



UNIVERSITY *of* NICOSIA

«Reforming the Greek pension system from a single to a three-pillar system: Justification, challenges and risks.»

PANAGIOTIS (NOTIS) A. MITARACHI

A thesis submitted to the University of Nicosia  
in accordance with the requirements of the degree of  
PhD (Doctor of Philosophy) in Business Administration  
Department of Accounting, Economics and Finance  
School of Business

May 2024

## Abstract

In September 2021, Greece undertook a significant reform of its pension system, aiming to address the challenges of an aging population and volatile economic conditions. The Greek State Pension consists, for most beneficiaries, of three parts. The reform involved changing the third part, the auxiliary pension (which affects most but not all beneficiaries) from a pay-as-you-go system (notional contribution) to a fully funded defined contribution (DC) scheme. The reform affected new or very recent labour market entrants. This was the first attempt ever for Greece to introduce a DC scheme in social security, in the first pillar. A previous attempt in early 2000's never even made it to the Parliament, due to social upheaval. It is also worth noting that, although DC schemes are quite common, only a few countries (Denmark, Sweden etc) have it as part of first pillar schemes.

The new system, which was put into place on 1<sup>st</sup> January 2022, is expected to reach maturity around 2045-2055. According to policy makers and the government, this reform is intended to:

- a) introduce some degree of risk diversification in the Greek social security system;
- b) partly offset negative effects of aging population on future pensions;
- c) improve the level of future pensions;
- d) accumulate capital which can be mostly invested in the Greek economy.

As secondary effects, the new system is expected to increase transparency and flexibility for new entrants, improve sustainability and adequacy of the pension system overall and provide workers with more choices as well as improve financial literacy for younger generations.

Participation in the new system is mandatory for wage earners first entering the labour market as of January 1<sup>st</sup>, 2022. At the onset of the program, beneficiaries younger than 35 years of age could also, on a voluntary basis, transit to the new system. Self-employed and farmers can also participate voluntarily to the new system. The DC scheme is operated by a new Social Security Fund, the Hellenic Auxiliary Pensions Defined Contributions Fund (TEKA), which was established by Law 4826/2021 as part of the national social security system.

The present study is an ambitious attempt to evaluate and estimate initial aspects of the reform. It provides a comprehensive analysis of the pivotal reforms undertaken in the Greek pension system against the backdrop of demographic shifts, economic constraints, and evolving societal expectations. The study critically examines the transition from a primarily

state-funded system to a more diversified three-pillar framework, aiming to assess the reform's rationale, implications, and sustainability within the context of global pension reform trends and the specific socio-economic landscape of Greece. The research employs a multifaceted methodological approach, integrating comparative policy analysis, demographic and financial modelling, as well as public opinion surveys to construct a nuanced narrative of the pension reform process.

Key findings highlight the demographic imperatives driving the reform, notably the aging population and declining fertility rates, which exert profound pressures on the pension system's financial viability. The analysis underscores the critical fiscal challenges posed by these demographic trends, emphasizing the need for a sustainable and adaptable pension framework. The dissertation also reveals significant public concern regarding pension security and adequacy, reflecting a broader desire for a more transparent, equitable, and responsive pension system.

The study's conclusions underscore the necessity of the 2021 Greek pension reform, situating it as a timely and critical response to ensure the system's long-term sustainability and alignment with demographic realities and public expectations. While acknowledging the inherent challenges and risks associated with implementing such a comprehensive reform, the dissertation posits that the transition to a three-pillar system represents a crucial step toward stabilizing the Greek pension system and safeguarding its future viability.

The research contributes valuable insights to the academic and policy discourse on pension reform, offering evidence-based recommendations for enhancing the Greek pension system's resilience and responsiveness to evolving demographic and economic dynamics. Furthermore, it provides a foundation for ongoing dialogue and research on pension reform strategies, with implications for policymakers, stakeholders, and the broader public engaged in shaping the future of retirement security in Greece and beyond.

## **Keywords**

Greek Pension Reform, Social Security Systems, Public Pension Policies, Actuarial Models, Public Sentiment Analysis, Financial Sustainability, Economic Impact, ARDL Models

## **Dedication**

To the love of my life Maria,  
my daughter Elizabeth,  
my mother Elizabeth and  
in loving memory of my father Anthony.

## **Acknowledgments**

This thesis would not have been possible without the support of my supervisors, special thanks to Professors Petros Lois, Sveltana Sapuric and my former colleague in government Professor Yannis Stournaras, currently Governor of the Bank of Greece.

Nor without the inspiration from my wife, Dr Maria Dourida-Mitarachi.

Moreover, I would like to thank my colleagues at work, my former Secretary General at the Ministry of Labour Dr Pavlina Karasiotou, George Gounaris and my colleagues in my office Kostas Kostakos and Dimitra Tsioulou.

## **Declaration**

This work has been carried out in accordance with the Regulations of the University of Nicosia. This thesis has been composed solely by myself except where stated otherwise by reference or acknowledgement. It has not been previously submitted, in whole or in part, to this or any other institution for a degree, diploma or other qualifications.

# Contents

<b>Abstract</b> .....	2
<b>Keywords</b> .....	3
<b>Dedication</b> .....	4
<b>Acknowledgments</b> .....	4
<b>Declaration</b> .....	4
<b>Chapter 1: Introduction</b> .....	9
<b>Chapter 2: Theoretical Framework and Presentation of Recent Reforms</b> .....	14
<b>2.1 Introduction</b> .....	14
<b>2.2 Literature Review</b> .....	17
<b>2.3 Public Pension Reforms: Trends</b> .....	27
<b>2.4 Reforming the Pension System in Greece</b> .....	38
<b>2.4.1 Introduction</b> .....	38
<b>2.4.2 Learning from international experience</b> .....	40
<b>2.4.3 The Pension System in Greece</b> .....	44
<b>2.4.3.1 Public Mandatory Insurance Pillar</b> .....	45
<b>2.4.3.1.1 Main pensions</b> .....	45
<b>2.4.3.1.2 Auxiliary pensions</b> .....	46
<b>2.4.3.1.3 Designing a reform</b> .....	47
<b>2.4.3.2 Occupational Insurance Funds</b> .....	47
<b>2.4.4 Necessity of the Reform</b> .....	49
<b>2.4.4.1 Socio-Demographic overview</b> .....	49
<b>2.4.4.2 Labour Market</b> .....	55
<b>2.4.4.3 Pension Coverage and Statistics</b> .....	59
<b>2.4.4.4 Living Standards of elderly</b> .....	61

<b>2.4.5 Moving Forward</b> .....	63
<b>2.4.5.1 Overall TEKA Architecture</b> .....	63
<b>2.4.5.2 IT Architecture</b> .....	65
<b>2.4.5.3 Transaction Cost</b> .....	68
<b>2.4.5.4 Transition Benefits</b> .....	69
<b>2.5 Methodology</b> .....	72
<b>2.6 Discussion</b> .....	73
<b>Chapter 3: Assessing the Financial Sustainability of the Pension System in Greece: The Role of Fertility Policy Adjustment</b> .....	75
<b>3.1 Research Purpose and Design</b> .....	75
<b>3.2 Literature Review</b> .....	76
<b>3.2.1 Demographic Problem and low birth rates</b> .....	76
<b>3.2.2 The role of Immigration in ageing problem</b> .....	80
<b>3.3 Models</b> .....	81
<b>3.3.1 Models for Population</b> .....	81
<b>3.3.2 Models of Pension Sustainability</b> .....	82
<b>3.4 Data and Scenarios</b> .....	84
<b>3.4.1 Data Assumptions</b> .....	84
<b>3.4.2 Retirement and Fertility Scenarios</b> .....	85
<b>3.5 Results</b> .....	86
<b>3.5.1 Scenario 1</b> .....	86
<b>3.5.2 Scenario 2</b> .....	88
<b>3.5.3 Scenario 3</b> .....	89
<b>3.5.4 Scenario 4</b> .....	91
<b>3.5.5 Scenario 5</b> .....	93
<b>3.5.6 Scenario 6</b> .....	94

<b>3.6 Policy Recommendations for Addressing the Demographic Challenge</b> .....	96
<b>Chapter 4: Assessing the effect of demographic changes on the stability of the Greek pension system through the application of co-integration theory</b> .....	98
<b>4.1 Introduction</b> .....	98
<b>4.2 Literature Review</b> .....	99
<b>4.3 Greece’s retirement system and demographic transition</b> .....	102
<b>4.4 Revenues and Expenditures of e-EFKA</b> .....	103
<b>4.5 Demographic transition in Greece</b> .....	105
<b>4.6 Econometric study of the effect of demographic factors on the financial balance of the pension system in Greece</b> .....	107
<b>4.6.1 Data and Method</b> .....	108
<b>4.6.2 Results</b> .....	110
<b>4.6.3 Discussion</b> .....	115
<b>4.7 Conclusion</b> .....	118
<b>Chapter 5: Public opinion and preferences on a possible reform in Greek Pension System</b> .....	121
<b>5.1 Introduction</b> .....	121
<b>5.2 Public`s knowledge</b> .....	122
<b>5.3 Public awareness on pension reforms</b> .....	132
<b>5.4 Social dialogue in pension reforms</b> .....	136
<b>5.4.1 Social Parties involvement in pension reforms</b> .....	136
<b>5.4.2 Requirements for engaging in social communication</b> .....	142
<b>5.5 A public opinion survey – the Methodology</b> .....	145
<b>5.6 Discussion</b> .....	147
<b>5.6.1 Descriptive Statistics</b> .....	147
<b>5.6.2 Knowledge of the system and Preferences</b> .....	151

<b>5.6.3 Priorities of a Pension Reform</b> .....	177
<b>5.6.4 Adequacy of pensions</b> .....	182
<b>5.6.5 Sustainability of pensions</b> .....	187
5.6.6 Employees preferences .....	188
<b>5.7 Discussion</b> .....	195
<b>Chapter 6: Conclusions</b> .....	199
<b>6.1 General Conclusions</b> .....	199
<b>6.2 Limitations of the Study</b> .....	202
<b>6.3 Areas for future research</b> .....	203
<b>References</b> .....	206
<b>Appendixes</b> .....	219
Appendix I Questionnaire.....	219
Appendix II List of Tables.....	227
Appendix III List of Figures .....	231
Appendix IV List of Graphs .....	232



## Chapter 1: Introduction

Social Security Systems have gone through various changes in many countries over the last decades. As demographic trends change, our standard of living improves, social considerations are evolving and return rates for investments are changing.

Greece, in addition, faced severe economic and social challenges since 2010. Challenges, which led the country to undergo a series of significant reforms in its social security and pension system. The main goal was to rationalize spending and bring it closer to the EU average. In 2020, it was 17.7% of GDP and 16.4% in 2021, compared to 13.6% and 12.9% respectively in the Euro area (Eurostat, 2023). However, it still remains a very “fiscally expensive” social person system. The state budget continues to finance half of the pension budget, with social security contributions – paid by employers and employees, accounting for the other half. State transfers for pensions account for 6,8% of GDP and 26% of tax revenue in 2020 and for 4.1% of GDP and 12.7% of tax revenue in 2023 (Ministry of Finance, 2023).

The pension system in Greece is predominantly public in nature and works on a Pay As You Go (PAYGO) basis. However, this model is under substantial strain due to increasing life expectancy and declining fertility rates, which elevate the dependency ratio. These demographic trends raise substantial concerns about the financial sustainability of the pension system and the adequacy of retirement incomes (Barr and Diamond, 2010). In such a system the social security contributions of income earners are used to fund the pension benefits of current retirees. The Greek pension system provides main pensions (around 90% of total expenditure) and auxiliary pensions (10% of expenditure). Main pension provisions are Defined Benefits (DB), while auxiliary pensions are awarded on a mixed DB and Notional Defined Contribution (NDC) basis. As such, it is vulnerable to demographics and fiscal crises. Population ageing weakens the financial sustainability of Greece`s pension system, as the number of retirees increases and the working population declines. More specifically, the employment rate of older workers, age group 55-64, is 55% in Q3 of 2023 (OECD, 2023), which means that, in the near future, the pension system should not be able to cover the pension benefits of the new inductees in retirement. A better measure to support the earlier point is the old age dependency ratio. According to EUROSTAT (2023) population projections, this ratio was 36% in 2023 in Greece (33.3% in the EU) and peak at 67.9% in 2050 (50.4% in the EU in 2050). This signals the need to reform the current system and turn to a more viable one. The introduction of a certain degree of diversity, a mix of risks that combines security with increased returns, could be an answer to all those issues.

Greece still remains a “terra incognita” as regards pension systems reforms. No attempt to assess the financial sustainability of the pension system or to examine how demographic factors affect the financial balance of the pension fund or to address public opinion on pension reforms had ever materialized, mainly because public opinion and the political system were sceptic or even hostile. However, this may be the most demanding part of this research, in the sense that a pension reform must be acceptable by the majority of public opinion. For a pension reform to be acceptable it should be beneficial for current and future generations.

Research in the field has been rather limited in Greece. It focuses primarily on the effects of the fiscal crisis on the welfare state and pensions (Matsaganis (2012), Angelaki (2018), or how the pension system led to the fiscal crisis (Christodoulakis, 2016). Several researchers propose the idea of introducing NDC or fully funded components to the system, (Panageas and Tinios 2017; Nektarios et al 2018; Nektarios and Tinios, 2019; IOBE 2019), without however taking into consideration optimality issues as well as resulting funding gap.

This research addresses three primary objectives:

First, to provide a comprehensive understanding of the financial stability of Greece’s pension system using an actuarial model. The model projects Greece's population trends, dependency ratios, and financial stability over the next several decades. It includes detailed forecasts of the system’s revenues and expenditures, allowing for an assessment of its long-term viability.

Second, the research aims to evaluate the relationship between demographic factors and the financial balance of the pension system using an Autoregressive Distributed Lag (ARDL) model. This econometric analysis focuses on understanding how fertility rates and life expectancy influence the financial performance of e-EFKA, Greece’s primary pension fund in both short-term and long-term. This objective seeks to reveal the dynamic interactions between demographic changes and the pension system’s fiscal health, providing insights into the system's resilience under different demographic scenarios.

Third, the thesis includes a survey-based analysis to understand the perspectives and preferences of Greek citizens regarding the current pension system and potential reforms. This part of the research assesses public awareness of pension policies, the level of satisfaction with the current system, and the preferred characteristics of a reformed system. The findings from this survey offer valuable input for policymakers to design reforms that are not only effective but also aligned with public preferences.

Under the theory of incentive provision, we expect the actuarial models to show that significant policy changes are necessary due to the increasing dependency ratio and financial instability of the current PAYG system. When projections indicate greater difficulty in sustaining the system, larger reforms and incentives will be necessary to ensure its long-term success and sustainability. Policymakers might need to introduce measures such as raising the retirement age or increasing contribution rates. According to the theory of retention improvement, we expect the ARDL model, used in Chapter 4, to reveal a significant relationship between fertility rates, life expectancy, and the financial balance of the e-EFKA pension fund. This is because changes in fertility rates and life expectancy directly impact the number of contributors versus beneficiaries in the pension system. As fertility rates decline and life expectancy increases, the financial burden on the pension system grows. To address these demographic challenges, policies aimed at improving labour market conditions, encouraging higher employment rates, and potentially increasing fertility rates are essential. These measures help maintain a balanced dependency ratio and ensure the financial stability of the pension fund. The empirical results support the theories.

The significance of this study lies in its potential contributions to both academic literature and practical policymaking. While existing studies have explored various pension reforms, this research fills a critical gap by providing an in-depth analysis of the Greek pension system using both actuarial and econometric methods. By offering a dual perspective on the system's sustainability, this thesis aims to equip policymakers with the insights needed to make informed decisions about future pension reforms. The Greek case provides new perspectives and findings on pension reform that previous academic studies have not adequately explored due to several unique factors, such as the economic and financial context, previous policy reforms and public preferences. Previous studies on pension reform often focus on either actuarial projections or econometric analyses in isolation. This thesis integrates both methodologies to provide a holistic view of the Greek pension system's sustainability. Another unique contribution of this thesis is the inclusion of a survey-based analysis that assesses the knowledge and preferences of Greek citizens regarding the pension system. This perspective provides insights into public awareness and attitudes towards pension reforms, which are crucial for the successful implementation of policy changes. Understanding public perception helps policymakers design reforms that are not only effective but also publicly acceptable, addressing a gap in the literature where the focus has predominantly been on macroeconomic and fiscal analyses without considering public sentiment (Tinios, 2016). It also addresses critical gaps in the literature by focusing on the unique socio-economic dynamics and financial challenges faced by Greece, particularly in the context of its recent

economic crisis and ongoing demographic shifts. Greece's economic crisis, which began in 2009, led to significant austerity measures and structural reforms across various sectors, including pensions. The Greek pension system underwent substantial changes aimed at ensuring fiscal sustainability and reducing public debt. These reforms were necessary due to the high levels of public spending on pensions, which were among the highest in the European Union as a percentage of GDP. By examining the Greek case, this thesis provides a detailed analysis of how severe economic conditions and stringent austerity measures influence pension system reforms and outcomes, offering insights that are particularly relevant for other countries facing similar fiscal challenges (Matsaganis, 2011; Featherstone, 2011).

The methodological approach of the study is defined by its use of quantitative analysis to ensure the empirical rigor required for assessing the complex dynamics of pension system reforms. The data were meticulously extracted from authoritative databases such as Eurostat, ELSTAT, and the World Bank to ensure a comprehensive and reliable dataset. The analysis was conducted using the advanced statistical package Stata, which provided a robust platform for the application of various statistical tests and models. This selection was strategic, aimed at leveraging their sophisticated analytical capabilities to unravel the intricate relationships within the data. The application of these tools enabled a thorough examination of the variables in question, ensuring precision in the conclusions drawn. This rigorous process was crucial for substantiating the study's findings and ensuring that the conclusions are grounded in statistically validated evidence, contributing to the field's academic discourse and providing insights with practical relevance to policymakers.

The necessity of pension reform in Greece is grounded in a confluence of pressing factors. An aging population, coupled with declining fertility rates, has precipitated a demographic shift that threatens the financial sustainability of the traditional pension model. Concurrent economic challenges, exacerbated by prolonged fiscal crises, have further strained the system, underscoring the urgent need for structural reform. Against this backdrop, the dissertation explores the evolution of pension systems both within Greece and across other EU and OECD countries, providing a comparative perspective that enriches the analysis of Greece's reform initiatives.

The second chapter sets the stage by outlining the key objectives and scope of the research. It delves into the historical context of the Greek pension system, tracing its development and identifying the inherent challenges that have culminated in the current crisis of sustainability. The chapter also introduces the theoretical frameworks and methodological approaches

employed in the study, establishing a foundation for the subsequent analysis. Following that, it systematically addresses the core themes through a series of interconnected chapters. It offers a comprehensive review of pension reforms in the EU and OECD realms, while identifying trends, strategies, and lessons that inform the Greek context. This comparative analysis sheds light on the diversity of pension reform trajectories and distils key insights that underscore the necessity and potential pathways for Greece's pension system overhaul.

The third chapter focuses on the financial sustainability of the Greek pension system, employing demographic projections and actuarial models to assess the long-term viability of existing structures. It critically examines the impact of demographic trends on pension liabilities and explores the potential of fertility policy adjustments to mitigate impending financial pressures.

In the fourth chapter, the thesis applies co-integration theory to analyse the relationship between demographic changes and pension system stability in Greece. This quantitative analysis provides empirical evidence supporting the reform's rationale, highlighting the critical interplay between demographic factors and pension fund solvency.

The final empirical chapter delves into public perceptions and preferences regarding the pension reform, drawing on survey data to capture the nuanced views of Greek citizens. This analysis offers valuable insights into the societal dimensions of the reform, gauging public support, concerns, and expectations, which are pivotal for the reform's legitimacy and success.

In synthesizing these findings, the dissertation aims to provide a comprehensive and nuanced understanding of the Greek pension reform, articulating its justification, dissecting its challenges, and evaluating its potential risks and benefits. The study not only contributes to the academic discourse on pension reform but also offers practical insights for policymakers, stakeholders, and the broader public, aiming to foster informed debate and decision-making as Greece navigates this critical juncture in its pension system's evolution.

## **Chapter 2: Theoretical Framework and Presentation of Recent Reforms**

### **2.1 Introduction**

Over recent decades, most EU Member-States have undertaken progressive and, in certain instances, significant pension reforms to bolster fiscal health and to ensure adequate retirement incomes. The pace of these reforms has intensified notably since the year 2000. Implemented through a broad array of changes, these reforms have significantly altered the structure and details of pension systems, including aspects such as retirement age, incentives for retirement, methods of pension calculation, indexation, and social contributions. The enactment of pension reforms has typically been phased and extended over considerable durations. Additionally, several Member States have embarked on more fundamental systemic changes, decisively promoting the establishment of additional pillars or substantially transforming their existing public pension systems. Furthermore, over half of the EU Member States have now integrated automatic adjustments, aligning crucial pension parameters with shifts in life expectancy.

The severe economic recession that struck the European Union during 2008-09 led to a rapid implementation of pension reforms aimed at enhancing fiscal sustainability in numerous countries, introducing additional measures that sometimes had immediate effects. In certain instances, these adjustments involved partial or complete rollbacks of earlier systemic changes. With birth rates projected to remain low and life expectancy anticipated to continue rising, the demographic composition by 2060 is expected to stay relatively stable in number but significantly older in age profile. The EU is projected to shift from a demographic structure with about four individuals of working age (15-64) for every person older than 65 to a ratio of merely two to one. Given this anticipated decrease in the working-age population across Europe, the potential for economic growth is expected to be substantially lower than what was recorded in past decades. Concurrently, the demand for publicly provided age-related transfers and services is set to rise (Carone et al., 2014).

It is important to recognize the significant advancements made in pension reform efforts, which have led to observable benefits. For example, employment rates have increased, particularly among older workers, as a direct result of these reforms. Furthermore, the reforms have played a crucial role in moderating future pension spending patterns. The most recent long-term forecasts from the 2015 Ageing Report indicate that public pension

expenditures in the EU are expected to stabilize at around 11% of GDP over the long term, maintaining a level similar to that of 2013.

While significant strides have been made in pension reform, the fiscal challenges posed by an ageing population are expected to manifest significantly in many EU nations within the next decade. This situation is partly due to the slow implementation of already enacted reforms, sparking concerns about the fairness across generations and raising doubts about the consistency over time of these reforms. The pension adjustments aimed at enhancing sustainability, enacted in most EU Member States, are poised to decrease the generosity of public pension systems for future retirees. Although these reforms mitigate the impact of demographic shifts on future expenditures, ensuring their acceptance without substantial political or social pushback, when they come into full effect, necessitates additional measures. For instance, further reforms might be needed to augment retirement incomes, such as initiatives that effectively prolong working careers and bolster alternative retirement income sources, like private pensions. Therefore, additional efforts are essential to address these issues adequately.

Although, in recent years, the economic recession was not the only problem that countries had to face in order to protect their pension systems. The global inflationary pressures, spurred by the COVID-19 pandemic and Russia's conflict against Ukraine, alongside respective policy reactions, have been felt worldwide since 2021. This inflationary trend has disproportionately impacted older demographics in numerous nations, given their tendency to allocate a larger portion of their expenditure on essentials like energy and food compared to other age groups. However, in countries where pension benefits are indexed to inflation, retirees are likely to experience less erosion in their purchasing power compared to the working-age population. In fact, over half of the OECD member states typically ensure that earnings-related pension benefits are adequately adjusted to guard against inflation over time. The detrimental effect of inflation on the purchasing power of pensioners is notably mitigated in jurisdictions that promptly adjust pensions in response to price increases, either through regular indexation mechanisms or adjustments triggered when inflation reaches a specific threshold.

With the retirement age set to rise in three out of five OECD countries, elevating the age of retirement has become a prevalent method for enhancing the financial viability of pension systems, without diminishing the benefits provided. Recent reforms in the Slovak Republic and Sweden have established a connection between retirement age and life expectancy, positioning these countries among the one-fourth of OECD members that now feature such

a correlation. Over the past couple of years, Costa Rica and the Czech Republic have implemented stricter criteria for early retirement, while France has increased its minimum retirement age. Meanwhile, Switzerland and Israel have opted to incrementally raise the retirement age for women, aiming to equalize or lessen the disparity in retirement ages between genders.

Concerns over financial sustainability of pension systems continue to catalyse pension reforms. These reforms extend beyond merely changing retirement ages and may include changes to the structure of benefits and contributions. For example, the Netherlands has enacted a significant systemic reform by transitioning its pension funds from funded defined benefit schemes to funded defined contribution schemes, aiming to bolster solvency. Similarly, Costa Rica and Spain have implemented parametric reforms, adjusting the parameters related to contributions and benefits to enhance the financial health of their pension systems.

Additionally, over the recent years, various OECD nations have enhanced pension protections, especially for those with lower earnings. In a notable shift, Chile transitioned from a targeted public pension system to a quasi-universal one in January 2022, which not only raised the benefits but also broadened its reach to cover 90% of the elderly demographic. Additionally, countries like Canada, Estonia, France, Italy, Lithuania, Spain, Sweden, and Türkiye have made significant enhancements to their basic pension provisions, minimum pension rates, and/or specific targeted benefits. In the realm of earnings-related pensions, Hungary accelerated the rollout of a 13th-month pension payment, while Poland introduced a supplementary 14th-month payment, further supporting their pensioners' financial security.

In general, pension systems are designed to achieve multiple objectives, including consumption smoothing, insurance against longevity risk, poverty relief, and income redistribution. The balance between these objectives shapes the design and implementation of pension policies. Different pension models distribute financial, demographic, and political risks in varied ways. Defined-benefit (DB) plans typically place financial risk on the employer, whereas defined-contribution (DC) plans shift this risk to the individual. This differentiation is critical in designing a system that balances risk appropriately between stakeholders (Barr and Diamond, 2010).

There is no one-size-fits-all approach to pension systems. Optimal pension solutions must consider a country's unique fiscal capacities, institutional capabilities, demographic trends, and societal preferences. Each system's design must be context-specific to address the



particular needs and constraints of the population it serves. In a world of imperfect markets and suboptimal individual decision-making, pension policies must strive for second-best solutions. This approach focuses on maximizing welfare given existing constraints and imperfections, acknowledging that ideal conditions are rarely met in practice. The shift towards funded pensions involves complex trade-offs, particularly between generations. While funded systems can mitigate certain risks, the transition from a pay-as-you-go (PAYG) system to a funded system can impose significant financial burdens on the current working population. Policy implications for Latin America include the importance of consumption smoothing. Notional defined-contribution (NDC) pensions emerge as a hybrid model, blending PAYG with elements of funded schemes. This approach can mitigate market risks while ensuring sustainability and adequacy of pensions (Barr and Diamond, 2010). Non-contributory pensions play a crucial role in ensuring that the elderly with low lifetime earnings receive adequate support. Programs like Chile's Pension Básica Solidaria exemplify targeted measures to aid the most vulnerable. High administrative costs in private pension schemes, particularly in Latin America, necessitate reforms. Competitive bidding processes and better regulatory frameworks can reduce these costs and improve efficiency (Barr and Diamond, 2010).

The sustainability of pension reforms hinges on realistic expectations and robust governance. Policymakers must navigate the political landscape to implement and sustain meaningful reforms. Pension reforms must be carefully tailored to the specific economic and institutional context of each country. Theoretical insights and practical lessons highlight the importance of balancing multiple objectives and managing risks to create sustainable and equitable pension systems (Barr and Diamond, 2010).

## **2.2 Literature Review**

Cesaratto (2005) in his study provides a comprehensive critique of pension systems through a blend of economic theories. He critiques the mainstream neoclassical perspective, advocating for a more inclusive theoretical approach. He argues that both classical-Keynesian and Sraffian economics offer essential insights for understanding pension reforms. The author critically examines the differences between PAYG and fully funded pension systems. He argues that PAYG schemes, where current workers fund retirees' pensions, are often misunderstood by neoclassical economists who tend to favor fully funded schemes where individuals save for their own retirement. Cesaratto (2005) points out that PAYG systems are inherently redistributive and can provide stability, especially in

economies with fluctuating growth rates. Conversely, fully funded systems are susceptible to market risks and may not guarantee stable returns, which can undermine economic stability and social welfare.

From a classical-Keynesian viewpoint, Cesaratto (2005) emphasizes the role of government intervention in ensuring the sustainability of pension systems. This perspective critiques the neoclassical reliance on market solutions, highlighting that unfettered markets can fail to provide adequate retirement security for all citizens. The Keynesian approach supports the idea that pensions should be managed in a way that promotes economic stability and social equity, advocating for policies that support full employment and income redistribution. Additionally, he incorporates Sraffian economics to further critique the neoclassical approach to pensions. Sraffian economics, rooted in the works of Piero Sraffa, focuses on the production and distribution of surplus in an economy. This perspective challenges the neoclassical notion of equilibrium and optimal savings, arguing instead that economic systems are dynamic and influenced by power relations and institutional settings. In the context of pension reform, Sraffian analysis suggests that fully funded systems can exacerbate economic inequalities and fail to address the needs of the most vulnerable populations.

The integration of these theoretical perspectives leads Cesaratto (2005) to advocate for a balanced approach to pension reform. He argues for the retention and enhancement of PAYG systems, complemented by selective funding mechanisms that are insulated from market volatility. Cesaratto (2005) also highlights the importance of strong regulatory frameworks and government oversight to ensure that pension systems are both sustainable and equitable. His work underscores the need for a multifaceted theoretical foundation in pension reform, blending insights from classical-Keynesian and Sraffian economics to critique and improve upon mainstream neoclassical approaches. This comprehensive analysis aims to develop pension policies that are resilient, equitable, and capable of promoting long-term economic stability.

Apart from theory, there are several models to examine a pension reform and its impact in a whole economy. The study by Gorry, Lee, and Slavov (2023) investigates the effects of actuarial adjustments for delaying pension claims on retirement behaviour and claiming decisions. Using a policy change in the United Kingdom in 2005, as a case study, the authors analyse how more generous terms for delaying state pensions influenced individuals' decisions regarding when to claim pensions and retire. The researchers employed a quasi-

experimental design to compare labour supply and pension claiming behaviour before and after the policy change. They found that the policy reduced the fraction of males, and to some extent females, claiming pensions at the earliest eligibility age. This suggests that more generous actuarial adjustments incentivized individuals to delay claiming their pensions. Further, the study observed an increase in labour supply around the earliest pension eligibility age, indicating that some individuals chose to work longer to finance the delay in claiming pensions. However, at older ages, there was a decrease in labour supply, likely due to the income effect from receiving more generous pension benefits. Additionally, about 3 percent of individuals who delayed their pensions opted to take their gains as lump sums, an option introduced by the policy. (Gorry, Lee, and Slavov, 2023). These findings highlight the significant role that actuarial adjustments can play in shaping retirement and pension claiming decisions. By providing financial incentives to delay claiming, policymakers can influence labour market behaviour and the timing of retirement, which has broader implications for pension system sustainability and individual financial security.

In the study by Díaz-Saavedra (2023), the focus is on the heterogeneity in longevity and its implications for redistribution and pension reform. The research examines how differences in life expectancy across various socio-economic groups affect the distributional outcomes of pension systems and the potential reforms needed to address these disparities. Díaz-Saavedra uses microsimulation models to analyse the distributional impacts of pension reforms in the context of varying longevity. The study finds that individuals with higher socio-economic status, who tend to live longer, benefit disproportionately from traditional pension systems. This creates an inherent bias in favour of wealthier individuals, exacerbating inequalities. The research suggests that pension reforms need to account for these longevity differences to ensure fairer outcomes. Possible reforms include adjusting benefits based on life expectancy or implementing more progressive benefit formulas that provide greater support to those with shorter lifespans. Such measures can help mitigate the inequities associated with differential longevity and improve the overall equity of pension systems (Díaz-Saavedra, 2023). These studies provide valuable insights into the dynamics of pension systems and the impact of policy changes on individual behaviour. Incorporating these findings into the broader context of pension reform can help design more effective and equitable pension policies that address the diverse needs of the population.

Angrisani, Burke, Lusardi, and Mottola (2023) examine the evolution of financial literacy over time and its impact on financial outcomes using longitudinal data from the FINRA Foundation's National Financial Capability Study. Administered to members of the RAND

American Life Panel in 2012 and 2018, the study provides a unique perspective on how financial literacy evolves and its predictive power for financial decision-making. The study uses a six-year observation period to track changes in financial literacy and assess its stability and predictive power. The findings indicate that financial literacy remains relatively stable over time, with a slight decline observed in older age groups. Importantly, the research demonstrates that financial literacy significantly predicts future financial outcomes, even after accounting for baseline financial conditions and a broad set of demographic and individual characteristics (Angrisani et al., 2023). This suggests that maintaining and improving financial literacy can have lasting positive effects on individuals' financial well-being.

Van Dalen and Henkens (2023) explore the crucial role of trust in pension funds and its impact on the perception of financial soundness. The study delves into how trust influences participants' confidence in the stability and reliability of pension funds, which is essential for the long-term success and sustainability of pension systems. The authors employ a combination of surveys and financial data analysis to assess the level of trust in pension funds among different demographic groups. Their findings reveal that trust is significantly correlated with the perceived financial soundness of pension funds. This relationship is critical because a high level of trust can lead to increased participation and support for pension reforms, whereas low trust can undermine the effectiveness of these systems (van Dalen & Henkens, 2023). The study underscores the importance of transparency, consistent communication, and robust financial management in building and maintaining trust in pension funds.

In the context of pension reform, the last two studies provide valuable insights into the factors influencing individual behaviour and system sustainability. The stability and predictive power of financial literacy highlight the need for continuous financial education to enhance retirement planning and financial decision-making. At the same time, fostering trust in pension funds through transparency and sound financial practices is essential for encouraging participation and ensuring the long-term viability of pension systems. These findings emphasize the importance of comprehensive strategies that combine financial literacy initiatives with efforts to build and maintain trust in pension institutions. By addressing both knowledge and trust, policymakers can create more resilient and effective pension systems that better serve the needs of the population.

Arenas de Mesa's report on pension systems in Latin America provides a detailed analysis of the institutional framework, public spending, and financial sustainability of pension systems in the context of the COVID-19 pandemic. The report addresses the critical challenges faced by pension systems in the region during the pandemic. The report compiles data on public spending and financial commitments of pension systems across Latin America. It emphasizes the importance of fiscal policy debates linked to the financial sustainability of social protection systems. The findings highlight the need for comprehensive data and projections to guide policy decisions and ensure the long-term viability of pension systems, especially during crises like the COVID-19 pandemic (Arenas de Mesa, 2020). The impact of the COVID-19 pandemic on Latin American pension systems underscores the importance of robust institutional frameworks and fiscal policies to navigate crises and maintain financial sustainability.

There are also numerous studies that use actuarial and econometric models to project scenarios under different policy assumptions for pension reforms. Zhao, Bai, Liu, and Hao (2017) explore the transition pension liabilities and the solvency sustainability of China's pension system. The study quantitatively analyses the pension system's liabilities and assesses the long-term solvency of pension funds. The research uses actuarial models to project future pension liabilities and solvency scenarios under different policy assumptions. The findings indicate significant transition liabilities that pose challenges to the financial sustainability of the pension system. The study emphasizes the need for policy adjustments to ensure long-term solvency and reduce fiscal burdens on the government. Hu and Yang (2012) investigate the real old-age dependency ratio and its implications for the adequacy of public pension finance in China. The study critically examines the traditional old-age dependency ratio and proposes a more accurate measure that considers the labour force participation rate and the actual number of pension beneficiaries. Using demographic data and pension statistics, the authors calculate a revised old-age dependency ratio and analyse its impact on public pension finance. The study finds that the traditional dependency ratio underestimates the financial pressures on the pension system. The revised ratio reveals a more severe strain on public pension finance, highlighting the inadequacy of current funding levels. Guo, Gietel-Basten, and Gu (2018) analyse the fertility rates in China using data from the 2015 Chinese 1% Sample Census. The study provides evidence of the lowest fertility rates globally and examines the implications for population policy and pension sustainability. The authors use census data to calculate fertility rates and compare them with global trends. The study finds that China's fertility rates are among the lowest in the world,

posing significant challenges for the future labour force and the sustainability of the pension system. The research calls for comprehensive policy measures to address declining fertility and its impact on economic and social stability. Shi, Chen, and Zheng (2018) evaluate the effects of recent adjustments in China's childbearing policies. The study examines the impact of policy changes on fertility rates and assesses whether these adjustments are sufficient to counteract the demographic challenges faced by the country. Using demographic analysis and policy evaluation techniques, the authors assess the effectiveness of policy measures such as the relaxation of the one-child policy. The findings suggest that while the policy adjustments have had some positive effects, they are not enough to significantly raise fertility rates. The study highlights the need for more comprehensive and supportive measures to encourage higher fertility. Additionally, Guo (2013) explores the reasons behind the low total fertility rate reported in the 2010 Population Census of China. The study delves into the demographic and socio-economic factors contributing to the declining fertility rates. Using census data and demographic analysis, Guo identifies key factors such as changing societal norms, economic pressures, and government policies that have contributed to the low fertility rate. The study emphasizes the need for a holistic approach to address the underlying causes of low fertility and to ensure sustainable population growth.

Many studies in the literature are trying to explore the financial stability of the pension systems through various methods. Swart, Raskin, and Robinson (2004) delve into the critical role of sustainability science in addressing the future's complex environmental and developmental challenges. They argue that traditional scientific approaches are insufficient to tackle the intertwined issues of human and natural systems. Instead, they propose using scenario analysis, a powerful tool for integrating diverse knowledge and exploring plausible future pathways under conditions of uncertainty and human choice. This approach not only aids in understanding potential futures but also helps in internalizing human decision-making processes into sustainability science, ultimately guiding more informed and effective policy-making. Liu and Liu (2018) address the sustainability of pension funds in the context of China's aging population and increasing population mobility. Their study, published in the *Journal of Jiangxi University of Finance and Economics*, uses demographic data and financial analysis to evaluate the impacts of these factors on pension fund solvency. The authors find that the aging population significantly strains pension funds, while high mobility rates complicate the fund's management and sustainability. They recommend policy measures to enhance fund management and ensure long-term sustainability. Yixin and

Wenjiong (2016) examine whether extending the contributory period can improve the financial sustainability of pension funds. Their actuarial evaluation compares pay-as-you-go (PAYG) and funded pension systems, analysing the potential benefits of longer contributory periods. The study finds that increasing the contributory period can enhance financial stability, particularly in PAYG systems, by ensuring a more robust inflow of contributions to balance out pension payouts. This adjustment is crucial for maintaining the solvency of pension funds in the face of demographic shifts. These studies collectively provide valuable insights into the complexities of pension reform, particularly in the context of sustainability science and demographic challenges. Swart et al. (2004) highlight the importance of scenario analysis in guiding sustainable policymaking. Liu and Liu (2018) emphasize the need to address the financial pressures on pension funds due to aging populations and high mobility. Yixin and Wenjiong (2016) underscore the potential benefits of extending contributory periods to improve pension fund sustainability. By leveraging scenario analysis, addressing demographic challenges, and optimizing contributory periods, pension systems can be better equipped to ensure long-term financial stability and meet the needs of an aging population.

There is also some literature on corporate pension policies that provides a rich array of insights into how pension plans impact corporate finance, managerial incentives, and investment decisions. This review synthesizes key findings from several notable studies, highlighting the diverse theoretical perspectives and empirical results that shape our understanding of the interplay between pensions and corporate behaviour. Alderson and Betker (2009) investigated the effect of the so-called 'perfect' pension storm on internal capital markets. Their study revealed that significant underfunding of pension plans could lead to constrained internal capital markets, affecting the firm's ability to invest and grow. This constraint underscores the importance of maintaining adequate pension funding to ensure financial flexibility within firms. In a subsequent study, Alderson, Betker, and Halford (2017) explored whether managers are compensated for achieving better levels of pension funding. Their findings suggest that managerial compensation is indeed aligned with the health of the pension fund, indicating that well-funded pension plans are a priority for corporate governance. Anantharaman and Lee (2014) examined the relationship between managerial risk-taking incentives and corporate pension policies. Their research indicates that managers with higher risk-taking incentives tend to adopt more aggressive pension investment strategies, potentially leading to higher returns but also increased risk for the pension fund.

This dynamic highlight the need for careful oversight of pension fund management to balance risk and return. Armitage and Gallagher (2019) addressed the potential conflict between pension contributions and shareholder payouts. They found that significant pension contributions can reduce the funds available for dividends and share buybacks, posing a threat to shareholder returns. This trade-off emphasizes the need for strategic planning to balance the interests of retirees and shareholders. Bartram (2018) explored how defined-benefit (DB) pension plans influence corporate financial policy. The study revealed that firms with DB pension plans tend to adopt more conservative financial policies, including lower levels of leverage and higher cash holdings. This conservative approach is driven by the need to ensure the long-term solvency of the pension fund.

Berchtold et al. (2021) examined how pension risk affects corporate investment decisions. Their findings indicate that higher pension risk can distort corporate investment strategies, leading to suboptimal investment decisions. Firms may prioritize pension funding over potentially profitable investments, highlighting the complex trade-offs involved in managing pension risk. Bradley et al. (2016) analysed the influence of political bias on state pension funds. The study found that political considerations can lead to biased investment decisions, affecting the performance and stability of pension funds. This underscores the importance of ensuring that pension fund management remains insulated from political pressures to maintain financial integrity. Duygun et al. (2018) explored whether corporate pension plans influence corporate investment choices through bargaining or conformity. Their research suggests that firms with strong bargaining power can negotiate better terms for pension contributions, while others may conform to industry norms. Such dynamic impacts the overall financial strategy and investment choices of firms. Ferson and Khang (2002) introduced a method for conditional performance measurement using portfolio weights, providing evidence on the performance of pension funds. Their approach allows for a more accurate assessment of pension fund performance by accounting for the varying risk profiles of different investment strategies. The studies reviewed provide a comprehensive understanding of how pension policies impact corporate behaviour, investment decisions, and financial stability. They highlight the intricate balance required to manage pension funds effectively, considering both the needs of retirees and the financial health of the corporation. The differences in findings across these studies underscore the complexity of pension management and the need for ongoing research to optimize pension strategies in various economic contexts.



The literature on social security and pension policies also provides comprehensive insights into the intersection of demographic changes, financial sustainability, and policy effectiveness. This review integrates findings from several studies, presenting a cohesive narrative on the critical aspects of social security and pension systems. Cipriani and Fioroni (2021) explore the relationship between social security policies and demographic changes, particularly focusing on child support and retirement policies. Their study argues that social security policies can influence demographic behaviour, such as fertility rates and retirement decisions. By integrating child support mechanisms with retirement policies, it is possible to address the dual challenges of supporting an aging population while encouraging higher birth rates, thus promoting a more balanced demographic structure. Based on this study, this thesis will try to evaluate the impact of a change in fertility rates and retirement age in financial sustainability of the Greek PAYG system. Samek, Kapteyn, and Gray (2021) use vignettes to enhance understanding of social security and annuities. Their research demonstrates that using simple, relatable scenarios can significantly improve individuals' comprehension of complex financial concepts, such as social security benefits and annuity products. This improved understanding can lead to better decision-making regarding retirement planning and financial security. Munnell, Hou, and Sanzenbacher (2021) discuss strategies to address the shortfall in Social Security's Trust Fund. They examine various funding options, including increasing payroll taxes, raising the retirement age, and adjusting benefits. Their analysis highlights the need for timely and decisive action to ensure the long-term solvency of the Social Security system, emphasizing the importance of balancing fiscal sustainability with social equity. Kangas et al. (2021) investigate public attitudes towards the 2017 pension reform in Finland through an experimental survey. Their findings reveal that providing detailed information about the reform significantly affects public perceptions and legitimacy. The study underscores the importance of transparent communication and public engagement in the policymaking process to foster trust and acceptance of pension reforms. This result can be crucial for implementing successful pension reforms in Greece, that is why a similar study will be conducted for the 2021 Greek pension reform in the thesis.

Hagen (2021) explores the discrepancies between actual and self-reported annuitization decisions in Sweden. The study finds that individuals often misreport their annuitization choices, which can lead to inaccuracies in understanding retirement behaviour. This highlights the need for better data collection and reporting methods to inform pension policy accurately. Fong and Li (2021) examine the effects of mandatory annuitization on retirement outcomes in Singapore. Their research shows that mandatory annuitization can provide

significant financial security for retirees, ensuring a steady income stream. However, it also raises concerns about flexibility and individual choice, suggesting that a balance needs to be struck between mandatory provisions and personal preferences. On the other hand, Martellini and Milhau (2021) analyse how capital structure choices impact pension fund allocation decisions and the rational pricing of liability streams. They argue that integrating pension liabilities into corporate financial strategies can lead to more efficient capital allocation and risk management, ultimately benefiting both the firm and its pension beneficiaries. Finally, Kieren and Weber (2021) address the challenges of wealth decumulation in retirement, emphasizing that simply saving for retirement is not sufficient. Their study highlights the importance of effective strategies for drawing down retirement savings to ensure financial security throughout retirement. This includes managing investment risks and understanding the implications of different decumulation methods. All the studies collectively provide a nuanced understanding of the various factors influencing social security and pension systems. They underscore the need for comprehensive policies that address demographic changes, financial literacy, and effective communication.

Despite extensive research on pension systems and their reforms, several gaps remain, particularly in the context of specific national cases such as Greece. The existing literature primarily focuses on broader, often generalized aspects of pension reform, leaving critical national-specific issues underexplored. Studies like those by Alderson and Betker (2009) highlight how economic shocks impact internal capital markets and pension funding. However, there is limited research on how prolonged economic crises, such as the one experienced by Greece, affect the sustainability and restructuring of national pension systems. While Cipriani and Fioroni (2021) discuss the relationship between social security policies and demographic changes, there is a lack of detailed analysis on how demographic factors like fertility rates and life expectancy specifically impact pension systems in countries with unique demographic profiles like Greece. Research by Kangas et al. (2021) on public attitudes towards pension reforms underscores the importance of legitimacy and information dissemination. However, comprehensive studies on how public perception influences the success of pension reforms in Greece are sparse. Most studies, such as those by Munnell et al. (2021), focus on proposed or recently implemented reforms without sufficient longitudinal analysis to assess long-term impacts on financial sustainability and public trust. The thesis aims to fill these gaps by providing a detailed and comprehensive analysis of the Greek pension system through various innovative approaches. By utilizing actuarial models, the thesis projects the population demographics, dependency ratios, and

fiscal sustainability of the Greek pension system. The use of an ARDL model to analyse the relationship between fertility rates, life expectancy, and the financial balance of the e-EFKA pension fund provides a specific, detailed examination of demographic impacts, addressing the gap in demographic analysis. The thesis also includes a survey to gauge public perception and trust in the pension system, providing empirical evidence on how public attitudes influence the success of pension reforms in Greece. This addresses the gap identified in studies like those by Kangas et al. (2021). The thesis not only addresses significant gaps in the existing literature but also provides actionable insights for policymakers. The holistic approach that is being implemented ensures that the findings are relevant, empirical, and tailored to the specific challenges and conditions of the Greek pension system, offering new perspectives that previous academic studies have not adequately explored.

### **2.3 Public Pension Reforms: Trends**

In recent decades, the predominant strategy for tackling pension sustainability issues within the EU has involved elevating pension ages. This approach has been nearly universally applied across European nations, with Luxembourg being the notable exception, where both early and statutory retirement ages have seen increments. Notably, substantial increases have been enacted within a short span from 2008 to 2013 in countries such as Greece, Sweden, France, and Finland. Yet, despite this widespread trend towards higher pension ages, significant variation in retirement ages is expected to persist into the future. For instance, by 2070, the Ageing Report (2024) forecasts that the statutory retirement age in Denmark will reach 74 for both genders, in stark contrast to Bulgaria, where the retirement age is projected to remain at 65 for both men and women.

Given that the actual retirement age often falls below the statutory pension age, numerous EU Member States have implemented various measures to modify retirement incentives. In an effort to counteract the trend established in the 1970s, when pathways to early retirement were created to address rising unemployment rates, these avenues have now been either shut off to new applicants or significantly curtailed in several European countries, including Spain, France, the Netherlands, Austria, Romania, Finland, and Sweden. These pathways once included specific early retirement schemes or the utilization of unemployment or sickness benefits for the aging workforce, and have now seen restrictions, including tighter controls on disability pensions. Moreover, an increase in the required years of contributions to qualify for a full pension has been a common element in pension reform efforts. For instance, while the average contribution period was estimated at 34 years across the EU in 2014, it is expected to rise to approximately 38 years by 2060, as per the Ageing Report

2015. Additionally, the implementation of bonus/penalty systems for retiring after or before the standard pension age has become commonplace, with such schemes now present in 18 EU countries. Facilitating the combination of receiving a pension while continuing to earn a salary has also been a reform approach, as seen in countries like the Czech Republic, Spain, and Romania. A few nations have even moved away from a fixed statutory retirement age concept, exemplified by Sweden, which has adopted a flexible retirement age, and the UK, where the state pension age denotes the point from which one is eligible to draw a public pension, irrespective of their employment status (Carone et al., 2014).

Beyond actions to tighten eligibility by raising retirement ages and eliminating alternative early retirement options, a further suite of measures has been adopted across numerous EU countries, targeting the reduction of public pension generosity. These parametric reforms affect both the initial pension calculation and its subsequent adjustment over time, including aspects such as the years considered for pensionable earnings, the method of their valorisation, the indexing of ongoing pensions, and the calculation of benefit accruals. Initially, an array of countries has broadened the earnings assessment period for determining the inaugural pension benefit, transitioning away from the traditional method that often considered only a limited span of final or peak earnings years. This shift typically results in lower pension benefits due to the general trend of rising income as individuals advance in age and experience. Consequently, the benchmark for pensionable earnings has shifted toward a lifetime average of earnings in up to 18 Member States, providing a more comprehensive reflection of an individual's career earnings. In contrast, a few countries like Spain, France, Lithuania, Malta, Austria, and Slovenia, according to current laws, still calculate pensionable earnings based on a narrower segment of an individual's career, potentially reflecting a higher income period, thus typically resulting in higher pension benefits (Carone et al., 2014).

To further curtail pension benefits, numerous nations have adopted less favourable valorisation rules that adjust individuals past earnings to reflect changes in living standards from the time they earn their pension rights to when they begin to claim them. A select group of countries, including France, Belgium, and Portugal, have implemented a strict price-valorisation rule, which adjusts earnings solely based on price changes, typically reflecting inflation rates rather than wage growth. Conversely, several member states, such as Greece, Croatia, Romania, and Finland, have opted for a hybrid approach that incorporates both nominal wage growth and price increases in their valorisation formulas. This method offers a less generous adjustment compared to the wage-valorisation rule, which continues to be

employed by half of the EU countries, aligning pension values more closely with wage growth, thus maintaining relative living standards for retirees. Additionally, various countries have chosen to decrease the annual pension accrual rates. Some have done this directly, like Greece, Italy, Luxembourg, Austria, and Slovakia, affecting how much pension value is accrued per year of work. Others, including Belgium and France, have indirectly reduced accrual rates by extending the necessary contributory period to qualify for a full pension, imposing penalties for early retirement, or introducing a "sustainability factor" that adjusts benefits in accordance with shifts in life expectancy, aiming to reflect demographic changes and sustain the financial viability of pension systems. Another key parametric reform adopted to modulate the growth of pension benefits has involved altering the rules for adjusting ongoing pension payments in numerous EU member states, transitioning to less generous mechanisms. A significant shift has been observed where many countries have moved away from aligning pension benefits with wage increases, adopting instead full or partial indexation to consumer prices. Complete price indexation is relatively uncommon, with countries like France, Italy, Hungary, and Austria being notable examples where pensions are fully indexed to price changes, typically reflecting inflation rates rather than wage growth. Most member states have preferred a hybrid form of indexation, combining elements such as wages and prices or wages and GDP growth, akin to the Swiss formula. These mixed approaches aim to balance the need for pension value preservation against economic and fiscal realities. Several countries have integrated mechanisms like "sustainability factors" or "reduction coefficients" into their pension indexation formulas to further temper the rate at which pension benefits increase. An illustrative case is Spain, where a new indexation model was introduced, expected to rise at a pace slower than inflation (as detailed in the Ageing Report 2015). These adjustments are designed to mitigate the financial strain on pension systems, ensuring their long-term viability amidst varying economic conditions (Carone et al., 2014).

In the same paper it is mentioned the fact that on top of reforms aimed at reducing pension expenditures, numerous EU Member States have implemented measures to boost revenues to stabilize public pension systems. For instance, several countries have raised social contribution rates, with Denmark and France doing so more broadly, and nations like Bulgaria, Cyprus, Poland, Portugal, Finland, and the UK making such increases post-crisis. In an innovative approach to funding, some EU Member States have designated specific tax revenues to support their public pension systems, such as Germany, which allocated one percentage point of its VAT revenue for this purpose. Additionally, countries like Ireland, France, Cyprus, Portugal, and the UK increased the contribution rates for civil servants. On

the tax benefit side, adjustments were made by reducing tax reliefs or allowances associated with pension benefits, as seen in Ireland, France, Cyprus, Latvia, and Romania. Germany, seeking a more dynamic solution, implemented a balancing mechanism that quasi-automatically adjusts contributions to maintain the financial stability of its public pension system. Furthermore, to address future spending increases while retaining the pay-as-you-go structure of their pension systems, an expanding number of countries (then totalling 15) have established reserve funds. These funds are intended to provide a financial cushion that can help manage the anticipated rise in pension-related expenditures, showcasing a proactive approach to pension system sustainability.

In addition to parametric reforms, five 'old' EU Member States have implemented systemic pension reforms, as identified by Hering (2006). These countries include Sweden, Italy, Greece, and to some extent, Germany and Austria. In the late 1990s, Sweden and Italy transitioned to a Notional Defined Contributions (NDC) public pension system, marking a shift from a primarily single-pillar system to a more diversified multi-pillar structure. In 2010, Greece introduced a basic pension and overhauled its Defined Benefit (DB) first pillar. By 2012, Greece had also modified its second pillar to adopt an NDC framework, and in May 2016, it enacted another systemic pension reform that, while reducing benefits, retained many of the structural elements from the 2010 and 2012 reforms. Germany, through its 1992 and 2004 reforms, revised its public pension point system, which now incorporates characteristics akin to an NDC system and has promoted private pension schemes. Similarly, Austria in 2005 rolled out a new, more actuarially sound public pension system based on individual pension accounts, replacing its older, more fragmented framework. A key aspect of these significant reforms undertaken by these nations is their shared goal of enhancing fiscal sustainability. Simultaneously, they have aimed to consolidate various fragmented systems into more coherent and unified public pension schemes, reflecting a broader trend toward systemic reform in the European pension landscape.

