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# Caribbean Actuarial Association Jamaican Chapter

## Response to the Green Paper No. 2-2011 On Options for Reform of the Public Sector Pension System

October 2011



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# INTRODUCTION

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The Jamaican Chapter of the Caribbean Actuarial Association welcomes the opportunity to present its considered views on Green Paper No. 2 – 2011, “**Options for Reform of the Public Sector Pension System**” (the Green Paper). Naturally, as local and regional practitioners in the arena of retirement systems, we wish to place our views in the public domain.

The issue of public pension reform is not unique to Jamaica. Retirement systems worldwide, both in the private and the public sectors, are under stress arising from a confluence of adverse factors, namely:

- Aging populations
- Increasing longevity
- Low interest rates
- Rising fiscal deficits
- Unsustainable levels of debt
- Rising unemployment
- Muted growth prospects

We commend the policymakers for initiating discussion on such a complex, emotive and difficult issue and look forward to assisting in its resolution. Our response aims to:

1. Address some of the complexities
2. Provide technical support to facilitate the decisions which will have long term implications both for the national budget and the employees in the public sector.

We have included results from our own projections based on the employees and pensioners data set obtained from the Ministry of Finance & Planning. It is our understanding that these were the same data sets used by the World Bank team to produce the results illustrated in the Green Paper.

There is no unique, simple or easy solution and so fundamental changes are required for meeting and reducing the significant costs for both past service (i.e. accrued) and future service pension benefits. We strongly urge that our recommendations be viewed in their totality rather than that the favourable recommendations be cherry-picked but the unfavourable recommendations discarded.

It is important that the reform be consistent as a whole and the opportunity be embraced to introduce parity and preserve some intergenerational equity.



## ASSESSMENT

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We assessed proposals in the Green Paper, and came up with our recommendations using the following criteria, “**SAFETY**”:

**S**ecurity of the Pension Promises

**A**dequacy of the Benefits

**F**iscal Sustainability

**E**fficiency

**T**ransparency

**Y**ield



## SECURITY OF THE PENSION PROMISES

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### Recommendation 1

We recommend that the benefits be funded on a phased basis starting at a fifty percent (50%) funding level of the past service liability and rising to one hundred (100%) over a period of ten to fifteen (10-15) years.

### The Status Quo

Public sector employees currently depend up on the good faith and credit of the Government of Jamaica (GOJ), to deliver on their pension promises. Currently Employees' contributions, payable at rates between 0% - 6 % of pay, are paid directly into the Consolidated Fund. All benefits are a charge on the Consolidated Fund from whence they are met as they become due. There is no advanced funding against the liability for emerging pensions.

### The Pay-As-You-Go Model Is No Longer Feasible

The Green Paper was silent on funding. The current method is pay-as-you-go (PAYG). The method of funding pensions on a PAYG basis is a traditional practice of most governments. PAYG is economically equivalent to full funding if certain critical assumptions are met namely:

1. A stable population (in terms of age and sex ),
2. An Age Dependency Ratio (ratio of contributing workers to pensioners) equal to the Passivity Ratio (ratio of years of retirement to years of working); and
3. A growth rate of pay equal to the return on assets.

Unfortunately, the first two assumptions are unlikely to be met in the future due to slower population growth, an aging population and increasing longevity.

The third assumption is inconsistent with historical experience and rational investment expectations.



## Unfunded Benefits Inconsistent with Mandatory Employees' Contributions

An unfunded pension system with mandatory contributions by members is inconsistent and inequitable. Some groups of public employees are required to make mandatory contributions deductible at source from pay. These contributions provide Survivors' (spouses' and children's) lump sum and pension benefits but the cost of these benefits at 0.8% annual pay is substantially less than the rates of 1.6%, 4% or 6% pay being paid each year. Hence, given that the employees' contributions are paid into the Consolidated Fund, these contributors have in fact been meeting a portion of the cost of their own pensions.

## Unfunded Benefits Inconsistent with Portability of Pensions

An unfunded plan is inconsistent with the right of portability of pensions. This, of course, is one of the features which are being mandated for private sector pension plans registered with, and regulated by, the Financial Services Commission under **The Pensions (Superannuation Funds and Retirement Schemes) Act, 2004**

## Unfunded Benefits Lead to Quantitative Easing

Many countries during the recent financial crisis have resorted to quantitative easing on more than one occasion which is particularly risky for pensioners on fixed incomes because of the associated inflationary effects. Funding mitigates this risk.

## Funding Would Bring Parity

Part of the GOJ organizational strategy has been to create state owned enterprises which have funded plans.

The members of these state enterprises are performing a public service yet enjoy greater security than their counterparts in the public sector. Funding would bring parity between employees of state enterprise and public sector employees.



## Unfunded Benefits Inconsistent with Local Experience

Jamaica currently operates two successful major financial institutions that actually fund for housing and social security benefits, the National Housing Trust and the National Insurance Fund. The administration of these benefits requires the maintenance of accurate records of mandatory contributions (by employers and employees).

## Unfunded Benefits Create Greater Problems

We recognize that a transition from PAYG to full funding is difficult because one generation has to pay twice, once for existing pensioners through PAYG and once for their own pensions through funding. However, to do otherwise would be to create greater challenges within the medium term.



## ADEQUACY OF THE BENEFITS

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### Recommendation 2

We support the retention of a defined benefit plan as was recommended in the Green Paper.

### Risk Exposures at Retirement

The adequacy of benefits has to be considered in the context of the risks that members of pension plans face. The following are the main risks:

- 1 **Replacement rate risk:** the risk that pensions will be insufficient to maintain the same standard of living after retirement as before retirement
- 2 **Investment risk:** the risk that the assets in the plan are inadequate as a result of poor investment performance
- 3 **Interest rate risk:** the risk that the actual pension is low as a result of low interest rates at the time of retirement
- 4 **Longevity risk:** the risk that individuals will outlive their income
- 5 **Inflation risk:** the risk that inflation will reduce the purchasing power of their income
- 6 **Portability risk:** the risk that accrued pension rights cannot be transferred when an employee changes jobs
- 7 **Employer insolvency risk:** the risk that the employer is in financial distress and unable to meet the promises
- 8 **Political risk:** the risk of explicit changes (by the government in laws and policies) that adversely affect the contributions, net investment yield or benefits e.g. changes to the tax regime



## The Defined Contribution Model Only Eliminates Two Risks

A defined contribution plan has all the risks except the Portability Risk and the Employer Insolvency Risk.

With the defined contribution model higher contribution rates, with appropriate investment returns, may improve the replacement rate, but exposure to the Inflation Risk remains.

## The Defined Benefit Model PLUS Funding Eliminates Five Risks

The defined benefit model removes three of the above eight risks, namely, the Investment Risk, the Interest Rate Risk and Longevity Risk. The Insolvency Risk and Portability Risks can only be hedged by funding benefits in funds segregated from the employer's business. If the first recommendation of funding is adopted, then the removal of these five risks places members in a better position than those in a funded defined contribution plan who are exposed to six risks. Political risk cannot be hedged.

