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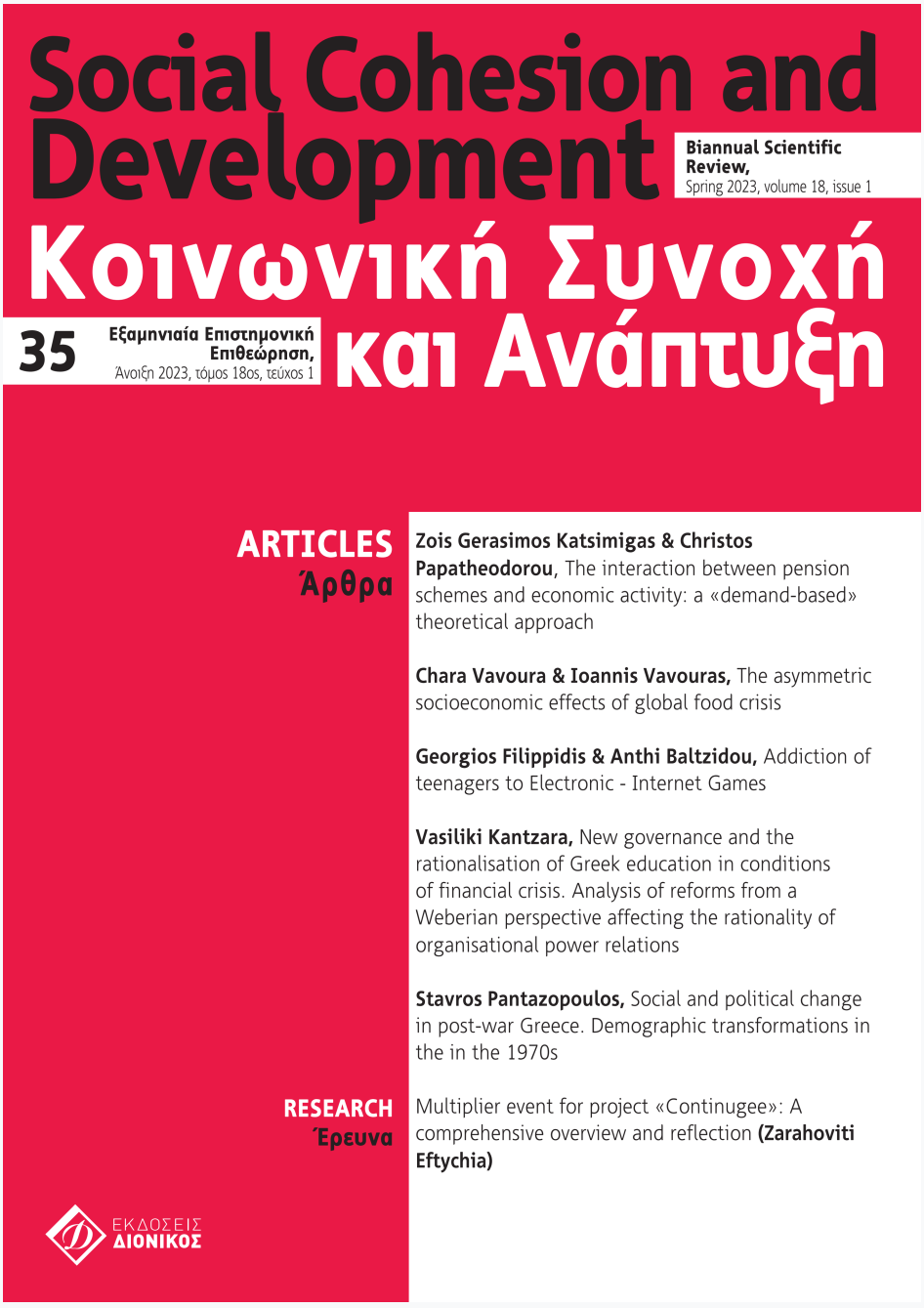

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The interaction between pension schemes and economic activity: a *«demand-based»* theoretical approach

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Η αλληλεπίδραση των συνταξιοδοτικών συστημάτων με την οικονομική δραστηριότητα: μία *«demand-based»* θεωρητική προσέγγιση

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ABSTRACT

Motivated by the recent capitalization of the auxiliary pension and the demographic projections of ageing and population decline in the coming decades in Greece, we will identify and examine the determinants of the pensions of the two social security schemes (Pay-As-You-Go & Fully Funded), their relationship with the functional distribution of income, as well as their interaction with economic activity. The aim is to highlight the importance of examining pension systems in relation to the macroeconomic environment in order to clarify the impact of both demographic changes and fiscal policies to reduce the pension system dependency ratio, and the state contribution to pensions on economic activity and public debt.

KEY WORDS: Pension schemes, demographic projection, macroeconomic environment, functional income distribution..

