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MASTER
ACTUARIAL SCIENCE

MASTER FINAL WORK
PROJECT

ACTUARIAL EVALUATION OF GOVERNMENT OF PUNJAB PENSION FUND LIABILITIES

MUHAMMAD TAYYAB RIAZ

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SUPERVISION: ONOFRE ALVES SIMÕES

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I express gratitude and praise to Almighty God, Who endowed me with the will to undertake this work.

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I take this opportunity to express my profound gratitude to my family for their motivation and prayers. I want to pay thanks to my loving friends for their support.

Abstract

The Government of Punjab (GoPb) has a pension scheme for its permanent employees, which is a Defined Benefit Pension Scheme. In addition to meeting the annual pension benefit payments the GoPb is also making contributions to a reserve fund called the Punjab Pension Fund (PPF).

The Punjab Pension Fund is established under the Punjab Pension Fund Act 2007. The PPF's primary role is to manage the funds set aside by GoPb to meet pension liabilities of its employees.

This actuarial investigation carried out of the Government of Punjab Pension Scheme liabilities as at the valuation date. To summarize, the work was developed with the following main objectives:

i. Conduct an actuarial valuation of Punjab Government Pension Fund;
ii. Carry out cash flow projections of Punjab Pension Fund over the next 5 years;
iii. Make recommendations for funding requirements for Pension Fund based upon above findings;
iv. Carry out sensitivity analysis of key assumptions on pension liability and cash flow projections;
v. Identifying reform contours to bring contribution rate of the existing pension scheme at a manageable level;
vi. Propose a structure for a new pension scheme for new hires.

In addition, the investigation is to assess the appropriateness of the current funding strategy and recommend changes if necessary.

Keywords: Pensions; Punjab Province; Actuarial Valuation; Sensitivity Analysis.

Resumo

O Governo de Punjab (GoPb) organizou um plano de pensões de benefícios definidos para os seus funcionários permanentes. Além de atender aos pagamentos anuais dos benefícios de pensão, o GoPb contribui igualmente para um fundo de reserva designado *Punjab Pension Fund* (PPF).

O *Punjab Pension Fund* foi estabelecido ao abrigo da lei designada *Punjab Pension Fund Act* 2007 (consulte http://punjablaws.gov.pk/laws/487.html). A principal função do PPF é gerir os fundos disponibilizados pelo GoPb para atender às responsabilidades com pensões dos seus funcionários.

Este trabalho tem por finalidade essencial fazer uma análise dos aspetos mais significativos do PPF, dada a importância que este fundo tem para o Governo da província, atualmente e no futuro. Detalhando um pouco mais, pode dizer-se que o trabalho foi desenvolvido com base nos seguintes objetivos:

i. Realizar uma avaliação atuarial do Fundo de Pensões do Governo de Punjab;
ii. Realizar projeções de fluxo de caixa do Fundo de Pensões do Governo de Punjab nos próximos cinco anos;
iii. Fazer recomendações relativamente aos requisitos de financiamento para o Fundo de Pensões, com base nos resultados obtidos em i. e ii.;
iv. Realizar uma análise de sensibilidade das principais premissas com efeitos sobre as projeções das responsabilidades com pensões e demais fluxos financeiros;
v. Identificar as medidas reformadoras que permitam colocar a taxa de contribuição do plano de pensão existente a um nível aceitável;
vi. Propor a estrutura de um novo plano de pensão, destinado aos futuros contratados.

Além disso, o estudo deve avaliar a adequação da atual estratégia de financiamento e recomendar alterações, se necessário.

Palavras-chave: Pensões; Província de Punjab; Avaliação Atuarial; Análise de Sensibilidade.

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Acronyms and Abbreviations

GoPb: Government of Punjab

PAYGO: Pay as you go approach to pension scheme financing

Pension Scheme: Government of Punjab Civil Servants Pension Scheme

PPF: Punjab Pension Fund

CS: Civil Service

DB: Defined Benefit

DC: Defined Contribution

PUC: Projected Credit Unit Method

Rs. Pak Rupees

Govt.: Government

CPI: Consumer Price Index

ICPA: Individual Compulsory Pension Accounts

1. Introduction

1.1. Motivation

Historical research suggests that the experience of Port of London, where an ad-hoc scheme intended for one individual expanded over time, and finally became a non-contributory unfunded Defined Benefit scheme, is maybe the first experience of a pension system (see https://www.civilservant.org.uk/information-pensions.html). This concept was later carried to countries where there was British presence for some time.

Recently I was part of a working group hired by the World Bank that conducted actuarial investigation of Balochistan Govt. Pension Scheme. Based on that experience, I thought it would be of interest to examine the current issue of Govt. of Punjab Pension Fund, which has particular aspects to consider.

The Government of Punjab (GoPb) has a pension scheme for its permanent employees, which is a Defined Benefit Pension Scheme. In addition to meeting the annual pension benefit payments the GoPb is also making contributions to a reserve fund called the Punjab Pension Fund (PPF). The Punjab Pension Fund is established under the Punjab Pension Fund Act 2007 (see http://punjablaws.gov.pk/laws/487.html). The PPF's primary role is to manage the funds set aside by GoPb to meet pension liabilities of its employees.
In Pakistan, the recent focus on Civil Service (CS) pensions and their reform has resulted from the ballooning fiscal burden.

i. As background various parameters are as follows.
    a. South Asia has the lowest level of integration of CS scheme with other national pension schemes. The highest integration being in Eastern Europe/Central Asia (due to communist background).
    b. Very few CS schemes are funded (wholly or partly), vast majority are of PAYGO type. National schemes tend to be 50/50 between funded (fully or partly) and PAYGO.
    c. Increasing number of countries opting for DC type schemes for civil service.
    d. The cash-flow burden is increasing rapidly for the low/middle income countries in respect of CS pension payments. For various provinces of Pakistan, the ratio of pension payments to the province revenues is in the range of 10% - 20%.
ii. In South Asia, all countries have special schemes for civil servants.

a. Countries other than Bhutan have final salary (excludes some allowances) DB scheme. Accrual rates, indexation, commutation, vesting, early retirement option all vary from. DB benefits supplemented by unfunded DC scheme subject to temporary/permanent withdrawals having varying contribution rates.

iii. Some south Asian countries have made recent reforms and Indian reform appears to be considered more appropriate because:

a. It moves to a fully funded DC type scheme whose target is to replace 50% of lifetime salary;

b. It provides for complete portability;

c. It is integrated with national scheme.

The Indian approach is desirable provided there is sufficient institutional capacity for funding and domestic environment for absorbing the funding.

This report details the results of the actuarial evaluation conducted using the information available from the PPF. It highlights in detail the data used, cash flow projections of the Pension Fund, sensitivity testing of key assumptions, and makes recommendations for the funding requirements of the Pension Fund. It further identifies reform contours to bring contribution rate of the existing pension scheme at a manageable level, and proposes a structure for a new pension scheme to cover new hires in the Government.

1.2. Some facts about Pakistan

Punjab has an estimated 110 Million Population and it is Pakistan's most populous province. Lahore is the provincial capital and have estimated population of 15 million people.

Population of Punjab is roughly 47% of the total population of Pakistan.

In Pakistan large section of population is not provided pension or old-age benefits.

All government employees and their dependents are entitled to life pension, widow pension and commutation of a portion of pension and medical Allowance.

The pension and social security coverage is limited to the formal economy workers whereas

the informal or unorganised sector fall outside the purview of the statutory provisions usually administered through registered public and private enterprises.

The current schemes can be divided into two main categories: The first category consists of the "general" or "by default" schemes. These are the Government schemes that employers in firms of 10 workers or more are required to contribute to, unless they have been specially exempted by legislation. The coverage is voluntary for employees in firms of less than 10 workers. The Employees Old Age Benefits Institution (EOBI) is a federal body that provides age, disability and survivors pensions. EOBI is funded by an employer contribution of 6 percent of wages and employee contribution of 1 percent of wages.
The Employees Social Security Institutions are provincial bodies (ESSIs) that provide health services and some cash benefits to retired and senior citizens.