More specifically, in 1998, Sweden initiated a comprehensive pension reform that garnered widespread agreement and was fully operational by 2003. This reform transitioned the public pension system to Notional Defined Contribution (NDC) rules and introduced additional, albeit smaller, Defined Contribution (DC) supplementary pillars, moving away from the primarily flat-rate and earnings-related PAYG Defined Benefit (DB) components of the old system. The significance of private pensions in Sweden, which accounted for about 20% of total pension expenditures in 2005, is expected to climb to over one-third by 2060. Italy's pension system underwent major changes with the reforms of 1992-93 and 1995, embracing

an NDC framework and evolving toward a tri-pillar architecture. Yet, the transition to the NDC system in Italy is unfolding slowly, with full implementation projected to span over 35 years, in contrast to Sweden's more rapid conversion. Supplementary pension coverage in Italy has been modest, prompting pre-crisis enhancements such as increased tax incentives and automatic transfers of severance pay into pension funds for private-sector workers. Germany has been reforming its pension system since 1992, influenced by reunification costs and anticipated demographic shifts. The reforms in 1992 and 2004, introducing contribution and sustainability factors, have aligned the German public pension point system more closely with an NDC model. The 2001 Riestert reform marked the beginning of a transition to a multi-pillar framework. By 2012, private pensions constituted about 10% of total pension expenditures. In 2005, Austria implemented a harmonized public pension system, adopting a more actuarially focused approach and utilizing individual pension accounts, although it continues to operate on a PAYG DB basis. This system is somewhat more akin to the German point system than the Swedish NDC model. Alongside, Austria introduced two new private pension schemes to promote the growth of secondary and tertiary pillars. Despite increased coverage over the past decade, private pension schemes in Austria still represent a small portion of the overall pension landscape (Hering, 2006).

In the late 1990s and early 2000s, facing the challenges of an aging population and their shifts towards market economies, numerous 'new' European countries implemented systemic pension reforms. These reforms were notably shaped by the World Bank's 1994 advocacy for a multi-pillar pension structure, emphasizing the significance of private individual pensions (Grech, 2010). Consequently, most of the 'new' EU Member States introduced compulsory private individual pension schemes, including Bulgaria, Estonia, Croatia, Latvia, Lithuania, Hungary, Poland, Romania, and Slovakia, reflecting a strong inclination towards bolstering private pension provision. Conversely, a smaller subset of countries opted for mandatory private occupational pension schemes, with Cyprus and Slovenia being pertinent examples. Additionally, certain nations transitioned their traditional Defined Benefit (DB) public pensions into more dynamic systems, such as the point system seen in Croatia, Cyprus, Romania, and Slovakia, or the Notional Defined Contribution (NDC) systems adopted by Latvia and Poland. A critical aspect of these reforms was the funding mechanism for the new private pension components, which often involved diverting a portion of social contributions or taxes originally designated for the conventional Pay-As-You-Go (PAYG) public schemes. This reallocation was instrumental in establishing the financial foundation for these nascent private pension systems, aligning with broader

European trends toward diversified pension structures to address demographic and economic pressures.

The 2009 financial and economic crisis significantly influenced various types of retirement income systems: initially, private funded pensions experienced a substantial decrease in asset values (a 23% drop in 2008), followed by financial instability caused by minimal returns. Concurrently, the weakening of public financial health necessitated cuts in governmental support, manifesting as reduced tax benefits or direct subsidies and, frequently, a temporary decrease in contributions. Public PAYG pension systems didn't escape unscathed either. They faced revenue reductions due to decreasing employment rates and wage growth, or in some cases, wage reductions. Additionally, the inclination to opt for early retirement grew among older workers who were laid off (Whitehouse, 2012). Furthermore, the escalation of public debt in several European nations, exacerbated by the need for banking rescues and the broader economic downturn, prompted urgent efforts in fiscal tightening.

Within this framework, the urgency to reform pension systems in the EU Member States gained momentum post-2008-09, with governments frequently implementing a blend of interim and enduring reformative actions. These temporary initiatives were primarily aimed at alleviating the immediate fiscal pressures on public pension systems, encompassing actions like halting pension indexation and, in some instances, reducing current pensions, alongside efforts to bolster funding through higher contribution rates, taxes, or expanded tax bases. The financial crisis's profound effect on state coffers, necessitated that several of these pension-related measures be enacted swiftly, sometimes taking effect almost instantaneously post-legislation, such as the hike in retirement age for women in Italy. This approach marked a departure from earlier pension reforms, which typically featured lengthy transition periods. Furthermore, to improve the long-term viability of public pension frameworks, additional comprehensive reforms were executed, exemplified by the introduction of automatic adjustment mechanisms in eight countries within four years following the crisis, a stark acceleration compared to the slower pace of similar reforms preceding the crisis over 14 years (Whitehouse, 2012).

In some instances, particularly within Eastern European nations, challenges facing private funded pension plans and budgetary manoeuvres aimed at curtailing public deficits and debts led to significant policy reversals, as highlighted by Bielawska et al. (2015). These policy shifts, while influenced by multiple factors, saw only a partial impact from fiscal rules. Notably, Hungary and Poland experienced a rollback in their private pension frameworks. Similarly, Slovakia altered its private pension system from mandatory to optional in 2013,



reflecting a broader regional trend of reevaluating the role of private pensions. Consequently, whereas the 2009 Ageing Report (AR) had anticipated a marked increase in private pension spending over the long haul, more recent assessments have substantially lowered these expectations. Several countries, including Latvia, Lithuania, Estonia, Romania, and Slovakia, implemented significant cuts to contributions directed toward private pension schemes, whether as temporary or enduring measures. In contrast, Sweden has maintained a steady contribution rate to its mandatory individual defined contribution (DC) pillar since its inception in 1998. The financial crisis effectively curbed, at least temporarily, the momentum towards expanding prefunded pension schemes across the EU (SPC, 2015). Additionally, certain countries tapped into reserve funds, initially set aside to support public PAYG pension systems, to alleviate their public deficits. For example, France and Poland utilized these reserves for such purposes. In Ireland's case, the National Pensions Reserve Fund (NPRF) was partially deployed to support bank recapitalization and secure the EU/IMF loan, illustrating diverse national responses to the fiscal pressures exacerbated by the crisis. Nations that sought macro-financial aid were typically the ones that implemented the broadest arrays of immediate and short-term strategies in response to the financial crisis. This group includes countries like Greece, Hungary, Romania, Ireland, Cyprus, Latvia, and Portugal. For instance, in 2014, Latvia decided to pause its scheduled elevation of the retirement age, and Romania reduced the social contributions required from employers, both strategies aimed at bolstering short-term employment opportunities. Such measures reflect a targeted approach to alleviate immediate economic pressures while balancing broader fiscal and structural challenges.

More pension reforms were introduced among OECD countries due to the emerge of the COVID-19 pandemic. has profoundly impacted global populations, significantly affecting health outcomes and leading to higher mortality rates, particularly among the elderly. In OECD countries, there was an observed increase in excess mortality of approximately 13% among those aged 65 and older, indicating that the actual deaths surpassed the anticipated figures based on data from 2015 to 2019 by this margin.

During 2020, a noticeable reduction in life expectancy was observed across the majority of OECD countries, a situation largely attributed to the surge in mortality rates stemming from the COVID-19 outbreak (OECD, 2021). The most substantial impact on excess mortality was observed among the population aged 60 and above, with this effect being particularly acute in nations that had not achieved high vaccination rates within this age group (Schöley et al., 2022). However, by the end of 2021, some countries had witnessed a reversal of these

trends, with life expectancy returning to the levels seen in 2019, as reported by OECD/European Union (2022) and Schöley et al. (2022).

Significant disparities in life expectancy exist across different socio-economic brackets, within all nations, with variations observable across occupational, income, and educational lines (Mosquera et al., 2018; OECD, 2017). Lifestyle habits, especially smoking, are notably influential in accounting for the disparities in life expectancy linked to educational levels (Mackenbach et al., 2019). Furthermore, the intersection of educational achievements and life expectancy can often be traced back to shared factors, such as the socio-economic conditions of the household in which an individual was raised. In the context of pension systems, income redistribution inherently occurs from individuals who die earlier to those who live longer. Given that lower earners typically have shorter life expectancies and thus collect pension benefits for a reduced duration, this mechanism inherently possesses a regressive characteristic, diminishing the overall progressivity of pension systems.

Tackling the issue of longevity inequality presents a significant challenge for pension policy frameworks. A hypothetical approach could involve setting varying retirement ages for different socio-economic groups to reflect their distinct life expectancies. However, accurately delineating these groups for practical application poses substantial difficulties, and the enforcement of such varied retirement rules would be complex (Deeg, De Tavernier and de Breij, 2021). Consequently, policymakers are advised to consider these disparities when establishing pension benefits for low-income earners, as pronounced longevity discrepancies warrant enhanced redistribution within pension formulas. Nonetheless, in addressing the appropriate measures to accommodate increasing life spans, the pivotal concern for pension distribution effects is not the mere presence of life expectancy inequalities but rather the evolution of these disparities over time (OECD, 2021). If the gaps in life expectancy remain relatively constant, it suggests that advancements in longevity are likely to be distributed proportionately across various socio-economic categories.

Few countries have implemented specific regulations for individuals who commenced their employment at an early age, aiming to address the health and life expectancy disparities these individuals might face. The underlying logic is that early workers often have less educational time, are less likely to possess higher education qualifications, and tend to engage in physically demanding or hazardous jobs, which could negatively affect their health and longevity. Yet, an examination of such a policy in France indicates that those who retire under early-starter provisions do not exhibit higher mortality rates and generally possess better health at retirement compared to counterparts retiring under standard old-age pension

provisions. A significant reason for this outcome is that early retirement schemes usually demand extensive career lengths, meaning that predominantly healthier individuals are able to take advantage of these programs (Aubert, 2023; Börsch-Supan et al., 2022).

Over the last years, the Slovak Republic and Sweden have established a connection between their retirement ages and life expectancy, aligning with practices already in place in Denmark, Estonia, Finland, Greece, Italy, the Netherlands, and Portugal. These developments were elaborated upon in the prior version of "Pensions at a Glance" (OECD, 2021). Additionally, the idea of linking retirement age to life expectancy is currently under consideration in Czechia and Norway, especially following a recommendation from the Norwegian Pension Commission in 2022.

The Slovak Republic had initially implemented a mechanism tying retirement age to life expectancy, but this was discontinued when a decision was made to set a maximum retirement age of 64 by the year 2030. However, in October 2022, the country reintroduced this linkage. Starting from 2030, for individuals born in 1967 and onwards, the retirement age will be adjusted in accordance with increases in life expectancy. Such adjustments to the retirement age are anticipated to result in higher replacement rates for individuals who prolong their careers, though this effect will be somewhat moderated because past wages will be indexed to 95% of wage growth, not 100%, beginning January 2023. Prior to this reform, pension expenditures in the Slovak Republic were expected to escalate to very high levels, but the reestablished connection between retirement age and life expectancy is projected to substantially curb these expenditure growths (OECD, 2023).

Sweden has undertaken significant reforms in its retirement age structures within both targeted and Notional Defined Contribution (NDC) pension schemes. Starting in 2023, the age at which individuals become eligible for targeted benefits, specifically the guaranteed pension, was raised from 65 to 66 years. This age threshold is set to increase further to 67 by 2026, after which it will adjust in response to two-thirds of the life expectancy improvements at age 65. In the context of the NDC scheme, Sweden has introduced a 'target retirement age' concept designed to influence retirement timing by suggesting an optimal retirement age. This target retirement age is set to be established at 67 years in 2026 and will thereafter be adjusted according to the same life expectancy linkage as the guaranteed pension's eligibility age. Additionally, the minimum age at which individuals can start drawing from the NDC pension was raised from 61 to 62 years in 2020, reached 63 in 2023, and is slated to increase to 64 years by 2026. Subsequent to this change, the minimum

retirement age will consistently be three years less than the target retirement age, thereby aligning with life expectancy shifts going forward (OECD, 2023).

Automatic mechanisms to adjust the retirement age in alignment with life expectancy are becoming a prevalent strategy within OECD nations, with a quarter of these countries now establishing such a correlation. Denmark, Estonia, Greece, Italy, and the Slovak Republic have adopted a one-to-one linkage, where the retirement age increases in direct proportion to the rise in life expectancy. On the other hand, Finland, the Netherlands, Portugal, and Sweden have chosen a two-thirds linkage, enhancing the retirement age by eight months for every one-year increase in life expectancy. This latter approach aims to maintain a consistent proportion of adulthood that individuals are expected to spend in retirement across different generations (OECD, 2023).

Aligning with a broader trend observed across OECD countries since the 1990s, both Costa Rica and Czech Republic have recently implemented stricter conditions for early retirement, while France has elevated its minimum retirement age in the past couple of years. Conversely, Türkiye and, to a more moderate degree, Iceland have adjusted their policies to allow for earlier retirement. Meanwhile, Italy has temporarily broadened its early retirement provisions, which were initially set to conclude. In the Slovak Republic, the approach has been more nuanced, with restrictions being tightened for certain groups and relaxed for others, indicating a targeted strategy to address specific needs or circumstances within its population. The 2023 pension reform in France, driven primarily by the objective to support pension system finances by the year 2030, has elevated the minimum retirement age within the principal mandatory pension schemes. Previously established at 62, this age threshold is slated to incrementally rise by three months annually starting from September 2023, culminating at the age of 64 by the year 2032. Poland and Spain have implemented measures to encourage individuals to postpone their pension claims. Specifically, Poland has adopted a policy providing favourable tax treatment for the labour income of individuals who have reached the statutory retirement age but choose to defer their pension benefits, aiming to incentivize a delay in retirement. Denmark and Germany have abolished, and Australia has decreased, the offsetting of pension income against earned income. This change allows individuals in these countries to earn more from work without reducing their pension benefits, thereby encouraging continued workforce participation among pension recipients (OECD, 2023).

Many more reforms took place or are in progress in order to ensure the financial sustainability of the pension system in every country. The present study will be focused on

the recent reform that adopted by Greece introducing a capitalization system in the supplementary insurance.

The shift from Defined Benefit (DB) to Defined Contribution (DC) pension schemes has been a significant trend in pension reform globally. While DC schemes offer several advantages, including portability and the potential for higher returns through investment in diverse financial instruments, they are not without risks. One critical risk is the potential for negative returns, which can significantly impact the pensions that individuals ultimately receive. This risk necessitates a thorough examination to understand its implications and to develop strategies to mitigate its adverse effects.

In a DC scheme, the retirement benefits are directly tied to the performance of the invested contributions. This structure inherently exposes individual retirement savings to market volatility. Unlike DB schemes, where the employer bears the investment risk and guarantees a specific retirement benefit, DC scheme participants bear the full brunt of investment risks. Consequently, during periods of poor market performance, participants may experience negative returns, which can erode their retirement savings and reduce their financial security in retirement. The volatility of financial markets means that returns on investments can fluctuate widely. Economic downturns, financial crises, and prolonged periods of low interest rates can all contribute to negative returns. For instance, the global financial crisis of 2008 resulted in significant losses for many DC pension funds, highlighting the vulnerability of these schemes to market shocks (OECD, 2019; Stewart and Yermo, 2008).

Negative returns in DC schemes can have profound implications for retirement security. When investments perform poorly, the value of the pension pot diminishes, potentially leaving retirees with insufficient funds to maintain their standard of living. This risk is particularly acute for individuals nearing retirement, as they have less time to recover from market downturns. Moreover, prolonged periods of negative returns can compound over time, leading to substantial shortfalls in expected retirement income (Antolin, 2008).

To address the risks associated with negative returns in DC schemes, several strategies can be implemented. One of the fundamental principles of investment is diversification. By spreading investments across a variety of asset classes (stocks, bonds, real estate, etc.), participants can reduce the risk of significant losses. Diversification helps to balance the performance of different assets, as the poor performance of one asset class may be offset by the better performance of another (Markowitz, 1952).

A second strategy is “lifecycle” or “target-date” funds, which automatically adjust the asset allocation, as the participant approaches retirement. These funds typically start with a higher allocation to equities (which have higher potential returns but also higher risk) and gradually shift towards more conservative investments (like bonds) as the retirement date nears. This strategy aims to reduce exposure to market volatility as participants age (Poterba et al., 2006).

A third strategy is Regular Contributions and Dollar-Cost Averaging. Encouraging regular contributions can help mitigate the impact of market volatility. Dollar-cost averaging, where participants invest a fixed amount regularly, can reduce the average cost of investments over time and lessen the impact of market fluctuations (Thorley, 1994).

A fourth strategy is Risk Management Tools. Financial instruments such as options, futures, and other derivatives can be used to hedge against market risks. These tools can provide a form of insurance against significant market downturns (Hull, 2012). A fifth strategy is Guaranteed Minimum Returns: Some DC plans offer investment options that include guarantees of minimum returns. While these options may come with lower potential returns, they provide a safety net against negative returns, ensuring that participants do not lose their principal investment (Mitchell and Turner, 2010).

A final strategy is Financial Education and Advice: Providing participants with education and access to financial advice can help them make informed investment decisions. Understanding the risks and benefits of different investment strategies can empower participants to manage their retirement savings more effectively (Lusardi and Mitchell, 2007).

## **2.4 Reforming the Pension System in Greece**

### **2.4.1 Introduction**

Social Security systems have gone through various changes in many countries over the last decades. As demographic trends change, our standard of living improves, social considerations are evolving and return rates for investments remain volatile.

Greece, in addition, faced severe economic and social challenges since 2010. Challenges, which led the country to undergo a series of significant reforms in its social security and pension system. The main goal was to rationalize spending and bring it closer to the EU average. In 2020, it was 29.2% of GDP and in 2021 it was 26.8% (Eurostat, 2023). The state budget still finances half of the pension budget, with social security contributions – paid by

employers and employees, accounting for the other half. State transfers for pensions accounted for 6,8% of GDP and 26% of tax revenue (Ministry of Finance, 2020).

The pension system in Greece is predominantly public in nature and works on a Pay As You Go (PAYGO) basis. In such a system the social security contributions of income earners are used to fund the pension benefits of current retirees. The Greek pension system provides for a “main pension” (around 90% of total expenditure) and for an “auxiliary pension” (10% of expenditure). The main pension operates on a Defined Benefits (DB) basis, while auxiliary pensions on a mixed DB and Notional Defined Contribution (NDC) basis, the later applying for post January 1<sup>st</sup>, 2014, contributions (Law 4387/2016). A DB scheme is vulnerable to demographics and fiscal crises (Selody, 2007; Yermo and Severinson, 2010). Population aging weakens the financial sustainability of Greece's pension system, as the number of retirees increases and the working population declines. These forecasts, signal the need to reform the current system and turn to a more viable (European Central Bank, 2018).

Putting “all eggs in one basket” has not been proved very wise in terms of pension – policy (Dequest, Martellini and Milhau, 2015). The introduction of a certain degree of diversity, a mix of risks that combines security with increased returns, could be an answer to all those issues. However, Greece remained for years a “terra incognita” as regards pension systems reforms. No attempt to move to a partially or fully funded pension scheme was ever materialized, mainly because public opinion and the political system were sceptic or even hostile. However, this may be the most demanding part of the change, in the sense that in such reforms, political risk may prove to be the highest of risks and many reforms were reversed either by governmental changes, or poor public acceptance (Venezuela, Ecuador, Nicaragua, Hungary, Poland, Argentina, Kazakhstan) (Ortiz et al., 2018). To accomplish a reform should be perceived as beneficial for current and future generations. Acceptable to stakeholders.

The need for a change in the pension system became a reality in 2021, when the Greek government passed a bill -Law 4826/2021- introducing a funded system in supplementary (auxiliary) social insurance. We will therefore present the new fund created to support the new system, as well as evidence that highlights its need, the benefits it will have both to beneficiaries and the economy in general, and the costs of transition to the new system. Recent examples of reforms, which we present, help us to understand the steps that need to be taken for the new reform to become an important part of the pension system, while solving the problems created by the old system and avoiding the mistakes of the past.

## 2.4.2 Learning from international experience

During recent decades, many countries (in Europe, Latin and South America, Africa etc.) undertook major pension reforms, moving from defined benefits (DB) systems to defined contribution (DC) systems. On many occasions, these reforms included the transition from state- to privately – managed systems. This, as we will explain later, proved to be a major factor affecting the reform’s success probabilities. In this section we will present some successful and not so successful cases, trying to highlight success and failure factors.

**Opportunities to design a pension system from scratch do not arise very frequently.**

Hence, the Greek experiment to introduce a DC system for labour market entrants, should be used to strive for excellence on behalf of the participants. Therefore, building the reform on best practice examples and avoiding pitfalls experienced by other countries should be a guiding star for the reform efforts of the Greek Government.

**Funded pensions play a key role in all best-in-class pension systems – e.g., Australia, Canada, Denmark, the Netherlands, New Zealand, Sweden, and the UK.** In all cases, funded pensions provide supplementary pension cover, and the schemes are designed as complements to a PAYG-financed basic public pension system. Such funded systems are either DC, or they are DB schemes (Canada and the Netherlands) equipped with financial stabilizers to ensure financial sustainability and avoid intergenerational inequity (Antolin, 2008; Palmer, 2011; OECD, 2018).

**The best-in-class group include successful DC pension savings systems:** E.g., the Premium Pension System (and AP7), and the labour market pensions in Sweden (Palmer, 2000), as well as the ATP, the occupational pension funds in Denmark, and the NEST default arrangement on the UK workplace pension system. Even the Australian superannuation and the New Zealand Kiwi-Saver belong to this group – especially after recent reforms addressing early design flaws.

**All these systems are designed to fit a specific public pension system and a particular national political context.** However, across the contextual variation key lessons have crystallized. All of them display how good design, professional management and execution, transparency and strong supervision are key prerequisites for success. As such they have served as important points of reference for the development of the DC pension systems and the relevant DC funds.

**However, the introduction of a funded pillar is not a “silver bullet”, and the success of such reform is not given.** In several instances, reforms have been partially or fully reversed,



including the Czech Republic in 2016 and Poland in 2011 and 2014. ILO (2018), summarizes the critique against these DB to DC reforms. Since the 1990s, many countries have introduced structural reforms to their pension systems. Reform efforts have taken two different directions.

*First*, a strong global trend across private occupational systems has been a shift from a defined benefit (DB) model to defined contribution (DC) individual accounts model<sup>1</sup>. This shift is driven by low interest rates and increasing longevity.

*Secondly*, many countries have introduced mandatory funded pillars. Such reforms come in two main-groups:

- One type of reform involved replacing an existing Pay As You Go (PAYG) system with defined contribution fully-funded individual accounts. Examples include Chile (1981), Mexico (1997), Kazakhstan (1998), and the Dominican Republic (2003).
- Another type involved the introduction of a complementary DC component as part of the overall pension system – often shifting social se. The weight of the pillars significantly differs among countries. Examples include Argentina (1994), Hungary (1998), Poland (1999) (Polakowski and Hagemjer, 2018), Latvia (2001), Bulgaria (2002), Croatia (1999), Estonia (2002), Lithuania (2004), Romania (2004) and Slovakia (2005).

**Failure and success link with the same key aspects as highlighted earlier.** Just as good design, professional management and execution, transparency and strong supervision are key prerequisites for success, they can also lead to failure if they are not addressed properly and consistently. Adding to this aspect, common denominators for the less successful examples are that reforms have been overly confident in the power of incentives, the individual's ability to address and process complex financial information, and the sole power of competition to drive product development and reduce costs. Furthermore, such reforms have failed to address information asymmetry and the imperfection of markets for complex financial products, and they have failed to create a strong custodianship on behalf of the participants.

**In relation to some of the failed reform efforts five challenges have been identified by the ILO (2018) as central in the debate regarding social security pension reform.** These are valid points of criticism in relation to some of the less successful reform efforts.

---

<sup>1</sup> However, none have, so far, undertaken the transition from NDC to DC.

- A. **The reforms did not increase coverage nor compliance rates:** The introduction of a defined contribution system was marketed in many countries as the solution to poor contribution compliance. However, few concerted efforts were taken to secure this. E.g., in Poland, the reform did not have a major impact on coverage because the supporting systems did not change with the reform; first, there was a decrease and later an increase – the overall number of persons covered was mainly a function of general employment levels. Hence, the strong focus on systems and procedures to enhance compliance rates needed were generally underestimated.
- B. **High administrative costs:** In most cases the high costs of the individual account systems could be explained by the effect of high management fees in the private pension companies tasked with administering the mandatory (or quasi-mandatory) savings arrangements. Examples count the mandatory DC schemes in Latvia and Lithuania. Several UCITS funds that are offered to DC participants in Latvia and Lithuania are also offered to participants in the Swedish Premium Pension System – albeit at significantly lower fees. The lower fees paid in Sweden is due to regulation and the custodianship national Pensions Agency. Thus, in Latvia and Lithuania economies of scale have primarily benefited the private pension companies instead of trickling down to the individual pension savers. Similar challenges were also seen in New Zealand's KiwiSaver or Australia's Superannuation system. Up until recently, those systems worked as retail systems for personal pensions, rather than wholesale markets.
- C. **Lower pension benefits:** Pension reforms as observed in Eastern Europe and Latin America generally resulted in a deterioration of the pension replacement rates. This had less to do with the reforms as such and more to do with the previous systems being unsustainable. Inspired by Chile, some Latin American countries replaced basic old age pensions with a savings-based scheme – however for large segments of the work force this strategy proved inadequate because of low contribution density. Chile has since reintroduced a basic minimum pension.
- D. **High fiscal costs, i.e., transition costs were underestimated:** In most cases, the main source of motivation for the pension reforms in Eastern Europe and South America was the fiscal pressures created by public pension systems. In many cases no sound analysis of the transition costs was carried out prior to the reform.
- E. **Lack of social dialogue:** Many of the reforms in Central and Eastern Europe and Latin America were implemented with limited social dialogue, which later led to legitimacy problems. Prior to the reforms, most public pension funds had some form of tripartite

involvement – formal or informal – through representatives of employees, employers, and the government. This is in line with ISSA Guidelines on Good Governance that includes recommendation on stakeholder representation as a way of building partnership between the board and the institution's stakeholders, allowing better policy making, improvement of trust among stakeholders and the enhancement of transparency. The reforms in Central and Eastern Europe and Latin America generally eliminated such participation, despite the employees being owners of the individual accounts.

Other elements of success to a DB to DC transition include strong system custodianship to protect participants best interests, openness and transparency including strong reporting of risk, returns, performance and costs as well as strong design to facilitate but not mandate individual choice (OECD, 2013). A main conclusion driven from the literature on several successful and less successful cases of DB to DC reforms is that these should always be based on strong managerial, supervisory and regulatory principles, in order to safeguard both the interests of the participants as well as the stability of the system.

Following the sovereign debt crisis, during the past decade especially in Europe, the pace of reforms has been slowed down. However, there were concerns about the financial sustainability and pension adequacy of current pension systems. Despite several reversed reforms, there are continuous concerns for those countries with defined benefit systems. Several measures can be taken in order to ensure the financial sustainability of the system, such as raising contributions, cutting benefits and limiting the indexation of pensions in payment. The continued ageing of societies, along with the maintaining of income adequacy, raised awareness and highlights the importance of continuing to improve pension systems. Both political and popular support are needed to implement a pension reform, otherwise may be reversed and cause side-effects as it tends to amplify economic cycles (OECD, 2017).

The usual response to the demographic problem of public pension in developed countries is the development of a multi-pillar system. In short, higher income - earners have the possibility to take care of a larger part of their own financial situation after retirement. With or without the participation of public entities in replenishing higher incomes, public resources are released for other purposes, such as focusing on lower incomes. In other words, a new distribution is sought between private and social security as distinct pillars of support for a single structure. This was the basic idea behind many reforms the last 20 years. More specifically, how public opinion understands the problem in the pension system and reacts to the proposed changes are at the centre of international interest in the issue of pensions (Tinios and Poupakis, 2013).

As we already mentioned, a driver for pension reform is the need to ensure financial viability of each scheme. Barr (2000) opposes that logic and he states that the raise of retirement age and the reduction of benefits to the pensioners are insufficient measures for addressing the problems of the existing PAYG systems. Meng and Pfau (2010) argue that for pension reform to be effective, a strong regulatory environment and effective institutions are needed. Moreover, a country must ensure some economic system preconditions so that it will be able to gain the most from a pension reform. As Moleko and Ikhide (2019) point out, a transition from a PAYG to a fully funded scheme produces financial gains for both financial institutions and banks. The preconditions of economic stability, the effective regulation and supervision and the dynamic linking between capital markets and pension funds will help limit the reduction of the gains.

Still, every transition from one scheme to another requires on-going payments to retirees or the ones who will retire with the previous system. This transition cost can be spread through the generations, or it can bear down on current workers. Nevertheless, based on the decision that will be taken on who is going to burden with the cost, the net gains of the reform will be determined (Cuevas et al, 2008; Zandberg and Spierdijk, 2013).

### 2.4.3 The Pension System in Greece

The pension system in Greece is public in nature and is structured on a PAYGO basis. The pension system typically consists of three pillars but is essentially based on the first (public and mandatory) pillar. Those three pillars are described on Figure 1 below. The PAYG scheme is based on the fact that the salary contributions of current employees plus the state budget contributions cover the benefits to retirees. Thus, the system is based on the so-called “solidarity of generations”. Therefore, demographic characteristics, such as fertility rates, longevity and population aging, play a key role in the level of benefits. As a result, radical changes such as the combination of an aging population with prolonged longevity and lower fertility rates, are key drivers of financial pressures or deficits in the public fund.

**Figure 1: The 3-Pillar Greek Pension System (before the September 2021 reform)**

<b>First Pillar</b>	<b>Second Pillar</b>	<b>Third Pillar</b>
<ul style="list-style-type: none"> <li>● Mandatory</li> <li>● Public</li> </ul>	<ul style="list-style-type: none"> <li>● Voluntary</li> <li>● Industry/ firm level</li> </ul>	<ul style="list-style-type: none"> <li>● Voluntary</li> <li>● Private</li> </ul>

<b>First Pillar</b>	<b>Second Pillar</b>	<b>Third Pillar</b>
<ul style="list-style-type: none"> <li>● Main pensions: DB / PAYGO</li> <li>● Auxiliary pensions: DB - NDC</li> <li>● Tripartite funding: Employees, employers, state</li> </ul>	<ul style="list-style-type: none"> <li>● Fully funded schemes</li> <li>● IORPs</li> <li>● Double funding: employees, employers</li> </ul>	<ul style="list-style-type: none"> <li>● Fully funded schemes</li> <li>● Private individual retirement funds</li> </ul>

### ***2.4.3.1 Public Mandatory Insurance Pillar***

The first pillar includes the so-called main pensions, the auxiliary pensions and lump-sum retirement benefits. Below we briefly present main and auxiliary pensions, while we leave out of the analysis the lump sum retirement benefits, as they do not account for “pensions”.

#### **2.4.3.1.1 Main pensions**

Main pensions comprise of two parts: a) the “national pension”, a flat-rate pension set at €426.17 per month, due to recent increase, for at least twenty (20) years of contributions, which is decreased by 2% yearly until the 15<sup>th</sup> year of contributions. It is financed entirely by the state budget, hence it is the redistributive part of pensions. b) the contributory pension that operates under a defined benefit pay-as-you-go scheme, based on years of work and wages earned (Ministry of Labour and Social Security, 2024).

After some serious parametric changes between 2011 and 2016 that resulted in significant fiscal savings, the main pension system was largely reformed, following Laws 4387/2016 and 4670/2020. All main pension funds have been merged into a single one (EFKA, then renamed to e-EFKA in 2020), and new rules apply to main pension calculations. Accrual rates used for the calculation of the contributory part rise with years worked, starting from 0.77% for each of the first 15 years to 2.55% for years 36 to 40 (see Table 1). Those in pension before 2016, receive the difference between their pension as calculated following the old rules and the one they would receive following the new rules.

The sum of National Pension and contributory pension should keep a person’s standard of living as close as it was before retirement. Total replacement rates are more favourable for those who work longer, but also for low earners.

**Table 1: Accrual rates for the contributory pension by law 4670/2020**

Contributory Years		Annual Replacement Rates
From	To	
0	15	0.77%
15.01	18	0.84%
18.01	21	0.90%
21.01	24	0.96%
24.01	27	1.03%
27.01	30	1.21%
30.01	33	1.98%
33.01	36	2.50%
36.01	40	2.55%
40.01	Onwards	0,50%

Concerning the retirement age and the eligibility rules, recent legislation increased the age thresholds in line with the change in life expectancy of Greece's population.

#### **2.4.3.1.2 Auxiliary pensions**

Auxiliary pension is financed by both employer and employee contributions set at 6%<sup>2</sup> (3% + 3%) of wages, and there is no state contribution. Currently, a mixed DB / NDC system is applied in pension calculations, with the NDC part steadily increasing as a part of the pension while the DB part is phasing out. For the NDC part of the provision, an implicit rate of interest, based on wages earned on the economy, is used. The auxiliary pension scheme is mandatory for salaried employees (private and public sector) and certain professions (lawyers and engineers). Participation in auxiliary pension scheme is optional for all other

---

<sup>2</sup> Contributions on auxiliary pensions are set to 6,5% (3,25 + 3,25%) until June 2022, falling to 6% afterwards.

employment groups. It is awarded under the main prerequisites of a) having at least 15 years of contributions and b) having received the main pension.

By construction, auxiliary pensions also face longevity and demographic risks, similar to main pensions. Moreover, there is no diversification on the “pension basket” of pensioners. The pension system by its very nature is inextricably linked to the economy and depends on the economic cycle and fiscal conditions. Number of current pensioners, age of retirement and replacement rates determine how high or low the pension will be in the retirement period.

Every part of the pension that is operating under a public statutory scheme is the most affected by economic shocks. On our occasion, all pension parts are either (entirely or partly) financed by the state, or (in the case of auxiliary pensions) the state guarantees pensions and defines provision rules. Therefore, lack of risk diversification increases the pressure in the state budget and calls for reforms.

#### **2.4.3.1.3 Designing a reform**

In September 2021 the Greek Parliament adopted legislation about a new pension reform. The reform regards the auxiliary pension system and includes the transition from the current Pay-as-you-go to a DC Fully-Funded scheme. The purpose of the law was to introduce a funded defined contribution scheme in supplementary insurance in order to contribute to ensuring an adequate standard of living for pensioners, as well as to the sustainability of a social security system which contributes to the development of the economy. This reform marks the solution of the pension problem with the risk spreading that offers. In this way, each part of the pension will contain a different risk, helping individuals to manage their pension better. Also, with the introduction of a fully funded scheme, the private sector comes in to assist in the provision of pensions, helping the state to maintain a satisfactory level of pensions for new generations.

#### **2.4.3.2 Occupational Insurance Funds**

As Pillar I is entirely PAYGO and dependent on state funding and guarantee, Pillar II, namely occupational insurance could in principle be the DC part of the pension system. According to EIOPA (2018), occupational insurance is effectively implemented at European level, allowing the widest possible dispersion of demographic and financial risks. However, Greece remains in one of the last places in EU countries, regarding Pillar II coverage and participation due to a number of factors including legal, financial, governance and supervision issues.

Pillar II Occupational Insurance, was established in Greece in 2002. It is provided through Occupational Insurance funds, (hereafter IORPs), and is considered to be a complementary mechanism of insurance coverage for employees. IORPs are non-profit legal entities under private law and participation is optional. They operate under the legal framework of L.3029/2002, L.4680/2020, and relevant Ministerial Decisions. The legal framework in Greece allows for extended degrees of freedom, therefore several issues, including level of contributions, time and kind of provisions are decided at the fund's level. As a result, the second pillar is highly fragmented, and differentiated, creating also problems in supervision, transparency and governance.

Following case laws, mandatory social security schemes in Greece should be provided through state or public entities. Therefore, participation in second pillar schemes is not only optional, but currently there is no way to impose any kind of mandatory schemes. This creates restrictions in growth prospects of the market and highlights the fact that any mandatory DC scheme should be provided through the first pillar.

Under the definition of the IORPs directive, and especially the IORP II<sup>3</sup> Occupational Funds could operate independently of the employer, either as an “open” type, with the participation of companies, institutions from various sectors, or as a “closed” type, with the participation limited to one or more companies in the same industry (Karavitis, 2011). Currently in Greece, only “closed” type IORPs are allowed, limiting even further their growth prospects.

The occupational pension sector in Greece currently consists of 22 active IORPs. Up from 13 IORPs in 2017, 8 new IORPs were established in 2018-2020, and 1 in the first half of 2021. Five (5) more are currently in the process of seeking authorization<sup>4</sup>. Six (6) existing IORPs are also in the process of amending their statutes, mainly to comply with the new provisions of the IORP II Directive or to increase contribution levels.

The currently existing IORPs operate on the basis of the defined contributions (DC) system. These IORPs are relatively small, ranging from 200 to 8,000 members. At the end of 2020, there were 33,000 members in 19 IORPs with EUR 150 million assets under management<sup>5</sup>.

---

<sup>3</sup> Directive (EU) 2016/2341 of the European Parliament and of the Council of 14 December 2016 on the activities and supervision of institutions for occupational retirement provision (IORPs) commonly referred to as “IORP II Directive”.

<sup>4</sup> According to information provided by the Ministry of Labour, September 2021.

<sup>5</sup> In the EIOPA pensions statistics 2004-2019 we see for year 2019 that IORPs had 21 thousand members and managed EUR 121 million of assets. We see similar numbers in the EIOPA Database of pension plans and products in the EEA.



Overall participation in occupational pensions is low and coverage in supplementary pensions remains limited in Greece. Based on data from the National Actuarial Authority (2021), today nineteen IORPs have 33,5 thousand insured people in total and €159,7 million total value of assets. The proportion of employees who participate in occupational pensions amounts for 0.84% of total employed, relatively small compared to other Member States.

The growth prospects of the sector are further limited by the way Pillar I is organized. Universal coverage of the working population by Pillar I mandatory pension schemes, high social security contribution rates that reach 40% of wages in some cases, and pension provisions with replacement rates above 50% (for low wage earners replacement rates could reach 80-90%), do not leave much space for occupational pensions in Greece (National Actuarial Authority, 2021).

Despite the fact that the development and growth of occupational funds could seem as the natural choice to introduce DC and required diversification in the Greek pension system, there are a number of factors that do not permit that. The most important are the architecture of the first pillar (universal coverage, high rates of contributions and replacement rates), the small and fragmented size of the Pillar II market and the constitutional provision that mandatory pension schemes should be provided only by state or public entities. As such, the reform of auxiliary pensions within Pillar I, seemed as the natural choice to introduce DC elements in the system.

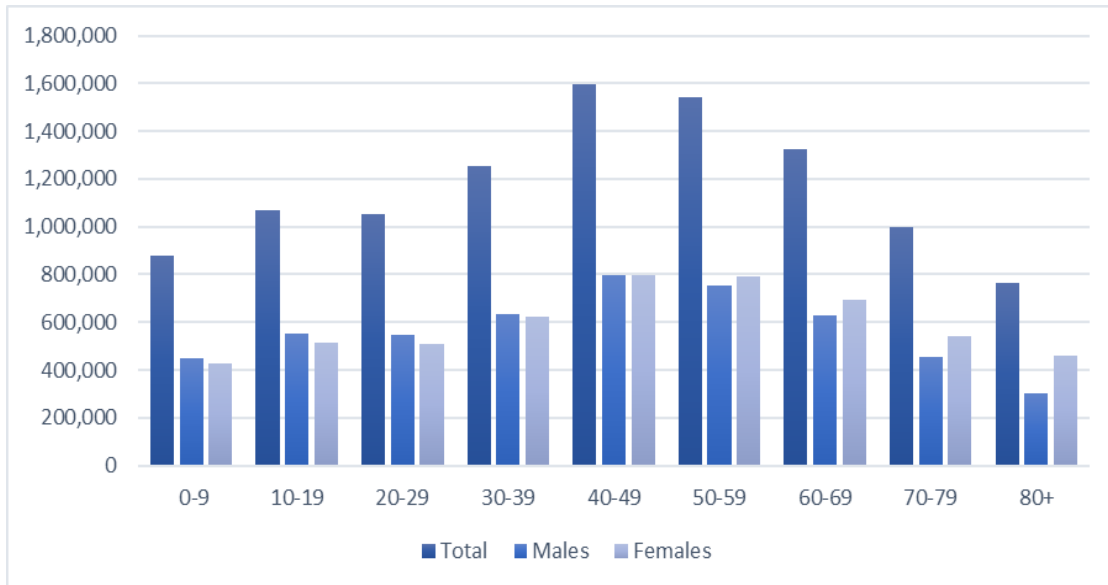
#### **2.4.4 Necessity of the Reform**

What calls for a reform of the Greek pension system? We have identified and present below three main lines of arguments in favour of a reform. First there are socio-economic conditions and demographic pressure put on the pension system, then we have the characteristic of the labour market itself with low participation rates and low earnings levels and thirdly the pension system itself which is characterized by low diversity, high replacement rates, high social security contributions and increased state budget dependency.

##### ***2.4.4.1 Socio-Demographic overview***

Last complete population data available for Greece is from Population – Housing Census of 2021, which was held in November of that year. The total population was 10.4 million persons (see Figure 2 for a breakdown by age group).

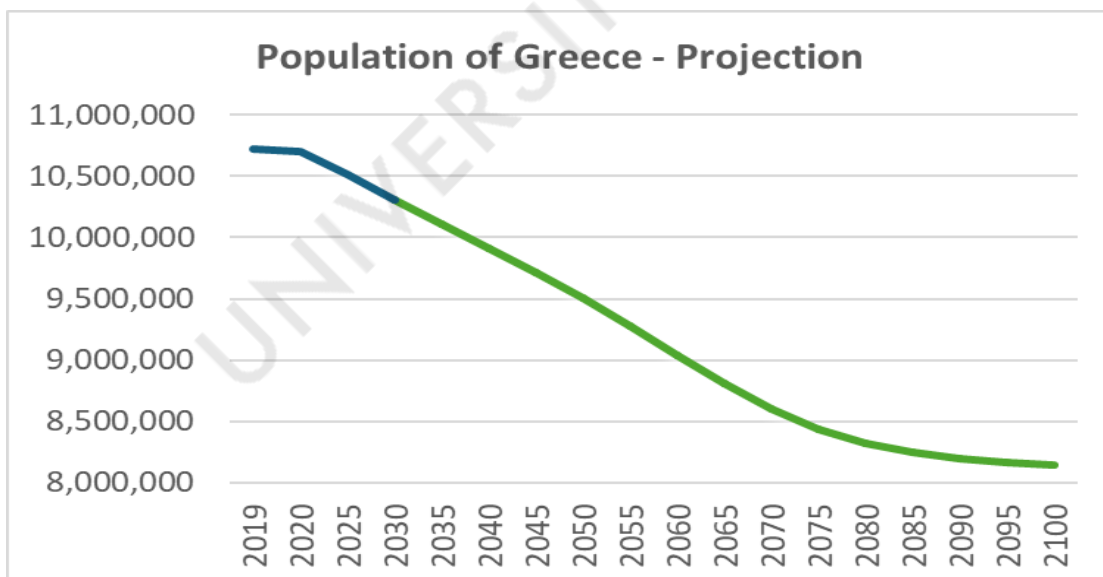
**Figure 2: Population of Greece: breakdown by age group 2021**



Source: ELSTAT (2023)

Annual population figures by ELSTAT show a decrease in population in the period 2011 – 2021 from 11.1 million and put the population at about 10.4 million in 2021. According to population projection exercise published in 2023 by EUROSTAT, the total population in Greece is expected to decline by 20% by 2070, based on 2022 data and an estimated projection of 2.1 million fewer individuals (see Figure 3) using a baseline of zero net migration and recent trends in fertility and mortality assumptions.

**Figure 3: Recent development and projection of the population of Greece**



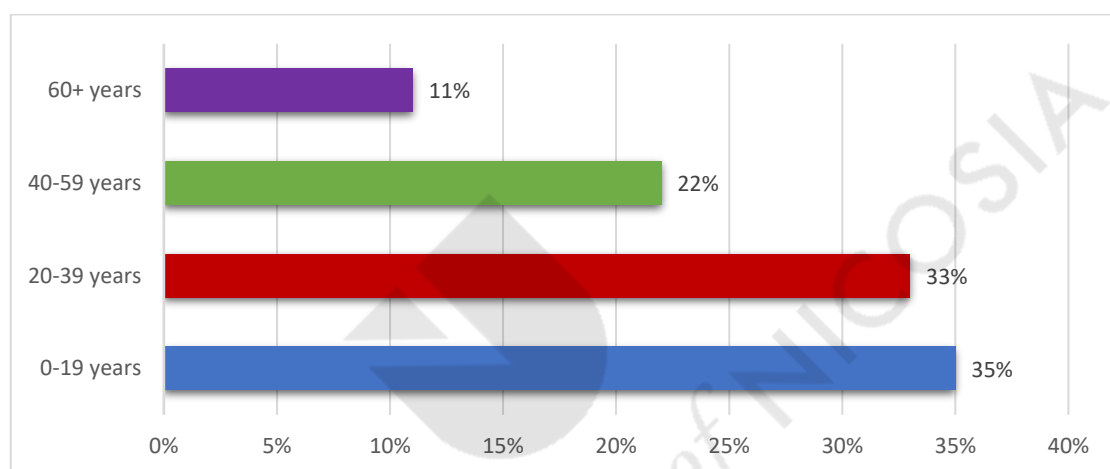
Source: Eurostat (2023) (*Statistics / Eurostat*)

One of the biggest issues of the Greek economy is the demographic developments in the population, as Eurostat projected a depopulation from 10.724 million in 2019 to 8.603

million in 2070. Also, projections on life expectancy of people show that both men and women will live longer. For men the life expectancy increases from 78.8 years in 2022 to 86.5 years in 2070 and for women from 84.2 years in 2022 to 90.4 years in 2070.

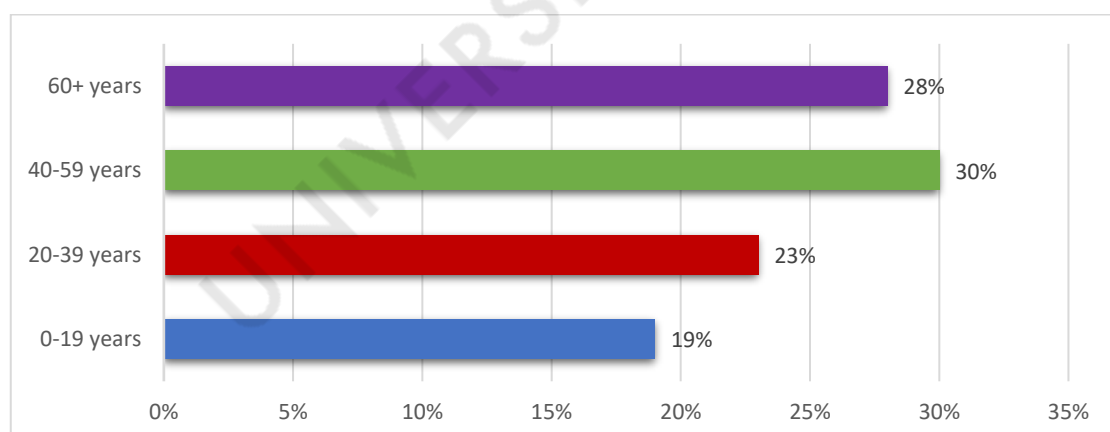
The dominant age groups eventually will be those over 60, while the younger ages will continue falling and becoming a smaller share of the population (see Graphs 1,2 and 3). In 1960 people aged 60 and over accounted for 11% of the population, while the same group is expected to rise to 42% of total population in 2070. At the same time, there is a constant decrease in younger ages (aged 20-59 years old): In the 1960's they accounted for 55% of total population and is expected to fall to 42% by 2070.

**Graph 1: Inverse population pyramid in 1960**



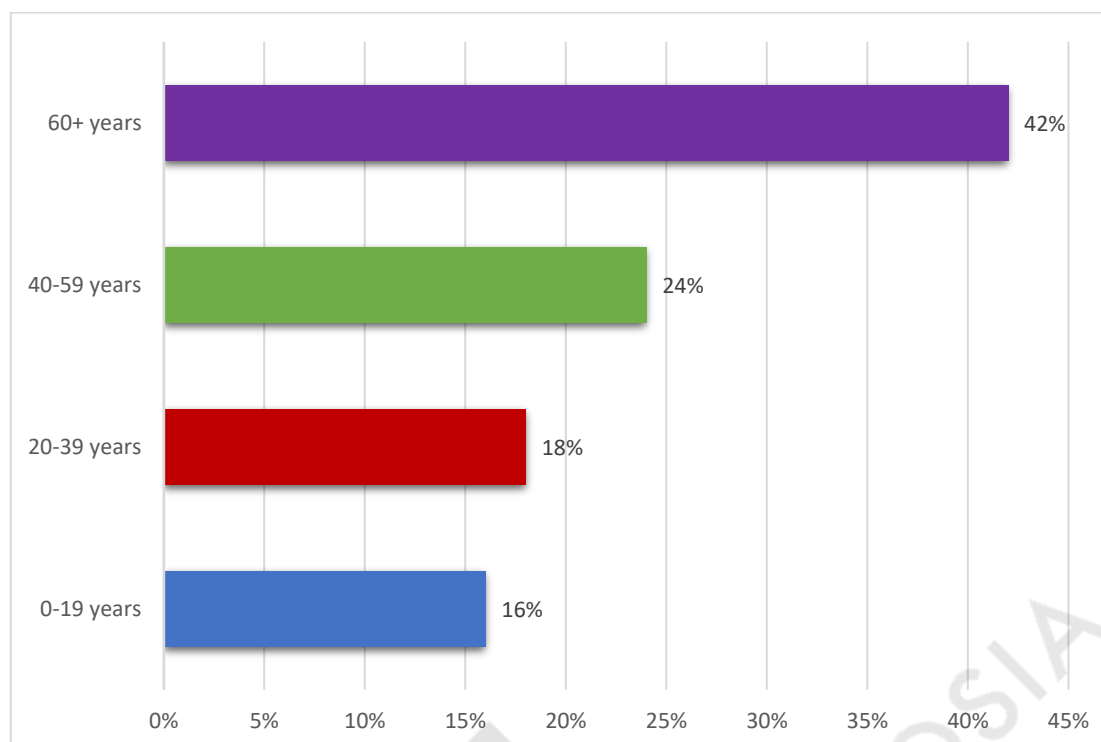
*Source: UN World Population Prospects*

**Graph 2: Inverse population pyramid in 2017**



*Source: UN World Population Prospects*

**Graph 3: Inverse population pyramid in 2060**



*Source: UN World Population Prospects*

The total dependency ratio, i.e. the ratio of the number of economically inactive persons (aged 0-20 and 65 years and over) compared to the number of economically active persons (aged 20 - 64 years), is projected to increase from 70.9% to 99.8% over the 2022-2070 period. As a result, fewer workers of working age will pay for the statutory pensions of a growing population of current pensioners. This not only raises questions about the future financial sustainability pay-as-you-go/statutory pensions but also equity and fairness concerns between current and future generations (Economic Policy Committee, 2019).

**Table 2: Total dependency ratio and Total economic dependency ratio projections for Greece, 2022 – 2070**

Demographic indicators						
	2022	2030	2040	2050	2060	2070
Total dependency ratio	70.9	76.5	92.4	109.5	107.0	99.8

Demographic indicators						
	2022	2030	2040	2050	2060	2070
Total economic dependency ratio <sup>6</sup>	152.2	149.2	157.0	165.4	162.1	149.7

Source: AWG (2023)

Table 3 below, presents projections on the main population figures, according to the Ageing Working Group (AWG, 2023).

**Table 3: Main demographic Variables Evolution**

	2022	2030	2040	2050	2060	2070
Old-age dependency ratio (pop 65+ / pop 20-64)	56.2	63.7	79.6	93.6	90.6	80.9
Old-age dependency ratio (pop 75+ / pop 20-74)	54.8	61.8	75.6	87.6	85.4	75.6
Ageing of the aged (pop 80+ / pop 65+)	31.3	30.6	32.9	37.9	47.0	49.0
Men - Life expectancy at birth	78.8	80.5	82.2	83.7	85.2	86.5
Women - Life expectancy at birth	84.2	85.5	86.8	88.1	89.3	90.4
Men - Life expectancy at 65	18.7	19.8	20.9	22.0	23.0	23.9
Women - Life expectancy at 65	21.7	22.7	23.8	24.8	25.8	26.7
Net migration (thousand)	21.5	-4.3	5.2	8.2	12.6	19.5
Net migration over population change (%)	0.2	0.0	0.1	0.1	0.2	0.2

<sup>6</sup> Total economic dependency ratio = Total population less employed as a % of the employed population 20-74

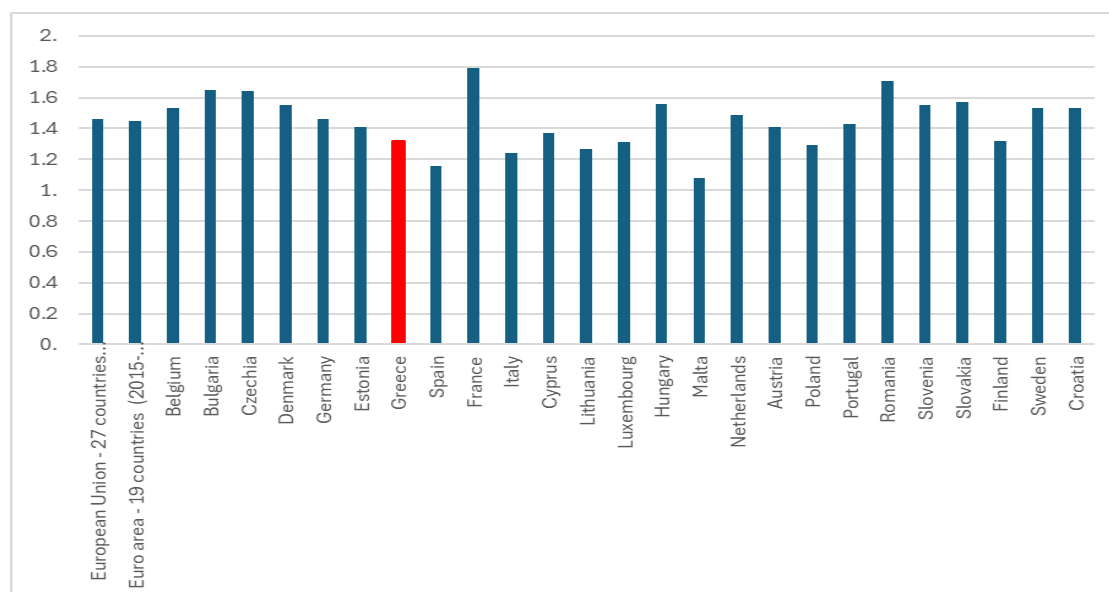
*Source: AWG (2023)*

AWG (2023) in their report, present a number of findings on labour force and the demographic developments in Greece. Employment rate for workers aged 65-74, increases from 2.4% in 2022 to 6.6% in 2070, labour force participation is expected to increase for workers aged 20-64 (from 75.4% in 2022 to 79.9% in 2070), for workers aged 20-74 (from 64.7% in 2022 to 69.7% at the end of the projection), for workers aged 55-64 (from 57.4% in 2022 to 78.2% in 2070) as well as for workers aged 65-74 (from 9.3% in 2022 to 24.3% in 2070). These trends are expected to mitigate demographic pressure on the pension system, but they are far from reversing them.