The two residual risks of low replacement rate and erosion by inflation depend in the defined benefit model, upon the pension formula and the level of indexation. There is an intrinsic trade-off between the pension formula and the level of post retirement indexation. That is, the more generous the formula, the lower the level of indexation that would be required.



### Recommendation 3

We recommend a revised benefit structure with parametric changes to the pension formula, early retirement terms and normal retirement age, with no guaranteed post retirement indexation. The key features of the proposed new benefit structure are:

- ✓ A pension formula of 2% of pay for each year of service averaged over the last five years prior to retirement for both Past and Future Service,
- ✓ The introduction of a reduction factor of 5% p.a. on early retirement, and a normal retirement age of 65.
- ✓ Indexation at the discretion of the GOJ where the GOJ targets increases at the lower of five per cent or inflation, payable only when funds permit.
- ✓ No restoration of the commuted pension on attaining twelve and a half (12.5) years on retirement pension.
- ✓ Mandatory employee contributions at 5% of pay for all public sector employees.
- ✓ Reduction in benefits **only if** there is mandatory employer funding.

### CAA Assumptions

The benefits for status quo and recommendation 3 were measured using the following key assumptions:

1. A discount rate of ten per cent (10%)
2. Inflation of five percent (5%)
3. Pay growth of five per cent (5%)
4. No guaranteed pension increases.

### Scenario 3 Represents a Meaningful Solution

We do not agree with the benefit structure recommended in the Green Paper because the benefits are not meaningful.

Scenario 3 was chosen because we recognise that the maintenance of the status quo does not create a meaningful solution to the fiscal position. So where existing past service benefits are very generous when benchmarked to the benefits provided by the private sector and similar countries, we recommend a reduction of the accrued benefits. This recommendation is locked to recommendation 1. In other words, this recommendation does not stand without recommendation 1.



In spite of the reduction in accrued benefits proposed this recommendation would reduce public sector employee exposure to the Replacement Rate Risk relative to the proposed Green Paper benefits.

### The Green Paper Proposal Increases Risk Exposure

**Appendix 2** shows that fifty per cent of current staff entered by age 25 years and eighty per cent had entered by age 35.

**Appendix 12** shows replacement rates for various ages at entry under various designs. The lowest replacement rates are provided by the 1.8% career average salary plan that is proposed in the Green Paper. We do not support this option in a volatile inflation climate like Jamaica. It penalizes long service employees and rewards short service employees disproportionately.

We do not support the recommendation that there should be “guaranteed indexation” rather, indexation should not be granted unless there are windfall sources of either fiscal revenue or investment surpluses under a funded status.



## FISCAL SUSTAINABILITY

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### Recommendation 4

We recommend the defeasance of the national debt, which was incurred to resolve the crisis in the financial sector in the mid 1990s, by low cost debt from the multilateral agencies which could generate savings of 3.5% of GDP. These savings would accommodate:

- ✓ The interest cost of the recommended benefits - 1.5% of GDP
- ✓ Amortization cost for the implicit pension debt (IPD) - 0.8% of GDP
- ✓ Non-pension purposes - the remainder of 1.2% of GDP

### The Status Quo is Not Fiscally Sustainable

We understand the tenuous nature of our macroeconomic position as demonstrated in the table below and the pessimistic outlook for growth given the current financial turbulence in the world.

**Table 1 Current Macroeconomic Indicators**

<b>Macro Statistics</b>	<b>J\$ Billion</b>	<b>% GDP</b>	<b>% Revenue</b>
<b>GDP</b>	1,217	100.0%	386.3%
<b>Debt</b>	1,570	129.0%	498.4%
<b>Fiscal Revenue</b>	315	25.9%	100.0%
<b>Fiscal Deficit</b>	74	6.1%	23.5%

**Appendices 10, 11, 13, 14 and 15** show the expected cash flows in absolute and relative amounts over the next five years if the status quo prevails.



## Defeasance of the Debt Stock Used to Resolve the Financial Sector Crisis

A major contributor to the debt stock was the resolution of the crisis in the financial sector in the mid 1990s. It is estimated that the resolution cost some 41.2% of GDP. The resolution was funded by high cost debt in the international capital markets because of the Washington consensus. The current approach to resolving crises in the financial sector in various countries e.g. USA, UK, Europe, Japan is to use low cost funds from the multilateral agencies and the central bank of the affected country. Using a prudent estimate of Jamaica interest cost prior to the Jamaica Debt Exchange, which was borne by taxpayers, of 10% p.a., the annual savings would be some 3.5% of GDP which could assist funding the public sector pension benefits.

This recommendation should not be viewed as a substitute for funding.

## Public Sector Downsizing Strategies Should Consider Pension Benefits

Removing higher paid workers who tend to be older results in, shifting them from the active employee payroll to the pensioner payroll. The outcome, under the current benefit structure is that payroll savings may not significant and at the same time the expenses of separation, and in some cases replacement and training, are incurred.

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### Example

Consider a person who is age 55 and has:  
A Salary of \$2,400,000 per annum  
30 years of Service

If the person is terminated, the work still exists and a replacement employee is needed then the GOJ now has to pay:

1. A pension for an extra 10 years totalling \$15,840,0000
2. Redundancy of about \$6,000,000
3. A new person to do the job for the next 10 years

The new person would have to be paid less than \$216,000 per annum to create any real savings to the fiscal position.

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In any downsizing process, the GOJ should examine if it is more cost effective for older higher paid workers to continue to normal retirement or to incur the expense of separation.



## Reducing Accrued Benefits and GOJ Funding Supports Fiscal Sustainability

A pension promise is a debt in economic terms. There are two components of the pension promise, the past service liability (the value of the liability for accrued/earned benefits) and the service cost (ongoing cost of benefits in respect of future service). The debt and fiscal deficit figures shown in the table above exclude the past service liability and the service cost respectively.

We project that the past service liability or the implicit pension debt (IPD), as it is called in the Green Paper, under the current structure is of the order of **\$223 billion** or 18% of GDP. The service cost we project to be **\$5.4 billion** or 0.4% of GDP. Using an average cost of borrowing for the Government of 11% p.a. long term, the interest cost of the public sector pensions is **\$25 billion** per annum or 2.1% of GDP.

Although it is convenient from a macro perspective to examine costs relative to GDP, pensions remain part of compensation policy and it is common from a micro perspective to consider pension costs relative to pensionable payroll. The service cost (for status quo benefits) is **10.8% payroll** which is at the upper end of similar costs experienced within the private sector. The funding of the IPD over the working lifetime of the workers is shown to be **36.4% payroll**. That the latter figure is high is no surprise because of the absence of funding. There is no comparable benchmark in the private sector. The comparative figures for the current and our recommended benefit structure are set out below.