The second category consists of schemes that are specific to particular sectors or enterprises and are specifically exempted from membership of the general schemes. The main category exempted consists of Government workers, members of the armed forces, and some others.

The scope of this work is limited to Punjab Government employees pension scheme where we have more than 1.5 Million members.
The basic purpose of an Actuarial Evaluation is to project the likely level of the emerging liabilities under a scheme and to recommend a plan of contributions that will enable the fund of the scheme to accumulate sufficient assets for meeting these liabilities. The solvency level of a fund is generally monitored on a regular basis, particularly if the economic parameters controlling the financial health of the fund change over time.

The liabilities of GoPb Scheme are long term, consequently the funds required to meet these liabilities can be accumulated over a longer period. In assessing the adequacy of the contribution rate, it is necessary to make projections to determine the levels of the liabilities and the accumulating assets.

Numerous actuarial methods have been developed to assist in determining a suitable funding strategy for the scheme sponsor, in view of its policy objectives and financial conditions. However, the fundamental principle, of accumulating sufficient contributions during the working lifetime to meet all future obligations, is maintained as the primary goal.

All actuarial methods demarcate the lifecycle of scheme members into two portions, as depicted in the above schematic for a person joining employment at age 20: retiring at age 60 and then receiving benefits. Actuarial methods place the same value on cost of benefits at the point of retirement. However, the primary difference between the various actuarial methods is the way that this cost is allocated to the various periods of employment.

The fundamental principle described above has been adopted while developing accounting guidelines for fair value reporting of commercial enterprise. The actuarial method included in the accounting standards, specifically International Accounting Standard 19, is the "Projected Credit Unit Method" (PUC) also known as the "Accrued Benefit Cost Method" (see McGill *et al.*(2005 and Blake (2006), for instance).

This method allocates the scheme benefits to the year of service in which it is earned and determines the cost as the "actuarial present value" as of the valuation date of providing these benefits from retirement age onwards. The sum of these costs for all employees is termed the "Normal Cost" and represents the amount required as contributions to the scheme to meet the benefits arising from the year immediately following the valuation date. The sum of the actuarial present value of benefits accrued up to the valuation date is termed the "accrued liability" or "past service liability".

The accrued liability would be offset by matching assets that would have developed from past normal costs (i.e. past contributions) and profit earned thereon. In reality there will be differences because the assumptions used in the actuarial calculations will never be exactly replicated by actual experience.

It can be appreciated that this method would result in escalating normal cost (i.e. contributions) for an individual employee as he/she approaches retirement, the primary driver for this being the closer an employee is to retirement the shorter the period for interest discount application. This aspect was considered to be acceptable from a fair value accounting perspective, possibly since it reflects the standard approach adopted in valuing other liabilities of the enterprise.

1.3. Historical Background

In 2003, the Government of Punjab (GoPb) formed a working group to study their existing pension scheme; to advise what reforms were needed and suggest how such reforms would be achieved.

The results of the exercise carried out in 2003 were very approximate as they were based on minimal information. As such, it has been decided to arrive at a better and up-to-date estimate of the GoPb pension liability by incorporating greater amount of specific information. An actuarial exercise was performed in 2007. The accrued liability of Punjab Govt. Pension Scheme worked out to Rs.425 billion as at June 30, 2007. Out of that, Rs.296 billion pertained to active employees with the remainder of Rs.129 billion being associated with pensioners.

In 2009, Punjab Government has initiated the second phase of reforms under Punjab Government Efficiency Improvement Program (PGEIP). Under that, the GoPb has created a separate Punjab Pension Fund to pre-finance part of the liabilities. One of the policy actions under PGEIP requires, streamlining the processing of Pension cases through necessary restructuring of the Pension administration and improving Pension & GP Fund record keeping. Government of the Punjab intends to update the earlier work and to illustrate financing options for revising the funding strategy.

For that purpose, GoPb conducted an actuarial assessment of Pension liabilities as at 30.06.2009. Based on that exercise the accrued liability of the Punjab Government Pension Scheme was Rs.597.6 billion as at 30th June 2009. Out of that liability, Rs.391.7 billion pertains to active employees and the remaining Rs.206.0 billion was associated with existing pensioners.

Under the extension of second phase of reforms GoPb has update the Pension Fund liabilities as per the data available on 30th June 2010 and 30th June 2015. The accrued liability of the Punjab Government Pension Scheme was Rs. 687.7 billion as at 30th June 2010 (compared to Rs.597.6 billion as at 30th June 2009). Out of that liability, Rs.401.9 billion pertains to active employees and the remaining Rs.285.8 billion was associated with existing pensioners. The accrued liability of the Punjab Government Pension Scheme was Rs. 3,866.458 billion as at 30th June 2015 (compared to Rs. 687.7 billion as at 30th June 2010). Out of that liability,

Rs.2,241.111 billion pertains to active employees and the remaining Rs. 1,625.347 billion was associated with existing pensioners.

This study concluded that the accrued liability of the Punjab Government Pension Scheme is Rs. 6,691.339 billion as at 30th June 2015 (compared to Rs. 3,866.458 billion as at 30th June 2015). Out of that liability, Rs.3,108.568 billion pertains to active employees and the remaining Rs. 3,582.771 billion is associated with existing pensioners. The table below shows the liability at each valuation date.

Table 1: Accrued Actuarial Liability of PPF

Valuation Year	Active Employees	Pensioners	Accrued Actuarial Liability (Rs. Billion)
2007	808,844	414,737	425
2009	831,186	360,822	597.6
2010	938,511	344,315	687.7
2015	951,521	465,030	3,866.46
2019	1,035,443	493,226	6,691.34

The differences between the economic assumptions are critical for the actuarial valuation of Pension benefits.

The actuarial assumptions used as at 30.06.2019 are in line with the previous valuation assumption as at 30.06.2015.

Any changes can generate significant gain/loss during the inter-valuation period. The differential between discount rate and salary increase rate as at 30.06.2015 is one percentage point (1%) which is consistent with previous valuation assumptions as at 30.06.2010. The differential between discount rate and pension increase rate as at 30.06.2015 is 2 percentage points which was 4% in the previous valuation assumption as at 30.06.2010. This reduction has increased the liability and pension cost of both actives and pensioners.

And Contribution Rate, as % of Pensionable Pays, for future Accrual of Benefits has increased to 60.7% as compare to 21.5% based on previous valuation assumption used as at 30.06.2010.

The past service accrued liability and contribution rate has increased significantly as at the current valuation date. The main sources of the increase in liability and future contribution rate are (i) changes in assumptions; (ii) policy of continuing pension increases to future new pensioners at the time of retirement/death; (iii) allowing restoration under 2001 salary package and (iv) change in benefits.

2. Punjab Government Pension Fund Data

2.1. Data Analysis.

As mentioned in previous actuarial reports of PPF there is lack of reliable single source of information on the numbers of active employees and their monthly pensionable payroll. To derive these numbers, we have used Pensionable Pay wise and Service wise distributions and number of estimated sanction posts of GoPb. The data estimation assumptions used are in line with the previous valuation assumption.

