

Portfolio Management in Public Pension Reserve Funds

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ABSTRACT

This paper presents the basic principles and procedures of a theoretical portfolio management system and also the practical implementation and the actual results of real utilization efforts of such systems. Portfolio management of public pension reserve funds is one of the major factors that can contribute in the provision of adequate pension level. The key components of portfolio management are the chosen strategy of investment (active or passive portfolio management) and the sequential steps of the investment decision making process. Numerous studies focusing on the investment management behavior, function and practice have been conducted by various researchers and also the OECD. All of them have stressed the need of an effective portfolio management strategy in order to maintain a satisfactory level of pensions for the pensions fund beneficiaries.

Keywords: Portfolio Management, Public Pension Reserve Funds, Asset Allocation.

Gestión de carteras en los Fondos de Reserva de las Pensiones Públicas

RESUMEN

Este artículo presenta los principios y procedimientos básicos de un teórico sistema de gestión de carteras, así como la implementación práctica y los resultados reales de los esfuerzos realizados en la utilización de tales sistemas. La gestión de carteras en los fondos de reserva de las pensiones públicas es uno de los factores más importantes que pueden contribuir a provisión de un nivel de pensión adecuado. Los componentes fundamentales de tal gestión son la estrategia de inversión (activa o pasiva) y las etapas secuenciales del proceso de toma de decisiones de inversión. Son numerosos los investigadores que han llevado a cabo estudios que se centran en el comportamiento, funcionamiento y práctica de la gestión de inversiones; incluso lo ha hecho la OCDE. Todos ellos destacan la necesidad de una gestión de carteras efectiva para poder mantener un nivel pensionario satisfactorio para los beneficiarios de los fondos de pensiones.

Palabras Clave: Gestión de Carteras, Fondos de Reserva de las Pensiones Públicas, asignación de activos.

Clasificación JEL: G11, G23, H55

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1. INTRODUCTION

During the previous decade, the financial, credit and debt crisis, ageing population and other macroeconomic data led governments to reconsider their policy about managing public pension reserve funds (PPRF). In many countries law changes have occurred, in an effort to limit the risk of fund's reserves and becoming able to meet future obligations towards their pension beneficiaries. The aim of this paper is to present the basic theories about portfolio management and to combine and apply them in the public pension fund reserves.

In the second section, the necessity of portfolio management is highlighted and the decision making process and types of portfolio management is briefly presented. Some of the studies that have been published, in the field of portfolio management, are being cited in the third part of this paper.

The fourth section of this paper deals with the evidence in OECD countries for public pension reserve funds, with an emphasis in their investment policy, asset allocation, asset management and performance of their investments. Finally, in the fifth section the main conclusions about the use of Portfolio Management in dealing with the public pensions reserve funds are presented.

2. PORTFOLIO MANAGEMENT

2.1. The importance of Portfolio Management

It is undeniable that economic policy, fiscal policy and economic fundamentals fluctuate over time. In this context changes in economy can lead in pension systems alterations and subsequently in lower pension levels. Managing reserves of pension funds is one of the major factors that can contribute in the provision of adequate pension levels.

2.2. Decision making process for portfolio investment

Decision making process for portfolio investment or investment management process may be defined as the process of managing money, funds, or even reserves of public pension funds. This process can be analyzed in five stages: (1) setting of investment policy, (2) analysis and evaluation of investment vehicles, (3) formation of diversified investment portfolio, (4) portfolio revision and monitoring and (5) measurement and evaluation of portfolio performance process.

The first step of the investment management process includes the setting of the investment objectives based on the investment return requirement and the risk tolerance of the investor or the manager. Generally there are two types of investing: (a) direct investing, and (b) indirect investing. According the first

one, investors use financial markets and take all the risk and revenues. The indirect investment is conducted via financial intermediaries, such as portfolio investment companies.

Investment policy should be based on the rate of return at which the investor is compensated, which includes the time value of money during the period of investment, the expected rate of inflation during the period and the risk involved. Furthermore, an investment policy should also account for other constraints that may affect the investment, such as liquidity needs, determined needs for specific periods and other investor needs. Investment policy also includes transaction cost and taxes. Also the chosen investment period will define the kind of investment that will be used.

Finally, asset allocation is a major factor in the determination of investment policy. Asset allocation is mentioned in the differentiation of portfolio assets, providing a combination of risk and expected return. There are two categories in asset allocation: (a) strategic asset allocation and (b) tactical asset allocation. Strategic asset allocation is usually used to extract long-term asset allocation weights, by investors that allocate a particular percentage of their portfolio to every asset class, and are not willing to change it for a long time period. In the contrary, tactical asset allocation deals with investors that have asset allocation weights for short periods.

In this step of the process, public pension funds should take into consideration the restrictions set by the law. In many countries there are upper limits or upper caps in the public pension funds' percentage of reserves that can be invested, and in the type of securities to be invested in.

As for the second step of portfolio investment process, it should be mentioned that after setting up the investment policy, an investor, or an institution, should analyze the defined vehicles that fit to its profile, according to its specific needs, by using technical analysis and fundamental analysis.

The third step deals with the formation of diversified investment portfolio, where the investor defines the investing portfolio, taking into account issues that have to do with selectivity, timing and diversification. Anat *et al.* (1986) show how the quality of timing and selectivity information can be identified statistically in a number of simple models. Diversification is a method that usually leads to lower risk of investment and there exist two kinds of diversification techniques random and objective diversification. Public pension funds usually use objective diversification.

The fourth step has to do with the revision of the three previous steps which takes place in specific time periods. For institutional investors such as public pension funds, portfolio revision is continuous and very important part of their activity, mainly because the resister monitoring may protect the future pension beneficiaries. The latter are the main directly interested party, because what is

invested is their insurance deductions throughout their working period, and specific segments of these amounts will be returned to them in the form of retirement compensation.

The last step involves the necessary evaluation of the portfolio, which deals with assesment / estimation of the risk and of the return of the portfolio. There are particular methods and benchmarks that can be used to measure the performance of the portfolio.

2.3. Investment vehicles

One of the most important characteristics of investment vehicles is their performance dependence on risk and return, which occurs due to uncertainty in capital markets. The main types of financial investment vehicles are: (a) the short term investment vehicles, which include certificates of deposit, treasury bills, commercial paper, bankers' acceptances, repurchase agreements (b) the fixed-income securities, which include long-term debt securities and preferred stocks, (c) the common stock, (d) the speculative investment vehicles, such as options, futures and commodities and (e) other investment tools, which are comprised by the various types of investment funds, investment life insurance, pension funds and hedge funds.