As for the old age dependency ratio, the AWG's projections show an increase in the coming years, which further indicates that the pension system will be unsustainable. More specifically, the old dependency ratio for the population aged 65 and over in 2070 is projected to reach 80.9%, meaning that the population of Greece aged 65 and over in 2070, i.e. pensioners, will be more than half of the population that will be able to work. And if we consider that a proportion of the working age population is not actually working, then we understand that the problem of an ageing population puts even more pressure on the existing pension system.

Greece is also expected to receive more pressure from demographic dependency because the fertility rate is too low and on the verge of being considered “lowest-low fertility” because it approaches the number 1.3. In developed countries the fertility rate must be 2.1 for the population to remain constant (absence of migration flows). As Figure 4 below shows, Greece’s fertility rate in 2022 is at 1.32, lower than what it should be.

**Figure 4: Total Fertility rate for EU Member-States<sup>7</sup>**



Source: Eurostat (2024)

At the same time, the Greek pension system is also under fiscal pressure as pensions depend primarily on the fiscal situation of the country.

We should note that the latter group are those who work and contribute to pay for the old-age pensions, in a PAYGO system. Should we take no measures to reform our pension system, this will lead to a need either a) to increase social security contributions, b) to increase state budget contribution c) to decrease pension provision or d) a combination of the above. None of these alternatives seem attractive.

Summarizing, based on data, it was crucially important for new policies to be drafted so that the demographic issue will not drive the system to further insolvency. The new legislation, that was adopted by the Greek Government, creates a new fund (TEKA) based on a fully-funded scheme for the supplementary insurance, giving the chance to new employees to manage their contributions, so that they have better earnings in their retirement to those they would have from the existing pension system. The new reform aims to address the demographic changes in the population and to manage the different risks faced by the future pensioners through the asset allocation of their contributions.

#### **2.4.4.2 Labour Market**

Labour force participation in Greece is rather weak, especially compared to other European countries. The labour force in Greece counted for 4671.8 thousand individuals in 4<sup>th</sup> Quarter

<sup>7</sup> Data for United Kingdom were not available

of 2023, that is 51.5% participation of the population aged 15 years and over (see Table 5). The proportion of the labour force declined by over 1 percentage point (pp) over the last five years and so did the population aged 15 years and over. During the same period, the employment rate rose by 3pp to 46.3% whilst the unemployment rate declined by over 7pp to 10.5% (see Table 6). The share of the active part of the population over 15 years of age is expected to increase in the future in proportional terms, even though it is smaller in absolute terms due to population decrease.

**Table 4: Greece employment statistics, 4<sup>th</sup> Quarter of 2019 – 2023 (in thousands)**

<b>Greece employment statistics, 2019 - 2023</b>					
<i>(in thousands)</i>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
<b>Population 15+</b>	<b>9,089.9</b>	<b>9074.2</b>	<b>9,060.0</b>	<b>9,044.7</b>	<b>9,032.7</b>
Male	4,379.9	4,372.5	4,370.1	4,367.1	4,364.3
Female	4,710.1	4,701.8	4,690.0	4,677.6	4,668.4
<b>Labour force</b>	<b>4688.2</b>	<b>4628.6</b>	<b>4670.7</b>	<b>4693.6</b>	<b>4671.8</b>
Male	2,622.1	2,574.9	2,590.2	2,611.0	2,588.1
Female	2,066.1	2,053.7	2,080.5	2,082.7	2,083.7
<b>Employed</b>	<b>3901.8</b>	<b>3878.5</b>	<b>4053.3</b>	<b>4135.2</b>	<b>4183.1</b>
Male	2,259.5	2,233.3	2,335.8	2,380.2	2,368.3
Female	1,642.3	1,645.1	1,717.4	1,755.0	1,814.8
<b>Unemployed</b>	<b>786.4</b>	<b>750.1</b>	<b>617.4</b>	<b>558.4</b>	<b>488.7</b>
Male	362.6	341.6	254.4	230.8	219.7



<b>Greece employment statistics, 2019 - 2023</b>					
<i>(in thousands)</i>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
Female	423.8	408.5	363.1	327.7	268.9

Source: ELSTAT (2024)

**Table 5: Greece employment statistics, 2019 – 2023 (in %)**

<b>Greece employment statistics, 2019 - 2023</b>					
<i>(in %)</i>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
<b>Population 15+</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>
Male	48.2%	48.2%	48.2%	48.3%	48.3%
Female	51.8%	51.8%	51.8%	51.7%	51.7%
<b>Labour force</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>
Male	55.9%	55.6%	55.5%	55.6%	55.4%
Female	44.1%	44.4%	44.5%	44.4%	44.6%
<b>Employment rate</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>
Male	57.9%	57.6%	57.6%	57.6%	56.6%
Female	42.1%	42.4%	42.4%	42.4%	43.4%
<b>Unemployment rate</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>
Male	46.1%	45.5%	41.2%	41.3%	45.0%
Female	53.9%	54.5%	58.8%	58.7%	55.0%

Source: ELSTAT (2024)

**Table 6: Population 15+ by employment status and age in 4<sup>th</sup> Quarter of 2023**

<b>Population 15+ by employment status and age in 4<sup>th</sup> Quarter of 2023</b>				
<i>(in thousands)</i>	<b>Employed</b>	<b>Unemployed</b>	<b>Unemployed %</b>	<b>Non-active</b>
15 – 19	16.2	12.8	44.2%	546.6
20 – 29	531.5	142.9	21.2%	367.4
30 – 44	1,475.4	174.2	10.6%	290.4
45 – 64	2,042.1	150.1	6.8%	837.1
65+	117.9	8.7	6.8%	2,319.4
<b>Total</b>	<b>4,183.1</b>	<b>488.7</b>	<b>10.5%</b>	<b>4,360.9</b>

Source: ELSTAT (2024)

Even the projections for labour force participation are pessimistic. The projections show an increase in labour force participation for workers aged 55-64 and for workers aged 65-74 (see Table 7). Also, the employment rate for workers aged 65-74 increases.

**Table 7: Projections for participation rate, employment rate and share of workers for the age groups 55-64 and 65-74.**

	<b>2022</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>
Labour force participation rate 20-64	75.4	76.3	77.6	79.1	79.6	79.9
Employment rate of workers aged 20-64	66.1	68.7	71.1	73.9	74.4	74.7
Share of workers aged 25-54 in the labour force 20-64	75.1	68.5	64.3	67.4	67.8	64.8
Labour force participation rate 20-74	64.7	63.9	63.4	64.3	68.1	69.7
Employment rate of workers aged 20-74	56.8	57.7	58.1	60.2	63.8	65.2

	2022	2030	2040	2050	2060	2070
Share of workers aged 25-54 in the labour force 20-74	75.1	68.5	64.3	67.4	67.8	64.8
Labour force participation rate 55-64	57.4	65.5	70.9	74.0	76.5	78.2
Employment rate of workers aged 55-64	57.4	65.5	70.9	74.0	76.5	78.2
Labour force participation rate 65-74	8.0	10.1	14.8	16.9	21.7	25.7
Employment rate of workers aged 65-74	9.3	9.9	13.9	16.8	19.9	24.3

*Source: AWG (2023)*

The data in Table 7: Projections for participation rate, employment rate and share of workers for the age groups 55-64 and 65-74. further support the argument that ageing will affect the pension system. The labour force participation rate of people aged 55-64 seems to increase radically (from 57.4% in 2022 to 78.2% in 2070). Similarly, the labour force participation rate of people aged 65-74, from 8% in 2022, is set to rise to 25.7% in 2070. Based on the current retirement age limits, this can be interpreted as a continuation of work for retirees. It is possible, therefore, that pensions will not be able to cover the cost of living of pensioners and therefore they will be pushed to continue working. Another interpretation that could be given is that due to the retirement of workers, combined with the lack of new workers entering the labour market, the state will not be able to cover pensions and therefore the age limits will have to be raised, so workers aged 62-67, who could retire, will have to continue working. Finally, both interpretations could happen at the same time in order for the state to deal more effectively with an ageing population.

#### ***2.4.4.3 Pension Coverage and Statistics***

The results of labour force participation and age dependency ratio show that in the next few years the pension system of Greece will be very vulnerable in demographic crises. The operation of the current pension system under a PAYGO scheme links pensions to fiscal crises, as the state budget finances the pensions. So, fiscal crises are also a threat to the pension system.

The crisis of 2010 reminded everyone that the pension system should have been reformed years ago. The reason was that the crisis affected even the risk-averse portfolios in which the pension funds invested contributions of pensioners. This creates a crowding out effect,

as workers tend to retire earlier to avoid unemployment. This mass exodus of workers is financed by the state, so government spending is increasing and public finances are under pressure. To stabilize these effects, adjustments in the retirement age, replacement rates and pension cuts are needed, as the first two parameters are important for the adequacy of pensions.

Based on what has been mentioned, the burden of paying pensions falls entirely on the state budget, making the pension system vulnerable to any crisis, as there is no risk diversification. This creates an urgency for change in the pension system.

The most frequent and important argument is the demographic development that puts at risk the financial sustainability of the pension system. The present problem of the PAYG system is that fewer young people are entering the labour market and existing workers tend to work longer, which means that there are not many employees to finance the pensions. The introduction of the capitalization system asserts the problem of population aging and ensures the sustainability of the pension system.

Another argument is the high cost of living for employees. The cost of living in Greece is quite high compared to the income of the population. At the European level, the cost of living as a percentage of income is quite high, as 4 out of 10 households in Greece spend 40% of their income on a basic cost of living (€796 per resident) and the equivalent European average is around 10% of income. The cost of living is higher in suburban and tourist areas. In non-tourist areas, the cost of living is lower due to the availability of local produce and lower rents (Eurostat, 2021). According to these, the state has to provide an adequate pension in relation to the cost of living that pensioners face. This could not happen with the present Defined Benefits (DB) system, because as the cost-of-living increases, so DB system liabilities do. The only solution is the introduction of a new system, which is not affected by fiscal changes and that system is a Defined Contribution (DC) scheme.

The avoidance of paying contributions to the existing system has been a major issue, particularly on the self-employed. Most employees feel that the current system does not provide adequate pensions and the pensions that they acquire do not reflect the sum of contributions that they paid on their working lives, so they choose to not pay contributions. The transition of the current PAYG system to a DC scheme will link the contributions straight to the expected pension of employees and motivate them to not avoid contribution payments. One of the benefits of the new DC pillar is that all contributions belong to the saver and the children inherit them if they die. The purpose is to introduce the hereditary

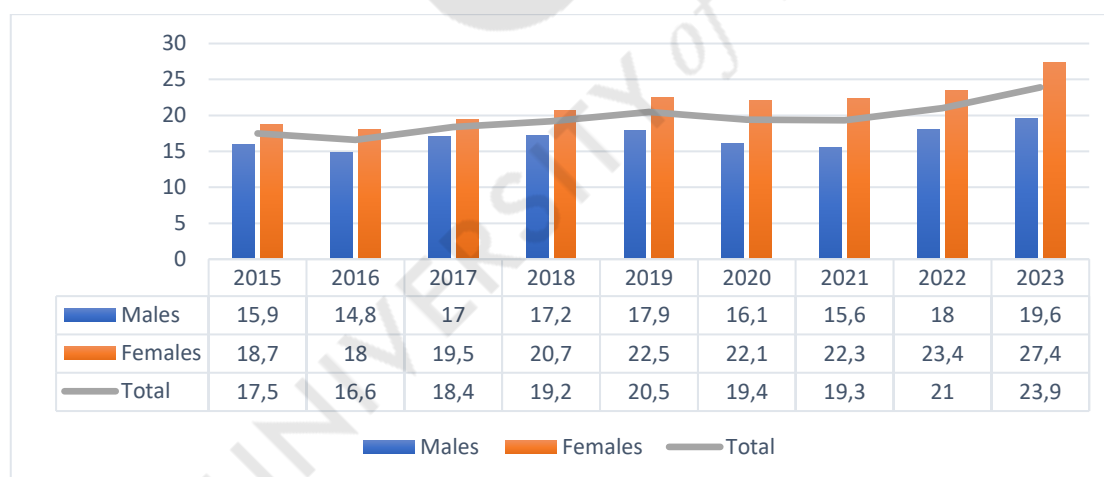
property of savings. Employees' money are no longer flowing into anonymous systems, they are stored in their personal account.

#### 2.4.4.4 Living Standards of elderly

From a social point of view, pensions protect older people from poverty and social exclusion and this should be the primary objective of a pension system in the process of its design. After all, the adequacy of pensions is also measured by their ability to protect older persons from poverty.

**For Greece the old-age poverty ratio is 7.5%, while the poverty ratio for the whole population is 12.1%.** This means that older persons are less likely to be income poor than the total population, but the problem of poverty in older remains. Historically, the poverty rate of the elderly in Greece has remained stable at around 8%, due to the increasing number of older populations. This means that in the foreseeable future, even if the pension system ensures adequate pensions for young pensioners and reduces poverty rates, the continued ageing of the population will tend to increase the number of older people at risk of poverty (OECD, 2021).

**Figure 5: Percentage of elderly (65 years or over) at risk of poverty and social exclusion, Greece, 2015-2023**



Source: Eurostat (*ilc\_peps01n*)

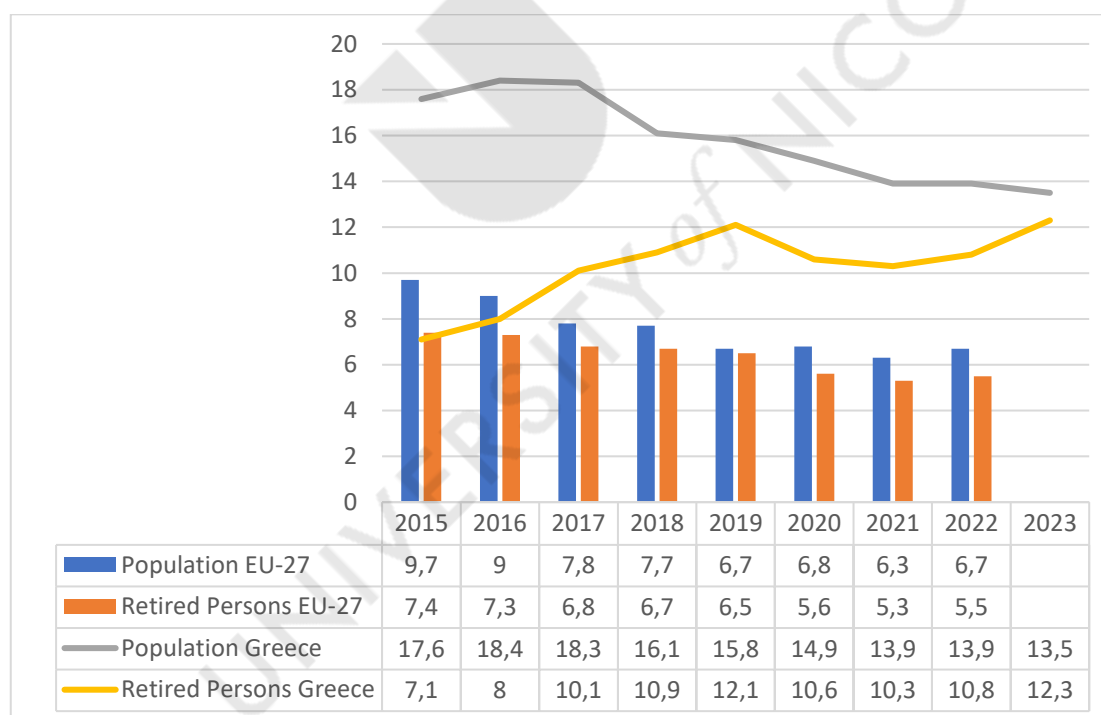
**In Greece, older persons at risk of poverty and social exclusion represent the 21% (0.494 million) of population, while in the EU-27 the rate is 20.2% (18.5 millions).** For women this rate has always been higher than for men (see Figure 5 above). The value of the rate, as for both men and women, have increased over time and remains very high comparatively to that of other EU countries.

To get a better picture of why a pension reform is necessary, beyond the proportion of older people at risk of poverty and social exclusion, we also need to look the material deprivation among older people.

By definition, material deprivation refers either to people's inability to pay their rent or mortgage or utility bills, or the financial inability to keep their home sufficiently warm, or the inability to meet unexpected expenses, or insufficient money to eat meat or many other difficulties on their daily life.

**Material deprivation of retired persons is decreasing over the years; however, it remains high and especially for Greece the percentage of retired persons for 2022 (10.8%) facing severe material deprivation is one of the highest among the countries of the European Union.** Most European Union countries have an average of close to 4-5% for retired persons aged 65 and over, with Greece having almost double that.

**Figure 6: Percentage of population and retired persons aged 65 years or over in severe material deprivation in Greece and EU-27, 2015-2023.**



Source: Eurostat (*ilc\_mdsd11*)

Results of the above indicators help us to understand the immediate problem that pensioners face in terms of the adequacy of their income. The need to provide pensions that allow new pensioners, and old ones, to maintain a good standard of living is evident. This is the direction of the new pension reform, which introduces a funded system in supplementary

insurance, enabling new members to anticipate better pensions and current pensioners not to fear further cuts in their pensions.

## **2.4.5 Moving Forward**

### ***2.4.5.1 Overall TEKA Architecture***

The new DC pillar was introduced in Greece in September 2021, by law 4826/2021, after a somewhat turbulent parliamentary discussion. The main arguments of the Government that introduced the reform were in favour of diversification of risks, addressing the demographic pressure on pensions, creating a pension pillar that will benefit newcomers in the labour market introducing choices for individuals and creating a new pension fund following European and international best practices. On the other hand, the critique of the opposition focused on transition costs and the introduction of market risk in the pension system. The law was finally voted by 157 MPs.

The reform includes the transition from NDC to DC for auxiliary pensions for newcomers (entering the labour market after January 1<sup>st</sup> 2022) and the setting up of a new auxiliary pension fund, that runs under the acronym “TEKA”.

The new fund, TEKA, is an independent public entity, in control of its own core operations. The longer term TEKA platform will accommodate a system with individualized accruals and with direct links between contributions and future rights. The platform will also accommodate individualized information, choice support etc. Hence, the TEKA platform will resemble that of a modern pension fund. A project outlining the proposed future system landscape is currently being undertaken. The creation and implementation of this system will take time and require external support acquired through procurement. The ambition is to be able to launch the system in 2023 – 1 January 2024 at the latest.

The TEKA will be a defined contribution (DC) savings system. All contributions will count as savings for retirement, and each participant will have their own individual account. All contributions and all net-investment returns earned will go into the individual participant’s account. Collection costs (paid to the e-EFKA) and the administrative costs of the TEKA will be financed while the investment costs are deducted from the gross investment returns.

The registration of participants, collection and validation of contributions, and the processing and collection of arrears will be undertaken by e-EFKA, and e-EFKA provides data on contributions at participant level to TEKA, while the management of the TEKA system and its individual accounts will be operated by TEKA itself.

The individual accounts are fundamental building blocks for the TEKA. The concept of an individual account in the TEKA system is almost like an individual bank account – with the clarification that the value of the TEKA account relates to the unit values of underlying investment vehicles.

As with a bank account it is pivotal that any pecuniary transaction is registered and posted on the exact date and with all relevant detail in the individual account. This goes for contribution payments (deposits), costs (fees), returns (interest) and pay-outs (withdrawals).

All transactions will be based on double entry book-keeping. Hence, every entry into an account requires a corresponding and opposite entry to a different account. In the double-entry system, transactions are recorded in terms of debits and credits. Since a debit in one account offsets a credit in another, the sum of all debits must equal the sum of all credits. In that way a full audit trail is facilitated and there is an improved detection of errors. I.e., the total assets of the TEKA must always be the sum of savings in participants' individual accounts plus any base capital that the TEKA might have.

Capital in the individual accounts of the TEKA will be invested in securities through mutual funds, UCITS funds or otherwise. The participant's investments or ownership of invested assets are registered as ideal parts of the underlying collective investment vehicles - fund units. Hence, each individual account will hold a specific number of units in the underlying collective investment vehicles, and the value of the account will depend on the current unit rate. New contributions are translated into units, and the total number of units will increase accordingly.

New contributions are invested in the underlying funds as per the individual's age in line with the life-cycle approach. This happens collectively based on the aggregate age-distribution of new contributions and an aggregate allocation to the underlying funds as determined by the TEKA.

The value of each account will be updated regularly at predetermined intervals. The individual can also process a valuation of the individual's account at any given time via the 'MyTEKA'.

TEKA is mandatory for individuals entering the labour market for the first time from January 1st, 2022. Additionally, individuals who are already employed and were born from January 1st, 1987, and onwards have the option to transfer their auxiliary pension to TEKA, provided they have not yet reached the age of 35 at the time of their application. The individualized accrual system ensures a direct link between each participant's contributions and their future



pension benefits, fostering a sense of ownership and transparency. This system aims to modernize the pension framework in Greece, offering participants detailed, real-time information about their contributions and accrued benefits through an advanced platform. The transition to a defined contribution (DC) model marks a departure from the traditional pay-as-you-go systems, with individual accounts reflecting the precise value of investments in various securities, thus providing a clear and transparent mechanism for pension accumulation.

To mitigate the risks associated with market volatility and ensure a baseline level of security for pensioners, the Greek government has introduced a state guarantee for the auxiliary pensions under the new capitalized system. According to law 4826/2021: "At the time of the occurrence of the covered social insurance risks, the state guarantees the payment of a minimum contributory auxiliary pension. The minimum contributory auxiliary pension is defined as the amount of the monthly auxiliary pension calculated based on the actual value of the total contributions paid, as these are accounted for in the individual accounts of the insured at the time of the occurrence of the covered social insurance risks." This guarantee ensures that, despite fluctuations in investment returns, the pension benefits will not fall below a certain level, thus providing a safety net for retirees. The guarantee is particularly crucial given the inherent risks of DC schemes, where the final pension benefit depends on the performance of the invested contributions. By offering this guarantee, the government aims to balance the potential for higher returns through market investments with the need for stability and predictability in retirement income. This dual approach seeks to reassure participants about the security of their pensions while allowing them to benefit from the growth potential of capital markets.

#### ***2.4.5.2 IT Architecture***

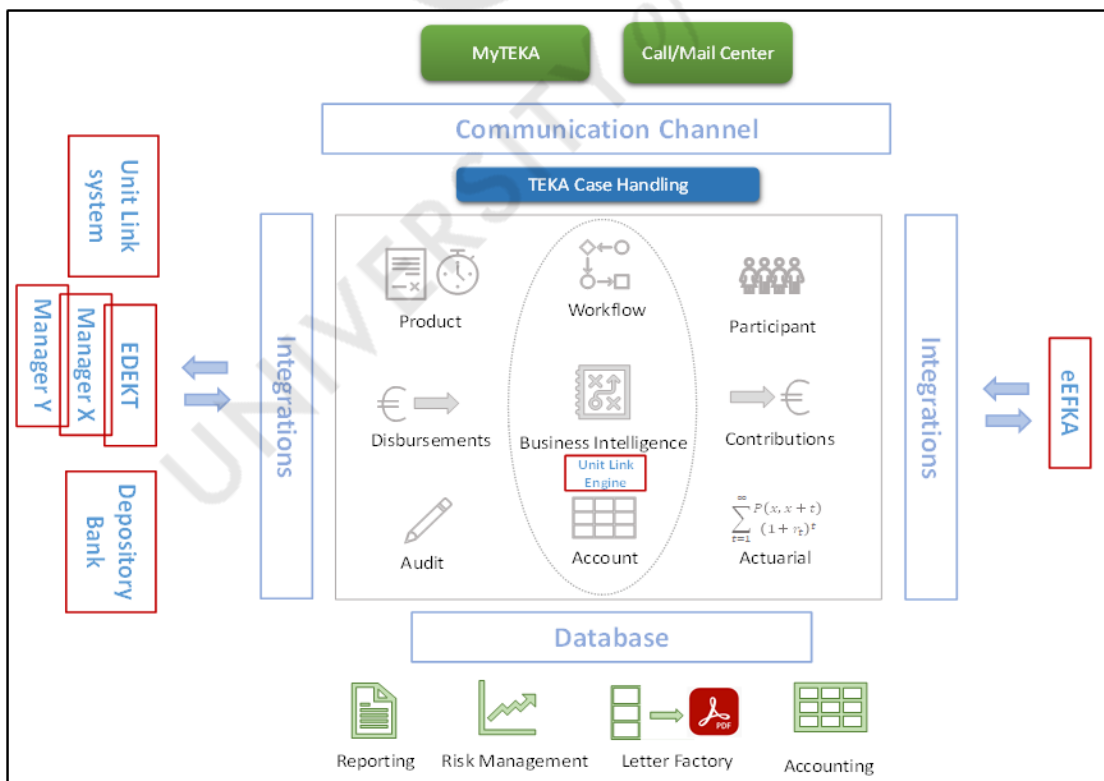
The TEKA IT system must effectively support the administration, documentation, auditing etc. of the individual accounts i.e., it must keep track of all transactions in and out of the individuals' account. The system landscape must be able to support the real-time updating of information as well as servicing the real-time access for individuals to information about their TEKA savings and other account information.

Digitalisation is essential to TEKA's business efficiency. From an IT perspective, the greatest potential of digitalisation is to maximize the degree of automation and 'straight-through processing' without human intervention.

As a precondition for increasing the degree of automation, sub-systems in the IT solution will be fully integrated, and the solution will be based on already available data provided from existing authoritative sources with high credibility. To support this and make the solution operational and maintenance-friendly, the target architecture must split the TEKA IT system into logical components and integrate these components (in terms of IT) to achieve the desired increased degree of automation.

The IT architecture is designed as a core with surrounding software components. This approach ensures a high level of transparency, functional separation, simple integrations, and the possibility to use components from different suppliers. The structure of the platform also supports efficient software development and/or replacement of components as well as quick time-to-market and focused user testing. Components could be delivered from one or more suppliers, or they could – over time – be built by the TEKA itself. A supplier could have standard solutions for one or more components and the component definition could differ from the target architecture - the architecture is robust and ready for this if the internal integrations and protocols are kept intact. The TEKA IT target architecture is presented in Figure 7 below. All communication with components within and outside the core will be orchestrated by the Workflow Engine. The TEKA IT target architecture is presented in Figure 7 below. All communication with components within and outside the core will be orchestrated by the Workflow Engine.

**Figure 7: TEKA IT Target Architecture**



As discussed earlier the individual accounts and the unit link set-up is the core functional application and the heart of the system and business logics. The core functionality is designed to update and support the individual accounts. The Workflow and Business Intelligence components are the components that update the individual accounts and communicate to and from the TEKA Unit Link engine, the Unit Link systems of the EDEKT and other asset managers and use the surrounding components. The perceived unit link set-up has several components:

- Each investment fund is operated as a unit link fund – i.e., it is split into a generic number of units and the current unit value determines its market value. This part is undertaken by the asset manager operating the fund.
- The individual accounts allocate the individuals' savings to specific funds depending on the age and fund choices of the fund. This part is undertaken by TEKA itself.
- The allocation to the different funds must be adjusted on an on-going basis to take account of new contributions, benefit payments, individual choices etc. and net trading orders must be issued to each of the funds. This part is operated by TEKA through its unit link engine.

The Workflow Engine “makes everything happen”. It initiates, executes, and reports process status on all business processes. The Business Intelligence component is the overall updating tool, it can use other components APIs<sup>8</sup>, it handles Unit Link communication through containers, it updates the individual accounts, it can read components databases, it can update components databases, it can manipulate data, it can compare data, and report the result.

The accumulated contributions and returns, minus expenses, any risk premiums, and payments, on the individual account are invested in a Unit Link system. The integration and communication between the Unit Link system and the individual account are of great importance. This interplay is orchestrated by the Workflow Engine.

To support the individual account, the core system has supporting components – some are database components and others are functional components. Two database components store all contributions and all disbursement. Two other database components are the components related to the registration and enrolment process. These are the participant component that

---

<sup>8</sup> API (Application Programming Interface) is a software intermediary allowing different components to communicate.

holds all participant master data and the other is the Product Component which holds all product master data.

To perform actuarial calculations, the core also has an actuarial engine. This engine has an API such that other components, also outside the core, can access these calculations. It is also this component that holds the tariffs and is used for forecasting etc.

All processes orchestrated by the Workflow Engine are logged in an audit database component.

Surrounding the core are other components – some are external components with integration points, others are TEKA's internal system supporting the business logic in the TEKA function. The internal components are components that support participant communication through MyTEKA and call centre as well as components that support reporting and analysis outside the core. The communication components will integrate internally through web service and the reporting and analysis will integrate using a database.

TEKA's architecture integrates with IT systems and resources operated by various other parties. The architecture will be robust in relation to different parties using the same integration over time. Therefore, it will always be TEKA that dictates how integrations are constructed and which protocols are used. This applies, when the integration is a simple data table delivery, and when data is transmitted through API upon request in real time.

### ***2.4.5.3 Transaction Cost***

As mentioned above, the reform will apply to new labour market participants, but will also include young workers, who are up to 35 years old and can voluntarily switch to the new system. As with any reform, it will face serious challenges. First and foremost, moving from the existing Defined Benefit scheme, which only recently includes Notional-Defined-Contribution (NDC) elements, will generate transition costs. The transition cost is the accumulated difference between the pensions in the PAYGO/ NDC (i.e. the "old") system and the contributions that are now accumulating in the PAYE/ DC (i.e. the "new" system).

The National Actuarial Authority (NAA) (2021) used three scenarios regarding the percentage transition population in a fully funded system. The basic scenario assumes that the 20% of the population will make the switch to the new fully funded scheme and the other two assumes that the 10% or the 30% of the existing workers, who are up to 35 years old, will switch to the new system. Table 8 below shows the amount of additional funding cost of transition to current values to meet liabilities auxiliary insurance of the NDC system.

Considering an average annual inflation of 2%, four scenarios were used in terms of the nominal discount rate to estimate the transition cost.

**Table 8: Transition Cost of the NDC scheme (in billions of euros)**

Nominal Discount rate	2.5%	3.0%	3.5%	4.0%
Basic scenario (20%)	-78	-66	-56	-48
10%	-76	-64	-54	-46
30%	-79	-67	-57	-49

*Source: National Actuarial Authority (2021)*

In the scenario in which a transition rate of 10% has been taken into account, this percentage corresponds to 84 thousand already insured aged up to 35 years in 2023 that will choose to continue their insurance in the new system. Respectively, 20% of them, taken in the basic scenario, are about 168 thousand insured and 30% corresponds to 252 thousand employees.

The Foundation for Economic and Industrial Research (IOBE) (2021) also tried to project the fiscal impact of the transition on various economic variables, such as GDP and employment, based on scenarios on the percentage of transition population. The main observation is that the projections of IOBE show only small differences from the corresponding ones of NAA, for all the main variables, such as the number of insured, the amount of annual contributions, the number of retirees and the amount of pension expenditure.

#### ***2.4.5.4 Transition Benefits***

Economic growth that is expected to arise from the ceteris paribus reform, it is estimated to have a positive medium-lasting effect on tax revenues, through taxation of the income of natural and legal persons, social security contributions, as well as consumption taxes, as IOBE (2021) pointed out in his study. This medium-long term, indirect, positive impact on tax revenues does not include the direct reduction in public revenue from its implementation reform as insured contributions for the new subsidiary will now be directed to the new fund. Also, it does not include a reduction in public spending in the future, once the payment of new supplementary pensions will now be made by the new fund.

Among the different participation scenarios, the overall indirect effect on tax revenues ranges between €4.2 billion and €4.8 billion (at constant prices in 2019) at the end of the

period in 2070, while the cumulative impact on tax revenues ranges between €74 billion and €87 billion (at fixed prices in 2019) at the end of the period (IOBE, 2021). Direct effects on revenues and expenditures, in conjunction with estimated medium-term indirect fiscal effects, as well as the degree of government bond markets, constitute the total net budgetary impact of the pension reform.

**Increased public revenues, due to growth caused by the implementation of the reform, fully cover cumulative fiscal losses in real terms in 2040, under base scenario.** Under the optimistic scenario the cumulative fiscal balancing occurs two years earlier, in 2038 and under the conservative scenario this cumulative fiscal balancing occurs in 2045. In addition, comparing the estimated average level of new subsidiary pensions with that of existing auxiliary pensions, an expected increase in pensioner's average income occurs, in each of the scenarios under consideration. This implies that the proposed reform does not seem to aggravate the adequacy of pensions compared to the "without reform" scenario. Furthermore, **the implementation of the reform is estimated to lead to a significant increase in GDP** in the Greece, compared to the level of economic activity if the reform had not been implemented, compared to GDP level in the current system. This increase in the base scenario is estimated at 0.32% in 2032, 1.18% in 2042 and 6.55% in 2070.

Under the optimistic scenario, the country's GDP is reinforced due to the reform by 0.48% in 2032, 1.73% in 2042 and 6.97% in 2070, compared to the level of economic activity if the reform is not implemented and under the preservative scenario, GDP amplification is respectively 0.14% in 2032, 0.67% in 2042 and 4.54% in 2070. Pension reform leads to less extent but equally significant employment enhancement in the country, compared to the level of employment if the reform had not been implemented. In the base scenario, employment is reduced by 0.08% in 2032, 0.18% in 2042 and 0.39% in 2070 due to the reform, compared to the level of employment if the current system is maintained. Under the optimistic scenario, employment boost reaches 0.12% in 2032, 0.25% in 2042 and 0.53% in 2070, compared to maintaining the current system and under the preservative scenario, employment reinforcement is 0.05% in 2032, 0.12% in 2042 and 0.28% in 2070 (IOBE, 2021).

Another macroeconomic variable to be affected by the pension reform is public debt. Public Debt Management Agency (PDMA) (2021) using the scenarios by IOBE projected the impact of the pension reform on debt and debt-to-GDP ratio. Until 2030, the debt-to-GDP ratio is expected to increase in all scenarios, though by a neglectable amount. The debt-to-GDP ratio is higher in 2030 than in the "No Reform" scenario by +0.3-0.4 points of GDP. This is mainly due to the weaker primary balance profile over the period in all 4 scenarios

(both in EUR and in % GDP terms) and it reflects the re-channelling of social security premia from the State to the social security reform, while, at the same time, legacy social security payments are still being made by the State. In the long term, the debt-to-GDP ratio diverges across scenarios. This mainly reflects the impact of the primary balance trajectory, which starts improving as compared to the “No Reform” scenario in all but the “Pessimistic / Conservative” scenario. The denominator (GDP) impact is positively impacting the debt-to-GDP ratio across all scenarios, as the reform would boost GDP. In the “Optimistic” and “Rather Optimistic” scenarios, the debt-to-GDP ratio is lower than in the “No Reform” scenario by 9.5 pts of GDP and 7.3 pts of GDP respectively in 2070. In the “Pessimistic / Conservative” scenario, it is higher than in the counterfactual scenario by 9.5 pts of GDP in 2070. In the “Baseline” scenario, the debt-to-GDP ratio is very slightly higher than in the counterfactual “No Reform” scenario, by 2.0 pts of GDP in 2070. Table 9 below shows the debt-to-GDP ratio in every scenario until 2070.

**Table 9: Debt-to-GDP ratio until 2070**

Year	No reform	Consolidation* * Including the intragovernmental debt (GOV bonds held by the social security funds)				No Consolidation			
		Base	Optimistic	Rather Optimistic	Conservative	Base	Optimistic	Rather Optimistic	Conservative
2022	181.1%	181.1%	181.1%	181.1%	181.1%	181.1%	181.1%	181.1%	181.1%
2023	171.9%	171.9%	171.9%	171.9%	171.9%	171.9%	171.9%	171.9%	171.9%
2024	161.4%	161.4%	161.5%	161.5%	161.4%	161.5%	161.5%	161.5%	161.5%
2025	154.4%	154.5%	154.5%	154.5%	154.4%	154.5%	154.6%	154.6%	154.5%
2030	128.7%	128.8%	128.7%	128.7%	128.8%	129.1%	129.0%	129.0%	129.0%
2040	98.7%	98.3%	97.7%	97.8%	98.8%	99.5%	98.6%	98.7%	99.8%
2050	76.5%	75%	72.8%	73.2%	76.5%	77.8%	75.1%	75.4%	79.5%
2060	60.3%	57%	51.9%	53.1%	60.2%	62.3%	56.3%	57.2%	65.9%
2070	46.8%	40.5%	30.5%	33.3%	46.9%	+8.8%	37.3%	39.5%	56.3%

Source: PDMA (2021)

## 2.5 Methodology

The methodological approach of this PhD thesis is anchored in quantitative analysis, a well-established research methodology in the literature for assessing complex systems and deriving empirical evidence. Quantitative research methodologies are known for their ability to provide rigorous, statistically validated insights, which are crucial for the empirical assessment of pension system reforms (Creswell, 2014; Bryman, 2015).

Data were meticulously extracted from authoritative databases such as Eurostat, ELSTAT, and the World Bank to ensure a comprehensive and reliable dataset. These sources were selected due to their credibility and the extensive range of economic and demographic indicators they provide. The data collection process involved extracting relevant variables critical for analysing the dynamics of the pension system, such as fertility rates, life expectancy, GDP growth, labour force participation, and pension fund financials. The extraction and cleaning of this data were conducted using advanced statistical package Stata.

The thesis employs actuarial modelling to project population trends, dependency ratios, and the financial sustainability of the pension system. Actuarial models are particularly effective for long-term forecasting and risk assessment in insurance and pension planning (Whelan, 2002). These models involved detailed calculations of future population demographics, pension fund inflows and outflows, and fiscal balances, offering a robust framework for assessing the system's sustainability.

An Autoregressive Distributed Lag (ARDL) model was applied to analyse the relationship between demographic factors, such as fertility rates and life expectancy, and the financial balance of the e-EFKA pension fund. The ARDL model is suitable for examining both short-term and long-term dynamics in time series data, making it an ideal choice for understanding the impact of demographic changes on the pension system over time (Pesaran and Shin, 1999). This econometric technique allowed for the capture of dynamic interactions and provided insights into how demographic trends influence the financial health of the pension system.

Survey data analysis was another crucial component of the methodology, aimed at assessing public perception and preferences regarding the pension system. A structured questionnaire was designed and administered to a representative sample of Greek citizens to gather data on their knowledge, attitudes, and preferences about pension policies.

To ensure precision in the conclusions drawn, several validation and robustness checks were performed. Data were cross-referenced from multiple sources to verify accuracy and



consistency. Econometric models were subjected to robustness checks to ensure the stability and reliability of the results, including tests for multicollinearity, autocorrelation, and heteroscedasticity. Sensitivity analyses were also conducted to examine how changes in key assumptions or parameters affected the outcomes of the models, ensuring that the findings were robust and reliable.

The rigorous methodological approach adopted in this thesis is essential for substantiating the study's findings and ensuring that the conclusions are grounded in statistically validated evidence. By integrating actuarial modelling, econometric analysis, and survey data analysis, the study provides a comprehensive assessment of the Greek pension system. This methodological rigor contributes to the academic discourse on pension reforms and offers practical insights for policymakers, helping them design policies that ensure the long-term sustainability and adequacy of the pension system.

## 2.6 Discussion

Greece's demographic projections and projections for labour force participation are pessimistic, making it very clear that it is time for the pension system to reconstruct. After many decades postponing pensions reform, the Greek Government took a very important decision to move forward and make reforms to secure the future of the new generation and to make the pension system more viable.

The pension reform aims to introduce and implement a fundamental system of predefined contributions to subsidiary insurance in order to help ensure a satisfactory standard of living for pensioners, as well as the sustainability of a social security system, which contributes to the development of the economy. This implementation will happen through the creation of a new fund. The purpose of the reform is the organization of public mandatory subsidiary insurance on the basis of the financial system of predetermined contributions for all insurers covered by it, as well as the establishment of a Sub-Fund for Subsidiary Insurance (TEKA) under the form of a legal person governed by public law on the management of the operation of the new subsidiary insurance.

As many studies have shown (Patel, 1997; Schmidt-Hebbel, 1999; Dell' Ariccia et al., 2007; Catalan, 2004; Borsch-Supan et al., 2005; Sun and Hu, 2014; Mazreku et al., 2020; Sy, 2017; Karam, Muir, Pereira and Tuladhar, 2010; Thomas and Spataro, 2014), **the reform will boost the economy through the increase in GDP, the decrease of debt and the increase of employment.** Theory has proven that, in many cases, a transition of the pension system from a pay-as-you-go to a funded pension system can only be beneficial for the insured and

for the economy as a whole, provided that this transition is not total, i.e. not a complete change of the whole system, but part of it, and that it is governed by specific rules. Greece seems to be following good practices, turning only the part of the supplementary pension into a funded system and not the system in general.

On the other hand, the, NAA and IOBE results seem to support the theory, with the tax revenues that will come from the reform being much higher than the transition costs that will be incurred for any scenario of transition rate (employee switching) in the new system. The IOBE study (2021) showed that, in addition to tax revenues, employment and investment will also increase in the coming years due to the reform. Also, the impact of reform on government debt, as shown by the PDMA results, seems to be consistent with the theory that pension reform will also affect the country's debt and in particular reduce it. Nevertheless, it is worth noting that the study of the fund is very limited, as it is currently not in operation and has no insured persons under its roof.

The results show that policymakers have designed a reform that benefits policyholders and will help Greece's economy in the long run. However, to draw more implications about the operation of the TEKA fund, we need to study how it will start to operate and observe the number of insured persons who will switch to it from the existing system. Future research should aim to compare the supplementary pensions between an insured person in the TEKA fund from an insured person in the existing system. In conclusion, future research could also study the optimal investment policy that the TEKA fund could have to deliver better supplementary pensions, as well as assess the benefits to the system of having an app that allows policyholders to access their personal accounts.

# **Chapter 3: Assessing the Financial Sustainability of the Pension System in Greece: The Role of Fertility Policy Adjustment**

## **3.1 Research Purpose and Design**

In the evolving landscape of global economics, the endurance and viability of pension systems have taken centre stage in various nations. Greece, given its unique socio-economic dynamics and financial challenges in recent decades, offers a compelling case study.

This chapter delves into an intricate exploration of the financial sustainability of the newly reformed pension system in Greece. With the backdrop of demographic shifts that point to an aging population, the strain on pension systems is anticipated to intensify. This situation is not unique to Greece, but given the nation's distinct historical and financial context, its implications are particularly profound. The reform, characterized by the introduction of a capitalized system in supplementary insurance, emerged as a response to address these challenges.

In the past, Greece attempted to address its population aging by adjusting the retirement age thresholds. For the first time in 2010, the impact of life expectancy on age limits was foreseen in Greece, with the law of that year (Law 3863/2010). Using 65 years as a reference point, it has been legislated that a review for potential adjustments would commence from January 1, 2021, onwards. Furthermore, it has been specified that such a review will take place every three years. The prerequisites and age limits that are still in effect for retirement were established in 2015 (Law 4404/2015), with 2024 set as the year for a re-evaluation of these limits. At that time, it will be revealed whether there has been an improvement in life expectancy in the country and to what extent, and if this improvement has influenced the insurance system to the point that adjustments in the age limits are required.

A parallel case of a country facing challenges due to population aging is China, which has adopted two reforms to address the phenomenon and ensure the sustainability of its pension system. These were the adjustment of the retirement age limits and the introduction of the two-child policy, which replaced the one-child policy that had been in place for decades and was imposed to curb the country's population explosion. The latter reform, pertains to granting couples the permission to have up to two children, with the ultimate aim of increasing the overall population and the future labour force. However, recently, the country adopted a three-child policy, following data announcements indicating a decline in births (Wang, Huang, and Yang, 2019; ETHNOS, 2021).

Thus, it would be highly intriguing to gauge the impact of such policies on the sustainability of the Greek pension system. Therefore, taking the Greek pension system as a reference, econometric and actuarial models will be employed to investigate the effects of policies akin to those of China, as well as potential interactions among them. The results emerging from the research and projections could serve as invaluable tools for policymakers to formulate positive policies and introduce new reforms for Greece's pension system. Concurrently, these insights might offer valuable conclusions for countries facing similar challenges.

## 3.2 Literature Review

### 3.2.1 Demographic Problem and low birth rates

The demographic issue in Greece has been highlighted by numerous studies, which have concurrently linked it to the problems it creates for the social security system (Symeonidou, 2009; Koutsampelas, 2021; Galazoulas and Tsetoura, 2014; Symeonidis, 2016; Pirounakis, 1997; Harper, 2010; Mylonas, P. and C. de la Maisonneuve, 1999). Therefore, demographic developments can capture extensive information regarding people's quality of life and draw conclusions about its trajectory in the coming years. These conclusions are essential for policymakers who, by acting promptly and implementing an appropriate mix of policies, can prevent any adverse effects of demographic trends on the quality of life.

A better understanding of the problem of the aging Greek population can be gained by examining the Hellenic Statistical Authority's (ELSTAT) data on the country's permanent population, by gender and age groups, as emerged from the population censuses in the years 2011 and 2021 (see table below).

**Table 10: Permanent Population of Greece by Gender and Age Groups**

Age group	2021			2011			Percentage change (%)		
	Total	Males	Females	Total	Males	Females	Total	Males	Females
Total	10,482,487	5,125,977	5,356,510	10,816,286	5,303,223	5,513,063	-3.1	-3.3	-2.8
0-9	878,491	451,492	426,999	1,049,839	537,220	512,619	-16.3	-16.0	-16.7
10-19	1,068,216	551,148	517,068	1,072,705	552,173	520,532	-0.4	-0.2	-0.7

Age groups	2021			2011			Percentage change (%)		
	Total	Males	Females	Total	Males	Females	Total	Males	Females
20-29	1,053,304	546,929	506,375	1,350,868	696,744	654,124	-22.0	-21.5	-22.6
30-39	1,256,393	633,913	622,480	1,635,304	827,542	807,762	-23.2	-23.4	-22.9
40-49	1,596,028	797,720	798,308	1,581,095	781,112	799,983	0.9	2.1	-0.2
50-59	1,543,340	753,596	789,744	1,391,854	677,018	714,836	10.9	11.3	10.5
60-69	1,324,635	630,150	694,485	1,134,045	543,421	590,624	16.8	16.0	17.6
70-79	996,037	455,938	540,099	1,017,242	456,247	560,995	-2.1	-0.1	-3.7
80+	766,043	305,091	460,952	583,334	231,746	351,588	31.3	31.6	31.1

Source: ELSTAT (2023)

Population censuses conducted in 2011 and 2021 by the Hellenic Statistical Authority **highlight the aging population trend that Greece is experiencing**. Specifically, it is evident that the age groups over 40 years old are the only ones showing an increase over the span of 10 years, with the most significant rise observed in the age group 80+, where the change was 31.3%. The second-largest increase is seen in the age group 60-69, with a rate of 16.8%.

Simultaneously, there is a noted decrease in the younger age groups. More specifically, the age group 0-9 years old shows a population decrease of 16.3%, the age group 20-29, which represents the new entrants into the labour market, shows a decrease of 22%, and finally, the age group 30-39 years old presents a reduction of 23.3%. This depiction indicates a decline in the youth population that can enter the labour market, coupled with an increase in the elderly. This suggests that a redistributive system may not be sustainable in the future if the population continues to exhibit the same trends.

The age group of 0-9 years old shows one of the most significant declines, according to the data, highlighting yet another serious issue facing Greece: low birth rates, which is also one of the causes of the general demographic problem. This conclusion is reinforced by looking

at the evolution of demographic indicators for Greece in recent years (see Table 11 below). Initially, the aging index emphasizes the increase in the older population relative to the younger population. Since 2017, there has been a continuous increase in the index at a rapid pace, and in 2021, the index increased by 5.7% compared to the previous year, which is 4% more than the changes in the previous years. Furthermore, the average age of the mother at childbirth indicator highlights the fact that year by year, the age at which women decide to become mothers is increasing, thus contributing to the rise in the aging index.

**Table 11: Demographic Indicators**

	2017	2018	2019	2020	2021
Age Dependency Ratio	56.5	56.9	57.3	57.7	57.5
Ageing Ratio	150.3	152.5	155.0	157.8	166.8
Mean age of mother at birth	31.5	31.5	31.7	31.6	32
Total Fertility Rate	1.3	1.3	1.3	1.4	1.5
Total Mortality Rate	11.6	11.2	11.7	12.3	13.7
Infant Mortality Rate	3.5	3.5	3.7	3.2	3.5

Source: ELSTAT (2023)

*Age Dependency Ratio: the ratio of the economically inactive population (aged 0 - 14 and 65 and over) to the economically active population (15 - 64 years old).*

*Ageing Ratio: the ratio of the elderly population (aged 65 and over) to the younger population (0 - 14 years old).*

*Total Fertility Rate: the average number of live children a woman will give birth to during her lifetime (if the age-specific fertility conditions of the reference year prevail throughout her reproductive age). The total fertility rate is used to determine the level of generation replacement, which in developed countries is considered to be 2.1.*

*Total Mortality Rate: the deaths during the reference year per 1,000 residents.*

*Infant Mortality Rate: the ratio of deaths of infants under one year of age during the reference year to the number of live births in the same year. The ratio is expressed per 1,000 live births.*

Combining the low infant mortality rate in Greece, it can be concluded that the reduction in the younger age groups is a result of sub-replacement fertility rates. This conclusion is further supported by the total fertility rate, which measures the average number of live births a woman will have during her lifetime. In 2021, this rate was 1.5, meaning that, on average, women give birth to 1.5 children during their lifetimes. It is noteworthy that this rate should be above 2, as this is considered the replacement level in developed countries. Greece, therefore, falls short of this number and should provide incentives for young people to address the issue of sub-replacement fertility. One of the main causes that contributed to the exacerbation of this phenomenon in previous years was the financial crisis that affected Greece. During this time, there were cuts in government spending, and austerity programs were implemented. The combination of all these factors influenced the income of citizens, with many facing financial difficulties. The result was a decrease in births and high usage of contraceptives. (Farfaras et al., 2016).

Tasia et al. (2021) in their research suggest that the decision to postpone childbearing by women was significantly influenced by the redefinition of the roles and values of both sexes, particularly that of women, due to urbanization and the adoption of a modern lifestyle by the population. Additionally, it appears that the decrease in births is linked to the level of education, women's employment, and the general climate of insecurity and uncertainty created by the recent economic crisis. Therefore, there is a need to change reproductive behaviour in young people, especially women, in order to address the problem and lead the country to increased fertility rates. Some policies that could help improve these rates include the creation of more favourable economic and employment conditions and the implementation of family planning policies.

A country that serves as an example of an effort to address either population increase or decrease is China, which, to mitigate the adverse effects of demographic shift, recently introduced fertility and retirement policy reforms, such as the two-child policy. This policy allowed couples to have up to two children, in contrast to an earlier policy that permitted only one child, believing that this would address the problem of an aging population while simultaneously increasing the retirement age limit (Wang, Huang, and Yang, 2019).

All countries facing the problem of an aging population have at some point adopted policies to increase retirement age limits and fertility rates. Through these policies, an effort is made to ensure the sustainability of the pension system, as this contributes to the socio-economic development of countries, closely related to boosting local economies and state revenues at a macroeconomic level (Mourao and Vilea, 2018). Additionally, the sustainability of the

pension system is linked to changes in household behaviour regarding savings and fertility (Lugauer et al., 2017; Curits et al., 2015; Curtis et al., 2017). These specific policies will also be the subject of study in this chapter, as an attempt will be made to ascertain the sustainability of the country's current pension system and the impact of the implementation of such policies on it.

### **3.2.2 The role of Immigration in ageing problem**

The demographic problem is naturally influenced by the migration balance. Migration is not the solution to the problem, but it can contribute to its improvement, as individuals who typically choose to migrate are of productive age and have a high fertility rate (European Commission, 2018; Kotzamanis, 2019). A necessary condition for improving the demographic problem through migration is that the outflows of the population of productive age are smaller than the inflows of a corresponding population.

According to IOBE (2022), migration can influence the demographic structure of the population through three directions. Initially, through the improvement of the degree of integration of migrants and refugees already in the country, then through attracting more highly-skilled migrants, and finally, through the repatriation of Greeks abroad and reducing the outflow from Greece.

The degree of integration plays a significant role in resolving the demographic problem, as integrating the migrant population into the labour market can contribute to economic development and potentially provide labour in sectors experiencing workforce shortages or needing additional workers due to the aging of the existing workforce. Additionally, integration positively affects the migrants themselves, as finding employment will improve their living standards, increase their productivity and wages, and create suitable conditions for starting or supporting their families.

During the years 1991 to 2008, Greece exhibited a positive migration balance (difference between inflows and outflows), though it displayed a declining trend (Kotzamanis and Karkanis, 2018). Migrant inflows consistently exceeded outflows during this period. Specifically, in 1991, the migration balance was 87,400 individuals (with 152,000 inflows and 64,600 outflows), while in 2009 it decreased to 14,900 individuals (with 58,600 inflows and 43,700 outflows).

The debt crisis in Greece triggered significant changes in the migration balance, leading to a substantial wave of departures from the country. In 2012, the number of people leaving



Greece exceeded the number of incoming individuals by 66,500 (124,700 departures compared to 58,200 arrivals). From 2012 to 2015, a total of 457,000 people left Greece.

The intensification of the refugee crisis in 2015 led to a dramatic increase in migration inflows from 2016 to 2019. Inflows rose from 64,400 in 2015 to 116,900 in 2016, reaching 129,000 in 2019. This increase brought the migration balance back into positive territory, from 10,300 in 2016 to 34,400 in 2019, despite relatively high levels of outflows (95,000 in 2019). **Overall, for the period 2008-2019, the migration balance was negative, with a total population decrease of 143,000 individuals, indicating a population contraction during the crisis.**

The IOBE study (2022) showed that for the coming years, the migration balance is expected to be positive for ages 1-29, as well as for ages 30-54. Despite the apparent impact of migration on Greece's population, this study will not consider it in projecting the population for the coming years, for reasons of simplifying the model.

### 3.3 Models

#### 3.3.1 Models for Population

The cohort component approach is extensively used to forecast demographic shifts within a specific region over time (Preston et al., 2000; Isserman, 1993). This method significantly relies on age-specific iterative transition equations, succinctly represented through the Leslie matrix (Preston et al., 2000). The demographics of insured workers and pensioners are influenced by several factors, including overall population, urbanization levels, urban employment rates, and the coverage extent of the public pension system. This section employs the cohort component methodology to estimate the age and gender-specific demographic distribution in Greece. These projections are then integrated with various assumptions regarding relative proportion parameters to simulate the changing dynamics of the insured workforce and pension recipients.

