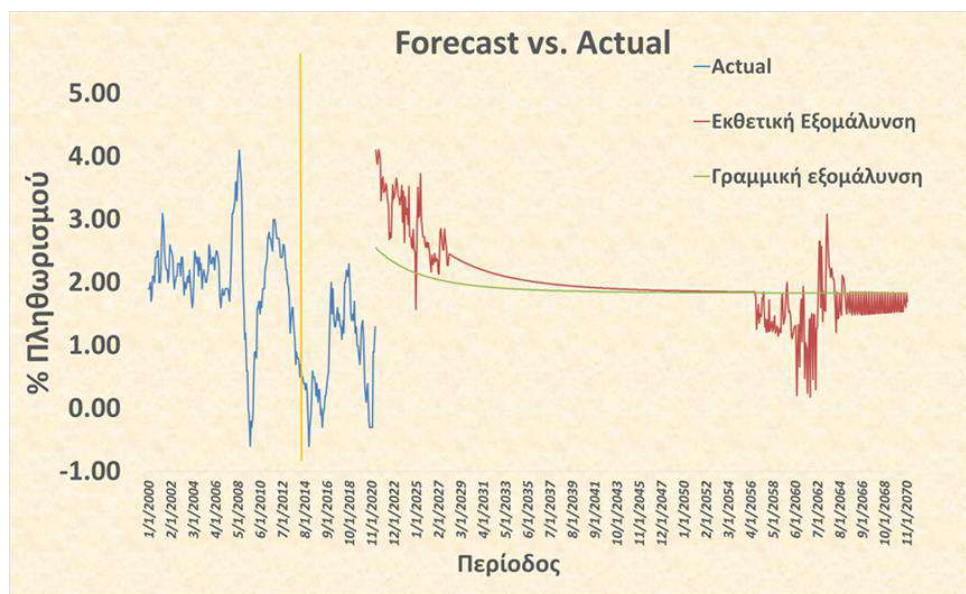
Figure 4.4. Inflation price projections graphic illustration

4.2.3.5 **Working density**

The inclusion of the variable D concerning work density (The ILO Pension Model) ch.4 aims to adapt the model to the logical assumption that an employee does not work and / or is not insured for consecutive years until retirement and is set at 85% in the context of this analysis.

4.3 Results

The first group of active contributors with the new system includes those born during the period 01/01/1970 - 31/12/2000. That is, the people who will initially contribute to this new pension system will be in the year 2021 aged 20 to 50 years. The first retirees with the new system will

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[120] **Harmonized Index of Consumer Prices (HICP)**

be those born during the period 01/01/1970 - 31/12/1970 with an initial retirement amount of 500.00 euros, at the year $t_0 = 2038$.

Table 4.2 summarizes the outputs of the model for the amount of the insurance contribution per investment scenario of reserves, while the expected evolution of contributions and benefits per investment scenario is shown in Graphs 4.5a - 4.7c.

Detailed data of the chronological series of annual projections 2021 - 2121 of the Fund's situation per investment reserve scenario are presented in Tables 4.3 - 4.5. in the Annex to this chapter.

Table 4.2. Estimation of a single average monthly contribution based on the proposed model

Retirement benefit (€)	Investment interest rate (%)	Single average monthly insurance contribution (€)	
$\overline{P}_{mon}$	r	C_{mon}	
		Employer - Employee	Total
500,00	2,0	105,87 - 52,93	158,80
	3,0	89,33 - 44,66	133,99
	4,0	73,73 - 36,87	110,60
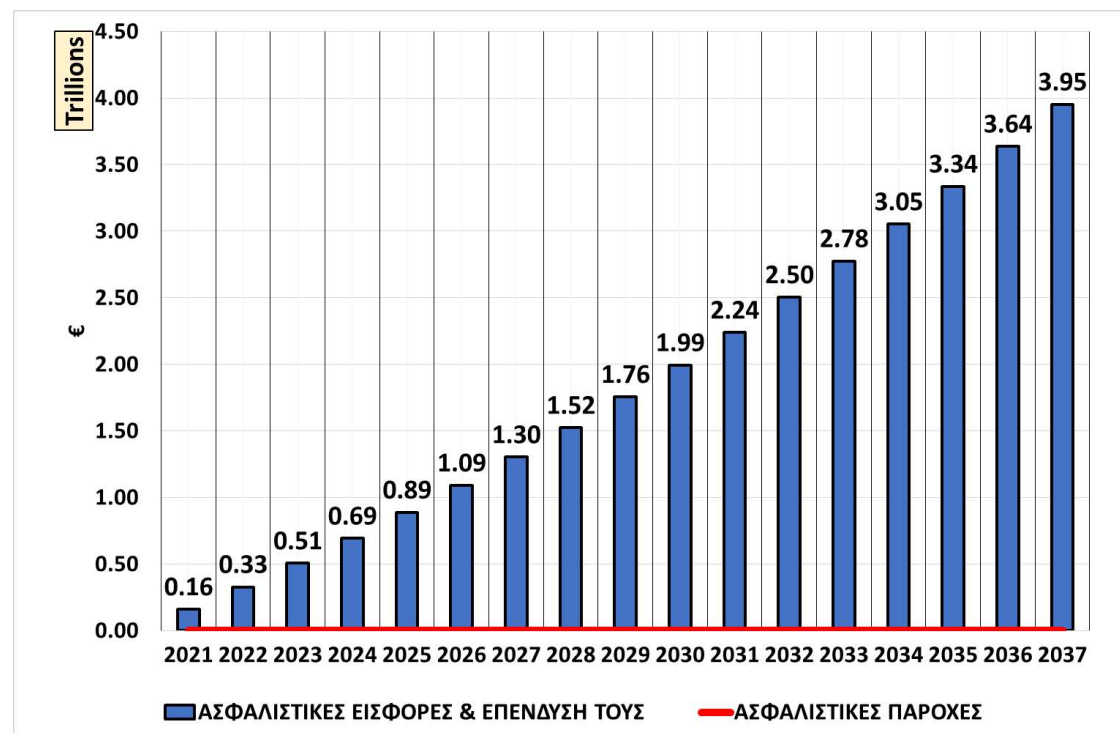
Figure 4.5a. Insurance benefits and Fund contributions during the period 2021-2037. Investment return scenario: 2.0%.
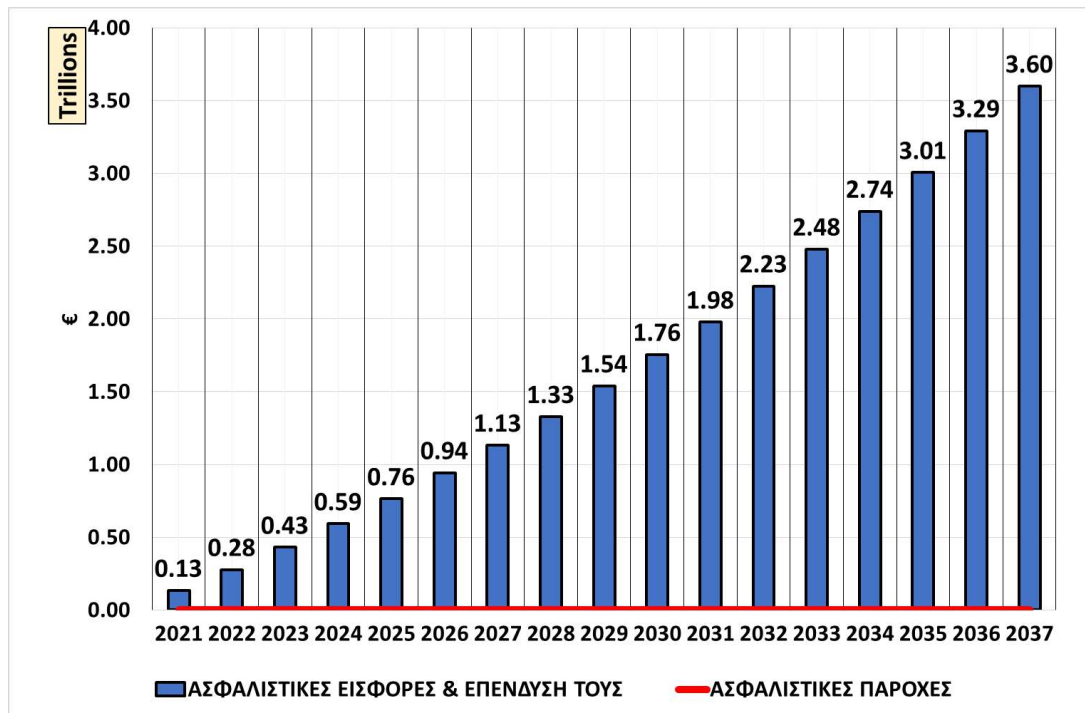
Figure 4.5b. Insurance benefits and Fund contributions during the period 2021-2037. Investment return scenario: 3.0%
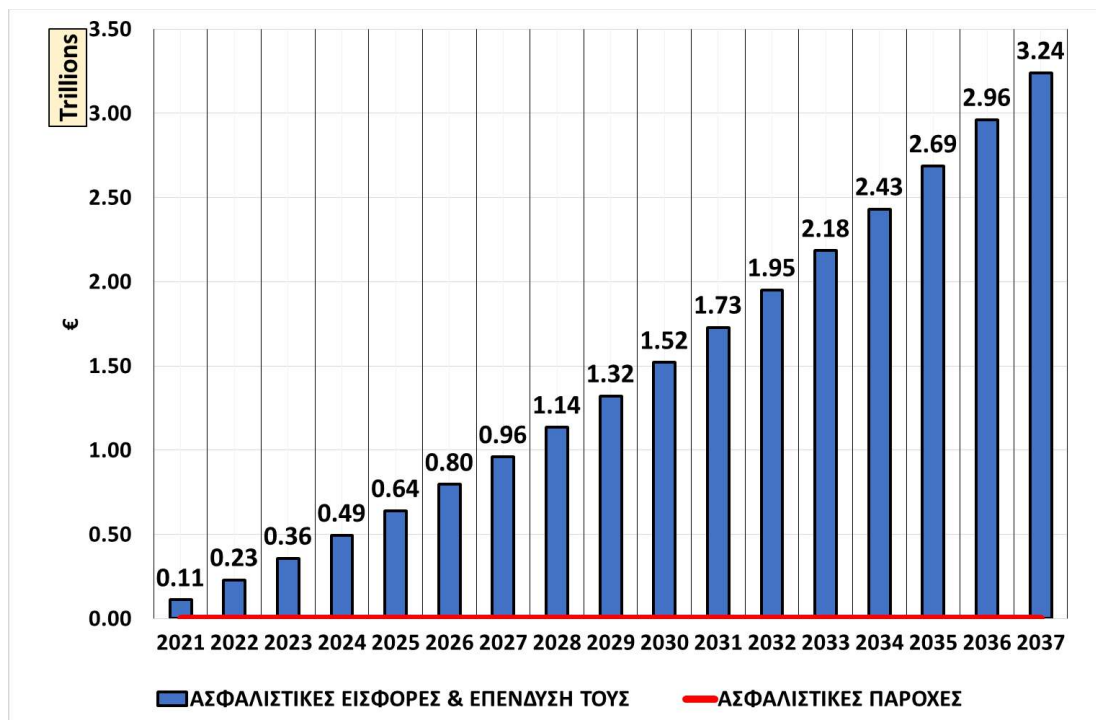
Figure 4.5c. Insurance benefits and Fund contributions during the period 2021-2037. Investment return scenario: 4.0%.
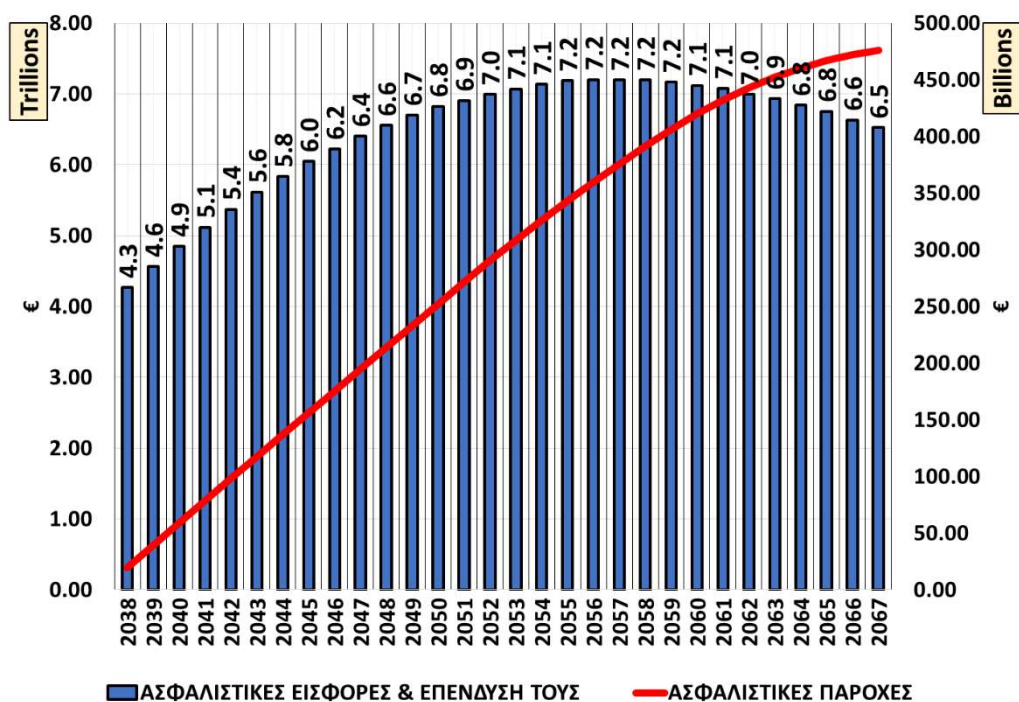
Figure 4.6a. Insurance benefits and Fund contributions during the period 2038-2067. Investment return scenario: 2.0%.
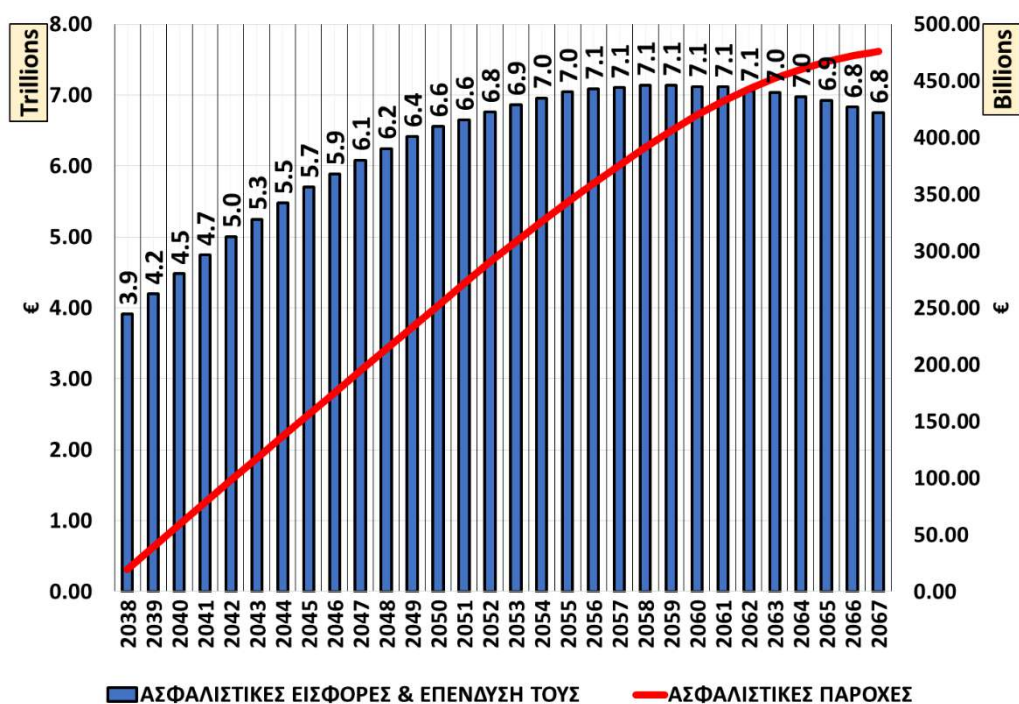
Figure 4.6b. Insurance benefits and Fund contributions during the period 2038-2067. Investment return scenario: 3.0%.
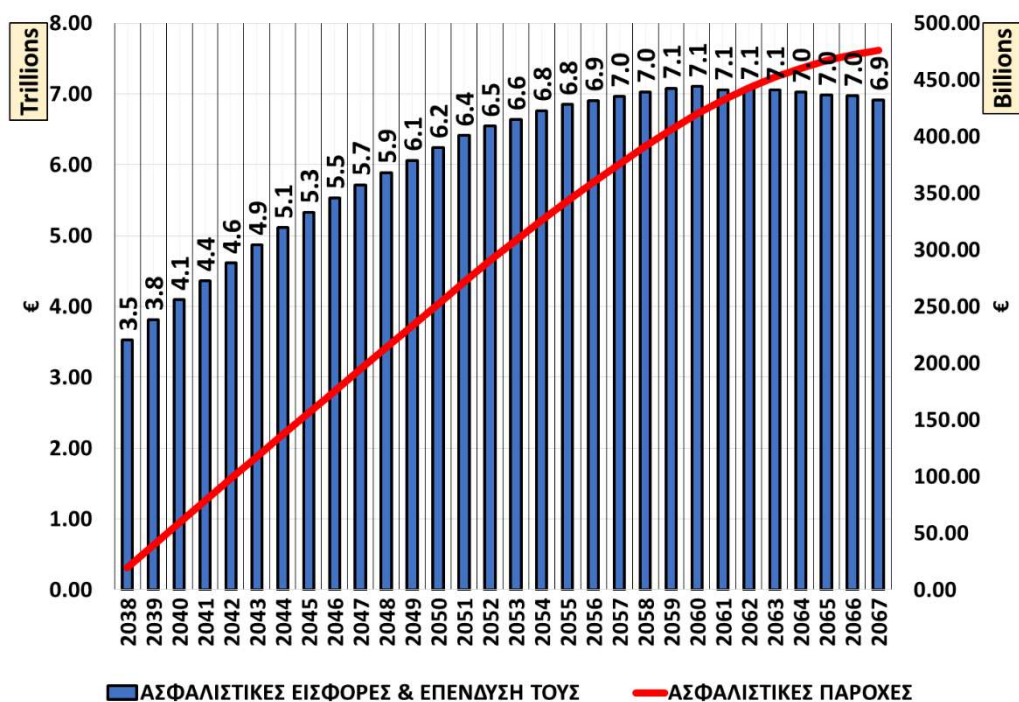
Figure 4.6c. Insurance benefits and Fund contributions during the period 2038-2067. Investment return scenario: 4.0%.
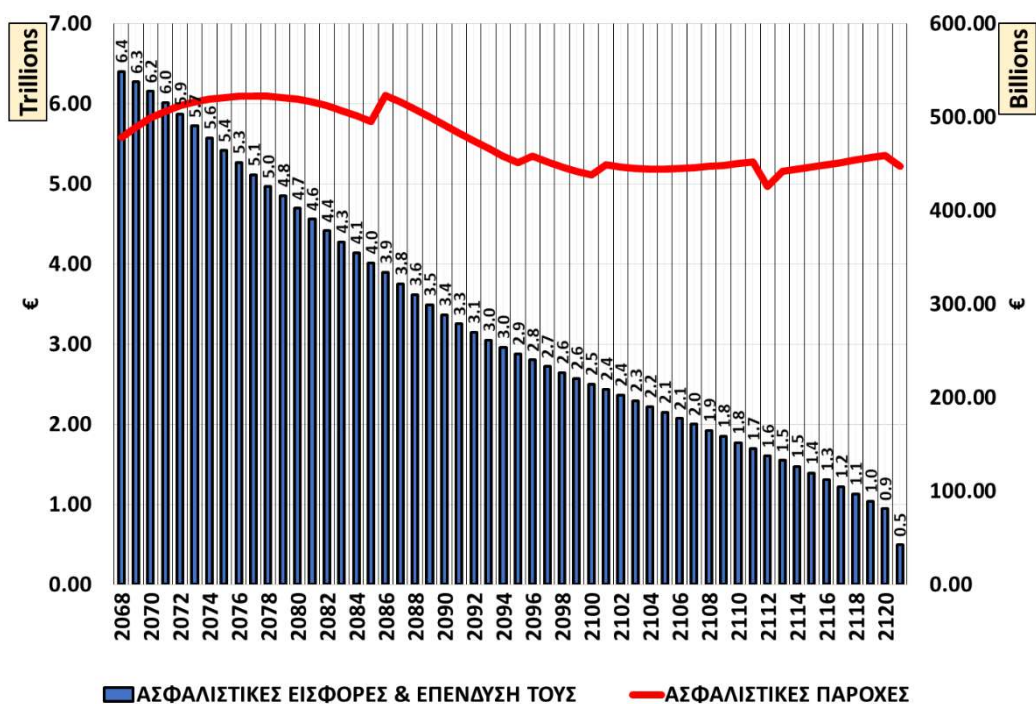
Figure 4.7a. Insurance benefits and Fund contributions during the period 2068-2121. Investment return scenario: 2.0%.

