Assessment of Pension funds with respect to countries and types of plan - An International Perspective

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Abstract

Pension system worldwide is witness with pension reforms. Pension liability and ageing population has compelled countries for structural reforms. Defined benefit and pay-as-you-go (PYG) are no easier task with current socio economic scenario. So along with Defined benefit, defined contribution, and in some countries both (DB & DC), private pension etc has been added to pension system. Defined contribution and private pension plan enhance savings. This paper has made an attempt to understand the association of variables such as pension fund (as percentage of GDP), Growth rate of pension, and internal rate of return with various types of pension plan and countries.

Key Words: Defined benefit, Defined contribution, Pension fund.

Introduction

Pension is a financial instrument that acts as cushion against uninterrupted continuous income for old age people. In other words, pension plan is to be designed in such a way to meet the requirement of an Individual, due to ageing, his or her capacity for works declines to the point when he/she unable to become self-sufficient. There were various traditional plan offered by various countries. In recent decade, there is a reform in pension sector that has transformed the overall structure of pension system. Most of the countries have undergone pension system transformation. These reforms have taken place to reduce the burden of pension liability, diversification of risk and better management of pension assets.

Broadly there are three types of Pension plan prevail in all over the world. Firstly, Defined benefit Pension plan; where an employer promises to pay certain amount in future in the form of pension. Secondly, Pay as You Go plan; here new employee or existing employee will contribute towards retired people. Finally, Defined Contribution Pension plan: Here employee would contribute towards his pension fund.

Some countries go for either Defined Benefit (DB) or Defined Contribution (DC) where as many countries go for both defined contribution and defined benefit. Countries like Finland, Germany, Israel, Switzerland and Nigeria have adopted Defined Benefit plan. Whereas countries like Chile Greece Hungary, Poland, Lativia, Slovenia, Bulgaria, Ghana, Thailand and few more have adopted Defined contribution plan. Countries like Estonia, Czec, Slovak, Maldives , Peru, Armenia, Columbia have adopted.

Structure of Pension system from international perspective can be represented as per OECD Taxonomy (2017). There various branch of the Pension system as mentioned in the figure 1. The Pension plan broadly divided into Public Pension Plan and Private Pension Plan. Public Pension plan is Pension system where payment of retirement benefit is administered by Central, State or Local Government. This is the minimum benefit provided to population at large or a certain employees of formal sector. Private Pension plan on other the hand is pension plan where the payment of pension benefit is administered by other institution or other private bodies. Pension plan are also divided under two categories i.e Occupational pension plan and personal pension plan. In Occupational plan, there is a relationship between plan members and the plan sponsors (employer).

Figure 1 (Source OECD Taxonomy)