**Table 2 Comparison of Current and CAA Proposed Benefit Structure**

	Current Benefit Structure			Proposed Benefit Structure <sup>1</sup>		
	\$Billion	%GDP	% Payroll	\$Billion	%GDP	% Payroll
<b>Past service liability</b>	222.6	18%	36.4%p.a.	162.9	13%	19.8% p.a.
<b>Service cost (p.a.)</b>	5.4	0.4%	10.8%	1.5	0.1%	3.4%
<b>Interest cost (p.a.)</b>	25.2	2.1%		18.1	1.5%	

These changes are assumed in the significant reduction of:

1. The past service liability or IPD from **\$222.6 billion** to **\$162.9 billion**, a fall of 27%  
and of
2. The service cost from **\$5.4 billion** per annum to **\$1.5 billion** per annum, a fall of 72%.

There are precedents for reducing accrued benefits that are not fiscally sustainable. The recent local experience is the Jamaican Debt Exchange.

<sup>1</sup> Scenario3



## EFFICIENCY

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### Recommendation 5

We recommend that the existing capacity and expertise that is within the private sector be used rather than building out that capacity and expertise which is both expensive and time consuming.

We agree with the recommendation in the green paper that the administration system (for HR and pensions) should allow quick, accurate estimates of pension expenditure. It should be standard for a retiree's pension to be calculated and paid starting from the end of the first month of retirement.

We do not agree with the Green Paper recommendation to build out systems and expertise within the public sector.

There is precedent for our recommendation in the outsourcing of the administration of the GEASO Health Plan. The capital which would have been used in such an exercise could be used to seed the dedicated fund to improve the security of pension benefits. We have allowed in our projections for an administrative cost of 1% of annual payroll or \$600 million per annum in current terms.



## TRANSPARENCY

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### Recommendation 6

We recommend that the dedicated fund be set up as a trust fund like other pension funds in the private sector and that there be a Board of Trustees appointed by GOJ, which should include persons nominated by the key stakeholders, to administer the Trust.

We notice that the Green Paper did not recommend a governance structure. In addition the requirements of annual audited accounts, annual statements of accrued and projected benefits to members, triennial actuarial valuations and statement of investment principles and policies should be applicable so that employees can buy into the changes with confidence.

The governance structure is critical because we are fundamentally asking employees to accept a reduction in their benefits. In fact it is now becoming clear that the promised benefit levels can no longer be realistically delivered.



## YIELD

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### Recommendation 7

We recommend that the contributions by the GOJ be used solely for investment in real assets i.e. excluding the financial sector and government bonds.

The Green Paper did not recommend an investment policy.

A public sector plan holding government debt in its assets is economically unfunded by the amount of government debt in its investment portfolio. Over the short term, employees' contributions can be invested in government bonds to assist in reducing interest rates. There is no allowance for investment expenses, but a reduction in yield of fifty (50) to one hundred (100) basis points should be expected and so would be funded out of the yield of real assets.

Jamaica is challenged in terms of its energy and food security which places pressure on fiscal growth and the exchange rate. Funds can be channelled into these challenges.



# Appendix 1

## Actuarial Liabilities

Scenarios	Status Quo	Status Quo	Status Quo	Status Quo	1	2	3	4	5	6	7	8
NRA	60	60	55	55	60	60	65	65	65	65	70	70
Accrual Rate	2.2%	2.2%	2.2%	2.2%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Member Contributions					5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Averaging Period	0	0	0	0	5	5	5	5	3	3	3	3
Valuation Basis	10/5/0	10/5/5	10/5/0	10/5/5	10/5/0	10/5/5	10/5/0	10/5/5	10/5/0	10/5/5	10/5/0	10/5/5

Description	\$mil's	\$mil's	\$mil's	\$mil's	\$mil's	\$mil's	\$mil's	\$mil's	\$mil's	\$mil's	\$mil's	\$mil's
Pensioners	73,394	105,771	73,394	105,771	73,394	105,771	73,394	105,771	73,394	105,771	73,394	105,771
Retirement Benefit	88,019	138,044	109,561	178,383	74,463	118,277	54,864	83,447	57,608	87,619	39,829	57,764
Lump Sum at NRA (Cash)	40,799	40,799	48,546	48,546	33,655	33,655	26,231	26,231	27,542	27,542	20,553	20,553
Spouse Benefit (Post Retirement)	2,299	5,577	2,244	6,095	4,369	10,468	4,165	8,784	4,372	9,224	3,717	7,001
Death Benefit	1,509	2,011	748	1,012	2,124	3,001	4,242	5,818	4,453	6,108	7,316	9,776
Reinstated Pension	6,196	8,529	7,372	10,144	0	0	0	0	0	0	0	0
<b>Total Past Service Liabilities</b>	<b>212,216</b>	<b>300,731</b>	<b>241,865</b>	<b>349,951</b>	<b>188,005</b>	<b>271,172</b>	<b>162,896</b>	<b>230,051</b>	<b>167,369</b>	<b>236,264</b>	<b>144,809</b>	<b>200,865</b>
<b>Service Cost</b>												
Retirement Benefit	3,989	6,270	4,008	6,562	3,368	5,357	2,805	4,267	2,944	4,481	2,096	3,040
Lump Sum at NRA (Cash)	1,842	1,842	1,763	1,763	1,520	1,520	1,340	1,340	1,406	1,406	1,081	1,081
Spouse Benefit (Post Retirement)	110	267	82	231	195	470	213	448	223	470	197	369
Death Benefit	115	152	68	90	155	221	265	366	279	385	424	572
Reinstated Pension	280	385	268	369	0	0	0	0	0	0	0	0
<b>Total</b>	<b>6,336</b>	<b>8,916</b>	<b>6,189</b>	<b>9,015</b>	<b>5,238</b>	<b>7,568</b>	<b>4,623</b>	<b>6,421</b>	<b>4,852</b>	<b>6,742</b>	<b>3,798</b>	<b>5,062</b>
Less Member Future Contributions	-962	-962	-837	-837	-2,923	-2,923	-3,118	-3,118	-3,118	-3,118	-3,157	-3,157
<b>Employer Service Cost</b>	<b>5,374</b>	<b>7,954</b>	<b>5,352</b>	<b>8,178</b>	<b>2,315</b>	<b>4,645</b>	<b>1,505</b>	<b>3,303</b>	<b>1,734</b>	<b>3,624</b>	<b>641</b>	<b>1,905</b>
<b>Service Cost</b>	<b>% of pay</b>	<b>% of pay</b>	<b>% of pay</b>	<b>% of pay</b>	<b>% of pay</b>	<b>% of pay</b>	<b>% of pay</b>	<b>% of pay</b>	<b>% of pay</b>	<b>% of pay</b>	<b>% of pay</b>	<b>% of pay</b>
Cost of Future Benefits	10.8	15.2	12.3	17.9	9.0	12.9	7.4	10.3	7.8	10.8	6.0	8.0
Administrative Expenses	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Less Member Rate of Contributions	-1.6	-1.6	-1.7	-1.7	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0
<b>Employer Service Cost</b>	<b>10.2</b>	<b>14.6</b>	<b>11.6</b>	<b>17.2</b>	<b>5.0</b>	<b>8.9</b>	<b>3.4</b>	<b>6.3</b>	<b>3.8</b>	<b>6.8</b>	<b>2.0</b>	<b>4.0</b>
1% of Next Year's Pay	585	585	505	505	585	585	624	624	624	624	632	632
Present Value of 1% of Future Pay	6,767	6,767	5,336	5,336	6,767	6,767	8,168	8,168	8,168	8,168	9,346	9,346
Annual Pay	63,349	63,349	63,349	63,349	63,349	63,349	63,349	63,349	63,349	63,349	63,349	63,349
<b>CAA 10/2011</b>												