Active Employees

The following table shows the summary of the data used for valuation and cash flow projections:

Table 2: Summary of Active Employees Data

Number of Active Employees	1,035,443
Total Monthly Pensionable pay	Rs.25,370.343 million
Average Monthly Pensionable pay	Rs.24,502
Average age	42 years
Average past service	16.3 years

Summary of the data according to the Basic Pay Scale is provided in the table below:

Table 3: Summary of the data according to the Basic Pay Scale

Pay Grade	Number of Employees	Average Monthly Pensionable Pay (Rs.)
1	38,464	10,431
2	73,049	12,846
3	110,406	17,315
4	42,837	17,988
5	228,530	15,284
6	35,516	20,175
7	61,219	20,326
8	9,803	23,229
9	58,837	18,897
10	1,157	24,647
11	46,878	22,156
12	22,901	22,657
13	521	36,834
14	82,408	26,982
15	25,034	32,180
16	87,453	39,743
17	74,006	46,694
18	19,075	69,584
19	13,600	88,444
20	3,529	119,781

21	210	135,788
22	10	160,190

The tables and graphs below show the distribution of the Active Employees according to age, past service and pay of the employees:

Table 4: Age Group Wise Distribution of Active Employees

Age Group			Number	% of Total Number
0	to	19	340	0.03%
20	to	24	27,616	2.7%
25	to	29	97,552	9.4%
30	to	34	182,408	17.6%
35	to	39	190,136	18.4%
40	to	44	164,198	15.9%
45	to	49	141,350	13.7%
50	to	54	139,839	13.5%
55	to	59	84,225	8.1%
60 and above			7,780	0.8%
Grand Total			1,035,443	100.0%

Graph 1: Age Group Wise Distribution of Active Employees

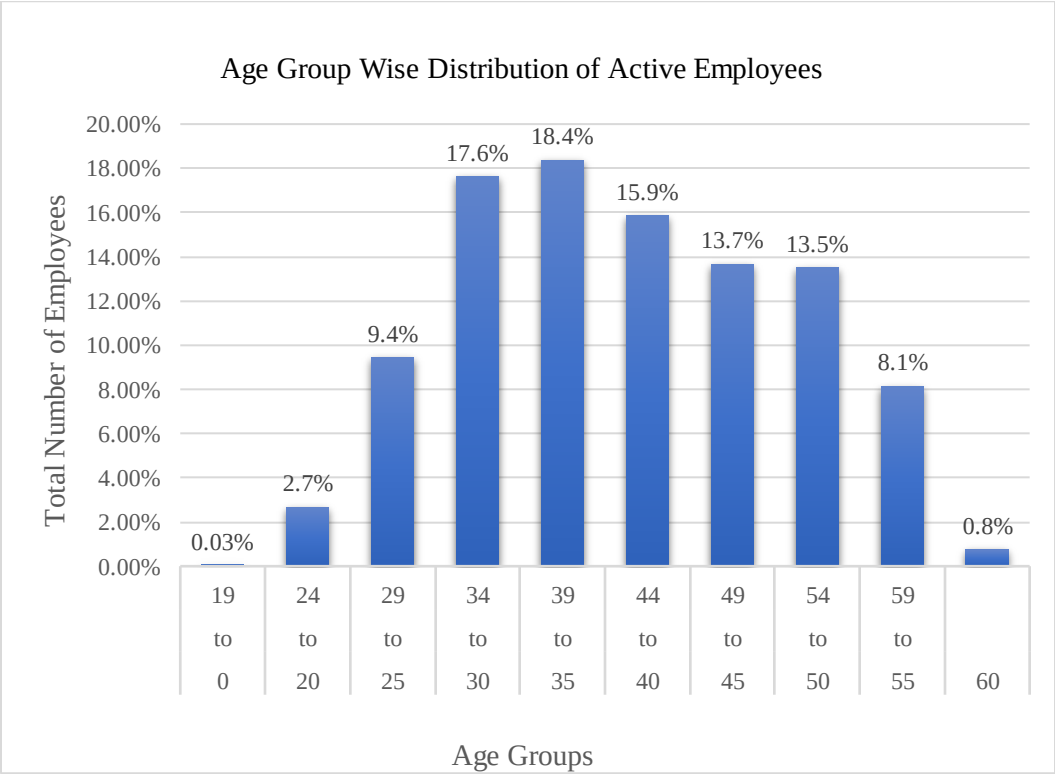
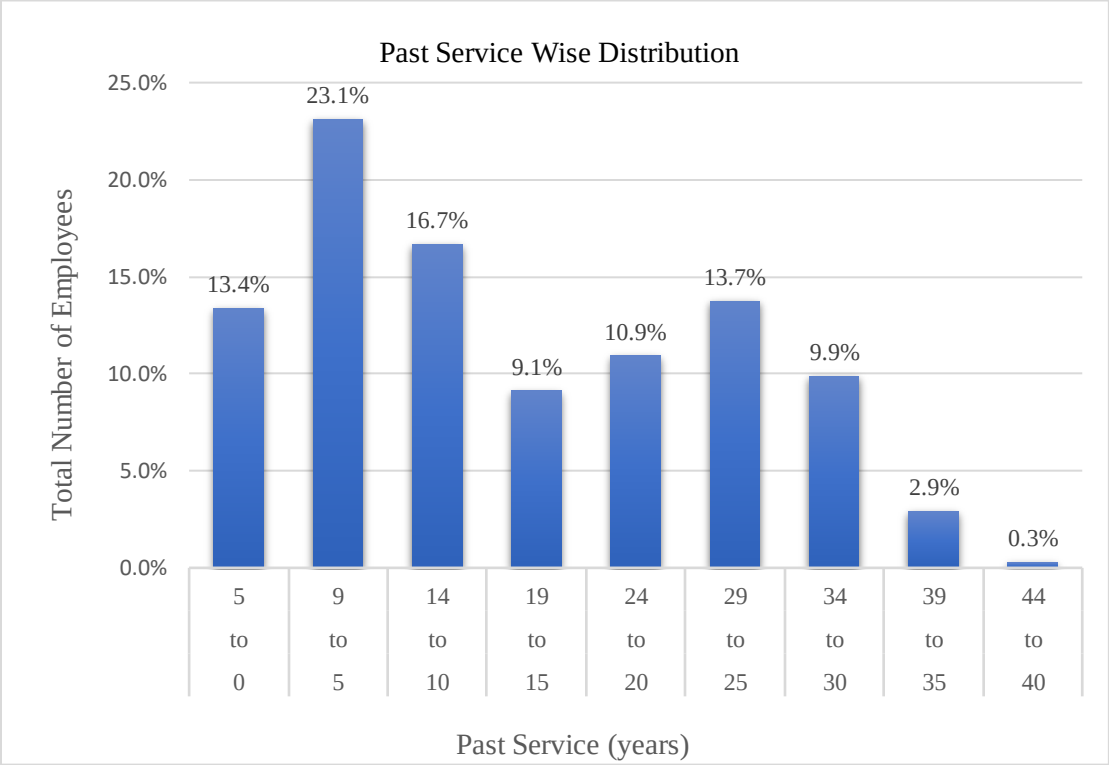


Table 5: Past Service Wise Distribution of Active Employees

Past Service (years)			Number	% of Total Number
0	to	5	138,331	13.4%
5	to	9	239,448	23.1%
10	to	14	172,418	16.7%
15	to	19	94,408	9.1%
20	to	24	113,082	10.9%
25	to	29	142,315	13.7%
30	to	34	102,217	9.9%
35	to	39	30,213	2.9%
40	to	44	3,013	0.3%
45	and Above		-	0.0%
Grand Total			1,035,443	100%

Graph 2: Past Service Wise Distribution of Active Employees



Pensioners

The Table below shows the summary of the pensioners data used for valuation and cash flow projections:

Table 6: Summary of Pensioners Data

Total Pensioners	493,226
Total Monthly Pension	Rs. 11,732,383,793
Total Monthly Medical Allowance	Rs. 1,286,076,771

The Tables and Graphs below show the distribution of All Pensioners according to different age groups, and different amount groups of pension and medical allowance:

Table 7: Age Group Wise Distribution of Pensioners

Age Group			Number	Distribution
25	to	45	6,012	1.2%
46	to	50	27,355	5.5%
51	to	55	57,004	11.6%
56	to	60	62,831	12.7%
61	to	65	126,329	25.6%
66	to	70	95,355	19.3%
71	to	75	50,549	10.2%
76	to	80	34,089	6.9%
81	to	85	17,940	3.6%
85	to	90	9,423	1.9%
Above 90			6,339	1.3%
Grand Total			493,226	100%