71
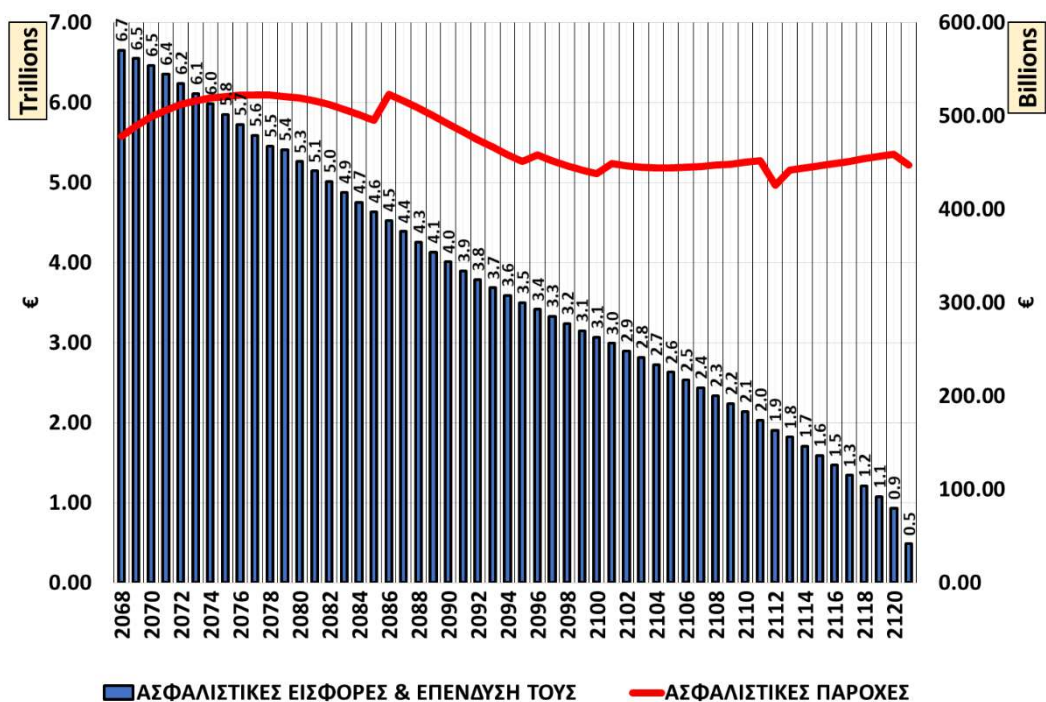
Figure 4.7b. Insurance benefits and Fund contributions during the period 2068-2121. Investment return scenario: 3.0%.
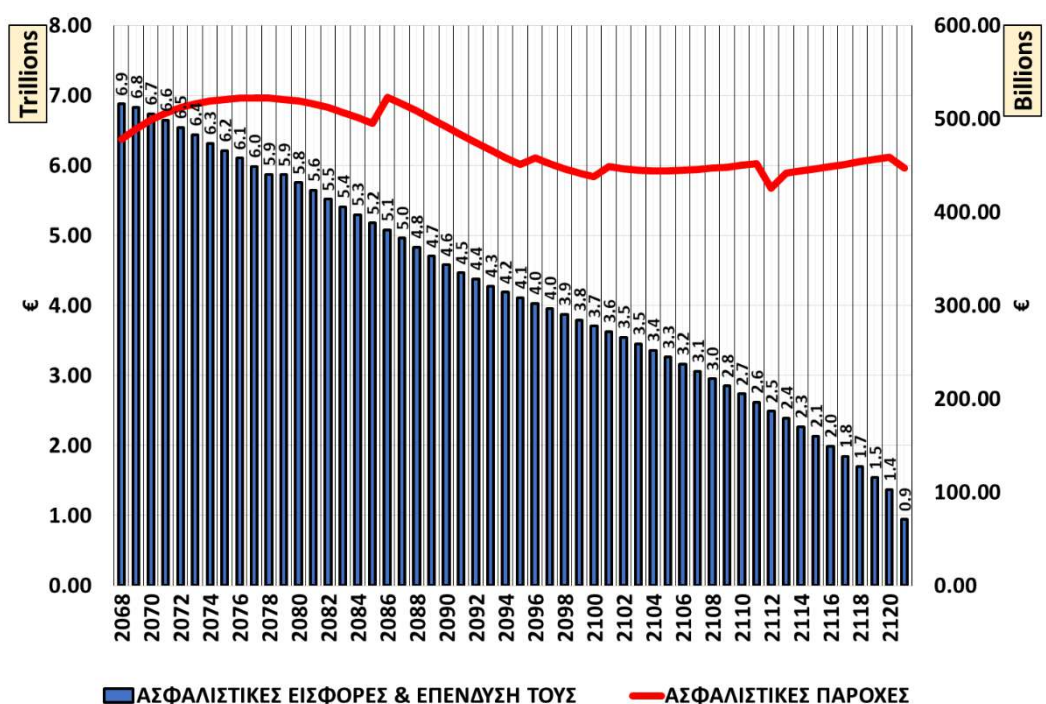
Figure 4.7c. Insurance benefits and Fund contributions during the period 2068-2121. Investment return scenario: 4.0%.

72

4.3.1 Further sensitivity scenarios of the proposed model

In order to control the behavior of the proposed model of the single insurance fund, we will record the effects of its viability on possible changes in the factors that affect its actuarial result.

Having as a basic scenario the model in which, according to the above, it derives its income from contributions of employees and employers amounting to 110.60 € (employee 73.73 € employer 36.87 €) per month for each employee and pays a monthly pension benefit of €500.00 to each retiree. In this scenario we have the following data:

Discount rate: 2,0%

Average stochastic investment rate: 4,0%

Working density d = 85%

Rate of transfer of pensions due to widowhood w = 80%

Our calculations have led to the result (Table 4.5 Annex Chapter 4):

Present value of Contributions	Present Value of Benefits	Actuarial result
13.521.540.526.691,5 €	10.587.819.410.550,4 €	2.933.721.116.141,1 €

The projection for the viability of the fund has been calculated until the year 2121 starting from the year 2021. The actuarial result shows us that with the data we mentioned there is a long-term viability of the fund..

A. Discount interest rate test:

By testing an alternative discount rate, we consider the possibility of a bad estimate of the future value of contributions and benefits due to market conditions and the course of inflation..

1. Reduction of the discount rate by 0.5%

The data are as follows:

Discount rate: 1,5%

Average stochastic investment rate: 4,0%

Working density d = 85%

Rate of transfer of pensions due to widowhood w = 80%

Our calculations have led to the result (table 4.6 appendix ch.4):

Present value of Contributions	Present Value of Benefits	Actuarial result
16.397.877.703.796,6 €	13.932.586.817.449,0 €	2.465.290.886.347,6 €

We are seeing an increase in the present value of contributions and benefits. However, the actuarial result of the fund's balance sheet is positive in its overall result for its years of operation.

2. Increase of the discount rate by 0.5%

The data are as follows:

Discount rate: 2,5%

Average stochastic investment rate: 4,0%

Working density d = 85%

Rate of transfer of pensions due to widowhood w = 80%

Our calculations have led to the result (table 4.7 appendix ch.4):

Present value of Contributions	Present Value of Benefits	Actuarial result
11.306.306.416.265,9 €	8.138.242.018.566,9 €	3.168.064.397.699,0 €

We observe a decrease in the present value of contributions and benefits, but even in this case, the actuarial effect of the fund's balance sheet is positive in its overall result for its years of operation.

B. Testing the average investment rate of the fund reserves.

1. Reduction by 1% of the average stochastic reserve investment rate

The data are as follows:

Discount rate: 2%

Average stochastic investment rate: 3,0%

Working density d = 85%

Rate of transfer of pensions due to widowhood w = 80%

Our calculations have led to the result (table 4.8 appendix ch.4):

Present value of Contributions	Present Value of Benefits	Actuarial result
10.120.559.092.774,4 €	10.587.819.410.550,4 €	- 467.260.317.775,9 €

We observe that there is a negative actuarial effect on the balance sheet of the fund. This negative eventuality could have been avoided if the average monthly contribution had increased by 2.8%.

2. Reduction by 2% of the average stochastic investment rate of reserves

The data are as follows:

Discount rate: 2%

Average stochastic investment rate: 2,0%

Working density d = 85%

Rate of transfer of pensions due to widowhood w = 80%

Our calculations have led to the result (table 4.9 appendix ch.4):

Present value of Contributions	Present Value of Benefits	Actuarial result
8.446.085.114.769,4 €	10.587.819.410.550,4 € -	- 2.141.734.295.781,0 €

We observe that there is a negative actuarial effect on the balance sheet of the fund. This negative eventuality could have been avoided if the average monthly contribution had increased by 17.6%.

C. Testing the probability of death or the increasing probability of survival of the participants.

1. 20% reduction in the probability of death.

The data are as follows:

Discount rate: 2%

Average stochastic investment rate: 4,0%

Working density d = 85%

Rate of transfer of pensions due to widowhood w = 80%

Reducing the probability of death increases the probability of survival and therefore changes the ratio index as defined in chapter 3. The index's projected values until 2031 are as follows:

t	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Number of Actives (age 20-66)	153.297.545	153.448.54	153.641.769	153.667.537	153.601.03	153.477.026	153.298.333	153.061.603	152.751.62	152.384.068	152.019.058
Number of Pensioners (age 67-120	80.344.03	82.628.792	84.555.218	86.519.708	88.302.753	89.906.533	91.350.049	92.605.652	93.737.297	94.711.912	95.530.736
Ratio(Actives/Pensioners)	1,908	1,857	1,817	1,776	1,739	1,707	1,678	1,653	1,630	1,609	1,591

Our calculations have led to the result (table 4.10 appendix ch.4):

Present value of Contributions	Present Value of Benefits	Actuarial result
12.902.408.111.839,7 €	11.778.816.054.119,9 €	1.123.592.057.719,8 €

We notice that a positive actuarial result is obtained, so in case the probability of death is reduced by 20%, the fund is still viable.

2. 20% increase in the chance of death.

The data are as follows:

Discount rate: 2%

Average stochastic investment rate: 4,0%

Working density d = 85%

Rate of transfer of pensions due to widowhood w = 80%

Increasing the probability of death reduces the chance of survival and therefore changes the ratio index as defined in chapter 3. The index's projected values until 2031 are as follows:

t	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Number of Actives (age 20-66)	153.297.545	153.235.498	153.230.41	153.072.127	152.834.999	152.553.194	152.229.234	151.858.638	151.427.669	150.950.600	150.486.924
Number of Pensioners (age 67-120	80.344.03	80.981.187	81.381.101	81.936.533	82.424.837	82.844.101	83.210.637	83.492.887	83.748.538	83.940.866	84.066.221
Ratio(Actives/Pensioners)	1,908	1,892	1,883	1,868	1,854	1,841	1,829	1,819	1,808	1,798	1,790

Our calculations have led to the result (table 4.11 appendix ch.4):

Present value of Contributions	Present Value of Benefits	Actuarial result
14.045.176.537.895,0 €	9.620.219.305.728,4 €	4.424.957.232.166,5 €

We observe that there is a positive actuarial result, so in case the probability of death increases by 20%, the fund due to the reduction of the obligation to pay pensions is in surplus to a large extent.

D. Testing the probability of changing the working density.

1. 5% increase in working density. in this case the employees are employed to a greater extent during their working life.

The data are as follows:

Discount rate: 2%

Average stochastic investment rate: 4,0%

Working density d = 90%

Rate of transfer of pensions due to widowhood w = 80%

Our calculations have led to the result (table 4.12 appendix ch.4):

Present value of Contributions	Present Value of Benefits	Actuarial result
14.891.926.561.997,0 €	10.587.819.410.550,4 €	4.304.107.151.446,6 €

As is logical in the case of a 5% increase in work density, the fund has a large surplus in the balance of benefit contributions.

2. 5% reduction in working density. in this case the employees are employed to a lesser extent during their working life.

The data are as follows:

Discount rate: 2%

Average stochastic investment rate : 4,0%

Working density d = 80%

Rate of transfer of pensions due to widowhood w = 80%

Our calculations have led to the result (table 4.13 appendix ch.4):

Present value of Contributions	Present Value of Benefits	Actuarial result
12.151.154.491.386,0 €	10.587.819.410.550,4 €	1.563.335.080.835,6 €

We observe that even with a reduced by 5% the employment rate in the working life of the participants in the fund, this remains surplus.

E. Checking the possibility of a change in the rate of transfer of the pension due to widowhood.

1. Reduction by 5% of the transfer of pensions due to widowhood. The data are as follows:

Discount rate: 2%

Average stochastic investment rate: 4,0%

Working density d = 90%

Rate of transfer of pensions due to widowhood w = 75%

Our calculations have led to the result (table 4.14 appendix ch.4):

Present value of Contributions	Present Value of Benefits	Actuarial result
13.618.054.259.851,4 €	10.486.236.303.110,5 €	3.131.817.956.741,0 €

We observe that in the case of the reduced by 5% transfer of pensions due to widowhood the surplus of the fund increases.

2. 5% increase in the transfer of pensions due to widowhood. The data are as follows:

Discount rate: 2%

Average stochastic investment rate: 4,0%

Working density d = 85%

Rate of transfer of pensions due to widowhood w = 85%

Our calculations have led to the result (table 4.15 appendix ch.4):

Present value of Contributions	Present Value of Benefits	Actuarial result
13.425.026.793.531,5 €	10.689.402.517.990,3 €	2.735.624.275.541,3 €

We note that in the case of a 5% increase in the transfer of widow's pensions, the fund remains in surplus.

F. Testing the probability of a change in the number of new entrants to the fund.

1. Increase of new entrants each year by 10%.

The data are as follows:

Discount rate: 2%

Average stochastic investment rate: 4,0%

Working density d = 85%

Rate of transfer of pensions due to widowhood w = 80%

Due to the increase of new entrants per year, the value of the active / pensioners ratio changes, which is as follows for an indicative period of 10 years.

t	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Number of Actives (age 20-66)	153.297.545	153.688.060	154.130.495	154.402.008	154.583.271	154.712.727	154.794.314	154.821.498	154.784.179	154.694.781	154.618.317
Number of Pensioners (age 67-120	80.344.033	81.804.990	82.952.591	84.184.502	85.282.312	86.248.482	87.102.708	87.817.171	88.454.248	88.980.407	89.395.618
Ratio(Actives/Pensioners)	1,908	1,879	1,858	1,834	1,813	1,794	1,777	1,763	1,750	1,739	1,730

Our calculations have led to the result (table 4.16 appendix ch.4):

Present value of Contributions	Present Value of Benefits	Actuarial result
14.571.842.034.151,4 €	10.986.124.714.115,2 €	3.585.717.320.036,2 €

In case of increase of the number of new entrants in the fund by 10% per year the fund has a bigger surplus.

2. Reduction of new entrants every year by 10%.

The data are as follows:

Discount rate: 2%

Average stochastic investment rate: 4,0%

Working density d = 85%

Rate of transfer of pensions due to widowhood w = 80%

Due to the decrease of new entrants per year, the value of the active / pensioners ratio changes, which is as follows for an indicative period of 10 years.

t	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Number of Actives (age 20-66)	153.297.545	152.995.98	152.741.406	152.336.888	151.851.343	151.315.30	150.730.22	150.094.816	149.390.27	148.634.142	147.881.034
Number of Pensioners (age 67-120	80.344.033	81.804.990	82.952.591	84.184.502	85.282.312	86.248.482	87.102.708	87.817.171	88.454.248	88.980.40	89.395.618
Ratio(Actives/Pensioners)	1,908	1,870	1,841	1,810	1,781	1,754	1,730	1,709	1,689	1,670	1,654

Our calculations have led to the result (table 4.17 appendix ch.4):

Present value of Contributions	Present Value of Benefits	Actuarial result
12.471.239.019.231,6 €	10.189.514.106.985,6 €	2.281.724.912.246,0 €

In the event of a reduction in the number of new entrants to the fund by 10% per year, the fund remains in surplus..