ΠΕΡΙΛΗΨΗ

Ορμώμενοι από την πρόσφατη κεφαλαιοποίησή της επικουρικής σύνταξης, αλλά και τις δημογραφικές προβλέψεις γήρανσης και μείωσης του πληθυσμού τις προσεχείς δεκαετίες στην Ελλάδα, θα εντοπίσουμε και θα εξετάσουμε τους προσδιοριστικούς παράγοντες των συντάξεων των δύο ασφαλιστικών συστημάτων (Pay-As-You-Go & Fully Funded), την σχέση αυτών με την λειτουργική διανομή εισοδήματος, καθώς και την αλληλεπίδραση τους με την εν γένει οικονομική δραστηριότητα. Στόχος είναι η ανάδειξη της σημασίας της από κοινού εξέτασης των συνταξιοδοτικών συστημάτων με το μακροοικονομικό περιβάλλον, ώστε να αποσαφηνιστεί η επίδραση τόσο των δημογραφικών αλλαγών όσο και των πολιτικών μείωσης του δείκτη εξάρτισης του συνταξιοδοτικού συστήματος και της κρατικής δαπάνης για συντάξεις στην εν γένει οικονομική δραστηριότητα και το δημόσιο χρέος.

ΛΕΞΕΙΣ-ΚΛΕΙΔΙΑ: Συνταξιοδοτικά συστήματα, δημογραφικές προβλέψεις, μακροοικονομικό περιβάλλον, λειτουργική διανομή εισοδήματος

1. Introduction

Pensioners are an integral and numerous group of every society. It strongly influences economic activity, mainly through consumption and savings. It does not participate in the production process, it influences and is influenced by the income of the other social groups through the social security contributions paid by the latter, and through the accumulated wealth transferred to them by pensioners. It has a direct relationship, unlike other social groups, with the state budget (Pay-As-You-Go), while it is linked, through the investment of social security contributions by the pension fund (Fully Funded), to the financial side of the economy. Furthermore, the main source of pensioners' income (pension) is not directly affected by the functional distribution of income, but indirectly, through the labor and capital income received by the insured. Compared to the incomes of other social groups, it is affected to a greater extent by economic activity (growth rate of economy, unemployment rate), by fiscal and monetary policies (social security contributions, replacement rates, retirement thresholds, interest rates) and by demographic changes (life expectancy, pension system dependency ratio[1]).

The above characteristics of pensioners and pensions make pension systems vital for the functioning of modern economies, as they are responsible for the link between: 1) the national income distributed to the factors of production (functional income distribution) and the disposable income of social groups that do not participate in the production process (pensioners), 2) the main source of income of pensioners (pension) and the state budget (state contribution, public debt), 3) demographic changes (dependency ratio, life expectancy) and economic activity, and 4) social security contributions and the financial side of the economy. The link between pay-as-you-go pension systems and the state budget, and in particular their sensitivity to demographic changes, has called into question their efficiency and, more importantly, their long-term sustainability in the face of the expected increase in population ageing. The latter has already led many governments to reform their pay-as-you-go pension system, either by changing the method of calculating pensions or by replacing, partially or fully, the entire pension system. The questioning of the efficiency and sustainability of the pay-as-you-go defined benefit pension system becomes more pronounced in the case of Greece, as in addition to projections of ageing and population decline, the pension system already manages high pension expenditures as a percentage of GDP and high state contributions compared to other EU countries. This led the Greek government, after the reduction of pensions due to the implementation of the Memorandum and the change in the method of calculating the auxiliary pension from defined benefits to notional defined contributions, to capitalize the auxiliary pension.

Many studies (Feldstein, 1997; Siebert, 1997; Attanasio et al., 2007; Whitehouse, 2012; De la Croix et al., 2013; Artige et al., 2014; Cipriani, 2014, 2018; Dedry et al., 2017; Alonso-Garcia et al., 2018; Morimoto et al., 2018, etc.) have examined the behavior of pay-as-you-go systems, focusing mainly on their sensitivity to demographic changes and, in several cases, the transfer of resources from the insured generation to the retired generation, which reduces savings and does not contribute to economic growth. However, as Robolis & Betsis (2021) point out, this approach does not consider that the transfer of resources from the insured to pensioners is a two-way process, as the latter "return" resources to the economy through consumption and demand for goods and services. In any case, the important role of social security systems in the functioning of the economy and their link both to the behavior of different economic sectors and to the fluctuation of many macroeconomic variables makes it necessary to place them in a complete macroeconomic environment in order to understand all the channels of their interaction with it.

2. Pay-as-you-go pension schemes & population ageing

In recent decades, the continuous decline in fertility and the simultaneous increase in longevity in developed countries have led to an outbreak of the phenomenon of population ageing. According to the "World Population Ageing Report" of the United Nations (2020), people tend to live longer, with the result that both the number of older people and their share of the total population are increasing rapidly. Projections show that by 2050, the share of older people in the total population will almost double, from 9.3% in 2020 to 16% in 2050. According to Bovenberg (2008), increasing longevity, from an economic perspective, can have a positive effect on the labor market because it implies an optimization of education and training and, therefore, an increased return on investment in human capital, as each individual lives, is educated and works longer.

On the other hand, the increase in population ageing and the high old-age dependency ratios[2], call into question the efficiency and sustainability of pay-as-you-go pension schemes, as the latter become especially vulnerable to demographic changes. Pay-as-you-go pension schemes are based on "intergenerational solidarity" as the contributions of current workers finance the current pension expenditure and the pensions paid to future retirees will be financed by the contributions of future workers. Therefore, the continuous increase in retirees (increasing longevity) combined with a decrease in insured persons (decreasing fertility) may create a structural sustainability problem in redistributive systems. In order to avoid it, governments should either adopt reform policies, e.g., increasing social security contributions or retirement thresholds, or replace the existing pension system with a more efficient one, e.g., partially or fully funded (Cigno, 2007).

