LifeWorks

Actuarial Review of the Contributory Pension Fund of Bermuda as of August 1, 2020

Final Report

July 2021

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Executive Summary

This is the actuarial review for the Bermuda Contributory Pension Fund (the “Fund”) as at 1 August 2020 (the “Review Date”). It presents the financial status of the Fund at the Review Date and provides projections of the Fund for the next 50 years to 2070. The last review was done as at 1 August 2017.

During the 3-year review period, 2017 to 2020, the Bermudian economy experienced minimal growth with real GDP performance averaging 0.05% over 2018-2019 (down from 1.3% over 2015 to 2017). Inflation (annual average Consumer Price Index) declined from an average of 1.7% over 2015-2017 to 0.4% over 2018-2020.

In response to the economic challenges brought about by the COVID-19 pandemic, a temporary amendment was made to the Contributory Pensions Act allowing employees, employers (with employee consent) and self-employed persons to opt to suspend contributions for the period 1 July 2020 to 30 June 2021.

Highlights of the Fund

The financial performance of the Fund over the three years was below expectations mainly due to lower than expected contribution income. This was tempered by higher than expected investment income and lower than expected benefit payments.

- The Fund earned a nominal rate of return net of investment expenses of 4.0% per annum and a real rate of 3.6% per annum over the three years since the last review (4.4% and 4% if investment expenses are excluded). This compares with the real rate of return assumed at the previous valuation of 3.5% per annum.
- The net assets of the Fund grew 2.20% over the three years from $1.93 billion to $1.97 billion. This was 0.7% below the projected value from the previous review.
- Contribution income in 2019/2020 ($112.3 million) was 7.7% lower than in 2016/2017 and benefit expenditure ($178.6 million) increased 14.6% over the three years since the last review.
- Total expenses for the three years averaged 0.42% of the average Fund, up from 0.37% over the previous 3 years. Pure administrative expenses averaged 0.12% of the average Fund over the 3 years and were 0.08% of the average Fund at the Review Date. As a percentage of contribution income, total expenses have been relatively stable over the last 10 years at 7.2%.
- The Asset / Expenditure ratio is a static measure of the size of the Fund relative to annual expenditure or the number of years cover provided by the Fund based on the current annual expenditure. This ratio decreased over the three years from 11.8 years to 10.5 years.
- The majority of the Fund’s assets were invested at the last review and this continues to be the case at the Review Date, 94.5% of the net assets are invested, with the major investments being equities, bonds, private equities and hedge funds to a lesser extent.

- Since the last review, the number of contributors has declined, from 35,889 in the year ending 31 July 2017 to 34,629 in the year ending 31 July 2020.
- Both the benefit and contribution rates increased during the inter-review period. Benefit rates increased by 1.7%, 1.4% and 1.2% effective August 2017, August 2018 and August 2019 respectively. Contribution rates increased once over the period by 4.2% effective August 2018.
- Based on the population projection figures, the old-age support ratio has declined since the last review. The ratio was 3.6 in 2017 and is 3.1 in 2020. The ratio is projected to decline to 1.6 over the next 50 years. The comparative ratio using the actual contributors and beneficiaries of the Fund declined from 3.1 in 2017 to 2.6 in 2020.

A summary of the performance indicators mentioned above is shown in Table 1 below.

Table 1 Fund Performance Indicators

	July 2008	July 2011	July 2014	July 2017	July 2020
Number of beneficiaries in receipt of monthly benefits	9,509	10,459	11,568	12,842	13,926
Average monthly benefit	$851.37	$932.56	$931.56	$990.71	$1,042.89
Number of contributors[1]	37,213	35,913	34,806	35,889	34,629
Active Insured as a % of Working Age Population	92%	87%	89%	89%	88%
Pensioner Support Ratio: Number of contributors / Number of Beneficiaries	4.1	3.4	3.0	3.1	2.6
Old-Age Support Ratio: Population	4.7	4.4	3.9	3.6	3.1
Average number of weekly contributions per month	3.86	3.84	3.55	3.90	3.68
Weekly Benefit Rate for Contributory Old Age Pension (OAP)	$209.17	$226.22	$226.22	$237.53	$247.89
Weekly Contribution Rate	$28.48	$30.40	$32.07	$34.47	$35.92
Annual Contribution Income ($ million)	$111.90	$117.30	$107.4	$121.7	$112.3
Annual Benefit Expenditure ($ million)	$93.50	$115.45	$133.7	$155.8	$178.6
Annual Administration & Investment Expenses ($ million)	$7.90	$9.45	$8.4	$6.2	$8.5
Net Assets (Fund) $ million	$1,297.5	$1,533.0	$1,802.3	$1,927.7	$1,970.0
Average Nominal Rate of Return (last 3 yrs)	8.0%	6.4%	7.2%	4.3%	4.0%
Average Real Rate of Return (last 3 yrs)	3.6%	4.2%	5.0%	2.5%	3.6%
Annual Expenses as a % of Contributions	7.2%	8.5%	7.8%	5.1%	7.6%
Annual Expenses as a % of Average Fund	0.61%	0.66%	0.49%	0.34%	0.43%
Administrative Costs as a % of Average Fund	0.3%[2]	0.3%	0.19%	0.12%	0.08%
Net Assets / (Benefits and Expenses)	12.8	12.3	12.6	11.8	10.5
Invested Assets / Net Assets	97%	95%	97%	93%	95%