4.2.4 Findings - Discussion

This section presented the methodology for calculating the average monthly contribution for European insured persons, which ensures a monthly lifetime benefit of five hundred euros based on a redistributive PAYGO model. The proposed model calculates the monthly contributions paid by all involved, annualizes them, creates a stock fund and then invests them using realistic return assumptions. This model is not stable and stationary, but it is self-powered. That is, every year, new entrants enter the system who will also contribute.

In summary, the model takes into account the number of active insured individuals of any age, starting from 2021, as well as the age of 21. The total income of each year is calculated, which results from the number of active insured persons times the average monthly contribution, times the number of monthly contributions, which is finally multiplied by the work density.

$$An_{earn} = \sum_{x=21}^{66} Act_{x,t} * C_{mon} * 12 * D$$

For the following years, the income is formed by adding the return on capital of previous years, which is invested at the stochastic interest rate of each year.

$$An_{earn} = \sum_{x=21}^{66} Act_{x,t} * C_{mon} * 12 * D + \sum_{t=1}^{121} An_{earn} * i_t$$

The benefits of the fund are calculated as the number of expected retirees at the age of 67 with the addition of the beneficiaries of widow's pensions, as calculated based on the chances of survival in Chapter 3, times the monthly benefit (500.00 euros), multiplied by the number of monthly benefits.

$$An_{expen} = \sum_{x=67}^{121} (Re_{x,t} + w_{x,t}) * P_{mon} * 12$$

For the first seventeen years we have shown that the system will not spend any benefits on retirees, in order to build a fairly strong financial reserve on the basis of which future retirees will be covered for many years. According to our analysis, the first retirees will receive the 'flat' benefit in the year 2038. Based on our calculations, we observe that a year before the first retirees leave, the Fund will have created a reserve of 4.17 trillion euros. It is a large enough amount of insurance to maintain the balance between contributions and benefits in many years to come. Our model shows the long-term viability of the Fund, as it produces a surplus up to the year 2121.

After seventeen years the system begins to spend the sums for future retirees. Although it starts paying pensions, the Fund continues to "build" reserves. Indeed, after the year 2067 the picture remains stable. This is because new employees are entering the system every year, the ratio of active / retired as we calculated in a previous chapter is increasing in the future and the reserves are invested at a satisfactory interest rate.

4.2.5 Conclusions

The dynamic redistributive system presented is a small burden on newcomers, but it greatly relieves the older ones, as the estimated range of the average monthly European contribution (111 - 159 euros) corresponds to a percentage of 3.9 % - 5.6%, assuming that the average monthly salary in the Eurozone amounts to 2,817.23 euros (2018) [Annex ch.4 table 4.6].

On the contrary, with a funded system, the contributions that would have to be paid would be disproportionate and unbearable for older people. For example, an employee aged 20, to receive a benefit of € 500 at age 67 would have to pay his actuarial fair contribution of € 115. An

employee aged 38 to receive a benefit of € 500 at age 67 would have to pay his actuarial fair contribution of € 306. A 50-year-old worker to receive a benefit of 500 euros at the age of 67 would have to pay his actuarial fair contribution of 725 euros.

At a local national level, the model assumes the deprivation of income from insurance contributions. However, this weakness is offset by the abolition of future obligations, as this role will be taken over by the European Fund.

In addition, the average single contribution calculated in all three retirement scheme scenarios is quite realistic but also more restrained. For example, if we achieve returns at an average of 6.0% we will have a benefit on the single average contribution of 31.0%. This scenario (real returns> scenarios returns) creates a significant margin of safety, which will essentially give us a security in the long run to achieve actuarial balance for many more generations.

Also, from the sensitivity scenarios that were presented, the viability of the model was proven. Even in cases where the balance sheet at a present value level was negative, its return to a positive sign required realistic interventions regarding the increase in the amount of contributions to be paid by the participants.

In summary, the proposed methodology, incorporating the qualitative element of the expected improvement of the prices of the 'Dependency Ratio', highlights the prospect of creating a Fund that will ensure a tolerable insurance contribution for all while not presenting deficits, ultimately fulfilling its goal. its operation on the fundamental principles of social solidarity and cohesion of generations.

Chapter 5

Application of the European Social Security Agency to the data of the Greek insurance system

5.1 Introduction

As already mentioned in Chapter 2, the pension system in Greece (E.F.K.A) has weaknesses in sustainability. Its weaknesses are found in the number of occupational pension funds that make it up, which in many cases can and do survive thanks to state aid. The unemployment rate in Greece is 16.3% for the year 2020, the highest in the Eurozone and more than double its average of 7.9% according to Eurostat. Also the demographic problem in combination with the above make the pension system unsustainable. Since the beginning of the financial crisis, pension funds have periodically faced the prospect of bankruptcy, as the number of people working and contributing to social security is shrinking and at the same time there is an erratic exit from work due to unemployment and low wages. Hence, the number of retirees is constantly growing. In addition, there is no generational equality in the pension system at a time when reforms are insufficient and new ones cannot be imposed due to social and political factors. This is because the reforms had a positive sign of the primary surplus at the expense of the poverty of pensioners and the pension system which is not considered sustainable.

5.2 Application description of the proposed model

5.2.1 Aim

This chapter attempts to apply the proposed model to the data of the Greek insurance system in order to assess the positive and negative effects of such an endeavor. The new pan-European insurance body could be called the "European Social Security fund". This fund will initially accumulate funds as we have mentioned in detail in the 4th chapter from the contributions of employees and employers in Greece and then based on the principles of the redistributive system will pay the fixed pension of 500.00 euros. At the same time, its reserves will be invested in order to achieve its viability.

5.2.2 Methodology

The possible application of the new "European Social Security fund" in the context of the Greek insurance system (EFKA) will have as a consequence the Greek insurance institution to have a

loss of income from the contributions of employees and employers and benefit from the substitution of the payment of benefits by the European institution. According to the estimate of a single average monthly contribution based on the proposed model, we have calculated that, in order to provide a monthly pension of 500.00 euros, an average monthly contribution of 110.60 euros is required, which is divided into 73.73 euros for the employer and 36.87 euros for the employee. The program is expected to start in 2040, so we will have to calculate the losses and benefits for the period 2040-2070. However, the loss of income of the Hellenic Insurance Institution EFKA from the payment of contributions by the Greeks insured to the ESSF until its start of operation must also be calculated.

5.2.2.1 Determination of Contributions with the ESSF in relation to EFKA
The methodology followed is as follows:

Based on the Actuarial Study of the Pension System for Main and supplementary Insurance Actuarial Projections 2018 - 2070 of the National Actuarial Authority prepared in February 2020, we calculated for the period 2021-2070, using as a driver the expected number of insured individuals, as it results from the above study, and the annual amount of contributions, for main pension (20%), according to the provisions of laws 4387/2016 and 4052/2012, the average monthly salary on the basis of which the contributions are calculated.

			EFKA CURRENT SYSTEM CURRENT PRICES			
t	Year	Number of insured	Total Contributions (20%) EFKA	Annual Contributions / person (20%) - EFKA	Monthly Contributions / person (20%) - EFKA	Monthly Average Salary / person
0	2021	4.872.081	11.788.000.000 €	2.420 €	173 €	864 €
4	2025	5.038.833	13.744.000.000 €	2.728 €	195 €	974 €
9	2030	5.042.652	16.004.000.000 €	3.174 €	227 €	1.133 €
14	2035	5.023.988	18.516.000.000 €	3.686 €	263 €	1.316 €
19	2040	4.934.191	21.605.000.000 €	4.379 €	313 €	1.564 €
24	2045	4.819.778	25.521.000.000 €	5.295 €	378 €	1.891 €
29	2050	4.688.895	30.039.000.000 €	6.406 €	458 €	2.288 €
34	2055	4.539.603	35.099.000.000 €	7.732 €	552 €	2.761 €
39	2060	4.441.450	41.323.000.000 €	9.304 €	665 €	3.323 €

| 44 | 2065 | 4.368.532 | 48.538.000.000 € | 11.111 € | 794 € | 3.968 € |
| 49 | 2070 | 4.299.047 | 57.356.000.000 € | 13.342 € | 953 € | 4.765 € |

The following table presents the percentage of the salary that corresponds to the contribution of 110.60 € of ESSF. We then estimated what percentage of this salary is the new average monthly contribution of the ESSF, in an effort determine the new amounts of annual contributions that EFKA will receive.

Monthly Average Salary / person	Salary Contribution rate based on the contribution of € 110.60 ESSF	EFKA - ESSF Contribution Difference	Monthly Contributions / person ESSF EFKA-ESSF	Annual Contributions / person ESSF
864 €	12,80%	7,20%	62 €	871 €
974 €	11,35%	8,65%	84 €	1.179 €
1.133 €	9,76%	10,24%	116 €	1.625 €
1.316 €	8,40%	11,60%	153 €	2.137 €
1.564 €	7,07%	12,93%	202 €	2.830 €
1.891 €	5,85%	14,15%	268 €	3.747 €
2.288 €	4,83%	15,17%	347 €	4.858 €
2.761 €	4,01%	15,99%	442 €	6.183 €
3.323 €	3,33%	16,67%	554 €	7.756 €
3.968 €	2,79%	17,21%	683 €	9.562 €
4.765 €	2,32%	17,68%	842 €	11.793 €

The determination of the loss of contributions by EFKA due to the implementation of the new ESSF is illustrated in the following table:

Year	Number of Insured	Annual Contributions / person ESSF	Total EFKA Contributions after the application of ESSF	Total EFKA Contributions before the application of the ESSF
2021	4.872.081	871 €	4.244.069.780 €	11.788.000.000 €
2025	5.038.833	1.179 €	5.941.870.983 €	13.744.000.000 €
2030	5.042.652	1.625 €	8.195.957.643 €	16.004.000.000 €
2035	5.023.988	2.137 €	10.736.856.981 €	18.516.000.000 €
2040	4.934.191	2.830 €	13.964.898.656 €	21.605.000.000 €
2045	4.819.778	3.747 €	18.058.055.745 €	25.521.000.000 €
2050	4.688.895	4.858 €	22.778.714.982 €	30.039.000.000 €
2055	4.539.603	6.183 €	28.069.878.715 €	35.099.000.000 €
2060	4.441.450	7.756 €	34.445.858.820 €	41.323.000.000 €
2065	4.368.532	9.562 €	41.773.765.051 €	48.538.000.000 €
2070	4.299.047	11.793 €	50.699.355.625 €	57.356.000.000 €

We notice that there is a decrease in the revenues of EFKA with the implementation of the new ESSF which is identified in the next table.

The cumulative loss of revenue arises from the forecast in the first year of each five years over the number of years.

Year	Total EFKA Contributions after the application of ESSF	Total EFKA Contributions before the application of the ESSF	Loss of EFKA Contributions in the forecasts every 5th year	Cumulative Loss of EFKA Contributions
2021	4.244.069.780 €	11.788.000.000 €	**7.543.930.220 €**	7.543.930.220 €
2025	5.941.870.983 €	13.744.000.000 €	**7.802.129.017 €**	38.752.446.289 €
2030	8.195.957.643 €	16.004.000.000 €	**7.808.042.357 €**	77.792.658.073 €
2035	10.736.856.981 €	18.516.000.000 €	**7.779.143.019 €**	116.688.373.169 €
2040	13.964.898.656 €	21.605.000.000 €	**7.640.101.344 €**	154.888.879.891 €
2045	18.058.055.745 €	25.521.000.000 €	**7.462.944.255 €**	192.203.601.167 €

2050	22.778.714.982 €	30.039.000.000 €	**7.260.285.018 €**	228.505.026.257 €
2055	28.069.878.715 €	35.099.000.000 €	**7.029.121.285 €**	263.650.632.683 €
2060	34.445.858.820 €	41.323.000.000 €	**6.877.141.180 €**	298.036.338.583 €
2065	41.773.765.051 €	48.538.000.000 €	**6.764.234.949 €**	331.857.513.327 €
2070	50.699.355.625 €	57.356.000.000 €	**6.656.644.375 €**	365.140.735.201 €

We observe that, on average, the annual loss in contributions corresponding to the main pension, amounts to

€ 7.3 billion in current prices.
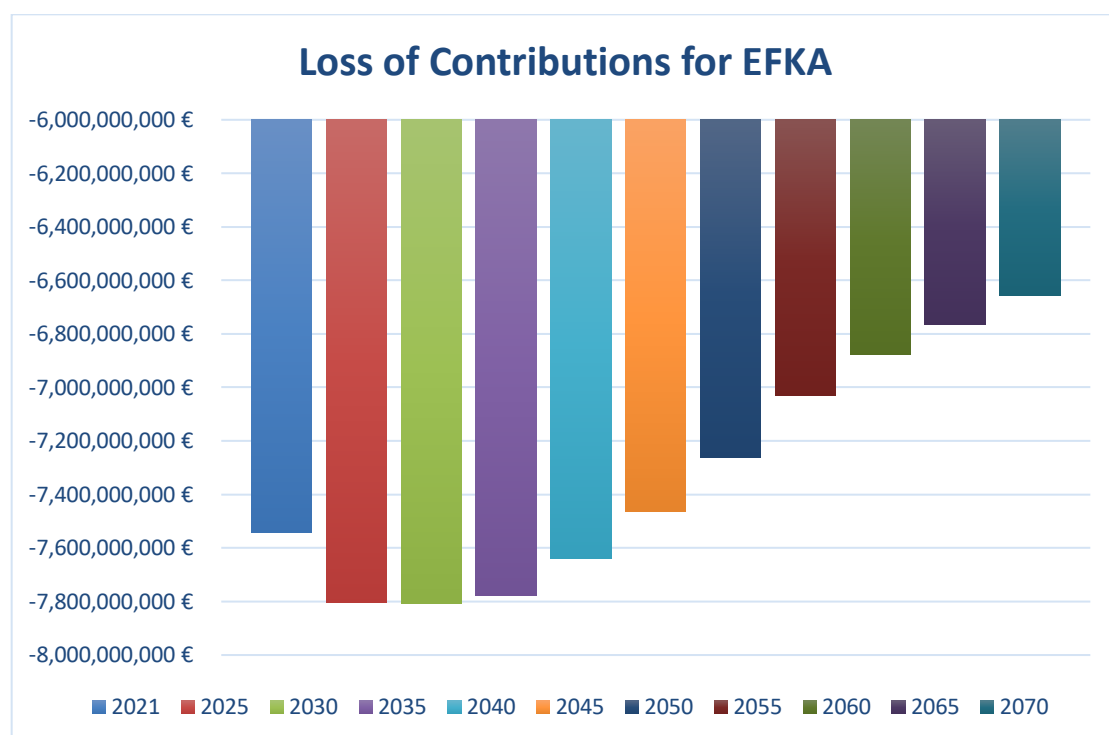
5.2.2.2 Determination of Benefits with the ESSF in relation to the EFKA

The methodology followed is as follows:

Based on the aforementioned actuarial study prepared in 2020, we calculated for the period 2021-2070, guided by the expected number of main pensions (MP) and the annual amount of benefits for main pension as well as the average contributory pension.

Year	Number of Pensions	Total Benefits MP EFKA Current System	Annual Benefits per person EFKA Current System	Monthly Benefits per person EFKA Current System	National Pension	Compensatory pension

87

2021	2.739.671	24.736.000.000 €	9.029 €	752 €	384 €	368 €
2025	2.744.265	25.793.000.000 €	9.399 €	783 €	384 €	399 €
2030	2.782.023	28.468.000.000 €	10.233 €	853 €	384 €	469 €
2035	2.974.082	34.338.000.000 €	11.546 €	962 €	384 €	578 €
2040	3.101.807	40.397.000.000 €	13.024 €	1.085 €	384 €	701 €
2045	3.185.674	47.111.000.000 €	14.788 €	1.232 €	384 €	848 €
2050	3.225.970	54.824.000.000 €	16.995 €	1.416 €	384 €	1.032 €
2055	3.201.585	62.406.000.000 €	19.492 €	1.624 €	384 €	1.240 €
2060	3.085.971	69.542.000.000 €	22.535 €	1.878 €	384 €	1.494 €
2065	3.098.598	83.004.000.000 €	26.788 €	2.232 €	384 €	1.848 €
2070	2.976.552	93.922.000.000 €	31.554 €	2.629 €	384 €	2.245 €

We then deducted from this amount the new monthly benefit that will be given by the ESSF, as a result of which we set the new average contributory pension to be provided by EFKA (excluding the national pension, which is financed by the state).