2.4. Types of Portfolio Management

The main strategies for investment portfolio management are: (1) active portfolio management and (2) passive portfolio management. Active portfolio management deals with the fact that inefficient markets during time periods lead to mispriced securities or groups of securities in the financial market. Implicitly, this means that investors can benefit from this inefficient. Active bond management strategies are based on the same assumption mentioned above, that the bonds market is not efficient. As a result, an investor can benefit through forecasting future interest rates and identifying the over valued and under valued bonds.

Some active bond management strategies are: (a) the active reaction to the forecasted changes of interest rate, (b) bonds swaps, and (c) immunization. The first classification deals with the fact that changes in interest rates influence bond prices, leading the investor to reform his portfolio according to these changes. The bond swaps strategy deals with the replacement of a bond that is included in the portfolio by a new one. The third strategy protects the investor from interest rate risk while keeping the same duration of portfolio. Immunization strategy deduces a particular rate of return during a specific investment horizon. Changes in interest rates affect the bond's price and value in two directions that immunization tries to leave out of the portfolios wealth. Passive portfolio management is a strategy used for long term investments

where investors act under the assumption that the security markets are relatively efficient. Usually these investors have a large portfolio of securities, such as pension funds, are active in controlling costs, taxes and rebalancing, but passive in market timing and stock picking. When investing in bonds, passive bond management strategy is mainly based on the assumption that bond prices are determined rationally. The investor has lower transaction costs, expected return and risk compared to the active strategy.

Two subcategories in bond management strategies are: (a) buy and hold strategy, and (b) indexing strategy. The first one applies to investors that are not interested in active investing and trading in the capital market. The investor takes this investment decision only in the cases that bonds held by him either lose their rating, reach the maturity period or when bonds are recalled. An investor that selects this kind of strategy chooses a bond portfolio that promises to meet his investment objectives, and hence he spends time and effort in his initial selection (Chandra 2008). The second strategy is usually selected by investors that own a bond portfolio which is identical to the well diversified bond market index. Each of the broad bond indexes contains a large number of individual bonds. There are many indexing methodologies developed to realize this passive strategy, all in accordance with the average bond market return.

3. LITERATURE REVIEW ON PORTFOLIO MANAGEMENT OF PUBLIC PENSION FUNDS

3.1. Studies for the case of the United States

Due to the fact that PPRF of US (OECD 2014¹) held USD 2.8 trillion out of USD 6.5 trillion in total it considered that it should be separately report in large-size pension funds, such as USs’.

Boon *et al.* (2014) using globally data, having to do with regulatory framework for public, corporate and industry pension funds in the US, Canada and the Netherlands, investigate the influence of investment regulations on the riskiness and procyclicality of defined-benefit (DB) pension funds' asset allocations. The main outcome is that regulatory factors have vital importance and that risk based capital requirements, balance sheet recognition of unfunded liabilities, lower liability discount rates, and shorter recovery periods lead pension funds to decrease their asset allocation to risky assets. Furthermore, according to Mohan and Zhang (2014), using data from states of US, it is demonstrated that unlike private pension plans, public funds undertake more risk if they are underfunded and have lower investment returns in the previous years.

¹ OECD (2014), Annual Survey of Large Pension Funds and Public Pension Reserve Funds, Report on Pension Funds' Long-Term Investments, OECD Publishing.

In their research, Lubich and Dobra (2013) analyze the relationship between governance, asset allocation, and risk among state and local government-operated pension systems in the US. They imply that governance influences investment decisions and risk profiles of public sector pension systems. They also suggest that agency problems exist between decision makers, plan members, and taxpayers. By September 30, 2012, the US state and local government pension funds held assets valued at about \$3.1 trillion. The size of state and local pension funds in terms of assets and the number of members shows that changes in their strategy can cause benefits for the citizens of the US.

Andonov *et al.* (2013) compare asset allocations and liability discount rate of public versus private funds in the US, Canada and Europe. The research shows that US public funds in order to maintain high discount rates and present lower liabilities preferred to increase their allocation to riskier investment strategies. It is also demonstrated that the increased risk-taking of US public regulation is negatively related to their performance.

There is a large number of researches that have been conducted in the US with a focus on the investment behavior of public pension funds. Albrecht and Hingorani (2004) and Useem and Mitchell (2000) analyze the relationship between governance structure and measures of overall pension fund performance. Asset allocation and returns is the subject of Useem's and Mitchell's (2000) research, which concludes that measures of system governance have limited explanatory power, and that asset allocation is the primary determinant of fund² performance. In the research of Albrecht and Hingorani (2004), the authors focus on direct effect of governance on rates of return, and on indirect effects, through asset allocation.

3.2. Studies for asset allocation and government policy

A recent study by Souto and Musalem (2012) supports that a good governance structure for PPRF is a component that may cause benefits for public pension funds. The sample they use is of 83 PPRF from 68 different countries, showing a global comprehensive survey on governance, transparency, assets, and investments. Their results include a wide dispersion in governance and transparency performance of these funds. They also find that those funds invest almost entirely in government securities. It should be mentioned that in U.S. the investments reaches 100%, in Spain 99.7%, in Sri Lanka 98.6%, and in Singapore 97%.

Ammann and Zingg (2010) find that governance policy in Swiss pension funds affect investment performance. Clare *et al.* (2010) study the ability of

² Board of Governors of the Federal Reserve System, 2012.

active fund managers to find solutions in addressing underfunding problems, starting with UK pensions.

Another research, by Chan-Lau (2005), analyzes the investment behavior of pension funds in developed and emerging market countries. Authors identify: firstly, the main determinants of the emerging market asset allocation of pension funds in developed countries; secondly, the contribution to local securities markets; thirdly, the determinants of the investment performance of pension funds. Impavido (2002) studied public pension systems from various countries addressing widespread governance issues ranging from the institutionalization of ETIs to heavy-handed portfolio restrictions, and arguing that the governance of NPPFs is critically important.

Grossman (1995) support that markets have an allocating role, and price changes create noise in the signal extraction process, and markets where such trading is important are markets in which it is expected to find a failure of informational efficiency. The use of dynamic trading strategies is an important source of allocational trading. The investors face incomplete equitization of risks, which causes trade transactions, and the latter implies the inefficiency of passive strategies.

3.3. Studies for performance of the portfolio

There are several studies, which rely on different asset classes and different time periods, showing that performance does not persist. Jensen (1968) studied the performance of 115 mutual funds over the time period 1945-1964 and found no evidence of persistence. Later on, Kritzman (1983) came to the same findings as Jensens, after examining the 32 fixed-income managers retained by AT &T for at least 10 years. In the same year, Dunn and Theisen (1983), by using a time period 1973-1982, also found no persistence using a data that included 201 institutional portfolios. A few years later, Elton *et al.* (1990) also resulted that that performance did not exist for 51 publicly offered commodity funds from 1980 to 1988.