The Greek pension system is also facing these demographic changes, as projections for the next eighty years show that the country's population will continue to decline, while at the same time the ageing of the population will increase, due to both declining birth rates and increasing life expectancy. According to Eurostat's projections (Eurostat, 2019a), the total population of Greece, births, deaths, migration and life expectancy considered, will decrease from 10,696,535 people in 2020 to 8,142,699 people in 2100, while the old-age dependency ratio according to the European Union's "Ageing Working Group" (AWG, 2021) will increase from 37.9% in 2019 to 65.2% in 2070. In addition, life expectancy for a man at age 65 will increase from 18.8 years in 2019 to 23.9 years in 2070 and for a woman from 21.8 years in 2019 to 26.7 years in 2070. These imply a gradual increase in the pension system dependency ratio from 64% in 2019 to 75.9% in 2070. The latter also reveals the serious sustainability problem that the Greek social security sector and especially the pay-as-you-go pension system will face soon, because it seems that an ever decreasing number of insured persons will contribute to the pensions of an ever increasing number of pensioners.

Greece's pay-as-you-go pension system, which even today covers the bulk of public pension expenditure (national & contributory pensions), already puts a significant strain on the fiscal balance. This is mainly due to the large state contribution to pensions, which may intensify, according to demographic projections, in the coming years, as a decreasing number of insured persons contribute to the pensions of an increasing number of pensioners. In the case of Greece, pension expenditure increased rapidly from 1980 (5.5% of GDP) to 2010 (14.2% of GDP), mainly due to an increase in both pensions and pensioners (IOBE, 2019). In 2016, despite pension cuts and social security reforms imposed by the Memorandum, Greece provided the highest public pension expenditure (17.7% of GDP)[3] among the European Union countries, as the corresponding indicator of the latter ranging at 13.3% of GDP (Eurostat, 2019b). At the same time, Greece had one of the highest contribution rates for the pension branch in the European Union, ranging from 27% to over 30% (Symeonidis et al., 2021).

According to the latest publication of the European Union's "Ageing Working Group" (AWG, 2021) on the sustainability of countries' pension systems, Greece's performance seems to be improving over time, due to reforms. In particular, according to the projections, pension expenditure for Greece from 15.7% of GDP in 2019 seems to decline gradually over the coming decades, reaching 11.9% of GDP in 2070, while the corresponding survey of 2018 (AWG, 2018), using 2016 as a base year, predicted that pension expenditure for Greece in 2070 will reach 10.6% of GDP. Beyond the level of pension expenditure, the measure directly linked to public debt is the state subsidy required each year to finance pensions. According to the "Development Plan for Greek Economy" ("Pissarides Report") (Pissarides committee, 2020), in 2018 in Greece, the state contribution to the financing of pension expenditure amounted to 10.1% of GDP[4], which is considered excessive compared to the eurozone average of just 3.1%. Moreover, according to the 2019 projections (AWG, 2021), state subsidies will decline over the coming decades, but will remain at high level, putting a strain on the fiscal balance and inflating public debt.

Therefore, in a pay-as-you-go pension system such as the Greek one, the continuous increase of pensioners may increase the state contribution to pensions and the fiscal deficit, thus calling into question the system itself. On the other hand, in order to avoid this and also to restore the sustainability of the pay-as-you-go pension system, governments are likely to implement policies such as reducing pensions, increasing social security contributions and retirement thresholds, which in the short run may reduce the state contribution to pensions, but in the long run may have adverse effects on public debt and economic activity.

3. Fiscal policies to reduce the dependency ratio and the state contribution

Several studies (Fanti & Gori, 2012; De la Croix et al., 2013; Cipriani 2014, 2018; Cipriani & Pascucci, 2020, etc.) have focused on the impact of increasing life expectancy and/or declining fertility on redistributive pension systems and have also examined whether specific fiscal policies can restore the efficiency of the system. Despite the important findings of the studies, research is mainly limited to studying the impact of reforms and demographic changes on the pension system and much less or not at all on the impact of reforms, through the interaction between the pension system and the macroeconomic environment, on economic activity. Policies aimed at reducing pensions or increasing social security contributions not only contribute to reducing public pension expenditure or state subsidies to pensions, but also reshape the consumption or savings decisions of the group concerned (employees/employers/pensioners), which then reshape economic activity.

3.1 Reduction in pensions

The reduction in the amount of the pension will lead to a decline in public pension expenditure, reducing in the short run the state contribution to pensions, the fiscal deficit as well as the public debt-to-GDP ratio. However, if the resources committed by the reform are not replenished by the government, the reduction in pensioners' income is likely to lead, due to the high propensity of pensioners to consume, to a decrease in consumption expenditure and aggregate demand, a slowdown in economic growth, an increase in the unemployment rate, and a further increase of the pension system dependency ratio through a reduction in the number of insured persons. Therefore, in the long run, the decrease in direct and indirect tax revenues, the increase in the expenditure on unemployment benefits, as well as the decrease in social security contributions

may lead to a higher state subsidy for pensions, and contribute to an increase in the public debt-to-GDP ratio, despite the reduction in pension expenditure.

Changes in the above-mentioned variables can in turn affect pensions. For example, a fall in aggregate demand may have a negative impact on the profits of firms and/or the bargaining power of workers, thereby reducing investment spending and wages. Lower wages imply lower social security contributions and hence higher state contribution to pensions. In addition, lower wages and fewer years of insurance (higher unemployment rates) will lead to lower future pensions, which in the long run will extend the interaction between the social security sector and the economic activity.