Year	Annual Benefits per person EFKA Current System	Monthly Benefits per person EFKA Current System	National Pension	Compensatory pension	New ESSF Compensatory Pension (-500)	New monthly benefits per person from EFKA
2021	9.029 €	752 €	384 €	368 €	368 €	752,00 €
2025	9.399 €	783 €	384 €	399 €	399 €	783,00 €

2030	10.233 €	853 €	384 €	469 €	469 €	853,00 €
2035	11.546 €	962 €	384 €	578 €	578 €	962,00 €
2040	13.024 €	1.085 €	384 €	701 €	201 €	585,31 €
2045	14.788 €	1.232 €	384 €	848 €	348 €	732,37 €
2050	16.995 €	1.416 €	384 €	1.032 €	532 €	916,21 €
2055	19.492 €	1.624 €	384 €	1.240 €	740 €	1.124,35 €
2060	22.535 €	1.878 €	384 €	1.494 €	993 €	1.377,91 €
2065	26.788 €	2.232 €	384 €	1.848 €	1.348 €	1.732,30 €
2070	31.554 €	2.629 €	384 €	2.245 €	1.745 €	2.129,50 €

Year	Number of Pensions	New Annual Benefits per person EFKA	Total New Benefits	Total Initial Benefits	Annual Benefit from Substitution of EFKA benefits
2040	3.101.807	7.023,70 €	21.786.158.000,00 €	40.397.000.000 €	18.610.842.000,00 €
2045	3.185.674	8.788,39 €	27.996.956.000,00 €	47.111.000.000 €	19.114.044.000,00 €
2050	3.225.970	10.994,58 €	35.468.180.000,00 €	54.824.000.000 €	19.355.820.000,00 €
2055	3.201.585	13.492,22 €	43.196.490.000,00 €	62.406.000.000 €	19.209.510.000,00 €
2060	3.085.971	16.534,88 €	51.026.174.000,00 €	69.542.000.000 €	18.515.826.000,00 €
2065	3.098.598	20.787,60 €	64.412.412.000,00 €	83.004.000.000 €	18.591.588.000,00 €
2070	2.976.552				

		25.553,96 €	76.062.688.000,00 €	93.922.000.000 €	17.859.312.000,00 €

We observe that, on average, the annual gain in benefits corresponding to the main pension, amounts to € 18.7 billion in current prices.
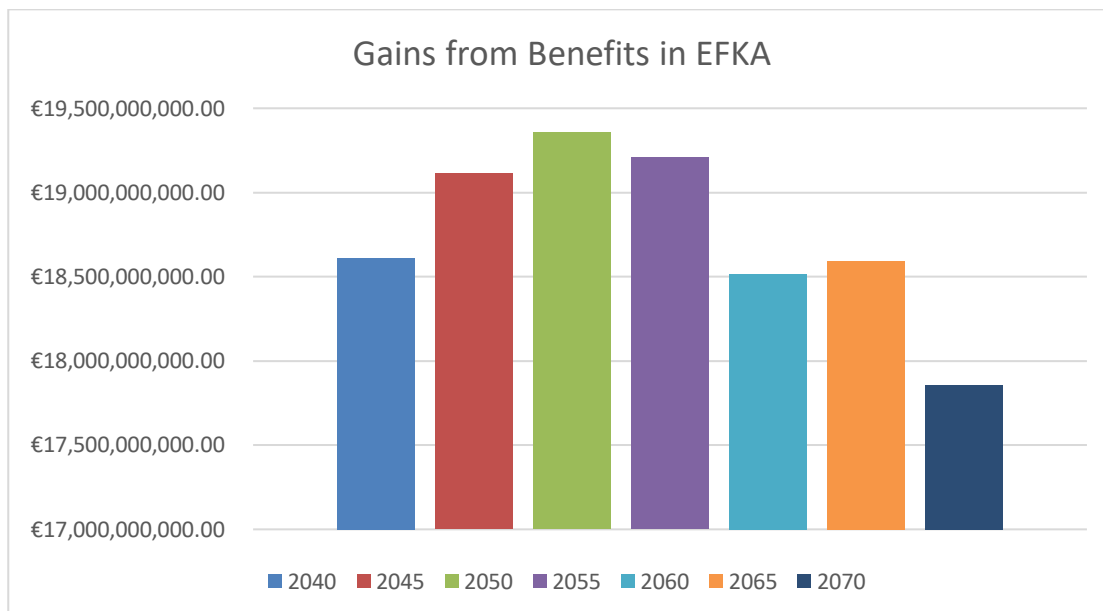
5.3 Summary conclusions

In order to be able to compare the results of contributions and benefits in the long run, we considered it appropriate to compare them to current values in order to understand the result. Based on a discount rate of 2.5%, the following table is obtained:

	EFKA				
Year	Total Contributions (20%) MP EFKA current prices	Total Contributions (20%) MP EFKA current prices present value t = 0	Total Benefits MP EFKA current prices	Total Benefits MP EFKA current prices present value t = 0	Result CONTRIBUTIONS - BENEFITS
2021	11.788.000.000 €	11.788.000.000 €	24.736.000.000 €		- 12.948.000.000 €
2025	13.744.000.000 €	12.451.385.662 €	25.793.000.000 €	23.367.184.981 €	- 10.915.799.319 €
2030	16.004.000.000 €	12.814.856.702 €	28.468.000.000 €		- 9.980.278.301 €
2035	18.516.000.000 €	13.104.276.757 €	34.338.000.000 €	24.301.936.448 €	- 11.197.659.691 €
2040	21.605.000.000 €	13.514.526.313 €	40.397.000.000 €		- 11.754.916.847 €
2045	25.521.000.000 €	14.109.931.914 €	47.111.000.000 €	26.046.510.811 €	- 11.936.578.897 €
2050	30.039.000.000 €	14.678.895.358 €	54.824.000.000 €		- 12.111.469.139 €
2055	35.099.000.000 €	15.159.445.635 €	62.406.000.000 €	26.953.484.838 €	- 11.794.039.202 €
2060	41.323.000.000 €	15.774.699.430 €	69.542.000.000 €		- 10.772.360.264 €
2065	48.538.000.000 €	16.376.903.882 €	83.004.000.000 €	28.005.862.001 €	- 11.628.958.119 €
2070	57.356.000.000 €	17.104.463.313 €	93.922.000.000 €		- 10.904.557.597 €

We observe that, with the current system, the Fund is in deficit with a very high cash deficit of around € 11.5 billion per year from 2021 to 2070.

If the new ESSF regime applies, we observe the following:

		ESSF			
Year	**Total ESSF MP Contributions current prices**	**Total Contributions (20%) ESSF current prices present value t = 0**	**Total Benefits MP ESSF current prices**	**Total Benefits MP ESSF present value t = 0**	**Result CONTRIBUTIONS - BENEFITS**
2021	4.244.069.780 €	4.244.069.780 €	24.722.791.104 €		- 20.491.930.220 €
2025	5.941.870.983 €	5.383.041.848 €	25.785.113.940 €	23.367.184.981 €	- 17.984.143.133 €
2030	8.195.957.643 €	6.562.735.737 €	28.476.787.428 €		- 16.232.399.266 €
2035	10.736.856.981 €	7.598.765.682 €	16.493.508.000 €	24.301.936.448 €	- 16.703.170.766 €
2040	13.964.898.656 €	8.735.431.166 €	21.786.158.000 €		- 4.892.414.497 €
2045	18.058.055.745 €	9.983.853.966 €	27.996.956.000 €	15.478.826.965 €	- 5.494.972.999 €
2050	22.778.714.982 €	11.131.075.389 €	35.468.180.000 €		- 6.200.849.867 €
2055	28.069.878.715 €	12.123.530.595 €	43.196.490.000 €	18.656.794.832 €	- 6.533.264.236 €
2060	34.445.858.820 €	13.149.410.001 €	51.026.174.000 €		- 6.329.392.552 €
2065	41.773.765.051 €	14.094.625.551 €	64.412.412.000 €	21.732.990.237 €	- 7.638.364.685 €
2070	50.699.355.625 €	15.119.347.031 €	76.062.688.000 €		- 7.563.745.521 €

The table above shows that the expected annual contributions are reduced to a degree, but at the same time the expected annual benefits are reduced to a much greater degree!

With this finding we see that our model is highly efficient for Greece, because the existing insurance system is relieved by a very significant burden. More specifically, the annual net benefit is reflected below:

Year	Result CONTRIBUTIONS - BENEFITS ESSF		Result CONTRIBUTIONS - BENEFITS EFKA		Net Annual Gain or EFKA Loss		Cumulative Benefit in favor of EFKA calculated per year	
2021	-	20.491.930.220 €	-	12.948.000.000 €	-	7.543.930.220 €	-	7.543.930.220 €
2025	-	17.984.143.133 €	-	10.915.799.319 €	-	7.068.343.814 €	-	35.817.305.476 €
2030	-	16.232.399.266 €	-	9.980.278.301 €	-	6.252.120.965 €	-	67.077.910.301 €
2035	-	16.703.170.766 €	-	11.197.659.691 €	-	5.505.511.074 €	-	94.605.465.673 €
2040	-	4.892.414.497 €	-	11.754.916.847 €		6.862.502.350 €	-	60.292.953.924 €
2045	-	5.494.972.999 €	-	11.936.578.897 €		6.441.605.898 €	-	28.084.924.434 €
2050	-	6.200.849.867 €	-	12.111.469.139 €		5.910.619.272 €		1.468.171.925 €
2055	-	6.533.264.236 €	-	11.794.039.202 €		5.260.774.966 €		27.772.046.756 €
2060	-	6.329.392.552 €	-	10.772.360.264 €		4.442.967.713 €		49.986.885.320 €
2065	-	7.638.364.685 €	-	11.628.958.119 €		3.990.593.434 €		69.939.852.489 €
2070	-	7.563.745.521 €	-	10.904.557.597 €		3.340.812.076 €		86.643.912.867 €

From the above calculation it results that for the period 2021-2040 the total net loss amounts to 95 billion euros. While for the period 2040-2070 the total net benefit amounts to 86 billion euros.

5.4 Sensitivity Scenarios

In order to be able to more fully compare the application scenarios of the proposed model of ESSF in the data of the insurance body of Greece, we examined the results of the application of ESSF in the data of the Greek Insurance system with different discount rates as follows:

Scenario with 2% discount rate

Year	Result CONTRIBUTIONS - BENEFITS ESSF		Result CONTRIBUTIONS - BENEFITS EFKA		Net Annual Gain or EFKA Loss		Cumulative Benefit in favor of EFKA calculated per year	
2021	-	20.491.930.220 €	-	12.948.000.000 €	-	**7.543.930.220 €**	-	7.543.930.220 €
2025	-	18.339.374.744 €	-	11.131.413.538 €	-	**7.207.961.206 €**	-	36.375.775.044 €
2030	-	16.962.738.192 €	-	10.429.317.634 €	-	**6.533.420.558 €**	-	69.042.877.835 €
2035	-	17.886.716.846 €	-	11.991.098.639 €	-	**5.895.618.207 €**	-	98.520.968.869 €
2040	-	5.368.752.994 €	-	12.899.406.838 €		**7.530.653.843 €**	-	60.867.699.652 €
2045	-	6.179.227.855 €	-	13.422.966.925 €		**7.243.739.069 €**	-	24.649.004.305 €
2050	-	7.145.593.918 €	-	13.956.738.523 €		**6.811.144.605 €**		9.406.718.721 €
2055	-	7.714.997.806 €	-	13.927.339.119 €		**6.212.341.313 €**		40.468.425.285 €
2060	-	7.659.247.142 €	-	13.035.716.919 €		**5.376.469.776 €**		67.350.774.167 €
2065	-	9.472.026.603 €	-	14.420.599.855 €		**4.948.573.252 €**		92.093.640.426 €
2070	-	9.611.648.864 €	-	13.856.994.309 €		**4.245.345.445 €**		113.320.367.649 €

Scenario with 3% discount rate

Year	Result CONTRIBUTIONS - BENEFITS ESSF		Result CONTRIBUTIONS - BENEFITS EFKA		Net Annual Gain or EFKA Loss		Cumulative Benefit in favor of EFKA calculated per year	
2021	-	20.491.930.220 €	-	12.948.000.000 €	-	**7.543.930.220 €**	-	7.543.930.220 €
2025	-	17.637.471.018 €	-	10.705.380.440 €	-	**6.932.090.578 €**	-	35.272.292.532 €
2030	-	15.536.832.461 €	-	9.552.618.152 €	-	**5.984.214.309 €**	-	65.193.364.078 €

94

2035	-	15.603.135.888 €	-	10.460.205.924 €	-	5.142.929.964 €	-	90.908.013.898 €
2040	-	4.460.354.916 €	-	10.716.815.016 €		6.256.460.100 €	-	59.625.713.399 €
2045	-	4.889.280.338 €	-	10.620.849.368 €		5.731.569.030 €	-	30.967.868.250 €
2050	-	5.384.728.320 €	-	10.517.424.590 €		5.132.696.270 €	-	5.304.386.901 €
2055	-	5.537.018.911 €	-	9.995.588.077 €		4.458.569.166 €		16.988.458.928 €
2060	-	5.235.293.312 €	-	8.910.249.314 €		3.674.956.003 €		35.363.238.942 €
2065	-	6.166.128.622 €	-	9.387.565.855 €		3.221.437.233 €		51.470.425.104 €
2070	-	5.959.122.352 €	-	8.591.192.384 €		2.632.070.032 €		64.630.775.263 €

In the above calculations with the discount rate of 2% and 3%, similar estimates are obtained.

Chapter 6

Applied joint insurance efforts, Conclusion, Estimates, Future study

6.1 Applied joint insurance coverage efforts in the EU

6.1.1 Legislative acts guaranteeing insurance rights

Efforts to safeguard the insurance rights of people moving around the EU, whether they are employed or retired, have been made through Regulations 883/2004 and 987/2009 with the aim of improving the recognition of guaranteed insurance rights from one state to another. The basis for these regulations was laid down in Regulation 1408/71 of the European Economic Community. The above regulations initially allow each Member State to design its own insurance system for its citizens, but determines which country is required to provide insurance coverage when two or more countries are involved. According to the above regulation, the country that provides insurance coverage is the last country in which the citizen works and in case of unemployed the last country of residence.

The above introduces the principle of equal treatment between citizens from different countries and obliges the host state to recognize the insurance rights of the displaced, adapted to its own applicable insurance conditions. The recognition of the insurance life of the mobile worker is also institutionalized so that he can be utilized in the insurance system of the host state. In order to avoid an unfair advantage, the regulation establishes the application of a legal framework that governs only one country, in which the employee's contributions should be paid.

Directive 2014/50 / EU of the European Parliament lays down the rules for easier movement of workers between Member States, reducing the barriers created by certain rules relating to supplementary pension schemes. The above directive set limits for the required years of insurance in order to secure a pension right. It also regulates the issue of dormant pension rights and allows the adoption of provisions by the social partners of the Member States which, however, do not create obstacles to the free movement of workers within the territory of the European Union.

For better implementation of the legal framework on insurance and labor relations of EU countries the European Labor Authority is established. The institutional framework was established by Regulation 2019/1149 of the European Parliament. The purpose of the Authority is to assist the Member States in the effective implementation of Community law in the field of

labor mobility within the EU. It also aims to coordinate the individual social security systems of the Member States. The Authority also acts as a mediator in resolving cross-border disputes between Member States.

Efforts to coordinate European insurance systems include the European Commission proposal for a European Social Security Number (ESSN) to facilitate the coordination of cross-border social security systems. The above proposal was not implemented and in its place a pilot project was announced to investigate the feasibility of introducing a European Social Security Card (ESPASS) by 2023.

6.1.2 Creation of a unified insurance system of 3rd Pillar

An effort for a unified supplementary insurance system of the 3rd pillar is created by regulation (EU) 2019/1938. This regulation creates the individual pension product called pan- European Personal Pension product (PEPP) is an individual pension product which will be available to European citizens on a voluntary basis and in which the insured will be able to participate on the same terms regardless of the Member State in which they reside. This product meets the need for individual supplementary insurance and the innovation it introduces is that it is established by a Community directive, the providers of the product are subject to certifications established by the European Parliament. By participating in this product, the party can move to any country of the association without changing the terms agreed. It is essentially a move that combines insurance with savings with the creation of national sub-accounts, each of which resembles a private pension scheme with the guarantee of the European Union.

6.2 Comparison of the institutionalized steps of insurance consolidation with the proposal of the dissertation

The steps that have been taken so far in the direction of the common insurance coverage of the members of the European Union concern the possibility of recognizing the insurance rights of the mobile citizen from the country of origin to the host country. The aim of the efforts is to make the best possible adaptation of the mobile citizen to the host state, where he is obliged to adapt to the insurance rules in force.

The creation of PEPP is still a positive step in the context of insurance consolidation, but it does not concern the pillars of compulsory insurance, which cannot be bypassed and are addressed to all European workers. This is an option of the insured which is not mandatory, which certainly contributes to the ease of movement of workers between Member States but is not addressed to all participants in insurance coverage.

The effort to implement a single insurance system in EU countries, which belongs to the first pillar (basic pension) such as the one proposed in this study, would probably be a step that

would bring European integration closer. Moreover, with the substantive procedural actions to date, for the recognition of insurance rights between the Member States, no effort is made to address the structural problems of all the individual insurance systems of the countries of the European Union. The main problems such as the aging of the population, the management of the insurance system at national level with the pathogenesis that this entails due to conflicting policies, the management and investment of the reserves that are created, are among the issues that need to be addressed at European Union level. The single policy, the joint decisions, the total investment of the available reserves of the individual insurance systems, are actions that can promote public insurance and ensure its solvency. The joint award of the basic pension proved in the previous analysis that the pension system of Greece benefits, in comparison with the existing one. The possibility of a charge from one of the other insurance systems of the member countries is likely to happen, however, according to the change of the index of employees to pensioners, it seems that there is a better development at a Eurozone level.

6.3 Conclusion - Estimates

In the work carried out in the previous chapters, an extensive presentation of the insurance systems of the Eurozone countries was made, and their evolution over time was presented in parallel with the socio-economic conditions prevailing in each of them. At the end of each country system were noted the weaknesses and challenges faced by the insurance system of each country. From the overview we observe that a common feature of the insurance systems of the Eurozone member states is the granting of a basic pension, which in most of them is based on the redistributive system. Also most of them operate with the system of defined pensions. The management of the funds generated by the contributions of employees and employers is crucial for the viability of the insurance system of each country.

It is a fact that the diversification of risk by investing the reserves created by the unallocated amounts of pensions, at any time, ensures the healthy operation of the institution. Having a large amount of cash is a prerequisite for more efficient and effective management achieving economies of scale and a strong bargaining position regarding the rate of return.

In this sense, the proposed model "European Social Security fund" combines these characteristics.

As analyzed in Chapters 4 and 5, the cash reserve that is required by the fund, in order to be managed at the beginning of its operation but also during the period when it will start providing benefits, is a multiple of the respective national insurance systems, in this sense the proven viability recorded in Chapter 4 is conservatively defined which means a possibility for

further reduction of insurance contributions, if the returns of the accumulated funds allow this development.

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In addition to the economic benefits of such an initiative, a significant benefit is the ease of labor mobility for employees in the countries of the Eurozone.

Under the current institutional framework, as it was analyzed in chapter 6.1, it is possible to move employees from one European Union country to another in order to work in it without the need for special approval procedures by the individual countries involved in the process.

However, one of the main problems that arises in many cases is the fact that there are no uniform insurance rules which is completely different from the process of recognizing the insurance life of the mobile insured between the two states.

The problem becomes greater when there is a movement between three or more states, where in these cases the continuation of insurance coverage is an uncertain factor for the employee thinking towards such a movement

The proposed model of the "European Social Security fund" bypasses the problem of uncertainty of insurance coverage regarding the basic pension ,while the amount of insurance contributions and benefits for the employment of the employee in any eurozone country is safe.

The aforementioned ease of work transfer contributes to European integration and the achievement of lower unemployment rates in the Eurozone as there will no longer be a moratorium on the movement of workers due to uncertain insurance coverage.

Also in the last decade due to the economic crisis there has been a movement of young people mainly with work skills from the countries of the European south to the northern countries of the European Union. This move has the effect of strengthening the insurance systems of the host countries (The phenomenon was intense in Luxemburg). In this case, the unified insurance system of our proposal contributes, on the one hand, to the ease of return of migrants, and on the other hand to "insurance justice", in the sense that in the unified insurance system the burden of sound insurance systems is greater than that of weak ones.

6.4 Future research & challenges of exploration

Following the work presented in this dissertation and in order to draw safer conclusions regarding the effects of

"European Social Security fund" in each Eurozone country, could be studied respectively as it was done with the application in the Greek insurance system, its application in each insurance system of all Eurozone member countries.

In this case and with a first assessment some countries benefit, such as the example of Greece which was analyzed, by reducing the burdens of their insurance system and consequently the state aid to it, and some others countries don't.

This burden, however, must be estimated from the above study in terms of its proportion in relation to the expenditure of the national system and whether it can be offset by the reduction in unemployment brought about by the implementation of the single system as mentioned.