In contrast to all the above studies, there are many surveys claiming that performance actually does persist. Some of the latter are Bauman and Miller's (1994), which by using a sample of 608 institutional portfolios for the time period December 1972 to September 1991 found persistence corresponding to complete market cycles, as well as Goetzmann and Ibbotson's (1994), which used 728 mutual funds over the period 1976 to 1988 and concluded that there is evidence for persistence. Similar evidence derives from the study of Grinblatt and Titman (1988) and Lehmann and Modest (1987). In 1993 Hendricks *et al.* found persistence of performance for 165 equity mutual funds for the time period 1974-1988. With regard to research on the United Kingdom's case, Brown and Draper (1992) find evidence for persistence using data on 550

pension managers from 1981 to 1990. Furthermore, in the study of Kahn and Rudd (1995), style effects, fees and expenses, as well as database errors are accounted for, through a time period of October 1988 to September 1994, and results find no evidence of performance persistence for 300 equity funds. In this research, evidence of insufficient persistence of performance is found in the cases of 195 bond funds from October 1991 to September 1994.

4. PUBLIC PENSION FUND'S RESERVES MANAGEMENT. EVIDENCE FROM OECD

During the last decade population ageing, declining fertility rates, economic crisis, unemployment and other reasons, underlined the need of reforming the pension systems globally. According to Yermo³ (2008), the main determining feature of public pension reserve funds, which differentiates them from pension funds, is that their ultimate beneficiaries (the general population) do not have legal or beneficial ownership over the reserve funds' assets. Instead, the legal or beneficial owner is the institution that administrates the public pension system (social security reserve funds - SSRFs) or the government (sovereign pension reserve funds - SPRFs). As a result, there exists a greater state influence in pension funds. In Latin America and most countries in Eastern Europe, pension funds have been established approximately since year 2008, partly replacing the PAYG financing system. Asia has relatively large reserve funds that support their social security systems, but a rather small pension fund sector.

4.1. Pension reform measures in 34 OECD countries, 2009-2013

In the last twenty years Norway, Poland, the Slovak Republic, Spain, Turkey and the United Kingdom have made the most reforms. During the last years, in the period under scrutiny, most of OECD countries, adopted pension reform measures (Table1).

Using as a source OECD countries there are evidence about changes having to do with the pension system coverage, adequacy of retirement benefits, financial sustainability, incentives that encourage people to work for more years, administrative efficiency, diversification of retirement income sources across public and private providers and other such as temporary measures and those designed to stimulate economic recovery. Countries such as Belgium and Chile, began changes in their legislation during the period 2004-2008 and after this period they are trying to improve financial sustainability and administrative efficiency. Greece and Ireland, revised the way in which they calculate benefits.

³ The report focuses on reserve funds in the following countries: Canada, France, Ireland, Japan, Korea, New Zealand, Norway and Sweden.

Italy in 2012 replaced defined benefit public pensions to notional defined-contribution (NDC) accounts.

Table 1
Overview of pension reform measures in 34 OECD countries, 2009-2013

	Coverage	Adequacy	Sustainability	Work incentives	Administrative efficiency	Diversification/security	Other
Australia	x	x	x	x	x		x
Austria	x	x	x				x
Belgium				x			
Canada	x		x	x		x	x
Chile	x	x			x	x	x
Czech Republic			x	x		x	
Denmark				x	x		
Estonia		x	x	x	x	x	
Finland	x	x	x	x		x	
France	x	x	x	x			x
Germany		x	x	x			
Greece		x	x	x	x		
Hungary		x	x	x		x	x
Iceland							x
Israel	x		x	x		x	x
Italy	x	x				x	
Japan		x	x	x	x		
Korea	x	x	x		x		x
Luxembourg	x		x	x			
Mexico		x			x	x	
Netherlands						x	
New Zealand		x	x				x
Norway		x	x	x			
Poland	x		x	x		x	
Portugal	x	x	x	x		x	
Slovak Republic			x		x	x	
Slovenia			x	x			
Slovenia	x	x	x	x	x	x	x
Spain		x	x	x			
Sweden		x	x	x	x	x	
Switzerland			x			x	
Turkey				x		x	x
UK	x	x	x	x	x	x	x
US	x	x	x				

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Source: Pensions at a glance 2013: OECD AND G20 INDICATORS.

All OECD countries have set up mandatory or quasi-mandatory pension plans, public or private, to achieve quasi-universal coverage. Italy and New

Zealand in 2007, UK in 2012 and Ireland in 2014 took measures to institute automatic enrolment in private voluntary plans.

Most OECD countries increased, or they planned to increase, retirement age. For example, Hungary increased pension age from 55 for women and 60 for men to 62 for both, France to 62, Greece to 65, Italy from 60 for men to 65 and from 55 for women to 60, Australia for women from 60 to 65 and in the future to 67 for both, Japan from 60 to 65, UK to 68 and Spain to 67 for both men and women by 2027.

Several OECD countries adopt measures having to do with diversification of investment policy of PPRF. Canada, the Czech and Slovak Republics, Poland and the United Kingdom adopted voluntary pension plans to improve investment options for workers. Canada, Estonia, Hungary, Israel, Mexico and Poland adopt policies that allow individuals greater choice over the way their retirement savings are invested in private plans.