3.2 Increase in social security contributions

If social security contributions are increased in order to reduce the state contribution to pensions, resources are taken away from the real economy through both consumption and investment. Workers now decide on their consumption based on less disposable income, while firms decide on their investment taking into account the higher production cost resulting from the higher employers' social security contribution. Therefore, also in this case, if the resources absorbed by the real economy are not replaced (e.g. through an expansionary policy), they may alter economic activity, slow down economic growth and, in the long run, they may not contribute to reducing the public debt-to-GDP ratio. The impact of this policy on consumption and investment varies according to the social security and labor institutions in each case, as the latter largely determine the distribution of the increase in social security contributions between employees and employers.

In contrast to fiscal policies that directly reduce the state contribution to pensions, expansionary policies, such as increasing low pensions or reducing social security contributions, despite increasing pension expenditure and the fiscal deficit in the short run, are likely to contribute more effectively in the long run. This will occur through increasing consumption and investment and thus accelerating the growth rate of the economy and reducing the public debt-to-GDP ratio. Apart from the potential benefits for economic activity, expansionary policies do not violate the adequacy (i.e., the provision of sufficient income to pensioners during their retirement), and the fairness (i.e., the fair return of the contributions paid by pensioners during their working life) of the social security system, in contrast to the reduction of pensions and the increase of social security contributions.

3.3 Increase in retirement thresholds

Fiscal policies that aim at reducing the pension system dependency ratio, such as increasing the retirement thresholds, may contribute to reducing the state subsidy to pensions in the short run, but in the long run they are likely to have a negative impact on both economic growth and public debt. If a policy of raising retirement thresholds is not accompanied by an expansionary policy of stimulating economic activity and creating new jobs, it actually «shifts» people from retirement to unemployment. The latter, apart from increasing the unemployment rate, causes adverse effects on both the social security balance and the fiscal balance.

In particular, the increase in the unemployment rate does not lead to an increase in social security contributions, as the unemployed do not pay contributions, while at the same time the public expenditure on unemployment benefits increases. Moreover, since income from unemployment benefits is lower than income from pensions, it places further downward pressure, through consumption, on aggregate demand. Therefore, a policy of raising retirement thresholds, although it may reduce the dependency ratio and the state contribution to pensions in the

short run, is likely to increase the public debt-to-GDP ratio in the long run, both by increasing unemployment and by reducing consumption and aggregate demand. Certainly, the increase in unemployment from the imposition of the above reform can be avoided due to the reduction in fertility and thus in the labor force. However, policies that aim to reduce the dependency ratio by reducing unemployment, and thus increasing the number of insured persons rather than by reducing the number of pensioners, are likely to be more effective in the long run in reducing the state subsidy on pensions, as well as in bringing multiple benefits to economic activity.

4. Different types of pension schemes and capitalization of auxiliary pension

Depending on the pension calculation method, pay-as-you-go schemes are divided into defined benefit (DB), defined contribution (DC) or notional defined contribution (NDC) schemes. In defined benefit scheme, the amount of the pension depends on the pensionable earnings and the years of insurance during the pensioner's working life. Pensionable earnings are based on the pensioner's final salary or on the average salary earned during his or her insurance life. On the contrary, in defined contribution scheme, the amount of the pension depends on the social security contributions paid by the pensioner during his or her working life and on life expectancy at retirement. Finally, in the notional defined contribution scheme, each insured person's contributions continue to finance the current pension expenditure, while forming an individual account only for accounting purposes (notional). At retirement, accumulated contributions, life expectancy and an internal rate of return determine the amount of the pension. The three types of pay-as-you-go pension schemes differ both in their behavior towards the risk of population ageing and in the distribution of risk among the parties involved (pensioners/workers/pension funds). According to Whitehouse (2007), in defined contribution and notional defined contribution schemes, an unexpected increase in life expectancy imposes a greater burden on pensioners than on the pension fund, because at retirement the regular payments will be adjusted to the new life expectancy, and therefore pensions will be reduced. On the other hand, in defined benefit schemes, the risk of an increase in life expectancy is shifted to the pension fund (government) and therefore to taxpayers and insured persons rather than to pensioners, as the pension calculation does not take life expectancy into account.

The different behavior of pension schemes to the risk of population ageing has led several researchers to study their vulnerability to demographic changes (Artige et al., 2014; Dedry et al., 2017; Morimoto et al., 2018; Alonso-Garcia et al., 2018), while it has prompted several governments to replace them, especially defined benefit schemes, with schemes less sensitive to demographic risks, such as the defined contribution or the notional defined contribution schemes. The Greek government has also partially replaced the defined benefit method with the notional defined contribution method in the case of auxiliary pension. In particular, according to Article 42 of Law no. 4052/2012 as amended and replaced by Article 96 of Law no. 4387/2016, as replaced upon its entry into force by Article 44 of Law no. 4670/2020, the notional defined contribution system is applied for those insured from 1.1.2013, while both the defined benefit method, for the part of the pension up to 31.12.2014, and the notional defined contribution method, for the part of the pension from 1.1.2015, are applied for those insured before 1.1.2013.