## Appendix 1.1 Legend

1. **NRA** – Normal Retirement Age
2. **Accrual Rate** – percent of salary for each year of service
3. **Member Contribution** – percent of salary paid by members
4. **Valuation Basis** - assumptions for discount rate/salary growth/future pension increases
5. **Averaging Period** - period over which salaries are averaged



## Appendix 2

### Distribution of Actives by Age at Entry and Past Service

As at November 1, 2011

	SERVICE IN YEARS TO NOVEMBER 1, 2011							ALL SERVICE
	Under 5	5 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30+	
<b>AGE AT ENTRY</b>								
<b>Under 20</b>	1,024	1,456	1,271	1,346	815	335	3,018	9,265
<b>20 - 24</b>	4,836	6,350	4,350	2,908	2,201	1,322	3,520	25,487
<b>25 - 29</b>	3,081	3,184	2,136	1,559	1,524	728	701	12,913
<b>30 - 34</b>	2,024	1,791	1,520	1,247	953	250	87	7,872
<b>35 - 39</b>	1,698	1,352	1,247	905	525	58	12	5,797
<b>40 - 44</b>	1,456	1,095	854	530	95	20	3	4,053
<b>45 - 49</b>	1,231	699	491	131	13	2	3	2,570
<b>50 - 54</b>	858	359	137	26	5	-	2	1,387
<b>55 - 59</b>	558	103	35	11	-	-	-	707
<b>60 - 64</b>	383	61	30	6	1	-	-	481
<b>65 +</b>	177	27	13	3	1	1	2	224
<b>All AGES</b>	17,326	16,477	12,084	8,672	6,133	2,716	7,348	70,756
<b>Under 20</b>	6%	9%	11%	16%	13%	12%	41%	13%
<b>20 - 24</b>	28%	39%	36%	34%	36%	49%	48%	36%
<b>25 - 29</b>	18%	19%	18%	18%	25%	27%	10%	18%
<b>30 - 34</b>	12%	11%	13%	14%	16%	9%	1%	11%
<b>35 - 39</b>	10%	8%	10%	10%	9%	2%	-	8%
<b>40 - 44</b>	8%	7%	7%	6%	2%	1%	-	6%
<b>45 - 49</b>	7%	4%	4%	2%	-	-	-	4%
<b>50 - 54</b>	5%	2%	1%	-	-	-	-	2%
<b>55 - 59</b>	3%	1%	-	-	-	-	-	1%
<b>60 - 64</b>	2%	-	-	-	-	-	-	1%
<b>65 +</b>	1%	-	-	-	-	-	-	-
<b>All AGES</b>	24%	23%	17%	12%	9%	4%	10%	100%



## Appendix 3

Distribution of Actives by Current Age and Pay  
As at November 1, 2011

CURRENT AGE	PAY PER ANNUM (\$MILLIONS)							ALL PAY
	Under 0.5	0.5 – 1.0	1.0 – 1.5	1.5- 2.0	2.0 – 2.5	2.5 – 3.0	3.0+	
Under 20	23	29	12	-	2	-	1	67
20 - 24	895	1,943	49	11	3	10	3	2,914
25 - 29	1,291	6,991	834	186	38	5	8	9,353
30 - 34	1,356	7,182	2,127	394	155	40	18	11,272
35 - 39	1,647	5,459	2,401	471	238	92	50	10,358
40 - 44	1,961	3,796	2,004	435	228	117	81	8,622
45 - 49	2,583	3,003	1,873	374	267	143	115	8,358
50 - 54	2,611	2,534	2,226	398	354	197	167	8,487
55 - 59	2,092	2,273	1,966	458	323	190	201	7,503
60 - 64	1,019	829	605	192	126	91	170	3,032
65+	383	159	59	33	51	23	82	790
<b>All AGES</b>	<b>15,861</b>	<b>34,198</b>	<b>14,156</b>	<b>2,952</b>	<b>1,785</b>	<b>908</b>	<b>896</b>	<b>70,756</b>
Under 20	-	-	-	-	-	-	-	-
20 - 24	6%	6%	-	-	-	1%	-	4%
25 - 29	8%	20%	6%	6%	2%	1%	1%	13%
30 - 34	9%	21%	15%	13%	9%	4%	2%	16%
35 - 39	10%	16%	17%	16%	13%	10%	6%	15%
40 - 44	12%	11%	14%	15%	13%	13%	9%	12%
45 - 49	16%	9%	13%	13%	15%	16%	13%	12%
50 - 54	16%	7%	16%	13%	20%	22%	19%	12%
55 - 59	13%	7%	14%	16%	18%	21%	22%	11%
60 - 64	6%	2%	4%	7%	7%	10%	19%	4%
65+	2%	-	-	1%	3%	3%	9%	1%
<b>All AGES</b>	<b>22%</b>	<b>48%</b>	<b>20%</b>	<b>4%</b>	<b>3%</b>	<b>1%</b>	<b>1%</b>	<b>100%</b>