The following equations express the age-sex-specific population in each year:

$$P_{x+1,t+1}^f = P_{x,t}^f \times (1 - d_{x,t}^f) \quad (1)$$

$$P_{x+1,t+1}^m = P_{x,t}^m \times (1 - d_{x,t}^m) \quad (2)$$

$$P_{0,t+1}^f = \rho_{x,t} \times \sum_{x=15}^{49} (P_{x,t}^f \times b_{x,t}) \quad (3)$$

$$P_{0,t+1}^m = (1 - \rho_{x,t}) \times \sum_{x=15}^{49} (P_{x,t}^f \times b_{x,t}) \quad (4)$$

Wherein the indices  $x$ ,  $t$ ,  $f$ , and  $m$  denote age, year, female, and male respectively;  $P_{x,t}$  represents the population at age  $x$  in year  $t$ ;  $d_{x,t}$  indicates the mortality rate of the population aged  $x$  in year  $t$ ;  $b_{x,t}$  signifies the fertility rate of childbearing women aged  $x$  in year  $t$ ;  $\rho_{x,t}$  stands for the percentage rate of female births in year  $t$ ; and  $\omega$  symbolizes the age limit. Therefore, the progression of population growth can be articulated in a matrix format as follows:

$$\begin{bmatrix} P_{0,t+1} \\ P_{1,t+1} \\ \vdots \\ P_{\omega-1,t+1} \end{bmatrix} = \begin{bmatrix} b_{0,t} & b_{1,t} & b_{2,t} & \cdots & b_{\omega-2,t} & b_{\omega-1,t} \\ 1-d_{0,t} & 0 & 0 & \cdots & 0 & \cdots \\ 0 & 1-d_{1,t} & 0 & \cdots & 0 & \cdots \\ 0 & 0 & 1-d_{2,t} & \cdots & \cdots & \cdots \\ \vdots & \vdots & \vdots & \ddots & \cdots & \cdots \\ 0 & 0 & 0 & \cdots & 1-b_{\omega-2,t} & 0 \end{bmatrix} \times \begin{bmatrix} P_{0,t} \\ P_{1,t} \\ \vdots \\ P_{\omega-1,t} \end{bmatrix} \quad (5)$$

or

$$P_{t+1} = L_t \times P_t \quad (6)$$

The insured population is presumed to exhibit the same demographic distribution as the overall population. Utilizing Equation (6), the population count of insured employees can be determined through the following calculation:

$$P_{a,t} = \left( \sum_{x=a_f}^{b_f-1} P_{x,t}^f + \sum_{x=a_m}^{b_m-1} P_{x,t}^m \right) \times u_t \times e_t \times c_t \quad (7)$$

The retiree population comprises two segments: individuals newly qualifying for retirement and retirees who have continued from prior years (Zhao et al., 2018). The calculation for the retiree population is as follows:

$$P_{b,t} = \left( P_{b_f,t}^f + P_{b_m,t}^m \right) \times u_t \times e_t \times c_t + \left( \sum_{x=b_f}^{\omega_f-1} P_{x,t-1}^f + \sum_{x=b_m}^{\omega_m-1} P_{x,t-1}^m \right) \times u_{t-1} \times e_{t-1} \times c_{t-1} \quad (8)$$

In previous equation, 'a' represents the initial age of entering the workforce, 'b' denotes the legal retirement age, 'u<sub>t</sub>' signifies the rate of urbanization in year  $t$ , 'c<sub>t</sub>' indicates the coverage rate of the public pension system, and 'e<sub>t</sub>' refers to the employment rate among urban workers in the given year.

### 3.3.2 Models of Pension Sustainability

As mentioned in Chapter 2, the pension system in Greece is predominantly public in nature and works on a Pay As You Go (PAYG) basis that provides definite benefits for retirees. The

current research utilizes indicators such as current and accumulated pension surpluses or deficits, along with the dependency ratio, to evaluate the financial sustainability of the public pension system. These indicators are widely recognized and commonly used in assessing a defined-benefit pension scheme (Zhao et al., 2018; Zhao et al., 2017; Hu and Yang, 2012).

According to pension regulations, the state collects contributions from both enterprises and employees, and disburses the scheduled benefits to eligible retirees. Thus, the current pension surpluses or deficits at the end of a particular year are determined by the annual pension contributions minus the annual pension expenditures, reflecting the financial liquidity status. The accumulated pension surpluses or deficits at the end of a specific year, which evaluate the financial gap, are calculated as the sum of the resources at the beginning of that year, annual fiscal surpluses or deficits, and annual interest income. The dependency ratio for a given year is a measure comparing the number of retirees to insured workers, which monitors the impact of demographic shifts on the pension system and indicates the burden placed on employees by retirees. Since this study's objective is to quantify and analyse the financial sustainability of the pension system, subsidies and administrative expenses are not factored in. Therefore, the actuarial projection models that Huang et al. (2019) constructed are being used to monitor the financial sustainability status of the pension system as follows.

The contributions to the public pension are articulated as:

$$I_t = w_t \times (c_t^1 + c_t^2) \times P_{a,t} \quad (9)$$

The pension income for a specific year, denoted as  $I_t$ , is calculated based on the contribution rates from both enterprises and employees towards the public pension for that year. Specifically,  $c_t^1$  represents the contribution rate of enterprises to the public pension in year  $t$ , while  $c_t^2$  signifies the employees' contribution rate for the same period. Additionally,  $w_t$  corresponds to the average wages of actively employed workers in that year.

Assuming that workers aged  $x$  retire in the year  $t-(x-b)$  the average social wage in the year prior to retirement is denoted as  $w_{t-(x-b)-1}$ . Furthermore, the pension replacement rate for a retiree aged  $x$  in year  $t$  is represented by  $r_t$ . The annual growth rate of the average social wage in year  $t$  is indicated by  $g_t$  and the annual growth rate of the pension is  $\tau_t$ . Therefore, the average wage of the retiree in the year before retirement can be calculated as

$w_{t-(x-b)-1} = W(t) / \prod_{j=0}^{x-b} (1 + g_{t-j})$ , and the annuity received by the retiree in their year of

retirement is  $w_{t-(x-b)-1} \times r_{t-(x-b)-1}$ . Consequently, the total pension expenditure for the year  $t$  can be formulated as follows:

$$E_t = \sum_{x=b}^{\omega-1} \left( w_{t-(x-b)-1} \times r_{t-(x-b)-1} \times \prod_{j=t-(x-b)-1}^t (1 + \tau_j)^{t-j} \right) \times P_{x,t} \quad (10)$$

Building upon the aforementioned equations, the current pension surpluses or deficits, the accumulated pension surpluses or deficits, and the support ratio of the public pension system can be calculated by employing the following mathematical expressions:

$$D_t = I_t - E_t \quad (11)$$

$$T_t = D_t + T_{t-1} \times (1 + r_t) \quad (12)$$

$$DR_t = P_t^1 / P_t^2 \quad (13)$$

In this formula,  $D_t$  represents the annual pension surpluses or deficits for the specific year  $t$ ;  $T_t$  signifies the total accumulated pension surpluses or deficits up to year  $t$ ;  $r_t$  denotes the rate of return for the public pension fund within year  $t$ ;  $DR_t$  indicates the ratio of dependency within the pension system for the year  $t$ ;  $P_t^1$  corresponds to the count of beneficiaries for the year  $t$ ; and  $P_t^2$  stands for the tally of insured working individuals in the year  $t$ .

### 3.4 Data and Scenarios

#### 3.4.1 Data Assumptions

- 1) Population data: The research takes population data differentiated by age and sex from the 2021 census as its initial demographic data. The 2021 census, designed and conducted by the Hellenic Statistical Authority (ELSTAT), offers a comprehensive and authoritative source that accurately depicts the size and structural characteristics of the Greek population. Also, the data for fertility rates by age, mortality rates by sex, employment rate, were also obtained by ELSTAT.
- 2) Coverage rate: Since the pension system is public in nature, that means that every employee and employer is covered by the pension system. So, the coverage rate is equal to 1.
- 3) Urbanization rate: Data from World bank shows that the urbanization level for the total population equals to 80% in 2022 and the research assumes that this will stay stable for the rest of the projected years. Greece has reached a high urbanization level, as most of the developed countries, such as USA (83%) and Japan (92%) (World Bank, 2023).

- 4) Contribution rate: For employees in the private sector insured in e-EFKA, a social security contribution of 20% is required for the main pension, which is distributed between the insured and the employer. The insured individual is responsible for a contribution of 6.67%, while the employer bears a contribution of 13.33%.
- 5) Growth rate of the average social wage and pension benefits: The consumer price index is taken as the growth rate of the average social wage and pension benefits.
- 6) Pension Replacement: The pension replacement rate is defined as the proportion of pension benefits to the salary in the year before retirement. The replacement rate, as established by Law 4670/2020, begins at 11.55% for 15 years of insurance, reaches 50% for 40 years of insurance, and increases by 0.5% for each additional year. This study assumes that each individual has completed 40 years of insurance prior to retirement, thus qualifying for a consistent replacement rate of 50%. This is in accordance with the legal requirement that for an individual to be eligible for a full pension, they must have accrued 40 years of insurance coverage and be at least 62 years of age.
- 7) Working age: The working age refers to the age when an individual begins to work after education. The study is predicated on the assumption that an individual begins their career at the age of 20 and proceeds to retire at the age of 67, which, according to the law, is the upper age limit for receiving a full pension.

### **3.4.2 Retirement and Fertility Scenarios**

Retirement age is a key parameter affecting the sustainability of the pension system, as it connects both pension revenue and pension expenditure. According to the stipulations of Greek Law, the general age threshold is set at 67 years, with a minimum insurance period of 15 years. Alternatively, full pension eligibility is achieved at completion of 40 years of insurance coverage, at the age of 62 or later.

Raising the statutory age of retirement has become a widespread measure implemented globally to address the demographic challenge of an aging population, as well as to mitigate the fiscal strain on pension systems. The UK, for instance, has incrementally increased the retirement age threshold from 60 to 65, with plans for additional hikes in the future (Holman et al., 2018). In the United States, there is a plan to gradually increase the eligible age for full pension benefits from 65 to 67, spanning from 2002 to 2027. Similarly, Denmark is set to raise its official retirement age from 65 to 67 between 2024 and 2027, subsequently adjusting it in accordance with life expectancy at the age of 60 (Meier and Werding, 2010). Compared to the most developed countries, Greece's legal retirement age is already adjusted to the life expectancy of population.

Greece has already initiated measures for further revising retirement age limits. The law determining the retirement age limits (Law 3863/2010) stipulates that from 2024 onwards, retirement age limits will be redefined every three years, based on changes in life expectancy at age 65. Since the change in life expectancy at 65 during the previous reference period was minimal, no alteration in retirement age limits is anticipated for the next three-year period. Any future re-evaluation related to the country's life expectancy will be conducted from 2027 onwards, as mandated by pension legislation (OT.gr, 2023).

In practice, policies are frequently applied concurrently. To explore the combined impact of adjusting fertility rates and delaying retirement on the sustainability of the Greek pension system, a series of combined policy scenarios were examined. These scenarios encompass six distinct arrangements, each varying in terms of fertility policy adjustment and the extension of retirement age (see Table 12).

**Table 12: Fertility and Retirement Scenarios**

Scenarios	Proportion of women that give birth	Retirement Age
Scenario 1	20%	67
Scenario 2	60%	67
Scenario 3	100%	67
Scenario 4	20%	70
Scenario 5	60%	70
Scenario 6	100%	70

*Source: Prepared by researcher*

## 3.5 Results

### 3.5.1 Scenario 1

The evolution of the insured population and the functioning of the urban employee pension system were modelled in the Baseline Scenario. As depicted in Figure 8, the trend of insured employees, retirees, and the total population is outlined. It is projected that by 2075, the number of insured retirees will surpass that of the insured employee group. Concurrently, the dependency ratio within the pension system is expected to rise from 0.32 in 2022 to 3.25 by 2089, indicating an escalating pressure on the contributing members.

**Figure 8: Trend of the population**

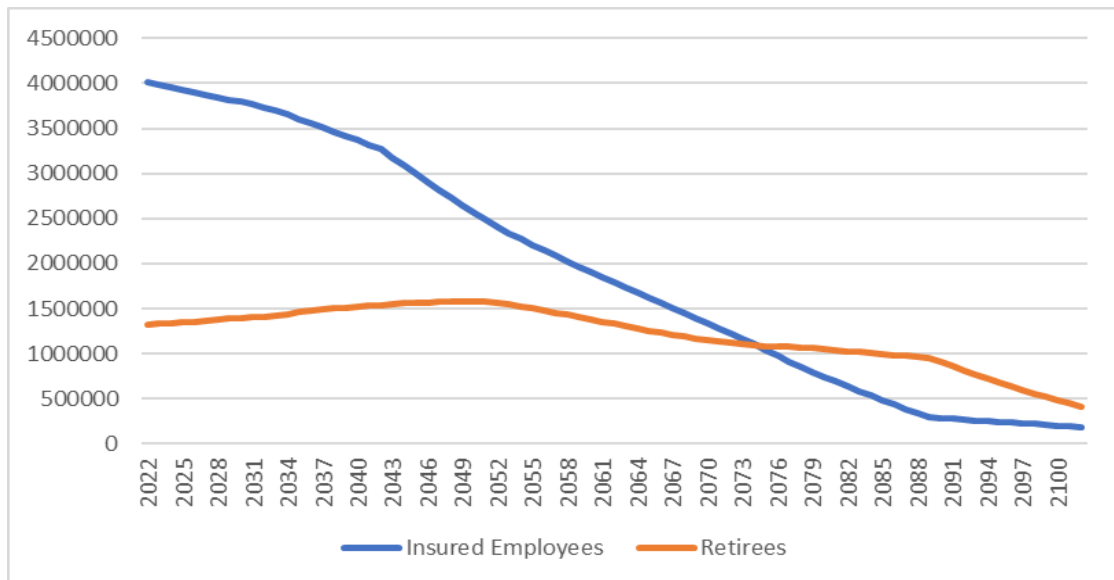


Table 13 displays the outcomes of the simulation. It is observed that both pension revenue and pension expenditure are projected to decrease annually, because the total population demonstrates a yearly decline. As described by the data (see Table 13), the total expenses of the pension system will start to exceed the total earnings by 2050 and the difference between them will remain negative after that.

This trend indicates that the pension system will suffer from financial pressure and the government must implement measures to improve the financial stability of the system.

**Table 13: Pension Fund Sustainability**

Date	Insured Employees	Retirees	DR	Total Earnings	Total Expenses	Deficit
2022	4006200	1320045	0.329	1.84E+10	1.01E+10	8.31E+09
2030	3793041	1394776	0.367	1.75E+10	1.07E+10	6.76E+09
2040	3366681	1520770	0.451	1.55E+10	1.17E+10	3.83E+09
2050	2562338	1577204	0.615	1.18E+10	1.21E+10	-3.05E+08
2060	1905794	1380802	0.724	8.77E+09	1.06E+10	-1.82E+09
2070	1337849	1149316	0.859	6.15E+09	8.81E+09	-2.66E+09

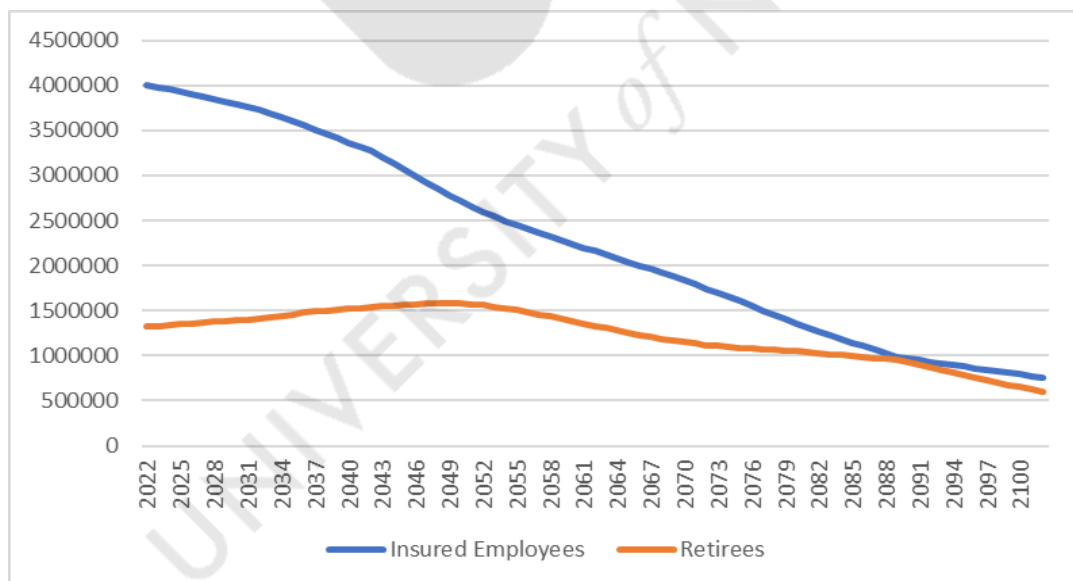
Date	Insured Employees	Retirees	DR	Total Earnings	Total Expenses	Deficit
2080	741103	1049232	1.415	3.41E+09	8.05E+09	-4.64E+09
2081	688036	1038265	1.509	3.17E+09	7.96E+09	-4.80E+09
2089	293096	953176	3.252	1.35E+09	7.31E+09	-5.96E+09

Source: Prepared by researcher using Stata

### 3.5.2 Scenario 2

In this section, the effect on the sustainability of Greece's pension system when the 60% of women will give birth to a child is investigated, while maintaining the existing retirement age threshold. The outcomes of this analysis are depicted in Figure 9 and detailed in Table 14.

Figure 9: Trend of the population in Scenario 2



Data illustrates a declining trajectory of insured employees, indicating a potential shrinkage in the workforce contributing to the pension system. Concurrently, the retiree population exhibits a relatively stable pattern and subsequent drop towards the end of the projection period. This suggests that the Greek pension system may face challenges in maintaining its sustainability due to the decreasing number of active contributors compared to beneficiaries, thereby potentially straining the financial resources of the system.



Although the population of retirees will not surpass that of the insured individuals, it appears that the dependency ratio will increase as the years pass, with a peak in the year 2089, where its value will be 0.97. Additionally, observing the deficit column for the pension system, it seems that the system will be deficient in the coming years and will become unsustainable.

However, compared to scenario 1, the dependency ratio values are lower. This indicates that if incentives for increasing births are provided, the impacts of the demographic problem are mitigated. The greater the desire of women to have children, the more the payment pressure on the pension plan could be alleviated.

**Table 14: Pension Fund Sustainability in Scenario 2**

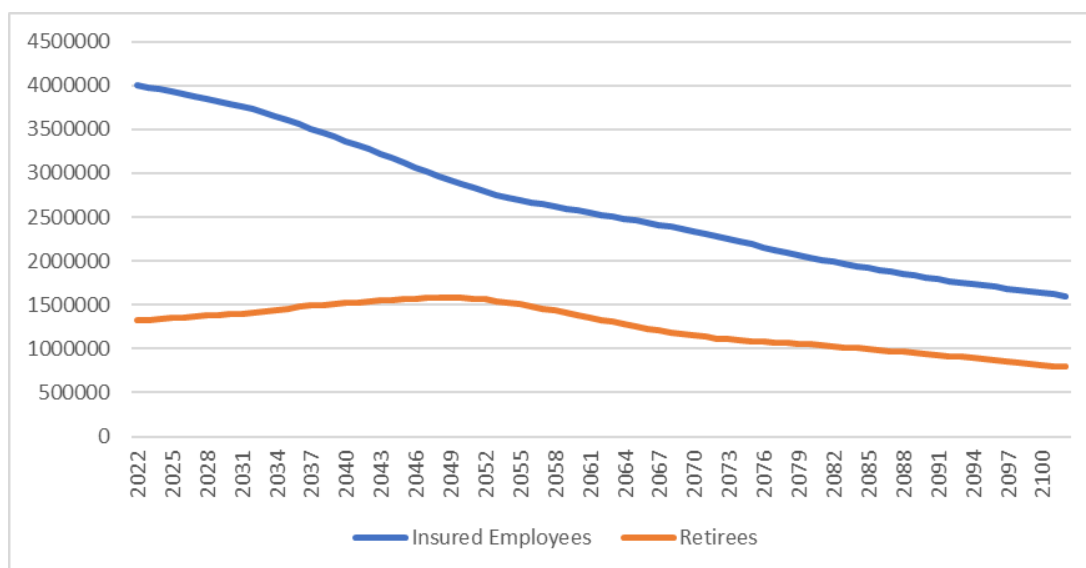
Date	Insured Employees	Retirees	DR	Total Earnings	Total Expenses	Deficit
2022	4006200	1320045	0.329	1.84E+10	1.01E+10	8.31E+09
2030	3793041	1394776	0.367	1.75E+10	1.07E+10	6.76E+09
2040	3366681	1520770	0.451	1.55E+10	1.17E+10	3.83E+09
2050	2717009	1577204	0.580	1.25E+10	1.21E+10	4.06E+08
2060	2238830	1380802	0.616	1.03E+10	1.06E+10	-2.88E+08
2070	1833099	1149316	0.626	8.43E+09	8.81E+09	-3.79E+08
2080	1358242	1049232	0.772	6.25E+09	8.05E+09	-1.80E+09
2089	989228	953176	0.963	4.55E+09	7.31E+09	-2.76E+09

*Source: Prepared by researcher using Stata*

### 3.5.3 Scenario 3

In this section, the impact on the pension system will be examined in the case where, all women bear children, while the retirement age remains steady at 67 years, as it is currently. Figure 10 and Table 15 display the population change and the impact on the sustainability of the system, respectively.

**Figure 10: Trend of the population in Scenario 3**



The projection of the population of retirees and insured employees shows that the latter will outnumber the former in every future year. However, the total population of the country is decreasing. Therefore, adopting a policy that incentivizes women to have children would positively affect the pension system, making it sustainable.

This is also reflected in the value of the dependency ratio, which, although it begins to increase in the early years, reaches its peak in 2053, where it equals 0.56, but then slightly decreases and fluctuates around 0.50 each year. The positive impact of the aforementioned policy on the pension system can also be seen from the surplus it displays over the years. Every year, the total contributions are greater than the total expenditures of the system, making it sustainable.

**Table 15: Pension Fund Sustainability in Scenario 3**

Date	Insured Employees	Retirees	DR	Total Earnings	Total Expenses	Surplus
2022	4006200	1320045	0.329	1.84E+10	1.01E+10	8.31E+09
2030	3793041	1394776	0.367	1.75E+10	1.07E+10	6.76E+09
2040	3366681	1520770	0.451	1.55E+10	1.17E+10	3.83E+09
2050	2871681	1577204	0.549	1.32E+10	1.21E+10	1.12E+09
2053	2755218	1544849	0.560	1.27E+10	1.18E+10	8.30E+08

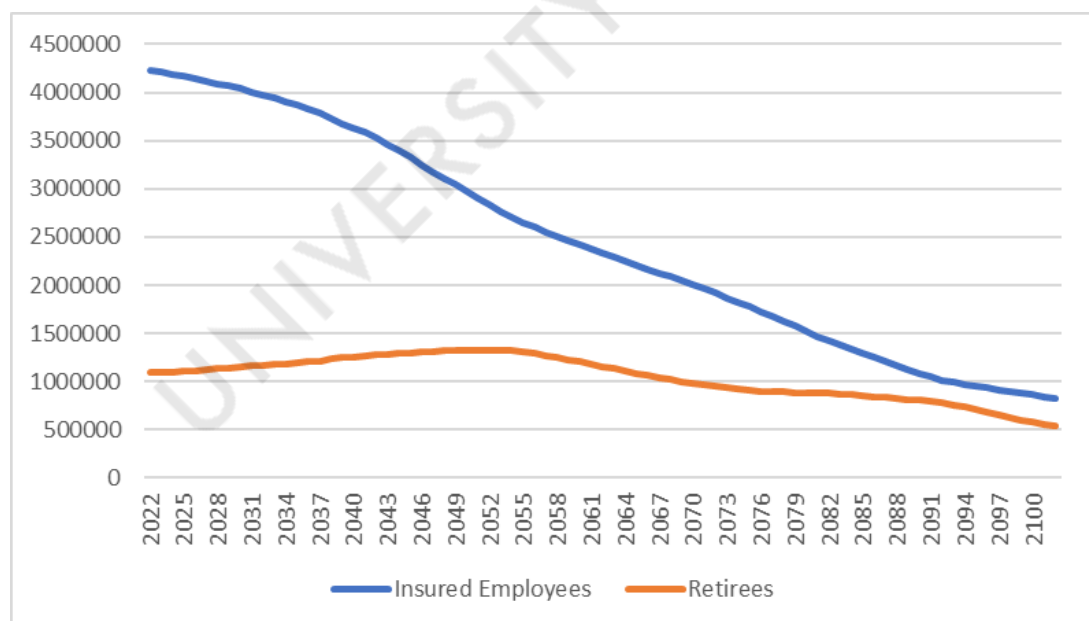
Date	Insured Employees	Retirees	DR	Total Earnings	Total Expenses	Surplus
2060	2571956	1380802	0.536	1.18E+10	1.06E+10	1.25E+09
2070	2336270	1149316	0.491	1.07E+10	8.81E+09	1.94E+09
2080	2037011	1049232	0.515	9.37E+09	8.05E+09	1.33E+09
2089	1832281	953176	0.520	8.43E+09	7.31E+09	1.12E+09

Source: Prepared by researcher using Stata

### 3.5.4 Scenario 4

In the forthcoming scenarios to be presented, the impact of varying proportions of women giving birth on the pension system will be combined with a change in the retirement age threshold to 70 years. Scenarios 4, 5, and 6, therefore, represent a combination of policies for the sustainability of the Greek pension system. Figure 11 and Table 16 display the results of the projections in the case where only 20% of women give birth while the retirement age threshold is set at 70 years.

**Figure 11: Trend of the population in Scenario 4**



Scenario 4 can be compared with Scenario 1, as they differ only in the retirement age threshold. Therefore, when comparing the two scenarios, the only difference that emerges is that due to the increase in the retirement age limit, the number of insured retirees will surpass

that of the insured employee group later than in Scenario 1. Specifically, in Scenario 1, the year when retirees outnumbered the insured for the first time was 2075, while in Scenario 4, this occurs in 2081. In essence, changing the retirement age limit merely gains additional years of system sustainability without, however, solving the problem.

On the other hand, just as in Scenario 1, the dependency ratio increases each year and reaches its peak in 2092, where it is valued at 2.69. From then on, it drops slightly, and its value for the following years remains stable at around 2.01. Additionally, with the increase in the retirement age, the year in which the pension system will become unsustainable is also pushed back, showing deficits (For Scenario 1, it is 2050, and for Scenario 4 it is 2065).

**Table 16: Pension Fund Sustainability in Scenario 4**

<b>Date</b>	<b>Insured Employees</b>	<b>Retirees</b>	<b>DR</b>	<b>Total Earnings</b>	<b>Total Expenses</b>	<b>Surplus</b>
<b>2022</b>	4233088	1093156	0.258	1.95E+10	8.38E+09	1.11E+10
<b>2030</b>	4037217	1150600	0.284	1.86E+10	8.82E+09	9.75E+09
<b>2040</b>	3629361	1258090	0.346	1.67E+10	9.65E+09	7.05E+09
<b>2050</b>	2814017	1325525	0.471	1.29E+10	1.02E+10	2.78E+09
<b>2060</b>	2083925	1202671	0.577	9.59E+09	9.22E+09	3.66E+08
<b>2070</b>	1508096	979069	0.649	6.94E+09	7.51E+09	-5.69E+08
<b>2080</b>	905630	884705	0.976	4.17E+09	6.78E+09	-2.62E+09
<b>2090</b>	383272	806859	2.105	1.76E+09	6.19E+09	-4.42E+09
<b>2092</b>	292992	787585	2.688	1.35E+09	6.04E+09	-4.69E+09
<b>2100</b>	225915	460704	2.039	1.04E+09	3.53E+09	-2.49E+09

*Source: Prepared by researcher using Stata*

### 3.5.5 Scenario 5

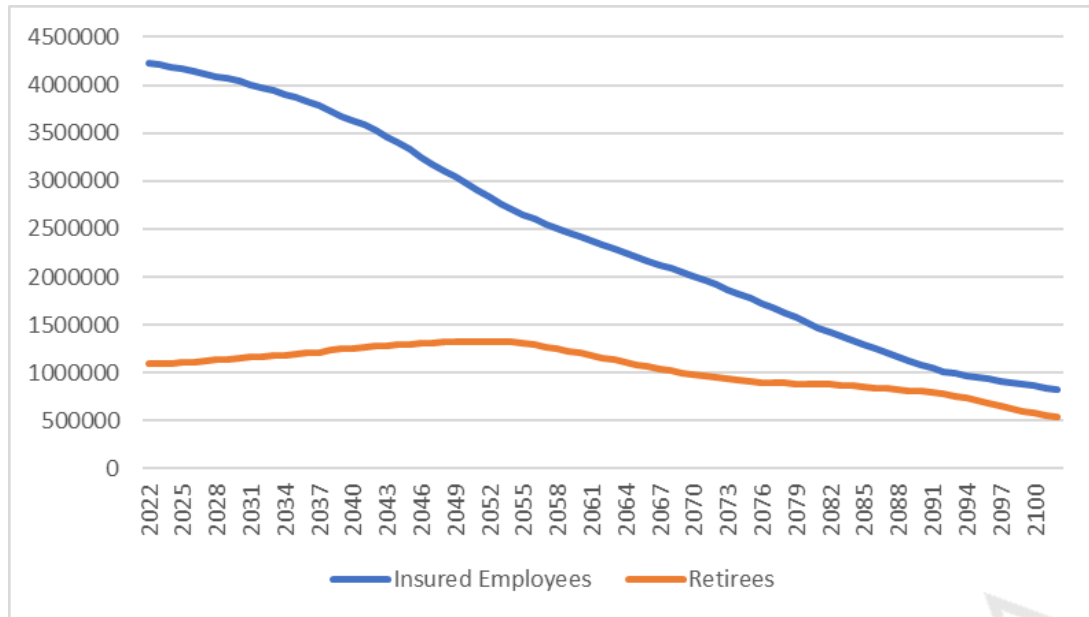
In Scenario 5, the assumptions are that only 60% of women give birth each year and the retirement age is set at 70 years. This scenario can be compared to Scenario 2, where the same percentage of women giving birth was presented, but the retirement age was lower. The results of the projections are presented in Figure 12 and Table 17.

**Table 17: Pension Fund Sustainability in Scenario 5**

<b>Date</b>	<b>Insured Employees</b>	<b>Retirees</b>	<b>DR</b>	<b>Total Earnings</b>	<b>Total Expenses</b>	<b>Surplus</b>
<b>2022</b>	4233088	1093156	0.258	1.95E+10	8.38E+09	1.11E+10
<b>2030</b>	4037217	1150600	0.284	1.86E+10	8.82E+09	9.75E+09
<b>2040</b>	3629361	1258090	0.346	1.67E+10	9.65E+09	7.05E+09
<b>2050</b>	2968688	1325525	0.446	1.37E+10	1.02E+10	3.49E+09
<b>2060</b>	2416960	1202671	0.497	1.11E+10	9.22E+09	1.90E+09
<b>2070</b>	2003346	979069	0.488	9.22E+09	7.51E+09	1.71E+09
<b>2080</b>	1522769	884705	0.580	7.01E+09	6.78E+09	2.22E+08
<b>2090</b>	1086781	806859	0.742	5.00E+09	6.19E+09	-1.19E+09
<b>2092</b>	1010237	787585	0.779	4.65E+09	6.04E+09	-1.39E+09
<b>2100</b>	862376	579179	0.671	3.97E+09	4.44E+09	-4.74E+08

*Source: Prepared by researcher using Stata*

**Figure 12: Trend of the population in Scenario 5**

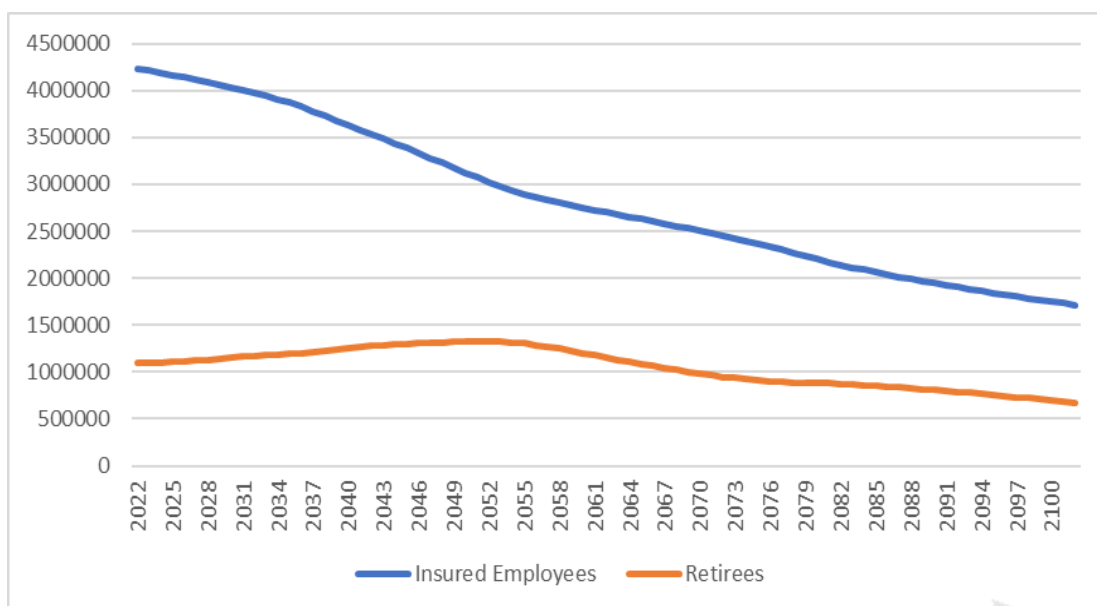


Despite the overall decline in population, insured individuals remain more numerous than retirees each year. Comparing these results with those of Scenario 2, the reason why the number of retirees does not tend to equalize with the number of insured individuals (as happened in Scenario 2) is the increase in the retirement age limit. However, this does not mean the system remains sustainable, as the dependency ratio increases every year, reaching around the value of 0.78, while simultaneously it is observed that the system's balance shows deficits from 2082 onwards. It becomes clear, therefore, that in the future the system will start to be unable to pay retirees, forcing the state to cover the ongoing differences between revenues and expenses, thus increasing its public expenditures.

### 3.5.6 Scenario 6

For the final scenario under examination (Scenario 6), the assumptions in place are that all women are having children and, simultaneously, the retirement age limit is increased to 70 years. The impact of the combination of these policies on the sustainability of the Greek pension system is thus examined. Figure 13 and Table 18 present the actuarial simulation results of the impacts of combination policies on the sustainability of the public pension and the predicted dependency ratio. The dependency ratio in scenarios combining multiple policies would be significantly lower compared to when each policy is implemented in isolation, or when fertility policies are applied at a lower level. The maximum value of the ratio over the years is 0.44, after which it slightly decreases again, stabilizing around the value of 0.40. Furthermore, the positive impact of the policy combination is also reflected in the substantial surplus maintained by the pension system over the years.

**Figure 13: Trend of the population in Scenario 6**



**Table 18: Pension Fund Sustainability in Scenario 6**

Date	Insured Employees	Retirees	DR	Total Earnings	Total Expenses	Surplus
<b>2022</b>	4233088	1093156	0.258	1.95E+10	8.38E+09	1.11E+10
<b>2030</b>	4037217	1150600	0.284	1.86E+10	8.82E+09	9.75E+09
<b>2040</b>	3629361	1258090	0.346	1.67E+10	9.65E+09	7.05E+09
<b>2050</b>	3123360	1325525	0.424	1.44E+10	1.02E+10	4.21E+09
<b>2060</b>	2750087	1202671	0.437	1.27E+10	9.22E+09	3.43E+09
<b>2070</b>	2506517	979069	0.390	1.15E+10	7.51E+09	4.02E+09
<b>2080</b>	2201538	884705	0.401	1.01E+10	6.78E+09	3.34E+09
<b>2090</b>	1946879	806859	0.414	8.96E+09	6.19E+09	2.77E+09
<b>2100</b>	1751368	697655	0.398	8.06E+09	5.35E+09	2.71E+09

Source: Prepared by researcher using Stata

The sustainability of the Greek pension system would see its most significant improvement if 100% of women give birth and the statutory retirement age is increased to 70 years (Scenario 6). In this scenario, the dependency ratio increases from 0.25 in 2022 to 0.45 in 2057, reflecting a ratio of approximately two insured persons supporting one beneficiary over the calculation period. Under Scenario 6, the current pension surpluses are projected to reach 3.28 billion euros in 2057, marking a notable improvement compared to Scenarios 1 and 2, which experience deficits, and showing a decrease of -69.7%, -39.2%, and -78.4% in comparison to Scenarios 3, 4, and 5 respectively.

The findings suggest that the simultaneous implementation of a fertility policy where 100% of women give birth and a delayed retirement age policy would result in the absence of pension deficits, in contrast to most other scenarios that involve a single reform. Nonetheless, given the challenge in regulating the proportion of women who give birth, the effectiveness of these combined scenarios largely hinges on the successful implementation of the delayed retirement policy.

### **3.6 Policy Recommendations for Addressing the Demographic Challenge**

In the previous subsections, the demographic problem facing Greece was discussed, along with the impacts of implementing policies concerning the proportion of women giving birth and raising the retirement age threshold on the sustainability of the Greek pension system. These impacts were evaluated using the Leslie Matrix and actuarial models. The simulation results indicate that in most scenarios, the Greek pension system would confront significant pressures regarding pension payments.

The demographic issue due to aging population significantly affects the economic growth of the country. The decline in the economically active population negatively impacts labour supply and economic growth potential, while the increasing dependency ratio puts pressure on fiscal sustainability. Additionally, the aging population slows down labour productivity. Inaction towards these demographic trends, due to the lack of policies prioritizing the pension system's adaptation and mitigation of the problem, is estimated to have long-term costly implications in terms of GDP, employment, and fiscal resources (IOBE, 2022).

The decrease and aging of the country's population is projected to continue over the next decades. Until 2050, population projections do not significantly vary among the scenarios of the analysis, as changes in the key parameters of the demographic balance are reflected in the overall population figures with considerable lag over decades. However, after 2050, the population exhibits significant divergences between the projection scenarios.



In the labour market, the expected demographic developments lead to a smaller workforce, with a higher average age and lower productivity. This highlights the critical importance of policies aimed at stimulating fertility.

Due to its high debt levels, Greece needs to follow a more prudent fiscal policy to ensure the sustainability of its system. The country's fiscal sustainability is critical both for better adaptation and for mitigating demographic trends, as it provides the necessary resources to implement proposed policies while creating conditions for stability.

As mentioned in the Development Plan by the Pissaridis et al. Commission (2020), to strengthen and ensure the sustainability of its pension system, Greece needs to reduce insurance contributions (indicatively, through fixed health contributions) and the upper limit of insurable income. It should enhance the proportionality of the public distributive insurance pillar, develop the second and third pillars with incentives for private decisions, transition from a distributive to a capitalized system for supplementary pensions with immediate application for new labour market entrants and voluntarily for other workers who desire it, and establish a supervisory framework for pension funds, including a public fund.

Most of the measures proposed to address the pressures that the demographic problem will exert on the country's pension system have already been institutionalized by the government, as previously discussed in earlier chapters. This demonstrates the government's recognition of the pension system as a major issue. Additionally, as the literature has shown, most countries facing or dealing with the problem of an aging population choose to protect their pension systems by transitioning, either entirely or partially, from a distributive to a capitalized system (OECD, 2005).

Therefore, transitioning the supplementary pension to a capitalized system provides a solution to the issue posed by the aging population in combination with low fertility rates. This change in the pension system ensures its sustainability without the need to alter the statutory retirement age or reduce the benefits received by current or future retirees.

## **Chapter 4: Assessing the effect of demographic changes on the stability of the Greek pension system through the application of co-integration theory**

### **4.1 Introduction**

The concept of retirement emerged as a facet of social security during the nineteenth century, aligning with the advent of the industrial revolution. This system played a pivotal role in securing a source of income for seniors who are no longer in the workforce. There are primarily two kinds of pension schemes: those based on the capitalization method and those that operate on the principle of distribution. Presently, numerous pension schemes are grappling with financial challenges due to various economic issues, including economic downturns, unemployment, and demographic shifts, notably the increase in the population of older adults with significantly long lifespans. In response to these challenges, countries worldwide are implementing new policies aimed at ensuring the long-term viability of pension schemes and safeguarding retirement benefits for future generations.

The pension system in Greece is founded primarily on the distribution principle, essentially embodying intergenerational solidarity. In recent years, it has been grappling with a fiscal deficit that jeopardizes the sustainability of the Greek pension system. Greece has undertaken several reforms, with the most recent one in 2021, which included the introduction of the capitalized system in the supplementary pension, to address these financial challenges. Experts have highlighted that demographic factors significantly aggravate the financial shortfall of the existing pension schemes due to the distribution principle. This situation has led this chapter of the study to pose the following question:

***How do demographic factors impact the financial balance of the pension system in Greece?***

This discussion is grounded on the hypothesis that:

- Greece's pension system, which operates primarily on a distribution principle, is experiencing a financial shortfall, posing a risk to its future sustainability.
- Demographic trends, including increased life expectancy and reduced fertility rates, contribute to the financial deficit of e-EFKA. The objective of this study is to assess the impact of demographic factors on the financial deficit within Greece's pension system.

## 4.2 Literature Review

Given the challenges that most pension systems encounter with financial strains, numerous domestic and international studies have explored the elements influencing the financial stability of pension schemes. A notable global investigation, a European study by Nerlich and Schroth (2018), found that Europe's population aging is projected to persist in the coming years, attributed to rising life expectancy and falling fertility rates. This demographic shift is expected to reduce the workforce size and exert additional pressure on public expenditures for pensions, healthcare, and long-term care as the population gets older. Despite many European nations undertaking pension reforms, further modifications seem imperative to guarantee fiscal sustainability over the long haul.

The interplay between economic conditions and fertility rates is a well-established topic in demographic studies. It is frequently cited in the literature that fertility tends to mirror economic fluctuations. Economic downturns and labour market instability often prompt individuals to delay parenthood and adapt their family size plans (Goldstein et al., 2013; Adsera, 2004; Sobotka et al., 2011; Hofmann and Hohmeyer, 2012; Schmitt, 2008 and 2012). Theoretically, it has been debated for over two centuries that fertility rates increase during economic booms and decrease during recessions. In the modern era, Becker (1960) analysed the nexus between fertility and income levels, while Easterlin (1973, 1976) viewed fertility as dependent on the economic circumstances faced by the younger generations, influenced by their upbringing in their parents' homes. Numerous scholars argue that economic recessions impact fertility by leading to the postponement of childbearing, which ultimately lowers the total fertility rate (TFR) and the average number of children per woman (Andorka, 1978; Rindfuss et al., 1988; Morgan, 1991, 1996; Sobotka, 2008a, 2008b).

Contrary to the conventional theories, Butz and Ward (1979a, 1979b) examined fertility trends in the United States during the early 1970s and proposed that fertility patterns might in fact exhibit an inverse relationship to economic cycles. With the rise in female labour force participation, they argued that economic prosperity raises the "opportunity cost" of childbearing for women, suggesting that having children during times of economic growth could lead to greater financial loss due to foregone earnings. On the other hand, Macunovich (1996) contended that fertility indeed correlates with economic cycles, emphasizing that the detrimental impact of high unemployment rates during economic slumps outweighs any decrease in "the value" of women's labour. The financial crisis of 2007-2008 in the United States and its spread to Europe reignited interest in investigating the nexus between economic crises and fertility patterns.

The most recent economic recession experienced by European nations, notably Cyprus, Greece, Ireland, Italy, Portugal, and Spain, marked a stark departure from earlier economic recessions. This recession stood out not only for its heightened severity and extended duration, but also for the profoundly different social backdrop against which it unfolded, compared to past eras such as the 1920s or the 1970s. Specifically, the onset of this latest financial crisis found the welfare state in a more advanced state of development than it had been half a century or even a century ago. Additionally, there was a notably higher participation rate of women in the workforce alongside a significant increase in their educational attainment. In most households, the earnings of employed women were no longer considered merely auxiliary. Contraceptive methods had become widespread, the total fertility rate (TFR) was elevated, and the average age at which women bore their first child was higher than in the periods before this economic downturn.

The variation in the impact of the economic crisis on fertility rates across different nations can largely be linked to the pre-crisis state of their social security systems and family support policies. Countries with well-established social security systems and robust family support mechanisms were better insulated against the economic downturn's adverse effects on fertility levels (Thévenon, 2011; Fagnani, 2012). An economic recession directly influences individuals of reproductive age, with heightened unemployment rates within this demographic affecting their choices and actions regarding reproduction, often resulting in delayed childbirth. The linkage between economic downturns and fertility rates is notably pronounced in Cyprus, Greece, Ireland, and Italy. In contrast, in Western and Northern European countries, where the recession had a relatively minor effect on unemployment rates, fertility rates seem to have remained largely unaffected by the recent economic challenges (Goldstein et al., 2013).

Econometric analyses are crucial for understanding the relationship between demographic factors and the financial stability of the National Retirement Fund e-EFKA. Utilizing econometric models and statistical data, these studies examine how demographic trends influence the solvency, sustainability, and overall health of pension systems. Numerous studies focus on individual countries, while some employ a comparative perspective, analysing various nations together. Essential demographic factors explored in these analyses encompass aging populations, the demographic dependency ratio, fertility levels, life expectancy, and additional elements concerning the population's age distribution. Results across these analyses show diversity attributable to methodological differences, the unique conditions of each country, and the particular traits of the pension schemes examined. While

some investigations underline the financial strain retirement systems face due to major demographic shifts like population aging, others stress the necessity of integrating demographic variables with suitable pension policies to maintain financial stability.

In a study conducted by Marceau (2013), a lasting association was discovered between the equilibrium metrics of the pay-as-you-go pension system and various economic-demographic factors. Similarly, Haffar and Dib (2018), through their econometric analysis, showcased how economic and demographic elements affect the pension system's efficiency over both medium and long-term periods. Investigating the repercussions of an aging population on pension costs in Algeria, Bouragne and Allam (2019) found that lower fertility rates, reduced mortality rates, and increased life expectancy have resulted in an aging population structure and a reduced dependency ratio. These demographic transformations, along with the unemployment issue, have significantly impacted pension fund financing.

A research project by Muhammad and Ismail in 2017, focusing on Saudi Arabia, developed a quantitative model to assess the actuarial shortfall within the country's social insurance mechanisms. Their findings indicated that anticipated deficits in social insurance funds primarily stem from demographic shifts, notably the rise in life expectancy that prolongs benefit disbursements without a corresponding rise in contribution rates.

Larbi Cherif (2021) mentions in his study that Laour (2017) highlighted the vulnerabilities of Algeria's retirement system, which relies on a distribution principle, to demographic shifts. The study found that an increasing ratio of retirees to active contributors exacerbates the system's financial strain, by boosting expenditures over income due to demographic transitions, resulting in fiscal instability. Concurrently, Murad, Boudia and Bouchar (2018) in their econometric analysis assessed the impact of the 2015 pension reform, which involved increasing the retirement age from 60 to 65. A key finding was that this adjustment could resolve the fund's insolvency within five years.

To achieve the objectives of this chapter in the study, a mapping of the demographic reality in Greece is attempted and the financial position of e-EFKA is analysed using statistics from Hellenic Statistical Authority (ELSTAT). Then the impact of the demographic transition on the financial balance of e-EFKA is measured by studying the relationship between the financial balance of the retirement fund as a dependent variable, and fertility rates and life expectancy as independent variables.

The application of the co-integration methodology is applied. The initial step involves establishing the integration level of each series. If the series are found to be integrated of the

same order, the Vector Error Correction Model (VECM) is applied. Conversely, if the series display varying degrees of integration, the Autoregressive Distributed Lag (ARDL) model is utilized. This analysis spans from 2000 to 2021, a relatively brief period constrained by the unavailability of data regarding the financial status of the National Pension Fund (e-EFKA) before 2000.

### **4.3 Greece's retirement system and demographic transition**

Research consistently shows that the aging of the population contributes to the unsustainability of pension systems, particularly those founded on the distribution principle, or the solidarity between generations. This leads to a higher old-age dependency ratio, indicating a reduction in the working-age population responsible for funding health and pension benefits for an increasing elderly demographic (Nerlich and Schroth, 2018). As the workforce contributions decline, while compensations to retirees rise, pension systems face a growing financial deficit.

In Greece, pension provisions are managed via a public framework, where the pension structure includes a base pension (the national pension) that does not depend on previous earnings, along with a supplementary pension that is contributory in nature. The national pension, which is not linked to earnings, is funded directly by the state budget. Eligibility for this pension requires a minimum of 15 years of insurance coverage and 15 years of residency within Greece.

The contributory pension amount is determined by the number of insurance years and the pensionable earnings from January 1<sup>st</sup> of 2002, until the retirement application date. The system for supplementary insurance, which is both public and compulsory, operates under two entities.

The first entity is the Supplementary Insurance Branch of e-EFKA, which operates on a hybrid system combining Defined Benefits (DB) and Notional Defined Contributions (NDC). Pensions for insurance periods up to December 31<sup>st</sup> of 2014, are calculated using the defined benefit system. From January 1<sup>st</sup> of 2015, onward, the calculation shifts to the NDC system. Individuals who first became insured after January 1<sup>st</sup> of 2014, have their entire pension calculated under the NDC system.

The second entity is the Hellenic Auxiliary Pensions Defined Contributions Fund (T.E.K.A.), which operates as a funded defined contribution (DC) system, targeted new labour market entrants from January 1<sup>st</sup> of 2022. It is mandatory for all individuals born after January 1<sup>st</sup> of

2004, and offers voluntary participation for currently employed individuals under 35 years of age (born after January 1<sup>st</sup> of 1987).

For those already insured and over 35, the existing pension system remains unchanged, with their pensions calculated according to prevailing regulations. The amount of the pension is determined by the technical parameters at retirement and the accumulated balance in the insured's personal account.

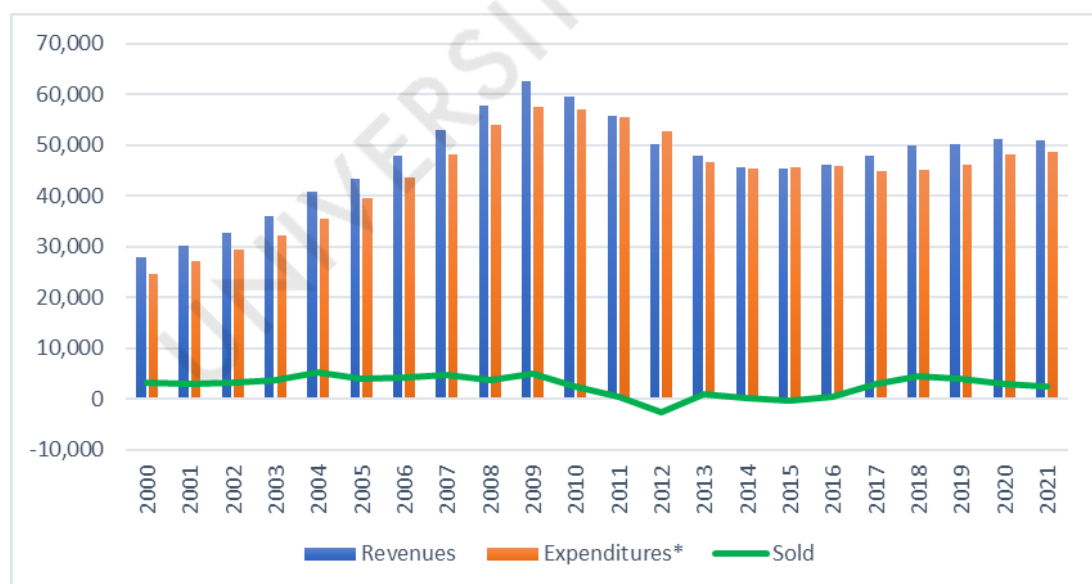
#### 4.4 Revenues and Expenditures of e-EFKA

In this section, the financial trajectory of e-EFKA is examined, analysing the annual revenues, expenditures, and their resulting balance (Sold) over a period spanning from 2000 to 2021.

The below bar chart (Figure 14) provided illustrates a comparison between the inflows and outflows of funds, as well as the net balance which is indicated by the line graph overlay.

The data suggests a relatively stable and positive financial status for e-EFKA, with revenues consistently exceeding expenditures across the 20-year period. This surplus indicates that the system has been effectively managing its financial resources, despite various economic challenges that may have arisen, including the global financial crisis of 2009. There is only one period that the expenditures surpass the revenues and its 2012, right in the heart of the crisis.

**Figure 14: Evolution of e-EFKAs expenditures and revenues (in million euros)**



Upon closer inspection, the chart reveals that the gap between revenues and expenditures varies from year to year. There is a pattern of financial health, as the revenues not only cover the expenditures each year but also provide a surplus that contributes to the net sold. It's

worth noting that during certain years, particularly in the midst of economic downturns, the surplus narrows, suggesting a reactive fiscal policy by e-EFKA to mitigate external economic pressures. Having said that, it is worth noting that revenues are mainly driven by State fiscal transfers, as the system enjoys tripartisan funding (employees, employers and state).

As part of the comprehensive analysis of e-EFKA's financial management, it's crucial to consider specific strategic measures that have been implemented to regulate expenditure on main pensions. The following actions have been adopted (NAA, 2021):

1. Pension Indexation Freeze: Adjustments to pension values based on cost-of-living or wage growth have been suspended until the year 2022. This freeze helps manage outflows by maintaining pension payments at current levels, despite any inflationary pressures.
2. Pension Recalculation: There has been a recalibration of all pensions awarded before the implementation of Law 4387/2016, aligning them with the stipulations of the new pension system. The recalibration process involves documenting each pension in the IT System with distinct components:
  - A national pension component.
  - A contributory pension is recalculated under the new regulations.
  - A 'personal difference', which represents the disparity between the old and new pension amounts.

For pensions where the recalculated amount under the new system is lower, a 'personal difference' is named and continues to be paid but is set aside to be compensated by future pension increases starting from 2023. This approach effectively spreads the financial impact over the coming years, ensuring a gradual adjustment to the new system. Conversely, for those pensions where the recalculated amount is higher under the new system's framework, the 'personal difference' is distributed in five yearly instalments commencing in 2019. This phased approach provides a controlled method for increasing pension payouts and mitigating sudden impacts on the fund's financial balance.

These initiatives reflect some of e-EFKA's proactive steps toward fiscal sustainability. By recalibrating pensions and controlling indexation, the organization is not only stabilizing its immediate financial standing but also laying the groundwork for a more balanced pension system in the long term. The gradual integration of these changes demonstrates a commitment to safeguarding the financial integrity of the pension fund while adapting to the evolving economic environment.



Despite the efforts and reforms made so far, it seems that over the years the level of expenses is almost equal to the level of revenues, with e-EFKA constantly being in a state of "technical support" in order to be able to meet its obligations and cover costs, with the state undertaking to fund it in order to be able to cover any deficits. It is worth noting, of course, that the management costs of the fund have not been included in the expenses.