Graph 3: Age Group Wise Distribution of Pensioners

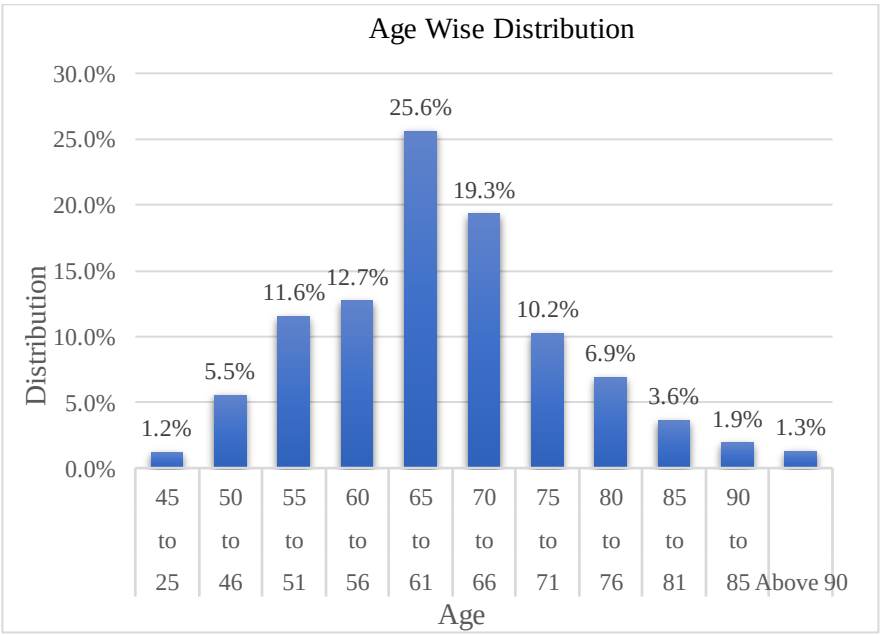
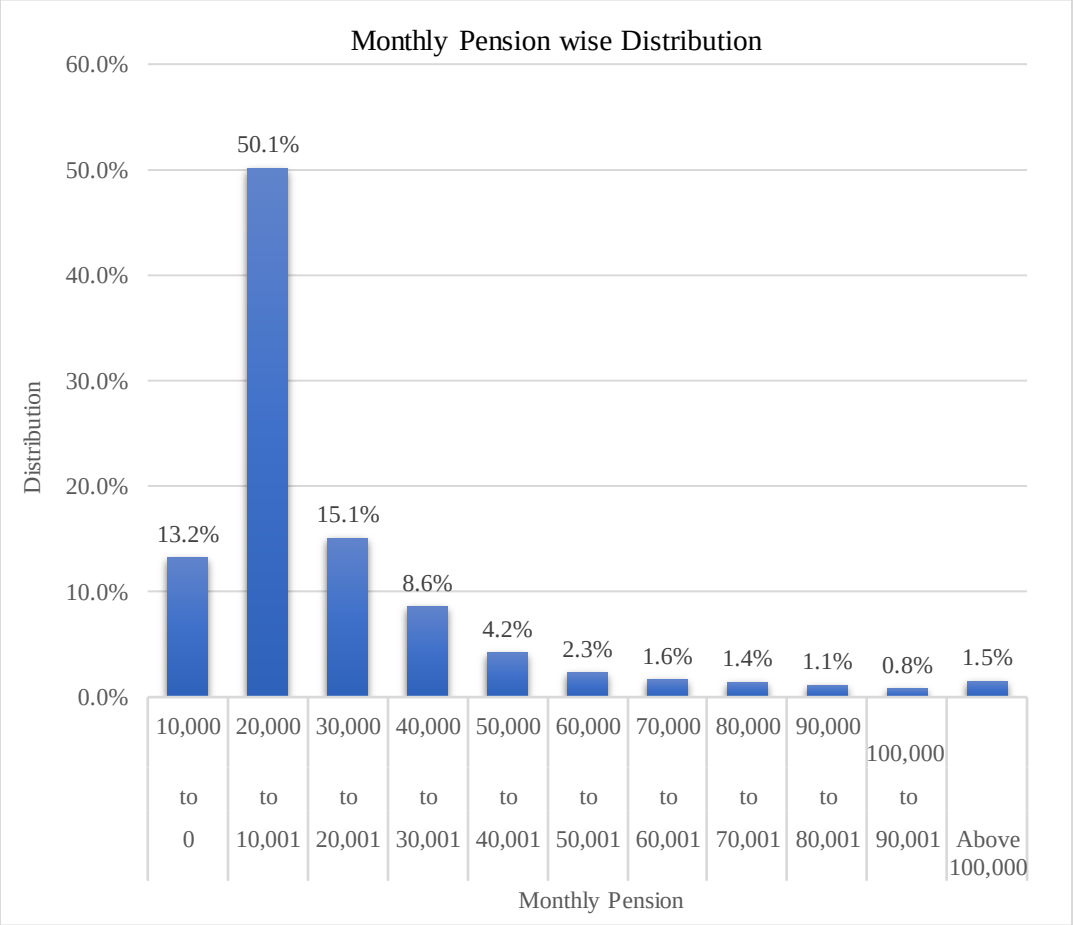


Table 8: Monthly Pension Amount Wise Distribution of Pensioners

Monthly Pension Amount Wise Distribution of Pensioners				
Monthly Pension Amount			Number	% of Total Number
0	To	10,000	65,117	13.2%
10,001	To	20,000	247,233	50.1%
20,001	To	30,000	74,370	15.1%
30,001	To	40,000	42,280	8.6%
40,001	To	50,000	20,636	4.2%
50,001	To	60,000	11,508	2.3%
60,001	To	70,000	8,059	1.6%
70,001	To	80,000	6,897	1.4%
80,001	To	90,000	5,618	1.1%
90,001	To	100,000	3,991	0.8%
Above 100,000			7,517	1.5%
Grand Total			493,226	100%

Graph 4: Monthly Pension Amount Wise Distribution of Pensioners



3. Assumptions

3.1. Valuation and Cash Flow Assumptions for Pension Scheme

Actuarial Assumptions are an enterprise's best estimates of the variables that will determine the cost of providing post-employment benefits. Actuarial Assumptions generally comprise of financial assumptions and demographic assumptions.

For selection of Demographic and financial assumptions, we have followed the Guidance Notes issued by the Pakistan Society of Actuaries (see http://www.psoa.org.pk/article/22-PSOA_Guidance_Notes).

Financial assumptions about future economic variables have an effect on the real value of money. The key components, for an actuarial valuation conducted to determine the financial implications to fund a Pension scheme, are:

- Inflation
- Net Rate of Return on the Pension Fund
- Expected Rate of Increase in Eligible (Pensionable) Salary
- Expected Rate of Increase in Pensions
- Rate of increase in Medical and Orderly allowance
- Expenses of Management of Pension Scheme/Fund

Demographic assumptions about future characteristics of current and former employees (and their dependents) who are eligible for benefits. The key components of demographic assumptions are:

- Mortality assumptions
- Employee turnover, disability and early retirement assumptions

For the purposes of the actuarial valuation of Punjab Government Pension Fund, the following assumptions have been used:

i. Inflation

Inflation is the prime driver for all economic factors. To determine appropriate estimates for discount rate, wage inflation, pension inflation and minimum pension inflation an

understanding of expected future inflation is essential. The recent world financial crises and the security challenges faced resulted in annual inflation peaking in financial year 2008-09 at over 24% and remain high for a couple of years thereafter. The rate of inflation that is of importance for actuarial projections is the expected long-term rate and not the immediate levels. This is because actuarial calculations, especially those used in standard actuarial methods, are of long-term nature looking at horizons of 50 years or more. Thus, for the purpose of actuarial analyses carried in this report a long-term inflation rate of 12.0% per annum is considered appropriate

ii. Net Rate of Return on the Pension Fund

The investment instruments, available for the investment of employee benefit funds as at the valuation date, were generally yielding 13% – 15% per annum.

Taking into account the volatility of economic environment prevailing as at June 30, 2019, it had been assumed that the average long term net rate of return on the proposed Fund (inclusive of both the invested and the un-invested portions) will be 14% per annum compounded.

iii. Expected Increase in Eligible (Pensionable) Salary

An estimate of future salary increases takes account of inflation, seniority, promotion and other relevant factors, such as supply and demand in the employment market. It had been assumed that salaries would increase at 13% per annum in future.