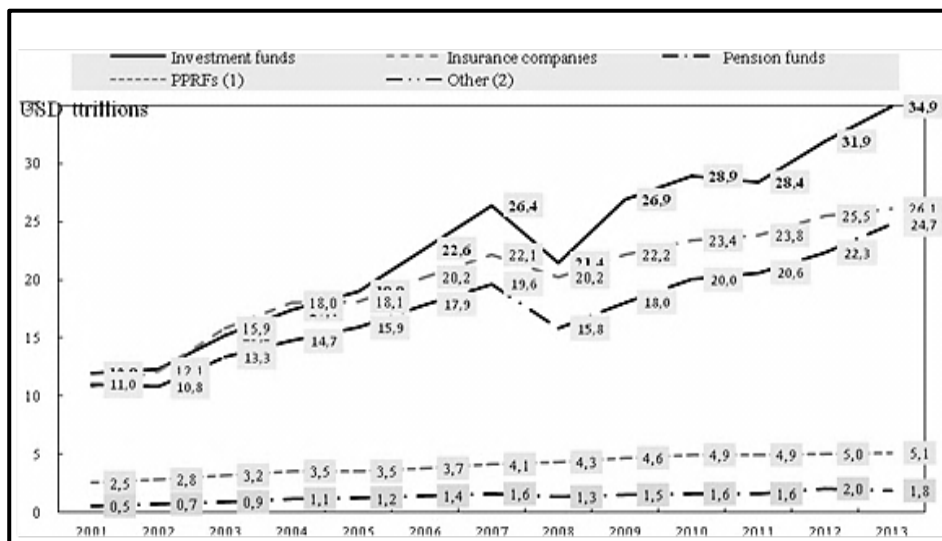
Chile, Finland, Switzerland and Turkey reduced restrictions on investment options dealing with diversification of pension funds' portfolios. Furthermore, Chile and the Slovak Republic allowed pension funds to take larger shares in foreign investments. Chile permitted increase in foreign assets from 60% to 80% of portfolios of DC plans, while Turkey's pension funds use derivatives for investment purposes since 2010.

In the shadow of solvency rates, Canada, Chile, Estonia and Ireland, adopted strict rules for investments on risky assets, in contrast with Finland and the Netherlands that for a short time period, relaxed solvency rules, so as to give funds longer time to recover.

4.2. Institutional investors in the OECD countries

The recent credit crisis led to reductions in government revenues to finance pay as you go public pensions, which led people to prefer other alternatives such as private insurance. According to OECDs' survey in 2013, the primary institutional investors in the OECD held totally USD 92.6 trillion in assets (Figure 1). This amount includes USD 24.7 trillion from pension funds, USD 5.1 trillion from PPRFs, USD 26.1 trillion from insurance companies and USD 34.9 trillion from investment funds. It is worth seeing that in 2001 investment funds had a portion of 32.4% out of total and in 2013 this portion increased to 37.7%, while the portion for PPRFs for the same years was 6.8% and 5.5% respectively.

Figure 1
Total assets by type of institutional investors in the OECD, 2001-2013, In USD trillion



Note: Book reserves are not included in this chart. Pension funds and insurance companies' assets include assets invested in mutual funds, which may be also counted in investment funds. As 2013 annual data for investment funds, insurance companies and other institutional investors are not yet available, 2013 Q4 data have been used instead when available. 1. Data include Australia's Future Fund, Belgium's Zilverfonds (2008-2013), Canada Pension Plan Investment Board, Chile's Pension Reserve Fund (2010-2013), Japan's Government Pension Investment Fund, Korea's National Pension Service, New Zealand Superannuation Fund, Government Pension Fund - Norway, Poland's Demographic Reserve Fund, Portugal's Social Security Financial Stabilisation Fund, Spain's Social Security Reserve Fund, Sweden's AP1-AP4 and AP6, United States' Social Security Trust Fund. 2. Other forms of institutional savings include foundations and endowment funds, non-pension fund money managed by banks, private investment partnership and other forms of institutional investors.

Source: OECD Global Pension Statistics, Global Insurance Statistics and Institutional Investors databases, and OECD staff estimates.

4.3. Governing body of public pension funds

Under the SPRF structure, the governing body is either an independent committee (such as the National Pensions Reserve Fund Commission in Ireland) or the highest organ of an independent legal entity that is exclusively responsible for the management of the reserve fund (such as the Board of the Guardians of New Zealand Superannuation). In Norway, the fund is directed by the parliament, which determines the investment guidelines, and the Ministry of Finance. The fund's assets are invested by the asset management subsidiary of the Central Bank (Norges Bank Investment Management).

In Japan, Korea and Norway, the fund's government body is supervised by the government ministry or the Parliament. This implies that there is political influence on investment decisions, mainly on the ones entailing a macroeconomic scope. For example, in the time period 1997-8, when the Asian

financial crisis occurred, government of Korea and Japan enforced their funds to buy shares, with an ultimate view to supporting of the stock market.

4.4. Main objectives of public pension funds in OECD countries

According to Yermo⁴ (2008), most reserve funds have a mission statement. The only countries that have stated a specific rate of return objective are Canada, Japan and New Zealand. In Canada, the government has set a funding ratio, which equals to the public pension's assets to liabilities ratio. There is a target for the rate of return at 4.2 %, and the time horizon is determined the year 2025. In this year, the funding ratio must have been increased from 8 % to 25 %. This is based on the yield on long term government bonds in real terms, plus a 2.3 % premium for equities.

The purpose of establishment of the French Pension Reserve Fund (FRR) has been to contribute to the long-term sustainability of the PAYG pension plans. The fund receives various contributions from the government, nevertheless it cannot give disbursements until the year 2020.

In Ireland, the NPRF's explicit aim is tax-smoothing, covering future deficits in the pension system. No money can be withdrawn before 2020. In Japan, the GPIF is required to develop an investment strategy dealing with a long-term rate of return, maintaining a stable ratio of reserves to annual public pension expenditure. The performance goal, which is 2.2 % p.a. (3.2 % nominal) or 1.1% p.a. above the assumed rate of growth of wages, was set by the Ministry of Health and Welfare.

In New Zealand, the fund is required to facilitate tax smoothing over a forty-year period, while government's contribution rate is linked to the fund's performance. Likewise, there can be no withdraws before the year 2020. In Korea, the requirement for public pension fund is defined as a long-term goal to align fund's return with the pace of GDP growth. In Sweden, public pension funds are requested to manage assets so as to achieve the greatest possible return on investments, with low total risk.

4.5. Investment Strategy. Policy of public pension funds in OECD countries

The investment strategy for public pension funds is determined by the fund's governing body. Sovereign Wealth Funds (SWFs) and PPRF changed their strategy in recent years by increasing participation in financial markets. Namely in Norway Government Pension Fund Global at the end of 2013 held USD 849.6 billion in assets, accounting for 171.5% of Norway's GDP. Furthermore, in October 2014 the largest pension fund in the world, Japan's Government

⁴ The report focuses on reserve funds in the following countries: Canada, France, Ireland, Japan, Korea, New Zealand, Norway and Sweden.

Pension Investment Fund, changed its investment policy, including alternative assets as part of its portfolio allocation, while, since 2003 Korea had already relaxed restrictions and asset allocation has been diversified, including foreign securities and alternative investments. In 2012 government of Ireland changed legislation about the National Pension Reserve Fund and allow investment only in areas called “strategic importance to Irish economy”.

Irish funds are prohibited from investing in Irish government securities and in Norway, the restriction limits that were standing until 2006, used to determine that government pension fund’s ownership of any company cannot be more than 3% of its assets. After the year 2006, the limit has been raised to 5%.