Private Pension plan on other the hand is pension plan where the payment of pension benefit is administered by other institution or other private bodies. Pension plan are also divided under two categories i.e Occupational pension plan and personal pension plan. In Occupational plan, there is a relationship between plan me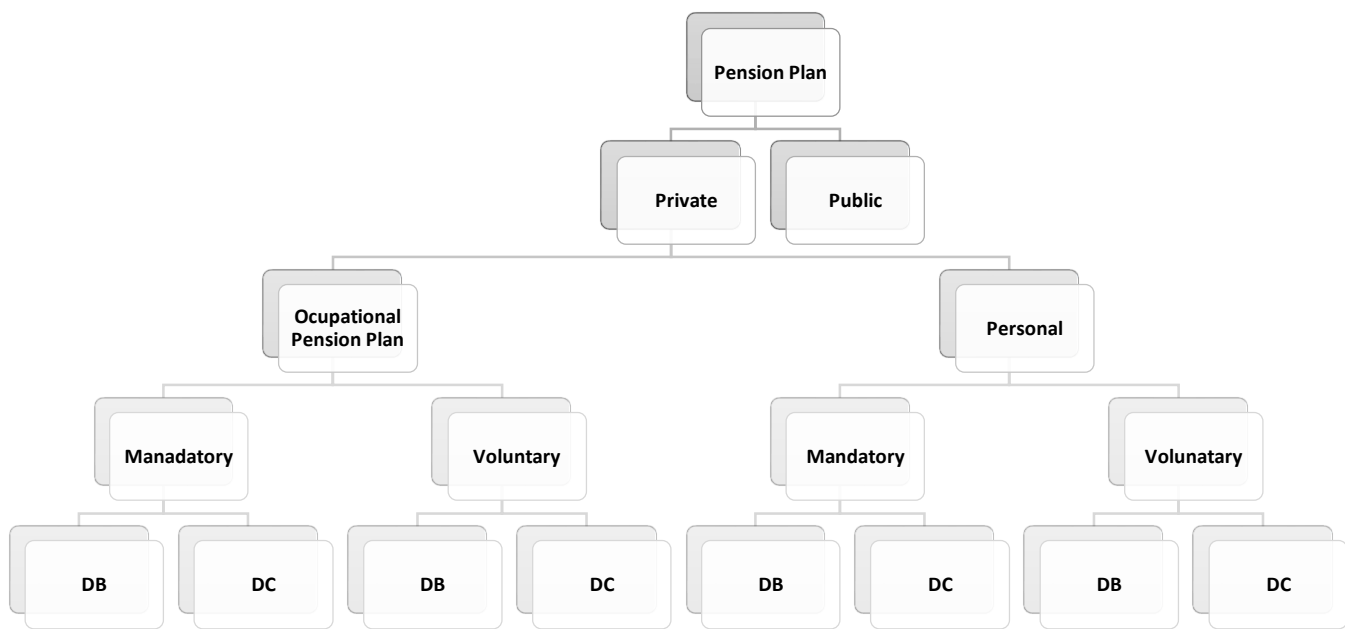mbers and the plan sponsors (employer). In this case plan sponsors are responsible to contribute towards pension scheme. Even in many cases employees are also allowed to contribute. Occupational pension plan can be Mandatory and/or Voluntary. In case of mandatory pension plan participation to this pension plan is mandatory. Employers are obliged to participate in this pension plan. In case of Voluntary pension scheme is voluntary in the hands of employer.

Personal pension plan is not linked with employment relationship. That is individual select and purchases the plan without any intervention of employer. Personal plans can be divided into two categories; Mandatory and Voluntary.

There is a shift of one plan to another being observed in various countries. By introducing defined contribution plan, employee from organized and unorganized sector started contributing towards pension plan. In this paper an attempt has been made to analyze pension funds investment with respect to various category of Plan (DB,DC,Both,None) and type of country (OECD and Non-OECD).

Literature review

Masson, Bayoumi & Samiei (1998) analyzed on the determinants of private savings. They analyzed two categories of countries; industrial countries and developing countries. They used both time series and cross-sectional analysis. As per cross sectional analysis, there is a strong relationship between savings and growth. Size of dependency ratio has lower effect on savings.

Klumpes & Whittington (2003) developed hypotheses to test firm switching towards market based actuarial pension valuation method with various factors such as funding ratio, real interest rate, number of retired workers, earning on investment. They used univariate method, Wilcoxon to test hypothesis. Their findings imply that UK firms' switching decisions are potentially explained by characteristics of the pension funds they sponsor.

Relationship between DB and DC scheme was developed Blake (2000). He pointed out the difference in terms of investment, surplus under both the scheme. In this study, surplus risk is highlighted. The main sources of these volatilities are uncertainties concerning future investment returns, real earnings growth rates and inflation rates. It is also noted that, DC plan at the time of retirement completely dependent on fund value of the assets, whereas DB does not. The final conclusion was whether DB or DC plan investment performance is critical.

Bodie, Marcus, & Merton (1988) analyzed the trade of between DB and DC plan by taking into consideration their individual advantages and disadvantages. They highlighted key points are investment performance and choice, Accrual patterns, Termination and portability, incentives, informational Economies in plan design and implementation, Wage-path risk and interest rate risk. One of the conclusions they deduce is that during inflation and interest rate uncertainty, DC plans are more advantageous.

Blundell, Adrian *et.all* (2008) compared between Sovereign Wealth Fund (SWF) and Public Pension Reserve Fund (PPRF). They studied these funder various ground such as financial stability, corporate governance and political interference. They considered both OECD and Non OECD country. They conclude that enhancing the above aspect is important for well performance of SWF.