Extending the single system to all European Union countries is also an interesting challenge. In this case, in addition to the problems analyzed for the eurozone countries, there is also the issue of the different currency and the exchange rates between the individual currencies that apply.

Based on the European Social Security fund as the main first pillar for a three-pillar system in the European Union, the existence of single occupational insurance funds in the Eurozone could be considered in order to provide uniform occupational insurance coverage in the second pillar, thus contributing further to European integration.

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ch. 1.2

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ch.5

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ANNEX ch.3

Table P3.1. Initial population of Active

Ηλικία	EU-19	Αυστρία	Βέλγιο	Κύπρος	Εσθονία	Φιλανδία	Γαλλία	Γερμανία	Ελλάδα	Ιρλανδία	Ιταλία	Λετονία	Λιθουανία	Λουξεμβούργο	Μάλτα	Ολλανδία	Πορτογαλία	Σλοβακία	Σλοβενία	Ισπανία
20	3,664,175	97,811	129,816	11,221	11,711	59,640	779,289	891,659	109,259	62,445	596,889	16,160	30,373	6,895	5,438	218,315	110,497	56,810	19,371	450,576
21	3,690,890	102,587	132,166	11,935	12,410	61,894	749,572	934,518	109,881	62,104	595,298	16,393	30,828	7,365	5,885	212,979	109,520	58,575	19,995	456,985
22	3,701,091	107,938	134,515	12,767	13,319	63,720	752,550	929,523	110,994	58,632	597,394	16,818	31,541	7,632	6,499	212,854	107,756	59,798	20,709	456,132
23	3,683,522	108,962	135,534	13,327	13,320	66,388	739,485	916,924	110,250	56,997	596,671	18,167	32,303	7,804	6,942	214,501	106,024	61,111	20,717	458,095
24	3,717,188	113,465	137,645	14,045	13,932	68,734	715,237	934,648	111,938	56,004	603,993	19,539	32,564	8,342	7,293	221,276	104,908	65,943	21,148	466,534
25	3,804,644	117,472	143,725	14,619	14,698	69,063	714,193	967,092	107,559	56,099	616,285	21,111	35,777	8,807	8,029	221,595	108,520	72,495	21,436	486,069
26	3,931,581	120,281	149,244	15,340	16,771	71,766	747,197	985,364	113,506	56,153	643,323	24,295	38,749	9,148	8,549	224,138	108,957	73,738	21,583	503,479
27	3,996,864	122,465	151,589	14,773	17,097	71,153	760,393	1,021,919	116,076	58,132	640,950	25,037	38,826	9,022	8,816	227,080	110,462	77,169	23,123	502,782
28	4,141,005	121,965	151,893	15,043	19,231	72,182	779,088	1,116,459	114,944	59,421	655,536	26,491	38,044	9,665	8,954	228,156	110,225	78,513	23,705	511,490
29	4,137,632	121,525	150,096	14,803	20,336	70,708	789,445	1,102,501	116,887	59,916	654,931	26,858	36,317	9,483	9,163	220,894	109,166	78,470	24,833	521,300
30	4,214,070	121,985	150,104	15,280	20,644	70,898	801,800	1,127,589	120,035	62,985	670,761	27,848	36,300	9,733	8,962	218,629	110,896	80,942	26,914	531,765
31	4,177,378	120,121	147,621	14,713	20,498	67,638	805,647	1,103,635	112,944	62,444	658,626	28,329	38,015	9,528	8,560	218,397	111,045	81,639	27,422	540,556
32	4,204,832	120,044	147,683	14,800	19,516	68,548	821,149	1,083,657	120,908	66,119	662,121	28,197	37,588	9,674	8,289	217,522	112,981	83,907	26,881	555,248
33	4,217,751	120,242	145,124	14,288	19,370	70,664	819,971	1,050,793	124,295	69,784	682,913	27,200	36,193	9,440	8,234	212,882	116,361	86,776	27,971	575,250
34	4,257,189	120,774	146,248	14,128	19,546	72,648	813,918	1,043,355	131,533	70,942	694,925	27,443	35,750	9,488	8,048	209,476	124,832	86,772	28,524	598,839
35	4,297,760	120,574	146,511	13,920	19,371	73,972	806,224	1,045,184	142,229	74,425	706,776	27,733	35,545	9,534	8,075	203,806	127,950	87,005	29,026	619,900
36	4,448,418	123,651	149,745	13,164	18,682	73,161	856,334	1,065,675	149,370	77,286	730,609	25,862	32,873	9,752	8,242	204,401	134,711	87,317	30,169	657,414
37	4,498,458	122,864	151,431	13,444	18,567	70,145	867,306	1,056,516	155,235	79,964	735,922	25,172	32,574	9,635	7,686	208,114	136,651	87,399	31,105	688,728
38	4,580,636	119,677	153,291	13,493	18,241	69,593	876,384	1,060,769	159,040	83,195	754,424	24,684	32,550	9,769	7,575	210,971	143,090	88,348	31,763	723,779
39	4,516,069	113,192	150,806	12,629	18,084	68,880	829,912	1,009,272	160,296	82,613	777,141	24,476	33,082	9,421	7,532	204,001	143,362	92,664	32,122	746,584
40	4,554,304	111,312	148,992	12,450	17,862	69,052	812,164	995,070	159,804	77,733	817,752	24,153	33,640	9,402	7,264	203,992	148,057	91,891	31,827	781,887
41	4,593,228	110,673	147,237	11,650	18,291	69,678	817,987	985,641	158,357	75,925	843,565	24,764	34,577	9,413	7,200	201,027	160,702	91,523	31,449	793,569
42	4,613,066	111,268	145,269	11,506	18,314	69,956	796,366	966,513	163,042	74,905	879,842	25,448	35,482	9,116	7,050	202,851	164,585	91,087	31,925	808,541
43	4,641,568	115,472	142,983	10,034	18,114	68,421	819,986	941,433	159,808	74,786	920,163	25,871	35,774	9,195	7,068	204,259	165,091	89,052	31,124	802,934
44	4,736,839	117,931	146,893	10,518	18,120	65,258	861,276	953,081	161,175	74,281	957,035	26,116	36,631	9,051	6,680	213,259	162,681	88,946	30,257	797,650
45	4,754,274	117,982	149,918	11,098	18,011	59,442	907,789	959,668	157,167	72,311	950,671	26,016	37,308	8,972	6,315	220,643	158,109	84,290	30,392	778,172
46	4,889,685	124,549	154,583	11,251	18,448	61,378	928,077	1,038,269	159,342	71,336	959,730	26,710	39,141	9,164	6,208	238,587	158,600	79,314	30,034	774,964
47	5,000,256	128,679	157,297	10,599	18,707	63,178	924,656	1,140,019	161,584	69,270	968,514	27,193	40,954	9,430	6,073	249,933	157,270	74,761	29,323	762,816
48	5,008,492	131,680	158,809	10,575	18,327	65,147	903,118	1,180,738	163,457	69,111	959,790	26,552	40,581	9,227	5,816	260,536	152,469	72,349	28,308	751,902
49	5,105,660	139,670	156,921	10,531	17,854	66,433	892,116	1,265,825	164,503	65,948	985,592	25,940	40,166	9,390	5,493	266,020	148,929	70,996	29,047	744,286
50	5,129,607	143,207	156,346	10,626	17,124	71,078	882,757	1,323,697	164,385	63,102	978,404	25,908	40,308	9,430	5,670	254,909	148,096	67,491	29,600	737,469
51	5,160,992	142,712	156,504	10,706	16,193	72,753	877,004	1,356,220	164,056	62,108	981,716	25,763	40,211	9,491	5,436	251,946	148,215	67,951	30,704	741,303
52	5,204,952	142,669	160,005	10,838	16,284	73,031	896,637	1,389,766	156,882	61,291	989,428	25,801	40,397	9,287	5,410	253,097	150,093	70,135	31,652	722,249
53	5,202,758	143,177	163,005	10,790	16,451	73,207	897,855	1,391,794	151,048	61,436	986,468	25,236	40,415	9,322	5,610	256,392	151,140	72,055	31,635	715,722
54	5,263,837	143,818	167,069	10,911	17,053	74,480	906,212	1,414,471	145,836	61,060	998,320	26,551	41,864	9,165	5,831	260,512	152,439	74,390	30,511	723,344
55	5,121,270	142,278	163,359	10,950	17,005	75,114	894,108	1,399,366	143,138	59,589	936,477	27,287	42,375	8,922	5,851	255,864	148,601	73,080	30,360	687,546
56	4,969,212	138,562	159,337	10,976	17,670	74,138	862,079	1,351,589	143,936	57,542	904,354	28,192	44,008	8,493	6,259	250,557	148,012	69,841	30,235	663,432
57	4,904,186	134,318	158,299	10,966	18,151	73,574	862,491	1,327,937	144,388	56,349	885,307	28,897	45,775	8,247	6,178	247,542	147,150	71,909	30,262	646,446
58	4,804,538	128,414	155,568	10,944	18,073	72,991	857,448	1,279,695	144,400	56,444	856,850	28,825	45,320	7,854	6,456	240,203	146,091	71,433	29,581	647,948
59	4,692,360	123,313	154,764	10,710	17,820	72,416	851,679	1,239,631	142,721	54,231	834,907	28,207	44,371	7,614	6,261	237,366	139,084	70,012	29,109	628,144
60	4,519,929	117,265	149,897	10,347	17,308	69,831	832,687	1,166,642	139,389	52,977	796,679	28,028	43,164	7,310	6,278	230,261	138,599	72,387	28,749	612,131
61	4,432,436	114,279	145,740	9,956	17,056	72,549	824,970	1,135,091	134,585	51,301	787,187	26,915	39,685	6,970	6,331	224,577	136,547	73,837	29,108	595,752
62	4,310,372	111,442	141,788	9,625	16,798	74,158	816,283	1,098,993	136,349	49,943	769,504	25,483	36,316	6,688	6,255	219,687	132,255	74,675	29,800	554,330
63	4,200,965	103,119	138,467	9,348	17,208	73,129	805,845	1,059,645	134,265	48,830	753,222	25,211	35,489	6,281	5,959	213,299	133,047	73,525	29,285	535,791
64	4,096,774	97,136	134,511	9,090	16,736	72,894	802,001	1,033,543	127,318	48,237	739,645	24,102	33,391	6,182	5,832	209,015	128,306	70,962	28,499	509,374
65	3,968,284	93,237	129,677	9,035	15,777	71,459	784,594	994,300	121,965	46,132	703,367	22,107	30,989	5,842	5,597	204,712	124,697	68,962	28,385	507,450
66	3,948,368	91,301	127,241	9,052	15,849	73,497	792,109	986,573	122,609	45,470	690,052	22,361	31,756	5,628	5,648	203,761	126,596	68,042	27,467	503,356
Σύνολο	209,709,365	5,657,058	6,975,266	562,814	815,948	3,279,637	38,935,388	51,822,262	6,522,688	2,977,308	37,110,029	1,181,450	1,745,880	405,223	322,800	10,584,794	6,323,375	3,590,287	1,317,145	29,580,013

Source: Data processing for the year 2019 by: Eurostat. Population on 1 January by age and sex [demo_pjan].

Table P3.2. Initial population of retirees

Data extracted on 12/11/2020 21:33:15 from [ESTAT]					
Dataset:	Pensions beneficiaries at 31st December				
Last updated:	10/11/2020 23:00				
Time frequency	Annual				
Unit of measure	Persons				
ESSPROS-means-testing	Total				
ESSPROS-pension type	Old age plus survivors pensions				
Sex	Total				

TIME	2015	2016	2017	2018	
GEO (Labels)					
Belgium	2032488	2066409	2103280	2185954	
Germany (until 1990 former territory of the FRG)	20949969	21048553	21065021 e	=AVERAGE(B14:F14)	
Estonia	314960	319811	318824	318852	
Ireland	733038	755412	778931	803464	
Greece	2559454	2494300	p 2450747	p 2430637	p
Spain	8318719	8420489	8522346	8638098	
France	17245800	17433600	17437142	17509136	
Italy	14551188	14401036	14358541	14227167	
Cyprus	148960	151815	153237	155191	
Latvia	499392	492586	488385	484625	
Lithuania	775365	772688	774890	770743	
Luxembourg	155654	161100	166465	172482	
Malta	78875	81185	83831	84900	
Netherlands	3409036	3431400	3453500	=AVERAGE(B26:F26)	
Austria	2173512	2197033	2218005	2236226	
Portugal	2688467	2690865	2676223	2665939	
Slovenia	612032	617026	619876	626093	
Slovakia	1153409	1171499	1185664	=AVERAGE(B30:F30)	
Finland	1333771	1359090	1392868	1411842	

Special value		=SUM(H13:H31)
:	not available	80344033
Available flags:		
e	estimated	
p	provisional	

Source: Data processing from:
https://ec.europa.eu/eurostat/databrowser/view/spr_pns_ben/default/table?lang=en Data
extracted on 12/11/2020 21:33:15 from [EUROSTAT]

Table P3.3. EU-19: Initial population of new entrants

Ηλικία	EU-19	Αυστρία	Βέλγιο	Κύπρος	Εσθονία	Φιλανδία	Γαλλία	Γερμανία	Ελλάδα	Ιρλανδία	Ιταλία	Λετονία	Λιθουανία	Λουξεμβούργο	Μάλτα	Ολλανδία	Πορτογαλία	Σλοβακία	Σλοβενία	Ισπανία
0	3,120,990	84,177	118,269	9,289	14,395	47,663	712,637	783,978	87,557	61,184	438,287	19,127	28,166	6,328	4,520	168,443	86,965	58,445	19,571	371,989
1	3,216,734	88,581	120,596	9,284	13,891	50,934	726,875	796,374	91,148	62,649	459,922	20,827	28,894	6,433	4,685	170,816	86,531	59,484	20,317	398,493
2	3,302,121	89,401	123,554	9,452	14,241	53,689	745,207	802,651	96,953	63,519	476,020	22,083	30,380	6,489	4,892	174,256	87,601	59,358	20,461	421,914
3	3,318,644	86,764	125,153	9,235	14,277	56,444	765,734	776,763	95,613	63,335	489,037	22,168	30,724	6,590	4,817	173,722	86,251	57,499	20,687	433,831
4	3,363,468	86,210	128,604	9,370	13,931	58,828	791,254	766,631	95,405	64,740	504,420	21,963	29,537	6,752	4,593	178,825	83,113	56,746	21,270	441,276
5	3,347,215	84,192	129,381	9,382	13,962	59,868	799,279	739,729	96,709	67,297	512,997	20,723	28,822	6,730	4,544	175,210	83,489	56,360	21,239	437,302
6	3,434,168	84,648	132,331	10,127	14,235	61,378	817,316	736,749	101,339	69,089	535,259	19,901	29,119	6,663	4,696	180,043	90,364	56,950	22,174	461,787
7	3,472,150	83,868	133,654	9,696	14,743	61,893	823,408	720,613	105,902	71,464	545,227	18,561	28,815	6,507	4,666	183,815	96,321	61,526	22,258	479,213
8	3,548,459	84,864	136,107	10,053	15,749	63,132	845,097	738,238	109,868	72,660	560,106	18,713	28,818	6,821	4,386	188,854	100,087	58,156	22,811	483,939
9	3,549,875	82,714	135,112	9,846	15,487	62,739	837,451	726,909	114,215	72,893	569,207	20,323	29,114	6,634	4,508	189,520	96,493	59,830	22,235	494,645
10	3,608,646	84,228	135,665	9,516	15,673	62,026	843,147	746,345	112,232	72,232	575,704	21,932	27,510	6,634	4,486	190,090	100,551	57,002	22,541	521,132
11	3,552,362	83,045	132,927	8,957	15,257	61,379	834,913	741,530	107,740	70,758	573,870	21,189	25,745	6,550	4,193	186,613	98,693	54,438	20,742	503,823
12	3,550,829	84,728	132,023	9,151	14,391	61,590	848,448	726,923	109,726	66,580	574,671	20,089	25,456	6,528	4,170	190,026	101,432	53,892	19,788	501,217
13	3,522,150	85,025	128,937	8,800	13,844	60,193	829,046	735,760	106,798	64,938	570,699	19,351	25,365	6,456	4,200	191,909	105,544	54,435	18,891	491,959
14	3,539,211	86,247	127,253	9,046	13,347	60,350	828,058	751,622	105,870	64,420	576,789	18,130	25,392	6,492	4,148	197,677	104,131	53,921	18,721	487,597
15	3,528,192	84,970	124,249	9,043	12,520	59,122	826,603	752,351	106,777	64,434	572,237	18,548	25,667	6,343	4,294	204,306	106,945	51,608	18,009	480,166
16	3,530,027	87,085	123,717	9,093	12,424	58,107	830,742	766,517	108,280	64,950	568,910	17,838	25,333	6,414	4,162	205,638	107,826	50,792	18,488	463,711
17	3,573,190	85,211	125,970	9,898	12,078	58,628	841,827	787,745	109,608	63,860	575,772	17,347	26,718	6,515	4,236	207,992	107,338	51,517	18,530	462,400
18	3,677,880	89,622	129,141	10,276	12,406	59,600	844,161	835,762	110,936	62,992	590,965	18,027	28,932	7,016	4,720	216,614	116,597	54,960	19,249	465,904
19	3,645,642	92,116	128,425	10,546	11,799	60,710	792,922	861,102	110,536	63,101	589,257	17,167	30,169	6,918	4,908	217,469	114,038	55,900	18,579	459,980
Σύνολο	69,401,953	1,717,696	2,571,068	190,060	278,650	1,178,273	16,184,125	15,294,292	2,083,212	1,327,095	10,859,356	394,007	558,676	131,813	89,824	3,791,838	1,960,310	1,122,819	406,561	9,262,278

Source: Data processing for the year 2019 by: Eurostat. Population on 1 January by age and sex [demo_pjan].