[1] *Figures from 2017 and onwards include Government workers*

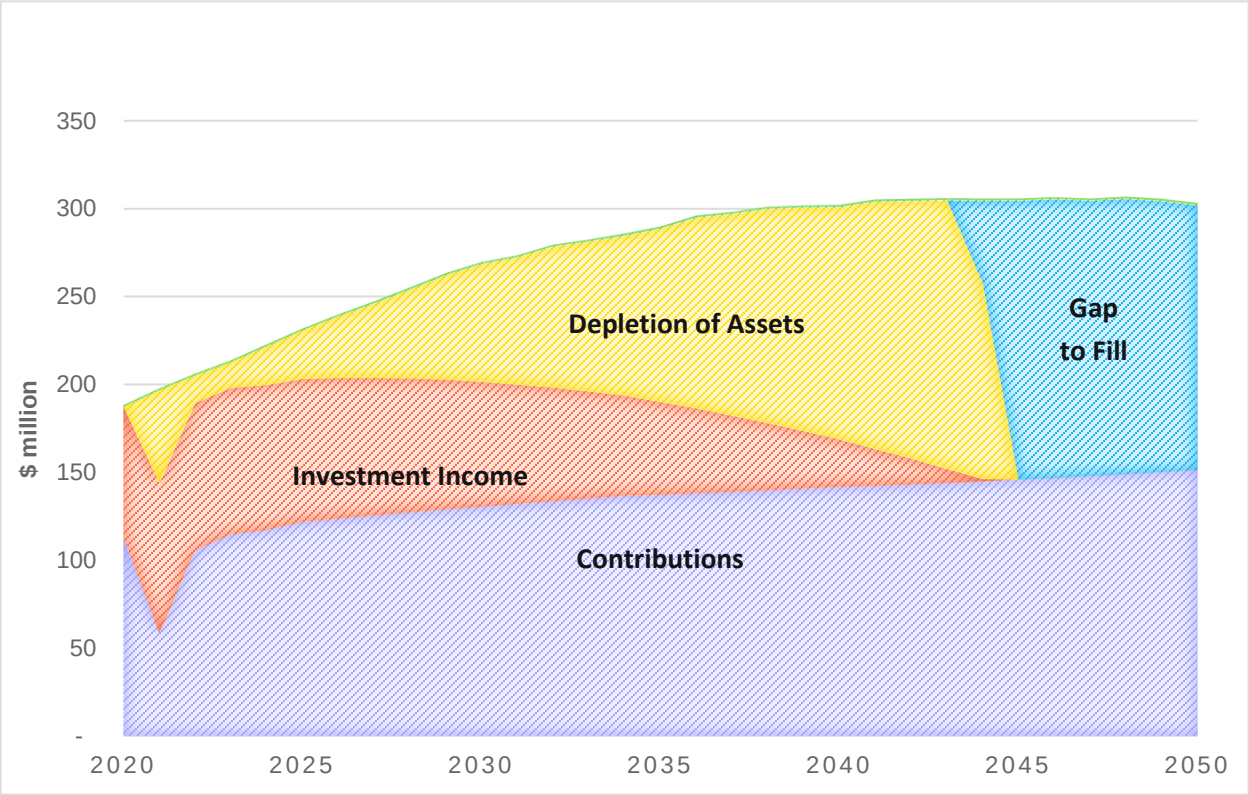
[2] *Estimated assuming Total expenses of $8m split as $4m in investment fees and $4m administrative expense*

Main Findings & Projection Results

- The Fund is projected to decline steadily until it is exhausted in 2044 under the best estimate scenario. This is 3 years earlier when compared to the previous review.
- Expenditure is projected to exceed contributions plus investment income in 2021 meaning that assets will have to be liquidated to help meet expenditure.

- As more and more assets are sold to meet benefits and expenses, they are projected to be depleted by 2044. The average annual income shortfall (blue section in Figure 1 below) from 2045 until the end of the projection period, is approximately 90% of contribution income. That is, the contribution rate would have to almost double to meet benefits and expenses, thereby reducing the ratio of the benefit rate to the contribution rate from 212% to 111%.