#### **4.5 Demographic transition in Greece**

Over the past century, there have been significant changes in the basic demographic components (mortality, fertility, nuptiality) in Greece. Today, we are considerably older than before, living many more years, having fewer children and marriages, divorcing more easily, and the composition of our households and families has changed markedly. In the two decades before World War II, we had particularly high infant and child mortality, thus low average life expectancies at birth (around 50 years, with women living 3-4 years longer than men). Mortality increased in the 1940s, only to decrease rapidly thereafter, leading to a significant increase in life expectancy at birth (+30 years compared to the interwar period). Initially, this increase was primarily due to a decrease in infant and child mortality, while in recent decades it is almost exclusively due to a decrease in mortality at older ages (>60 years). This rise in average life expectancy at birth is likely to continue, although at a slower pace, resulting in women nearing 90 years and men exceeding 85 years by the middle of our century. The reduction in mortality probabilities at mature and older ages has already led (and will continue to lead) to an increase in years lived after the age of 65, with women living 2-3 years more than men. Therefore, while women born around 1930 had a chance to live on average another 15 years upon reaching 65, those born around 1980 are likely to live almost 25 more years (10 years longer). Naturally, these additional years of life after 65 do not apply to all women born in 1920 or 1980, but only to a segment of them: those who have or will survive until their 65th birthday (Kotzamanis, 2023).

At the same time, there have been significant changes in marital patterns as well. While in the generations of the early 1920s, the rate of single individuals at 50 years of age did not exceed 12%, for women born in the mid-1980s, this rate has almost doubled. Concurrently, very few married women from pre-war generations divorced, a trend which does not hold for the newer generations, as women born around 1985 divorce much more frequently (nearly one in three marriages will lead to divorce). In the same generations, there has been an increase in cohabitation (with or without formal agreements) and, obviously, higher rates of out-of-wedlock births (2% in the first post-war decade, 13% currently). These changes have led to a rapid increase in single-parent families, mainly due to the rise in divorces.

However, equally significant changes have been recorded in fertility. Analysing it across successive generations allows us to observe that while women born during the interwar period had on average 2.3-2.5 children, those born in the '50s and '60s had just over 2 children, while generations after 1960 are having fewer and at an older age (for instance, women born in 1985 will have only 1.45 children at a relatively older age, at 31 years). Yet another emerging trend is the increase in final childlessness, which will likely lead one in four women born in the mid-1980s to remain childless (for context, the proportion of childless women did not exceed 15% in pre-war generations).

One of the key indicators of demographic change in Greece is the rise in life expectancy coupled with a decrease in birth rates, leading to alterations in the population's age composition.

**Table 19: Total Fertility rate and Life expectancy every decade in Greece**

Year	1960	1970	1980	1990	2000	2010	2020
<b>Total Fertility rate</b>	2.232	2.398	2.231	1.388	1.253	1.481	1.386
<b>Life expectancy</b>	69.3	72.7	74.5	76.9	77.8	80.3	81.2

*Source: Eurostat (2023)*

The data presented in the table indicates a long-term trend of decreasing fertility and increasing life expectancy in the population over the six decades from 1960 to 2020.

Starting with fertility rates, there is a clear downward trajectory. In 1960, the total fertility rate stood at approximately 2.3 children per woman, which can be considered above the replacement level of 2.1, where the population size remains stable. By 1970, this rate increased slightly to around 2.4, suggesting a brief period of higher birth rates. However, from 1980 onwards, the fertility rate began a consistent decline, falling to approximately 1.39 by 1990, below the replacement level, indicating that fewer children were being born per woman. This downward trend continued into the new millennium, with the total fertility rate reaching 1.25 by 2000 and temporarily improving to roughly 1.48 by 2010. By 2020, the fertility rate had declined to approximately 1.39, reinforcing the pattern of reduced childbearing. This trend can be explained by several factors such as the delayed marriage age and the entrance of women to the workforce.

In contrast, life expectancy has shown a steady increase, indicating improvements in health, medical care, and overall living conditions. In 1960, the average life expectancy was around 69.3 years, which increased to approximately 72.7 years by 1970. The following decades saw a consistent rise, with life expectancy reaching 74.5 years in 1980 and 76.9 years by 1990. As we entered the 21st century, life expectancy continued its ascent, reaching 77.8 years in 2000, surpassing 80 years in 2010, and hitting an average of 81.2 years by 2020.

The implications of these trends are significant for societal planning and resource allocation. The decrease in fertility rates led Greece to an aging population, with a higher proportion of older individuals relative to the working-age population. This demographic shift posed challenges for pension systems, healthcare infrastructure, and led to a reduced labour force, impacting economic growth, as shown in Chapter 2 of the thesis.

On the other hand, the increase in life expectancy suggests that people are living healthier and longer lives, which is a positive development. However, it also means that provisions must be made for longer periods of retirement and potential healthcare needs, which could place additional financial pressure on the social security system.

These trends reflect a demographic transition common in many parts of the world, where societies move from high birth and death rates to lower birth and death rates, leading to an older average population age and potentially shrinking populations if fertility rates remain below replacement levels.

#### **4.6 Econometric study of the effect of demographic factors on the financial balance of the pension system in Greece**

To gauge the impact of demographic variables on the e-EFKA's balance over short-term and long-term periods, it is essential to explore the potential co-integration relationship between the pension fund's balance-to-GDP ratio and key demographic indicators such as life expectancy and fertility rate. Co-integration analysis will reveal whether there is a statistically significant long-term equilibrium relationship between these variables, indicating that demographic shifts directly affect the financial health of the pension fund.

In the short term, fluctuations in life expectancy and fertility rates may not immediately reflect changes in the pension fund's balance. However, over the long term, an increase in life expectancy could lead to a greater number of retirees drawing from the fund, while a decrease in the fertility rate could result in a smaller working-age population contributing to the fund. Both scenarios could potentially create financial stress on the pension system.

By applying co-integration techniques, we can statistically test whether a long-run equilibrium exists and the extent of the demographic factors' influence. If a co-integration relationship is found, policymakers might need to consider demographic trends in their strategies to ensure the sustainability of the pension fund. If no co-integration is found, this suggests that other factors might be influencing the fund's balance more significantly than demographic variables.

#### 4.6.1 Data and Method

The data on which this study will be based are time series for the period 2000-2021 and were obtained from World Bank database and Hellenic Statistical Authority (ELSTAT). The dependent variable Sold is the ratio of financial balance (= revenues – expenditures) of e-EFKA to GDP. The source for data of revenues and expenditures of e-EFKA and the GDP of Greece is ELSTAT. The independent variables are the life expectancy (ESP) and the total fertility rate (FIC), the data of which were obtained from the World Bank.

The stationarity of each time series was studied by testing the unit root by conducting the Augmented Dickey – Fuller (ADF) test for the three variables. This test is used to determine whether a time series is stationary or not. The null hypothesis (H0) for the Dickey-Fuller test is that the time series has a unit root (i.e., it is non-stationary and follows a random walk without drift). The results are listed in the table below.

**Table 20: ADF test results**

Variable	Stat	Prob	Critical Values at 1%, 5% and 10%	Integration degree
<b>Sold</b>	-1.920	0.322	-3.750	I(1)
			-3.000	
			-2.630	
<b>ESP</b>	-2.262	0.184	-3.750	I(1)
			-3.000	
			-2.630	

Variable	Stat	Prob	Critical Values at 1%, 5% and 10%	Integration degree
FIC	-1.722	0.419	-3.750	I(1)
			-3.000	
			-2.630	

*Source: Prepared by researcher using Stata*

The table provided displays the ADF test results for three variables, presumably assessing their stationarity. The variables are Sold, ESP, and FIC, each yielding a specific test statistic (Stat) and a probability value (Prob). The critical values for the test are given at three levels of significance (1%, 5%, and 10%), and the integration degree of each variable is indicated in the last column.

For the variable Sold, the test statistic is -1.920 with a probability value of 0.322. Given that this statistic is greater than the critical values at all significance levels, the null hypothesis of a unit root cannot be rejected, implying that Sold is non-stationary and integrated of order one, I(1).

Similarly, the ESP variable has a test statistic of -2.262 with a probability value of 0.1845. Although closer to the critical values, it is still insufficient to reject the null hypothesis, suggesting that ESP is also I(1).

Lastly, the FIC variable has a test statistic of -1.722 with a probability value of 0.419. This is the furthest from the critical values, strongly indicating that FIC is non-stationary and I(1).

Given that all variables are integrated of the same order, I(1), this means that they are non-stationary but become stationary after first differencing. Hence, an ARDL (Autoregressive Distributed Lag) model is utilized in subsequent analysis.

The use of an ARDL model is justified by its flexibility in handling variables of different integration levels, although in this case, all are I(1). The ARDL approach is particularly useful as it can estimate the long-term and short-term dynamics simultaneously, even with a small sample size. The ARDL model thus provides a robust framework for examining the relationships between the variables in question, making it a suitable choice for further analysis in this study.

## 4.6.2 Results

Since the co-integration of variables is I(1) the autoregressive distributed lag model (ARDL) is used which is distinguished from the rest of the co-integration methods by that the boundary test in this methodology can be applied either if time series are stationary at their level either at the first differences or a mixture between the two.

The ARDL from in this case can be expressed as follows:

$$\begin{aligned} d(SOLD_t) = & c + \lambda \cdot SOLD_{t-1} + \beta_1 \cdot ESP_{t-1} + \beta_2 \cdot FIC_{t-1} \\ & + \sum_{i=1}^m a_{1,i} \cdot d(SOLD_{t-1}) + \sum_{i=1}^n a_{2,i} \cdot d(ESP_{t-1}) \\ & + \sum_{i=1}^n a_{3,i} \cdot d(FIC_{t-1}) + \varepsilon_t \end{aligned}$$

where,  $d(SOLD_t)$  is the first difference of the dependent variable and, according to the model, can be explained by the long and short term:

where, is the first difference of the dependent variable and, according to the model, can be explained by the long and short term:

- i. Long term information:  $c + \lambda \cdot SOLD_{t-1} + b_1 \cdot ESP_{t-1} + b_2 \cdot FIC_{t-1}$
- ii. Short term information: This term consists of delays of the dependent variable

$$\begin{aligned} & \sum_{i=1}^m a_{1,i} \cdot d(SOLD_{t-1}) \text{ and the block of delays of the explained demographic} \\ & \text{variables } \sum_{i=1}^n a_{2,i} \cdot d(ESP_{t-1}) \text{ and } \sum_{i=1}^n a_{3,i} \cdot d(FIC_{t-1}). \end{aligned}$$

In both information there are some parameters that represent a relationship between the variables. For example,  $\lambda$  is the error correction parameter and signifies the proportion of short-term discrepancies that are adjusted over time to reestablish equilibrium in the long-term. For the long-term association to be valid, this parameter should be both negative and statistically significant. The  $\beta$  represents the coefficient that measures the influence of the variables in explaining the long-term relationship dynamics.

So,  $b_1 = -\frac{\beta_1}{\lambda}$  is the long-run equation between balance and life expectancy and  $b_2 = -\frac{\beta_2}{\lambda}$  is the long-term equation between balance and fertility rate.

The results for estimation of the parameters for the period 2000-2021 are presented in the following table.

**Table 21: Estimation Results of an ARDL model (4,1,4) (short-run)**

<b>Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-statistic</b>	<b>P&gt; t </b>
<b>Sold(-1)</b>	0.600	0.170	3.53	0.012
<b>Sold(-2)</b>	0.450	0.209	2.15	0.075
<b>Sold(-3)</b>	0.242	0.164	1.47	0.191
<b>Sold(-4)</b>	0.928	0.204	4.54	0.004
<b>ESP</b>	0.030	0.005	5.36	0.002
<b>ESP(-1)</b>	-0.012	0.003	-3.19	0.019
<b>FIC</b>	-0.138	0.048	-2.87	0.028
<b>FIC(-1)</b>	-0.225	0.071	3.16	0.020
<b>FIC(-2)</b>	-0.169	0.052	-3.21	0.018
<b>FIC(-3)</b>	-0.174	0.073	-2.37	0.056
<b>FIC(-4)</b>	0.053	0.058	0.91	0.398
<b>Constant</b>	-1.232	0.253	-4.86	0.003
<b>R-squared</b>	0.958			
<b>Adjusted R-squared</b>	0.883			
<b>Prob &gt; F</b>	0.003			

*Source: Prepared by researcher using Stata*

In the following table the results of the ARDL- EC model are presented in order to recognize the long-run and short-run effects of the independent variables, as the speed of adjustment.

**Table 22: Estimation Results of an ARDL-EC model (4,1,4) (long-run)**

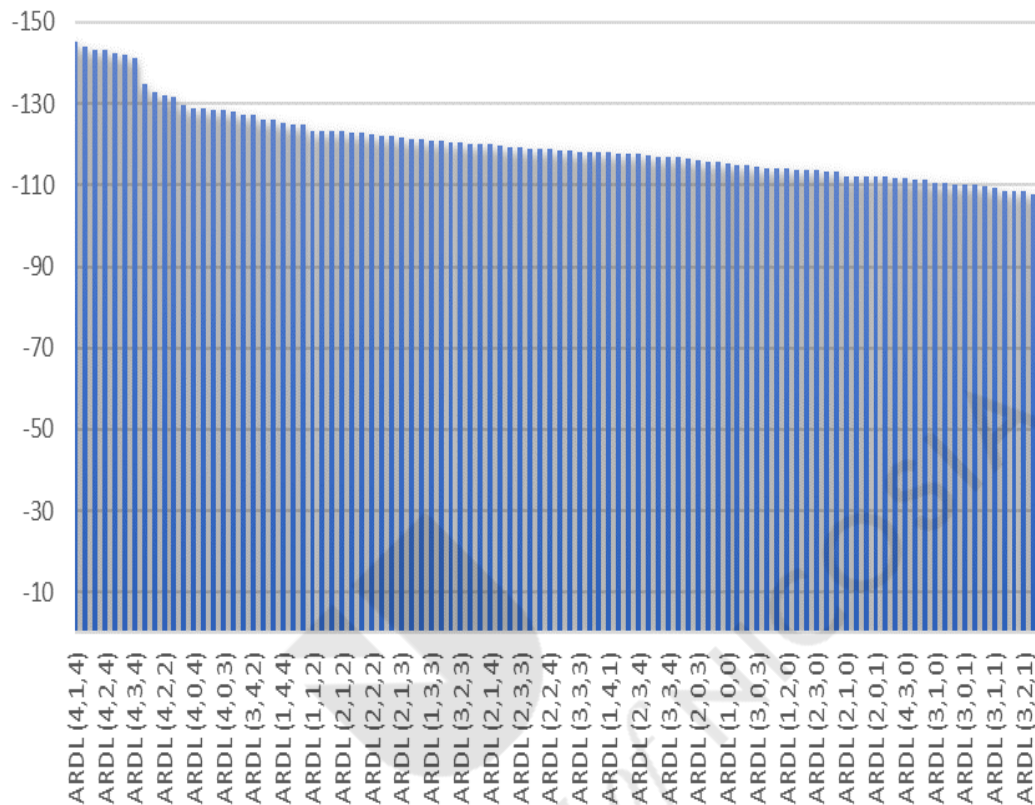
Variable	Coefficient	Std. Error	t-statistic	P> t
<b>ADJ</b>				
<b>SoldL1</b>	1.221	0.371	3.29	0.017
<b>LR</b>				
<b>ESPL1</b>	-0.015	0.002	-5.70	0.001
<b>FICL1</b>	0.166	0.042	3.86	0.008
<b>SR</b>				
<b>LDSOLD</b>	-1.621	0.341	-4.74	0.003
<b>L2DSOLD</b>	-1.170	0.249	-4.69	0.003
<b>L3SOLD</b>	-0.928	0.204	-4.54	0.004
<b>D1ESP</b>	0.030	0.005	5.36	0.002
<b>D1FIC</b>	-0.138	0.048	-2.87	0.028
<b>LDFIC</b>	0.289	0.042	6.89	0.000
<b>L2DFIC</b>	0.120	0.039	3.06	0.022
<b>L3DFIC</b>	-0.053	0.058	-0.91	0.398
<b>Constant</b>	-1.232	0.253	-4.86	0.003
<b>R-squared</b>	0.935			
<b>Adjusted R-squared</b>	0.818			
<b>Prob &gt; F</b>	0.002			

*Source: Prepared by researcher using Stata*



The selection of the optimal lags for the aforementioned model were made by using the Akaike information criterion (AIC). The following figure presents the AIC for some possible lags for the model.

**Figure 15: Optimal model with the graph of the AIC**



As can be seen, the ARDL (4,1,4) is the most optimal among the 33 others presented, because it offers the smallest value of the AIC. Additionally, concerning the evaluations utilized to scrutinize the deduced ARDL framework, it is observed that there is an absence of error autocorrelation, heteroskedasticity is not present, and the model is appropriately specified. Regarding the test for normal distribution, the errors do adhere to a normal distribution.

The Breusch-Godfrey test yields a probability of 0.098, indicating that there is no statistically significant evidence of autocorrelation in the model's residuals, as the value is above the common significance threshold of 0.05. The null hypothesis is also accepted, as there is not enough evidence to reject it, in the case of White test as the probability of the test is greater than 0.05. Same for the rest of the tests that were conducted. This implies that the residuals from the ARDL model do follow a normal distribution and there are no statistically significant issues with the model's specification.

**Table 23: Diagnostic test results for estimated ARDL model**

Test Hypothesis	Tests	Probability
<b>Autocorrelation</b>	Breusch-Godfrey	0.098
<b>Heteroskedasticity</b>	White	0.362
<b>Normality</b>	Bera-Jaque	0.934
	Skewness and kurtosis tests for normality	0.955
<b>Specification</b>	Ramsey RESET	0.106

*Source: Prepared by researcher using Stata*

The estimated ARDL model (4,1,4) is generally good and explains the dynamics of dependent variable in Greece, from 2000 to 2021 at a rate of 88.33%.

To confirm whether a long-term association exists or not, a Bounds Testing approach is employed. In this test, the null hypothesis posits that there is no co-integration linkage between pension system revenues and expenses.

**Table 24: Bounds Testing Results**

T-statistic	Value	k
F-statistic	15.721	2
<b>Critical Value Bounds</b>		
Significance	I(0) Bound	I(1) Bound
10%	3.17	4.14
5%	3.79	4.85
2.5%	4.41	5.52
1%	5.15	6.36

*Source: Prepared by researcher using Stata*

The findings presented in the preceding table indicate that the computed Fischer statistic exceeds the critical value at the upper bound of the Bounds Test (11) for the significance thresholds of 5%, 2.5%, and 1%. Consequently, the null hypothesis is dismissed, **corroborating the presence of a long-term association (co-integration relationship) between life expectancy and fertility rate in relation to the pension fund's balance.**

**Table 25: Results of the error correction factor estimate and long-run parameters**

Parameters	Error correction factor ( $\lambda$ )	Long-range parameters		
		$b_1$	$b_2$	$a$
<b>Results of the estimation</b>	1.221 (0.017)	-0.015 (0.001)	0.166 (0.008)	-1.232 (0.003)

*Source: Prepared by researcher using Stata*

Through Table 25, the significance of the long-run parameters in 5% significance level is observed, but it is also observed the positive sign of the error correction factor, which is not align with the theory that tells that speed of adjustment takes values between -1 and 0.

### 4.6.3 Discussion

To address the study's hypothesis, an econometric study was conducted on the relationship between the financial balance of e-EFKA in proportion to the gross domestic product and demographic factors represented by life expectancy and fertility rate based on the theory of co-integration during the period 2020-2021.

In the ARDL (Autoregressive Distributed Lag) model of Table 20, the relationship between the financial balance of e-EFKA (represented by the variable Sold) and two demographic factors: the fertility rate (FIC) and life expectancy (ESP), has been estimated. The coefficient of Sold(-1) is 0.600 with a p-value of 0.012, indicating a statistically significant positive effect of the previous year's Sold on the current year. This means that if the Sold value increases by 1% in the previous year, it is expected to increase by approximately 60.026% in the current year, ceteris paribus. The same interpretation is applied for the coefficients of the next lags of this variable. An interesting fact is that the coefficients of the next lags of variable Sold is smaller than the coefficient of the first lag, suggesting that the effect of the previous years is less certain as the years pass by. Nevertheless, it seems that the effect of the variable

looking three years back is not statistically significant as its p-value is equal to 0.191 but the p-value of the coefficient four years prior is 0.004, indicating a strong and statistically significant influence.

The immediate effect of life expectancy on Sold is significant and negative (coefficient = -0.036) with a p-value of 0.002, suggesting that an increase in life expectancy has a significant immediate negative impact on the financial balance and the lagged effect (from one year prior) is also significant with a coefficient of -0.012 and a p-value of 0.019, indicating that the negative effect persists over time, although it becomes weaker. An increasing life expectancy has a negative immediate impact on the financial balance. This could mean that as people live longer, the period during which they receive benefits (such as pensions) extends, increasing the financial burden on e-EFKA. Since the negative effect of life expectancy on financial balance is also significant one year prior, it suggests that the effect is not just immediate but persists over time.

The fertility rate has a significant immediate negative effect on Sold (coefficient = -0.138) with a p-value of 0.028. The lagged effects of the fertility rate from one to three years ago also show significant negative impacts on SoldGDP, with the effects diminishing over time. The effect four years prior shows a positive coefficient (0.053) but is not statistically significant (p-value = 0.398), suggesting that any positive influence from the fertility rate from four years ago on the financial balance is uncertain. Decreasing fertility rate also shows a negative immediate and lagged impact on the financial balance. A lower fertility rate might imply a shrinking workforce in the future, leading to fewer contributors to the system relative to the number of beneficiaries, which would strain e-EFKA's finances. The lagged effects of the fertility rate indicate that the negative impact on financial balance echoes through subsequent years, highlighting potential long-term challenges.

The combination of increasing life expectancy and decreasing fertility rate poses a challenge to the financial sustainability of e-EFKA. As the population ages and the ratio of workers to retirees shifts unfavourably, there may be increased pressure on the financial resources of the system. The significant negative coefficients of life expectancy and fertility rate suggest that without policy adjustments or changes in other economic factors, the trend of these demographic changes could lead to a larger financial deficit for e-EFKA.

The latter findings are enforcing the arguments that arise for the sustainability of the pension system claiming that the pension system of Greece will face serious challenges due to demographic changes of its population (Kapopoulos and Thomaidou, 2021; Kangur, Kalavrezou and Kim, 2021; Nektarios, 2007; Symeonidis, Tinos and Xenos, 2021).

As life expectancy rises, individuals spend a longer time in retirement, drawing pensions for extended periods. This extension results in higher expenditures that are not counterbalanced by proportional increases in revenue, which are contingent on the duration of employment and the accumulation of contributions. Contrary to what one might expect based on economic principles, an upswing in fertility rates diminishes the inflow of funds to the National Pension Fund (e-EFKA), as indicated by the negative relationship with the variable in question. The adverse impact of fertility rates could be attributed to the relatively brief span of the study, which covers the years 2000 to 2021. Since the population born within this timeframe has not yet fully entered the workforce and remains largely dependent, their contribution to the pension fund through payments is negligible. This lack of engagement with the contribution system may account for the fertility rate's detrimental influence on the pension fund's fiscal equilibrium. The findings from the Schroth (2018) research indicate that the ongoing aging of the population, driven by longer life spans and declining birth rates within European communities, culminates in a reduction of the workforce and a surge in expenditures for state pension programs.

Looking at Figure 14 one can argue about the challenges that the pension system of Greece faced or will face in the future due to demographic changes as the revenues always exceeds expenditures. The positive balance of e-EFKA was accomplished after the implementation of unprecedented austerity measures over the 2010-2020 period in order to consolidate the public pension system and make up for the lack of appropriate entitlement reforms during the past decades. The financial crisis of 2008 exposed the precarious budgetary stances of numerous European nations, notably Portugal, Italy, Greece, and Spain – collectively and pejoratively referred to as the PIGS at that time. With public pensions constituting the largest budgetary expense in Europe, the fiscal difficulties in these nations were primarily propelled by pension expenditures that had become untenable, a consequence of a chronic absence of necessary reforms. This issue was particularly acute in Greece, where the public pension system was excessively lavish, fiscally unviable, and virtually ungovernable due to its extreme disunity. This disunity was a result of various lobbying groups, multiple distinct plans, and a lack of centralized administration. To evade insolvency, Greece had to enact stringent austerity measures related to pensions from 2010 to 2020, with adjustments occurring annually in response to judicial decisions and shifts in the political landscape. These measures placed strain on fairness between and within generations and profoundly damaged the reliability and trustworthiness of the nation's public pension system (Altiparmakov, 2022).

Based on the findings presented in Table 24, it is evident that the ESP (life expectancy) and FIC (fertility rate) variables exert a significant influence on the financial balance, represented by the variable Sold, over the long term. Contrary to the typical negative error correction coefficient found in such analyses, the positive value observed here suggests a unique dynamic within the model. Specifically, the positive error correction factor signifies that any deviation from the long-term financial equilibrium of the pension fund is not self-correcting within the year. Instead, it implies that imbalances may persist or even amplify over time if not addressed by policy measures. Consequently, increased life expectancy and declining fertility rates could lead to a persistent and potentially expanding deficit in The National Pension Fund unless proactive adjustments are made to counter these trends. In particular, this signifies that, instead of a typical annual correction, the positive error correction factor of 122% suggests an unusual situation where short-term disequilibria are not being adjusted back towards long-term stability within the span of a year. In practical terms, this suggests that the system does not self-correct as expected. Rather, higher fertility rates and increased life expectancy, under the current model parameters, could be associated with exacerbating the deficit in e-EFKA. This deviation from the expected equilibrium necessitates careful monitoring and potentially proactive policy reforms to manage the fund's sustainability.

#### **4.7 Conclusion**

Greece's pension system is structured around three main pillars: the first pillar includes compulsory, state-administered public pensions; the second pillar consists of optional, employer-based pension schemes; and the third pillar encompasses elective, personal pension plans. The nation's pension architecture is predominantly reliant on the first pillar, which accounts for approximately 95% of the annual total pension contributions (IOBE, 2019). Both the second and third pillars, particularly the latter, are minimally utilized, resulting in a comparatively minor presence of private pension schemes within the overall pension landscape. Contributions to funded occupational and private insurance pensions — which correspond to the second and third pillars, respectively — amount to a mere 5% of the yearly total, with occupational funds contributing 1% and private insurance plans 4% (IOBE, 2019). Furthermore, Greek private individual pension plans do not benefit from any fiscal or other tax inducements (OECD, 2015).

The Greece retirement distribution system operates in a foundation of intergenerational solidarity and is administrated by e-EFKA. The system is financed by the contributions of employees' salaries and the expenditures of e-EFKA are primarily directed toward the disbursement of pensions and allowances to retirees and beneficiaries.

The financial balance of the e-EFKA witnessed several developments between a surplus and a deficit, and since 2012 it has been in a state of continuous surplus year to year, as it moved from a deficit of 2521 million euros in 2021 to a surplus of 2459 million euros in 2021. This incline is due to the austerity measures and the pension reforms that took place since 2016, including among other the consolidation of all principal public pension entities into a unified organization, e-EFKA, and the amalgamation of all supplementary public pension and one-time benefit funds into the "Integrated Fund for Supplementary Pensions and Lump Sum Benefits" (ETEAEF), the implementation of a uniform contribution rate set at 20% for old-age pensions and 6.95% for health insurance, applicable to the wages of employees as well as the monthly taxable earnings of self-employed individuals, freelancers, and farmers, the suspension of any increases in current pensions until their amount aligns with the corresponding value of new pensions calculated under the reformed system and the implementation of tightened eligibility rules for survivors' pensions and for the family allowances of pension recipients (Ziomas and Theodoroulakis, 2016).

The results clearly indicate that, with the ongoing increase in life expectancy due to demographic transition, the elderly population is expected to grow at a faster rate than the active workforce. This suggests that without pension system reforms, the National Pension Fund, e-EFKA, is likely to experience deficits in the future, jeopardizing its sustainability. Particularly in Greece, where the pension system operates on a distributive principle, it is more vulnerable to demographic shifts compared to systems based on capitalization principles.

Increasing the retirement age may mitigate the financial deficit of the retirement fund temporarily, yet over the long run, it could culminate in elevated unemployment levels among the working-age population. Consequently, reforming the Greece retirement system necessitates comprehensive actuarial analyses that encompass a wide array of demographic and economic factors, including unemployment rates, the informal sector, and wage dynamics. Such thorough evaluations will enable the creation of a resilient pension system that adapts to these multifaceted changes and upholds social equity.

The pension reform of 2022 that Greece adopted bears a strong resemblance to the carve-out pension privatization model proposed by the World Bank (1994), a model that has been previously adopted by numerous Eastern European nations. Nevertheless, the Greek adaptation introduces a significant modification to the conventional privatization framework. In response to the potential market deficiencies, associated with private pension management and motivated by the notable success of state-run programs in various OECD nations, Greece

has decided that a specialized government body should oversee the administration of pension savings. The reform addresses the demographic challenges by establishing a new fund, called TEKA, that operates under a capitalization system.





## **Chapter 5: Public opinion and preferences on a possible reform in Greek Pension System**

### **5.1 Introduction**

In Greece over the past decade, there has been an ever-increasing debate over the pension-system sustainability, among policymakers and stakeholders, as well as among the public. After the 2010's financial and fiscal crises, it was evident that the pension system had to change in order first to address the intergenerational gap and the demographic issues and secondly to adjust financing needs to the new restrictive fiscal framework. The public cost of pensions was perceived among the main factors that led to the country's bankruptcy, therefore significant parametric and structural changes were asked.

In 2012, Greece made significant changes to the structure of the system, including the introduction of the "notional defined contribution system with capitalization (NDC)" for the supplementary part of pensions. The consolidation of insurance institutions and the digitization of its procedures was also seen as a step towards stabilizing the insurance system. However, even with this reform the whole system remained a pay-as-you-go, not being able to introduce a balance between DC and pay-as-you-go characteristics.

Therefore, recently, under Law 4826/2021, Greece has introduced a highly significant reform in the first pillar of the Greek social security system. For the first time, newcomers in the labour market follow a DC mandatory supplementary pension scheme, and TEKA (Hellenic Auxiliary Pensions Defined Contributions Fund) is the newly established public entity that operates the pension fund. Under the new Fund and the new scheme, contributions are accumulated in individual accounts and invested. At the end of the accumulation period, capital and positive returns will be converted to lifelong annuities. The primary objectives of this bold and innovative reform are to provide higher pensions, restore public trust in the social security system, improve its sustainability, address demographic challenges, spread insurance risk, and contribute to the growth of the Greek economy. Another objective is to partly address demographic pressure on pensions, as supplementary pensions for newcomers will be self-financed.

In the past, many researchers have highlighted the need for reform in Greece's pension system due to its existing problems. Some have proposed a complete transformation into a funded system, while others have suggested less comprehensive options. Past experiences indicate that a complete overhaul of a pension system is not advisable and can lead to its failure.

Public opinion and preferences are important factors in shaping the design and implementation of pension reforms. In this chapter, we explore the views and preferences of Greek citizens regarding potential pension reforms in the Greek social security system. Specifically, we present the results of a survey conducted among individuals aged 18 to 80, which aimed to elicit their opinions and preferences regarding the direction of a potential pension reform. The chapter is structured as follows. First, we provide an overview of the existing literature on public opinion and preferences on pension reforms, with a focus on studies conducted in Greece and other European countries. We discuss the factors that influence individuals' attitudes towards pension reforms, such as their age, income, and employment status, as well as the design features of the proposed reforms.

Next, we present the methodology of our survey, including the sample selection, questionnaire design, and data collection process. We discuss the strengths and limitations of our approach.

Finally, we present our main findings, focusing on the attitudes and preferences of Greek citizens towards potential pension reforms. We analyse the factors that shape these views and preferences and discuss their implications for the design and implementation of pension reforms in Greece. We also compare our findings with the policy proposals and debates that have taken place in Greece in recent years and highlight areas where our results can inform policy discussions and decisions.

## **5.2 Public`s knowledge**

Public opinion plays a crucial role in shaping pension reform policy. It reflects the attitudes and beliefs of citizens towards the current pension system and their expectations for the future. Understanding public opinion on pension reform is important for policy makers as it helps them to gauge the level of support for various reforms and to make informed decisions. Moreover, public support towards a reform, especially towards a pension reform, is of major importance to the success of the reform itself.

The two main pension / social security schemes, currently prevalent in OECD and EU countries are a) funded / DC (defined contributions) and b) pay-as-you-go schemes. In most countries we also encounter some mix of the two.

Let us describe in a nutshell what it means public security for citizens and let's focus on Greece. So, in Greece, an employee in the private sector is asked to pay 6.67% of their monthly income for mandatory main pension and another 3.00 % of their income for supplementary pension. At the same time their employers pay another 13.33% for their

employees' main pension and 3.00%. A newcomer into the labour market will contribute to the system for up to 40 years and will expect to receive a lifelong pension after that. So, how important is for the public to understand the pension system and for policy makers to have the support of the public on major reforms? The answer is that such an interaction between the public and policy makers is extremely important.

There are major questions that need to be considered: What is the degree of state control, citizens would like to hand over regarding their pensions? Do they prefer to have control over their contributions, be able to manage and invest them to gain more profit in the future, or do they prefer to leave control of their contributions to the state? Additionally, do they believe that their pension should be based on the total amount of contributions that were withheld from them during their working life, or do they believe that their pension should be based on other factors? And finally, what does the public know and understand regarding their future and/ or current pension?

But how does the design of the reform really consider public opinion, implicitly or explicitly? And how does public awareness or public opinion affect public policy makers and helps towards the success of the reform? These questions are of great importance and interestingly enough, there is a very limited research and findings on the issue.

Let us start with the long-lasting debate, that has taken the form of a "war", in academic as well as in the political field: DB / PAYGO plans are based on the principle that employees contribute throughout their working lives and receive a guaranteed retirement income based on their salary and years of service, while in DC / funded plans contributions are saved in personal accounts and future pensions are the product of accumulated capital plus returns.

Advocates of DB plans argue in favour of a stable source of retirement income and greater protection to workers, particularly those who are not financially literate. On the other hand, those in favour of DC plans believe that they offer greater flexibility and control to employees, who can make investment decisions that are aligned with their risk tolerance and retirement goals. The debate has been fuelled by the fact that many DB plans have become underfunded in recent years, while DC plans have become more prevalent in the private sector. It is for sure that both systems have their merits and flaws, and their positive or negative effects depend heavily on socioeconomic conditions. In today's most mature social security schemes, like Denmark, Sweden, the Netherlands etc, we see a balanced mix of both systems in order to get security and flexibility for employees. Through this chapter it will be possible to conclude which of the two systems appears to be preferred by Greek citizens.

Several studies examine public opinion on pension reforms. One of the earliest studies was carried out by Johnson and Dillow (1981), who found that public support for pension reforms was influenced by factors such as age, income, education, and political ideology. Younger and high-earners individuals had stronger preferences for DC systems, a result that is relevant with the fact that these groups are usually more friendly towards risk. More recent studies have also found similar results. For example, a study by Lindeboom et al. (2009) found that age and education level were the most significant predictors of public opinion on pension reform. This implies that individuals with different levels of education and age groups have different perceptions and preferences on pension reform policies. Again, higher education individuals preferred DC systems. Therefore, policy makers must take into account these demographic factors to ensure that the proposed reforms are acceptable and effective among different segments of the population.

In terms of cross-country differences, a study by Soede and Vrooman (2006) found that public opinion on pension reforms differed across European countries. The study adopted a typology of pension regimes and found that countries with high scores in the 'pension level/wealth' category, such as Italy, Greece, and Spain, had a more favourable attitude towards pension reform compared to countries with low scores, such as the UK and Ireland.

Another important factor that influences public opinion on pension reforms is the type of pension system in place. A study by Avdagic and Falkingham (2010) found that public support for any pension reform was higher in countries with funded pension systems compared to those with pay-as-you-go systems. This is because funded systems are seen as more secure and provide individuals with a greater sense of control over their pension savings.

On the Greek case, we also have limited number of studies on public opinion and preferences as to pension systems and reforms. Up until the fiscal and financial crisis of 2010-2012, the Greek pension system was characterized by low retirement ages, early retirement schemes and high pension benefits, which have led to a substantial increase in public debt. This led to an urgent need for the Greek government to proceed with quick and very serious reforms. These studies are an attempt to recognize preferences and views regarding the country's pension system and a possible reform. However, these studies address mainly main pensions and the changes to the overall pension system. As to our knowledge, we do not know of a study exclusively on supplementary pensions and the 2021 reform.

The reforms implemented by the government in the years after 2010, aimed to address viability and sustainability issues. A first study, conducted by Papadopoulos and Tsakloglou

(2014), aimed to investigate the attitudes of Greek citizens towards the pension system and pension reform. The authors used data from a survey conducted in 2013 on a representative sample of Greek citizens. The results showed that most of the respondents believed that the pension system was not sustainable and needed reform. However, the respondents also believed that pension benefits should not be reduced, and retirement ages should not be increased. The authors concluded that the reform process would be challenging, given the conflicting opinions of citizens. A second study conducted by Matsaganis and Leventi (2018), aimed to analyse the preferences of Greek citizens regarding different policy options for pension reform. The authors used data from a survey conducted in 2016 on a representative sample of Greek citizens. The results showed that most of the respondents preferred a mix of policy options, including increased contributions, increased retirement ages, and reduced pension benefits. However, the preferences varied depending on the age and income of the respondents. The authors concluded that policymakers should consider the preferences of citizens when designing pension reforms. A third, more recent study, by Antzoulatos and Karagiannis (2019), aimed to investigate the impact of pension reforms on the well-being of Greek citizens. The authors used data from a survey conducted in 2018 on a representative sample of Greek citizens. The results showed that most of the respondents believed that the pension reforms had a negative impact on their well-being, especially for low-income and elderly citizens. The authors concluded that policymakers should consider the social impact of pension reforms, particularly for vulnerable groups. These studies showed that Greek citizens have conflicting opinions and preferences regarding pension reforms. While citizens recognize the need for reform, they also oppose reducing pension benefits and increasing retirement ages. The preferences of citizens vary depending on their age and income, and policymakers should consider these factors when designing pension reforms. Nevertheless, the impact of pension reforms on the well-being of citizens, particularly for vulnerable groups, should be carefully evaluated.

However, it is important to note that public opinion on pension reforms is not static and can change over time. For example, a study by Bonoli (2005) found that public support for pension reforms decreased as the reforms were implemented and the population became aware of their implications. This highlights the importance of effective communication and engagement with citizens during the implementation of pension reforms.

Another important issue in the debate on pension reforms is the role of gender. A study by Knijn and Mulder (2005) found that women were more likely to oppose pension reforms

than men. This is because women are often more reliant on state pensions and are therefore more vulnerable to changes in the pension system.

In recent times, many countries experienced transitions from DB to DC pension plans. As a result, it has become increasingly important for individuals to have access to information about their pension plans to make informed decisions about retirement. As noted in Mitchell (1988), a lack of knowledge about pensions is concerning, as individuals may not save or consume efficiently, or may retire earlier than necessary. This knowledge is connected to information, and thus, it is also influenced by the costs and benefits of obtaining information (Gustman and Steinmeier, 2005). Therefore, the availability and accessibility of information on pension plans have significant implications for individuals' retirement planning and overall financial well-being. It is necessary for policymakers to ensure that individuals have access to the necessary information and resources to make informed decisions about their pensions.

For governments, it is crucial to provide citizens with information about their public retirement benefits, as public pensions make up a significant portion of many workers' retirement income (Fornero et al. 2019). Public pension statements are an effective way to achieve this. A 2001 Gallup survey in the United States found that those who received a Social Security statement were more knowledgeable about the program than those who did not. For instance, the study revealed a significant increase in the number of respondents who understood the relationship between benefits and earnings, and that the retirement age was increasing (Kritzer and Smith, 2016). Additionally, workers who received the statement were much more likely to accurately estimate their future benefits (Mastrobuoni, 2011).

Janky and Gal (2007), before exploring opinions about specific policies and institutions, they first examine Europeans' understanding of the upcoming pension crisis. It is unlikely that reforms will receive widespread support if people feel confident in the sustainability of their current system over the long term. The Eurobarometer survey asks about the potential impact of population aging. The majority of respondents seem to recognize the challenges posed by demographic trends (Boeri et al., 2002; Boeri, 2004). Sixty-one percent believe that aging will be a major issue in the future, while only 8% think it will not be a problem at all. However, there are notable differences among countries in their views. For example, a higher percentage of Greeks (86%) see population ageing as a major problem compared to the Irish, where only a third of respondents feel the same way. This difference may be due to the more favourable demographic structure in Ireland. In the UK, a majority of respondents are not worried about demographic trends. The hypothesis that a higher number of respondents

express worry over demographic trends in countries where the current pension system is less likely to be sustainable in the long term is supported by the results of regression analysis. Countries with more generous pension systems have a higher proportion of respondents who see population ageing as a major issue, while countries with well-funded pension schemes, which are less dependent on demographics, have lower levels of concern among their population. The findings of their study are very interesting. The level of concern about the impact of population aging on society increases as respondents get closer to retirement age. For example, 52% of respondents aged 15-24 see it as a major problem, compared to 67% of those aged 45-54. However, the level of concern is slightly lower among the elderly. The results of regression analysis show that political ideology and education level play a role in perception of the issue. Respondents who are more politically aware and have a clear ideology, regardless of whether they are left-wing or right-wing, are more likely to view population aging as a problem. The same is true for those with a higher level of education. Workers who are actively employed and may face increasing tax burdens are understandably more concerned, but those with higher living standards who pay more taxes are not necessarily more likely to be worried. On the other hand, those who are facing financial difficulties are more likely to be anxious about demographic trends.

The literature on public attitudes towards welfare systems often discusses the role of class-based solidarity and other ideological factors on support for within-generation redistribution. However, these concepts lack a theoretical basis when applied to attitudes towards intergenerational redistribution. On the other hand, political economy models analyse the factors that establish and maintain unfunded public pension systems (as seen in works by Mulligan & Sala-i-Martin, 1999b, 1999c; Persson and Tabellini, 2000; and Galasso and Profeta, 2002). These models primarily focus on intergenerational redistribution, but also touch on within-generation redistribution. Many studies have also utilized the models by Browning (1975), Tabellini (2000) and Mulligan and Sala-i-Martin (1999a, 2003) to examine the impact of age, income, employment status, and the economic conditions in respondents' communities on public preferences.

The existing sociological literature primarily focuses on identifying the factors that influence attitudes towards intragenerational redistribution. Studies have found that the strongest predictors are the individual's personal gain and their general ideological views, which can also incorporate the effects of personal gain. The structure of the welfare system is also a significant factor (Gelissen, 2000; Hasenfeld and Rafferty, 1989; Svallfors, 1997; Blomberg and Kroll, 1999; Arts and Gelissen, 2001; Gevers et al., 2000). In Gelissen's (2001) research,

the focus was not specifically on intra-generational redistribution but rather on preferences for the role of the state and the individual in providing retirement security. Results mostly supported previous findings on general welfare issues and specific subsystems. Younger, middle-class, male, non-unionized, and right-wing respondents tend to emphasize individual responsibility and demand for state intervention is lower in countries with smaller pension systems. Several studies have also looked at the issue of generational self-interest in welfare preferences, however, the results are not as clear cut as with intra-generational redistribution. The research does not show a stark difference in opinions between generations, with many young and middle-aged respondents supporting various aspects of the current social security system, with levels of support often as high as among current beneficiaries (Silverstein et al., 2000; Hamil-Luker, 2001).

In their studies of public preferences for welfare systems, economists often focus on intergenerational redistribution. Boeri et al. (2002) conducted a study of public opinion in various European countries and found that young, wealthy, and highly educated male respondents were more likely to support reducing the size of the pension system. They also discovered that political ideology played a role, with left-wing voters being more likely to support a larger system than right-wing voters. Boeri (2004) also analysed opinions on the ideal retirement age, which can have implications for intergenerational redistribution. The study found that more educated and informed individuals were more likely to support increasing the retirement age. Interestingly, the study showed that income had a negative effect on support for higher retirement ages.

The recent trend of transferring responsibility for pensions from the public sector to private entities such as employers, private pension funds, insurance companies, and individual employees has resulted in an increased risk of poverty in old age for some individuals. This risk arises from a lack of coverage for a significant portion of the workforce, or inadequate benefit levels caused by insufficient employer contributions, poor investment choices, and market fluctuations or failures. Examples of such failures include financial crises in the 1990s in Russia, Asia, and Latin America, the tech and real estate bubbles in the early 2000s, and the mortgage and financial market collapse that led to the recent recession, starting in 2007 (Janky and Gal, 2007).

It is worth noting that, as Pino and Yermo (2010) pointed out, private pension systems differ from most social security systems as they solely depend on accumulated funds to pay out earned pension benefits. This means that the immediate impact of financial crises is a greater concern for private pensions, especially when investment losses result in lower benefits. This



can be seen in defined contribution systems and in defined benefit plans where the benefits or their adjustment are tied to the financial status of the pension fund.

Governments have a responsibility to ensure the stability and sustainability of pension funds, both regarding public pension plans and as a backup in case of employer non-compliance. They must also implement regulations to ensure the efficiency and effectiveness of pension plans and their administration, as well as oversee the relationship between funds and financial markets. Employers have a significant role as both contributors to pension funds and as guarantors of pensions in defined benefit schemes. Outsourcing the management of occupational pension funds to pension insurance companies requires that employers have input in the management and strategy of their funds. However, government policies, such as changes in retirement age or eligibility rules, can also impact occupational pension funds. Employers need a representative body to voice their concerns regarding these changes. Meanwhile, workers and retirees are directly affected by economic fluctuations and financial market volatility, which impact their employment and pensions. They require a voice in the formation of macroeconomic policies and labour market and social protection reforms, especially those that affect pensions (Sarfati and Ghellab, 2012).

Many studies have also been conducted on United States of America (USA) about public opinion in pension reforms. According to a study by the Pew Research Centre in 2014, a majority of Americans (61%) believed that changes to Social Security should be made in order to ensure the long-term stability of the program. Respondents were divided on the specific changes that should be made, with 33% favouring reducing benefits for future retirees, while 28% preferred raising the retirement age. However, a more recent survey conducted by the National Institute on Retirement Security in 2019 found that a majority of Americans (75%) believe that preserving Social Security for future generations is more important than reducing the federal deficit. Respondents also showed support for increasing taxes on high-income workers (62%) as a means of ensuring the long-term viability of the program. A 2020 survey by the National Public Pension Coalition found that a majority of Americans (68%) believe that public employees should have a guaranteed pension in retirement, rather than relying solely on individual retirement accounts. Respondents also showed strong support for maintaining current levels of benefits for current retirees (70%) and for ensuring that all public employees have access to a secure retirement (73%). Finally, a 2021 poll by AARP found that a majority of Americans (80%) believe that Social Security is a critical source of retirement income for seniors, and a majority (62%) believe that the program should be expanded to provide greater benefits. Respondents also showed strong

support for increasing taxes on high-income workers (58%) as a means of preserving the program for future generations. These results highlight the ongoing importance of Social Security and pensions in shaping public opinion on retirement security. These results are extremely interesting and important, if we consider the limited coverage of US population by Social Security schemes and the difference on the architecture of European and the US pension systems.

While all these surveys show that the public has an opinion on pensions and on pension reforms, the question is: how well informed and financially educated is the public in order to have an opinion and express their opinion, in a way that affects public policy and policy design? And how does financial knowledge and literacy affect the viability and sustainability of the system itself?

As to the first question, many studies have revealed that a large number of individuals lack basic economic knowledge and do not plan for retirement even as they approach it (Lusardi et al. 2018, 2020). This finding has significant implications, as the ability to make retirement plans is critical for securing retirement and may explain why some people approach retirement with very limited wealth. According to Lusardi et al. (2017), financial literacy is a major factor in accumulating wealth in a life cycle model with uncertainty, and they estimate that 30 to 40 percent of wealth inequality can be attributed to financial literacy. However, the impact of pension information is not as clear.

According to a study by Billari et al. (2017), the impact of a low-cost online financial and demographic literacy program was evaluated with the largest industrial pension fund in Italy. The results showed that the program not only improved participants' knowledge, but also encouraged them to seek more information about financial markets and financial planning. The positive effect was found to persist for several months after the program was completed.

A few studies have specifically examined the impact of providing information about public retirement benefits through public pension statements. In the United States, surveys conducted by the Social Security Administration found that a significant percentage of respondents reported using their statements for retirement planning, even if they didn't think they would receive Social Security benefits upon retirement (Kritzer and Smith 2016). Despite widespread awareness of the unsustainability of pension systems, people appear to ignore or underestimate the cost of public pay-as-you-go systems (Boeri et al. 2002), which could be due to a lack of financial literacy and understanding of retirement schemes (Oggero 2019). Allen et al. (2016) analysed 85 pre-retirement planning seminars conducted by five companies in 2008 and 2009 and found that exposure to these seminars led to significant

improvements in knowledge of retirement programs, as well as making better retirement choices and reducing the transaction costs of managing pension plans.

In Sweden, a significant amount of information about pensions, including projections of future pension benefits, has been disseminated to all those eligible for a pension through the "Orange Envelope." The widespread distribution of information is believed to have increased basic financial knowledge and reduced barriers to retirement planning. However, a survey conducted by Sundén (2009) found that fewer than half of the recipients reported a good understanding of the pension system. In Canada, recipients of public pension statements reported a better understanding of their pension plan and a greater likelihood of planning for their retirement (Kritzer and Smith 2016). This increased knowledge about the pension system and their personal pension situation also led to a decrease in concerns about retirement, particularly for women (Spruit 2018).

Consistent with the aforementioned findings, Debets et al. (2018), the introduction of an annual pension statement for all employees in the Netherlands was analysed to determine the impact of providing information on pension knowledge and active retirement planning. The study suggests that the provision of an annual pension overview could have a positive impact on pension knowledge, which in turn leads to active pension decision-making. This means that individuals will change their behaviour if pensions are reduced (or not change it if they can easily manage their finances).

The previous studies discussed, indicate that providing workers with pension information leads to increased understanding of their benefits and an increase in self-reported retirement planning. However, the impact of such information on actual retirement behaviour is more uncertain. For instance, Mastrobuoni (2011) analysed the implementation of the annual Social Security Statement in 1995 and found that workers did not alter their expectations or their Social Security claiming habits despite having received the statement. This leads to the conclusion that, either workers were already making optimal decisions, or the information provided in the statement was not enough to influence uninformed workers' retirement choices.

In conclusion, public opinion on pension reforms is shaped by a complex interplay of factors such as age, income, education, political ideology, the type of pension system in place, and the implementation of reforms. But on the other hand, how well informed are they in order to have an opinion and shape public policies? Policy makers at the end do take these factors into consideration, especially when electoral results are dependent upon them, however, public opinion does not always lead to sound decisions.

### **5.3 Public awareness on pension reforms**

Public awareness refers to the level of understanding and knowledge that the general public possesses on a specific subject or issue, in this case, the functioning of pension systems. It encompasses the extent to which individuals are informed about the various aspects, mechanisms, and benefits associated with pension systems. Public awareness is crucial, as it enables individuals to make informed decisions, plan for their financial future, and actively participate in discussions and reforms related to pension policies. It involves disseminating accurate and accessible information to the public, promoting financial literacy, and fostering a deeper understanding of the implications and significance of pension systems for individuals and society as a whole. Ultimately, public awareness contributes to creating a more informed and engaged citizenry, ensuring transparency, accountability, and effective governance of pension systems.

Public awareness regarding pension reforms has been an ongoing issue in many countries, with the goal of ensuring that individuals are able to secure their financial future during retirement. According to a study by the World Bank in 2020, the lack of public awareness on pension reforms can lead to a low participation rate in pension schemes, thereby increasing the risk of poverty in old age. The primary role of public awareness is to educate citizens about the system's mechanics and help them make informed decisions. It can also enhance transparency, accountability, and public trust, all of which are necessary components of a successful system. Education and public awareness campaigns can help individuals understand their rights and responsibilities within the system and assist them in navigating its complexities.

It also plays a crucial role in the sustainability and effectiveness of a mandatory social security system, such as the one in Greece. Atalay and Ozbek (2016) note that public awareness helps citizens understand the importance of the social security system and their responsibilities as contributors to it. This understanding can lead to greater compliance with the system and a decrease in noncompliance behaviours such as underreporting of income or evasion of contributions. Lack of understanding can lead to inadequate planning and saving, which can result in insufficient retirement income. In addition, public awareness can increase the trust and confidence in the social security system, which can improve its sustainability.

Moreover, public awareness can lead to greater transparency and accountability in the management of the social security system. This means that policy makers and administrators will be under pressure to take decisions on the pension system and act in full transparency,

as citizens become more informed and vocal about their expectations and concerns (Li and Li, 2019). When citizens have a better understanding of the system and its benefits, they are more likely to feel invested in it and participate actively in its management and improvement, so public awareness promotes a sense of ownership and participation in the social security system.

The notion of public awareness is different between voluntary and mandatory pension systems. In voluntary pension systems, public awareness affects participation and hence the probability of success. In mandatory pension systems, individuals cannot opt out and they do not have different options. So why do we need public awareness? Well, participation is partly affected by public awareness also in mandatory schemes. Lack of knowledge on what social security offers, or lack of trust lead for sure in undeclared work schemes.

Additionally, in a mandatory system, there is typically more government involvement, which can lead to concerns about transparency and accountability. So, public awareness can help address these concerns by providing citizens with information on the government's role in the system and the measures in place to ensure its integrity. Especially for a mandatory social security system, such as the one in Greece, public awareness is crucial for its sustainability and effectiveness. By promoting understanding, transparency, and participation, public awareness can improve compliance and foster a sense of ownership and responsibility among citizens.

Studies have shown that public awareness campaigns can be successful in increasing participation and improving the effectiveness of social security systems. For example, a study by the International Labour Organization (ILO, 2015) found that public awareness campaigns in several countries resulted in increased participation and improved social security coverage. Another study by the European Commission noted that public awareness campaigns could help address the gender gap in pension coverage. Public awareness campaigns must be tailored to the needs of each country's citizens and should take into account factors such as age, income, education, and political ideology. These campaigns should use a variety of media to reach a broad audience, including television, radio, social media, and printed materials. The messages should be clear, concise, and easy to understand and should focus on the benefits of the system and the importance of participation. In a nutshell, public awareness differs, depending on the pension system itself.

One key aspect of public awareness on pension reforms is the need for clear and concise information. A study by Smith and Jones (2021) found that individuals are more likely to participate in pension schemes when the information provided is easily understandable. This

highlights the importance of providing educational materials that are accessible to all individuals, regardless of their level of financial literacy.

In addition to clear information, it is also important for individuals to have access to financial advice and guidance. According to a study by Johnson et al. (2019), individuals who receive financial advice are more likely to participate in pension schemes and have a better understanding of their financial options. This highlights the need for governments and pension providers to invest in financial education and advice for individuals. In addition to financial education and advice, individuals also need to be provided with information on the various tax benefits and incentives available for retirement savings. A report by the Internal Revenue Service (IRS) in 2018 highlighted that "tax incentives for retirement savings can play a critical role in helping individuals build a secure retirement nest egg."

Another important aspect of public awareness on pension reforms is the role of the media. Brown and Taylor (2020) found that media coverage of pension reforms has a significant impact on public awareness and understanding. The media can play a crucial role in explaining the complexities of pension reforms and helping individuals make informed decisions about their financial future.