The net rate of return on the Fund and the rate of increase in the Eligible Salary are usually inter-related since during periods of inflation, both tend to rise in conformity with each other. **From an actuarial costing point of view, it is the difference between these two rates that matters, and not their individual values in isolation.**

Thus a difference of 1% between the long-term rate of return on the proposed Fund assets (i.e. 14%) and the long-term rate of increase in Eligible Salary (i.e. 13%) had been considered appropriate. Such an assumption was within the internationally and locally recognised norms.

iv. Pension Indexation

The indexation of pension has been assumed as the rate of 12% per annum. This was based upon past history of indexation provided by the government from time to time and future expectations based upon increased inflation expectation. (The average indexation given to pensioners since 1973 has been 12.5%)

v. Rate of Increase in Monthly Medical Allowance / Orderly Allowance

It has been assumed that the monthly Medical Allowance and Orderly Allowance will not increase in future because the Government has not increased this allowance since June 2015.

vi. Expenses of Management

It had been assumed that the expenses for management of Pension Scheme/Fund would be borne by Punjab Government, and the valuation accordingly did not make any provision for them.

vii. Expected Mortality Experience

It had been assumed that the mortality of the employees in active service will be according to SLIC (2001-05) Mortality Table. (Mortality Table is given in Appendix-II of the Report). Life expectancy at each age is provided in the Appendix-II. Life Expectancy at Normal Retirement age is 18.5 Years.

viii. Expected rates of Withdrawal/Ill-health/Retirement

The Employee Turnover, Disability and Early Retirement rates used in the valuation were based on the experience of public-sector employee benefit schemes in Pakistan.

ix. Nature of Group

A closed pension group has been assumed, that is, no new entrants will enter the group of current employees.

x. Benefit Structure

It has been assumed that the current benefit structure will not change for the period for which the valuation and cash-flow projections have been made.

xi. Increase in Pension for New Retirees as from 1st July 2019

Provision has been made while determining the Actuarial Liability of the increase in pension allowed by the Government to the new Retirees in lieu of the previous four increases in

pension amounts. The total increase to the new Retirees thus being 57% of the Net pension payable.

4. Valuation Results

4.1. Accrued Liability

As given in Chapter 3, the economic assumptions used for the following calculations are:

Table 9: Summary of Financial Assumptions

Expected Rate of Return on the Fund (i.e. the interest rate used to discount the future liabilities)	14% per annum
Expected Increase in Pensionable Pay	13% per annum
Expected Rate of Pension Indexation	12% per annum

The valuation results of Punjab Government Employees Pension Scheme based on the above data provided and assumptions outlined in earlier Chapter of report and Projected Credit Unit Method is as follows:

Table 10: Valuation Results

	Valuation Results (Rs. Billion)
Accrued Pension Liability on account of :	
a) Active Employees	3,108.568
b) Pensioners	3,582.771
Total Accrued Pension Liability as at 30.06.2019	6,691.339
Market Value of Assets	59.273
Funding Deficit	6,632.066
Required Contribution Rate, as %age of Pensionable Salaries, to fund Future Accrual of Benefits	64.25%

Total liability of the fund as at 30.06.2019 turns out to be **Rs. 6,691.339** billion. The market value of Fund Assets of **Rs.59.273 billion** as of June 30, 2019, was published by PPF. Therefore, funding deficit as at 30.06.2019 worked out to be **Rs. 6,632.066** billion. In case contributions are made to the Fund with the objective of financing the **future** liability as it accrues, the required contribution rate to the Fund is **64.25%** of pensionable salaries.

4.2. Cash-Flow Projections

The expected pension payments divided into regular pension and commutation over the next 5 years starting from the financial year ending 2019, under Punjab Government Pension Fund have been estimated on a combined basis for both active employees and existing pensioners. The expected pension out-flows are as follows:

Table 11: Projected Pension Scheme Payments

	Projected Pension Scheme Payments (Rs. Billions)			
Year	Commutation	Pension	Pen. + Comm.	% Age Increase
2019-20	13.032	159.302	172.334	
2020-21	27.435	183.655	211.090	22.49%
2021-22	34.741	213.088	247.829	17.40%
2022-23	42.241	247.385	289.626	16.87%
2023-24	52.483	287.692	340.175	17.45%

The expected pension cash flows increase by 19% over the next 5 years. However, the rate of increase is 22% for the first year and tends to slow down to 17% over the next 5 years.

4.3. Sensitivity Analysis of Accrued Pension Liability

In order to gauge the potential variation in the pension benefit liabilities of the Punjab Government, actuarial valuation and cash flow projections have been conducted by changing some critical economic and demographic assumptions/characteristics. The various set of assumptions and their associated pension liabilities are given below:

Table 12: Sensitivity Scenarios

Scenarios	Expected Rate of Return	Expected Increase in Pensionable Pay	Expected Rate of Pension Indexation
Base Scenario	14%	13%	12%
Sensitivity-I	**15%**	13%	12%
Sensitivity-II	**13%**	13%	12%
Sensitivity-III	14%	**14%**	12%
Sensitivity-IV	14%	**12%**	12%
Sensitivity-V	14%	13%	**13%**
Sensitivity-VI	14%	13%	**11%**

The following table summarizes the effect of various sensitivities on accrued pension liability:

Table 13: Sensitivity Results

Sensitivity	Accrued Liability as at 30.06.2019 (Rs. billion)	Increase in Liability compared to Base
Base	6,691.339	
Sensitivity – I	5,756.894	-14%
Sensitivity – II	7,877.451	18%
Sensitivity – III	6,991.938	4%
Sensitivity – IV	6,426.475	-4%
Sensitivity – V	7,580.785	13%
Sensitivity – VI	5,964.561	-11%

4.4. Observations/Comments

The actuarial valuation of the Punjab Government Pension Fund has been conducted as at 30.06.2019. The valuation was performed on the population of active employees and pensioners as at the valuation date.

i. The past service accrued liability of the Punjab Government Pension Fund works out to approximately Rs. 6,691.339 billion as at 30.06.2019.

   The market value of Fund Assets of Rs.59.273 billion as of June 30, 2019, was published by PPF. Therefore, funding deficit as at 30.06.2019 worked out to be Rs. 6,632.066 billion.

ii. The contribution rate, as percentage of total pensionable salaries, required for funding the future accrual of benefits is 64.25%.

iii. The Pension benefit cash out-flows have been projected for the next 5 years. The amounts of annual pension, commutation and total payments for each year have been provided in the relevant table given in this Chapter of the report. The quantum of pension outgoes increase rapidly over time. As an example, the total expected outgo is Rs.172 billion in 2019-20, which multiplies to Rs.340 billion in 2023-24

   In terms of percentage, the expected pension cash flows increase by 19% over the next 5 years. However, the rate of increase is 22% for the first year and tends to slow down to 17% over the next 5 years.

iv. There are no visible jumps in expected cash-flows in any year and the amounts have a rather smooth progression over time.

5. Options for Pension Reforms

5.1. Existing Employees

Parametric Reforms in the Existing Pension Scheme.

The Existing Pension System for the Civil Servants of the Punjab Government is a Defined Benefit System i.e. the employees are guaranteed certain retirement benefits after the current normal retirement age of 60 years.

The Pension Funds have very nominal assets and the annual cost is being met through the annual budgets of the Punjab Governments. This is termed as a "Pay As You Go" system of funding the Pension liability.

On the basis of the data available and assuming that new employees will also be entitled to benefits under the existing Pension Scheme, it is estimated that during the next 25years the annual pension cost as percentage of the annual wages will vary between 45% to 60%. This cost is high by generally accepted standards and is financially unsustainable in the long run. More so there are some basic inequalities in the Existing Pension Scheme.

Thus it is necessary that this Pension Scheme should be reformed in such a manner that

- it is more fairer for all the employees
- the purchasing power of the pensioners is not drastically eroded because of inflation,
- the emerging costs are financially sustainable on a long term basis and,
- there is general acceptance by the stakeholders

In the light of the above observations the following parametric reforms are proposed:-

i. Pension Accrual Rate

The present pension accrual rate is 2.33% for each year of service subject to the maximum being 70% of the pensionable pay. This formula seem to have the following drawbacks

- after 30 years of service the employee is not entitled to any further increase in the pension percentage.
- it is more favourable for employees retiring after completing between 25 to 30 years of service than for employees retiring with service in excess of 30 years.
- The present pension accrual rate is higher by general international standards

- In majority of the occupational pension schemes both in Pakistan and abroad the rate is 1/60th (1.67%) of pay for each year of service and the maximum pension is 2/3rd of the final or average pensionable pay (66.67%) after 40 years of service. The replacement rate on the average is about 53% after 40 years of service i.e. the pension is on the average about 53% of the total final or average pay.