## Appendix 4

### Distribution of Actives by Current Age and Past Service Pension As at November 2011

	PAST SERVICE PENSION (\$MILLIONS)							ALL PENSIONS
	Under 0.24	0.24 - 0.36	0.36 - 0.48	0.48 - 0.60	0.60 - 0.72	0.72 - 0.84	Over 0.84	
<b>CURRENT AGE</b>								
Under 20	49	9	7	1	-	-	1	67
20 - 24	2,902	6	2	3	-	1	-	2,914
25 - 29	9,229	88	14	13	5	-	4	9,353
30 - 34	9,256	1,662	249	64	22	6	13	11,272
35 - 39	5,983	2,557	1,227	360	115	52	64	10,358
40 - 44	4,288	1,488	1,508	768	252	125	193	8,622
45 - 49	4,122	1,025	1,100	856	590	242	423	8,358
50 - 54	3,372	770	722	879	899	674	1,171	8,487
55 - 59	2,229	602	552	451	653	902	2,114	7,503
60 - 64	1,118	246	208	125	160	305	870	3,032
65+	532	56	31	18	25	15	113	790
<b>All AGES</b>	<b>43,080</b>	<b>8,509</b>	<b>5,620</b>	<b>3,538</b>	<b>2,721</b>	<b>2,322</b>	<b>4,966</b>	<b>70,756</b>
Under 20	0%	0%	0%	0%	0%	0%	0%	0%
20 - 24	7%	0%	0%	0%	0%	0%	0%	4%
25 - 29	21%	1%	0%	0%	0%	0%	0%	13%
30 - 34	21%	20%	4%	2%	1%	0%	0%	16%
35 - 39	14%	30%	22%	10%	4%	2%	1%	15%
40 - 44	10%	17%	27%	22%	9%	5%	4%	12%
45 - 49	10%	12%	20%	24%	22%	10%	9%	12%
50 - 54	8%	9%	13%	25%	33%	29%	24%	12%
55 - 59	5%	7%	10%	13%	24%	39%	43%	11%
60 - 64	3%	3%	4%	4%	6%	13%	18%	4%
65+	1%	1%	1%	1%	1%	1%	2%	1%
<b>All AGES</b>	<b>61%</b>	<b>12%</b>	<b>8%</b>	<b>5%</b>	<b>4%</b>	<b>3%</b>	<b>7%</b>	<b>100%</b>



## Appendix 5

Distribution of Actives by Current Age and Total Pension  
As at November 1, 2011

	TOTAL PENSION (\$MILLIONS)							ALL PENSIONSE
	Under 0.24	0.24 - 0.36	0.36 - 0.48	0.48 - 0.6	0.6 - 0.72	0.72 - 0.84	Over 0.84	
<b>CURRENT AGE</b>								
Under 20	7	3	12	8	6	7	24	67
20 - 24	247	266	830	871	478	135	87	2,914
25 - 29	235	690	1,600	2,202	2,723	959	944	9,353
30 - 34	357	922	1,344	2,433	2,245	1,640	2,331	11,272
35 - 39	770	1,059	1,308	1,635	1,511	1,429	2,646	10,358
40 - 44	1,338	1,079	998	1,003	1,094	1,032	2,078	8,622
45 - 49	2,160	1,111	875	735	908	772	1,797	8,358
50 - 54	2,433	860	631	600	772	868	2,323	8,487
55 - 59	2,000	620	538	407	553	831	2,554	7,503
60 - 64	1,118	246	208	125	160	305	870	3,032
65+	532	56	31	18	25	15	113	790
<b>All AGES</b>	<b>11,197</b>	<b>6,912</b>	<b>8,375</b>	<b>10,037</b>	<b>10,475</b>	<b>7,993</b>	<b>15,767</b>	<b>70,756</b>
Under 20	0%	0%	0%	0%	0%	0%	0%	0%
20 - 24	2%	4%	10%	9%	5%	2%	1%	4%
25 - 29	2%	10%	19%	22%	26%	12%	6%	13%
30 - 34	3%	13%	16%	24%	21%	21%	15%	16%
35 - 39	7%	15%	16%	16%	14%	18%	17%	15%
40 - 44	12%	16%	12%	10%	10%	13%	13%	12%
45 - 49	19%	16%	10%	7%	9%	10%	11%	12%
50 - 54	22%	12%	8%	6%	7%	11%	15%	12%
55 - 59	18%	9%	6%	4%	5%	10%	16%	11%
60 - 64	10%	4%	2%	1%	2%	4%	6%	4%
Over 65	5%	1%	0%	0%	0%	0%	1%	1%
<b>All AGES</b>	<b>16%</b>	<b>10%</b>	<b>12%</b>	<b>14%</b>	<b>15%</b>	<b>11%</b>	<b>22%</b>	<b>100%</b>



## Appendix 6

### Distribution of Pensioners by Current Age and Age at Retirement

Age at Valuation Date			Age at Retirement Date		
Age	Amount	Percentage	Age	Amount	Percentage
<55	1,381	6%	<55	5,655	25%
55	208	1%	55	746	3%
56	254	1%	56	868	4%
57	287	1%	57	729	3%
58	287	1%	58	743	3%
59	333	1%	59	785	3%
60	397	2%	60	7,687	34%
61	434	2%	61	2,661	12%
62	549	2%	62	1,003	4%
63	854	4%	63	583	3%
64	1,133	5%	64	413	2%
65	1,303	6%	65	370	2%
66	1,049	5%	66	201	1%
67	1,061	5%	67	123	1%
68	972	4%	68	82	0%
69	905	4%	69	61	0%
70	867	4%	70	60	0%
71	711	3%	70+	112	0%
72	770	3%			
73	749	3%			
74	767	3%			
75	684	3%			
76	695	3%			
77	622	3%			
78	621	3%			
79	562	2%			
80	538	2%			
80+	3,889	17%			
<b>TOTALS</b>	<b>22,882</b>	<b>100%</b>	<b>TOTALS</b>	<b>22,882</b>	<b>100%</b>



## Appendix 7

### Demographic Profile of Pensioners

Category	Males	Females	Both Sexes
<b>Pensioners:</b>			
Number	10,220	12,662	22,882
Annual Pensions ( Millions p.a.)	\$3,689	\$4,718	\$8,407
Average Age (weighted by pension)	70	71	70
<b>Beneficiaries:</b>			
Number	186	731	917
Annual Pensions (Millions p.a.)	\$26	\$161	\$186
Average Age (weighted by pension)	21	63	57



## Appendix 8

### Actuarial Liabilities for Pensioners

	LIABILITIES (\$MILLIONS)		
	MALES	FEMALES	BOTH SEXES
<b>PENSIONERS</b>			
With Indexation	43,599	61,252	104,851
Without Indexation	31,729	40,862	72,591
<b>BENEFICIARIES</b>			
With Indexation	163	757	920
Without Indexation	135	668	803
<b>TOTALS</b>			
With Indexation	43,762	62,009	105,771
Without Indexation	31,864	41,530	73,394