Table T3.4. EU-19: EU employment rate 2019

Employment rate, aged 20-64, 2019 (%)
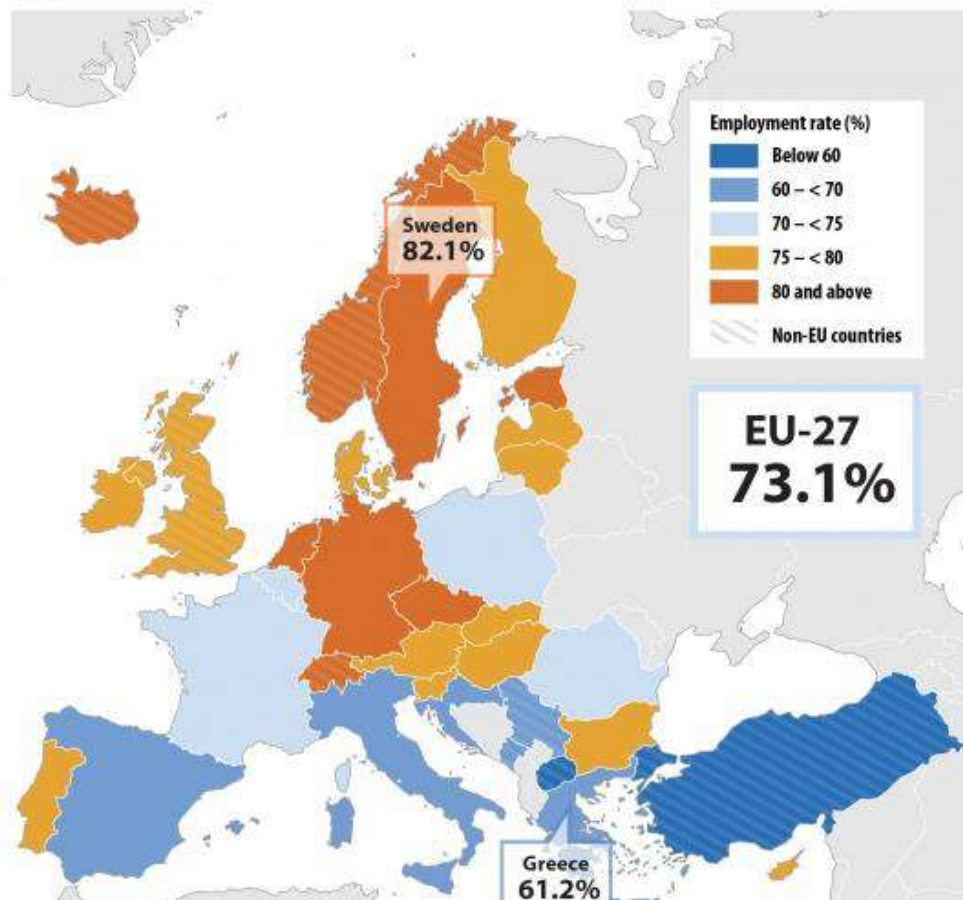
Source: https://ec.europa.eu/eurostat/statistics-explained/images/thumb/6/6e/Map1_employment2019.jpg/544px-Map1_employment2019.jpg

Table T3.5. Mortality table

A. Mortality Table: EAE2012A							
Age				**Withdr awal**	**Inabilit y**	**Surviv al px**	**Death qx**	**Marriag e wx**
0	100.000.000	166.500	0,001665	1,000000	1,000000	0,998335	0,001665	0
1	99.833.500	24.759	0,000248	1,000000	1,000000	0,999752	0,000248	0
2	99.808.741	21.359	0,000214	1,000000	1,000000	0,999786	0,000214	0
3	99.787.382	18.361	0,000184	1,000000	1,000000	0,999816	0,000184	0
4	99.769.021	15.863	0,000159	1,000000	1,000000	0,999841	0,000159	0
5	99.753.158	13.866	0,000139	1,000000	1,000000	0,999861	0,000139	0
6	99.739.292	13.066	0,000131	1,000000	1,000000	0,999869	0,000131	0
7	99.726.226	12.466	0,000125	1,000000	1,000000	0,999875	0,000125	0
8	99.713.760	12.265	0,000123	1,000000	1,000000	0,999877	0,000123	0
9	99.701.495	12.562	0,000126	1,000000	1,000000	0,999874	0,000126	0
10	99.688.933	13.558	0,000136	1,000000	1,000000	0,999864	0,000136	0
11	99.675.375	15.749	0,000158	1,000000	1,000000	0,999842	0,000158	0
12	99.659.626	19.434	0,000195	1,000000	1,000000	0,999805	0,000195	0
13	99.640.192	25.010	0,000251	1,000000	1,000000	0,999749	0,000251	0
14	99.615.182	32.674	0,000328	1,000000	1,000000	0,999672	0,000328	0
15	99.582.508	42.323	0,000425	1,000000	1,000000	0,999575	0,000425	0
16	99.540.185	53.453	0,000537	1,000000	1,000000	0,999463	0,000537	0
17	99.486.732	65.363	0,000657	1,000000	1,000000	0,999343	0,000657	0
18	99.421.369	76.554	0,000770	1,000000	1,000000	0,99923	0,00077	0,008
19	99.344.815	85.735	0,000863	1,000000	1,000000	0,999137	0,000863	0,013
20	99.259.080	92.013	0,000927	1,000000	1,000000	0,999073	0,000927	0,02
21	99.167.067	96.688	0,000975	1,000000	1,000000	0,999025	0,000975	0,03
22	99.070.379	99.764	0,001007	1,000000	1,000000	0,998993	0,001007	0,044
23	98.970.615	101.445	0,001025	1,000000	1,000000	0,998975	0,001025	0,062
24	98.869.170	101.835	0,001030	1,000000	1,000000	0,99897	0,00103	0,084
25	98.767.335	101.138	0,001024	1,000000	1,000000	0,998976	0,001024	0,11
26	98.666.197	99.850	0,001012	1,000000	1,000000	0,998988	0,001012	0,14
27	98.566.347	98.172	0,000996	1,000000	1,000000	0,999004	0,000996	0,175
28	98.468.175	96.499	0,000980	1,000000	1,000000	0,99902	0,00098	0,213
29	98.371.676	95.027	0,000966	1,000000	1,000000	0,999034	0,000966	0,254204

30	98.276.649	93.658	0,000953	1,000000	1,000000	0,999047	0,000953	0,2986
31	98.182.991	92.587	0,000943	1,000000	1,000000	0,999057	0,000943	0,342499
32	98.090.404	91.911	0,000937	1,000000	1,000000	0,999063	0,000937	0,385391
33	97.998.493	92.119	0,000940	1,000000	1,000000	0,99906	0,00094	0,426845
34	97.906.374	93.598	0,000956	1,000000	1,000000	0,999044	0,000956	0,466511
35	97.812.776	96.639	0,000988	1,000000	1,000000	0,999012	0,000988	0,504105
36	97.716.137	101.527	0,001039	1,000000	1,000000	0,998961	0,001039	0,539411
37	97.614.610	108.157	0,001108	1,000000	1,000000	0,998892	0,001108	0,572269
38	97.506.453	116.130	0,001191	1,000000	1,000000	0,998809	0,001191	0,602574
39	97.390.323	125.341	0,001287	1,000000	1,000000	0,998713	0,001287	0,630269
40	97.264.982	135.296	0,001391	1,000000	1,000000	0,998609	0,001391	0,655339
41	97.129.686	145.986	0,001503	1,000000	1,000000	0,998497	0,001503	0,677806
42	96.983.700	157.889	0,001628	1,000000	1,000000	0,998372	0,001628	0,697729
43	96.825.811	170.607	0,001762	1,000000	1,000000	0,998238	0,001762	0,715191
44	96.655.204	184.225	0,001906	1,000000	1,000000	0,998094	0,001906	0,730303
45	96.470.979	199.406	0,002067	1,000000	1,000000	0,997933	0,002067	0,743196
46	96.271.573	216.900	0,002253	1,000000	1,000000	0,997747	0,002253	0,754015
47	96.054.673	237.543	0,002473	1,000000	1,000000	0,997527	0,002473	0,762922
48	95.817.130	261.964	0,002734	1,000000	1,000000	0,997266	0,002734	0,770085
49	95.555.166	290.392	0,003039	1,000000	1,000000	0,996961	0,003039	0,775679
50	95.264.774	322.090	0,003381	1,000000	1,000000	0,996619	0,003381	0,779882
51	94.942.684	355.845	0,003748	1,000000	1,000000	0,996252	0,003748	0,782874
52	94.586.839	390.360	0,004127	1,000000	1,000000	0,995873	0,004127	0,784828
53	94.196.479	425.203	0,004514	1,000000	1,000000	0,995486	0,004514	0,785917
54	93.771.276	461.448	0,004921	1,000000	1,000000	0,995079	0,004921	0,786304
55	93.309.828	501.260	0,005372	1,000000	1,000000	0,994628	0,005372	0,786142
56	92.808.568	546.828	0,005892	1,000000	1,000000	0,994108	0,005892	0,785574
57	92.261.740	598.133	0,006483	1,000000	1,000000	0,993517	0,006483	0,78473
58	91.663.607	655.578	0,007152	1,000000	1,000000	0,992848	0,007152	0,783725
59	91.008.029	719.418	0,007905	1,000000	1,000000	0,992095	0,007905	0,782658
60	90.288.611	789.303	0,008742	1,000000	1,000000	0,991258	0,008742	0,781613
61	89.499.308	864.921	0,009664	1,000000	1,000000	0,990336	0,009664	0,780655
62	88.634.387	945.108	0,010663	1,000000	1,000000	0,989337	0,010663	0,779829
63	87.689.279	1.028.946	0,011734	1,000000	1,000000	0,988266	0,011734	0,779164
64	86.660.333	1.116.358	0,012882	1,000000	1,000000	0,987118	0,012882	0,778668
65	85.543.975	1.207.368	0,014114	1,000000	1,000000	0,985886	0,014114	0,778332
66	84.336.607	1.302.495	0,015444	1,000000	1,000000	0,984556	0,015444	0,778125

67	83.034.112	1.402.529	0,016891	1,000000	1,000000	0,983109	0,016891	0,777999
68	81.631.583	1.508.307	0,018477	1,000000	1,000000	0,981523	0,018477	0,777887
69	80.123.276	1.620.253	0,020222	1,000000	1,000000	0,979778	0,020222	0,777707
70	78.503.023	1.738.449	0,022145	1,000000	1,000000	0,977855	0,022145	0,777357
71	76.764.574	1.862.462	0,024262	1,000000	1,000000	0,975738	0,024262	0,776721
72	74.902.112	1.991.497	0,026588	1,000000	1,000000	0,973412	0,026588	0,775669
73	72.910.615	2.124.907	0,029144	1,000000	1,000000	0,970856	0,029144	0,774059
74	70.785.708	2.261.603	0,031950	1,000000	1,000000	0,96805	0,03195	0,771737
75	68.524.105	2.400.331	0,035029	1,000000	1,000000	0,964971	0,035029	0,768542
76	66.123.774	2.539.616	0,038407	1,000000	1,000000	0,961593	0,038407	0,764303
77	63.584.158	2.677.529	0,042110	1,000000	1,000000	0,95789	0,04211	0,758848
78	60.906.629	2.811.755	0,046165	1,000000	1,000000	0,953835	0,046165	0,752002
79	58.094.874	2.939.833	0,050604	1,000000	1,000000	0,949396	0,050604	0,743588
80	55.155.041	3.058.843	0,055459	1,000000	1,000000	0,944541	0,055459	0,733438
81	52.096.198	3.165.469	0,060762	1,000000	1,000000	0,939238	0,060762	0,721387
82	48.930.729	3.256.389	0,066551	1,000000	1,000000	0,933449	0,066551	0,707282
83	45.674.340	3.327.969	0,072863	1,000000	1,000000	0,927137	0,072863	0,690982
84	42.346.371	3.376.530	0,079736	1,000000	1,000000	0,920264	0,079736	0,672366
85	38.969.841	3.398.677	0,087213	1,000000	1,000000	0,912787	0,087213	0,651332
86	35.571.164	3.391.106	0,095333	1,000000	1,000000	0,904667	0,095333	0,627806
87	32.180.058	3.351.231	0,104140	1,000000	1,000000	0,89586	0,10414	0,601743
88	28.828.827	3.277.203	0,113678	1,000000	1,000000	0,886322	0,113678	0,573131
89	25.551.624	3.168.120	0,123989	1,000000	1,000000	0,876011	0,123989	0,542
90	22.383.504	3.024.370	0,135116	1,000000	1,000000	0,864884	0,135116	0,508421
91	19.359.134	2.847.729	0,147100	1,000000	1,000000	0,8529	0,1471	0,472518
92	16.511.405	2.641.528	0,159982	1,000000	1,000000	0,840018	0,159982	0,434466
93	13.869.877	2.410.557	0,173798	1,000000	1,000000	0,826202	0,173798	0,394502
94	11.459.320	2.161.021	0,188582	1,000000	1,000000	0,811418	0,188582	0,35293
95	9.298.299	1.900.228	0,204363	1,000000	1,000000	0,795637	0,204363	0,310124
96	7.398.071	1.636.165	0,221161	1,000000	1,000000	0,778839	0,221161	0,266537
97	5.761.906	1.377.061	0,238994	1,000000	1,000000	0,761006	0,238994	0,222705
98	4.384.845	1.130.702	0,257866	1,000000	1,000000	0,742134	0,257866	0,179258
99	3.254.143	903.913	0,277773	1,000000	1,000000	0,722227	0,277773	0,136921
100	2.350.230	702.014	0,298700	1,000000	1,000000	0,7013	0,2987	0,105
101	1.648.216	528.448	0,320618	1,000000	1,000000	0,679382	0,320618	0,09
102	1.119.768	384.619	0,343481	1,000000	1,000000	0,656519	0,343481	0,08
103	735.149	269.968	0,367229	1,000000	1,000000	0,632771	0,367229	0,07

104	465.181	182.252	0,391787	1,000000	1,000000	0,608213	0,391787	0,06
105	282.929	117.999	0,417061	1,000000	1,000000	0,582939	0,417061	0,05
106	164.930	73.054	0,442941	1,000000	1,000000	0,557059	0,442941	0,04
107	91.876	43.118	0,469303	1,000000	1,000000	0,530697	0,469303	0,03
108	48.758	24.184	0,496008	1,000000	1,000000	0,503992	0,496008	0,02
109	24.574	12.850	0,522907	1,000000	1,000000	0,477093	0,522907	0,01
110	11.724	6.446	0,549845	1,000000	1,000000	0,450155	0,549845	0
111	5.278	3.044	0,576668	1,000000	1,000000	0,423332	0,576668	0
112	2.234	1.347	0,603178	1,000000	1,000000	0,396822	0,603178	0
113	887	558	0,629232	1,000000	1,000000	0,370768	0,629232	0
114	329	215	0,654482	1,000000	1,000000	0,345518	0,654482	0
115	114	77	0,679543	1,000000	1,000000	0,320457	0,679543	0
116	37	26	0,702740	1,000000	1,000000	0,29726	0,70274	0
117	11	8	0,728111	1,000000	1,000000	0,271889	0,728111	0
118	3	2	0,745763	1,000000	1,000000	0,254237	0,745763	0
119	1	1	0,800000	1,000000	1,000000	0,2	0,8	0
120	0	0	1,000000	1,000000	1,000000	0	1	0

ANNEX ch.4

Table 4.3. Fund Summary 2021-2121. Investment return scenario: 2.0%.

Year (t)	FUND CASH BASED ON THEIR CONTRIBUTIONS & INVESTMENTS (€)	INSURANCE BENEFITS (€)	FUND RESULT (€)	DISCOUNT FACTOR	INSURANCE CONTRIBUTIONS (€)
2021	159.737.239.202,34	-	159.737.239.202,34	1,00000	159.737.239.202,34
2022	327.916.205.960,98	-	327.916.205.960,98	0,98039	168.178.966.758,64
2023	505.243.910.061,41	-	505.243.910.061,41	0,96117	177.327.704.100,42
2024	691.579.751.815,82	-	691.579.751.815,82	0,94232	186.335.841.754,41
2025	887.352.328.409,46	-	887.352.328.409,46	0,92385	195.772.576.593,64
2026	1.090.766.842.655,12	-	1.090.766.842.655,12	0,90573	203.414.514.245,66
2027	1.302.757.541.691,87	-	1.302.757.541.691,87	0,88797	211.990.699.036,75
2028	1.522.873.044.777,43	-	1.522.873.044.777,43	0,87056	220.115.503.085,56
2029	1.755.468.279.705,54	-	1.755.468.279.705,54	0,85349	232.595.234.928,11
2030	1.993.794.179.428,56	-	1.993.794.179.428,56	0,83676	238.325.899.723,02
2031	2.238.163.551.671,56	-	2.238.163.551.671,56	0,82035	244.369.372.243,00
2032	2.503.869.626.347,91	-	2.503.869.626.347,91	0,80426	265.706.074.676,36
2033	2.775.017.282.216,12	-	2.775.017.282.216,12	0,78849	271.147.655.868,21
2034	3.052.230.287.145,99	-	3.052.230.287.145,99	0,77303	277.213.004.929,87
2035	3.335.776.031.056,05	-	3.335.776.031.056,05	0,75788	283.545.743.910,07
2036	3.636.135.127.109,68	-	3.636.135.127.109,68	0,74301	300.359.096.053,63
2037	3.952.359.106.860,10	-	3.952.359.106.860,10	0,72845	316.223.979.750,42
2038	4.270.596.848.038,74	19.609.969.370,81	4.250.986.878.667,93	0,71416	318.237.741.178,64
2039	4.567.297.862.127,80	39.376.271.688,72	4.527.921.590.439,08	0,70016	316.679.742.121,83
2040	4.852.308.618.862,08	58.998.975.426,35	4.793.309.643.435,74	0,68643	325.162.159.465,69
2041	5.118.316.051.848,46	78.808.699.237,61	5.039.507.352.610,86	0,67297	326.126.432.373,39
2042	5.371.877.111.255,72	98.411.161.442,28	5.273.465.949.813,44	0,65978	333.924.787.871,08
2043	5.613.630.297.643,88	117.697.807.257,87	5.495.932.490.386,01	0,64684	342.182.154.189,97
2044	5.832.816.741.810,25	137.094.709.241,16	5.695.722.032.569,09	0,63416	339.147.371.061,84
2045	6.045.145.133.447,85	156.292.880.504,20	5.888.852.252.943,66	0,62172	352.285.124.122,32
2046	6.222.478.596.294,35	175.519.293.230,49	6.046.959.303.063,86	0,60953	331.605.936.350,03
2047	6.404.806.152.521,40	194.782.186.880,88	6.210.023.965.640,52	0,59758	356.783.603.952,28
2048	6.553.821.306.361,53	213.981.343.080,64	6.339.839.963.280,90	0,58586	342.589.850.683,27
2049	6.702.061.966.172,30	233.084.428.956,95	6.468.977.537.215,35	0,57437	361.905.639.003,83
2050	6.824.567.310.728,29	252.434.697.344,90	6.572.132.613.383,39	0,56311	355.337.101.741,37
2051	6.905.014.282.199,96	271.442.310.016,86	6.633.571.972.183,10	0,55207	332.055.384.427,92
2052	6.992.803.780.994,55	290.169.300.799,54	6.702.634.480.195,01	0,54125	359.741.241.156,08
2053	7.068.737.142.540,41	308.177.253.536,91	6.760.559.889.003,50	0,53063	367.235.591.059,70
2054	7.134.263.684.182,77	325.797.682.397,50	6.808.466.001.785,27	0,52023	375.406.876.664,35
2055	7.184.869.975.594,40	342.953.860.084,85	6.841.916.115.509,55	0,51003	378.419.613.629,62
2056	7.203.712.891.822,40	359.653.935.236,48	6.844.058.956.585,92	0,50003	363.271.744.298,86
2057	7.196.130.251.898,62	375.746.571.481,75	6.820.383.680.416,87	0,49022	353.223.607.956,92
2058	7.197.529.605.770,84	391.363.933.763,61	6.806.165.672.007,23	0,48061	379.909.335.059,11
2059	7.166.833.059.253,01	405.984.430.073,49	6.760.848.629.179,53	0,47119	362.702.878.546,53
2060	7.121.191.053.322,45	419.787.194.986,74	6.701.403.858.335,71	0,46195	362.523.183.605,86
2061	7.078.751.149.770,82	432.115.690.391,30	6.646.635.459.379,52	0,45289	380.685.644.650,54