Ponds, Eduard *et al* (2007) made an intense study on Dutch pension system. During the study Dutch introduced hybrid pension i.e DB-DC plan. Author has pointed out the fall in funding ratio has accelerated

the switch from DB to DC scheme. The study was scrutinized from through Asset Liability Management (ALM) model. They conclude that in this conversion of hybrid DB-DC plan, risk has shifted more to individual.

Most of the above research revealed that there is need for research based on types plan. Various factors need to be analyzed such as pension assets, internal return, portfolio investment etc. Many sponsors started substituting DB plan with DC plan.

Research Methodology

Scope and Objective

The objective of the paper is to examine the pension funds and growth rate in pension of a country with respect to its nature or type of fund and type of country. The underlying objectives for the study are as follows.

- Association between Pension funds and growth in pension funds with types of pension plan.
- Association between Pension funds and growth in pension funds with types of country.

There are total of 77 countries data have been collected. Variables such as country type, Pension types, Pension funds, CAGR of pension and Internal rate of return (IRR) has been taken for the analysis. All 77 countries are divided in to two categories OECD and Non OECD. There are various nation fall under these categories and can be considered as representative sample of the whole world. Most OECD members area unit high-income economies with high Human Development Index (HDI) and considered as developed countries. These countries hold higher index associated with lifespan, education and per-capita income. Pension funds are total pension funds of the various countries. Pension fund is considered as a percentage of GDP. Pension fund (percentage of GDP) is taken average of 10 years data (2006-2016). IRR is the average nominal net investment return (ratio between the net investments incomes at the end of the year divided by average level of assets). IRR is also average return of past 10years data. CAGR of pension is cumulative average growth rate in pension fund across the over the years from 2006 to 2016. The pension system has been categorized in to four groups i.e. Defined Benefit, Defined Contribution, Both and None. For this study data have been collected from global pension statistics. The source of data is OECD database with specific to pension statistics (Pension Market in Focus, 2017).

The sample size within the group is unequal. Levene's test was run to test the homogeneity. It was found that the assumption violated under Levene's test. It means there are unequal means and variances among group. Hence, non parametric test is conducted. Among various tests, Kruskal-Wallis is considered to be best fit hypothesis testing to know the pension funds and growth in Pension funds under various pension plans. Mann-Whitney test was conducted to test the pension funds and growth rate in pension funds between two group of countries i.e OECD and Non OECD Country.

Hypothesis

- Under K-W test, the null hypothesis says Pension funds and growth rate in pension funds are identical across the various pension plans.

- Under Mann-Whitney test; the null hypothesis assumed that OECD country and Non OECD countries are identical.

Data Analysis

There are 35 OECD country and 42 Non-OECD countries. When all the three variables (Pension fund as Percentage GDP, IRR and CAGR of Pension) are analyzed, it is found Denmark has highest (209%) pension fund as percentage of GDP (Table 1). Denmark offers both DB and DC plan. They are countries like Australia, Belgium, Ireland, Canada, US, Netherland, Switzerland and South Africa (Non OECD) whose Pension fund as percentage to GDP is more than 100%. Amongst OECD countries Poland has highest IRR (8.3%) and this country offers only DC plan. Growth rate in Pension fund is very low ranging 0 to 1.4% in both OECD and Non OECD countries. Out of 77 countries, 50 countries offer both plan (DB &DC) plan.

Table 1

OECD Country			
	Percentage of GDP	IRR	CAGR of Pension
Maximum	209.0	8.3	0.5
Minimum	0.7	-1.2	0.0
Non OECD			
Maximum	100.6	9.0	1.4
Minimum	0.1	-17.0	0.1

Result and analysis

Under K-W test, for pension fund; p value is 0.036 (<0.05), hence null hypothesis rejected. It means the pension funds across countries are not identical under each plan. Whereas, IRR and Pension growth rate p value is 0.63 and 0.139 (Table 2). Both are less than significant level (p<0.05), hence null hypothesis accepted.