Furthermore, due to the sensitivity of pay-as-you-go defined benefit schemes to demographic changes, several researchers have recommended not only their modification towards a less vul-

nerable pay-as-you-go scheme, such as the notional defined contribution scheme, but also their partial or fully replacement by funded pension schemes. In fully funded pension schemes, the contributions do not finance the current pension expenditure, instead they flow into individual accounts in a pension/investment fund and are invested in financial products. At retirement, the amount of the pension is determined by each pensioner's contributions, the returns on the investment of the contributions and life expectancy. In partially funded schemes, pensions are financed not only from the accumulated funds but also from the current social security contributions. According to various studies, funded pension systems may reduce the state contribution to pensions and the risks of demographic changes (IOBE, 2019), increase capital accumulation through the contributions collected by the pension fund, stimulate investment through the investment of contributions in capital markets (Bijlsma et al., 2014), provide incentives to increase employment (Pissarides committee, 2020), increase labor productivity and wages (Feldstein, 1997), increase per capita income through the high returns earned by pension fund (Siebert, 1997) and therefore contribute significantly to economic growth (Davis & Hu, 2008). Nevertheless, funded pension systems may reduce public savings by increasing private savings (Cesaratto, 2006), transfer domestic funds to foreign markets by investing contributions in financial products of foreign economies (Robolis & Betsis, 2021), reduce the amount of pensions by changing their calculation method (Makarski et al., 2017), expose themselves to financial market risks (Blake, 2006), shift the risk of demographic fluctuations mainly to pensioners (Whitehouse, 2007), and, therefore, fail to confirm the expected economic growth (Cavallini et al., 2013).

The benefits of transition to a funded pension system, as well as projections of population ageing that have called into question the efficiency and long-term sustainability of the pay-as-you-go pension system, have prompted several researchers to investigate more efficient and less vulnerable pension schemes also in the case of Greece (Nektarios et al., 2018; Daskalopoulos et al., 2018; Christodoulakis et al., 2018; Pissarides committee, 2020). The studies mostly recommend the capitalization of a part of the pay-as-you-go pension system, as this can contribute decisively to the long-term sustainability of the social security sector, manage demographic changes more effectively and promote economic growth through the savings and the investment of the contributions, as well as through incentives to increase employment. Finally, the debate on the efficiency and sustainability of the Greek redistributed pension system led, according to Articles 1, 2 and 3 of Law no. 4826/2021, to the recent establishment of the auxiliary pension fund and the implementation of the funded defined contribution pension scheme for the calculation of the auxiliary pension in order to replace the existing auxiliary pension[5].

5. Determinants of pensions

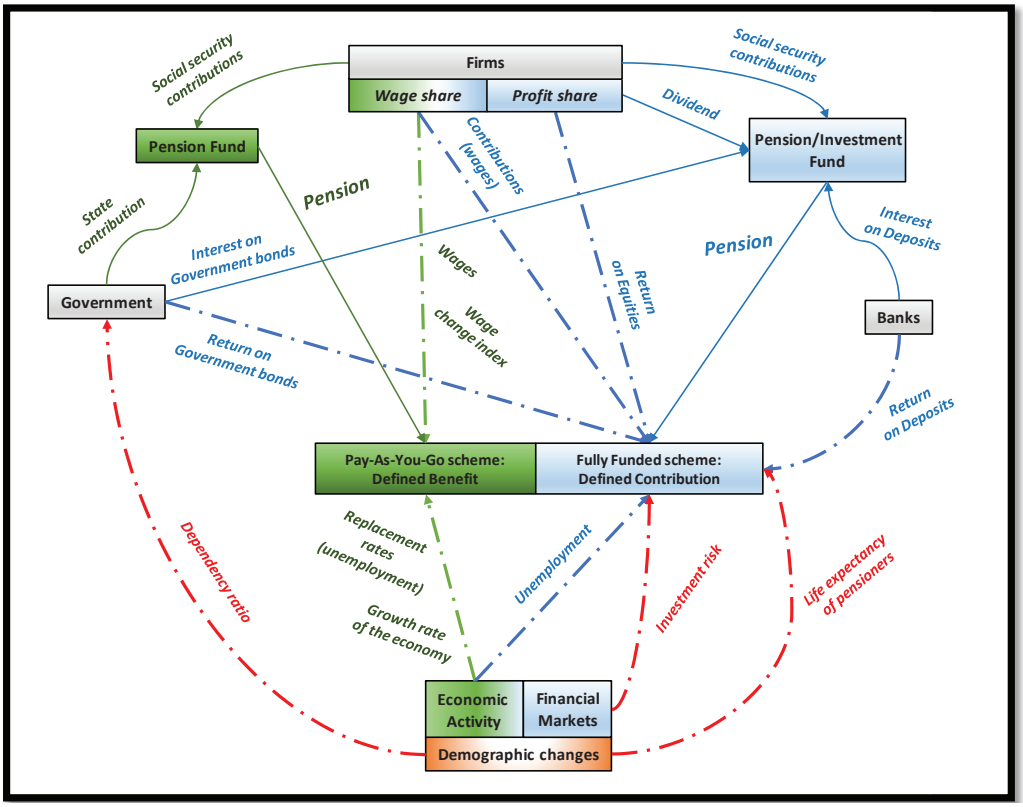
In order to understand the interaction of the two pension systems (Pay-As-You-Go & Fully Funded) and the pension calculation methods (Defined Benefit & Defined Contribution) with economic activity, as well as their behavior to demographic changes, we will describe the different determinants of pensions of the two pension systems and will clarify their relationship with the rest of macroeconomic variables, based on the characteristics and functioning of the contributory pension and the funded part of the auxiliary pension of the Greek pension system.