	Investment return scenario: 2.0%.				
Year (t)	FUND CASH BASED ON THEIR CONTRIBUTIONS & INVESTMENTS (€)	INSURANCE BENEFITS (€)	FUND RESULT (€)	DISCOUNT FACTOR	INSURANCE CONTRIBUTIONS (€)
2062	6.996.298.622.291,24	443.147.459.216,97	6.553.151.163.074,27	0,44401	351.232.677.622,83
2063	6.931.623.939.828,88	452.556.636.113,12	6.479.067.303.715,76	0,43530	381.994.477.445,42
2064	6.839.318.043.666,23	460.403.222.002,82	6.378.914.821.663,41	0,42677	362.495.048.399,02
2065	6.755.486.995.939,81	466.824.990.669,74	6.288.662.005.270,07	0,41840	380.054.751.390,10
2066	6.631.963.668.863,26	471.980.630.132,72	6.159.983.038.730,54	0,41020	344.480.845.898,40
2067	6.522.862.476.093,18	475.772.510.961,00	6.047.089.965.132,19	0,40215	365.714.758.947,44
2068	6.397.481.942.908,00	478.177.555.877,05	5.919.304.387.030,95	0,39427	352.358.799.442,51
2069	6.268.378.270.326,33	489.327.854.215,91	5.779.050.416.110,42	0,38654	347.104.790.922,94
2070	6.151.338.037.781,30	498.951.773.568,85	5.652.386.264.212,45	0,37896	368.716.389.395,72
2071	6.014.410.759.474,15	506.289.984.165,93	5.508.120.775.308,23	0,37153	357.716.505.833,20
2072	5.869.481.102.751,15	511.875.337.275,82	5.357.605.765.475,33	0,36424	362.157.549.374,51
2073	5.720.660.415.203,92	516.120.418.958,62	5.204.539.996.245,30	0,35710	364.075.051.863,99
2074	5.570.609.606.917,04	519.252.881.034,00	5.051.356.725.883,04	0,35010	367.440.833.454,40
2075	5.413.649.047.646,69	520.870.922.380,33	4.892.778.125.266,36	0,34323	363.324.459.865,58
2076	5.265.971.719.240,27	521.827.516.563,78	4.744.144.202.676,49	0,33650	375.413.238.510,95
2077	5.112.908.993.273,68	522.024.839.219,06	4.590.884.154.054,62	0,32991	370.541.565.875,12
2078	4.961.754.330.683,53	521.859.692.933,89	4.439.894.637.749,64	0,32344	368.290.986.612,78
2079	4.849.970.119.908,49	520.632.358.850,62	4.329.337.761.057,87	0,31710	380.367.463.529,47
2080	4.693.102.949.726,08	518.740.680.591,07	4.174.362.269.135,01	0,31088	365.003.598.196,14
2081	4.555.640.207.353,07	515.712.087.078,52	4.039.928.120.274,55	0,30478	384.804.529.091,22
2082	4.414.043.965.966,42	511.820.835.931,61	3.902.223.130.034,81	0,29881	376.857.441.517,88
2083	4.272.164.266.979,27	506.769.114.417,51	3.765.395.152.561,77	0,29295	372.258.588.727,22
2084	4.136.771.409.957,42	501.250.077.828,37	3.635.521.332.129,06	0,28720	373.999.457.616,64
2085	4.011.652.671.416,04	494.904.618.243,22	3.516.748.053.172,82	0,28157	379.529.900.565,00
2086	3.896.273.883.686,56	523.261.369.581,16	3.373.012.514.105,41	0,27605	383.519.966.906,32
2087	3.752.320.174.635,78	516.284.176.809,82	3.236.035.997.825,96	0,27064	384.223.647.359,03
2088	3.616.027.261.484,21	508.143.587.054,39	3.107.883.674.429,82	0,26533	385.248.007.239,95
2089	3.487.257.611.891,90	499.782.137.602,51	2.987.475.474.289,39	0,26013	384.743.231.732,08
2090	3.364.761.955.055,29	491.300.749.955,83	2.873.461.205.099,46	0,25503	382.516.634.799,91
2091	3.251.119.881.926,03	482.799.596.217,57	2.768.320.285.708,46	0,25003	383.157.051.082,74
2092	3.145.088.991.363,86	474.396.214.898,75	2.670.692.776.465,11	0,24513	316.804.907.455,88
2093	3.046.832.101.897,88	466.212.073.897,82	2.580.620.028.000,06	0,24032	318.983.922.137,27
2094	2.957.117.565.795,69	458.372.891.482,36	2.498.744.674.313,33	0,23561	320.991.814.467,27
2095	2.875.139.082.083,01	450.994.386.958,22	2.424.144.695.124,79	0,23099	322.835.107.689,54
2096	2.799.183.554.078,71	457.717.156.134,19	2.341.466.397.944,53	0,22646	324.522.203.968,06
2097	2.718.753.186.675,29	451.642.907.782,57	2.267.110.278.892,73	0,22202	326.063.270.632,44
2098	2.640.788.626.155,39	446.307.104.459,17	2.194.481.521.696,22	0,21766	327.470.039.744,87
2099	2.568.344.240.207,66	441.753.552.824,92	2.126.590.687.382,74	0,21340	328.755.525.692,56
2100	2.498.679.895.914,34	438.010.132.963,24	2.060.669.762.951,10	0,20921	329.933.663.795,75
2101	2.436.285.620.474,70	448.794.777.933,82	1.987.490.842.540,89	0,20511	331.018.887.815,94
2102	2.360.973.034.010,74	446.650.866.776,56	1.914.322.167.234,18	0,20109	332.025.669.804,06
2103	2.292.532.646.762,03	445.223.872.984,38	1.847.308.773.777,65	0,19715	332.968.047.517,20
2104	2.217.291.987.113,15	444.449.286.213,24	1.772.842.700.899,91	0,19328	333.859.178.275,67
2105	2.145.564.308.714,59	444.331.387.154,38	1.701.232.921.560,21	0,18949	334.710.948.256,66
2106	2.070.210.864.871,62	444.853.682.111,39	1.625.357.182.760,23	0,18577	335.533.667.445,07
2107	1.998.429.069.352,27	445.739.044.806,14	1.552.690.024.546,14	0,18213	336.335.872.223,85
2108	1.922.349.620.343,22	446.932.400.532,23	1.475.417.219.810,99	0,17856	337.903.643.379,06

Year (t)	FUND CASH BASED ON THEIR CONTRIBUTIONS & INVESTMENTS (€)	INSURANCE BENEFITS (€)	FUND RESULT (€)	DISCOUNT FACTOR	INSURANCE CONTRIBUTIONS (€)
Investment return scenario: 2.0%.					
2109	1.846.980.200.196,79	448.386.852.732,58	1.398.593.347.464,21	0,17506	338.677.236.943,14
2110	1.770.132.812.785,30	450.063.399.413,00	1.320.069.413.372,30	0,17163	339.446.705.052,93
2111	1.690.182.545.283,43	451.930.029.139,71	1.238.252.516.143,72	0,16826	340.212.488.150,73
2112	1.602.113.946.313,34	425.589.269.851,92	1.176.524.676.461,42	0,16496	340.974.049.736,44
2113	1.546.087.480.773,87	441.878.717.026,11	1.104.208.763.747,77	0,16173	341.730.128.970,48
2114	1.467.969.976.962,11	444.101.961.447,72	1.023.868.015.514,38	0,15856	342.478.966.554,72
2115	1.389.020.415.769,38	446.428.593.174,87	942.591.822.594,51	0,15545	343.218.495.510,85
2116	1.305.686.004.975,28	448.844.138.180,27	856.841.866.795,01	0,15240	343.946.495.946,02
2117	1.219.685.453.017,32	451.335.772.323,43	768.349.680.693,89	0,14941	344.660.717.101,31
2118	1.130.774.906.351,67	453.892.446.478,26	676.882.459.873,41	0,14648	345.358.972.078,34
2119	1.039.674.989.583,97	456.504.331.777,16	583.170.657.806,81	0,14361	346.039.209.479,84
2120	943.060.629.402,45	459.163.412.857,83	483.897.216.544,62	0,14079	346.699.566.268,88
2121	493.806.653.792,30	446.963.690.153,21	46.842.963.639,09	0,13803	347.338.404.628,46

Table 4.4. Fund Statement 2021-2121. Investment return scenario: 3.0%.

	Investment return scenario: 3%.				
Year (t)	FUND CASH BASED ON THEIR CONTRIBUTIONS & INVESTMENTS (€)	INSURANCE BENEFITS (€)	FUND RESULT (€)	DISCOUNT FACTOR	INSURANCE CONTRIBUTIONS (€)
2021	134.790.869.352,10	-	134.790.869.352,10	1,00000	134.790.869.352,10
2022	277.995.846.773,82	-	277.995.846.773,82	0,98039	143.204.977.421,71
2023	430.540.422.918,57	-	430.540.422.918,57	0,96117	152.544.576.144,75
2024	592.378.191.610,39	-	592.378.191.610,39	0,94232	161.837.768.691,82
2025	764.152.536.149,16	-	764.152.536.149,16	0,92385	171.774.344.538,78
2026	943.622.610.352,23	-	943.622.610.352,23	0,90573	179.470.074.203,06
2027	1.132.023.131.296,57	-	1.132.023.131.296,57	0,88797	188.400.520.944,34
2028	1.328.831.557.315,40	-	1.328.831.557.315,40	0,87056	196.808.426.018,84
2029	1.539.772.259.939,14	-	1.539.772.259.939,14	0,85349	210.940.702.623,74
2030	1.756.118.024.890,39	-	1.756.118.024.890,39	0,83676	216.345.764.951,25
2031	1.978.228.231.258,63	-	1.978.228.231.258,63	0,82035	222.110.206.368,24
2032	2.226.425.551.079,68	-	2.226.425.551.079,68	0,80426	248.197.319.821,06
2033	2.479.911.117.491,85	-	2.479.911.117.491,85	0,78849	253.485.566.412,17
2034	2.739.549.631.195,30	-	2.739.549.631.195,30	0,77303	259.638.513.703,45
2035	3.005.734.194.831,36	-	3.005.734.194.831,36	0,75788	266.184.563.636,06
2036	3.292.718.501.241,50	-	3.292.718.501.241,50	0,74301	286.984.306.410,13
2037	3.599.484.826.977,30	-	3.599.484.826.977,30	0,72845	306.766.325.735,80
2038	3.910.196.444.510,48	19.609.969.370,81	3.890.586.475.139,66	0,71416	310.711.617.533,18
2039	4.199.786.197.087,72	39.376.271.688,72	4.160.409.925.399,00	0,70016	309.752.859.941,00
2040	4.481.771.824.049,90	58.998.975.426,35	4.422.772.848.623,55	0,68643	322.524.595.214,94
2041	4.746.179.717.502,22	78.808.699.237,61	4.667.371.018.264,61	0,67297	325.086.904.819,66
2042	5.002.068.218.746,55	98.411.161.442,28	4.903.657.057.304,26	0,65978	337.029.744.321,26
2043	5.250.273.112.640,62	117.697.807.257,87	5.132.575.305.382,75	0,64684	349.642.764.875,63
2044	5.475.710.062.823,57	137.094.709.241,16	5.338.615.353.582,41	0,63416	346.529.436.897,24
2045	5.700.308.277.905,57	156.292.880.504,20	5.544.015.397.401,38	0,62172	365.985.959.188,49
2046	5.884.490.172.727,55	175.519.293.230,49	5.708.970.879.497,06	0,60953	340.576.301.078,76
2047	6.084.478.099.343,32	194.782.186.880,88	5.889.695.912.462,44	0,59758	377.057.484.792,54
2048	6.246.321.537.968,85	213.981.343.080,64	6.032.340.194.888,21	0,58586	357.972.062.669,58
2049	6.416.023.478.625,25	233.084.428.956,95	6.182.939.049.668,31	0,57437	386.378.408.395,83
2050	6.558.221.012.678,09	252.434.697.344,90	6.305.786.315.333,19	0,56311	378.083.971.905,43
2051	6.649.268.075.183,57	271.442.310.016,86	6.377.825.765.166,71	0,55207	345.433.910.550,32
2052	6.759.742.229.680,77	290.169.300.799,54	6.469.572.928.881,23	0,54125	385.881.825.650,42
2053	6.862.192.147.211,74	308.177.253.536,91	6.554.014.893.674,83	0,53063	397.511.228.598,76
2054	6.958.524.995.930,63	325.797.682.397,50	6.632.727.313.533,13	0,52023	410.317.095.724,02
2055	7.042.134.658.391,01	342.953.860.084,85	6.699.180.798.306,16	0,51003	415.775.783.576,43
2056	7.088.119.233.407,33	359.653.935.236,48	6.728.465.298.170,85	0,50003	394.585.704.168,76
2057	7.103.699.132.915,35	375.746.571.481,75	6.727.952.561.433,60	0,49022	380.477.663.731,69
2058	7.140.747.536.306,11	391.363.933.763,61	6.749.383.602.542,50	0,48061	420.502.182.221,18
2059	7.138.593.606.571,68	405.984.430.073,49	6.732.609.176.498,20	0,47119	395.902.545.458,32
2060	7.121.899.892.907,86	419.787.194.986,74	6.702.112.697.921,12	0,46195	396.297.849.721,65
2061	7.117.378.300.274,76	432.115.690.391,30	6.685.262.609.883,46	0,45289	424.147.925.767,83
2062	7.059.576.486.491,61	443.147.459.216,97	6.616.429.027.274,64	0,44401	380.723.500.594,95
2063	7.034.505.470.202,52	452.556.636.113,12	6.581.948.834.089,41	0,43530	427.579.131.083,47
2064	6.972.989.180.667,88	460.403.222.002,82	6.512.585.958.665,06	0,42677	398.801.564.277,36
2065	6.928.904.909.964,45	466.824.990.669,74	6.462.079.919.294,71	0,41840	426.045.868.244,17
2066	6.827.833.770.192,19	471.980.630.132,72	6.355.853.140.059,47	0,41020	372.060.626.995,25
2067	6.751.860.294.920,43	475.772.510.961,00	6.276.087.783.959,44	0,40215	404.813.888.898,29

		Investment return scenario: 3%.			
Year (t)	FUND CASH BASED ON THEIR CONTRIBUTIONS & INVESTMENTS (€)	INSURANCE BENEFITS (€)	FUND RESULT (€)	DISCOUNT FACTOR	INSURANCE CONTRIBUTIONS (€)
2068	6.653.033.554.206,99	478.177.555.877,05	6.174.855.998.329,94	0,39427	384.490.514.396,69
2069	6.547.214.485.070,11	489.327.854.215,91	6.057.886.630.854,21	0,38654	376.417.248.182,00
2070	6.464.130.359.543,34	498.951.773.568,85	5.965.178.585.974,50	0,37896	410.253.634.191,61
2071	6.353.067.512.494,64	506.289.984.165,93	5.846.777.528.328,72	0,37153	390.710.766.180,28
2072	6.234.636.512.827,76	511.875.337.275,82	5.722.761.175.551,94	0,36424	395.215.261.782,67
2073	6.110.942.375.239,06	516.120.418.958,62	5.594.821.956.280,45	0,35710	395.806.131.126,83
2074	5.985.467.048.669,88	519.252.881.034,00	5.466.214.167.635,88	0,35010	398.722.330.791,42
2075	5.848.365.932.202,69	520.870.922.380,33	5.327.495.009.822,36	0,34323	389.638.229.229,29
2076	5.724.951.286.452,67	521.827.516.563,78	5.203.123.769.888,89	0,33650	406.633.264.658,65
2077	5.591.055.091.871,67	522.024.839.219,06	5.069.030.252.652,61	0,32991	396.344.371.222,76
2078	5.454.676.986.265,41	521.859.692.933,89	4.932.817.293.331,52	0,32344	390.146.897.480,53
2079	5.406.945.806.033,42	520.632.358.850,62	4.886.313.447.182,80	0,31710	407.437.606.130,07
2080	5.259.803.203.530,17	518.740.680.591,07	4.741.062.522.939,10	0,31088	380.717.608.784,48
2081	5.141.886.353.981,95	515.712.087.078,52	4.626.174.266.903,43	0,30478	411.300.354.552,10
2082	5.012.727.494.832,36	511.820.835.931,61	4.500.906.658.900,75	0,29881	395.659.348.750,37
2083	4.878.081.074.792,29	506.769.114.417,51	4.371.311.960.374,79	0,29295	385.442.487.239,67
2084	4.748.749.858.741,50	501.250.077.828,37	4.247.499.780.913,13	0,28720	385.954.413.240,90
2085	4.631.119.850.499,16	494.904.618.243,22	4.136.215.232.255,95	0,28157	393.081.901.238,83
2086	4.523.854.621.151,49	523.261.369.581,16	4.000.593.251.570,33	0,27605	397.770.349.706,02
2087	4.386.228.824.540,33	516.284.176.809,82	3.869.944.647.730,51	0,27064	396.919.853.426,77
2088	4.255.263.262.584,85	508.143.587.054,39	3.747.119.675.530,46	0,26533	396.880.900.684,21
2089	4.129.877.902.115,57	499.782.137.602,51	3.630.095.764.513,06	0,26013	394.254.337.140,10
2090	4.007.662.016.919,57	491.300.749.955,83	3.516.361.266.963,73	0,25503	388.618.820.796,46
2091	3.893.232.777.085,56	482.799.596.217,57	3.410.433.180.867,99	0,25003	388.093.995.175,94
2092	3.784.366.833.331,67	474.396.214.898,75	3.309.970.618.432,93	0,24513	267.329.078.079,90
2093	3.681.483.448.870,57	466.212.073.897,82	3.215.271.374.972,75	0,24032	269.167.793.239,26
2094	3.586.248.954.759,69	458.372.891.482,36	3.127.876.063.277,33	0,23561	270.862.110.444,68
2095	3.497.522.803.433,05	450.994.386.958,22	3.046.528.416.474,83	0,23099	272.417.534.196,46
2096	3.412.529.755.597,93	457.717.156.134,19	2.954.812.599.463,74	0,22646	273.841.154.481,87
2097	3.324.091.964.817,41	451.642.907.782,57	2.872.449.057.034,84	0,22202	275.141.550.785,56
2098	3.233.993.916.158,33	446.307.104.459,17	2.787.686.811.699,16	0,21766	276.328.622.958,52
2099	3.148.647.913.403,58	441.753.552.824,92	2.706.894.360.578,65	0,21340	277.413.352.914,38
2100	3.063.561.259.638,89	438.010.132.963,24	2.625.551.126.675,64	0,20921	278.407.499.676,51
2101	2.988.027.096.081,69	448.794.777.933,82	2.539.232.318.147,87	0,20511	279.323.242.867,36
2102	2.896.886.241.340,46	446.650.866.776,56	2.450.235.374.563,91	0,20109	280.172.794.419,04
2103	2.816.189.877.881,82	445.223.872.984,38	2.370.966.004.897,44	0,19715	280.967.999.794,11
2104	2.720.421.403.603,17	444.449.286.213,24	2.275.972.117.389,94	0,19328	281.719.961.517,25
2105	2.629.849.892.519,74	444.331.387.154,38	2.185.518.505.365,36	0,18949	282.438.709.486,10
2106	2.530.531.513.682,19	444.853.682.111,39	2.085.677.831.570,80	0,18577	283.132.943.561,96
2107	2.437.666.849.786,10	445.739.044.806,14	1.991.927.804.979,97	0,18213	283.809.866.989,90
2108	2.336.502.326.325,49	446.932.400.532,23	1.889.569.925.793,27	0,17856	285.132.797.309,79
2109	2.236.876.954.291,86	448.386.852.732,58	1.788.490.101.559,28	0,17506	285.785.577.773,18
2110	2.134.843.357.532,91	450.063.399.413,00	1.684.779.958.119,90	0,17163	286.434.877.059,78
2111	2.027.478.699.336,22	451.930.029.139,71	1.575.548.670.196,52	0,16826	287.081.066.827,44
2112	1.905.352.727.398,42	425.589.269.851,92	1.479.763.457.546,50	0,16496	287.723.694.361,99
2113	1.819.082.560.163,48	441.878.717.026,11	1.377.203.843.137,37	0,16173	288.361.695.730,76
2114	1.704.506.079.327,14	444.101.961.447,72	1.260.404.117.879,41	0,15856	288.993.586.387,48
2115	1.589.077.299.168,62	446.428.593.174,87	1.142.648.705.993,75	0,15545	289.617.622.156,51
2116	1.466.321.554.473,75	448.844.138.180,27	1.017.477.416.293,49	0,15240	290.231.929.828,51
2117	1.339.407.377.930,76	451.335.772.323,43	888.071.605.607,33	0,14941	290.834.610.148,46
2118	1.207.890.631.385,93	453.892.446.478,26	753.998.184.907,68	0,14648	291.423.817.748,73