## Appendix 9

### Distribution of Pensioners by Current Age and Pensions

	MONTHLY PENSIONS IN THOUSANDS OF DOLLARS (\$,000S)										ALL	TOTAL MEMBERS	
	< 20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	100+			
<b>CURRENT AGE</b>													
<55	5.1%	0.5%	0.2%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	6.0%	1,381	
55-60	3.9%	0.6%	0.5%	0.3%	0.3%	0.2%	0.1%	0.0%	0.0%	0.1%	6.0%	1,369	
60-65	4.9%	2.4%	1.7%	1.5%	1.3%	0.8%	0.5%	0.4%	0.3%	0.9%	14.7%	3,367	
65-70	8.0%	4.7%	2.8%	2.7%	1.6%	1.0%	0.7%	0.4%	0.3%	0.9%	23.1%	5,290	
70-75	3.7%	8.2%	1.9%	1.2%	0.9%	0.4%	0.2%	0.1%	0.1%	0.3%	16.9%	3,864	
75+	2.0%	26.0%	3.4%	1.0%	0.5%	0.2%	0.1%	0.1%	0.0%	0.1%	33.3%	7,611	
<b>NUMBER MEMBERS</b>	<b>6,310</b>	<b>9,666</b>	<b>2,397</b>	<b>1,561</b>	<b>1,049</b>	<b>609</b>	<b>372</b>	<b>250</b>	<b>160</b>	<b>508</b>	<b>22,882</b>	<b>22,882</b>	
<b>%AGE</b>	<b>27.6%</b>	<b>42.2%</b>	<b>10.5%</b>	<b>6.8%</b>	<b>4.6%</b>	<b>2.7%</b>	<b>1.6%</b>	<b>1.1%</b>	<b>0.7%</b>	<b>2.2%</b>	<b>100.00%</b>	<b>100.0%</b>	



## Appendix 10

### Cash Flows over the Next Five Years with No Post Retirement Increases

(\$MILLIONS)	YEAR				
	2012	2013	2014	2015	2016
<b>CURRENT PENSIONERS</b>					
Retirees	8,511	8,539	8,570	8,605	8,653
Beneficiaries	186	186	186	186	186
<b>ACTIVE MEMBERS</b>					
Lump Sum	9,905	2,992	3,558	3,847	4,245
Pensions	2,377	3,071	3,895	4,779	5,750
Beneficiaries	0	5	7	12	18
<b>TOTALS</b>	<b>20,979</b>	<b>14,794</b>	<b>16,216</b>	<b>17,429</b>	<b>18,852</b>



## Appendix 11

Cash Flows over the Next Five Years with Post Retirement Increases at 5% p.a.

(\$MILLIONS)	YEAR				
	2012	2013	2014	2015	2016
<b>CURRENT PENSIONERS</b>					
Retirees	8,511	8,960	9,429	9,921	10,445
Beneficiaries	186	186	186	186	186
<b>ACTIVE MEMBERS</b>					
Lump Sum	9,905	2,992	3,558	3,847	4,245
Pensions	2,377	3,189	4,169	5,257	6,483
Beneficiaries	0	5	7	13	19
<b>TOTALS</b>	<b>20,979</b>	<b>15,333</b>	<b>17,349</b>	<b>19,224</b>	<b>21,379</b>



## Appendix 12

### Replacement Rates Under Varying Benefit Structures

REPLACEMENT RATIOS AS A PERCENTAGE OF SALARY AT NORMAL RETIREMENT AGE				
	Benefit Structure 1	Benefit Structure 2	Benefit Structure 3	Benefit Structure 4
AGE				
20	9.0%	85.9%	87.6%	265.4%
25	10.2%	75.1%	77.9%	200.7%
30	11.4%	64.4%	68.2%	150.1%
35	12.5%	53.7%	58.4%	110.4%
40	13.3%	42.9%	48.7%	79.3%
45	13.6%	32.2%	38.9%	54.9%

#### **Benefit Structure 1**

- Career Average Benefit Proposed in the Green Paper

#### **Benefit Structure 2**

- Status Quo

#### **Benefit Structure 3**

- 2% Benefit Accrual based on Final Average Salary over Five Years just prior to Normal Retirement Age and a Normal Retirement Age of 65, Proposed by CAA

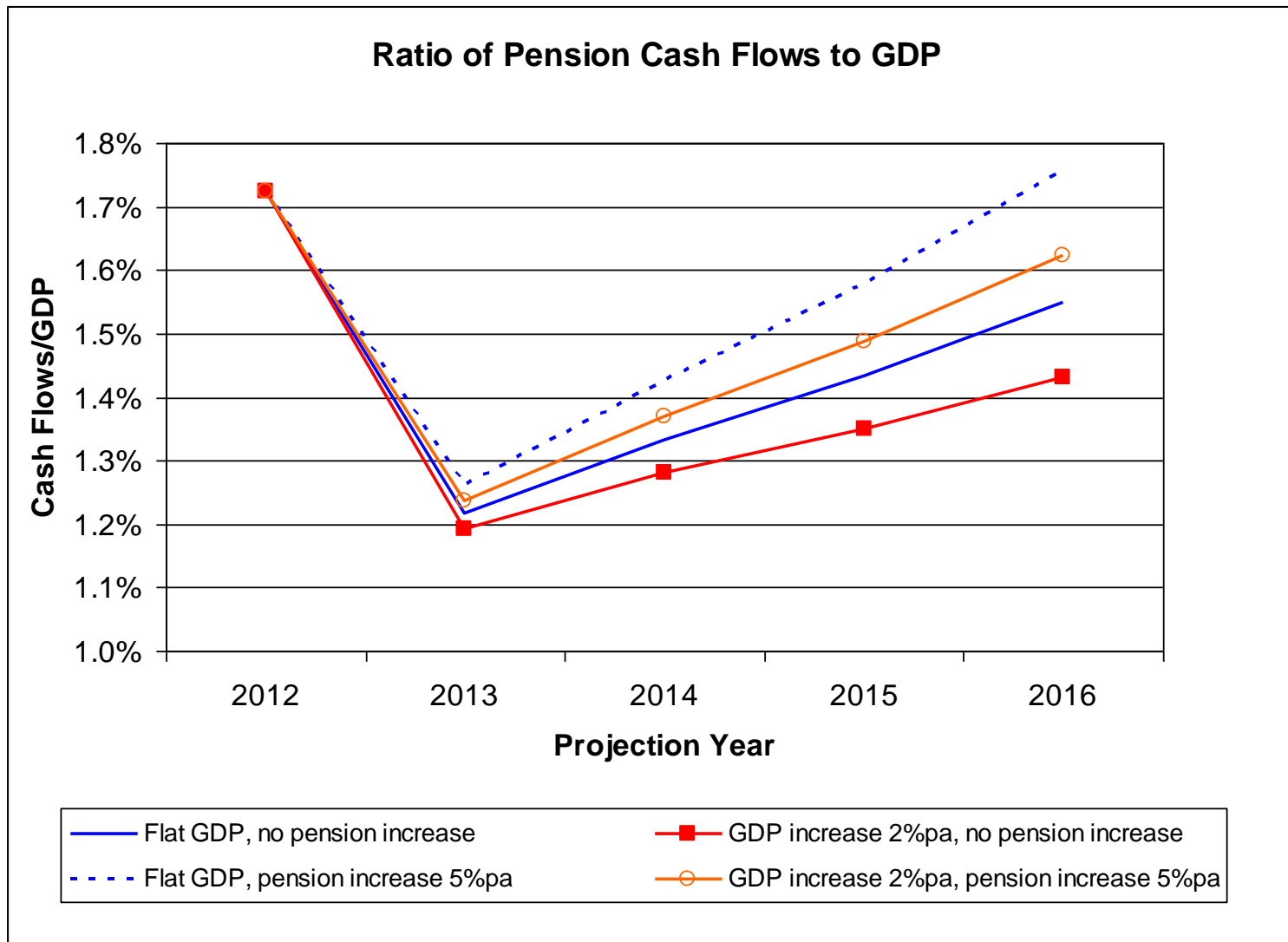
#### **Benefit Structure 4**

- Defined Contribution Benefit where Employee contributes 5%, Employer contributes 5% and a Normal Retirement Age of 65.