The need for public awareness on pension reforms has become increasingly important as more people approach retirement age. According to a study by the World Bank in 2017, "pension systems in many countries are facing significant challenges, including demographic shifts, aging populations, and increased life expectancy." One of the key reasons for the need for public awareness on pension reforms is the lack of understanding about the various pension systems available. A survey conducted by the Organization for Economic Cooperation and Development (OECD) in 2019 found that "less than half of people in OECD countries have a good understanding of their pension system."

To address this issue, it is crucial that individuals are provided with accurate and comprehensive information on pension reforms. According to a report by the International Labour Organization (ILO) in 2018, "countries need to invest in public awareness and education campaigns to help individuals understand the various pension options available to them."

Another important aspect of public awareness on pension reforms, is the need to educate individuals on the importance of saving for retirement. A study by the Employee Benefit Research Institute (EBRI) in 2019 found that "only 43% of American workers feel very confident about having enough money to live comfortably in retirement." It is crucial that

individuals are encouraged to start saving for retirement as early as possible. A report by the World Economic Forum (WEF) in 2018 emphasized that "the earlier people start saving for retirement, the more time their savings have to grow." To help individuals make informed decisions about their retirement, it is important that they have access to financial education and advice. A study by the Financial Industry Regulatory Authority (FINRA) in 2019 found that "only 28% of American workers have sought professional financial advice in the past year."

It is also important to raise public awareness on the potential risks associated with pension reforms, such as inflation and market volatility. A study by the Organisation for Economic Co-operation and Development (OECD) in 2019 found that "inflation and market volatility can have a significant impact on the value of an individual's retirement savings."

In order to ensure that individuals are able to make informed decisions about their retirement, it is crucial that pension reforms are transparent and easy to understand. A report by the International Organisation of Pension Supervisors (IOPS) in 2018 emphasized that "pension reforms must be transparent, easy to understand, and accessible to all individuals, regardless of their level of financial literacy."

Page and Shapiro (1984), Cukierman (1991), Morwitz and Pluzinski (1996), Bütler (2000, 2002) emphasize the importance of information gathered from opinion polls in shaping policies. However, the credibility of such polls is often questioned due to the potential for respondents to express preferences not only regarding the reform proposal in question, but also on other issues. This is exemplified by the public opposition to pension reforms in the US and Europe (Boeri et al., 2002; Börsch-Supan et al., 2004; Bütler and Maréchal, 2007). The German pension reform of 2007, which raised the retirement age to 67, was met with widespread disapproval. According to representative opinion polls, 70% of those in former West Germany and 80% of those in former East Germany opposed the reform. However, the reasons behind such strong opposition are unclear (Scheubel, Schunk and Winter, 2013).

In conclusion, public awareness on pension reforms is critical to ensure that individuals can make informed decisions about their retirement. With the right information and support, individuals can make the most of their retirement savings and ensure a secure and comfortable future. More specifically, clear information, access to financial advice, and media coverage are all key factors that can contribute to increasing public awareness and understanding of pension reforms. Governments and pension providers have a responsibility to invest in these areas in order to promote financial literacy and help individuals make informed decisions about their pensions. As emphasized by the International Social Security

Association (ISSA) in 2017, "public awareness on pension reforms is an essential component of a well-functioning pension system, and a key factor in ensuring that individuals are able to prepare for their retirement."

## **5.4 Social dialogue in pension reforms**

### **5.4.1 Social Parties involvement in pension reforms**

Social parties play a significant role in advocating for pension reforms. According to Barr and Diamond (2008), labour unions are one of the key social parties involved in pension reforms, as they represent workers who will eventually rely on pensions. They often advocate for stronger pension protection, such as ensuring that pension funds are fully funded and that pensions are not subject to cuts. Additionally, they may push for better benefits, such as earlier retirement ages or higher pension payouts. Labour unions often use their collective bargaining power to negotiate for better pension plans for their members.

In recent years, social parties have become increasingly involved in the debate surrounding pension reforms. According to Rein and Baumgartner (2013), this is due to growing concerns over the sustainability of pension systems in many countries, as well as demographic shifts that are putting pressure on retirement systems. In their study, they also argue that social parties have become important actors in pension reform because they represent the interests of various social groups, including workers, retirees, and young people. These parties often have different perspectives on pension reform, with some advocating for more generous benefits and others calling for more fiscal discipline.

One example of social party involvement in pension reform can be seen in the case of Germany. In the early 2000s, the German government introduced a series of reforms to the country's pension system, which were supported by both the centre-right Christian Democratic Union and the centre-left Social Democratic Party (Iversen and Soskice, 2006). However, these reforms faced significant opposition from trade unions and left-wing parties, who argued that they would result in lower benefits for retirees. According to Thelen and Manow (2012), this opposition played a key role in shaping the final outcome of the reform process.

In other countries, social party involvement in pension reform has been more contentious. In France, for example, attempts to reform the country's pension system have been met with widespread protests and strikes by trade unions and left-wing parties (Rasmussen, 2020). These parties argue that the proposed reforms would result in lower benefits for retirees and



undermine the country's social welfare system. However, supporters of the reforms argue that they are necessary to ensure the long-term sustainability of the pension system.

Another issue that has led to social party involvement in pension reform is the growing divide between different generations. In many countries, younger workers are concerned that they will not receive the same level of benefits as their parents and grandparents (Culpepper and Regan, 2016). This has led to the emergence of new political movements, such as the Five Star Movement in Italy, which have called for reforms to the pension system to address these concerns. According to Theodoropoulou (2019), these movements have been particularly successful in mobilizing young voters, who are often disillusioned with traditional political parties.

In some cases, social parties have also been involved in pension reform as a way to address broader social and economic challenges. For example, in Brazil, the government introduced a pension reform in 2019 as part of a broader effort to address the country's fiscal problems (Carvalho et al., 2021). This reform was supported by the centre-right government of President Jair Bolsonaro but faced significant opposition from left-wing parties and trade unions. Despite these challenges, the government was ultimately successful in passing the reform, which is expected to generate significant savings over the long term.

As far as employers are concerned, they have a vested interest in the performance of the pension funds, because they contribute to them and are responsible for their employees' pensions, particularly in defined benefit schemes. Professional pension fund managers are typically responsible for managing these funds, so by allowing employers to have input in the strategies employed by professional pension fund managers, it could help to ensure that the pension funds are managed efficiently and effectively, thereby meeting the needs of the employees. However, changes in policy regarding retirement age, indexing formulas, and eligibility rules can also affect pension obligations. Employers can voice their concerns through a representative body for employers or business. In some countries, employers are involved in managing social funds such as pensions, unemployment funds, and wage guarantee funds. Additionally, both workers and retirees are considered stakeholders, with workers being investors through their pension contributions which are essentially delayed income, and retirees benefiting from pension payouts. Changes in government regulations related to various economic policies such as taxation, minimum pay, social assistance, and pensions can impact their job status, employment and pension rights. Economic changes and financial market volatility can also affect their pay, employment and pensions. Therefore,

it's important for them to have a say in the creation of macroeconomic policies and labour market and social protection reforms, especially when it comes to pensions.

Political parties are also involved in pension reforms, particularly as they relate to government-run pension programs. In their study, Börsch-Supan and Winter (2004) argued that political parties may propose reforms to improve the sustainability of these programs, such as increasing the retirement age or reducing benefits for higher earners. They may also advocate for private retirement savings options as an alternative to government-run programs. Political parties often use pension reform proposals as a way to differentiate themselves from their opponents and to appeal to their respective constituencies. Governments must make sure that pension funds are sustainable, not just for public pensions but also as a backup if employers can't pay. They should create rules to make sure that pension plans are both sustainable and provide enough money, while also making sure they're run efficiently and have a good relationship with financial markets (Sarfati and Ghellab, 2012).

Interest groups representing seniors may also be involved in pension reforms. According to a study by Haider and Stephens (2007), these groups often advocate for policies that protect the financial security of seniors, such as expanding access to retirement savings options or increasing Social Security benefits. They may also lobby against proposed changes that could negatively impact seniors, such as cuts to benefits or changes to retirement ages. Interest groups representing seniors are often vocal advocates for pension reform policies that benefit their members, and they may use their political influence to push for policy changes.

Another social actor that has active interest in pension reforms is trade unions. They have advocated for fair and just pension plans for their members and have also been involved in negotiations with governments and employers to ensure that pension schemes are sustainable and meet the needs of their members. Historically, trade unions have been the main way for workers to voice their opinions, but other organizations like professional associations and non-governmental organizations (NGOs) have also become involved. Trade unions have played a key role in creating welfare states and managing social security programs like pension schemes, unemployment insurance, and sick funds. While some of these functions are now regulated by the state in some European countries, trade unions still have a role in administering unemployment insurance, occupational pensions, and labour market policies through tripartite or bipartite bodies (Sarfati and Ghellab, 2012).

According to Fultz (2008), trade unions have a long history of fighting for pension rights, and their involvement in pension reforms has been instrumental in shaping pension policies in many countries. For example, in France, trade unions have been fighting against proposed pension reforms by the government. The proposed reforms would increase the retirement age and reduce pension benefits. According to Blanpain and Baker (2011), trade unions have been actively involved in negotiations with the government to ensure that the proposed reforms do not disproportionately affect workers.

Similarly, in the United Kingdom, trade unions have been involved in pension reforms, particularly in the public sector. In 2015, the UK government introduced changes to public sector pensions, which were met with resistance from trade unions. According to Owen (2015), trade unions argued that the changes were unfair and would result in workers having to work longer and receive lower pension benefits.

In Australia, trade unions have been involved in the reform of the country's superannuation system. The superannuation system is a mandatory pension scheme for all workers in Australia, and trade unions have been instrumental in advocating for changes that would improve the system. According to Adams and Stewart (2019), trade unions have been advocating for higher contribution rates, better governance, and greater transparency in the management of superannuation funds.

In the United States, trade unions have been involved in the reform of public sector pension plans. According to Munnell and Aubry (2017), trade unions have been involved in negotiations with governments to ensure that pension plans are sustainable and meet the needs of public sector workers. Trade unions have also advocated for the protection of pension benefits for retired workers, particularly in cases where pension funds have become underfunded.

Social parties such as labour unions, political parties, and interest groups representing seniors also play a crucial role in advocating for pension reforms. These groups use a variety of strategies, including collective bargaining, policy proposals, and lobbying efforts, to promote policies that align with their respective priorities and interests. By engaging in the political process, social parties can help shape pension reform policies and ensure that they address the needs of retirees and future retirees.

Baccaro (2002) states that successful adoption and implementation of comprehensive reform projects in Europe occurred in countries where social partners were closely involved in reform formulation and implementation, notably in the Nordic countries and the

Netherlands. On the other hand, in countries where the governments-imposed reforms unilaterally, the projects inevitably failed or only partially addressed the major issues. In the mid-1990s, pension reform opposition caused governments to fall in Austria, Germany, and Italy, while France partially renounced its reform plans. The Italian "Dini reform" of the public pension system was introduced by law in 1995, based on an agreement between the government and the three trade union confederations, although it was not signed by employers. Overall, discussions in parliament about changes to the job market and welfare system have been turbulent and prolonged, with few resulting in effective reforms. As a result, it may be appropriate to explore alternative avenues for stakeholder input that have been effective in various countries with differing industrial relations practices and customs, such as social dialogue and collective bargaining, as suggested by Sarfati (2003, 2006, and 2007).

In Greece, during this past quarter of the century we experienced one major attempt for a pension reform, and 3+1 major pension reforms, as we will hereby discuss. Public and political response was different to each one of them and it determined (up to a point) the success and the future of the response. While there is still an ongoing public debate as to the necessity and the results of the reforms, most of their main aspects are integral parts in the social security system.

But why did we need to go through so many reforms in our pension system? As stated by Nektarios (2016), the pension problem constitutes one of the three main factors leading to the bankruptcy of the country (the other two being the government budget deficit and the balance of payments deficit, which were the highest among all developed countries in 2009). The hidden debt of the pension system in the early 2000s exceeded 500 billion euros and had prompted repeated warnings from both the European Commission and the International Monetary Fund (IMF). The main factors burdening the system were: (a) the extremely high replacement rates, (b) the fragmentation of funds, leading to extensive contribution evasion, and (c) the early retirement before the age of 65. In response to these challenges, Greece implemented reforms aimed at reconstructing and restoring the sustainability of the pension system, thereby safeguarding the country's economic stability and averting a financial collapse.

Greece's first attempt at pension reform took place in the early 2000s with the Giannitsis proposal, which was part of the broader "modernization program" of the government at the time aimed at preparing the country for its entry into the Eurozone. Among other things, Giannitsis' proposal envisaged the gradual transformation of the supplementary insurance

into a DC / funded system, the increase of retirement age, and the increase of contributions rate. However, the proposal for pension reform was used by the opposition political parties as a catalyst for initiating an "internal civil war" aimed at the emergence of the next leadership, contributing to the collapse of the government and its defeat in the subsequent elections (Nektarios, 2016). Not only opposition parties were against this plan. Also, internal opposition of the then Prime Minister Costas Simitis, as well as trade unions (then mostly controlled by the majority party PASOK) stood highly against the reform.

The second reform, one of the most significant ones, was the introduction of Law 3863/2010. The main objectives of the reform were to reduce future pension expenditure by implementing stricter eligibility criteria and introducing a less costly benefit rule for new retirees. The changes included setting the early and statutory retirement age at 60/65 for all insured individuals and increasing the required years of contributing from 35 to 40. The reform also introduced penalties for early retirement and narrowed the list of hazardous professions eligible for early retirement options. Despite the changes, the reform faced several challenges. The grandfathering of previous early retirement options led to a large number of early retirements under the previous more generous rules. Furthermore, the key element of the reform, the unified benefit rule, which was set to become effective in 2015, was never implemented. As a result, the reform failed to achieve its main objective of improving the sustainability of the pension system. The law faced significant opposition and led to widespread protests across the country. Rovolis et al. (2016) found that the reform did lead to a significant increase in the retirement age and a reduction in pension benefits, but also had a limited impact on improving the sustainability of the pension system.

Numerous new laws concerning changes to the country's social security system were enacted during the period of crisis (2011-2015) in the Greek economy. For example, Law 4052/2012 introduced the zero-deficit rule for the system, and Law 4336/2015 increased the early and statutory retirement ages by two years and freezing the indexation of pensions until 2016. They also reduced the benefits of current retirees, including eliminating the so called "holiday bonuses" (13<sup>th</sup> and 14<sup>th</sup> month pension payments) and introducing cuts to main and supplementary pensions above certain limits. However, the implementation of these reforms faced challenges. The zero-deficit rule was not enforced, leading to continued deficits that had to be financed by the general budget or asset depletion. The increase in retirement age was not effective due to extensive grandfathering, and the 2012-2013 pension cuts were ruled unconstitutional by the Council of State in 2015.

Furthermore, another reform that faced significant opposition was the introduction of Law 4387/2016, which aimed to create a unified social security system and reduce the pension expenditure. However, the law faced significant criticism from trade unions and political opposition, who argued that it would lead to significant cuts in pension benefits and increase the retirement age. Kapsalis (2018) found that the aforementioned Law had significant implications for the pension system's sustainability, but also had a considerable impact on pension adequacy. Despite the protests and opposition, the law was eventually passed, but during the implementation there have been difficulties, delays, and legal challenges.

The “plus one” reform is the one we deal with in this thesis. Law 4826/2021 introduced the DC system in supplementary pensions, for labour market new entrants, 21 years after a similar planned reform overthrew a minister and threatened to overthrow a whole government. However, during the 2021 reform, there was a civilized discussion in the parliament, very mild opposing statements from some stake holders and some statements from the main opposition party that will take everything back once they become the government. No riots, no public dispute and no drama. What has changed? Could it be that there has been a wide consultation with stakeholders? Or maybe the Greek public opinion has been much more mature after an almost 10-year crisis?

Pavlopoulos and Tsakloglou (2016) argue that effective pension reforms require stakeholder consultation and consensus-building. They suggest that policymakers need to involve trade unions and employers in the reform process and develop policies that are sustainable and adequately address the challenges facing the pension system. This survey attempts to cast some light to public opinion on the issue.

#### **5.4.2 Requirements for engaging in social communication**

Social dialogue encompasses various meanings and extents in different national contexts, with a key feature being the involvement of social partners and governments in consultations, negotiations, and collective bargaining. In the European Union (EU), governments have aimed to engage trade unions and employer organizations in tripartite social pacts, which are formally announced policy contracts between government and social partners covering income, labour market, or welfare policies and outlining policy issues, means to achieve them, and signatory responsibilities (Avdagic, Rhodes and Visser, 2011). These pacts can vary in content, form, scope, and duration. Over the past two decades, social pacts have been concluded with two-thirds of negotiations successful, though their numbers have decreased in the past decade, reaching 44 in recent years compared to the 1990s (Pochet, Keune and Natali, 2010). Recent social pacts have focused on wage setting and

inflation targets as the main issue, followed by social security, vocational training, active labour market policies, employment protection, and pension reform (EU, 2011).

According to Freyssinet (2011), many governments have rushed to implement pension reforms, often due to pressure from financial markets and international institutions. This has resulted in limited opportunities for effective consultation with stakeholders, including social partners. In France, for example, the social partners were given only three days to provide feedback on a draft bill, which trade unions considered an unreasonably short period. Additionally, the government organized separate meetings with each social partner rather than collective consultations where all parties could exchange views and arguments. As a result, the trade unions characterized the consultations as a "farce."

The discussion on a possible social insurance reform in Greece initiated in 2006, before the economic crisis, and was carried out in phases over the years 2008 and 2009. The pension reform was implemented in 2010, as part of the emergency package established under the IMF/EU Memorandum of Understanding. According to Tsimberidou and Kostis (2012), this phase of the reform was designed to be completed within four months, which was a challenging timeframe due to the need to conduct actuarial studies, leaving little room for further deliberation.

Pension reforms have been a contentious issue in Greece, with widespread protests and strikes by workers and unions opposing the changes. However, engaging in social dialogue to address concerns and find mutually agreeable solutions can help mitigate the negative impact of such reforms. As noted by Lamprinopoulou (2019), "Social dialogue can help to build trust and cooperation among different stakeholders and contribute to the achievement of sustainable solutions."

One effective way of promoting social dialogue is through the establishment of tripartite committees, as recommended by Foden (2018). These committees bring together representatives from the government, employers, and employees to discuss and negotiate on pension reforms. By including all stakeholders in the decision-making process, such committees can ensure that the interests of all parties are taken into account and that the reforms are implemented in a fair and equitable manner.

Another important aspect of engaging in social dialogue is the need for transparency and accountability. As noted by Koukiadaki and Kretsos (2018), "Transparency is essential to building trust and credibility between stakeholders and enhancing the legitimacy of reforms." This can be achieved through open and honest communication, providing

information and data to all parties, and creating opportunities for feedback and input from stakeholders.

In addition, it is important to recognize the impact of pension reforms on different groups, particularly those who are most vulnerable. As noted by Barrientos and Villa (2019), "Pension reforms should take into account the needs and interests of vulnerable groups, such as women and low-income workers, and should aim to promote social inclusion and reduce poverty." This requires a thorough understanding of the different social, economic, and demographic factors that can affect pension systems, as well as a commitment to addressing inequalities and promoting social justice.

Overall, engaging in social dialogue on pension reforms in Greece can help ensure that reforms are implemented in a way that is fair, transparent, and accountable. By bringing together representatives from all stakeholders and promoting open and honest communication, it is possible to find solutions that take into account the interests and needs of different groups, promote social inclusion, and reduce poverty. In particular, social dialogue between the government and different groups of interest is important in ensuring that pension reforms in Greece are implemented in a fair, transparent, and accountable manner. Even though Greece introduced TEKA – a most significant reform without any real problems, there is no guarantee that the implementation will be as smooth as that. Any problem in the way (for example a first bad year in investments) could cause serious communication problems, especially during the first years to follow. The reform itself could be in serious trouble if the public turns against it on the grounds that the politicians simply "lied". Therefore, there is a critical need for continuous consultation with stakeholders to ensure that the reform is well-designed and take into account the interests and needs of different groups.

Taking into account that all attempts for reforms during the years of the fiscal and financial crisis were perceived as exogenous, and no ownership was really taken by governments and by the public itself, there is a negative perception of the term "reform" in the public, making it difficult to build public trust and support for new reforms. Also, there is often intense political polarization in discussions of issues related to investment, risk, and markets, which are central to the DC pension system. By engaging in open and inclusive consultation, however, stakeholders can work together to build a more sustainable and equitable system of social security for all Greeks. In a sense, public dialogue with stakeholders and citizens, building financial literacy and public awareness are interrelated notions. Through those three, stability and ownership on reforms is built.



According to Sarfati (2003, 2006), some governments view social dialogue as a mere teaching exercise that aims to clarify their economic policies to social partners, without actually taking their feedback into account. However, social dialogue should play a more significant role than this, serving not only to facilitate the implementation of unilateral government policies, but also to foster collaboration between the government and social partners in identifying more effective alternatives to economic adjustment.

## **5.5 A public opinion survey – the Methodology**

This chapter aims to present a questionnaire-based survey, regarding the Greek public's opinion on the recent pension reform. It includes questions on how Greeks perceive the pension system, what are their expectations and how they stand in front of a possible reform. This serves as a valuable tool to complement the existing theoretical framework on pension reform in Greece. By examining the perceptions and knowledge of the Greek public regarding pension reform, this research contributes to the understanding of how individuals perceive and interact with already voted changes within the framework of the economic challenges faced by the country. This empirical approach aligns with previous studies that emphasize the importance of considering public opinions and perspectives in the formulation and implementation of effective pension systems. By bridging theoretical insights with empirical data, this study aims to provide a comprehensive analysis of the current discourse surrounding pension reform in Greece. Moreover, it can highlight future actions to be taken in building public awareness and educating the public in order to ensure smooth implementation of the reform.

The survey targeted a random sample of 454 individuals from various regions in Greece. The sample was selected using a stratified random sampling technique to ensure that it is representative of the population. In addition to the standard set of socio-economic background variables such as age, education, and income, the questionnaire included questions which elicited the information and the preferences about the current pension systems and potential reform options. We were careful not to ask open questions (“Would you like to receive higher benefits?”) but posed trade-offs among specific policy options (“Are you willing to pay x% higher contributions in order to obtain y% higher benefits”) in the tradition of contingent valuation and stated-preference survey techniques. The questionnaire was administered to the sample by phone. A representative sample of 454 people in the population aged 16 to 80 answered it. Data was then collected from the survey responses. The data stored in a spreadsheet and were checked for accuracy and completeness.

The survey consists of 3 parts and includes a total of 56 questions. The first part of the survey (questions 1 to 9) included demographic information, namely age, gender, educational background, and employment status. This information was important to help understand the characteristics of the survey respondents and how their perceptions might differ based on these demographic factors. The second part of the survey (questions 10 to 17, 51, 52, 54 and 56) is about participants' perceptions on the current state of the Greek pension system: we address adequacy and sustainability issues. The third part of the survey (questions 18,19, 21 to 47, 53 and 55) is about participants' opinion on potential pension reforms. This section included close-ended questions that asked participants to rate their level of agreement or disagreement with various reform proposals. The questionnaire comprised distinct sections designed to capture the perspectives of different stakeholder groups. Some questions were tailored specifically for employees, focusing on their satisfaction with the current pension system and their expectations for future reforms. Other sections targeted employers, seeking their insights on the sustainability of the pension system and their willingness to contribute to pension funds. Additionally, retirees were provided with questions that centred around their experiences with the pension system, including their satisfaction with received benefits and their opinions on potential adjustments to ensure long-term viability. This comprehensive approach aimed to gather diverse viewpoints and provide a holistic understanding of how employees, employers, and retirees perceive and engage with the subject of pension reform.

As an initial observation, the survey findings revealed widespread dissatisfaction with the current Greek pension system. A considerable number of participants expressed a pervasive sense of unfairness and inadequacy in terms of the benefits provided to retired individuals. Moreover, there was a prevalent concern among respondents regarding the sustainability of the system, especially in light of the economic challenges Greece has faced in recent years. To substantiate these initial insights, the following sections will delve into the precise data and specific responses obtained through the research study. In terms of potential pension reforms, the survey results indicated that there is significant support for changes to the current system. However, participants had varying opinions on what specific reforms should be implemented. Some participants felt that the retirement age should be increased, while others felt that benefits should be increased. There was also a significant amount of support for increased government funding for the pension system. In conclusion, the survey results provide valuable insight into the perceptions of Greeks regarding pension reform.

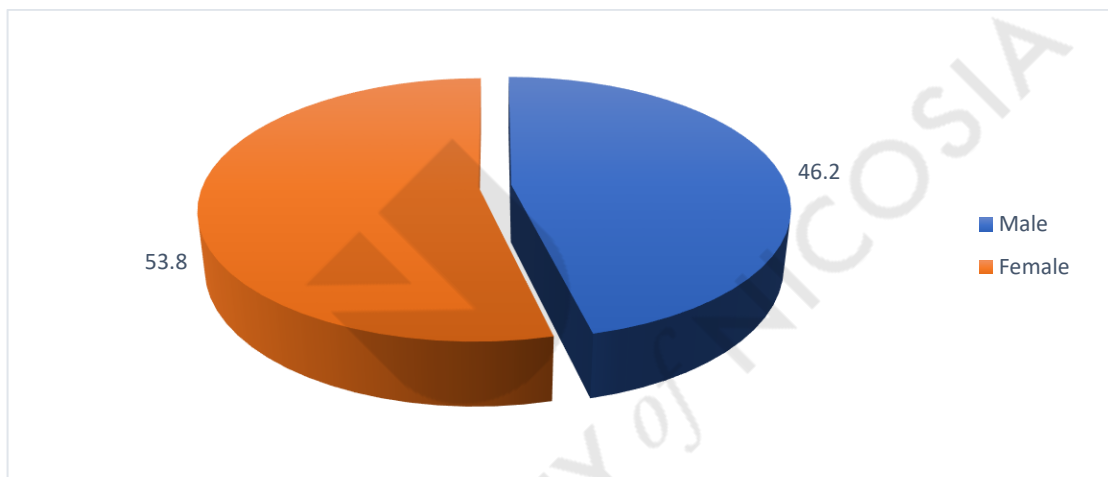
## 5.6 Discussion

### 5.6.1 Descriptive Statistics

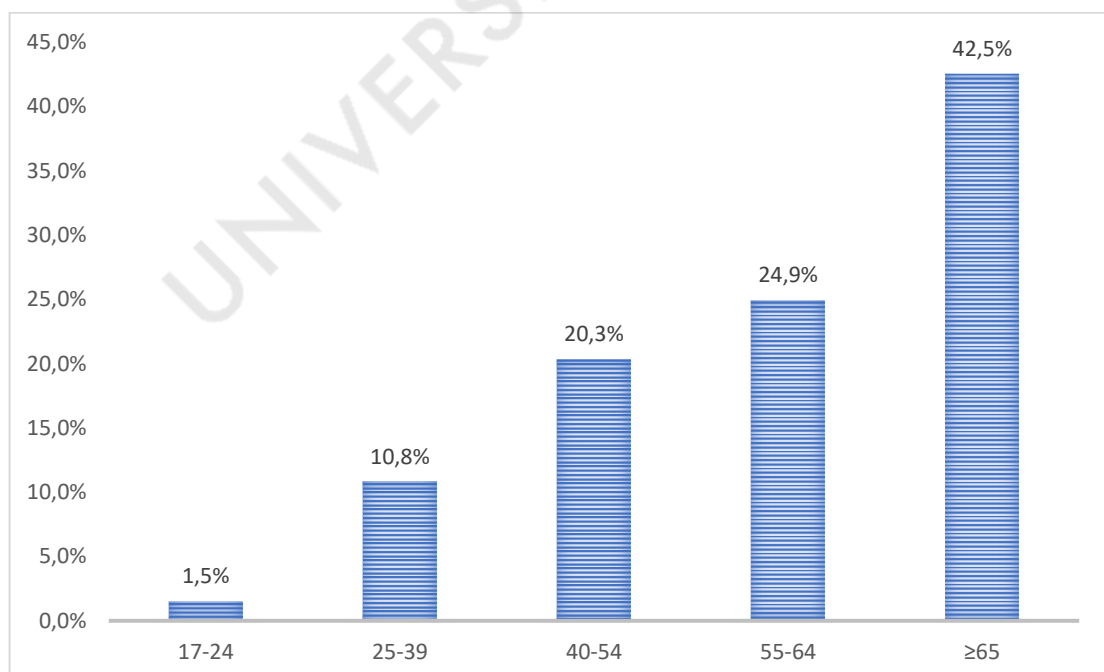
A total of 454 participants completed the survey, of which 210 were men and 244 were women. This represents approximately 46.2% of the sample being male and 53.8% being female (figure 1), thus indicating that our sample is fairly evenly split.

The age of the participants ranges from 17 to 65+ years old. The age distribution of the sample is as follows: 1.5% of participants were between 17 and 24 years old, 10.8% were between 25 and 39 years old, 20.3% were between 40 and 54 years old, 24.9% were between 55 and 64 years old, and the remaining 42.5% were 65 years old or older (Figure 2).

**Figure 16: Gender distribution of the sample**



**Figure 17: Age distribution of the sample**



The age demographics within the study sample reveal significant insight when related to Greek pension eligibility. To be eligible for a pension in Greece, a worker typically needs to meet several requirements. The standard pensionable age in Greece is 67 years. However, if a worker contributed to the social security system for 40 years, then he/she is eligible for a full pension at 62 years. To be eligible for a minimum pension a worker must have contributed to the social security system for minimum of 15 years. These requirements hold for main as well as supplementary pensions. As depicted in Figure 2, the largest group consisted of participants aged 65 or older, representing 42.5% of the sample. This age group is either already eligible for pension or will be within the next couple of years. This imminent shift from active employment to retirement represents a considerable portion of the study population.

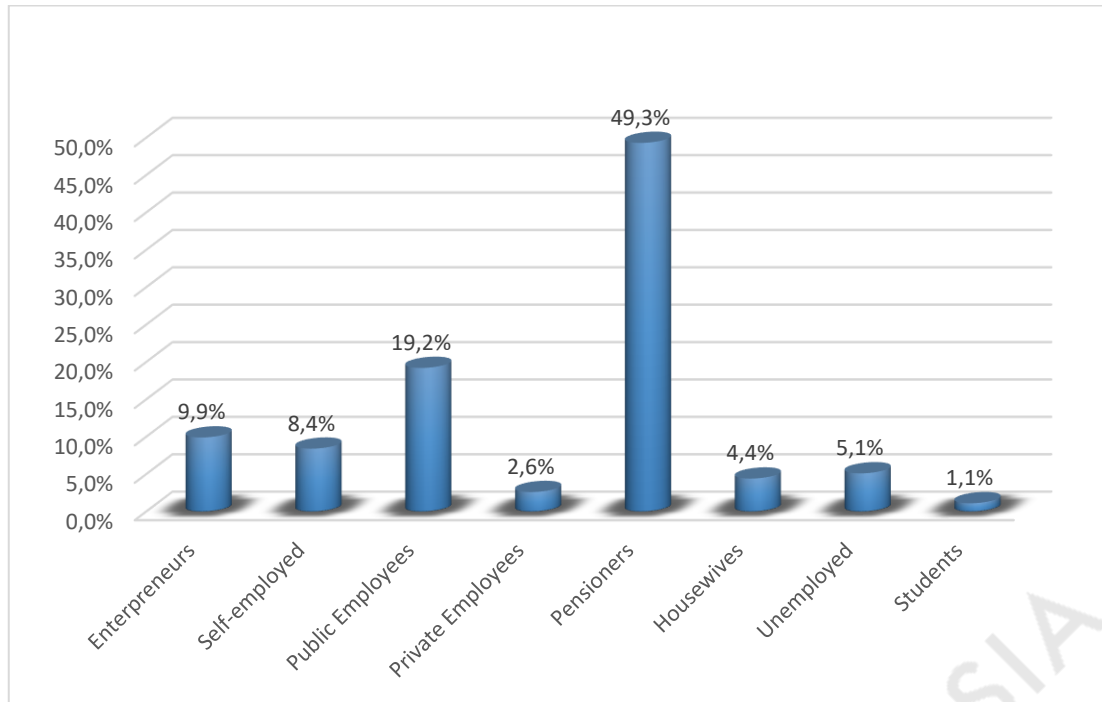
Following this group, participants aged 55 to 64, who represent 24.9% of the sample, are not far behind. With only a few years left to the standard pensionable age, this group's transition to retirement would also be an important consideration for workforce planning and social security resources.

On the other hand, the remaining three age groups (17-24, 25-39, and 40-54) represented smaller proportions of the sample, at 1.5%, 10.8%, and 20.3%, respectively, are consisted mainly of individuals who are still relatively far from retirement age but may have an interest in understanding the current pension system and potential reforms, as they are shaping their expectations and long-term financial plans. This disparity between the age demographics and their respective distance from pension eligibility underlines the multifaceted nature of the study's sample, contributing to a rich and diverse pool of data.

Analysing the survey data in conjunction with the retirement eligibility criteria provides a comprehensive understanding of how different age groups perceive and engage with pension-related issues. It allows for a nuanced examination of the varying perspectives and concerns among those who are closer to retirement and those who are in earlier stages of their careers, contributing to a holistic analysis of the pension reform discourse in Greece.

The sample of 454 participants was also separated by employment status. The employment status of the participants is as follows: 9.9% were entrepreneurs, 8.4% were self-employed, 19.2% were public employees, 2.6% were private employees, 49.3% were pensioners, 4.4% were housewives, 5.1% were unemployed, and 1.1% were students (Figure 3).

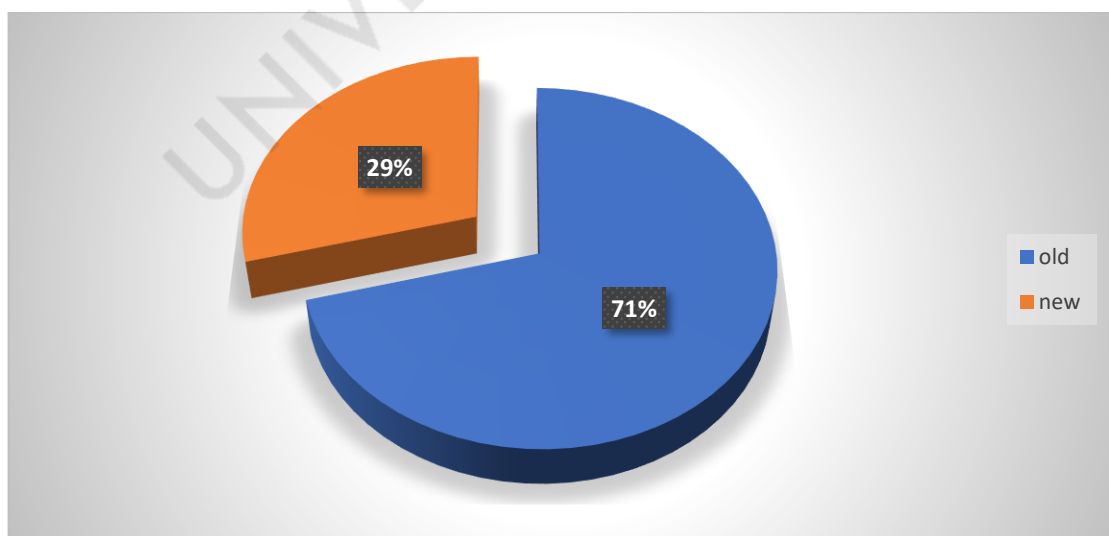
**Figure 18: Employment Status**



We expect that employment status to have a significant effect on the perception over the pension system as well as priorities on pension reforms. For example, pensioners may be more interested in maintaining current pension benefits, while entrepreneurs may be more interested in the potential for future growth and flexibility of the pension system.

The sample was also separated by status of insurance. In Greece, individuals who became insured before 1993 are considered «old» insured, while those who became insured from 1993 onwards are considered «new» insured. Out of the 454 participants, 322 (70.9%) were old insured and the remaining 132 (29.1%) were new insured (Figure 4).

**Figure 19: Insurance status**

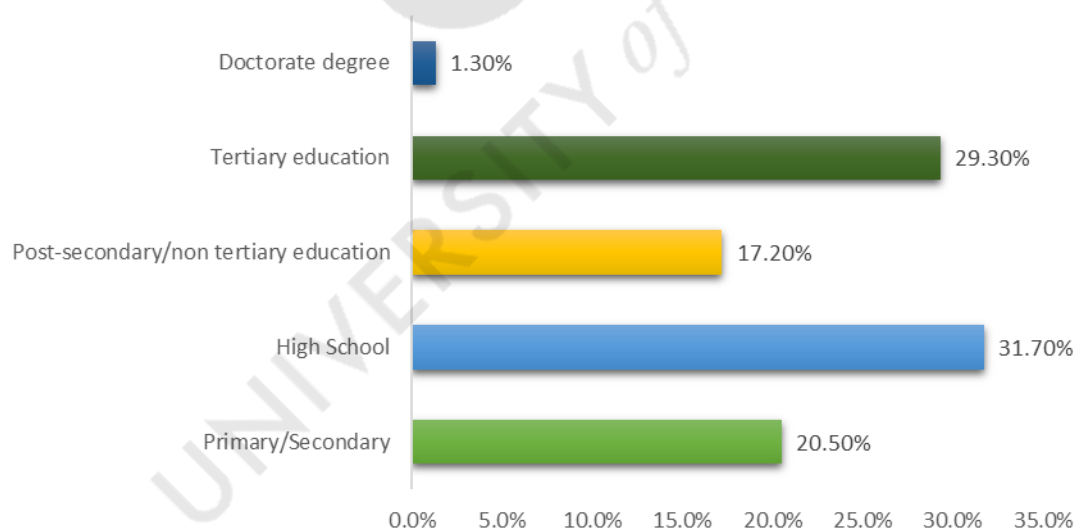


It is important to note that the old insured group may have different perspectives and preferences towards the pension system compared to the new insured group, as they may have different entitlements and benefits under the system. For example, the old insured group may have contributed to the system for a longer period of time and may be more reliant on pension benefits, while the new insured group may be more concerned with the sustainability and adaptability of the system for future generations. By examining the differences in preferences and knowledge between old and new insured groups, the study can provide insights into how the pension system can be improved to meet the needs and expectations of both groups.

Participants were also asked to indicate the highest level of education they had completed. Out of the 454 participants, 20.5% had completed Primary/Secondary education, 31.7% had completed high school, 17.2% had completed post-secondary/non-tertiary education, 29.3% had completed tertiary education, and 1.3% had a doctorate degree.

As shown in the bar chart, the largest percentage of participants had completed high school (31.7%), followed by tertiary education (29.3%) and Primary/Secondary education (20.5%). The smallest percentage of participants had a doctorate degree (1.3%).

**Figure 20: Distribution of education levels in the sample**



Education is also among the factors we expect to significantly affect reform preferences and also the perception of pension system characteristics. As Boeri, Boersch-Supan, and Tabellini (2002) point out, individuals with higher levels of education tend to have a better understanding of the complexities of the system and may be more aware of the potential reforms needed for its improvement. Moreover, Lusardi and Mitchell (2014) provide

evidence that financial literacy, closely tied to education level, positively correlates with a better comprehension of retirement savings and pension systems.

On the other hand, individuals with lower levels of education, often have more limited knowledge and may rely more on external sources such as family and friends for information. This phenomenon is captured well by Lynch, Netemeyer and Fernandes (2013) who highlight that less-educated individuals frequently depend on informal channels for information on financial and retirement matters. Additionally, the work of Banks and Oldfield (2007) demonstrates a greater propensity among this group to rely on hearsay or anecdotal advice in the absence of formal financial education.

By examining the differences in preferences and knowledge between different education levels, the study can provide insights into how the pension system can be made more accessible and understandable for all individuals, regardless of their education background.

### **5.6.2 Knowledge of the system and Preferences**

The pension system is a crucial component of the social safety net that provides financial support to retired individuals. In Greece, the pension system is comprised of both public and private pension plans. However, the insurance coverage data from a survey of 454 individuals revealed that the vast majority of respondents, 449 individuals (98.9%), rely solely on the public pension system for their insurance coverage, while only 5 individuals (1.1%) rely on private pension plans (see Table below). This finding is consistent with the population coverage by professional pension funds (2nd pillar) in Greece. According to data from the National Actuarial Authority (NAA) and the Hellenic Statistical Authority (ELSTAT), the active members of professional pensions Funds, both mandatory and optional insurance, amounted to 123,757 by the end of 2021. In the same period, the total number of employed individuals in Greece was estimated to be 3,928,000. Consequently, by the end of 2021, only about 3.1% of the employed population was covered by the second pillar of insurance in Greece. This statistical evidence underscores the overwhelming reliance on the public pension system for insurance coverage, thereby reiterating the crucial role of the public pension system as the primary source of post-retirement income in Greece.

**Table 26: Main source of insurance coverage**

	Frequency	Percent	Valid Percent	Cumulative Percent
Public Pension system	449	98.9	98.9	98.9

Private Pension system	5	1.1	1.1	100.0
Total	454	100.0	100.0	

*Source: Prepared by researcher*

The fact that such a small percentage of individuals rely on private pension plans highlights the absolute dependence on state pensions. While private pensions are often considered an important supplement to the public pension system (also in other EU countries), providing additional financial support for retirement, in Greece, only a tiny minority engages in professional or private pension plans. This implies the existence of a number of barriers or challenges, financial, institutional and others.

One potential explanation for the low percentage of professional and / or private pensions in Greece pertains to the structure of the pension market itself, as well as socio-economic factors and policy-related issues. Private pensions may not be widely available or accessible to all individuals, particularly low-earners, or workers who are under less stable employment. Furthermore, there might be a deficiency in information or awareness about the benefits of private pensions and how they can supplement the public pension system.

However, it is essential to note that in the Greek context, these exist substantial institutional factors. Primarily, the high cost of insurance, high replacement rates, and universal coverage provided by the first pillar of the pension system (state pensions) are the more crucial factors impeding the expansion of private pensions. Boersch-Supan and Tinios (2001) provide an analysis that supports this argument, emphasizing that high public pension replacement rates can act as a disincentive for the development of private pensions. Meanwhile, Queisser and Vittas (2000) suggest that universally high coverage from the public pension system can deter the need for private pensions. The cost factor is also highlighted by James, Smalhout, and Vittas (2001) who underline the prohibitive expense of private pensions, especially for lower-income individuals.

Interestingly, the ongoing reductions in contributions and the gradual decrease in pensions may potentially pave the way for greater participation in the second pillar. According to Barr and Diamond (2009), pension reform that reduces the generosity of public pensions can spur the growth of private pension coverage, a scenario that might unfold in Greece in the future.

Another potential explanation for the low uptake of private pensions could be related to distrust of private pension providers. Private pensions are often managed by financial



institutions, and there may be concerns among individuals about the security and stability of these providers. There may also be concerns about the fees and charges associated with private pensions, which could make them less attractive to potential users.

Overall, the low uptake of private pensions among Greek citizens is a concerning issue that warrants further investigation. Policymakers and pension providers may need to work together to identify and address the barriers that prevent individuals from accessing private pensions. Additionally, there may be a need for increased education and awareness campaigns to help individuals understand the benefits of private pensions and how they can supplement the public pension system. Ultimately, the goal should be to ensure that all individuals have access to a secure and stable retirement, regardless of their income or employment status.

One of the critical aspects of understanding the current pension system in Greece is to assess the public's knowledge of the system's intricacies. To achieve this, one of the questions asked in the survey, was what type of retirement plan the current system offers. The results indicated that 93.2% of respondents believe that the current system offers a pension determined based on years of service and other components, while only 6.8% believe that the current system offers a pension determined by the total amount of accumulated contributions plus earnings from investments (see Table below).

This finding suggests an alignment between public perception and the actual structure of the Greek pension system for the majority of the respondents. A substantial 93.2% correctly understand that the current pension system is primarily predicated on years of service and other components. This shows a notable level of public comprehension, acknowledging that pension benefits are largely correlated to their work history and related factors, rather than the total volume of contributions and investment yields. Conversely, a small fraction of the population, specifically 6.8%, holds a considerably misconstrued perception of the pension system. This minority erroneously believes that the Greek pension system functions on a Defined Contribution basis, whereby pensions are determined by the total amount of accumulated contributions and earnings from investments. This misapprehension, can have profound implications, potentially leading to a failure to plan appropriately for retirement, as well as fostering misplaced expectations about pension benefits.

It is vital to rectify this misconception, as it may lead to discontentment with the system's design, especially if individuals feel their pension benefits do not reflect their contributions. Moreover, this could also contribute to misunderstandings about the significance of financial planning for retirement, particularly if individuals incorrectly presume their pension benefits

are guaranteed regardless of their actual contributions or investment earnings. Thus, it underscores the importance of educational efforts to improve public understanding of the Greek pension system's actual workings.

To address this issue, the government and policymakers need to take steps to improve public understanding of the pension system. This could include educational campaigns to provide individuals with more accurate information about the current system's design and how it operates. The government could also consider simplifying the pension system and making it more transparent to increase public understanding.

The results of the survey indicate that the vast majority of respondents believe that the current pension system in Greece offers a pension based on years of service and other components. While the current system may not rely on investments, the widespread perception of how the system works still has important implications for policymakers and the public's understanding of the importance of financial planning for retirement.

**Table 27: What type of retirement plan the current system offers?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Pension is determined by the total amount of accumulated contributions plus earnings from investments	31	6.8	6.8	6.8
	Pension is determined based on years of service and other components	423	93.2	93.2	100.0
	Total	454	100.0	100.0	

*Source: Prepared by researcher*

The results of the survey question regarding the public's level of information about the pension system in Greece suggest that there is a significant knowledge gap among the general population. Out of 454 respondents, 22.7% answered that they were not informed at all, while a further 44.5% stated that they had some knowledge but were not fully informed.

This indicates that the majority of respondents felt that they had limited knowledge about the pension system and how it functions (see Table below).

However, there is a silver lining to this result, as 28.6% of respondents claimed to be somewhat informed, and 4.2% of respondents felt they were very much informed. This suggests that there is a small but significant percentage of the population that has a good understanding of the pension system's workings. These respondents may be well-equipped to provide informed feedback and recommendations for improving the system.

The comparison with the previous questions shows that despite the general lack of knowledge about the pension system, most respondents have a clear understanding of the type of retirement plan offered by the current system. This suggests that while there is room for improvement in public education about the pension system's specifics, the general principles of the system are relatively well understood.

The government and policymakers need to take this information into account when designing strategies for improving the pension system. In particular, it may be necessary to focus on educating the general public about the specifics of the system, including the different types of pensions available, the eligibility criteria, and the calculation of pension benefits. This could be achieved through targeted campaigns, educational materials, and other initiatives that aim to increase public awareness and understanding of the pension system.

In conclusion, the results of the survey regarding the public's level of knowledge about the pension system in Greece suggest that there is a significant knowledge gap among the general population. While most respondents had some level of knowledge about the system, few felt they were well-informed. Nonetheless, there is a small but significant percentage of the population that has a good understanding of the pension system's workings, which may be leveraged to improve the system. The government and policymakers need to take this information into account when designing strategies for improving the pension system and increasing public awareness about its specifics.

**Table 288: How well informed are you about the pension system of Greece and the way it functions?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Well	103	22.7	22.7	22.7

Somewhat informed	202	44.5	44.5	67.2
Not too informed	130	28.6	28.6	95.8
Not at all informed	19	4.2	4.2	100.0
Total	454	100.0	100.0	

*Source: Prepared by researcher*

Next, the results of the survey question regarding the public's knowledge about their employer's contribution to their main and supplementary insurance are presented and they are encouraging. Out of 454 respondents, an overwhelming majority of 94.9% indicated that they were aware that their employer pays a part of the total contributions for their insurance. This suggests that most employees in Greece understand the role their employer plays in contributing to their insurance coverage.

On the other hand, the fact that 5.1% of respondents were not aware of their employer's contribution is a cause for concern. This may indicate that some employees are not receiving adequate information about their employment benefits or that they are not paying close attention to the details of their employment contract. It is essential to address this issue by improving communication between employers and employees to ensure that all employees have a clear understanding of their employment benefits, including their insurance coverage.

When comparing this question's results to the previous questions, it is evident that the level of knowledge about the pension system's specifics varies among the respondents. While most respondents understood that their employer contributes to their insurance coverage, many felt they had limited knowledge about the pension system's workings.

It is essential to recognize that a lack of knowledge about the pension system can lead to misunderstandings and misperceptions about how the system works, which may result in mistrust and a lack of support for the system. Therefore, it is crucial to improve public education and awareness about the specifics of the pension system to ensure that all citizens have a clear understanding of how it works as was mentioned before.

Results of the survey question regarding the public's knowledge of their employer's contribution to their insurance coverage are promising, with the majority of respondents indicating that they were aware of their employer's contribution. However, it is concerning that a small percentage of respondents were not aware of their employer's contribution,

highlighting the importance of improving communication between employers and employees. The varying levels of knowledge about the pension system among the respondents emphasize the need to improve public education and awareness about the pension system's specifics to ensure that all citizens have a clear understanding of how it works.

**Table 29: Did you know that your employer pays part of the total contributions for your main and supplementary insurance?**

	Frequency	Percent	Valid Percent	Cumulative Percent
No	23	5.1	5.1	5.1
Yes	431	94.9	94.9	100.0
Total	454	100.0	100.0	

*Source: Prepared by researcher*

Participants were then asked to answer the question about their ability to estimate their pension without professional help and the results are concerning. Only 20.9% indicated that they felt confident in their ability to estimate their pension with a 90% probability. The majority of respondents, 79.1%, expressed doubts about their ability to make accurate predictions regarding their pension.

The high percentage of respondents indicating that they could not estimate their future pension with 90% certainty is not entirely surprising when considering the intricacy of the Greek pension system. Such complexities inherently make it difficult for individuals to predict their post-retirement finances without expert assistance. The Greek pension system comprises multiple plans and benefit calculations, which can present significant challenges to comprehension and navigation, further complicating accurate pension estimation.

However, it's important to note that the onus of understanding these complexities should not necessarily be placed entirely on the insured individuals. The inherent intricacy of the pension calculation mechanisms may arguably signify a systemic issue - a need for improved communication and information dissemination by the managing entities. Moreover, this pervasive lack of confidence, as evidenced by the survey results, could point towards broader implications. It indicates widespread uncertainty about future financial stability post-retirement, which can be potentially problematic. Thus, beyond the system's inherent

complexity, there may also be a need for better informational resources and initiatives aimed at helping individuals understand the pension calculation process and their individual prospects within it.

When comparing the results of this question to the previous questions, it is evident that the public's understanding of the pension system varies widely. This particular question was considered as an indicator of knowledge about the insurance system due to its focus on respondents' awareness of their employer's contributions and their overall understanding of the pension system's functioning. While this question may not be the only measure of knowledge, it provides an insight into participants' perceptions and awareness of key aspects of the insurance system.

Additional questions could certainly provide further indicators of knowledge, and it is important to note that this survey aimed to capture a broad range of perspectives on the pension system. However, the question in focus specifically aimed to gauge respondents' knowledge regarding their employer's contributions and their level of understanding about the system. By assessing participants' self-perceived knowledge and their ability to estimate their pension accurately, we gained insights into their confidence in their understanding of the pension system. This approach allowed us to explore not only factual knowledge but also participants' perception of their own knowledge gaps and uncertainties.

**Improving public understanding of the Greek pension system is crucial to empower individuals and enable them to effectively plan for their financial future after retirement.** Traditionally, social security in Greece has been perceived as a given for individuals, with limited room for personal influence on their pension outcomes, except for choosing an earlier or later retirement age. Policy decisions were predominantly made by policymakers, often influenced by union pressures, while individuals had little autonomy in managing their pension contributions.

However, in a different system where individuals have the freedom to manage their contributions, they can actively shape their pension program and have greater control over their retirement outcomes. This allows individuals to take their destiny into their own hands, without blindly relying on others for the sustainability of the system and the ability to receive a pension. The current system lacks individual freedom in decision-making and places the fate of individuals in the hands of external factors. Moving towards a system where individuals have the freedom to manage their contributions would offer a paradigm shift, granting them greater agency and control over their retirement planning.

Therefore, it is imperative to introduce reforms that enhance transparency, provide clear information and guidance, and increase access to professional support. By empowering individuals with knowledge and decision-making authority, Greece can foster a more sustainable and inclusive pension system, ensuring that citizens have the means to secure their financial well-being during retirement.

Concluding, the results of the survey question regarding the public's ability to estimate their pension without professional help are concerning, with a significant percentage of respondents expressing doubts about their ability to make accurate predictions regarding their pension. This highlights the need for improved public education and awareness about the pension system and the importance of providing resources and support for individuals who need help estimating their pension.

**Table 30: Are you in a position to estimate, with no professional help (with a 90% probability), the pension you will receive, assuming you will retire at the allowed age for either a full or reduced pension?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Definitely not	219	48.2	48.2	48.2
	Probably not	140	30.8	30.8	79.1
	Probably yes	75	16.5	16.5	95.6
	Definitely yes	20	4.4	4.4	100.0
	Total	454	100.0	100.0	

*Source: Prepared by researcher*

Next question of the survey captures the concern of the public about the security of their pension and their ability to receive it. The fact that 72% of respondents expressed some level of concern, with almost half indicating they are "very concerned," highlights the importance of addressing issues related to pension security in Greece.

The Greek pension system has faced significant challenges in recent years due to economic instability, high unemployment rates, and an aging population. These factors have contributed to concerns about the sustainability and reliability of the pension system. The

results of the survey suggest that these concerns have not gone unnoticed by the public, and there is a need for action to address them.

One potential solution to addressing the concerns of the public is to increase transparency and communication about the pension system. Providing clear information about how the system works, how pensions are calculated, and what measures are in place to ensure pension security could help alleviate some of the fears and concerns of the public.

Additionally, there may be a need for policy changes and reforms to improve the sustainability and reliability of the pension system. Addressing the root causes of economic instability and unemployment, as well as implementing measures to support an aging population, could help strengthen the pension system and provide more security for retirees.

The high level of concern expressed by the public about the security of their pension and their ability to receive it is a significant issue that requires attention. Increasing transparency and communication about the pension system, as well as implementing policy changes and reforms, could help alleviate some of the fears and concerns of the public. Addressing these issues is essential to ensuring a stable and reliable pension system for current and future generations of retirees in Greece.

**Table 31: How concerned are you about the security of your pension and your ability to receive it?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all concerned	57	12.6	12.6	12.6
	Not too concerned	70	15.4	15.4	28.0
	Somewhat concerned	123	27.1	27.1	55.1
	Very concerned	204	44.9	44.9	100.0
	Total	454	100.0	100.0	



*Source: Prepared by researcher*

The next question highlights the importance of the pension in financing the retirement years of the public. The results of the question indicate that the majority of respondents consider it to be very important (53.3%) and somewhat important (23.1%). This highlights the fact that for many people, the pension system is a crucial aspect of their financial planning for retirement.