In Sweden, restrictions deal with asset classes. For instance, funds are permitted to invest only in capital market instruments, whereas direct loans are prohibited. Furthermore, 5% of the fund’s assets can be invested through portfolio management funds in unlisted securities, while at least 30% of them ought to be invested in low-risk securities. Finally, only up to 40% of the fund’s assets may be exposed to currency exchange risk. As for asset allocation, only 10% of the fund’s assets can be invested to one issuer or group of issuers, while each fund cannot own more than 10% of the votes of any single listed company.

4.6. Performance and asset allocation of public pension reserve funds in OECD countries

In Canada, Korea, Japan and Norway, public pension funds used to invest in conservative portfolios, mainly in fixed income securities or loans to public entities. In the recent years, investment preferences are in equities and other asset classes, such as private equity, hedge funds, commodities, and other alternative investments facing higher risk and return.

In France, Ireland, New Zealand and Sweden, public pension funds diversified their investments portfolios, mainly by including size allocation to equities.

All countries use a market valuation approach, but there are some differences in the methodology for calculating rates of return. On average, all funds included in Yermo (2008) research have reached their long-term return targets and have performed better than their market benchmarks, even after taking management fees into account. According to Vittas *et al.* (2008), both in terms of transparency and management efficiency, the assessment is generally positive.

4.6.1. Size of Public Pension Reserve Funds

At the end of 2013 the total amount of PPRFs assets was equal to USD 5.6 trillion (OECD 2014), the largest portion was held by the US reaching the

49.5% out of total assets and Japan, Korea, China and Canada follows. In terms of total assets as reflecting national economy, Korea comes first in the list and Sweden and Japan follows. The largest increase as % compared with the previous year, was Argentina's Sustainability Guarantee Fund which faced 34.6% increase, while Spain's Social Security Reserve Fund faced a decrease of 14.7%. In the Table 2 the size of public pension reserve fund markets in selected OECD countries and other major economies for the year 2013, is being presented:

Table 2
Total assets of selected PPRFs in 2013

Country head office	Name of the fund or institution	Founded in	Total investments or Assets (1)		
			USD billions	% of GDP	% increase (compared to previous year)
Selected countries					
United States	Social Security Trust Fund	1940	2.764,4	16,5	1,2
Japan	Government Pension Investment Fund	2006	1.223,9	26,9	14,7
Korea	National Pension service (2)	1988	404,5	32,4	8,9
China (People's Rep. of)	National Social Security Fund	2001	203,5	2,1	12,3
Canada	Canada pension Plan Investment Board	1997	189,3	10,7	16,6
Sweden	National Pension Funds (AP1-AP4 and AP6) (3)	2000	164,7	29,0	10,4
India	Employee Provident Fund (2,4)	1952	116,2	6,1	15,8
Australia	Future Fund	2006	85,6	6,2	17,2
Canada	PSP Investments (2,5)	1999	75,0	4,2	na
Spain	Social Security Reserve Fund	1997	74,1	5,3	-14,7
France	AGIRC-ARRCO (2)	n.d.	71,6	2,5	na
Argentina	Sustainability Guarantee Fund	2007	50,7	11,3	34,6
Canada	Quebec Pension Plan	1966	43,1	2,4	17,4
Norway	Government Pension Fund - Norway	2006	28,9	5,8	13,3
Belgium	Zilverfonds	2001	27,5	5,2	4,1
New Zealand	New Zealand Superannuation Fund	2001	20,6	11,4	20,2
Portugal	Social Security Financial Stabilisation Fund	1989	16,1	7,1	6,9
Indonesia	Jamsostek (6)	1977	12,3	1,7	12,9
Chile	Pension Reserve Fund	2006	7,3	2,8	36,4
Poland	Demographic Reserve Fund	2002	5,9	1,1	7,2
Mexico	IMSS Reserve (7)	n.d.	1,7	0,1	7,0
Bosnia and Herzegovina	Pension Reserve Fund Of Republic of Srpska	2011	0,2	0,9	0,6
Total selected OECD countries (8)			5.587,1	18,3	7,1

Table 2 (continue)
Total assets of selected PPRFs in 2013

Country head office	Name of the fund or institution	Founded in	Total investments or Assets (1)		
			USD billions	% of GDP	% increase (compared to previous year)
<i>Memo item: Sovereign Wealth Funds with a pension focus (9)</i>					
Norway	Government Pension Fund - Global	1990	849,6	171,5	33,6
Russian	National Wealth Fund (2)	2008	88,6	4,3	7,8

(1) Data correspond to all forms of investment with a value associated to a pension fund/plan. (2) Data have been gathered from publicly available reports. (3) Data for AP6 come from publicly available reports. The 2012 data for AP1 come from a publicly available report. (4) Data refer to the end of March 2013, and include the Employees Provident Fund, the Employees' Pension Fund and the Employees Deposit Linked Insurance Fund. (5) Data refer to the end of March 2013. (6) Jamsostek was founded in 1977 as a state entity which develops employment accident, health care, death and provident fund schemes for employees. Since the beginning of January 2014, the state pension fund was converted into BPJS Ketenagakerjaan, which is the workers' social security provider agency. (7) Data only refer to reserves used to pay early retirement due to invalidity or work-related injuries. (8) Weighted average for assets as a % of GDP and % increase. (9) Norway's Government Pension Fund - Global and Russia's National Wealth Funds are sovereign wealth funds and not public pension reserve funds, because their mandate goes beyond financing pension expenditures. "n.d." means not available.

Source: OECD and various other sources.

4.6.2. Asset allocation of public pension reserve funds

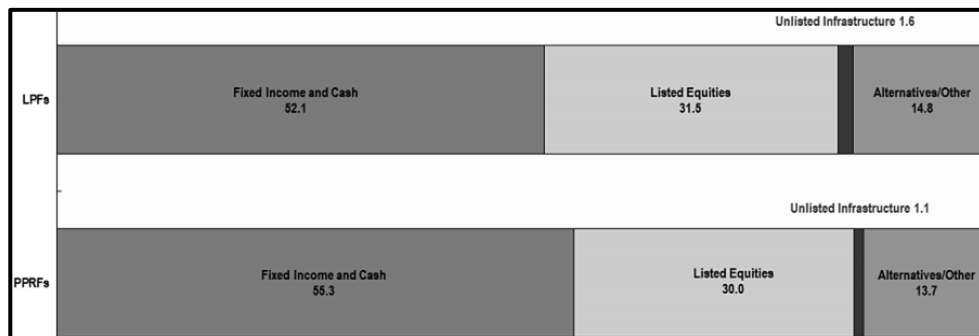
According to recent data (OECD 2014), 55.3% of PPFs assets were invested in fixed income and cash (lower from the 64% in 2010), 30.0% in listed equities (increased from the 27% in 2010), 1.1% in unlisted infrastructure (increased from the 1% in 2012) and 13.7% in alternative and other investments (increased from the 10% in 2010), while for LPFs these numbers were 52.1%, 31.5%, 1.6% and 14.8% respectively (Figure 2).