## Appendix 13

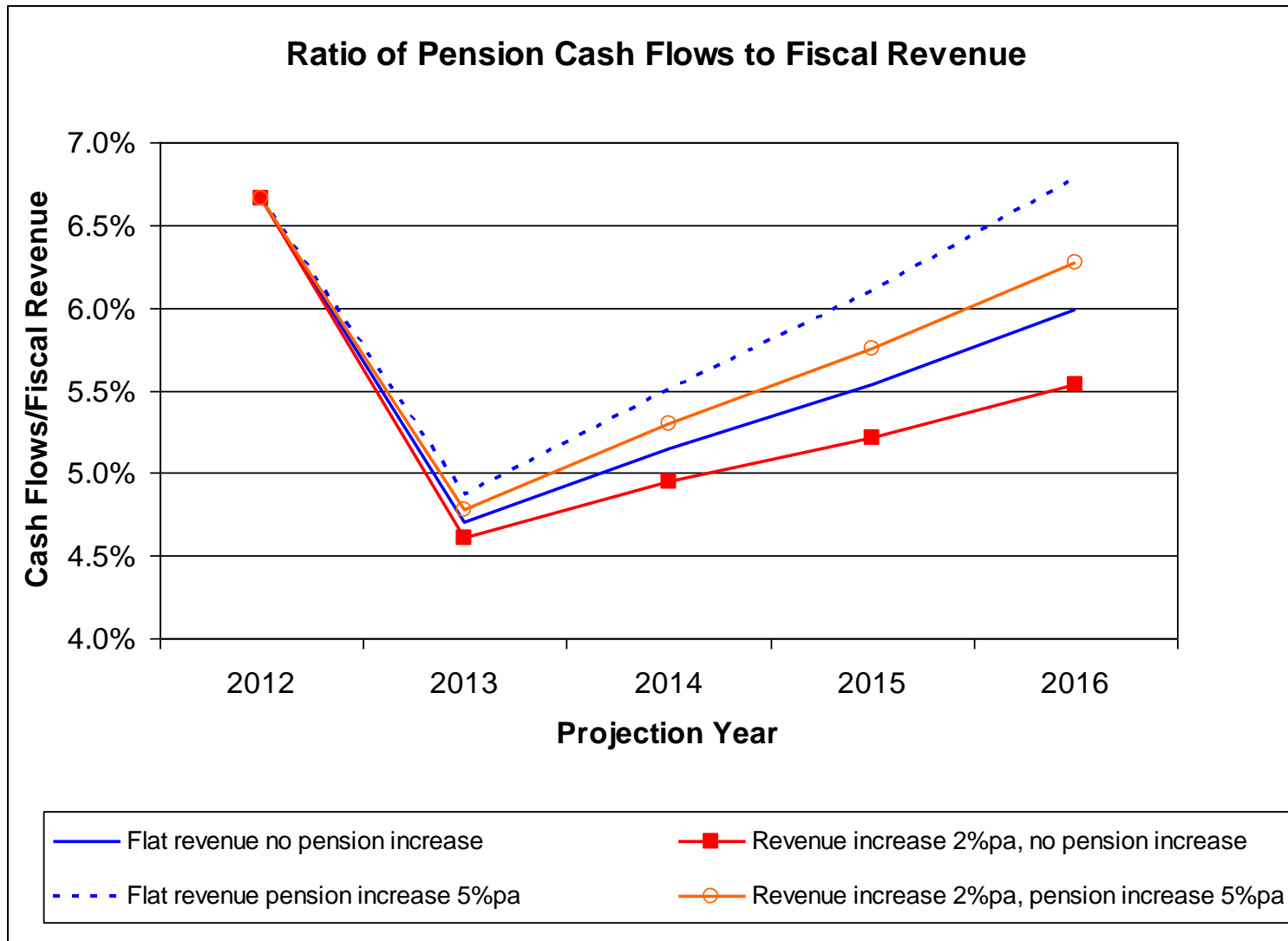
### Ratio of Cash Flows to GDP





## Appendix 14

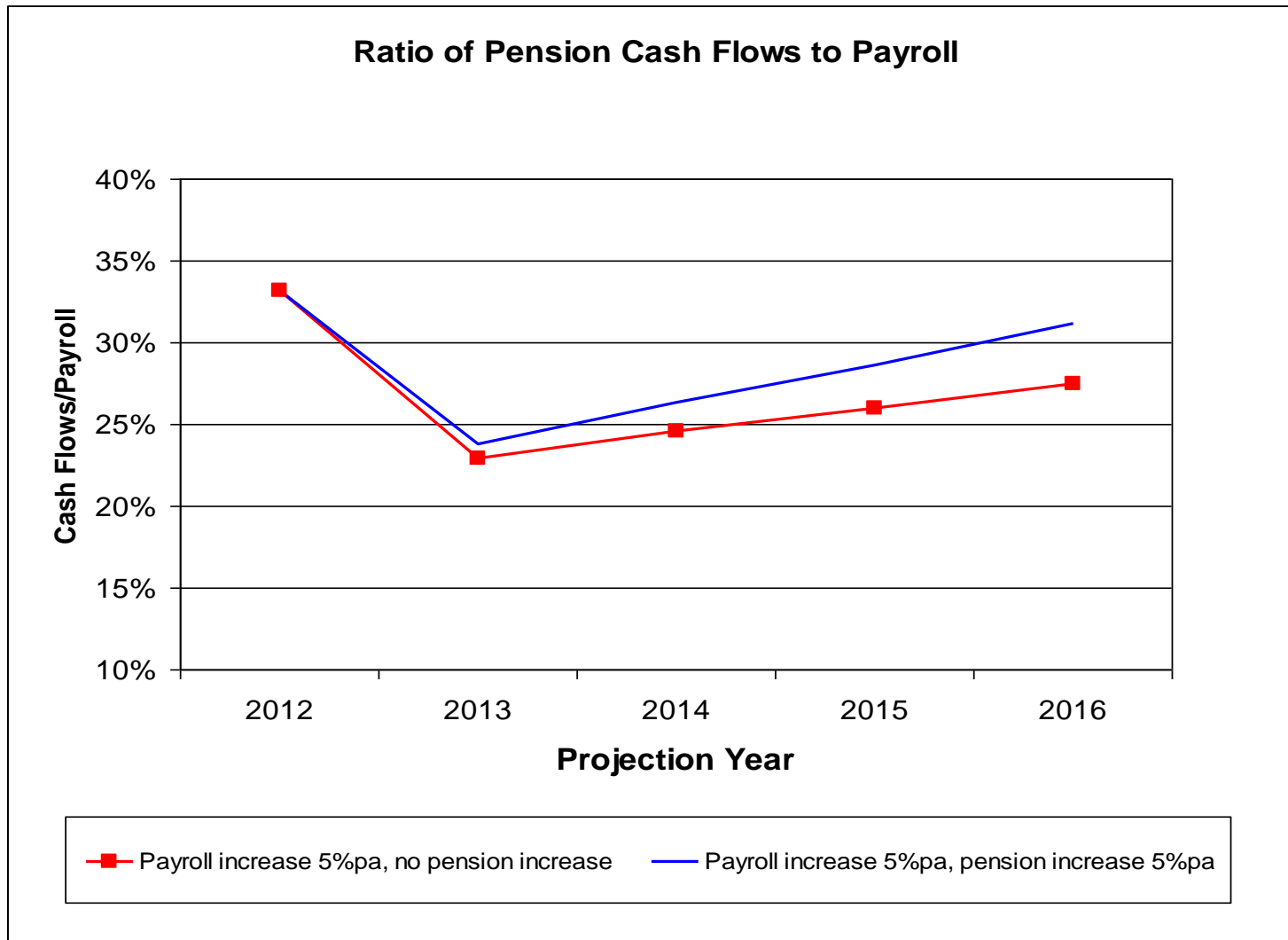
### Ratio of Cash Flows to Fiscal Revenue