Proposed Pension Accrual Rate

- It is proposed that the pension accrual rate may be fixed at 2% without any limit as to the maximum pension percentage. This will be more fairer for all the employees as each year of service will increase the pension percentage.
- After 40 years of service the pension will be 80% of the pensionable pay. This will increase the replacement rate to 48% from the present rate of 42%, after 40years of service and
- there will be reduction in the overall cost of the pension scheme.

ii. Pension on early retirement

The existing Pension Scheme allows the employee to retire after 25 years of service with pension payable immediately from the date of retirement and the commutation of the part of the pension on the basis of the factor corresponding to the age at retirement. This system is not fair in many respects, such as:

- The commutation factor is higher at the younger age and also the employee is expected to receive pension for a longer period. In this way an employee retiring before age 60 will get a better deal than an employee who defers retirement till age 60.
- It is true that generally only the employees having more productive employment in the private sector or otherwise will retire early. Thus such an employee, after early retirement will receive pension plus better emoluments.
- This provision, in a way, is also contrary to the basic concept that the person should receive pension only when he has completely retired from full time active employment. This is the practice in most of the other countries.

Proposed early retirement pension

- It is proposed that the employees retiring (except due to medical disability) after having completed 25 years of service but before age 60 should only be entitled to

deferred pension, payable as from age 60. However such an employee may be given an option to take reduced immediate pension and commuted value, calculated on actuarial basis.

- This will be more equitable for all the employees and
- There will be reduction in the overall cost of the pension scheme.

iii. Pay for Pension calculation

Presently the monthly pension is a percentage of the last drawn monthly pensionable pay. This system leads to:

- Strategic manipulation of earnings profile
- Inequity, as disproportionately higher benefits accrue to employees with sharp increases in pay in the last few years of service, and more so in the last year.
- Higher costs with related financial sustainability problems.

Proposed Pay for Pension calculation

- It is proposed that the pay for pension calculation should be the average annual pensionable pay during the last three years of service.
- This system will partially reduce the drawbacks listed above in the present method.
- There will be reduction in the overall cost of the pension scheme and it will become more sustainable.

Other alternative method being suggested is to base the pension on the valorized average pay during the whole period of service (i.e. each year's pay is increased by the average rate of pay growth each year till the date of retirement for the purposes of determining the valorized average pay). This method takes into account the pay throughout the career of the employee and does not give adequate increase in pension to the employees whose pays have increased at above the average rate i.e. employees who have been better performers. From the point of view of providing incentive to better performers this method do not seem to be appropriate and also administratively it will be very cumbersome, keeping in view the state of the employees' records.

iv. Indexation of pension

Presently the pensions are not indexed and the increases are made by the Government on adhoc basis through the budget. These increases do not have direct relation with the increase

in the Consumer price index. Overall the purchasing power of the pensioners have been eroded over a period of time.

It is thus necessary that in future there should be a guaranteed increase in pension each year corresponding directly to the increase in the Consumer price index (CPI). Ideally the increase in pension should exactly match the increase in CPI, but guaranteeing this may not be financially sustainable in the long run.

Proposed indexation of pension

- It is proposed that there should be an annual guaranteed increase of 3% in the pension amounts being paid, subject to the maximum being the increase in CPI.
- Besides this, the Government may continue to allow adhoc increases, depending on the fiscal space available and after necessary actuarial advice.

5.2. New Employees

Non-Contributory Pension Scheme

The new employees may be allowed benefits as under the Existing Pension Scheme with the proposed Parametric reforms, without paying any contribution towards the cost of the benefits.

The salary scales for new and existing employees are likely to be the same at all times and therefore it would be more appropriate from administrative and equity points of view, that the Pension Scheme for new employees should also be non-contributory.

New Contributory Pension Schemes

This Pension Scheme shall be contributory, which means, unlike as at present, the new employees will also contribute a certain percentage of their pensionable salary towards the cost of the benefits.

The contributions paid by the employees and any amounts paid by the Government shall be credited to Individual Compulsory Pension Accounts (ICPA) of the employees, forming a part of the Pension Trust Fund being managed by a Pension Fund Authority. This Authority shall be responsible for all forms of record keeping, payment of pensions and investment of the Fund by outsourcing to Asset Management companies in the private sector.

It is desirable that the Government should guarantee that the investment return on the Fund in any financial year shall not be less than the Consumer Price Index plus one percent.

The employee should be allowed tax credit on the contributions paid and there should be no tax on the income of the Pension Trust Fund.

The new employees shall be members of the existing Benevolent and Group Insurance Fund but the contributions to the General Provident Fund shall not be mandatory.

The proposed Three Types of the New Contributory Pension Schemes are briefly as follows:

First Type

This will be a Defined Benefits Scheme with benefits, as under the existing Pension Scheme with certain parametric changes, except that on leaving service before 25 years of service, the employee will receive the accumulated amount of his contributions plus a percentage of the Government's actual or notional accumulated contributions, depending on the length of service.

As presently an employee leaving before 25 years of service is not paid any benefit, this provision of portability will result in better allocation of the human resources in the economy.

Second Type

This will be a Defined Contributions Scheme with mandatory contributions as percentage of the pensionable pay from the new employees and the Government.

On leaving service before 25 years of service, the benefits will be somewhat similar as for First Type.

At the date of normal or early retirement the employee will be entitled to take part of the accumulated amount in his Individual Compulsory Pension Account as cash and the remaining amount will be used to purchase an indexed linked life annuity from an insurance company.

Under this life annuity there can also be a provision for the payment of 50% of the amount to the widow and children, after the death of the employee.

Third Type

This will be a Hybrid Scheme with the Government providing reduced Defined Benefits as in First Type, for its share of the total cost and the new employees contributing to a Defined Contribution Scheme as in Second Type.

The complete detail of the benefits payable under all the proposed Three Types of New Contributory Schemes are given hereunder in a Tabular form.

Table 14: Comparison of Proposed Three Schemes

Type of Scheme`	Defined Benefits Scheme (DB)	Defined Contributions Scheme (DC)	Hybrid Scheme (DB + DC)
Retirement Age	60 years	60 years	60 years
Pension as Percentage of	Average pensionable pay of last three years of service	N/a	Average pensionable pay of last three years of service
Pension Formula	2% for each year of service With no maximum limit	Pension will depend on the remaining amount in ICPA and the index linked life annuity rates applicable at retirement.	Reduced pension of 1% for each year of service Plus - pension from the remaining amount in ICPA as for dc scheme.
Lump Sum At Retirement	Commuted value of up to 25% of the pension	Up to 25% of the amount in ICPA	No commutation of reduced pension Up to 50% of the amount in ICPA.
Guaranteed Pension Increases	Percentage increase in CPI (consumer price index) or 3.0% whichever is less	Increase according to the terms of the index linked life annuity purchased.	Increase in reduced pension as for DB scheme. Plus-increase according to the terms of the index linked life annuity purchased.
Contributions	Employee-10% of his pensionable pay each month Government - government shall be responsible for the remaining cost.	Employee-10% of his pensionable pay each month Government - 15% of the employee's pensionable pay each month	Employee-10% of his pensionable pay each month Government -no contribution but reduced pension at retirement.
Benefits (A) Employees Leaving Before Age 60 With	Length of service • less than 5 years 100% of the amount in the ICPA	Length of service • less than 5 years 50% of the amount in the ICPA	Length of service • less than 5 years 100% of the amount in the ICPA