It has to be mentioned that comparing 2013 to 2012 it is undeniable that investment policy of PPRF increased preference to listed equities, in alternative and other investments and unlisted infrastructure.

In 2013, most Public Pension Funds of OECD countries, as depicted in the Figure 3, prefer to invest their assets in fixed income strategies, while land and buildings, cash and deposits, seem to get the lower portion of the asset allocation, similar to previous year. Belgium, Spain and United States are the OECD countries that prefer to invest their public pension funds reserves by a 100 % in fixed income.

By the end of 2012 huge changes in investment strategy were occurred in Ireland, Spain and Portugal. Portugal's fund by the end of 2013 has increased the portion to fixed income and cash to 82.3% from 65.3% in 2010. In New Zealand a reduction in cash holding occurred and an increase in equities equal to 12% for the period 2012-2013. Norway and Sweden preferred larger allocations to alternative investments.

Figure 2
Average asset allocation of Large Pension Funds (LPFs) and
Public Pension Reserve Funds (PPRFs), 2013 (1,2)
As a percentage of total assets



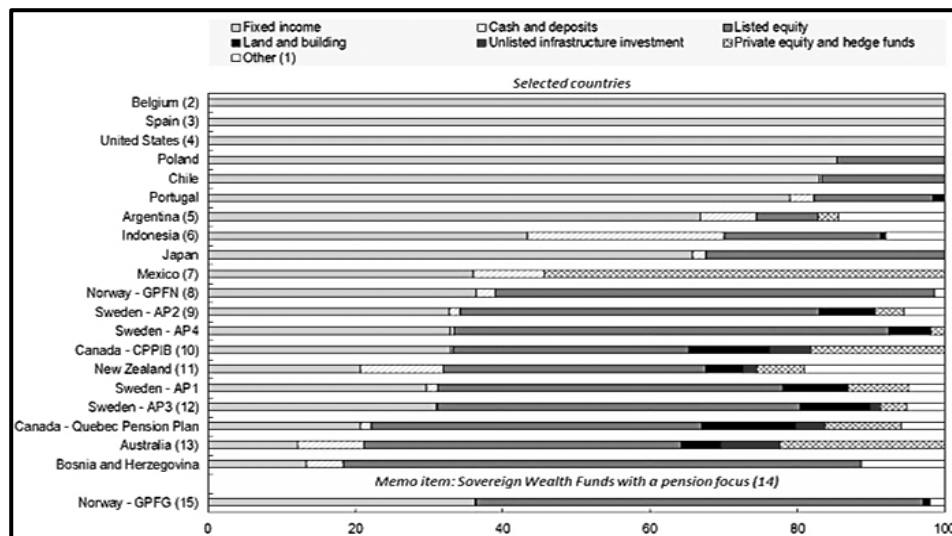
Note: (1) The value is a simple average of the share invested in unlisted infrastructure investments for all LPFs (respectively PPRFs) for which actual asset allocation was available in 2013, independently of their size in terms of assets. Totals may not add to 100% due to rounding (2) Both OMERS and FUNCEF changed the way that their asset allocation is reported compared to previous years. OMERS moved to a factor-based asset allocation approach and reported traditional investments such as stocks and bonds in the "other" category. FUNCEF reported fixed income in the "other" category compared to previous years.

Source: OECD.

It is worth to mention that from 2010 to 2013 tree Swedish funds preferred to increase their allocation to alternatives such as hedge funds, unlisted real estate, private equity and infrastructure assets.

In 2011 (OECD 2013), bond and equities remained the two most important classes, at 80% of the total portfolio of pension funds in Belgium 46% out of total pension fund's assets were invested in bonds and 34,8% in equities. In the same year, 2011 (OECD 2013), 5-10% out of the total assets of public pension fund reserves portfolio's in Switzerland, Portugal, Finland, Canada and Australia are invested in real estate. Furthermore, in 2011, Chile, Japan, Mexico, Portugal and Poland invested more in bonds than equities, while reserves in the main Canadian reserve fund CPPIB amounted to 34.3% in public equities and to thirty three point six in bonds. Respectively, in Norway the relevant % was 57.3% in equities and 37.4% in bonds. As for cash and deposits in total portfolio in 2011, for the cases of public pension funds in Slovak Republic, Slovenia, Greece and Korea they amounted to 28.8%, 31.6%, 40.4% and 59.0% respectively.

Figure 3
Asset allocation of Public Pension Reserve Funds (PPRFs), 2013
As a percentage of total investment



(1) The "Other" category includes loans, commodities and other investments. (2) Zilverfonds invested in Belgian Government bonds only. (3) The Spanish Social Security Reserve Fund invested all the assets in sovereign bonds of a selection of countries, such as France, Germany, the Netherlands and Spain. (4) Assets were invested in interest-bearing securities of U.S. Government for purchase exclusively by the Social Security trust funds (special issues). (5) Other investments include listed infrastructure investments. (6) Other investments include investments in mutual funds. (7) Data only refer to reserves used to pay early retirement due to invalidity or work-related injuries. The asset allocation of IMSS changed between 2012 and 2013, mainly in private equity, as a result of the increase in the Afore investment. Since 1997, IMSS invested in Afore XXI, which in 2012 merged their operations with Afore Banorte and became Afore XXI Banorte. In March 2013, with the acquisition of Afore BBVA Bancomer, the institutional investment in Afore XXI Banorte increased as well. (8) Other investments include financial derivatives, unsettled trades, and receivables. (9) "Fixed income" includes, apart from bonds and certificates, investments in fixed income funds (including alternative credit funds, emerging market debt funds, etc.). Derivatives are reported at fair value as "Other investments". Any cash backing of these derivatives are included and reported as "Cash and deposits". Unsettled transactions, accrued interest and dividends are reported as "Other investments". (10) Structured products are included in "Cash and deposits". (11) Other Investments include Timberlands, Farmland, Insurance linked securities and derivatives. (12) Other investments include derivatives, convertibles, and insurance-linked securities. (13) The category "unlisted infrastructure investment" includes listed and unlisted infrastructure investments. (14) Norway's Government Pension Fund - Global is a Sovereign Wealth Fund and is not a Public Pension Reserve Fund, because its mandate goes beyond financing pension expenditures. (15) Other investments include financial derivatives, unsettled trades, receivables, and lending (repo).