The contributory pension, according to Article 8 of Law no. 4387/2016 and Articles 22 & 24 of Law no. 4670/2020, is part of the pay-as-you-go pension system, as the contributions of current employees finance the current pension expenditure, while pensions are calculated following

the defined benefit method, as the amount of the pension depends on the pensionable earnings[6] and the replacement rates[7], which refer to each pensioner's insurance period. According to paragraph 4.a. of Article 24 of Law no. 4670/2020, for the period up to 2024, pensionable earnings are valorized by the change in the average annual general consumer price index (CPI), while from 2025 onwards pensionable earnings are annually adjusted based on the salary change index, both calculated by ELSTAT. Furthermore, according to Article 14 of Law no. 4387/2016 and its amendment by Law no. 4670/2020, the total amount of the pension increases annually from 1.1.2023 based on the coefficient resulting from the sum of the annual rate of change of GDP plus the rate of change of the annual general consumer price index of the previous year divided by two.

On the other hand, auxiliary pension contributions are not used to finance current pension expenditure, instead they are credited to individual accounts and invested by the pension fund in financial products, forming diversified portfolios of deposits, bonds and equities. At retirement, the accumulated capital, i.e., the sum of contributions and returns, is converted into a monthly auxiliary pension, which includes provision for fluctuations in the life expectancy of retirees. As a result, the two pension systems differ in the pension calculation method (Defined Benefit vs Defined Contribution), in the sector of pension administration (Pension Fund vs Investment Fund) and in their overall operation (Pay-As-You-Go vs Fully Funded). Figure (1) illustrates the determinants of pensions in the two systems, as well as the sectors of the economy that influence these determinants.

Figure 1: Determinants of pensions in social security schemes



The solid green and blue arrows show the flow of income converted into a pension in the cases of the pay-as-you-go and fully funded schemes respectively. In the case of the pay-as-you-go scheme, current pensions are financed by the current contributions of employees and employers, and if the latter do not cover the pension expenditure, the government subsidizes the difference between contributions and pensions. On the other hand, in the case of the fully funded scheme, pensions consist of the contributions of employees and employers and also of the returns earned by the fund from its investment in firms' equities, government bonds and bank deposits, while, because of the calculation method, there is no deficit between contributions and pensions. The green dotted arrows show the determinants of pensions in the pay-as-you-go scheme, while the blue dotted arrows show the determinants of pensions in the fully funded scheme. These arrows represent the positive relationship between pensions and determinants, e.g., an increase in wages (contributions) will benefit pensions in both schemes, while the red arrows represent the negative relationship between demographic changes and either public debt (pay-as-you-go scheme) or pensions (fully funded scheme), as well as the relationship between the fully funded scheme and investment risks. However, figure (1) does not include the two-way relationship between pension schemes and pensions, both with their determinants and with economic sectors. For example, an increase in pensions, due to an increase in either wages or contributions, directly or indirectly affects consumption, aggregate demand, unemployment and the shares of wages and profits in national income, with the result that these variables change and in turn change pensions again.

In the pay-as-you-go scheme, the main determinants of pensions are the amount of wages received by the pensioner during his working life, as these are used to calculate his future pension, the pensioner's years of insurance, which determine the replacement rates, and the growth rate of the economy, as pensions increase each period on this basis. In the case of the fully funded scheme, pensions are determined by the amount of social security contributions (wages), the returns on latter's investment and the life expectancy projections of pensioners. According to figure (1), the pay-as-you-go scheme is entirely influenced by fluctuations on the real side of the economy (wages, growth rate of the economy), while the funded scheme is linked to changes in both the real (wages) and the financial side (returns on financial products) of the economy. This follows from linking the two pension schemes to the shares of wages and profits in national income. Pensions, although not directly linked to the income shares of wages and profits (functional income distribution), as pensioners do not participate in the production process, are heavily influenced by them, with the result that functional income distribution is very likely to be their most important determinant.

Pensions in both schemes are largely affected by the wage share, as wages, either directly (pay-as-you-go) or indirectly through contributions (fully funded scheme), determine their amount. In the pay-as-you-go scheme, the effect of the wage share in pensions is more pronounced, because pensionable earnings are adjusted each period according to the wage change index. On the other hand, pensions in the funded scheme, in addition to the wage share, are also affected by the profit share, mainly through the dividends received by the pension fund from firms. In line with the previous, a rise in the wage share would in any case have a positive effect on pensions in the pay-as-you-go scheme, which is not always the case for pensions in the funded scheme, as a rise in wages creates countervailing forces in this scheme. On the one hand, a rise in wages, through higher contributions, will benefit the pensions of the funded scheme, but on the other hand, it is likely to reduce the return on equities held by the pension fund, due to the downward pressure that increased wage share places on distributed profits of firms. Moreover, pensions in the pay-as-you-go scheme

are affected both directly (growth rate of economy) and indirectly (unemployment) by fluctuations in economic activity, which takes place only indirectly (unemployment) in the funded scheme. The pensions of the pay-as-you-go scheme increase each period according to the rate of change of GDP, while the unemployment rate indirectly determines the replacement rates, which represent the years of insurance in the calculation of pensions. The unemployment rate also indirectly affects the pensions of the funded scheme, as a lower unemployment rate implies more years of insurance and therefore more accumulated contributions, which may result in higher future pensions.