Service Less than 25 Years	• 5 years or more but less than 25 years 100% of the amount in the ICPA multiplied by 1 plus a factor varying according to length of service. Factor = 0.025* number of complete years of service.	• 5 years or more but less than 25 years 50% of the amount in the ICPA multiplied by 1 plus a factor varying according to length of service. Factor= 0.035* number of complete years of service	• 5 years or more but less than 25years 100% of the accumulated amount in the ICPA multiplied by1 plus a factor varying according to length of service. Factor= 0.03* number of complete years of service
(B) Employees Leaving Before Age 60 With Service 25 Years Or More	Deferred pension payable from age 60 at the rate of 2% for each year of service or actuarially reduced pension from the time of leaving.	Up to 25% of the amount in the ICPA as cash and remaining amount for the purchase of index linked life annuity	Deferred pension payable from age 60 at the rate of 1% for each year of service or Actuarially reduced pension from the time of leaving. Plus up to 50% of the amount in the ICPA as cash and remaining amount for the purchase of index linked life annuity
(C) Employees Leaving At Normal Retirement Age	Length of service • less than 5 years 100% of the amount in the ICPA • 5 years or more but less than 10 years 100% of the amount in the ICPA multiplied by 1 plus a factor varying according to length of service. Factor = 0.07* number of complete years of service. • 10 years or more pension at the rate of 2% for each year of service	Length of service • less than 5 years 50% of the amount in the ICPA • 5 years or more but less than 10 years 50% of the amount in the ICPA multiplied by 1 plus a factor varying according to length of service. Factor = 0.09* number of complete years of service. • 10 years or more up to 25% of the amount in the ICPA as cash and remaining amount for the purchase of index linked life annuity.	Length of service • less than 5 years 100% of the amount in the ICPA • 5 years or more but less than 10 years 100% of the amount in the ICPA multiplied by1 plus a factor varying according to length of service. Factor = 0.08* number of complete years of service • 10 years or more pension at the rate of 1.0% for each year of service, plus up to 50% of the amount in the ICPA as cash and remaining amount for the purchase of index linked life annuity

(D) Death While In Service (Benefits Payable To Widow And Children)	Length of service of the deceased a. Less than 10 years 100% of the amount in the ICPA multiplied by 2 b. 10 years or more pension at the rate of 2% for each year of service	Length of service of the deceased a. Less than 10 years 100% of the amount in the ICPA b. 10 years or more up to 25% of the amount in the ICPA as cash and remaining amount for the purchase of index linked life annuity.	Length of service of the deceased a. Less than 10 years 100% of the amount in the ICPA multiplied by 2 b. 10 years or more pension at the rate of 1.0% for each year of service, plus unto 50% of the amount in the ICPA as cash and remaining amount for the purchase of index linked life annuity.
(E) Death After Retirement (Benefits Payable To Widow And Children)	50% of the pension being paid to the deceased	Benefit according to the index linked life annuity	50% of the pension being paid to the deceased Plus benefit according to the index linked life annuity
(F) Permanent Disability Due to Accident or Sickness While In Service	Benefits payable shall be according to the length of service till the date of disability, as specified in (d) for death while in service.	Benefits payable shall be according to the length of service till the date of disability, as specified in (d) for death while in service.	Benefits payable shall be according to the length of service till the date of disability, as specified in (d) for death while in service.

Comparison of the Three Types of New Contributory Schemes

First Type --Defined Benefit Scheme

The employee is assured of a pension as a definite percentage of the pensionable pay at retirement.

He enjoys better peace of mind and financial security in old age.

The Government bears the risk of inflation, salary increases, return on fund, (if any) and the mortality risk (risk of longevity) after retirement for the employee, spouse, and children.

Second Type---Defined Contribution Scheme

The employee has the facility of portability. This means that on leaving service any time before 25 years of service he shall be paid his own contributions with interest plus an increasing percentage of the Government's contributions with interest.

The employee at no stage is certain of the amount of pension at retirement until he purchases the annuity from the insurance company. His pension will depend on the accumulated value of the contributions (based on the then market values of the underlying assets) and the rate of interest and estimate as for life expectancy at the time of retirement. This could be more or less than that payable under First Type.

He may be assured of the minimum pension (if any) guaranteed by the Government.

Instead of the Government, he will bear all the risks as mentioned for First Type.

In the event of death or disability of the employee during service, the pension to the widow/disabled employee will only depend on the accumulated value of the contributions at that time. Depending on the timing of these events the pension amount can be very nominal and thus the employee or his widow has to bear this additional risk.

This Scheme may encourage short termism in investment strategy because investment managers would like to avoid poor returns in the short run, ignoring the expected long term returns.

The liability of the Government is limited to the annual contributions payable, unless the pension at retirement is less than the minimum guaranteed amount (if any).

Third Type---Hybrid Scheme

The employee is assured of a minimum pension as a definite percentage of the pensionable pay at retirement.

He bears the risks mentioned for First Type up to the extent of about 50% of his pension. For the remaining 50% of the pension Government bears all the risks.

6. Recommendations and other Conclusions

6.1. Funding of the Plan Liabilities

For a normal Pension Scheme of any Autonomous Organisation it would be prudent to set up a Pension Fund which should always be adequate to meet the Actuarial Liability of the benefits payable to the existing members of the Scheme. This is purely necessary to guarantee the payment of future cash benefits and pensions to the employees, even in the event the Organisation becomes insolvent.

For the Pension Schemes of the Government Employees where the payment of the benefits is guaranteed by the Government, it may not be necessary to have a fully Funded Scheme, unless the said Government have specific/surplus funds available for this purpose from own sources or from donor agencies.

It will not be financially appropriate to use the money obtained as loan to build the Pension Fund, rather than use these Funds on projects for the welfare of the general public. In our opinion, it would be more prudent to fund such a liability on 'Pay as You Go' basis.

More so, there seems to be a general tendency with Governments to divert money from such Funds, at different times to other projects, which may be considered as of higher priority.

i. Funding annual Pension Outgo on 'Pay as You Go' basis.

The Pension Scheme Outgo each year can be funded on 'Pay as You Go' basis, budgeting each year's cost as a specific percentage of the total Projected Provincial Revenue for that particular year. Based on the above Projections the GoPb can make necessary provisions in the Budget each year for the next five years. In our opinion the Pension Outgo as not more than 15% of the Revenue may be considered as reasonable. No doubt efforts will be made to increase the Revenue each year, may be by also using different sources.

ii. Funding of total Accrued Liability of the Pension Scheme as on 30.6.2019

In case the GoPb intends to fund the Total Accrued Actuarial Liability and the liability for the future accrual of benefits, then it is recommended that the following payments on annual basis may be made to the Pension Fund:

a. 64.25% of the total annual pensionable pay for the Active Employees to fund their future accrual of benefits.

b. The total funding deficit of the Pension Scheme as on 30.06.19 is Rs 6,632.066 billion and to fully fund the Scheme, technically this amount is immediately payable to the Pension Fund. However, as the liabilities are of a long-term nature the payment of this Liability can be spread over a period of time.

Again, depending on the availability of surplus funds, this Liability can be funded by making an annual payment of Rs 937.849 billion for 20 years, provided the expected Return on the Fund moneys is at least 14% per annum.

6.2. Pension Reforms

i. Existing Employees

At present the employees are not contributing any amount towards the cost of the pension benefits. There is no doubt that if the employees are made to contribute any little amount without giving any consideration in the new pay scales for this aspect, there will be a saving for the Government.

There will definitely be a demand, that besides considering the rise in the CPI and the pays in the private sector, allowance for the contribution to the pension fund should also be considered. This means that overall the cost to the Government will not be reduced.

If the Scheme is made Contributory, records will have to be maintained, as in the case of General Provident Fund, of the contributions received from individual employees. Without a well designed computer programme and proper implementation, there will be insurmountable record keeping problems.

Thus it is recommended that the Scheme should continue to be Non Contributory with suitable parametric reforms to make it more equitable and financially sustainable over a longer period of time.

ii. New Employees

The New Employees other, than on contract basis, are not likely to have different scales of pay and in that event if they are required to contribute towards the cost of the pension benefits, it will be somewhat inequitable.

This will reduce the take home pay and thus will contribute towards discouraging persons from joining the Civil Service. At present the Non Contributory Defined Benefits Pension Scheme of the Government is to certain extent an attraction for the existing and the new employees.

The Administrative and Accounting problems as mentioned above will still be experienced in handling the contributions from the New Employees, though on a reduced scale for some time.

It is recommended that in case if it is decided to also offer a Defined Benefit Pension Scheme to the New Employees, then this should be on Non Contributory basis.