Year (t)	FUND CASH BASED ON THEIR CONTRIBUTIONS & INVESTMENTS (€)	INSURANCE BENEFITS (€)	FUND RESULT (€)	DISCOUNT FACTOR	INSURANCE CONTRIBUTIONS (€)
Investment return scenario: 3%.					
2119	1.072.914.473.859,42	456.504.331.777,16	616.410.142.082,26	0,14361	291.997.821.601,38
2120	928.947.915.789,95	459.163.412.857,83	469.784.502.932,12	0,14079	292.555.049.622,35
2121	484.215.150.265,60	446.963.690.153,21	37.251.460.112,39	0,13803	293.094.119.774,64

Table 4.5. Fund Statement 2021-2121. Investment return scenario: 4.0%.

Year (t)	FUND CASH BASED ON THEIR CONTRIBUTIONS & INVESTMENTS (€)	INSURANCE BENEFITS (€)	FUND RESULT (€)	DISCOUNT FACTOR	INSURANCE CONTRIBUTIONS (€)
2021	111.252.762.315,99	-	111.252.762.315,99	1,00000	111.252.762.315,99
2022	230.865.659.241,48	-	230.865.659.241,48	0,98039	119.612.896.925,50
2023	358.365.143.924,04	-	358.365.143.924,04	0,96117	127.499.484.682,55
2024	494.752.074.018,32	-	494.752.074.018,32	0,94232	136.386.930.094,29
2025	640.645.487.862,00	-	640.645.487.862,00	0,92385	145.893.413.843,68
2026	796.424.791.245,73	-	796.424.791.245,73	0,90573	155.779.303.383,72
2027	960.299.340.504,80	-	960.299.340.504,80	0,88797	163.874.549.259,07
2028	1.136.055.108.542,36	-	1.136.055.108.542,36	0,87056	175.755.768.037,57
2029	1.322.101.392.137,47	-	1.322.101.392.137,47	0,85349	186.046.283.595,11
2030	1.520.280.266.912,90	-	1.520.280.266.912,90	0,83676	198.178.874.775,43
2031	1.729.788.331.684,58	-	1.729.788.331.684,58	0,82035	209.508.064.771,68
2032	1.951.598.498.147,69	-	1.951.598.498.147,69	0,80426	221.810.166.463,12
2033	2.184.692.936.996,19	-	2.184.692.936.996,19	0,78849	233.094.438.848,50
2034	2.432.141.523.850,56	-	2.432.141.523.850,56	0,77303	247.448.586.854,37
2035	2.686.588.208.103,68	-	2.686.588.208.103,68	0,75788	254.446.684.253,12
2036	2.962.629.806.921,07	-	2.962.629.806.921,07	0,74301	276.041.598.817,38
2037	3.240.241.331.185,21	-	3.240.241.331.185,21	0,72845	277.611.524.264,14
2038	3.526.962.881.018,43	19.609.969.370,81	3.507.352.911.647,62	0,71416	286.721.549.833,22
2039	3.812.460.600.480,85	39.376.271.688,72	3.773.084.328.792,13	0,70016	305.893.129.073,83
2040	4.097.800.137.263,09	58.998.975.426,35	4.038.801.161.836,75	0,68643	326.394.639.604,19
2041	4.365.200.838.440,88	78.808.699.237,61	4.286.392.139.203,27	0,67297	328.786.879.473,47
2042	4.613.884.224.684,82	98.411.161.442,28	4.515.473.063.242,53	0,65978	330.530.544.641,43
2043	4.875.127.658.224,62	117.697.807.257,87	4.757.429.850.966,75	0,64684	363.970.855.597,20
2044	5.109.605.078.769,65	137.094.709.241,16	4.972.510.369.528,50	0,63416	356.904.127.040,70
2045	5.328.286.277.556,05	156.292.880.504,20	5.171.993.397.051,86	0,62172	361.158.400.875,70
2046	5.530.638.804.733,38	175.519.293.230,49	5.355.119.511.502,89	0,60953	361.320.171.054,20
2047	5.718.556.941.570,20	194.782.186.880,88	5.523.774.754.689,32	0,59758	366.775.753.563,30
2048	5.890.633.909.863,07	213.981.343.080,64	5.676.652.566.782,43	0,58586	370.822.996.997,58
2049	6.063.864.263.357,73	233.084.428.956,95	5.830.779.834.400,78	0,57437	392.444.986.002,19
2050	6.243.187.178.291,75	252.434.697.344,90	5.990.752.480.946,85	0,56311	419.167.452.648,21
2051	6.412.849.677.873,96	271.442.310.016,86	6.141.407.367.857,10	0,55207	429.811.421.747,62
2052	6.543.618.930.516,94	290.169.300.799,54	6.253.449.629.717,40	0,54125	409.586.017.073,12
2053	6.638.253.052.954,41	308.177.253.536,91	6.330.075.799.417,50	0,53063	391.916.527.102,00
2054	6.766.156.915.882,63	325.797.682.397,50	6.440.359.233.485,13	0,52023	446.141.760.521,78
2055	6.849.974.184.423,14	342.953.860.084,85	6.507.020.324.338,29	0,51003	418.761.476.203,22
2056	6.906.128.188.935,66	359.653.935.236,48	6.546.474.253.699,18	0,50003	408.129.953.806,92
2057	6.964.230.932.878,29	375.746.571.481,75	6.588.484.361.396,54	0,49022	428.244.888.630,96
2058	7.027.840.845.305,64	391.363.933.763,61	6.636.476.911.542,03	0,48061	451.558.395.919,29
2059	7.080.440.861.927,93	405.984.430.073,49	6.674.456.431.854,44	0,47119	456.884.517.697,80
2060	7.105.160.169.118,04	419.787.194.986,74	6.685.372.974.131,30	0,46195	443.226.218.996,48
2061	7.060.577.223.898,40	432.115.690.391,30	6.628.461.533.507,10	0,45289	384.602.057.848,34
2062	7.065.466.205.149,93	443.147.459.216,97	6.622.318.745.932,96	0,44401	450.725.318.758,00
2063	7.058.865.453.512,97	452.556.636.113,12	6.606.308.817.399,85	0,43530	450.500.445.405,78
2064	7.028.705.391.239,66	460.403.222.002,82	6.568.302.169.236,84	0,42677	435.587.525.060,44
2065	6.985.006.285.510,63	466.824.990.669,74	6.518.181.294.840,89	0,41840	429.746.723.968,50
2066	6.972.285.684.813,64	471.980.630.132,72	6.500.305.054.680,93	0,41020	470.125.473.708,80

	FUND CASH BASED ON THEIR CONTRIBUTIONS & INVESTMENTS (€)	INSURANCE BENEFITS (€)	FUND RESULT (€)	DISCOUNT FACTOR	INSURANCE CONTRIBUTIONS (€)
Investment return scenario: 4.0%.					
Year (t)					
2067	6.916.840.938.930,70	475.772.510.961,00	6.441.068.427.969,70	0,40215	430.047.520.811,56
2068	6.874.718.304.926,81	478.177.555.877,05	6.396.540.749.049,75	0,39427	448.643.350.270,64
2069	6.831.008.458.476,37	489.327.854.215,91	6.341.680.604.260,47	0,38654	446.947.557.297,19
2070	6.735.414.455.033,98	498.951.773.568,85	6.236.462.681.465,13	0,37896	400.959.081.718,07
2071	6.643.102.872.388,96	506.289.984.165,93	6.136.812.888.223,04	0,37153	415.358.749.633,89
2072	6.539.364.682.729,22	511.875.337.275,82	6.027.489.345.453,39	0,36424	414.827.446.931,88
2073	6.437.906.027.452,29	516.120.418.958,62	5.921.785.608.493,67	0,35710	423.709.902.471,03
2074	6.315.979.621.057,31	519.252.881.034,00	5.796.726.740.023,30	0,35010	406.394.684.760,62
2075	6.208.920.171.632,66	520.870.922.380,33	5.688.049.249.252,33	0,34323	426.329.726.672,29
2076	6.104.778.256.502,07	521.827.516.563,78	5.582.950.739.938,29	0,33650	431.550.503.281,07
2077	5.984.811.797.245,50	522.024.839.219,06	5.462.786.958.026,45	0,32991	415.551.291.310,00
2078	5.872.625.876.949,75	521.859.692.933,89	5.350.766.184.015,86	0,32344	421.392.463.123,20
2079	5.868.437.404.920,66	520.632.358.850,62	5.347.805.046.070,04	0,31710	413.679.607.622,55
2080	5.752.978.883.337,08	518.740.680.591,07	5.234.238.202.746,01	0,31088	419.566.979.891,13
2081	5.643.211.907.184,19	515.712.087.078,52	5.127.499.820.105,67	0,30478	424.031.836.961,08
2082	5.517.440.520.933,49	511.820.835.931,61	5.005.619.685.001,88	0,29881	403.333.522.648,30
2083	5.406.549.091.544,76	506.769.114.417,51	4.899.779.977.127,26	0,29295	415.716.282.216,72
2084	5.297.240.222.042,28	501.250.077.828,37	4.795.990.144.213,91	0,28720	412.094.683.983,47
2085	5.178.597.795.109,14	494.904.618.243,22	4.683.693.176.865,92	0,28157	395.889.967.057,13
2086	5.081.664.530.477,61	523.261.369.581,16	4.558.403.160.896,45	0,27605	413.086.608.085,62
2087	4.959.361.516.107,00	516.284.176.809,82	4.443.077.339.297,17	0,27064	418.113.656.399,32
2088	4.830.509.737.315,65	508.143.587.054,39	4.322.366.150.261,26	0,26533	403.305.455.647,62
2089	4.702.835.554.695,66	499.782.137.602,51	4.203.053.417.093,15	0,26013	395.797.660.391,48
2090	4.578.478.532.298,32	491.300.749.955,83	4.087.177.782.342,49	0,25503	390.425.429.837,72
2091	4.466.905.459.587,09	482.799.596.217,57	3.984.105.863.369,53	0,25003	395.510.050.312,68
2092	4.376.422.277.551,27	474.396.214.898,75	3.902.026.062.652,53	0,24513	220.646.239.071,92
2093	4.273.780.632.185,16	466.212.073.897,82	3.807.568.558.287,34	0,24032	222.163.865.166,13
2094	4.188.709.637.490,90	458.372.891.482,36	3.730.336.746.008,54	0,23561	223.562.309.068,52
2095	4.111.217.586.133,57	450.994.386.958,22	3.660.223.199.175,35	0,23099	224.846.114.045,74
2096	4.028.375.741.024,85	457.717.156.134,19	3.570.658.584.890,66	0,22646	226.021.131.982,80
2097	3.956.554.291.719,05	451.642.907.782,57	3.504.911.383.936,49	0,22202	227.094.444.155,84
2098	3.875.061.996.807,62	446.307.104.459,17	3.428.754.892.348,44	0,21766	228.074.221.635,91
2099	3.790.084.635.477,57	441.753.552.824,92	3.348.331.082.652,65	0,21340	228.969.528.599,48
2100	3.705.533.178.923,16	438.010.132.963,24	3.267.523.045.959,92	0,20921	229.790.070.628,53
2101	3.625.708.553.719,08	448.794.777.933,82	3.176.913.775.785,26	0,20511	230.545.900.456,19
2102	3.543.204.487.112,42	446.650.866.776,56	3.096.553.620.335,87	0,20109	231.247.097.483,18
2103	3.454.074.144.286,12	445.223.872.984,38	3.008.850.271.301,75	0,19715	231.903.438.636,03
2104	3.360.900.803.206,14	444.449.286.213,24	2.916.451.516.992,91	0,19328	232.524.087.640,36
2105	3.261.344.799.523,58	444.331.387.154,38	2.817.013.412.369,20	0,18949	233.117.322.904,20
2106	3.163.492.570.825,17	444.853.682.111,39	2.718.638.888.713,78	0,18577	233.690.325.059,35
2107	3.058.832.058.871,83	445.739.044.806,14	2.613.093.014.065,69	0,18213	234.249.039.470,76
2108	2.952.277.664.932,74	446.932.400.532,23	2.505.345.264.400,51	0,17856	235.340.950.615,39
2109	2.849.416.745.405,67	448.386.852.732,58	2.401.029.892.673,09	0,17506	235.879.738.072,49
2110	2.735.438.292.505,24	450.063.399.413,00	2.285.374.893.092,24	0,17163	236.415.652.259,79
2111	2.618.421.413.677,44	451.930.029.139,71	2.166.491.384.537,73	0,16826	236.948.999.933,70
2112	2.488.916.469.185,86	425.589.269.851,92	2.063.327.199.333,93	0,16496	237.479.407.436,09
2113	2.389.801.371.385,66	441.878.717.026,11	1.947.922.654.359,55	0,16173	238.005.996.625,53
2114	2.268.002.117.303,12	444.101.961.447,72	1.823.900.155.855,40	0,15856	238.527.542.197,43

Investment return scenario: 4.0%.				
Year (t)	FUND CASH BASED ON THEIR CONTRIBUTIONS & INVESTMENTS (€)	INSURANCE BENEFITS (€)	FUND RESULT (€)	DISCOUNT FACTOR	INSURANCE CONTRIBUTIONS (€)
2115	2.135.595.418.944,66	446.428.593.174,87	1.689.166.825.769,78	0,15545	239.042.604.556,04
2116	1.989.814.947.594,05	448.844.138.180,27	1.540.970.809.413,78	0,15240	239.549.637.604,72
2117	1.848.272.041.356,03	451.335.772.323,43	1.396.936.269.032,60	0,14941	240.047.073.749,40
2118	1.695.413.997.261,51	453.892.446.478,26	1.241.521.550.783,25	0,14648	240.533.389.873,20
2119	1.540.876.628.843,86	456.504.331.777,16	1.084.372.297.066,70	0,14361	241.007.157.232,18
2120	1.370.967.826.241,18	459.163.412.857,83	911.804.413.383,35	0,14079	241.467.078.270,39
2121	945.976.166.700,60	446.963.690.153,21	499.012.476.547,38	0,13803	241.912.012.291,61

Table 4.6. Monthly Mean earnings in Euro area - 19 countries

Source of data Eurostat

https://ec.europa.eu/eurostat/databrowser/view/earn_ses_annual/default/table?lang=en

Structure of earnings survey: annual earnings					
GEO (Labels)	2014	2018			
European Union - 27 countries (from 2020)	32.642,88	:			
European Union - 28 countries (2013-2020)	34.210	:			
European Union - 27 countries (2007-2013)	34.327,53	:			

Structure of earnings survey: annual earnings					
GEO (Labels)	2014	2018			
Euro area - 19 countries (from 2015)	37.967	:			
Euro area - 18 countries (2014)	38.337	:			
Belgium	47.527	49.160			
Germany (until 1990 former territory of the FRG)	45.429	49.953			
Estonia	13.609	17.094			
Ireland	48.598	49.790			
Greece	22.957	22.550			
Spain	28.933	29.994			
France	37.253	38.747			
Italy	36.242	36.671			
Cyprus	25.670	26.172			
Latvia	10.195	14.057			
Lithuania	8.756	11.943			
Luxembourg	58.797	64.641			
Malta	22.641	27.047			
Netherlands	48.839,67	51.826			
Austria	44.454	48.549			
Portugal	17.497	18.236			
Slovenia	22.508	24.669			
Slovakia	12.265	15.159			
Finland	44.543	46.071			
Total		642.329			
Annual Mean earnings in Euro area - 19 countries		642.329/19= 33.806,79			
Monthly Mean earnings in Euro area - 19 countries		33.806,79/12= 2817,232			