Comparing these results with the previous question on concerns about the security of pensions and the ability to receive them, a majority of respondents (44.9%) expressed significant concerns regarding the security of their pensions. This finding suggests that while people understand the importance of pensions in financing their retirement, there is also a prevailing worry about the security and reliability of the system to deliver pension benefits when needed. This highlights the crucial role that pensions play in the financial planning of Greek individuals for their retirement years.

The statistical data further supports this observation. Considering each age group as shown in the table below, the majority of respondents across all age categories expressed either significant or moderate levels of worry about their ability to receive pensions in the future.

**Table 32: How concerned are you about the security of your pension and your ability to receive it, with respect to age?**

		Very concerned	Somewhat concerned	Not too concerned	Not at all concerned	Total
Age	[17-24]	0	0	2	5	7
	[25-39]	3	3	10	33	49
	[40-54]	4	4	24	60	92
	[55-64]	4	16	44	49	113
	65+	46	47	43	57	193
	Total	57	70	123	204	454

*Source: Prepared by researcher*

These findings underscore the critical need for effective pension reform that addresses these concerns and ensures the long-term sustainability of the pension system. One aspect is increasing public awareness and education about the pension system, as discussed in previous questions. The survey results indicate a significant lack of knowledge among the public regarding the pension system, which contributes to their concerns about its security. Therefore, there should be a concerted effort to educate the public about the pension system, its benefits, and its limitations, empowering individuals to make informed decisions and alleviate their concerns about their future retirement income.

Another way to address these concerns is by implementing policies that improve the security of the pension system. For example, introducing a more sustainable and flexible pension system that allows for more individual choice and responsibility could help improve the security of the pension system. This could include measures such as promoting private pension savings.

Furthermore, there should be a focus on addressing the underlying issues that have contributed to the instability of the pension system, such as low employment rates, a high proportion of informal employment, and a low fertility rate. Addressing these issues could help ensure that the pension system is sustainable in the long run. In general, addressing these concerns will require a multi-faceted approach that includes increasing public awareness and education, implementing policies that improve the security of the pension system, and addressing underlying issues that have contributed to its instability. By taking these steps, the Greek government can help ensure the long-term sustainability of the pension system and improve the financial security of its citizens.

It is worth noting that only a small percentage of respondents (14.5%) answered that the pension is not at all important, while an even smaller percentage (9%) answered that it is only a little important. This indicates that for the vast majority of people, the pension system is an important consideration when planning for retirement.

Overall, the results of this question highlight the critical role of the pension system in financing retirement years for many people. While there is a concern about the security of the system and the ability to receive the pension when needed, the majority of respondents recognize the importance of the pension in their financial planning for the future.

**Table 33: How important will be your pension in financing your retirement years?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all important	66	14.5	14.5
	Not too important	41	9.0	23.6
	Somewhat important	105	23.1	46.7
	Very important	242	53.4	100.0
	Total	454	100.0	100.0

*Source: Prepared by researcher*

Based on the results of the survey question regarding the public's belief about the existing pension system, it is clear that the majority of the respondents do not believe that the system offers pensions that are capable of maintaining a worker's standard of living and can be considered rewarding in relation to the contributions paid by a worker during his/her working life. Specifically, more than half of the respondents (54.6%) completely disagree with this statement, while only a small percentage (2.4%) completely agree.

This result is in line with the previous questions that highlighted the public's concerns about the security and importance of their pensions. It seems that the public is not satisfied with the current state of the pension system and they do not trust it to provide them with a sufficient income during their retirement years.

It is worth noting again that the Greek pension system has faced significant challenges in recent years, including a demographic shift towards an aging population, a decrease in the number of workers contributing to the system, and an increase in life expectancy. These challenges have put a strain on the system and have made it difficult to provide adequate pensions to all retirees.

To fix this situation, it is necessary to implement structural reforms that address the challenges faced by the pension system. These reforms could include changes to the

retirement age, the way pensions are calculated, and the contribution rates of both workers and employers. It is also important to improve the public's awareness and understanding of the pension system, so that they can make informed decisions about their retirement planning.

Overall, the results of the survey regarding the public's belief about the existing pension system in Greece show a clear dissatisfaction with the system and a need for reforms to ensure that it provides adequate pensions to all retirees.

**Table 34: Do you believe that the existing pension system offers pensions that are capable of maintaining a worker's standard of living and can be considered rewarding in relation to the contributions paid by a worker during his/her working life?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	248	54.6	54.6	54.6
	Probably disagree	102	22.5	22.5	77.1
	Not sure	58	12.8	12.8	89.9
	Probably agree	35	7.7	7.7	97.6
	Strongly agree	11	2.4	2.4	100.0
	Total	454	100.0	100.0	

*Source: Prepared by researcher*

The analysis of the question revealed that a considerable percentage of respondents (77.1%) believed that the existing pension system does not offer pensions that are capable of maintaining a worker's standard of living and are not rewarding in relation to the contributions paid during their working life. Nevertheless, the introduction of new replacement rates in the Greek pension system, following the enactment of Law 4670/2020, contradicts this conclusion. According to a study conducted by the National Actuarial Authority (2020), the average monthly primary pension gradually increases due to the progressive increase in the annual replacement rates for individuals with 30 years of

insurance or more. This finding suggests that the recent reforms aim to address the concerns raised by respondents regarding the adequacy of pension benefits. Therefore, it is necessary to consider both the perception of the current system and the impact of recent legislative changes on the overall assessment of the Greek pension system.

However, when asked about which proposed reform they would choose, the responses showed a preference towards a capitalisation system. This could indicate that people believe that a shift towards a system where their contributions are invested in the market would result in a more rewarding retirement plan.

Of those who preferred a capitalisation system, only a minority (20.6%) chose a fully capitalised system, while the majority (43.6%) chose a partial shift from the current system to a capitalisation system. This suggests that people may not be willing to abandon the existing system altogether but are open to changes that would incorporate capitalisation elements.

Participants who disagreed to some extent or strongly disagreed that the current pension system maintains retirees' standard of living and corresponds to the contributions they have made during their working life were asked about their preferred reform for the pension system. The results showed that 35.8% of respondents expressed a desire for the government to provide more incentives for a private pension system, while 43.6% indicated a preference for a partial capitalization system within the existing system. Furthermore, 20.6% of participants expressed a desire for a complete transition to a fully capitalized pension system. These responses could be attributed to a lack of trust in the government's ability to effectively manage a capitalization system or a preference for a more private-oriented approach to retirement planning. This sentiment aligns with the demographic problem that Greece is facing, as numerous studies have highlighted the challenges posed by an aging population and the strain it puts on the sustainability of the pension system (National Statistical Service of Greece, 2020; Hellenic Federation of Enterprises, 2021; Bank of Greece, 2022). The combination of demographic changes and concerns about the current system may contribute to the diverse preferences expressed by the respondents (Table).

The demographic problem in Greece is a significant concern that directly impacts the sustainability of the pension system. The country is facing an aging population and a declining birth rate, resulting in a shrinking workforce and an increasing number of retirees. This demographic shift creates a strain on the pension system, as fewer active workers contribute to supporting a growing number of pensioners. Greece has one of the highest percentages of elderly population in Europe (Eurostat, 2023), with projections indicating a

continuous aging trend in the coming decades. This demographic challenge poses several challenges for the pension system, including reduced revenue from contributions and increased financial pressure to meet the growing demand for pension benefits. Moreover, the declining birth rate further exacerbates the problem by limiting the potential for future generations to support the pension system through their contributions. This is supported by studies that demonstrate a direct link between the financial sustainability of a pension system and fertility rates (Wang et al., 2019). The combination of an aging population, declining birth rate, and economic challenges places the Greek pension system under significant strain. It underscores the importance of implementing comprehensive reforms that consider the changing demographic landscape, promote sustainability, and ensure that future generations can rely on a stable and adequate pension system. It is crucial for policymakers to address the demographic problem through strategic measures such as encouraging higher birth rates, promoting active labour market participation, and exploring innovative solutions that can support the financial stability of the pension system in the long run. By considering the demographic challenges and implementing targeted reforms, Greece can work towards ensuring a sustainable and viable pension system for its citizens.

Overall, these responses suggest that **there is a desire for change in the current pension system, particularly towards a capitalisation system.** Conversely, it is important for the government to carefully consider the preferences of the public and provide clear and transparent information about any proposed reforms to gain trust and support from the public.

**Table 35: If you chose the latter options in question 8, then in your opinion which reform would you like to see in the pension system?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Full funded system	84	18.5	20.6	20.6
	A part of current system to become a funded system	178	39.2	43.6	64.2

		Frequency	Percent	Valid Percent	Cumulative Percent
	Give more incentives for a private pension system	146	32.2	35.8	100.0
	Total	408	89.9	100.0	
Missing	System	46	10.1		
	Total	454	100.0		

*Source: Prepared by researcher*

Then, regarding a pension reform, all the respondents had to answer how much the Government, Social Partners, Pension Institutions, Employer's organizations, Trade Unions and Other Parties should be involved in the design of the reform. The results of this question, highlight the importance of involving various stakeholders in the design of a pension reform. Most of the respondents believe that the government, social partners, pension institutions, employer's organizations, trade unions, and other bodies should be very much involved in the design of a pension reform.

Specifically, over 60% of the respondents believe that the government should be very much involved in the pension reform design. This is understandable, as the government is the entity responsible for regulating and overseeing the pension system. Moreover, given the complex nature of pension systems and their significant impact on society, it is crucial for the government to play a significant role in designing a successful pension reform.

Similarly, most of the respondents believe that social partners, pension institutions, employer's organizations, trade unions, and other bodies should be very much involved in the design of a pension reform. This highlights the importance of involving various stakeholders in the reform process to ensure that the reform is comprehensive and effective.

Overall, the results of this question suggest that involving a diverse group of stakeholders in the design of a pension reform is crucial. This can help ensure that the reform considers the interests and concerns of all relevant parties, leading to a more successful and sustainable pension system.

It is important to note that involving a large number of stakeholders can also lead to challenges in reaching a consensus and implementing the reform. Therefore, it is essential to have effective communication and collaboration between stakeholders to ensure that the pension reform is successful.

In conclusion, the involvement of various stakeholders in the design of a pension reform is critical. The results of this question suggest that the government, social partners, pension institutions, employer's organizations, trade unions, and other bodies should be very much involved in the design of a pension reform. By involving a diverse group of stakeholders, it is possible to develop a comprehensive and effective pension reform that takes into account the interests and concerns of all relevant parties.

**Table 36: Regarding a pension reform how much the Government should be involved in the design of the reform?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all	15	3.3	3.3	3.3
	Very Little	16	3.5	3.5	6.8
	No more, no less	13	2.9	2.9	9.7
	High	129	28.4	28.4	38.1
	Very High	281	61.9	61.9	100.0
	Total	454	100.0	100.0	

*Source: Prepared by researcher*

**Table 37: Regarding a pension reform how much Social Partners should be involved in the design of the reform?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all	31	6.8	6.8	6.8



Very Little	28	6.2	6.2	13.0
No more, no less	59	13.0	13.0	26.0
High	138	30.4	30.4	56.4
Very High	198	43.6	43.6	100.0
Total	454	100.0	100.0	

Source: Prepared by researcher

**Table 38: Regarding a pension reform how much Pension Institutions should be involved in the design of the reform?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Not at all	10	2.2	2.2	2.2
Valid Very Little	8	1.8	1.8	4.0
Valid No more, no less	8	1.8	1.8	5.7
Valid High	123	27.1	27.1	32.8
Valid Very High	305	67.1	67.1	100.0
Valid Total	454	100.0	100.0	

Source: Prepared by researcher

**Table 39: Regarding a pension reform how much Employer's organizations should be involved in the design of the reform?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Not at all	45	9.9	9.9	9.9

Very Little	49	10.8	10.8	20.7
No more, no less	44	9.7	9.7	30.4
High	107	23.6	23.6	54.0
Very High	209	46.0	46.0	100.0
Total	454	100.0	100.0	

Source: Prepared by researcher

**Table 40: Regarding a pension reform how much Trade Unions should be involved in the design of the reform?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all	45	9.9	9.9
	Very Little	33	7.3	17.2
	No more, no less	37	8.1	25.3
	High	92	20.3	45.6
	Very High	247	54.4	100.0
	Total	454	100.0	100.0

Source: Prepared by researcher

**Table 41: Regarding a pension reform how much Other Bodies should be involved in the design of the reform?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all	39	8.6	8.6
	Very Little	51	11.2	19.8

No more, no less	77	17.0	17.0	36.8
High	84	18.5	18.5	55.3
Very High	203	44.7	44.7	100.0
Total	454	100.0	100.0	

*Source: Prepared by researcher*

In Greece, every worker is covered by a state pension insurance scheme but is free to set up a private insurance scheme as well, if they so wish. The results of the question regarding private retirement insurance reveal that the vast majority of the respondents do not have any private insurance to complement their state system insurance. Specifically, 85.9% answered that they do not have any private insurance for retirement, 13.4% answered positively and only 0.7% indicated that they only have private insurance.

This result suggests that the Greek population heavily relies on the state system insurance for their retirement years. This is consistent with the previous questions that showed how important the pension system is to the public and how concerned they are about its security. It seems that the public sees the state system insurance as the only reliable source of income for their retirement and therefore, they do not feel the need to complement it with private insurance.

It is worth noting, that the lack of private retirement insurance could potentially create issues for some individuals in the future. Depending solely on the state system insurance can put individuals at risk of not having enough income to cover their expenses during retirement. This could happen as the state system insurance may not be able to provide sufficient benefits due to financial instability or other issues. Therefore, it might be wise for individuals to consider complementing their state system insurance with private insurance options.

Results of this question show the need for the government and other stakeholders to address the concerns of the public regarding the security of the pension system. The lack of private retirement insurance options among the Greek population suggests that there is a need for more incentives for individuals to invest in private insurance options. By doing so, individuals could ensure that they have a more diversified and secure source of income during their retirement years.

**Table 42: Apart from your state system insurance due to work, do you have any private insurance for retirement?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	390	85.9	85.9	85.9
	Yes	61	13.4	13.4	99.3
	Only private retirement plan	3	0.7	0.7	100.0
	Total	454	100.0	100.0	

*Source: Prepared by researcher*

Next question in the survey is about how important it would be for the public if they could manage their contributions (i.e. invest them). The results of this question indicate that the majority of the public (88.4%) believes that managing their contributions is important to them. This highlights a desire for greater control over their financial future and retirement planning. It is not surprising that a high percentage of respondents (71.4%) consider it quite important, as managing contributions can provide a sense of security and peace of mind. On the other hand, 17% of the respondents consider it very important, which suggests that they may have a more active approach to their retirement planning and want to have more control over their investments.

The importance of managing contributions is closely linked to the previous questions regarding pension reforms and the existing pension system. The public's lack of confidence in the current pension system has been highlighted in previous questions, and providing them with the ability to manage their contributions could help to address this issue. Allowing individuals to control their contributions can provide a greater sense of ownership and responsibility and can help to create a more engaged and invested population.

Furthermore, the importance of managing contributions may also be linked to the lack of private retirement insurance coverage among the respondents. As previously mentioned, the vast majority of the respondents (85.9%) do not have a private insurance for retirement. Allowing individuals to manage their contributions can provide an alternative means of supplementing their retirement income and may be seen as a more accessible option than relying solely on a private insurance for retirement.

Overall, the results of this question suggest that there is a strong desire among the public to have more control over their retirement planning. Allowing individuals to manage their contributions can provide a sense of ownership and responsibility and may help to address concerns regarding the existing pension system. It may also provide an accessible alternative to private insurance for retirement, particularly for those who do not have coverage.

**Table 43: How important it would be if you could manage your contributions (i.e. invest them)**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very important	77	17.0	17.0	17.0
	Somewhat important	324	71.3	71.3	88.3
	Little important	50	11.0	11.0	99.3
	Not important at all	3	0.7	0.7	100.0
	Total	454	100.0	100.0	

*Source: Prepared by researcher*

After that, the public was asked if they would consider investing a part of their contributions in order to gain more savings in the future. The question of whether or not to invest a portion of pension contributions in order to potentially gain more savings is a complex issue, and the responses from the public are similarly nuanced.

The results show that a significant proportion of the respondents, around 30%, were either unsure or hesitant about investing a portion of their pension contributions. However, a greater proportion of the respondents, around 50%, were either open to or in favour of investing. The respondents who were not in favour of investing may have concerns about the risks involved, such as the potential for losses or instability in the markets. They may also be concerned about the complexity of investing and their own lack of knowledge or expertise in this area.

On the other hand, the respondents who were in favour of investing may see it as an opportunity to potentially earn more returns on their pension savings. They may be comfortable with taking on some level of risk in exchange for the potential rewards of higher returns. Overall, it is clear that there is a range of opinions on this issue, and it is important to take into account the concerns and preferences of all stakeholders in any potential reforms or changes to the pension system.

One possible way to address the concerns of those who are hesitant about investing is to provide more education and information about the potential benefits and risks of investing. This could be done through public awareness campaigns or through offering resources and tools to help individuals make informed decisions about investing. At the same time, it may also be necessary to ensure that any investment options offered through the pension system are transparent, affordable, and accessible to all individuals. This could help to build trust and confidence in the investment options available and make it easier for individuals to make decisions about how to manage their contributions.

**Table 44: Would you consider investing a part of your contributions in order to gain more savings?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Not at all	91	20.0	20.0	20.0
Probably not	48	10.6	10.6	30.6
Neither yes or no	84	18.5	18.5	49.1
Probably yes	145	31.9	31.9	81.1
Definitely yes	86	18.9	18.9	100.0
Total	454	100.0	100.0	

*Source: Prepared by researcher*

Next, the results of the survey on whether recent pension reforms helped to address the problem of aging population and the sustainability of the system are quite interesting. A

majority of the respondents either disagreed or were unsure about the impact of the recent pension reforms on these issues. A significant percentage of the respondents (36.8%) strongly disagreed that recent pension reforms have helped to combat the aging population problem and keep the system sustainable. Another 20.9% probably disagreed with the statement, making a total of 57.7% of the respondents who are not confident that recent pension reforms have done enough to address the challenges facing the pension system. Additionally, a substantial percentage of the respondents (25.8%) neither disagreed nor agreed with the statement, indicating that they are unsure about the impact of the recent pension reforms on the sustainability of the system and the aging population problem. This suggests that the public may be uncertain about the effectiveness of the recent pension reforms in addressing these critical issues.

Only a small percentage of the respondents (10.1%) probably agreed that recent pension reforms have helped to address these problems, while an even smaller percentage (6.4%) strongly agreed with the statement. These results show that there is a significant divide among the public on whether the recent pension reforms have been effective in addressing the aging population problem and ensuring the sustainability of the system.

When comparing this question with previous ones, it is interesting to note that there is some scepticism about the effectiveness of the pension system and the reforms. For example, in the question about the level of trust in the state pension system, the majority of the respondents, 59.1%, either did not trust the system at all or trusted it only a little. Similarly, in the question about the effectiveness of the current system, the majority of the respondents, 50.5%, thought that the current system was not effective in providing adequate retirement benefits. The results of the question on whether recent pension reforms have helped address the aging population problem and the sustainability of the system show that the majority of the respondents are sceptical about the effectiveness of the reforms. The highest percentage of respondents, 36.8%, totally disagree that recent pension reforms have addressed these issues. This is followed by 20.9% who probably disagree with the statement. The results suggest that the public is not confident that recent pension reforms have done enough to address the challenges facing the pension system.

The findings also highlight the need for policymakers to engage with the public in the design of pension reforms and to take into account their views and preferences. This can help to build trust and confidence in the pension system and increase the likelihood that reforms will be effective in addressing the challenges facing the system. Overall, the results of the question on whether recent pension reforms have helped address the aging population

problem and the sustainability of the system suggest that the public is not confident that recent reforms have done enough to address the challenges facing the pension system. This underscores the need for policymakers to engage with the public in the design of pension reforms and take into account their views and preferences in order to build trust and confidence in the system.

**Table 45: Recent pension system reforms helped address the ageing population and the sustainability of the system?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	167	36.8	36.8
	Disagree	95	20.9	57.7
	Not sure	117	25.8	83.5
	Agree	46	10.1	93.6
	Strongly agree	29	6.4	100.0
	Total	454	100.0	100.0

*Source: Prepared by researcher*

Based on the results of the surveys so far, the question arises whether people are concerned about the level of pension they will receive. The survey results suggest that the level of pension people will receive is a significant concern for the majority of respondents. Over half of the respondents (51.3%) answered that they are very much concerned about the level of their future pension, and another 28.9% answered that they are quite a lot concerned about it. This indicates that people are aware of the potential financial challenges they may face in retirement and are worried about the adequacy of their retirement income.

Compared to previous questions, which focused on the structure and governance of the pension system, this question is more personal and direct. It addresses the concerns of individual citizens about their own financial security in old age. The results highlight the importance of pensions for people's financial well-being and security.



The findings also suggest that there is a need for more education and information about pension planning and retirement income. People may benefit from learning about different savings strategies, investment options, and the role of pensions in retirement planning. Additionally, policymakers and financial institutions may need to improve their communication to the public about the importance of saving for retirement and the various options available to them.

These questions help policymakers understand that people are concerned about the level of their future pension and want to be involved in the design and management of the pension system. It is essential for policymakers and other stakeholders to listen to people's concerns and work together to develop a sustainable and effective pension system that meets the needs of all citizens.

**Table 46: How worried are you about the level of pension you will receive?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not worried at all	61	13.4	13.4	13.4
	Not too worried	29	6.4	6.4	19.8
	Quite worried	131	28.9	28.9	48.7
	Very worried	233	51.3	51.3	100.0
	Total	454	100.0	100.0	

*Source: Prepared by researcher*

### 5.6.3 Priorities of a Pension Reform

In this section, an analysis of citizens' opinions regarding the priorities of an insurance system reform is presented. Through the questionnaire distributed to the citizens, data were also collected regarding their views and priorities concerning the reform of the insurance system. This analysis examines the priorities they attribute to an effective insurance system.

**Table 47: Those who pay more contributions, should be paid higher pensions**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Unimportant	10	2.2	2.2	2.2

Unimportant	6	1.3	1.3	3.5
Not sure	20	4.4	4.4	7.9
Important	113	24.9	24.9	32.8
Very Important	305	67.2	67.2	100.0
Total	454	100.0	100.0	

*Source: Prepared by researcher*

**An overwhelming majority of 92.1% of the respondents stated that it is important or very important for an insurance system to follow the principle of proportionality**, where higher contributions correspond to higher pension benefits. This finding highlights the strong belief among citizens that a fair and equitable system should reward those who contribute more during their working lives. It also indicates the expectation for a pension system that aligns with the principles of fairness and just distribution of benefits. The minimal response rate of 3.5% indicating the lack of importance assigned to this principle suggests that it is a widely accepted notion among the surveyed individuals. These results emphasize the need for policies that ensure a direct link between contributions and pension benefits.

These answers indicate some preference over DC / funded systems. The reason for that being that in these systems there is a direct link between contributions, individual accounts, and future benefits. Contrary to that in PAYG / DB systems, current contributions are used to finance current pensions and pensions in general are calculated using predefined rules, rather than accumulated capital. However, this is just a first indication, with more evidence needed to back up this idea.

The next question regarding the priorities of a possible reform, focuses on working age limits. How willing are workers of today, remain longer periods in the labour market to ensure sustainability of pension provision? Again, let us highlight the differences between the PAYGO / DB and DC / funded systems. In the first case, as we said current workers' pay for current pensioners. Those systems are therefore more vulnerable to demographic crises. As working population diminishes, policy makers will inevitably have to decide on increasing statutory pension age, keep people longer in the labour market and give pensions for shorter periods (pension age to be closer to expected life duration). On the other hand, in DC systems, one pays contributions to finance his/ her future pension. This alone makes DC systems less vulnerable to demographics and the effect of retirement age is less important.

**Table 48: Employees will have to work more to enable the system to serve pensions**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Unimportant	216	47.6	47.6	47.6
	Unimportant	86	18.9	18.9	66.5
	Not sure	26	5.7	5.7	72.2
	Important	58	12.8	12.8	85.0
	Very Important	68	15.0	15.0	100.0
	Total	454	100.0	100.0	

*Source: Prepared by researcher*

The results of the survey showed that the majority of respondents (66.5%) do not consider increasing the retirement age as a solution in a potential pension system reform. However, a significant portion of respondents (27.8%) believe that the option of working for more years is important or very important to consider when designing a pension reform, while a percentage of approximately 5.7% considers it slightly important. Given that Greece is currently facing population aging, it is understandable that an increase in the retirement age limit as a measure for pension system reform would not be welcomed by the citizens. They desire different ways to reform the system to ensure its sustainability and its ability to provide pensions.

This conclusion is further reinforced by the fact that the respondents of the survey expressed that the issue of population aging is highly significant, and any pension system reform should be directed towards addressing this problem. The table below precisely illustrates this viewpoint of the respondents. 93.6% of the individuals who answered the questionnaire stated that addressing the issue of population aging is very important or at least important, indicating that any reform designed should tackle this problem and ensure the economic sustainability of the system. Only 6.4% consider it not important at all for any pension system reform to address the issue of population aging.

**Table 49: Any reform of a pension system must address the problem of an ageing population and ensure the financial sustainability of the system**

	Frequency	Percent	Valid Percent	Cumulative Percent
--	-----------	---------	---------------	--------------------

Valid	Very Unimportant	19	4.2	4.2	4.2
	Unimportant	10	2.2	2.2	6.4
	Not sure	28	6.2	6.2	12.6
	Important	125	27.5	27.5	40.1
	Very Important	272	59.9	59.9	100.0
	Total	454	100.0	100.0	

*Source: Prepared by researcher*

Previously, the preference of the respondents for defined contribution or capitalization systems was mentioned based on their responses. This finding is further supported by their answers to the question of whether retirees should receive the exact amount of their contributions made during their working life. The table below presents the results of their responses. As shown, the majority of the respondents (91.9%) answered that it is very important for the retiree to receive as benefits the exact amount of contributions they made while they were employed, while a small percentage (8.1%) responded that it is not necessary.

Retirement systems that allow retirees to receive the exact amount of contributions they made while they were employed are either defined contribution systems, or particularly capitalization systems. The current pension system in Greece does not support this operating way, indicating that a change to a capitalization system could be inferred to receive positive response from the citizens.

**Table 50: Pensioners should get paid the exact amount of contributions that they paid during their working lives**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Unimportant	8	1.8	1.8	1.8
	Unimportant	8	1.8	1.8	3.5
	Not sure	16	3.5	3.5	7.0

	Frequency	Percent	Valid Percent	Cumulative Percent
Important	60	13.2	13.2	20.3
Very Important	362	79.7	79.7	100.0
Total	454	100.0	100.0	

*Source: Prepared by researcher*

An important finding regarding the content of a pension system reform is provided by the last question answered by the respondents, which addressed whether any reform should avoid further pension cuts, regardless of the prevailing economic conditions during the implementation period of the reform. The answers showed that a significant majority (96.4%) of citizens consider that pension cuts should not be considered as an option in implementing a pension system reform, while only 3.6% indicated that pension cuts could be part of a reform (Table below).

**Table 51: Any reform of the pension system should aim to avoid further pension cuts in the future, regardless of the circumstances**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Unimportant	19	4.2	4.2	4.2
	Unimportant	10	2.2	2.2	6.4
	Not sure	28	6.2	6.2	12.6
	Important	125	27.5	27.5	40.1
	Very Important	272	59.9	59.9	100.0
	Total	454	100.0	100.0	

*Source: Prepared by researcher*

The overall pattern of responses indicates that citizens are not inclined towards reforms that would bring changes to their work arrangements or benefits. Instead, they seem to desire

reforms that would, on the one hand, not disrupt the functioning of the current system and, on the other hand, effectively address the various problems affecting the pension system.

#### 5.6.4 Adequacy of pensions

Another bunch of questions in the questionnaire aimed to capture citizens' opinions regarding the adequacy of pensions and how this could be achieved. One proposition could be the increase of the national pension to cover a larger portion of people's cost of living. Many citizens agreed with this proposition, as evident from their responses in the table below.

**Table 52: The part of the pension corresponding to the national pension must be able to cover a large part of the cost of living of pensioners**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	12	2.6	2.6	2.6
	Disagree	13	2.9	2.9	5.5
	Not sure	22	4.8	4.8	10.4
	Agree	139	30.6	30.6	41.0
	Strongly agree	268	59.1	59.1	100.0
	Total	454	100.0	100.0	

*Source: Prepared by researcher*

These results indicate that a significant number of citizens (89.6%) are in favour of increasing the national pension to address the issue of adequacy and ensure it covers a larger portion of people's living expenses. The corresponding percentage of those who do not consider the national pension should cover a significant portion of the cost of living is 5.5%. However, it is worth noting that the national pension is not funded by social security contributions but directly from the state budget and is granted to those who establish pension entitlement. A significant increase in its coverage could potentially create financial challenges for the government, which may not be feasible to cover. Indeed, it is questionable whether such a measure would be in the right direction for a reform that ensures the sustainability of the system while providing pensions that cover retirees' cost of living. This result is somewhat contrary to previous questions, where responses spoke in favour of less state-dependent pension schemes.

The respondents were also asked a similar question regarding the contributory part of the pension that exists in the Greek pension system. The question examines whether the contributory part of Greek retirees' pensions should reflect the total contributions they made throughout their working lives. The results indicate that 89.7% of the responses consider this to be very important, while only 5.5% disagree. This question aligns with the citizens' need for a system that rewards workers with the amount of contributions they made during their employment (table below).

**Table 53: The contributory part of the pension should reflect the total contributions paid by insured persons during their working life**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	12	2.6	2.6	2.6
	Disagree	13	2.9	2.9	5.5
	Not sure	22	4.8	4.8	10.4
	Agree	126	27.8	27.8	38.1
	Strongly agree	281	61.9	61.9	100.0
	Total	454	100.0	100.0	

*Source: Prepared by researcher*

The results of this question serve as another indication of the citizens' need for a change in the pension system, whether it be towards a capitalized system or one that incorporates similar characteristics. The respondents' strong preference for the proportional reflection of their total contributions in their pension payouts highlights their desire for a more equitable and transparent system that rewards their lifetime contributions.

The citizens were asked to assess the adequacy of the pensions provided by the current pension system in Greece and whether they help retirees maintain the standard of living they enjoyed during their working lives. The responses were one-sided, with 84.6% strongly disagreeing or somewhat disagreeing and believing that the existing pensions do not cover the standard of living that the worker had while employed (see Table below).

**Table 54: Existing pensions help pensioners maintain the standard of living they enjoyed during their working lives (1 totally disagree ... 5 totally agree)**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	293	64.6	64.6	64.5
	Disagree	91	20.0	20.0	84.6
	Not sure	16	3.5	3.5	88.1
	Agree	29	6.4	6.4	94.5
	Strongly agree	25	5.5	5.5	100.0
	Total	454	100.0	100.0	

*Source: Prepared by researcher*

On the contrary, 11.9% believe that the existing pensions do cover the retirees' standard of living. It is important to compare the responses given in relation to the employment status of each respondent in order to examine the opinion solely of retirees regarding this question. The results of this comparison are presented in the table below.

**Table 55: Employment Status \* Existing pensions help pensioners maintain the standard of living they enjoyed during their working lives. (Crosstabulation)**

	Strongly disagree	Probably disagree	Not sure	Probably agree	Strongly agree	Total
Entrepreneur	26	13	4	2	0	45
Self-employed	24	9	1	1	3	38
Public Employee	53	19	2	7	6	87
Private Employee	7	2	1	1	1	12
Retiree	156	35	5	16	12	224



Housekeeper	12	4	1	0	3	20
Unemployed	13	7	1	2	0	23
Student	2	2	1	0	0	5
	293	91	16	29	25	454

*Source: Prepared by researcher*

As evident, retirees constitute the largest portion of the sample in this survey, accounting for 49.3% (224 individuals). Among them, 156 (69.7%) strongly disagree with the statement that the existing pensions are sufficient to cover their standard of living, 35 (15.6%) simply disagree, 28 (12.5%) either agree to some extent, and the remaining 5 (2.2%) neither agree nor disagree with this statement. The conclusion that can be drawn is that the existing pension system does not provide adequate pensions, according to the citizens' opinion, highlighting the need for reform to ensure that pensions cover the cost of living. Combining the need for reform with the preferences of citizens, as revealed by the survey, it is clear that a capitalized system is what would meet their needs, offering both sufficient pensions and adequacy.

The mistrust of citizens towards the existing system and its ability to address the problems is evident from their responses to the question of whether they believe the current system can tackle the issue of ageing and ensure that there will be no further pension cuts. 63% of respondents completely disagree with this question, while only 24.2% agree. 12.8% are undecided about the ability of the existing system to address the issue of aging and ensure the integrity of pensions (Table below).

**Table 56: The existing pension system can cope with the problem of an ageing population and guarantee that there will be no new pension cuts in the future**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	216	47.8	47.8	47.6

Disagree	70	15.5	15.5	63.0
Not sure	58	12.8	12.8	75.8
Agree	60	13.3	13.3	89.0
Strongly agree	48	10.6	10.6	100.0
Total	454	100.0	100.0	

*Source: Prepared by researcher*

Through this question, it becomes apparent that citizens may not prefer a reform that leaves the existing system unchanged but attempts to address the various problems. On the contrary, they would prefer a reform that creates a transition to a more reliable system to tackle the issues of aging, pension adequacy, and the economic sustainability of the pension system in general. For the defence of this conclusion, we can add the findings from the question regarding whether the funding of the pension system by the state is sufficient to ensure pensions and their coverage (Table below).

The result of this question is also revealing. 66.5% of the respondents strongly disagree or disagree to some extent with the view that funding from the state is sufficient to ensure pensions and their coverage. This reinforces the idea that citizens consider a revision of the funding approach necessary and the need to find a more sustainable and reliable means to secure pensions in the future. Only a minority (22.2%) strongly or partially agree that pensions and the needs of the system can be covered by state funding, while the remaining 11.2% neither agree nor disagree.

**Table 57: The funding of the pension system by the state is sufficient to guarantee pensions and cover the needs of the system**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	222	48.9	48.9	48.9

Disagree	80	17.6	17.6	66.5
Not sure	51	11.2	11.2	77.8
Agree	66	14.5	14.5	92.3
Strongly agree	35	7.7	7.7	100.0
Total	454	100.0	100.0	

Source: Prepared by researcher

### 5.6.5 Sustainability of pensions

The continuation of the Greek pension system in its current form does not provide many opportunities for radical reforms to address any potential problems that may arise. The sustainability of the system and its ability to provide adequate pensions can only be achieved through increasing the retirement age, the contribution rate, or implementing fiscal constraints on the state budget. However, the respondents in the survey are strongly opposed to all of these potential solutions. Regarding an increase in the retirement age, 85% are strongly opposed, while for an increase in the contribution rate, the percentage is smaller (49.6%), but still represents a majority.

On the other hand, they seem to be quite positive about the idea of changing the structure of the pillars that make up the Greek pension system and introducing new systems that would spread the various risks of pensions. It is evident from the table below, which presents their responses to a corresponding question in the survey.

**Table 58: Changes to the structure of the pillars of the pension system and the introduction of new schemes to spread the risk of pensions**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	76	16.7	16.7	16.7

Disagree	32	7.0	7.0	23.8
Not sure	60	13.2	13.2	37.0
Agree	169	37.2	37.2	74.2
Strongly agree	117	25.8	25.8	100.0
Total	454	100.0	100.0	

*Source: Prepared by researcher*

Approximately 63% of the respondents answered that they fully agree with such a choice and solution, which would ensure the sustainability of pensions. The citizens who disagree with this comprise only 23.8% of the sample, while there is also a percentage (13.2%) that is undecided about such a choice but tends towards a positive recommendation.

#### 5.6.6 Employees preferences

The last questions of the questionnaire pertain to various options that could be included in a reform, in order to clarify the citizens' perspective on what they would prefer. The first question relates to whether they would like to receive a guaranteed income as a pension every month, regardless of how long they live. In response to this question, 94.5% of the respondents stated that they strongly prefer this scheme. Only 2% of the respondents expressed a negative view towards such an option (as shown in the table below). It is obvious that the citizens prefer to receive a stable income that is not influenced by any factors and carries no risk of being altered over time.

**Table 59: Receive as pension a guaranteed amount every month, no matter how long you live**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Unimportant	4	0.9	0.9	0.9
	Unimportant	5	1.1	1.1	2.0
	Not sure	16	3.5	3.5	5.5
	Important	157	34.6	34.6	40.1
	Very Important	272	59.9	59.9	100.0
	Total	454	100.0	100.0	

*Source: Prepared by researcher*

Another reform that appears to have strong support among citizens is the ability to have access to their contributions, enabling them to use and manage them in case of need, as shown from the table below. Approximately 80% of respondents consider such a reform to be highly important. To implement this reform, there would need to be individual accounts for each insured individual, where their contributions would be deposited and accessible. This capability exists only in capitalization systems and not in redistributive systems, such as the current pension system in Greece.

**Table 60: Access to your contributions to use them for exceptional reasons before your retirement**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Unimportant	33	7.3	7.3	7.3
	Unimportant	28	6.2	6.2	13.4
	Not sure	30	6.6	6.6	20.0
	Important	165	36.3	36.3	56.4

Very Important	198	43.6	43.6	100.0
Total	454	100.0	100.0	

Source: Prepared by researcher

It can be considered safe to assume that citizens would view the transition to a capitalized pension system that provides them with choices in a positive light. Their support for the ability to access and manage their contributions demonstrates their desire for greater control and flexibility in managing their pensions. However, it is important to take into account other factors, such as citizen education, potential reactions and concerns that may arise, as well as an examination of the sustainability and implications of transitioning to such a system.

The latter assumption is further supported by the fact that citizens, through their responses, expressed a desire to be able to invest in and manage their contributions throughout their working lives. This option is only available in capitalized systems. More specifically, as shown in the table below, 93.8% of respondents consider a reform that would provide them with this ability to be highly significant, while only 3.1% oppose this choice. The majority of the sample, therefore, indicates that transitioning to a capitalized system is seen as an ideal scenario for reform.

**Table 61: Investing my savings and managing them during my working life**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Unimportant	9	2.0	2.0	2.0
	Unimportant	5	1.1	1.1	3.1
	Not sure	14	3.1	3.1	6.2
	Important	197	43.4	43.4	49.6
	Very Important	229	50.4	50.4	100.0
	Total	454	100.0	100.0	

*Source: Prepared by researcher*

The ability to invest contributions can protect insured individuals from risks such as inflation, thereby maintaining their purchasing power and standard of living. Additionally, studies have shown that investing the contributions of insured individuals can have positive implications for both the economic development of the state and employment (Diop, 2022; International Trade Union Confederation, 2023). The protection of contributions from factors such as inflation is another option that insured individuals would desire, as indicated by their responses to the corresponding question, the results of which are presented in the table below. With a similarly high percentage (95.4%), as in previous questions, respondents stated that such a priority in pension reform would be very important. It is important to address that the percentage of those who disagree with a reform that would protect the contributions of insured individuals within the pension system is even smaller than in previous questions, representing only 1.5% of the survey sample.

**Table 62: Protect the value of your contributions from inflation, meaning they don't lose value due to inflation**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Unimportant	3	0.7	0.7	0.7
	Unimportant	4	0.9	0.9	1.5
	Not sure	14	3.1	3.1	4.6
	Important	151	33.3	33.3	37.9
	Very Important	282	62.0	62.0	100.0
	Total	454	100.0	100.0	

*Source: Prepared by researcher*

Presenting the results regarding the number of insured individuals supporting the need for access to their contributions and their utilization in case of need, there was mention of the existence of individual accounts for the insured, where their contributions are accumulated,

and that this possibility is only available in capitalized pension systems. Beyond the ability to access contributions, capitalized systems also offer the option for the insured to choose whether they want to receive a fixed monthly income during retirement or to receive the entire accumulated amount in their account immediately and manage it as they wish (Matic et al., 2019).

This appears to be another option that insured individuals would like to have, judging from their responses to a corresponding question, as shown in the table below. The research results indicate that 84.4% of respondents believe that such a capability is highly important as a reform of the pension system. A small percentage, around 6.8%, does not consider it an important priority for reform, while a remaining percentage of approximately 8.8% does not consider it either important or not important as a priority.

**Table 63: The option to choose between taking all your contributions at once or taking an amount of them per month**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Unimportant	14	3.1	3.1	3.1
	Unimportant	17	3.7	3.7	6.8
	Not sure	40	8.8	8.8	15.6
	Important	153	33.7	33.7	49.3
	Very Important	230	50.7	50.7	100.0
	Total	454	100.0	100.0	

*Source: Prepared by researcher*

In every pension system, the relatives of the insured are entitled to survivor benefits in the event of the insured individual's death. Based on this, it appears that insured individuals would prefer if all their contributions could be inherited by their children or surviving spouses, as indicated by the table below. A significant majority (95.8%) of respondents believe that such a reform, which would offer this possibility to insured individuals and their relatives, is important. However, for this to be feasible, it presupposes that the insured



individual would have access to their contributions and be able to track their progress. On the other hand, as in PAYGO / DB systems it is rarely feasible to know how many contributions someone has paid, there is a high probability that workers believe that they do not receive their contributions back, while it is actually the opposite that happens.

In every pension system, the relatives of the insured are entitled to survivor benefits in the event of the insured individual's death. Based on this, it appears that insured individuals would prefer if all their contributions could be inherited by their children or surviving spouses, as indicated by the table below. A significant majority (95.8%) of respondents believe that such a reform, which would offer this possibility to insured individuals and their relatives, is important. However, for this to be feasible, it presupposes that the insured individual would have access to their contributions and be able to track their progress. On the other hand, as in PAYGO/ DB systems it is rarely feasible to know how many contributions someone has paid, there is a high probability that workers believe that they do not receive their contributions back, while it is actually the opposite that happens.

**Table 64: In the event of my death, all my contributions will be inherited by my family and they will receive an amount of these as a regular payment**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Unimportant	1	0.2	0.2	0.2
	Unimportant	3	0.7	0.7	0.9
	Not sure	15	3.3	3.3	4.2
	Important	153	33.7	33.7	37.9
	Very Important	282	62.1	62.1	100.0
	Total	454	100.0	100.0	

*Source: Prepared by researcher*

The findings of the next question will further help understand the needs and preferences of the insured regarding an ideal pension system, as they were asked whether they would like to transition to a different pension system, with 80% of respondents answering positively. They were then given various options to choose from regarding the desired form of the new

pension system. Among those who responded positively to a change, 27.5% would prefer a system where they receive as a pension exactly the contributions they made during their working life. The 11.3% would prefer a system where they receive all the money they contributed immediately upon retirement and do not receive a pension, the 31.7% prefer a system where they can choose the amount of contributions they will make and, consequently, the amount of pension they will receive upon retirement and finally, the 29.5% prefer a system where they can invest their contributions to earn additional income as retirees.

**Table 65: Different choices of pension schemes**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	A system where I gain as pension the contribution that I paid in my working life	100	22.0	27.5	27.5
	A system where I would get all the money that I paid as contributions immediately after I retire and receive no pension	41	9.0	11.3	38.8
	A system where I can choose how much contributions I will pay and as a result how much of a pension I will receive	115	25.3	31.7	70.5
	A system where I can invest my contributions to earn more income as a pensioner, beyond the pension	107	23.6	29.5	100.0
	Total	363	80.0	100.0	
Missing	System	91	20.0		
	Total	454	100.0		

*Source: Prepared by researcher*

The adoption of a capitalized system may be the best solution to address the various problems of the pension system, as such a system eliminates the link between workers' contributions and the pensions received by retirees, as the former no longer finance the latter. As mentioned in a previous question, in redistributive systems, such as PAYGO, the solutions available to address the various threats to pensions are limited, such as increasing the retirement age or increasing contributions from workers or cutting pension benefits. Therefore, either workers or retirees would have to sacrifice their benefits for the greater good of the other. However, as the results in the table below indicate, neither category is willing to do so. Out of the total respondents, 85.9% are not willing at all to sacrifice their benefits in order for the next generation to receive benefits of the same level during retirement. Only 3.3% responded that they are very or somewhat willing to make cuts to their own benefits to ensure that the new generation receives equally satisfactory benefits.

**Table 66: How willing are you to sacrifice your benefits, so that the next generation can earn the same benefits as you in their retirement?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all	273	60.1	60.1	60.1
	A Little	117	25.8	25.8	85.9
	Not sure	49	10.8	10.8	96.7
	Much	14	3.1	3.1	99.8
	Very much	1	0.2	0.2	100.0
	Total	454	100.0	100.0	

*Source: Prepared by researcher*

## 5.7 Discussion

After conducting the study, the key findings will now be discussed based on the responses received from the questionnaire. The questionnaire comprised 39 questions and was completed by a total of 454 participants. Regarding the demographic characteristics, the sample is evenly distributed between females and males. Additionally, concerning the age range of the participants, the majority (42.5%) falls into the category of individuals aged 65

and above, which is expected as they belong to the retiree category. As for their employment status, retirees represent the largest portion of the sample (49.3%).

Regarding the knowledge of individuals about the current pension system in Greece, it is worth noting that almost the entire sample (98.9%) is covered by the public pension system, which is expected as enrolment in this system is mandatory for all employees. However, it appears that insured individuals do not have knowledge about what the current pension system offers, with 93.2% stating that their pension is based on years of work and some other factors, while only 6.8% were aware that the current system also offers a pension determined by the total amount of accumulated contributions plus earnings from investments. However, this is understandable, since the TEKA reform is very recent and no public awareness has been built upon it.

Similarly, the results regarding whether they are familiar with the functioning of the system were also concerning, with 67.2% stating that they have little or no knowledge about the system and how it operates. There is thus a significant knowledge gap among the general population regarding their understanding of the pension system in Greece. This lack of knowledge makes it difficult for insured individuals to assess the benefits they will receive upon retirement, as indicated by the responses to the corresponding question, expressing their doubts about being able to estimate their pension benefits, even with a 90% probability. Based on all these responses, it can be concluded that there is a lack of knowledge among insured individuals about the pension system, and the government, in collaboration with relevant entities, should increase transparency and communication about the system. Providing clear information about how the system works, how pensions are calculated, and the measures in place to ensure pension security could help alleviate some of the fears and concerns of the public.

Due to the lack of knowledge among insured individuals about the operation of Greece's pension system, there is a high level of concern expressed by the public regarding the security and availability of their pensions. There are also concerns about the sustainability and reliability of the pension system. Findings from the survey questions show that 72% of insured individuals are particularly worried about the security of their pensions and whether they will be able to receive them in full. Given that for a significant percentage of insured individuals (76.4%), the pension they will receive from the pension system is a crucial aspect of their financial planning for retirement, the expression of concern about the system's sustainability should be taken seriously. The government should address these concerns by implementing policies that improve the system's sustainability.

The mistrust towards the current system seems to stem, in part, from the fact that existing pensions cannot maintain the standard of living those insured individuals had during their working lives. The analysis of the results revealed that 77.1% of respondents believe that the existing pension system fails to provide pensions that adequately support a worker's standard of living and are not rewarding considering the contributions made throughout their working life. In conjunction with this claim, it is noteworthy that when insured individuals were asked if they would prefer the existence of a different pension system, **the majority responded that a capitalized system would be preferable**. Specifically, the results showed that 35.8% of respondents expressed a desire for the government to provide more incentives for a private pension system, while 43.6% indicated a preference for a partial capitalization system within the existing system. Furthermore, 20.6% of participants expressed a desire for a complete transition to a fully capitalized pension system. This sentiment aligns with the demographic challenge that Greece is facing, as numerous studies (Bazzana, 2020; Gaspar et al., 2020) have highlighted the challenges posed by an aging population and the strain it puts on the sustainability of the pension system.

The main reasons why insured individuals appear to prefer a capitalized system are that it provides them with the opportunity to have access to their contributions and manage them, while also allowing them to invest them and generate additional income throughout their working life. With a percentage of 96.4%, they believe that the pension system should pay retirees the exact amount of contributions that were deducted from their earnings during their working life. This choice is offered by capitalized systems, where each insured individual's contributions accumulate in an individual account accessible to them throughout their working life, and upon retirement, they can choose how to manage the accumulated amount in that account. Additionally, it seems that they are receptive to a change in the pillars of the current pension system to ensure the sufficiency and sustainability of pensions through reform. Another reason they desire a capitalized system is the protection of their contributions from inflation, which is provided by such a system. With a similarly high percentage (95.4%), as in previous questions, respondents stated that such a priority in pension reform would be very important.

A recent attempt to change the pension system to a capitalized one has been made by Greece, with the introduction of the capitalized system in the supplementary insurance. This reform affected only those entering the labour market from January 1, 2022, for whom enrolment was mandatory. However, insured individuals up to the age of 35 had the option to transfer their rights to the new Hellenic Auxiliary Pensions Defined Contributions Fund (TEKA).

This new fund was established by Law 4826/2021 and is part of the social security system (the first pillar of the pension system). As mentioned earlier, it primarily targets newcomers to the labour market and is gradually intended to replace the existing supplementary insurance. The contributions of both the insured individual and the employer are credited to the individual account of the insured, which the insured individual has continuous access to. The capital, consisting of accumulated contributions, is invested, and the returns are credited back to the individual's account. At the end of the working life, the accumulated capital, i.e., the sum of contributions and returns, is converted into a lifelong monthly supplementary pension. It is understandable, therefore, that this reform by Greece encompasses all the characteristics desired by the insured individuals according to the research findings.



## Chapter 6: Conclusions

### 6.1 General Conclusions

The doctoral dissertation "Reforming the Greek pension system from a single to a three-pillar system: Justification, challenges, and risks" embarks on a detailed exploration into the multifaceted dimensions of the Greek pension reform, encapsulating its necessity and strategic execution against a backdrop of demographic, economic, and societal shifts. This synthesis of the dissertation's findings elucidates a coherent narrative that stitches together empirical insights, comparative analyses, and public sentiments to craft a holistic understanding of the reform's underpinnings and implications. Each chapter's conclusions contribute to a holistic understanding of why the 2021 reform in Greece was not only necessary but also well-conceived and timely implemented.

Chapter 2 sets the stage providing a comparative analysis of pension reforms across EU and OECD countries, highlighting trends and strategies that have been successful elsewhere. By reviewing these reforms, the study delineates a pattern of shifting towards multi-pillar systems, underscoring the necessity for Greece to adapt similarly to maintain its system's viability. The detailed examination of other countries' experiences serves as a justification for Greece's move towards a comprehensive pension reform, aligning with broader global trends. Then, the chapter outlining the historical context of the Greek pension system, emphasizing its heavy reliance on the first pillar, which was financially unsustainable given demographic and economic pressures. This foundational review delineates the systemic over-reliance on the state-administered first pillar, spotlighting its inadequacy in the face of projected demographic trends and economic strains. It establishes the research question and objectives, framing the necessity of transitioning towards a multi-pillar system to ensure financial sustainability and adaptability to demographic changes.

In Chapter 3, the focus shifts to assessing the Greek pension system's financial sustainability, particularly in light of demographic challenges. Through the application of the Leslie Matrix and actuarial models, the analysis reveals significant fiscal pressures exacerbated by an aging population and low fertility rates. The chapter underscores the critical role of adjusting fertility-related policies as part of broader pension reform efforts, highlighting how these adjustments can alleviate some of the demographic pressures on the pension system. Projections indicated that without reform, Greece would face escalating pension costs, pressuring public finances and potentially undermining economic stability. Also, the chapter argued for integrated policy measures, highlighting the necessity of fertility policy

adjustments alongside pension reforms to address the system's sustainability comprehensively.

In the fourth chapter, the dissertation employs co-integration theory to unravel the nuanced interdependencies between demographic evolutions and pension fund solvency. The statistical rigor of this analysis substantiates the demographic imperatives driving the pension reform, underscoring the criticality of aligning the system's design with longevity and fertility trajectories to ensure its enduring viability. The meticulous statistical analysis provides empirical substantiation for the reform's urgency, illustrating how demographic inertia could jeopardize fiscal equilibrium. The chapter corroborates the theoretical premise that demographic resilience is pivotal to pension system stability, further accentuating the reform's timeliness and criticality. The analysis demonstrated a clear linkage between demographic trends (aging and fertility rates) and pension system stability, emphasizing the reform's urgency and the findings suggested that reforms must be responsive to demographic shifts, advocating for adaptive mechanisms within the pension system to maintain financial equilibrium.

The final empirical chapter delves into the societal dimensions of pension reform, gauging public sentiment through an expansive questionnaire. The findings reveal a populace acutely aware of the pension system's frailties, yearning for a more robust, transparent, and equitable framework. Despite general awareness of the pension system's challenges, there was significant concern about individual pension outcomes and a lack of detailed system understanding. **The preference for a capitalized approach among a substantial segment of the populace echoes a collective aspiration for greater control over retirement savings and a pronounced desire for reforms that promise improved pension security and adequacy.**

The thesis comprehensive analysis, spanning historical context, comparative studies, financial modelling, and public opinion, robustly justifies the 2021 Greek pension reform. It illustrates the reform's alignment with demographic realities and public expectations, advocating for a balanced approach that integrates financial sustainability with social equity. The study concludes that while the reform represents a significant step forward, ongoing monitoring, evaluation, and adaptability are crucial to address future challenges and ensure the pension system's resilience and relevance for future generations. The transition to a three-pillar system is portrayed as an enlightened strategy to instil resilience, fairness, and sustainability into the pension landscape, resonating with public expectations and international best practices.



Incorporating the practical implications of the study into the concluding section elucidates the direct actions that could be initiated to enhance public comprehension of pension reforms. It details how such reforms are projected to affect beneficiaries in real terms and assesses their financial consequences on state budgets. Theoretically, the study broadens the scholarly discourse on social security reform, providing insights into the global narrative and comparative analyses. It also contributes to a more profound understanding of how socio-economic variables, such as shifts in retirement age, affect labour markets and individual financial planning. This expanded discussion of implications should follow the presentation of empirical data, leading to a nuanced synthesis that highlights the study's significance within both the practical realm of policy-making and the theoretical confines of social science research.

A key challenge identified is the public's limited understanding of the pension system, as evidenced by a survey where 93.2% of participants acknowledged a lack of clarity about their pension calculations. This knowledge gap, coupled with apprehensions about pension security—where 72% expressed concerns about receiving their full pension benefits—underscores the need for enhanced informational campaigns and stakeholder engagement.

Moreover, the thesis identifies a critical limitation in the reform's scope, particularly concerning the incentivization and structural development of the second and third pillars. Despite recent legislative efforts, such as the establishment of TEKA for supplementary pensions, public preference leans towards a more capitalized system, with 43.6% favouring a partial capitalization within the existing framework.