The calculation method of pensions in the funded scheme includes the risks of demographic changes, as it considers the projected life expectancy of pensioners. In this way, the funded scheme shifts demographic risks to pensioners, as the latter will receive lower pensions if life expectancy increases. On the other hand, demographic risks are not considered by the pay-as-you-go scheme, with the result that a demographic change, such as an increase in the dependency ratio, is borne by the government (state budget) and not by pensioners. Therefore, the pay-as-you-go scheme seems more exposed to risks arising from demographic changes, in contrast to the funded scheme which is clearly less vulnerable to changes such as decreasing fertility or increasing longevity. However, by investing in financial products, the funded scheme is exposed to investment risks, such as the market risk or the interest rate risk. Finally, a very important difference between the two pension schemes is the transfer of resources from the real to the financial side of the economy. In particular, the funded scheme absorbs resources (contributions) from the real economy and invests them in financial products, which can have a positive effect on investment and therefore a significant impact on economic activity. For example, investing in firms' equities can increase the price of equities, increase the market value of firms, generate higher capital gains for shareholders and stimulate firms' investment.

6. Ageing & population decline

According to the demographic projections for the coming decades for Greece, an increase of ageing and a simultaneous decrease in population is expected, through a decrease in fertility and an increase in longevity. The expected demographic changes are likely to have adverse effects on economic activity and raise serious sustainability issues for the social security system.

6.1 Pay-as-you-go pension scheme

Population decline may lead to a slowdown in the growth rates of consumption, demand and output, while the continuous increase in the pension system dependency ratio, both due to the decline in the labor force (fewer insured persons) and the increase in life expectancy (more retired persons), may significantly increase the state contribution to pensions. However, this demographic change can be not only sustainable for the pension system, but also efficient in the long run for the economy, if workers manage to increase their bargaining power and, consequently, their wages in the process of setting the latter. According to Screpanti (1996, 2000) and Cassetti (2003), workers' bargaining power is affected by fear of unemployment, which is best reflected in the rate of change in employment or the rate of change in the employment rate. Therefore, if we consider the rate of change in the employment rate of workers as an indicator of their bargaining power, an exogenous decline in the labor force (fertility decline) may increase their bargaining power, and thus both their wages and the wage share in national income, which could potentially offset the negative impact of ageing and population decline on economic activity.

Since the propensity to consume out of wages is higher than the propensity to consume out of profits (Kalecki, 1937, 1942), an increase in wages would place upward pressure on consumption, demand, and output and to some extent it would counterbalance the downward pressure of population decline to the aforementioned variables. Then, due to the limitation of the negative effect of population decline on economic activity, labor demand can be maintained at its initial level, with the result that the decline in the labor force and the ageing of the population, if jobs are not reduced, would turn into a "transfer" of unemployed people into retirement. The latter, as income from pensions exceeds income from unemployment benefits, may further stimulate consumption and maintain the growth rate of the economy at the initial level. In the short run, the increase in the number of pensioners and the gradual increase in pensions, due to both the increase in pensionable earnings and their adjustment to the growth rate of wages, increase pension expenditure. However, the rise of wages, through the higher social security contributions, can, despite the rise in the dependency ratio, maintain the state contribution to pensions at a level that does not inflate the public debt.

In the long run, pension expenditure will become even higher because pensions will continue to rise due to higher wages (higher pensionable earnings) and lower unemployment (more years of insurance/higher replacement rates) of previous periods. However, the continuous increase in the bargaining power of workers, due to the prolonged decline in the labor force, could lead to a continuous increase in wages and social security contributions, which, combined with lower expenditure on unemployment benefits and higher tax revenues, due to the decline in the unemployment rate and the acceleration of economic activity respectively, could finance the state contribution to pensions. Finally, if propensity to consume out of pensions, which now have a greater impact on consumption due to the higher share of pensioners in the total population, is relatively high, the aggregate demand could increase further, outweighing the negative effect of population decline, thus increasing the growth rate of the economy and possibly reducing the public debt-to-GDP ratio in the long run.

On the other hand, if workers fail to benefit from the reduction of the labor force by increasing their bargaining power and thus the growth rate of wages, the negative impact of population decline on demand will be difficult to avoid without the imposition of additional policies. The decline in consumption and output would probably lead to an increase in unemployment, which would have a further negative impact on demand and the fiscal balance. Furthermore, the continuous increase in pensioners and hence the increase in pension expenditure, as well as the simultaneous decrease in social security contributions, due to the decrease in the number of insured persons (decrease in births & increase in unemployment), will lead to a rapid increase in the state contribution to pensions, which, combined with the decrease in tax revenues due to the slowdown in economic growth, will place a significant burden on the public debt. Finally, the imposition of policies aimed at reducing the state contribution and the dependency ratio, such as reducing pensions or increasing the retirement thresholds, is likely to intensify the slowdown in the growth rate of the economy and increase the public debt-to-GDP ratio in the long run, by further reducing consumption and demand.

6.2 Fully Funded pension scheme

In the fully funded pension system, the reduction in the labor force will increase the bargaining power of workers and in the short term will stimulate consumption and demand, thus tending

to offset the negative effect of the population decline on economic activity. However, in the medium term, the increase in wages places countervailing forces on pensions, through the return earned by pension fund from holding firms' equities. Rising wages place upward pressure on consumption and provide higher social security contributions to the pension fund, thereby increasing the fund's demand for financial products. On the other hand, the increase in wages and thus the increase in production costs reduces, at least in the short term, the profits of firms, which in turn reduces the profits distributed to entrepreneurs and the pension fund. The latter reduces the return earned by the pension fund from holding equities and negatively affects the level of future pensions. The result of the above is that, despite the increase in the fund's portfolio due to the increase in contributions, the pension fund reduces the demand for equities as it starts to invest in more efficient financial products. The fall in equity demand and rising production costs are likely to lead firms to reduce their investment spending, which will place downward pressure on aggregate demand and offset the positive impact of wages on consumption.