Source: OECD.

4.7. Asset management of public pension funds in OECD countries

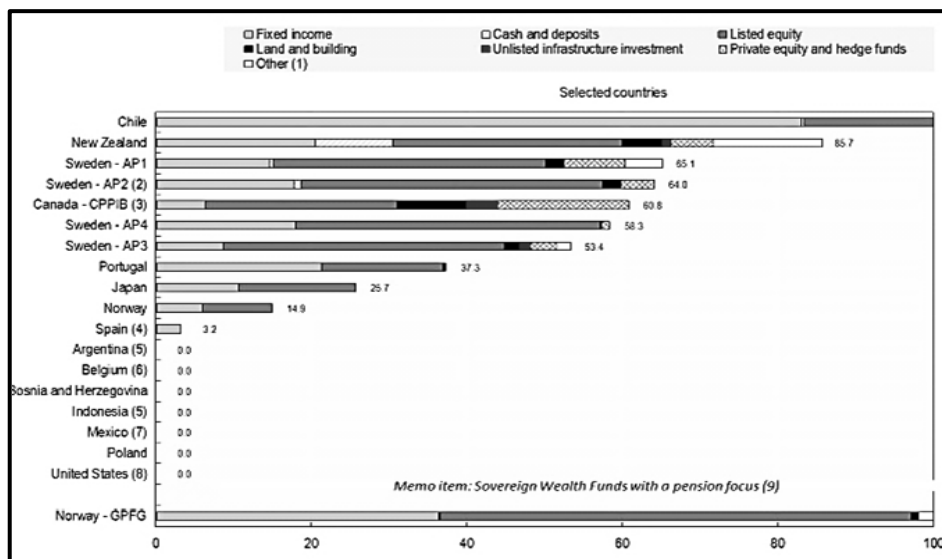
Asset management policy is not the same for all countries. Public pension fund reserves in France and Ireland may fully externalize their asset management. In Sweden 10% of assets must be managed by external fund administrators, while in Norway 80% of its assets is been managed by Norges Bank Investment Management, and in Korea 90% of its assets is been managed in-house.

The public pension fund of Japan may use external asset managers for its non-debt and foreign investments, but is obliged to reconsider the asset manager's structure once every three years. The strategy used is the passive portfolio management, and particularly the Indexing strategy (tracking market indices).

4.7.1. Foreign investment of public pension reserve funds

In 2013 foreign investment by asset class in selected PPRFs (OECD 2014) increased their portion through equity and fixed income instruments. Almost all countries included in the Figure 4 had increased their foreign investment amounts comparing 2013 to 2012. Namely, in 2013 Chile invested abroad over 80% of total and Spain increased foreign investment from 2.7% in 2012 to 3.2% in 2013. New Zealand also invested in foreign alternatives, allocating 11.7%.

Figure 4
Foreign investment by asset class in selected PPRFs in 2013
As a percentage of total (i.e. domestic and foreign) investment



(1) The "Other" category includes loans, commodities and other investments. (2) Other investments have been excluded because they were negative in 2013. (3) Investments in cash and deposits have been excluded because they were negative in 2013 in the domestic market. (4) The Spanish Social Security Reserve Fund invested all the assets abroad in sovereign bonds of a selection of countries, such as France, Germany and the Netherlands. (5) Foreign investments are prohibited. (6) Zilverfonds invested in Belgian Government bonds only. (7) Data only refer to reserves used to pay early retirement due to invalidity or work-related injuries. (8) Assets were invested in interest-bearing securities of U.S. Government for purchase exclusively by the Social Security trust funds (special issues). (9) Norway's Government Pension Fund - Global is a Sovereign Wealth Fund and is not a Public Pension Reserve Fund, because its mandate goes beyond financing pension expenditures.

Source: OECD.

4.7.2. Public pension reserve funds' real net investment returns

Investment rate of returns for all countries (in OECD's 2014) survey were positive in 2013. Similarly, the average real and nominal returns for the period 2009-2013 were positive, for all countries in the survey, except from Chile.

In the year period 2009-2013 (Table 3) New Zealand has the biggest real average investment rate of return reaching 13.4%, while Norway and Sweden (AP4) follow with 12.0% and 10.5% respectively. It is noted that in 2009, New Zealand illustrates the lower percentage from other countries, which was negative and over twenty percent.

The Future Fund in Australia is one of the reserve funds with the largest allocation to private equity and hedge funds (in the OECDs 2014 survey) came out with 14.1% real average investment rate of return in 2013 and 17.2% nominal. Bosnia & Herzegovina's Pension Reserve Fund, Norway's GPFN and Sweden's AP4, AP3, AP2 and AP1 are funds with high equity allocations and all come up with returns above 11.0% in 2013. In 2013 real average investment rate of return for Portugal is 6.7% facing a big reduction from 21% in 2012. On the contrary real (nominal) investment rate of return for Sustainability Guarantee Fund of Argentina continues its upward trend reaching 20.6% (33.8%) in 2013, from 10.7% (22.7%) in 2012.

It is worth mentioning that in 2011 the rage of real rate of investment return for public pension funds' reserves (OECD 2013) varied within the range of-38.2%, in Ireland, to 9.9%, in Chile. In Ireland, this outcome is due to the reductions in the valuations of the ordinary and preference shares of Allied Irish Banks and Bank of Ireland, held by the fund.

In 2010, most of the public pension's funds reserves in OECD countries had a positive performance, given a net investment rate of return of 3% in real terms. Norway, Canada and New Zealand, presented the highest performances, 12.2%, 11.4% and 11.0% respectively Sweden, Ireland and France followed. Despite the above evidence, Portugal's, Ireland's and Chile's reserve funds presented negative returns during 2010 reaching -2.4%, -4.2% and -8.4%, respectively. Ireland's results are due to the reductions in the valuations of the ordinary and preference shares of Allied Irish Banks and Bank of Ireland, held by the fund.

The main result for the time period from 2010 to 2011 is that PPRF experienced a remarkable charge from a positive to a negative performance, in most of the countries included in the research⁵. After this period, and until the end of 2013 the PPRF turned again to a positive performance.

⁵ There exists evidence from the Hellenic Ministry of Finance that the same results apply for Greece as well.