## Appendix 15

### Ratio of Cash Flows to Payroll





## Appendix 16

### Modifications to Raw Data

The data used for this analysis were extracted from the raw datasets provided and was modified by team members only. Each contained the basic required fields of date of birth (DOB), date of employment (DOE), gender, salary, contribution, date of retirement and pension. The date of appointment and administrative department was scarcely provided. The data appeared to be composed by as many authors as the number of excel files provided. It contained numerous errors and after careful inspection, we made the following adjustments:

#### **FOR ACTIVE**

- The date of employment was used instead of date of appointment, as the latter was indicated for only a small proportion.
- 30% of all dates contained errors. This included various formats which could not be used directly for calculations. Dates were partially written, separated by periods, above or below acceptable years, contained spaces, typographical errors, etc.
- Where the salary was not indicated for a record, the average population salary was used
- Where the DOE was less than and not equal to the DOB, the assignment of these dates were switched. Where the DOE or DOB was provided but not both, we assumed the age at employment to be 20. Where neither DOE nor DOB was indicated, the DOB was set at the population average and the DOE 20 years later. Where DOE equalled the DOB, the DOB remained and the DOE set to 20 years later.
- Gender column contained "W" and "N" as indicators. These were assumed to be "F" and "M" respectively. For the records with the gender not indicated, the population proportion of male to female, 40:60, was used.
- Contributions were provided on different bases and not indicated, i.e. annually, monthly fortnightly and weekly. These were normalized to the expected range. Police contributions were assumed to be 1.7% pay. All other contributions not indicated, were assumed to be 0%.

#### **FOR PENSIONERS**

- 66 records did not indicate gender; these were all set as female.
- 28 records had date of birth errors; their ages were set to the average for the remaining records.

#### **FOR BENEFICIARIES**

- 2 records did not indicate gender; these were set as female.



## Appendix 17

### Actuarial Assumptions and Methods

#### FINANCIAL ASSUMPTIONS

1. Inflation	5.0% p.a.
2. Discount Rate	10.0% p.a.
3. Investment Expenses	0.0% p.a.
4. Pay Increases	5.0% p.a.
5. Pension Increases	0.0% p.a.
6. Administrative Expenses	1.0% p.a.

#### DEMOGRAPHIC ASSUMPTIONS

1. Mortality is assumed to be consistent with the experience underlying the American 1994 Group Annuitant Mortality (GAM94) table.
2. 35% of employees retire at age 55 years with full accrued pension for the earlier retirement and 65% at age 60.
3. 100% of employees are married at the date of death.
4. There are no withdrawals from service.
5. All employees exercise the gratuity option to commute 25% of their pension for a cash gratuity at retirement. Each dollar of pension given up provides the member with \$12.5 in cash, regardless of the age at retirement.

#### METHOD

The age, sex, service and pay distributions are assumed to be stable (i.e. new entrants have the same profile as those who exit). The liability for deferred pensioners is not assumed to be significant because no data was provided.



## Appendix 18

### Summary of Existing Principal Benefits

#### MAIN BENEFIT

##### BENEFIT FORMULAS

Statutory Pension =  $2.2\% \times \text{Service} \times \text{final 12 Months' Pay}$

Legislators' Pension =  $2/3$  of Final Salary

##### NORMAL RETIREMENT AGE

60 years

55 years, provided two full terms have been served

#### ADDITIONAL BENEFITS

##### DEATH BENEFIT

##### BEFORE RETIREMENT

The greater of one year's pay or the gratuity that the employee would have been entitled to had he or she retired on the day before the date of death.

##### SPOUSE'S PENSION

On the death of a pensioner his or her spouse will continue to receive pension payments set at 45% of the employee's accrued retirement pension before the gratuity option.

Spouse's pensions are only payable in respect of employees who pay contributions(e.g. civil servants, police, and legislators).

##### CASH LUMP SUM

Members have the option at retirement to commute up to 25% of their pension for a gratuity; Each dollar of pension surrendered provides the retiree with \$12.5 in cash.

##### RESTORATION OF PENSION COMMUTED

Pensions that were commuted at retirement will be re-stored to their full value if the retirees are alive 12.5 years after retirement. This restoration also applies to spouses' pensions.

##### EARLY RETIREMENT PENSION

Members may retire early with an unreduced pension anytime within five years of the specified normal retirement age.

##### INDEXATION

Pensions in payment may be increased at the discretion of the Government.

#### CONTRIBUTION RATES BY CATEGORY

	% OF PAY
Teachers	0.0%
Constabulary Force	1.6%
Civil Servants	4.0%
Legislators	6%



## Appendix 19

### Acknowledgements

Mrs. Bridgett Wilks, Ministry of Finance (for provision of data)

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Ms. Britta Hay

Ms. Megan Irvine

Mr. Mark Longman

Mr. Conrad McKellop

Ms. Kathryn Myers

Mr. Ravi Rambarran, Chair