In the long term, despite the increase in social security contributions due to a continuous rise in wages, the fund's assets will begin to decline as it pays pensions to more and more retirees, further reducing the demand for equities. Future pensions, because of their link to both wage share and profit share, on the one hand are positively affected by the increase in the contributions, but on the other hand are negatively affected by the lower returns earned by the fund from holding equities. Also, if we consider the increase in life expectancy of pensioners, which places further downward pressure on pensions, we realize that pensions in the fully funded system are significantly lower than pensions in the pay-as-you-go system, with the consequence that, as pensioners increase, pensions do not contribute effectively to stimulating consumption. Finally, the greater negative impact on investment and lower pensions relative to the pay-as-you-go system may lead the economy to lower demand and output and higher unemployment and dependency ratios, with the result that weaker growth rate may not be able to offset the impact of population decline on economic activity.

In the case of the fully funded system, the fiscal balance is not burdened by the increase in the dependency ratio, as no deficits are created between contributions and pensions, nevertheless, the negative impact of population decline and low pension expenditure on economic activity may lead in the long run to an increase in the public debt-to-GDP ratio. If workers do not benefit from the reduction of the labor force and do not increase their bargaining power, the negative effect of population decline on aggregate demand, as in the case of the pay-as-you-go system, would be difficult to overcome without the imposition of expansionary policies.

6.3 Different characteristics of each economy

In any case, the impact of demographic changes on social security schemes and economic activity varies depending on the specific characteristics of each economy, such as the demand regime, the propensities to consume out of income from different sources, the intensity of demographic changes, the share of consumption and investment in total output, the labor and social security institutions, the investment risks, the openness of each economy, etc. For example, in a "wage-led" economy (Blecker, 1989; Bhaduri & Marglin, 1990), a rise in the wage share would probably increase, at least in the long run, by stimulating consumption, demand and output, the profit rate of firms, which would generate higher returns to the pension fund of the fully funded system from holding equities and would lead to higher pensions in the long run. On the other hand, in

an economy like the one we have described in which a rise in wages accelerates aggregate demand by increasing consumption, but at the same time places downward pressure on the profit rate of firms and on investment ("conflictual stagnationist") (Marglin & Bhaduri, 1991), pensions of the fully funded system face countervailing forces because of their link to both the wage share and profit share.

Moreover, in an economy where the propensity to consume out of pensions is relatively high, any reduction in pensions would have a multiple negative impact on economic growth through consumption. It is important to note that the effect of the profit share on pensions of the funded scheme is proportional to the pension fund's investment in domestic financial products, because the more foreign financial products the pension fund holds in its portfolio, the less it is affected by the fluctuations in domestic economic activity. Similarly, the more equities of domestic firms the pension fund holds, the more the latter's decisions affect domestic investment.

7. Conclusions

Research into pension systems that are more efficient for the economy and less vulnerable to demographic risks has been a major concern of governments and researchers in recent decades, especially in view of the expected increase in population ageing. This issue becomes even more relevant in the case of Greece, as, in addition to ageing, a significant population decline is expected, resulting in fewer and fewer insured persons contributing to the pensions of more and more pensioners. The latter has already led to the transformation of the auxiliary pension from a pay-as-you-go to a fully funded scheme. According to most relevant studies, the fully funded scheme is less vulnerable to demographic risks and through savings and investment can stimulate economic growth and reduce the state contribution to pensions. Despite the important findings, most of these studies do not place pension systems in a fully macroeconomic environment in order to examine the interaction between pensions and other macroeconomic variables, and do not realize that the intergenerational transfer of resources is a two-way process and can stimulate economic activity through consumption and demand. Changes in economic activity can affect the determinants of pensions and alter the latter, which in turn can have a significant impact on macroeconomic environment, creating a two-way dynamic relationship between pension systems and economic activity. Therefore, despite the different demographic projections of each society and the different characteristics of each economy, it is crucial to explore the linkage between pension systems and economic activity, not only to clarify the determinants of pensions, but also to develop pension systems that provide fair returns and adequate income to pensioners and mitigate poverty and social exclusion of the elderly.

Notes

1. Pension system dependency ratio (SDR) is the ratio of pensioners to contributors.
2. The old-age dependency ratio (OADR) is the ratio of the total population aged over 65 years to the total population aged between 15 and 65 years.
3. The increase in pension expenditure as a percentage of GDP is largely explained by the contraction of GDP (over 25%) during the same period.
4. The state contribution finances not only the difference between social security contributions and pensions, but also national pensions, which are directly and entirely financed by the state budget.

5. According to Article 6 of Law no. 4826/2021, the new system includes employees insured for the first time after 1.1.2022, while from 1.1.2023 to 31.12.2023, insured persons who have not reached the age of 35 may optionally be included.
6. Pensionable earnings are the average of the worker's annual earnings throughout his or her working life.
7. The replacement rate for each insurance year from 1.10.2019 is derived from the table of Article 24 of Law no. 4670/2020.

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