Table 3
Nominal and real average annual investment rate of returns
in selected PPRFs over 2009-2013
(in percentage)

Country	Name of the fund or institution	Nominal						Real					
		2009	2010	2011	2012	2013	5-year average	2009	2010	2011	2012	2013	5-year average
Selected countries													
Argentina	Sustainability Guarantee Fund	...	26.4	12.1	22.7	33.8	...	14.0	2.3	10.7	20.6	...	
Australia	Future Fund	11.1	9.5	1.6	12.8	17.2	10.3	8.8	6.7	-1.5	10.4	14.1	7.6
Belgium	Zilverfond	4.4	4.3	4.3	4.2	4.0	4.3	4.2	1.2	0.8	2.0	3.0	2.2
Bosnia and Herzegovina	Pension Reserve Fund Of Republic of Srpska	...	...	-0.7	2.6	6.0	...			-3.2	0.8	7.5	...
Canada	Canada pension Plan Investment Board	7.6	9.1	5.6	10.0	13.5	9.1	6.2	6.6	3.2	9.1	12.1	7.4
Canada	Quebec Pension Plan	...	14.0	2.6	10.3	15.3	...		11.4	0.3	9.4	13.9	...
Chile	Pension Reserve Fund	-17.7	-5.7	14.8	-3.4	10.5	-1.0	-15.5	-8.4	9.9	-4.8	7.2	-2.8
France	AGIRC-(1)	10.6	3.4	-1.4	10.2	5.9	5.6	9.6	1.6	-3.8	8.7	5.2	4.1
France	ARCCO (1)	11.6	3.1	-2.4	11.6	6.7	6.0	10.6	1.3	-4.8	10.1	6.0	4.5
Indonesia	Jamsostek	...	...	...	...	10.0	...					1.7	...
Japan	Government Pension Investment Fund(2)	7.9	0.4	-1.9	8.7	17.1	6.2	9.7	0.8	-1.7	8.8	15.2	6.4
Korea	National Pension service	10.4	10.4	2.3	...	...	...	7.4	7.1	-1.8			...
Mexico	IMSS Reserve (3)	6.7	6.6	5.0	4.3	4.6	5.4	3.0	2.1	1.1	0.7	0.6	1.5
New Zealand	New Zealand Superannuation Fund	18.9	15.1	1.2	19.2	26.1	15.8	16.6	10.6	-0.7	18.1	24.1	13.4
Norway	Government Pension Fund - Norway	33.5	15.3	-3.9	12.2	15.6	13.9	30.9	12.2	-4.1	10.6	13.3	12.0
Poland	Demographic Reserve Fund	8.9	6.6	1.8	10.2	3.0	6.1	5.0	3.4	-2.7	7.7	2.3	3.1
Portugal	Social Security Financial Stabilisation Fund (2)	6.3	0.1	-11.0	23.3	6.9	4.5	6.3	-2.4	-14.1	21.0	6.7	2.8
Spain	Social Security Reserve Fund (2)	4.6	4.0	4.1	4.2	4.2	4.2	3.8	1.0	1.7	1.3	3.9	2.3
Sweden	National Pension Fund AP1	20.2	10.3	-1.9	11.3	11.2	10.0	19.5	7.8	-4.1	11.4	11.0	8.8
Sweden	National Pension Fund AP2	20.6	11.2	-2.1	13.3	12.7	10.9	19.9	8.7	-4.3	13.4	12.5	9.7
Sweden	National Pension Fund AP3	16.3	9.0	-2.5	10.7	14.1	9.3	15.6	6.5	-4.7	10.8	13.9	8.2
Sweden	National Pension Fund AP4	21.6	10.9	-0.7	11.2	16.4	11.6	20.6	8.4	-2.9	11.3	16.2	10.5
Sweden	National Pension Fund AP6	11.3	9.4	-6.9	9.2	...	...	10.7	6.9	-9.0	9.3	...	...
United States	Social Security Trust Fund	4.9	4.6	4.4	4.1	3.8	4.3	2.1	3.1	1.4	2.3	2.3	2.2
Memo item: Sovereign Wealth Funds with a pension focus (4)													
Norway	Government Pension Fund Global	...	...	-2.6	13.4	15.9	...			-2.8	11.8	13.6	...

"..." means not available. (1) AGIRC and ARCCO are unfunded mandatory supplementary plans for white-collar and blue-collar workers respectively, with reserves. (2) Returns are gross investment rates of return. (3) Data only refer to reserves used to pay early retirement due to invalidity or work-related injuries. (4) Norway's Government Pension Fund - Global is a Sovereign Wealth Fund and not a Public Pension Reserve Fund, because its mandate goes beyond financing pension expenditures.

Source: OECD and other sources.

5. CONCLUSIONS

During the last decade, the importance of managing the public pension funds reserves has become a hot issue. The recent financial, credit and debt crisis led to restrictive governance policies, which in turn affected those reserves. All data show that alternative investment policies as for PPRF portfolios, such as in

hedge funds, real estate, unlisted infrastructure private equity and other categories such as natural resources, were adopted in lately years. In Greece, public pension funds' reserves faced a huge reduction, mainly due to the government's investing in national bonds. What is more, Japan's and Korea's reserve funds have been used for financial stability purposes and for addressing development needs.

It has to be mentioned that comparing 2013 to 2012 it is undeniable that investment policy of PPRF increased preference to listed equities, in alternative and other investments and unlisted infrastructure.

Evidence from OECD countries prove that, following a year of positive returns in 2010, PPRF experienced negative to null rates of return in more than half of the OECD countries, in 2011. Following, in 2013 investment rate of returns for all survey's countries were positive. Similarly, the average real and nominal returns for the period 2009-2013 were positive for all countries in the survey except from Chile.

Portfolio management theory may be used to define an effective management of public pension reserve funds. If the theory, in conjunction with evidence from studies, is applied, suitable solutions can be found for a satisfactory performance of these reserves. This attempt is not easily attained, because there is not only one strategy that can be used. There are different objectives, restrictions, investment policies, leading to respectively different requisite strategies of managing public pension reserve funds.

In this study, evidence shows that, from implementing various portfolio management strategies in public pension reserve funds, positive and negative performance may result. Nevertheless, it is undeniable that applying the available portfolio management strategies, in accordance with public pension funds' preferences and decision making process for portfolio investment, optimum practices in portfolio management can be found.

Specific parts of the fund's governance structure and investment management can be improved, so as to remain independent from influences by political policies and to enhance the management ability of funds. Investment objectives must be clearly defined in reserve funds, setting specific funding ratios, investment return targets and allowing a better monitoring of the fund's performance. There should always be a mandate for all the above, so as to measure the performance as compared to these objectives.

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