In the event, it is decided that the New employees should be members of a Defined Contribution or a Hybrid Scheme, then they may have to contribute. However, as\an alternative, in this case also, these Schemes can be on Non-Contributory basis, with the Government just contributing the total fixed percentage of the pay, (or a notional amount) with no guarantee of the amount of pension etc.

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Appendix I

Summary of the Benefit Structure of Punjab Government Pension Fund

The Pension Scheme Members of Punjab Government were entitled to the following pension benefits on normal and early retirement, death and disability as at June 30, 2019:

Normal Retirement Pension

The normal retirement age is 60 years.

If service is less than 5 years:

- Nil Benefit

If service is greater than 5 and less than 10 years:

- A lump sum gratuity is payable. The rate of gratuity is calculated as per the following formula:

  Gratuity = Last Drawn Pensionable Salary x Pensionable Service

If service is greater than 10 years:

- The rate of pension at normal retirement age is 2.33% of the last drawn pensionable salary for each year of service subject to a maximum service period of 30 years. The maximum pension amount is thus limited to 70% of the last drawn pensionable salary

  The employees can surrender up to a maximum of 35% of the gross pension in lieu of a lumpsum-commuted value. The commuted value at age 60 shall be calculated as per the following formula:

  Commuted Value = 12.37 x amount of pension surrendered x 12

Early Retirement Pension

Early retirement is applicable on the completion of 25 years of continuous service.

- The rate of pension at early retirement age is 2.33% of the last drawn pensionable salary for each year of service subject to a maximum service period of 30 years. The maximum pension amount is thus limited to 70% of the last drawn pensionable salary

  The employees can surrender up to a maximum of 35% of the gross pension in lieu of a lumpsum-commuted value.

Death in Service

If service is less than 5 years:

- Nil

If service is greater than 5 and less than 10 years:

- A lump sum gratuity is payable. The rate of gratuity is calculated as per the following formula:

  Gratuity = 1.5 x Last Drawn Pensionable Salary x Service

If service is greater than 10 years:

- The basic pension shall be 2.33% of the last drawn pensionable salary for each year of service subject to a maximum service period of 30 years

  Widow's Pension = 75% x basic pension

Widow's pension is paid to eligible children in case of death of the widow. Eligible children are defined as legal male child under the age of 21 years and legal unmarried daughter

In addition to the above, the widow is entitled to 25% of the commuted value of gross pension. The age based commutation factors are set out in the table (later in the Chapter)

Death after Retirement

In case of death after retirement, the widow is entitled to receive 75% of the pension being received by the retiree.

Widow's pension is paid to eligible children in case of death of the widow. Eligible children are defined as legal male child under the age of 21 years and legal unmarried daughter. In the absence of widow and eligible children, the pension is payable to the dependents (such as parents, widow daughter etc.) for the remaining guaranteed period

Ill-health Pension

If service is less than 5 years:

- Nil

If service is greater than 5 and less than 10 years:

- A lump sum gratuity is payable. The rate of gratuity is calculated as per the following formula:

  Gratuity = 1.5 x Last Drawn Pensionable Salary x Service

If service is greater than 10 years:

- The basic pension is 2.33% of the last drawn pensionable salary for each year of service subject to a maximum service period of 30 years.

  The employees can surrender up to a maximum of 35% of the gross pension in lieu of a lumpsum-commuted value.

  Following is the age – based commutation table showing commutation factors at ages 20 – 60.

Age	Commutation Factors	Age	Commutation Factors	Age	Commutation Factors
20	40.5043	36	28.3362	52	17.0050
21	39.7341	37	27.5908	53	16.3710
22	38.9653	38	26.8482	54	15.7517
23	38.1974	39	26.1009	55	15.1478
24	37.4307	40	25.3728	56	14.5602
25	36.6651	41	24.6406	57	13.9888
26	35.9006	42	23.9126	58	13.4340
27	35.1372	43	23.1840	59	12.8953
28	34.3750	44	22.4713	60	12.3719
29	33.6143	45	21.7592		
30	32.8071	46	21.0538		
31	32.0974	47	20.3555		
32	31.3412	48	19.6653		
33	30.5869	49	18.9841		
34	29.8343	50	18.3129		
35	29.0841	51	17.6526		

Appendix II

Mortality Rates

The following table shows the age-based in-service mortality rates used for the purpose of valuation. The rates are those of the standard SLIC 2001–05 mortality table used for actuarial work in Pakistan.

Age	Mortality Rates	Life Expectancy	Age	Mortality Rates	Life Expectancy
20	0.000958	54	61	0.01750	17.8
21	0.000974	53	62	0.01888	17.1
22	0.000991	52	63	0.02028	16.5
23	0.001011	51	64	0.02168	15.8
24	0.001032	50	65	0.02305	15.2
25	0.001057	49	66	0.02439	14.5
26	0.001084	48	67	0.02569	13.9
27	0.001115	47	68	0.02751	13.3
28	0.001150	46	69	0.02946	12.6
29	0.001190	46	70	0.03225	12.0
30	0.001235	45	71	0.03533	11.4
31	0.001287	44	72	0.03876	10.8
32	0.001345	43	73	0.04242	10.3
33	0.001413	42	74	0.04638	9.7
34	0.001489	41	75	0.05070	9.2
35	0.001577	40	76	0.05544	8.7
36	0.001678	39	77	0.06065	8.2
37	0.001793	38	78	0.06623	7.7
38	0.001924	37	79	0.07223	7.3
39	0.002075	36	80	0.07871	6.8
40	0.002248	35	81	0.08571	6.4
41	0.002445	34	82	0.09328	6.0
42	0.002671	33	83	0.10139	5.7
43	0.002928	32	84	0.11005	5.3
44	0.003221	32	85	0.11926	4.9
45	0.003554	31	86	0.12904	4.6
46	0.003932	30	87	0.13942	4.3
47	0.00436	29	88	0.15066	4.0
48	0.00484	28	89	0.16261	3.7
49	0.00538	27	90	0.17532	3.4
50	0.00599	26	91	0.18899	3.1
51	0.00667	25	92	0.20397	2.9
52	0.00742	25	93	0.22061	2.6
53	0.00824	24	94	0.23947	2.4
54	0.00915	23	95	0.26084	2.1
55	0.01013	22	96	0.28496	1.8
56	0.01120	21	97	0.31235	1.6
57	0.01234	21	98	0.34366	1.3
58	0.01354	20	99	0.37921	1.0

59	0.01481	19	100	0.41967	0.6
60	0.01613	19	101	1	0.0

It has been assumed that the mortality of the employees in active service will be according to SLIC (2001-2005) Mortality Table with 1-year set-back. The mortality of the pensioners has been assumed to correspond to the Mortality Table SLIC (2001-2005) with 1-year set-back. The mortality of the widow pensioners has been assumed to correspond to the Mortality Table SLIC (2001-2005) with 4-year set-back.

Withdrawal and Early Retirement Rates

The Withdrawal and Early Retirement rates used in the Actuarial Evaluation are shown in the Table below. These Rates are based on the experience of public-sector Employee Benefit Schemes in Pakistan.

Age	Withdrawal Rates	Early Retirement Rates
20	0.09947	-
21	0.09461	-
22	0.09118	-
23	0.08568	-
24	0.07996	-
25	0.07523	-
26	0.07157	-
27	0.06750	-
28	0.06430	-
29	0.06350	-
30	0.06250	-
31	0.06190	-
32	0.06125	-
33	0.05630	-
34	0.05102	-
35	0.04560	-
36	0.04142	-
37	0.03662	-
38	0.03240	-
39	0.02765	-
40	0.02280	-
41	0.02040	-
42	0.01862	-
43	0.01618	-
44	0.01382	-
45	0.01142	0.005
46	0.01022	0.005
47	0.00965	0.005
48	0.00845	0.005
49	0.00725	0.00735
50	-	0.0097

51	-	0.01205
52	-	0.0144
53	-	0.01675
54	-	0.0191
55	-	0.02145
56	-	0.0238
57	-	0.02615
58	-	0.0285
59	-	0.03085
60	-	1