IRR, Pension funds and growth rate in PF are analyzed country (Category) wise. Following results are derived as per Mann-Whitney test. The p value for pension fund to type of country is 0.036(<.05) (table 3). Hence reject null hypothesis. It shows that there is a significant difference in pension fund between two categories of country. It is also noticed that pension funds in case of OECD country is higher than Non-OECD country. In case of pension growth rate, again null hypothesis is rejected, p value 0.000 (<.05). Hence there is a difference in growth rate in pension fund (CAGR Pension) between two categories of countries. Surprisingly, growth rate of Non OECD country is higher than OECD country. In case of IRR, null hypothesis is accepted (p value 0.35>0.5). It implies that IRR between two categories of countries are equal.

Table 2

Test Statistics[a,b]			
	Pension Funds	IRR	Growth in Pension
Kruskal-Wallis H	9.850	7.281	5.491
df	3	3	3
Asymp. Sig.	.020	.063	.139
a. Kruskal Wallis Test			
b. Grouping Variable: plantypeN			

Table 3

Test Statistics[a]			
	SMEAN(IRR)	PercentageGDP LN	CAGRPension
Mann-Whitney U	644.000	530.000	188.500
Wilcoxon W	1274.000	1433.000	818.500
Z	-.934	-2.099	-4.778
Asymp. Sig. (2-tailed)	.350	.036	.000
a. Grouping Variable: Type of country			

Conclusion

Pension sector reforms are taking place with motive of reducing government liability, diversification of risk. It has also encouraged more contribution from organized and unorganized sector. This is happened due to introduction of various public and private pension plans. Hence there is wide coverage of pension scheme all over the world. Many countries have shifted from DB plan to DC or both. There are countries who have introduced hybrid pension plan i.e. combination of both DB and DC. Being various category of plan voluntary and mandatory, the study attempted to find out whether there is substantial difference in pension funds investment under various scheme or plan (DB,DC,Both). Hence data from 2006-2016, are analyzed to understand the association of PF investment, growth rate IRR with its plan. The study revealed that there is a difference in pension fund investment in plan wise as well as country wise. It is also noticed from the data base that the countries opting both types of plan have high pension fund investment (as percentage to GDP) than others. It is also evident from the data that there are larger number of countries opted for both (DB, DC) plan. But in case of growth rate in pension funds, there is no difference among various plans but there is difference in country wise. It is also noticed that the growth pension funds are higher in Non OECD countries than OECD country. The study did not reveal significant result towards IRR. There is need for further research on IRR with respect to other factors. As most of the countries have transformed their pension plan to Both (DB,DC) or only DC, there is need for future research on factors influencing pension fund investment at macro and micro economic level.

References

- Masson, P. R., Bayoumi, T., & Samiei, H. (1998). International evidence on the determinants of private saving. *The World Bank Economic Review*, *12*(3), 483-501.

- Klumpes, P. J., & Whittington, M. (2003). Determinants of actuarial valuation method changes for pension funding and reporting: Evidence from the UK. *Journal of business finance & accounting*, *30*(1-2), 175-204.

- Blake, D. (2000). Does it matter what type of pension scheme you have?. *The Economic Journal*, *110*(461), F46-F81.

- Bodie, Z., Marcus, A. J., & Merton, R. C. (1988). Defined benefit versus defined contribution pension plans: What are the real trade-offs?. In *Pensions in the US Economy* (pp. 139-162). University of Chicago Press.

- Blundell-Wignall, Adrian and Hu, Yu-Wei and Yermo, Juan, (2008) Sovereign Wealth and Pension Fund Issues. OECD Working Papers on Insurance and Private Pensions No. 14.Available at SSRN: https://ssrn.com/abstract=1217270 or http://dx.doi.org/10.2139/ssrn.1217270

- Ponds, Eduard H.M. and van Riel, Bart, (2007) The Recent Evolution of Pension Funds in the Netherlands: The Trend to Hybrid DB-DC Plans and Beyond. Available at SSRN: https://ssrn.com/abstract=964428 or http://dx.doi.org/10.2139/ssrn.964428

- OECD. (2017). *Pension Market in Focus*.