A critical theoretical advancement offered by this thesis is the in-depth analysis of how prolonged economic crises impact the sustainability and restructuring of national pension systems. Previous studies, such as those by Alderson and Betker (2009), have explored the effects of economic shocks on internal capital markets and pension funding. However, this thesis goes further by employing actuarial models to project long-term demographic and fiscal trends in the context of Greece's extended economic crisis. This approach provides a nuanced understanding of the interplay between economic stability and pension system sustainability, highlighting how crises can lead to structural changes and necessitate innovative policy responses. The thesis also makes a substantial theoretical contribution by integrating demographic factors into the analysis of pension system sustainability using Autoregressive Distributed Lag (ARDL) model. While Cipriani and Fioroni (2021) have discussed the relationship between social security policies and demographic changes, this thesis specifically examines the impact of fertility rates and life expectancy on the financial

balance of Greece's e-EFKA pension fund. This detailed examination elucidates the long-term effects of demographic shifts on pension systems, providing a robust framework for predicting and managing these impacts. This contribution is particularly valuable for understanding the complex interactions between demographic trends and pension sustainability. Finally, the inclusion of survey data analysis to assess public perception and preferences regarding pension reforms adds a new dimension to the theoretical understanding of policy legitimacy and public trust. Kangas et al. (2021) have highlighted the importance of information and legitimacy in public attitudes towards pension reforms. This thesis builds on that foundation by employing statistical techniques to analyse how public knowledge, attitudes, and preferences influence the acceptance and success of pension reforms in Greece. This theoretical framework underscores the role of public engagement and transparent communication in shaping effective pension policies, thereby contributing to the broader discourse on policy implementation and legitimacy. This thesis not only provides practical recommendations for pension reform in Greece but also makes significant theoretical contributions to the field. By addressing critical gaps in the literature and offering new frameworks for understanding the complex dynamics of pension systems, this research advances theoretical knowledge and provides a robust foundation for future studies and offers valuable insights for academics and policymakers alike.

## **6.2 Limitations of the Study**

While this thesis offers significant insights into the sustainability and reform of the Greek pension system, several limitations must be acknowledged to provide a comprehensive understanding of the research context and findings. One of the primary limitations of this study is the limited number of periods available for analysis, despite the high quality and reliability of the data sources used. The data employed in this research are derived from reputable and consistent sources, ensuring their reliability and accuracy. However, the relatively short time span covered by the available data restricts the ability to draw robust long-term conclusions. This limitation underscores the need for more extended datasets to enhance the robustness of future research and allow for more comprehensive trend analyses.

The study's temporal scope is another significant limitation. The research focuses on a specific period, which may not fully capture the long-term trends and impacts of pension reforms. Temporal constraints can affect the generalizability of the findings, as economic and demographic conditions can change over time. Longitudinal studies extending over more extended periods are necessary to understand better the enduring effects of policy changes and demographic shifts on the pension system.

While the study employs rigorous actuarial and econometric models to analyse the pension system's sustainability, methodological limitations exist. The models used, including the Autoregressive Distributed Lag (ARDL) model and actuarial projections, have inherent assumptions that may not fully capture the complexities of real-world scenarios. For instance, the ARDL model assumes a linear relationship between variables, which may not hold true in all cases. Additionally, the actuarial model's assumptions regarding mortality rates, fertility rates, and economic growth may introduce biases into the projections. Future research should consider alternative methodologies and models to validate and complement the findings.

The dynamic nature of policy environments and economic conditions presents another limitation. The study's findings are based on current policies and economic conditions, which are subject to change. Sudden policy shifts, economic crises, or significant demographic changes can alter the pension system's trajectory, rendering some of the study's conclusions less relevant. Continuous monitoring and adjustment of the models to reflect current realities are crucial for maintaining the relevance and applicability of the research.

The modelling constraints also play a significant role in shaping the study's outcomes. The actuarial and econometric models used in the research may not fully account for all variables influencing the pension system. Factors such as political stability, international economic trends, and unforeseen demographic changes can impact the pension system in ways that are difficult to model accurately. Additionally, the simplifications and assumptions required to make the models computationally feasible may overlook critical nuances of the pension system's functioning. Future studies should aim to incorporate more comprehensive and flexible modelling approaches to address these constraints.

Acknowledging the limitations is essential for interpreting the results accurately and guiding future research efforts. Continuous data updates, extended temporal analyses, alternative methodologies, and adaptive modelling approaches will be crucial in overcoming these limitations and enhancing the understanding of pension system dynamics.

### **6.3 Areas for future research**

The Greek case offers valuable lessons for policymakers in other countries by demonstrating the effects of various reform measures under extreme economic conditions. The findings of this thesis can inform future pension reforms by highlighting the importance of balancing fiscal sustainability with social equity. The recommendations provided are grounded in

empirical evidence and tailored to address the specific challenges faced by the Greek pension system, making them relevant and actionable for policymakers in similar contexts.

Future studies could focus on a longitudinal analysis post-reform implementation to assess the actual impacts on financial sustainability and public trust. Investigating the correlation between pension system literacy and public support for reforms could offer insights into effective communication strategies. Additionally, comparative analyses with other OECD countries that have undergone similar transitions could provide valuable benchmarks and lessons for Greece.

In-depth exploration into the socio-economic impacts of increasing the retirement age, particularly concerning labor market dynamics and potential shifts in the employment-to-retirement transition, would further elucidate the reform's broader implications. Researching the impact of the pension fund's Assets Under Management (AUM) on broader economic growth and government revenue is crucial. This involves analyzing how investment strategies and returns from pension funds contribute to economic development and fiscal health.

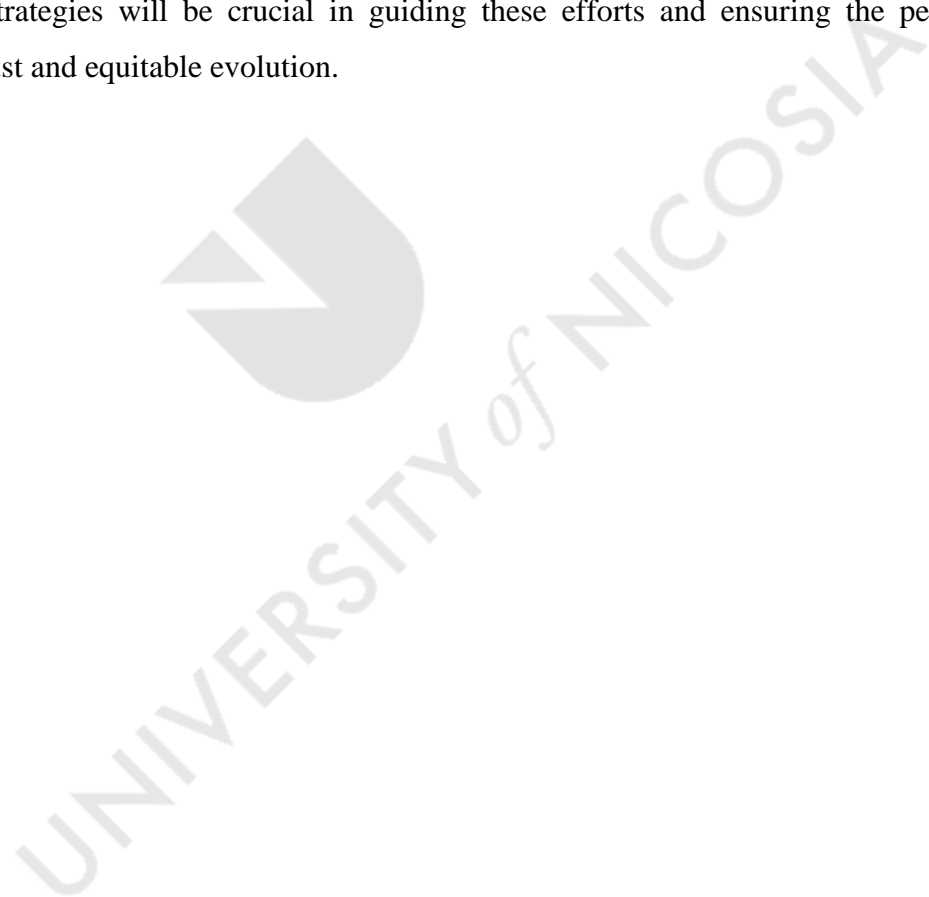
Calculating the optimal mix among components of the Greek pension system, balancing risks and returns, is essential for enhancing system efficiency. Future studies should explore the best combination of PAYGO, funded, and supplementary schemes to achieve sustainability and adequacy. Examining the impact of demographic changes on long-term investment returns is critical. This research would assess how factors such as aging populations and changing workforce demographics influence investment performance and pension fund stability.

A comparative analysis of supplementary pensions between insured persons in both the existing schemes and the newly introduced TEKA scheme could provide insights into the effectiveness and equity of these systems. This comparison would help identify gaps and opportunities for improving supplementary pension provisions. Studying the optimal investment policy for the TEKA fund is vital for ensuring its long-term success. This research would involve evaluating various investment strategies to maximize returns while managing risks, considering the specific needs and constraints of the Greek pension landscape.

In conclusion, the thesis articulates a compelling narrative about the imperative and challenges of pension system reform in Greece, emphasizing the need for continued

evaluation, public engagement, and adaptive policymaking to ensure the system's long-term viability and responsiveness to demographic and economic realities. Nevertheless, the study substantiates that the 2021 reform was a critical step toward ensuring the Greek pension system's sustainability, responsiveness, and fairness, reflecting a necessary evolution in the face of changing demographic and economic landscapes.

As Greece navigates the intricacies of post-reform implementation and adjustment, this scholarly work underscores the imperative of continued vigilance, evaluation, and policy evolution to fortify the pension system's sustainability and relevance for future generations. This entails an ongoing dialogue between policymakers, stakeholders, and the citizenry to refine and optimize pension strategies in alignment with emerging trends and challenges. Future research focusing on longitudinal analyses, public literacy, comparative studies, and investment strategies will be crucial in guiding these efforts and ensuring the pension system's robust and equitable evolution.



## References

- Adsera, A. (2004), "Changing fertility rates in developed countries. The impact of labour market institutions", *Journal of Population Economics*, 17(1), pp. 1-27.
- Alderson, M., J. and Betker, B., L. (2009), "Were internal capital markets affected by the 'perfect' pension storm?", *Journal of Corporate Finance*, 15, pp. 257-271.
- Alderson, M., J., Betker, B., L. and Halford, J., T. (2017), "Are managers paid for better levels of pension funding?", *Journal of Corporate Finance*, 46, pp. 25-33.
- Anantharaman, D. and Lee, Y., G. (2014), "Managerial risk-taking incentives and corporate pension policy", *Journal of Financial Economics*, 111, pp. 328-351.
- Andorka, R. (1978). *Determinants of fertility in advanced societies*, London: Methuen & Co.
- Angrisani, M., Burke, J., Lusardi, A. and Mottola, G. (2023), "The evolution of financial literacy over time and its predictive power for financial outcomes: evidence from longitudinal data", *Journal of Pension Economics and Finance*, 22(4), pp. 640-657.
- Antolin, P. (2008), "Coverage of Funded Pension Plans", *OECD Working Papers on Insurance and Private Pensions No. 19*, OECD Publishing, OECD.
- (2008), "Pension Fund Performance", *OECD Working Papers on Insurance and Private Pensions*, No. 20, OECD Publishing, OECD.
- Antzoulatos, A. A. and Karagiannis, S. (2019). Pension reforms and citizens' well-being in Greece. *Journal of European Social Policy*, 29(5), 546-560.
- Arenas de Mesa, A. (2020). *Los sistemas de pensiones en América Latina: institucionalidad, gasto público y sostenibilidad financiera en tiempos del COVID-19*. Santiago: CEPAL.
- Armitage, S. and Gallagher, R. (2019), "Are pension contributions a threat to shareholder payouts?", *Journal of Corporate Finance*, 58, pp. 27-42.
- Aubert, P. (2023), "Les départs anticipés pour carrière longue permettent-ils de compenser une plus grande pénibilité des métiers?", Available at: <<https://blog.ipp.eu/2023/03/06/les-departs-anticipes-pour-carriere-longue-permettent-ils-de-compenser-une-plus-grande-penibilite-des-metiers/>> [Accessed 20.06.2023]
- Barr, N. (2000), "Reforming pensions: Myths, truths, and policy choices", *IMF Working Paper No. WP/00/139*.

- Barr, N. and Diamond, P. (2008). Reforming pensions: Principles and policy choices. *Oxford Review of Economic Policy*, 24(1), 149-167.
- Bartram, S. M. (2018), "In good times and in bad: Defined-benefit pensions and corporate financial policy", *Journal of Corporate Finance*, 48, pp. 331-351.
- (2010). *Pension Reform: A Short Guide*. Oxford University Press.
- Bazzana, D. (2020), "Ageing population and pension system sustainability: reforms and redistributive implications", *International Journal of Economic Policy Studies*, 37, pp. 971–992.
- Berchtold, D., Dichter, O., Loderer, C. and Waelchli, U. (2021), "Pension risk and corporate investment distortion", *Journal of Corporate Finance*, 68, pp. 101-932.
- Bielawska, K., Chlon-Dominczak, A. and Stanko, D. (2015), "Retreat from mandatory pension funds in countries of the Eastern and Central Europe in result of financial and fiscal crisis: Causes, effects and recommendations for fiscal rules", unpublished paper.
- Börsch-Supan, A. and Winter, J. (2004), "Pension reform, savings behavior, and capital market performance", *The American Economic Review*, 94(1), 402-418.
- Börsch-Supan, A., Koke, J. and Winter, J. (2005), "Pension reform, savings behavior, and capital market performance", *Journal of Pension Economics and Finance*, 4, pp. 87–107.
- Börsch-Supan, A., Bucher-Koenen, T., Goll, N., and Hanemann, F. (2022), "Targets missed: three case studies exploiting the linked SHARE-RV data", *Journal of Pension Economics and Finance*, Vol. 21/1, pp. 1-21.
- Bradley, D., Pantzalis, C. and Yuan, X. (2016), "The influence of political bias in state pension funds", *Journal of Financial Economics*, 119, pp.69-91.
- Bryman, A. (2015). *Social Research Methods*. 5th ed. Oxford University Press.
- Butz, W., P. and Ward, M., P. (1979a), "The emergence of countercyclical U.S. fertility", *The American Economic Review*, 69(3), pp. 318-328.
- Butz, W., P. and Ward, M., P. (1979b), "Will US fertility remain low? A new economic interpretation", *Population and Development Review*, 5(4), pp. 663-688.
- Carone, G., Eckefeldt, P., Schwierz, C., Giamboni, L., Aarnout, M. (2014), "Identifying fiscal sustainability challenges in the areas of pension, health care and long-term care policies", *European Economy, Occasional Papers No. 201*.

- Catalan, M. (2004), "Pension funds and corporate governance in developing countries: what do we know and what do we need to know?", *Journal of Pension Economics and Finance*, 3, pp. 197–232.
- Cipriani, G., P. and Fioroni, T. (2021), "Social security and endogenous demographic change: child support and retirement policies", *Journal of Corporate Finance*, pp. 307-325.
- Creswell, J., W. (2014). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. 4th ed. SAGE Publications.
- Cuevas, A., Gonzalez, M., Lombardo, D., and Lopez-Mármolejo, A. (2008), "Pension privatization and country risk", *IMF Working Paper No. WP/08/195*, Washington DC: International Monetary Fund.
- Curtis, C., Lugauer, S. and Mark, N. (2015), "Demographic Patterns and Household Saving in China", *American Economic Journal: Macroeconomics*, Volume 7, pp. 58–94.
- (2017), "Demographics and Aggregate Household Saving in Japan, China, and India", *Journal of Macroeconomics*, Volume 51, pp. 175–191.
- Díaz-Saavedra, J. (2023), "Heterogeneity in longevity, redistribution, and pension reform", *Journal of Pension Economics and Finance*, 22(4), pp. 604-639.
- Deeg, D., W. De Tavernier and S. de Breij (2021), "Occupation-Based Life Expectancy: Actuarial Fairness in Determining Statutory Retirement Age", *Frontiers in Sociology*, Vol. 6.
- Dell'Ariccia, G., Detragiache, E., Rajan, R. (2007), "The real effect of banking crises", *Journal of Financial Intermediation*, 17, pp. 89–112.
- Duygun, M., Huang, B., Qian, X. and Tam, L., H., K. (2018), "Corporate pension plans and investment choices: Bargaining or conforming?", *Journal of Corporate Finance*, 50, pp. 519-537.
- Easterlin, R., A. (1973). Relative economic status and the American fertility swing in Sheldon, E. B. (ed.) *Family economic behavior: problems and prospects*, Philadelphia: J. B. Lippincott, pp. 170-227.
- Easterlin, R., A. (1976), "The conflict between aspirations and resources", *Population and Development Review*, 2(3-4), pp. 417-425.
- EIOPA (2018), "Decision of the Board of Supervisors on EIOPA's regular information requests towards NCAs regarding provision of occupational pensions information",



European Insurance and Occupational Pensions Authority. Available from: <[https://www.eiopa.europa.eu/media/news/eiopa-significantly-enhancing-european-pensions-statistics\\_en](https://www.eiopa.europa.eu/media/news/eiopa-significantly-enhancing-european-pensions-statistics_en)> [Accessed 24.08.2021]

Ethnos (2021). China: Three-child policy - Beijing changes birth limit per family. Ethnos. Available at: <<https://www.ethnos.gr/World/article/159339/kinapolitikhtrionpaidiontopekinoallazeitooriogennhseonanaoikogeneia>> [Accessed 24.08.2021].

European Central Bank (2018), "Shifts in the portfolio holdings of euro area sectors", *ECB Economic Bulletin*, Issue 2. Available at: [https://www.ecb.europa.eu/pub/pdf/other/ebart201802\\_02.en.pdf](https://www.ecb.europa.eu/pub/pdf/other/ebart201802_02.en.pdf) [Accessed 15.05.2022]

European Commission (2021), "The 2021 Ageing Report: Economic and Budgetary Projections for the EU Member States (2019-2070)", Institutional Paper 148 [Internet], May. Available at: <[https://ec.europa.eu/info/publications/2021-ageing-report-economic-and-budgetary-projections-eu-member-states-2019-2070\\_en](https://ec.europa.eu/info/publications/2021-ageing-report-economic-and-budgetary-projections-eu-member-states-2019-2070_en)> [Accessed 24.08.2021]

European Commission (2023), "The 2024 Ageing Report: Underlying Assumptions and Projection Methodologies", Institutional Paper 257, November. Brussels: European Commission. Available at: <[https://economy-finance.ec.europa.eu/publications/2024-ageing-report-underlying-assumptions-and-projection-methodologies\\_en](https://economy-finance.ec.europa.eu/publications/2024-ageing-report-underlying-assumptions-and-projection-methodologies_en)> [Accessed 20.12.2023].

Economic Policy Committee (2019), "Joint Paper on Pensions". Available at: <<https://economic-policy-committee.europa.eu/system/files/2020-01/Joint-Paper-on-Pensions-2019.pdf>> [Accessed 20.12.2023].

EUROSTAT (2020), "Projected old-age dependency ratio", Eurostat [Internet]. Available at: <<https://ec.europa.eu/eurostat>> [Accessed 24.08.2021]

-(2021), "Population on 1st January by age, sex and type of projection", Eurostat [Internet]. Available at: <[https://ec.europa.eu/eurostat/databrowser/view/proj\\_19np/default/table?lang=en](https://ec.europa.eu/eurostat/databrowser/view/proj_19np/default/table?lang=en)> [Accessed 24.08.2021]

Fagnani, J. (2012). "Work-family life balance: Future trends and challenges", in OECD (ed.) *The Future of Families to 2030*, OECD Publishing, pp. 119-187.

- Farfaras, A., Pateras, J., Panariti, E., Pierrakos, G., Sarris, M., Soulis, S. and Skolarikos, P. (2016), "The Greek economic crisis leads to declining birth rates", *International Journal of Child Health and Human Development*, 9(2), 157.
- Featherstone, K. (2011), "The Greek Sovereign Debt Crisis and EMU: A Failing State in a Skewed Regime", *Journal of Common Market Studies*, 49(2), pp. 193-217.
- Ferson, W. and Khang, K. (2002), "Conditional performance measurement using portfolio weights: evidence for pension funds", *Journal of Financial Economics*, 65, pp. 249-282.
- Fong, J.H. and Li, J. (2021), "Mandatory annuitization and money's worth: evidence from Singapore", *Journal of Corporate Finance*, pp. 405-424.
- Galazoulas, T. and Tsetoura, A. (2014), "Social Security Administration Confronting Sustainability Challenges: The Greek Pension System from a Comparative Perspective", *European Journal of Social Security*, 16(2), pp. 140-164.
- Gaspar, V., Amaglobeli, D. and Dabla-Norris, E. (2020), "The impact of aging on pensions and public policy", *IMF Finance and Development*.
- Goldstein, J., Kreyenfeld, M., Jasilioniene, A. and Karaman Örsal, D. (2013), "Fertility Reactions to the "Great Recession" in Europe: Recent Evidence from Order-Specific Data", *Demographic Research*, 29, Art. 4, pp. 85-104.
- Gorry, D., Lee, K., M. and Slavov, S., N. (2023), "Does the actuarial adjustment for pension delay affect retirement and claiming decisions?", *Journal of Pension Economics and Finance*, 22(4), pp. 590-603.
- Grech, A. (2010), "Assessing the sustainability of pension reforms in Europe", thesis submitted to the London School of Economics and Political Science, March.
- Guo, Z. (2013), "Why the Total Fertility Rate of 2010 Population Census Is so Low?", *Chinese Journal of Population Science*, 33, pp. 2-10. (In Chinese)
- Guo, Z., Gietel-Basten, S. and Gu, B. (2018), "The Lowest Fertility Rates in the World? Evidence from the 2015 Chinese 1% Sample Census", *China Population and Development Studies*, pp. 1-14.
- Hagen, J. (2021), "Partial recall: differences between actual and self-reported annuitization decisions in Sweden", *Journal of Corporate Finance*, pp. 375-404.
- Haider, S. J. and Stephens, M. A. (2007). The role of social security in intergenerational redistribution. *National Tax Journal*, 60(2), 323-337.

Hering, M. (2006), "The politics of structural pension reform in Western Europe: Does the EU matter?", Paper presented at the Fifteenth International Conference of the Council for European Studies, 29 March - 2 April, Chicago.

Hofmann, B. and Hohmeyer, K. (2012), "Perceived economic uncertainty and fertility", *Journal of Marriage and Family*, 75, pp. 503–521.

Hu, N. and Yang, Y. (2012), "The Real Old-Age Dependency Ratio and the Inadequacy of Public Pension Finance in China", *Journal of Population Ageing*, Vol. 5, pp. 193–209.

Hull, J.C. (2012). *Options, Futures, and Other Derivatives*. 8th ed. Pearson Education.

ILO (2018), "Social Protection for older persons: Policy trends and statistics 2017 - 2019", Geneva.

-(2018), "Reversing Pension Privatization: Key Issues", International Labour Office, Available at: <<https://www.social-protection.org/gimi/RessourcePDF.action?id=55463>> [Accessed 24.08.2021]

International Trade Union Confederation (ITUC) (2021). Investments in Social Protection and Their Impacts on Economic Growth. Available at: <[chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.ituc-csi.org/IMG/pdf/investments\\_in\\_social\\_protection\\_and\\_their\\_impacts\\_on\\_economic\\_growth.pdf](chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.ituc-csi.org/IMG/pdf/investments_in_social_protection_and_their_impacts_on_economic_growth.pdf)> [Accessed 21.03.2022]

IOBE (2021), "Macroeconomic impact of pension reform scenarios", Foundation for Economic and Industrial Research], February. Available at: <[http://iobe.gr/research\\_dtl.asp?RID=236](http://iobe.gr/research_dtl.asp?RID=236)> [Accessed 24.08.2021]

Isserman, A., M. (1993), "The Right People, the Right Rates: Making Population Estimates and Forecasts with an Interregional Cohort-Component Model", *Journal of the American Planning Association*, 59, pp. 45–64.

Kangas, O., Airio, I., Koskenvuo, K., Kuivalainen, S. and Tenhunen, S. (2021), "Information and legitimacy: results from an experimental survey on attitudes to the 2017 pension reform in Finland", *Journal of Corporate Finance*, pp. 359-374.

Kapopoulos, P. and Thomaidou, F. (2021), "Retirement Security and Pension System in Greece: Reform Efforts, Ageing Population and Intergenerational Allocation of Risks and Benefits", *Alpha Bank Economic Research, Insights: February 2021*.

Karavitis, N. (2011), "Pensions: Beyond first pillar", IOBE, Available at: <[http://www.iobe.gr/index.asp?a\\_id=96](http://www.iobe.gr/index.asp?a_id=96)> [Accessed 24.08.2021]

Kieren, P. and Weber, M. (2021), “When saving is not enough – wealth decumulation in retirement”, *Journal of Corporate Finance*, pp.446-473.

Kotzamanis, B. (2023), “The effects of demographic changes on the family environment of people over 65 years old in Greece”, *FLASH NEWS 15*, University of Thessaly.

Kotzamanis, B. and Karkanis, D. (2018). International migrations in Greece during the last decades: inversion of tendencies and refugees waves, in: B. Kotzamanis., A. Parant (eds), *Regards sur la population de l’Europe du Sud-est / Viewpoints on Population in South-East Europe*, Demobalk, Athens, pp. 299-309.

Koutsampelas, C. (2021), “Social Security in Greece in the Aftermath of the Economic Recession: Policies and Challenges Lying Ahead”, in *Social Security in the Balkans*, Volume 1, pp. 219-242.

Larbi Cherif, H. (2021), “Measuring the impact of demographic transition on the sustainability of the pension system in Algeria using the theory of co-integration”, *Revue scientifique Avenir économique*, Vol.9. N° 01, pp. 316-333.

Liu, W. and Liu, C. (2018), "Aging, Population Mobility and the Sustainability of Pension Fund", *Journal of Jiangxi University of Finance and Economics*, 117, pp. 66-76.

Lugauer, S., Ni, J. and Yin, Z. (2017), “Chinese Household Saving and Dependent Children: Theory and Evidence”, *China Economic Review*.

Lusardi, A. and Mitchell, O., S. (2007), “Baby Boomer Retirement Security: The Roles of Planning, Financial Literacy, and Housing Wealth”, *Journal of Monetary Economics*, 54(1), pp. 205-224.

Mackenbach, J., P., Rubio Valverde, J., Bopp, M., Brønnum-Hansen, H., Deboosere, P., Kalediene, R., Kovács, K., Leinsalu, M., Martikainen, P., Menvielle, G., Regidor, E. and Nusselder, W., J. (2019), “Determinants of inequalities in life expectancy: an international comparative study of eight risk factors”, *The Lancet Public Health*, Vol. 4/10, pp. e529-e537. Available at: <[https://doi.org/10.1016/s2468-2667\(19\)30147-1](https://doi.org/10.1016/s2468-2667(19)30147-1)> [Accessed 24.08.2021]

Macunovich, D. J. (1996). 'Relative income and the price of time: Exploring their effects on US fertility and female labor force participation', in Casterline, J. B., Lee, R. D., and Foote, K. A. (eds.) *Fertility in the United States: New patterns, new theories*, *Population and Development Review* 22, New York: Population Council, pp. 223-257.

Markowitz, H. (1952), “Portfolio Selection”, *The Journal of Finance*, 7(1), pp. 77-91.

- Martellini, L. and Milhau, V. (2021), “Capital structure choices, pension fund allocation decisions and the rational pricing of liability streams”, *Journal of Corporate Finance*, pp. 425-445.
- Matsaganis, M. (2011), "The Welfare State and the Crisis: The Case of Greece", *Journal of European Social Policy*, 21(5), pp. 501-512.
- Matsaganis, M., & Leventi, C. (2018). Preferences for pension reforms: Evidence from a survey in Greece. *International Social Security Review*, 71(3), 41-58.
- Mazreku, I., Morina, F. and Curraj, E. (2020), "Evaluation of the Financial Performance of Pension Funds. Empirical Evidence: Kosovo, Albania and North Macedonia", *European Journal of Sustainable Development*, 9, pp. 161–172.
- Meier, V. and Werding, M. (2010), “Ageing and the Welfare State: Securing Sustainability”, CESifo Working Paper No.2916. Munich, Germany: Center for Economic Studies and Ifo Institute.
- Meng, C. and Pfau, W.D. (2010), “The Role of Pension Funds in Capital Market Development”, *National Graduate Institute for Policy Studies, Minato*, Tokyo, pp. 1-20.
- Minister of Finance (2023), “State Budget 2023”, Hellenic Parliament [Internet]. Available at: <<https://www.hellenicparliament.gr>> [Accessed 23.12.2023]
- Mitchell, O., S. and Turner, J., A. (2010), “Human Capital Risk and Pension Outcomes”, *National Bureau of Economic Research Working Paper No. 15658*.
- Moleko, N. and Ikhide, S. (2019), “The Case of Pension Funds Evolution and Reforms in South Africa: A Shift from PAYG to FF”, *The Pensions Institute Discussion Paper PI-1902*.
- Morgan, S., P. (1991), “Late Nineteenth and early Twentieth century childlessness”, *The American Journal of Sociology*, 97(3), pp. 779-807.
- Morgan, S., P. (1996). Characteristic features of modern American fertility in Casterline, J. B., Lee, R. D., and Foote, K. A. (eds.) *Fertility in the United States: New patterns, new theories*, Population and Development Review 22, New York: Population Council, pp. 19-63.
- Mosquera, I., González-Rábago, Y., Martín, U. and Bacigalupe, A. (2018), Review of Socio-economic inequalities in life expectancy and health expectancy in Europe.

Mourao, P., R., and Vilela, C. (2018), “No country for old men”? The Multiplier Effects of Pensions in Portuguese Municipalities”, *Journal of Pension Economics and Finance*, pp. 1-35.

Munnell, A., H., Hou, W. and Sanzenbacher, G., T. (2021), “How to pay for Social Security's Missing Trust Fund?”, *Journal of Corporate Finance*, pp. 344-358.

Mylonas, P. and de la Maisonnette, C. (1999), “The Problems and Prospects Faced by PAYG Pension Systems: a Case Study of Greece”, OECD Economic Department Working Paper 215. Paris: OECD.

National Actuarial Authority (2021), “Actuarial Study of the transition of the insurance for Auxiliary Pension from a system of defined contributions Imaginary Capitalization NDC in a Capitalization System”, National Actuarial Authority.

-(2021), “Greek Pension System Fiche”, European Commission, Economic Policy Committee, Ageing Working Group, Ageing Projections Exercise 2021. Available at: <[https://ec.europa.eu/info/sites/default/files/economy-finance/el\\_-\\_ar\\_2021\\_final\\_pension\\_fiche.pdf](https://ec.europa.eu/info/sites/default/files/economy-finance/el_-_ar_2021_final_pension_fiche.pdf)> [Accessed 24.08.2021]

Nerlich, C. and Schroth, J. (2018), “The economic impact of population ageing and pension reforms”, ECB Economic Bulletin, No. 2, pp. 85-109.

OECD (2013), “Design and Delivery of Defined Contribution (DC) Pension Schemes: Policy challenges and recommendations”, Cass Business School, London, UK. Available at: <<https://www.oecd.org/daf/fin/private-pensions/DCPensionDesignHighlights.pdf>> [Accessed 20.02.2022]

-(2017), “Preventing Ageing Unequally”, OECD Publishing, Paris. Available at: <<http://dx.doi.org/10.1787/9789264279087-en>> [Accessed 24.08.2021]

-(2018), “OECD Pensions Outlook 2018”, OECD Publishing, Paris. Available at: <<https://www.oecd.org/daf/fin/private-pensions/OECD-Pensions-Outlook-2018-Highlights.pdf>> [Accessed 20.02.2022]

-(2019), “Pensions at a Glance 2019: OECD and G20 Indicators”, OECD Publishing, Paris.

-(2021), “Pensions at a Glance 2021: OECD and G20 Indicators”, OECD Publishing, Paris. Available at: <<https://doi.org/10.1787/ca401ebd-en>> [Accessed 20.02.2022]

-(2021), “Trends in life expectancy”, in Health at a Glance 2021: OECD Indicators, OECD Publishing, Paris. Available at: <<https://doi.org/10.1787/e0d509f9-en>> [Accessed 20.02.2022]

OECD/European Union (2022), “Trends in life expectancy”, in *Health at a Glance: Europe 2022: State of Health in the EU Cycle*, OECD Publishing, Paris. Available at: <<https://doi.org/10.1787/cf070758-en>> [Accessed 25.03.2023]

OECD (2023), “Health at a Glance 2023: OECD Indicators”, OECD Publishing, Paris. Available at: <<https://doi.org/10.1787/7a7afb35-en>> [Accessed 30.11.2023]

-(2023), “OECD Employment Outlook 2023: Artificial Intelligence and the Labour Market”, OECD Publishing, Paris. Available at: <<https://doi.org/10.1787/08785bba-en>> [Accessed 30.11.2023]

-(2023), “Taxing Wages 2023: Indexation of Labour Taxation and Benefits in OECD Countries”, OECD Publishing, Paris. Available at: <<https://doi.org/10.1787/8c99fa4d-en>> [Accessed 30.11.2023]

-(2023), "COVID-19 Health Indicators: Mortality (by week): Excess deaths by week, 2020-23", OECD Health Statistics.

Ortiz, I., Durán-Valverde, F., Urban, S. and Wodsak, V. (eds) (2018). *Reversing Pension Privatizations: Rebuilding Public Pension Systems in Eastern Europe and Latin America*. International Labour Organization.

OT.gr (2023). Pensions: What applies to age limits and when they change. OT.gr. Available at: <<https://www.ot.gr/2023/11/19/forologia/syntakseis-ti-isxyei-gia-ta-oria-ilikias-kai-pote-allazoun/>> [Accessed 30.11.2023].

Palmer, E. (2000), “The Swedish Pension Reform Model: Framework and Issues”, World Bank Pension Reform Primer, Social Protection Paper 0012, World Bank, Washington, DC.

-(2011), “Generic NDC: Equilibrium, Valuation and Risk Sharing with and with-out NDC Bonds”, *Department of Economics Working Paper 2011:3*, Uppsala University, Sweden.

Papadopoulos, F. and Tsakloglou, P. (2014). Greek citizens' views on the pension system and pension reform. *International Social Security Review*, 67(2), pp. 85-107.

Patel, U., R. (1997), A“pects of Pension Fund Reform: Lessons for India”, *Economic and Political Weekly*, 32, pp. 2395–2402.

Pesaran, M., H. and Shin, Y. (1999). An Autoregressive Distributed Lag Modelling Approach to Cointegration Analysis. In: Storm, S., ed. *Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium*. Cambridge University Press.

- Pirounakis, N., G. (1997). *The Greek Economy: Past, Present and Future*. St. Martin's Press.
- Pissarides, C., Vayanos, D., Vettas, N. and Megir, C. (2020), "Development Plan for the Greek Economy: Final Report".
- Polakowski, M. and Hagemeyer, K. (2018), "Reversing Pension Privatization: The Case of Polish Pension Reform and Re-Reforms", *International Labour Organization (ILO) Working Papers*, No. 68.
- Poterba, J., M., Venti, S., F. and Wise, D., A. (2006), "The Shift from Defined Benefit Pensions to 401(k) Plans and the Pension Assets of the Baby Boom Cohort", *National Bureau of Economic Research Working Paper No. 21828*.
- Preston, S.H., Heuveline, P. and Guillot, M. (2000), "Demography: Measuring and Modeling Population Processes", 1st ed. Malden, MA: Wiley-Blackwell, pp. 117–136. ISBN 1557864519.
- Rindfuss, R., R., Morgan, S., P. and Swicegood, G. (1988). *First births in America: Changes in the timing of parenthood*. Berkeley: University of California Press.
- Samek, A., Kapteyn, A. and Gray, A. (2021), "Using vignettes to improve understanding of Social Security and annuities", *Journal of Corporate Finance*, pp. 326-343.
- Schöley, J., Aburto, J.M., Kashnitsky, I., Kniffka, M.S., Zhang, L., Jaadla, H., Dowd, J.B., and Kashyap, R. (2022), "Life expectancy changes since COVID-19", *Nature Human Behaviour*, Vol. 6/12, pp. 1649-1659, Available at: <<https://doi.org/10.1038/s41562-022-01450-3>>
- Schmidt-Hebbel, K. (1999), "Does pension reform really spur productivity, saving and growth?", *Central Bank of Chile Working Papers*, 33.
- Schmitt, C. (2008), "Gender-specific effects of unemployment on family formation: A cross-national perspective", *DIW Berlin*, Discussion Papers 841.
- Schmitt, C. (2012), "A cross-national perspective on unemployment and first births", *European Journal of Population*, 28(3), pp. 303-335.
- Selody, J. (2007), "Vulnerabilities in Defined-Benefit Pension Plans", Bank of Canada Discussion Paper, no. 2007-3, May.
- Shi, R., Chen, N. and Zheng, Q. (2018), "Evaluation on the Effect of Childbearing Policy Adjustments in China", *Chinese Journal of Population Science*, 38, pp. 114-125. (In Chinese)



Sobotka, T. (2008a). Does persistent low fertility threaten the future of European populations?, in Surkyn, J., Deboosere, P., and van Bavel, J. (eds.) *Demographic challenges for the 21st Century: A state of the art in demography*, Brussels: VUBPRESS, pp. 27-89.

Sobotka, T. (2008b), "The diverse faces of the second demographic transition in Europe", *Demographic Research*, Special Collection 7, Vol. 19(8), pp. 171-224.

Sobotka, T., Skirbekk, V., and Philipov, D. (2011), "Economic recession and fertility in the developed world. A literature review", *Population and Development Review*, 37(2), pp. 267-306.

SPC, (2015), "Synthesis report on the impact of the crisis on pensions in payment and current retirement patterns", ESPN, unpublished document, March.

Stewart, F. and Yermo, J. (2008), "Pension Fund Governance: Challenges and Potential Solutions", *OECD Working Papers on Insurance and Private Pensions*, No. 18, OECD Publishing.

Sun, S. and Hu, J. (2014), "The impact of pension system on financial development: an empirical study", *Risk Governance and Control: Financial Markets and Institutions*, 4, pp. 120–131.

Swart, R.J., Raskin, P. and Robinson, J. (2004), "The Problem of the Future: Sustainability Science and Scenario Analysis", *Global Environmental Change*, 14(2), pp. 137-146.

Sy, A., N. (2017). *Leveraging African Pension Funds for Financing Infrastructure Development*. Brookings.

Symeonidis, G. (2016), "World Bank Social Protection and Labor Discussion Paper: The Greek Pension Reform Strategy 2010–2016". Washington, DC: World Bank.

Tasia, A., Kornarou, E., Siori, M., Barbouni, A. and Vlachadis, N. (2021), "The role of socio-economic factors in birth rates of the Greek population", *Scientific Chronicles / Epistimonika Chronika*, Volume 26, Issue 4, pp. 717.

Thorley, S. (1994), "The Time-Diversification Controversy", *Financial Analysts Journal*, 50(4), pp. 68-76.

Tinios, P. (2016). *Pension Reform in Greece: National Report*. European Social Policy Network (ESPN).

- Tinios, P. and Poupakis, S. (2013), “Insurance Reform and Private Insurance in Public Opinion: A Multivariate Analysis”, *Social Policy*. Available at: <<https://ejournals.epublishing.ekt.gr/index.php/eeep/article/view/10545>> [Accessed 24.08.2021]
- Thévenon, O. (2011), “Family policies in OECD countries: A comparative analysis”, *Population and Development Review*, 37(1).
- Van Dalen, H. P., & Henkens, K. (2023), "Trust in pension funds, or the importance of being financially sound", *Journal of Pension Economics and Finance*, 22(4), pp. 658-669.
- Wang, H., Huang, J. and Yang, Q. (2019), “Assessing the Financial Sustainability of the Pension Plan in China: The Role of Fertility Policy Adjustment and Retirement Delay”, Research Institute for Population Science, School of Public Administration, Hohai University, 11(3), 883.
- Whelan, S., F. (2002). Actuarial Models. In: J. Lemaire, ed. Modern Actuarial Theory. Kluwer Academic Publishers.
- Whitehouse, E. (2012), “Policies to Encourage Private Pension Savings: Evidence from OECD Countries”, in Hinz et al., eds. Matching Defined Contribution (MDC) Schemes: A Promising Pension Design to Enhance Coverage and Benefit Level? Washington DC: World Bank.
- Yixin, Y. and Wenjong, H. (2016), "Can Increasing the Contributory Period Effectively Improve the Financial Sustainability of Pension Fund? Based on the Actuarial Evaluation of Pay-As-You-Go and Funded Systems", *Population Research*, 40, pp. 18-29. (In Chinese)
- Zandberg, E., & Spierdijk, L. (2013), “Funding of pensions and economic growth: are they really related?”, *Journal of Pension Economics & Finance*, Vol.12, Issue 2, pp. 151-167.
- Zhao, Y., Bai, M., Liu, Y. and Hao, J. (2017), “Quantitative Analyses of Transition Pension Liabilities and Solvency Sustainability in China”, *Sustainability*, Vol. 9, pp. 22-52.
- Zhao, Y., Bai, M., Feng, P. and Zhu, M. (2018), “Stochastic Assessments of Urban Employees’ Pension Plan of China”, *Sustainability*, Vol. 10, pp. 10-28.
- IOBE (2022) Επαγγελματική ασφάλιση στην Ελλάδα: Προκλήσεις και προοπτικές.
- Κοτζαμάνης, Β. (2019). Είναι δυνατόν οι αλλοδαποί να δώσουν λύση στην υπογεννητικότητα του πληθυσμού της Ελλάδας; *Δημογραφικά Νέα*, 36.

## Appendixes

### Appendix I Questionnaire

#### Descriptive Statistics

- i. Gender
- ii. Age
- iii. Years of work
- iv. Employment status
  - a) Self-employed
  - b) Public employee
  - c) Private employee
  - d) Retiree
- v. Old/New insured
- vi. Expected age of retirement
- vii. Marital Status
- viii. Education
  - a) Primary and Lower Secondary
  - b) Upper Secondary
  - c) Post-secondary - non-tertiary
  - d) First stage of tertiary (Bachelor, Master)
  - e) Second stage of tertiary (Doctoral)
- ix. Household income
  - a)  $\leq 1000\text{€}$
  - b) 1001-1500€
  - c) 1501-2000€
  - d) 2001-3000€
  - e)  $\geq 3001\text{€}$

#### Knowledge of the current system

<b>1. Your insurance coverage comes from:</b>	<b>Main component</b>	<b>Supplementary component</b>	<b>Exist but not very relevant</b>	<b>Does not exist</b>
---	-----------------------	--------------------------------	------------------------------------	-----------------------

Public pension system				
Occupational system				
Private pension system				

**2. What type of retirement plan the current system offers?**

- Pension is determined by the total amount of accumulated contributions plus earnings from investments
- Pension is determined based on years of service and other components
- Do not know

**3. How well informed are you about the pension system of Greece and the way it functions?**

- Very well
- Somewhat informed
- Not too informed
- Not at all informed
- No answer

**4. Did you know that your employer pays part of the total contributions for your main and supplementary insurance?**

*(This concerns private sector employees)*

- Yes
- No
- I disagree
- No answer

**5. Are you in a position to estimate, with no professional help (with a 90% probability), the pension you will receive, assuming you will retire at the allowed age for either a full or reduced pension?**

- Yes

- No
- No answer

**6. How concerned are you about the security of your pension and your ability to receive it?**

- Very concerned
- Somewhat concerned
- Not too concerned
- Not at all concerned
- No answer

**7. How important will be your pension in financing your retirement years?**

- Very important
- Somewhat important
- Not too important
- Not at all important
- No answer

**8. Do you believe that the existing pension system offers pensions that are capable of maintaining a worker's standard of living and can be considered rewarding in relation to the contributions paid by a worker during his/her working life?**

- Very rewarding
- Somewhat rewarding
- Not too rewarding
- Not at all rewarding
- No answer

**9. If you chose the latter options in question 8, then in your opinion which reform would you like to see in the pension system?**

- Fully funded system
- A part of the current system to become a funded system
- Defined Benefits System

- No change

<b>10. Regarding a pension reform how much the below parties should be involved in the design of the reform?</b>	<b>Not at all</b>	<b>Very Little</b>	<b>Little</b>	<b>High</b>	<b>Very High</b>
Government					
Social partners					
Pension institutions					
Employer's organisations					
Trade unions					
Other Bodies					

**11. Apart from your state system insurance due to work, do you have any private insurance for retirement?**

- Yes
- No
- Only private retirement plan
- No answer

**12. How important it would be if you could manage your contributions (i.e. invest them)?**

- Very little
- Little
- Neither yes nor no
- High
- Very High

**13. Would you consider invest a part of your contributions in order to gain more savings?**

- Very little
- Little
- Neither yes nor no
- High
- Very High

**14. Recent pension system reforms helped address the ageing population and the sustainability of the system?**

*(Please mark how much you agree/disagree with the above statement)*

- Strongly disagree – Strongly agree (from 1 to 5)

**15. How worried are you about the level of pension you will receive?**

- Very worried
- Somewhat worried
- Not too worried
- Not at all worried
- No answer

**16. How worried are you about a further reduction in the level of pension you receive?**

- Very worried
- Somewhat worried
- Not too worried
- Not at all worried
- No answer

#### **A. Priorities of Pension Reform**

Please mark how important these priorities are, in your opinion, for pension reform

- Unimportant – Very important (from 1 to 5)

**17. Those who pay more contributions, should be paid higher pensions**

**18. Employees will have to work more to enable the system to serve pensions**

**19. Any reform of a pension system must address the problem of an ageing population and ensure the financial sustainability of the system**

**20. Pensioners should get paid the exact amount of contributions that they paid during their working lives**

**21. Any reform of the pension system should aim to avoid further pension cuts in the future, regardless of the circumstances**

### **B. Adequacy of pensions**

Please mark how important these priorities are, in your opinion, for pension reform

- Unimportant – Very important (from 1 to 5)

**22. The part of the pension corresponding to the national pension must be able to cover a large part of the cost of living of pensioners**

**23. The contributory part of the pension should reflect the total contributions paid by insured persons during their working life**

Please mark how much you agree/disagree with the following statements

- Strongly disagree – Strongly agree (from 1 to 5)

**24. Existing pensions help pensioners maintain the standard of living they enjoyed during their working lives.**

**25. The existing pension system can cope with the problem of an ageing population and guarantee that there will be no new pension cuts in the future.**

**26. The funding of the pension system by the state is sufficient to guarantee pensions and cover the needs of the system.**



### **C. Sustainability of pensions**

Please mark how much you agree/disagree that the below changes will help secure sustainability of pensions

- Strongly disagree – Strongly agree (from 1 to 5)

**27. Increasing the retirement age.**

**28. Increase in the rate of contributions paid by the insured person and the employer.**

**29. Fiscal constraints on the state budget to avoid deficits and to be able to pay pensions to pensioners.**

**30. Changes to the structure of the pillars of the pension system and the introduction of new schemes to spread the risk of pensions.**

### **D. Employees aspect**

Please mark how important these priorities are, in your opinion, for pension reform.

- Unimportant – Very important (from 1 to 5)

**31. Receive as pension a guaranteed amount every month, no matter how long you live**

**32. Access to your contributions to use them for exceptional reasons before your retirement.**

**33. Investing my savings and managing them during my working life**

**34. Protect the value of your contributions from inflation, meaning they don't lose value due to inflation.**

**35. The option to choose between taking all your contributions at once or taking an amount of them per month.**

**36. In the event of my death, all my contributions will be inherited by my family and they will receive an amount of these as a regular payment.**

**37. Would you choose a different scheme for your pension? If so, which one of the following systems would be the ideal one for you?**

*(In case your answer is “yes”, choose one of the following options with “yes” or “no”)*

- A system where I gain as pension exactly the contributions that I paid in my working life
- A system where I would get all the money that I paid as contributions immediately after I retire and receive no pension
- A system where I can choose how much contributions I will pay and as a result how much of a pension I will receive
- A system where I can invest my contributions to earn more income as a pensioner, beyond the pension
- No change at all

**38. How much willing are you to sacrifice your benefits, so that the next generation can earn the same benefits as you in their retirement?**

- Not at all – Very much (from 1 to 5)

*Bonus*

Question for retirees

**39. How would you describe your current standard of living based only on the pension you receive and in relation to the salary you had during your working life?**

- Better than before
- About the same
- Worse than before
- No answer

## Appendix II List of Tables

Table 1: Accrual rates for the contributory pension by law 4670/2020 .....	46
Table 2: Total dependency ratio and Total economic dependency ratio projections for Greece, 2022 – 2070 .....	52
Table 3: Main demographic Variables Evolution.....	53
Table 4: Greece employment statistics, 4 <sup>th</sup> Quarter of 2019 – 2023 (in thousands).....	56
Table 5: Greece employment statistics, 2019 – 2023 (in %) .....	57
Table 6: Population 15+ by employment status and age in 4 <sup>th</sup> Quarter of 2023 .....	58
Table 7: Projections for participation rate, employment rate and share of workers for the age groups 55-64 and 65-74.....	58
Table 8: Transition Cost of the NDC scheme (in billions of euros).....	69
Table 9: Debt-to-GDP ratio until 2070 .....	71
Table 10: Permanent Population of Greece by Gender and Age Groups .....	76
Table 11: Demographic Indicators .....	78
Table 12: Fertility and Retirement Scenarios .....	86
Table 13: Pension Fund Sustainability .....	87
Table 14: Pension Fund Sustainability in Scenario 2 .....	89
Table 15: Pension Fund Sustainability in Scenario 3 .....	90
Table 16: Pension Fund Sustainability in Scenario 4 .....	92
Table 17: Pension Fund Sustainability in Scenario 5 .....	93
Table 18: Pension Fund Sustainability in Scenario 6 .....	95
Table 19: Total Fertility rate and Life expectancy every decade in Greece .....	106
Table 20: ADF test results .....	108
Table 21: Estimation Results of an ARDL model (4,1,4) (short-run) .....	111
Table 22: Estimation Results of an ARDL-EC model (4,1,4) (long-run).....	112
Table 23: Diagnostic test results for estimated ARDL model .....	114

Table 24: Bounds Testing Results .....	114
Table 25: Results of the error correction factor estimate and long-run parameters .....	115
Table 26: Main source of insurance coverage .....	151
Table 27: What type of retirement plan the current system offers?.....	154
Table 288: How well informed are you about the pension system of Greece and the way it functions?.....	155
Table 29: Did you know that your employer pays part of the total contributions for your main and supplementary insurance? .....	157
Table 30: Are you in a position to estimate, with no professional help (with a 90% probability), the pension you will receive, assuming you will retire at the allowed age for either a full or reduced pension?.....	159
Table 31: How concerned are you about the security of your pension and your ability to receive it?.....	160
Table 32: How concerned are you about the security of your pension and your ability to receive it, with respect to age?.....	161
Table 33: How important will be your pension in financing your retirement years?.....	163
Table 34: Do you believe that the existing pension system offers pensions that are capable of maintaining a worker's standard of living and can be considered rewarding in relation to the contributions paid by a worker during his/her working life?.....	164
Table 35: If you chose the latter options in question 8, then in your opinion which reform would you like to see in the pension system?.....	166
Table 36: Regarding a pension reform how much the Government should be involved in the design of the reform? .....	168
Table 37: Regarding a pension reform how much Social Partners should be involved in the design of the reform? .....	168
Table 38: Regarding a pension reform how much Pension Institutions should be involved in the design of the reform? .....	169
Table 39: Regarding a pension reform how much Employer's organizations should be involved in the design of the reform? .....	169
Table 40: Regarding a pension reform how much Trade Unions should be involved in the design of the reform? .....	170

Table 41: Regarding a pension reform how much Other Bodies should be involved in the design of the reform? .....	170
Table 42: Apart from your state system insurance due to work, do you have any private insurance for retirement? .....	172
Table 43: How important it would be if you could manage your contributions (i.e. invest them) .....	173
Table 44: Would you consider investing a part of your contributions in order to gain more savings?.....	174
Table 45: Recent pension system reforms helped address the ageing population and the sustainability of the system? .....	176
Table 46: How worried are you about the level of pension you will receive? .....	177
Table 47: Those who pay more contributions, should be paid higher pensions .....	177
Table 48: Employees will have to work more to enable the system to serve pensions .....	179
Table 49: Any reform of a pension system must address the problem of an ageing population and ensure the financial sustainability of the system.....	179
Table 50: Pensioners should get paid the exact amount of contributions that they paid during their working lives.....	180
Table 51: Any reform of the pension system should aim to avoid further pension cuts in the future, regardless of the circumstances .....	181
Table 52: The part of the pension corresponding to the national pension must be able to cover a large part of the cost of living of pensioners .....	182
Table 53: The contributory part of the pension should reflect the total contributions paid by insured persons during their working life .....	183
Table 54: Existing pensions help pensioners maintain the standard of living they enjoyed during their working lives (1 totally disagree ... 5 totally agree).....	184
Table 55: Employment Status * Existing pensions help pensioners maintain the standard of living they enjoyed during their working lives. (Crosstabulation) .....	184
Table 56: The existing pension system can cope with the problem of an ageing population and guarantee that there will be no new pension cuts in the future .....	185
Table 57: The funding of the pension system by the state is sufficient to guarantee pensions and cover the needs of the system .....	186

Table 58: Changes to the structure of the pillars of the pension system and the introduction of new schemes to spread the risk of pensions .....	187
Table 59: Receive as pension a guaranteed amount every month, no matter how long you live .....	189
Table 60: Access to your contributions to use them for exceptional reasons before your retirement .....	189
Table 61: Investing my savings and managing them during my working life .....	190
Table 62: Protect the value of your contributions from inflation, meaning they don't lose value due to inflation .....	191
Table 63: The option to choose between taking all your contributions at once or taking an amount of them per month.....	192
Table 64: In the event of my death, all my contributions will be inherited by my family and they will receive an amount of these as a regular payment .....	193
Table 65: Different choices of pension schemes .....	194
Table 66: How wiling are you to sacrifice your benefits, so that the next generation can earn the same benefits as you in their retirement?.....	195

### Appendix III List of Figures

Figure 1: The 3-Pillar Greek Pension System (before the September 2021 reform).....	44
Figure 2: Population of Greece: breakdown by age group 2021 .....	50
Figure 3: Recent development and projection of the population of Greece .....	50
Figure 4: Total Fertility rate for EU Member-States .....	55
Figure 5: Percentage of elderly (65 years or over) at risk of poverty and social exclusion, Greece, 2015-2023 .....	61
Figure 6: Percentage of population and retired persons aged 65 years or over in severe material deprivation in Greece and EU-27, 2015-2023.....	62
Figure 7: TEKA IT Target Architecture .....	66
Figure 8: Trend of the population .....	87
Figure 9: Trend of the population in Scenario 2 .....	88
Figure 10: Trend of the population in Scenario 3 .....	90
Figure 11: Trend of the population in Scenario 4 .....	91
Figure 12: Trend of the population in Scenario 5 .....	94
Figure 13: Trend of the population in Scenario 6 .....	95
Figure 14: Evolution of e-EFKAs expenditures and revenues (in million euros) .....	103
Figure 15: Optimal model with the graph of the AIC.....	113
Figure 16: Gender distribution of the sample .....	147
Figure 17: Age distribution of the sample .....	147
Figure 18: Employment Status .....	149
Figure 19: Insurance status .....	149
Figure 20: Distribution of education levels in the sample .....	150

Appendix IV List of Graphs

Graph 1: Inverse population pyramid in 1960 .....	51
Graph 2: Inverse population pyramid in 2017 .....	51
Graph 3: Inverse population pyramid in 2060 .....	52