Figure 1 Sources of Financing Expenditure, 2020 to 2050



- If contributions were to increase by 2.5% more than benefits with future real returns of 5% a year, the Fund is projected to run out by 2046. If future real returns are 3.5% a year (same assumption as at the previous valuation), the fund is projected to run out by 2041. Under scenarios of lower real investment returns, the Fund is not sustainable in the long term.
- If the contributing population is 5% higher than under best estimate throughout the projection period, this is expected to extend the life of the Fund until 2046. For a 5% lower contributor population, the Fund runs out in 2043.
- If there is an increase in the retirement age to 70 years over an 8 year period ending 2035, all else unchanged, the life of the Fund would be extended beyond 2070.
- The Fund has been projected to be sustainable to the end of the projection period if the retirement age were to increase to age 70 over 8 years combined with contributions increasing by 4% more than benefits.
- The total number of beneficiaries over age 65, taking into account the impact of Non-Bermudians, is expected to increase steadily, reaching a peak in about 23 years. Thereafter, a gradual decline in numbers is expected.

- The total number of working age persons (age 20 to 64) is projected to decline gradually resulting in a declining old-age support ratio (3.1 to 1.6 over 50 years).

Recommendation

We recommend that an increase in retirement age should be pursued, as this would materially enhance the sustainability of the Fund whilst keeping the system affordable.

In light of the fact that the current benefit and contribution structure is made up of flat rate amounts and the Government's policy is to increase both rates relative to inflation, with contributions increasing faster than benefits, we recommend that the Government should set a target 'benefit/contribution ratio' as part of the policy. Setting a policy to achieve this target would ensure that any future increases to both amounts would not result in the contribution rate exceeding the benefit rate at any point. The current ratio is 3.45 (247.89/71.84). Under the best estimate assumption of contributions increasing at 2.5% more than benefits, we applied the increase up to the year 2034 at which point the ratio was 2.5 and applied a 1.75% increase thereafter.

The projected contribution rates should also be compared to projected national average wages to ensure that they are feasible and affordable. We recommend that the Government establishes a target contribution rate as a percentage of the average wage with a view to maintaining this target over the long term (next 50 years).

Accrued Benefits

The Fund is not designed around a policy of full funding but one of sustainable funding, that is, contribution and investment income is sufficient to meet benefits and administrative expenditure on an ongoing annual basis. This is consistent with the partial funding method where future generations are expected to meet part of the cost of previous generations.

The concept of comparing accrued benefits with existing assets is more consistent with a policy of full funding and therefore the following results are presented for illustrative purposes only. The present value of benefits accrued up to 31 July 2020 is estimated to be $2.8 billion. This is based on the contributions made to that date and assumes no further increases to the benefit rate. If future increases to the benefit rate are included and assuming no further contributions, the present value of these benefits increases to $3.7 billion at the same date. If expected future benefit accruals are included up to the respective retirement dates, assuming benefit increases at the rate of assumed inflation of 2% per annum, the present value of both accrued and future liabilities is estimated to be $5.5 billion. The present value of future contributions in respect of the future benefit accruals, assuming increases in the contribution rate of 2.5% above inflation up to 2034 and 1.75% above inflation thereafter, is estimated to be $2.0 billion. These future contributions together with current assets total $3.9 billion.

These calculations are only in respect of existing beneficiaries and the working population age group as at the Review Date. No new entrants into the Fund are assumed. All dollar amounts are quoted in 2020 Bermudian dollars.

Table 2 Funded ratios

$'billions	Accrued Benefits (no increases)	Projected Accrued Benefits	Projected Future Benefits
Total Liabilities	2.8	3.7	5.5
Present Value of Future Contributions	-	-	2.0
Current Fund Value	2.0	2.0	2.0
Total Fund + Future Contributions	2.0	2.0	3.9
Ratio: (Fund+ Future Contributions Value) / Liabilities	71%	53%	72%

The Fund is estimated to be 71% funded on an accrued basis (no benefit increases) and 53% if benefits are assumed to increase at 2% per annum. If benefits continue to accrue and contributions are made assuming increases to both, then the Fund is estimated to be 72% funded.

The present value of future pension payments for the next 10 years for existing beneficiaries is estimated to be $1,117 million.

The present value of gratuities expected to be paid over the next 10 years, assuming contribution rates increase at 2.5% a year in excess of benefit increases is estimated to be $74 million.

Chapter 1 Introduction

We have conducted an actuarial review of the Contributory Pension Fund (the "Fund") as at 1 August 2020 as requested by the Bermuda Department of Social Insurance (the "Department"). An actuarial review is required every third year by Section 35 of the Contributory Pensions Act, 1970 (the "Act"). The last review was performed as of 1 August 2017 by LifeWorks (formerly Morneau Shepell) and the results were presented in our report dated May 2019.

The Act came into effect on 24 December 1970 replacing a repealed Act dated 5 August 1968. Since the last review, there were no significant amendments to the Act aside from changes to benefit and contribution amounts.

Under the Act, two classes of benefits are payable:

> *Contributory benefits*: old-age pension and gratuity, widow(er)'s allowance and gratuity, and disability pension
>
> *Non-contributory benefits*: old-age pension, and disability pension

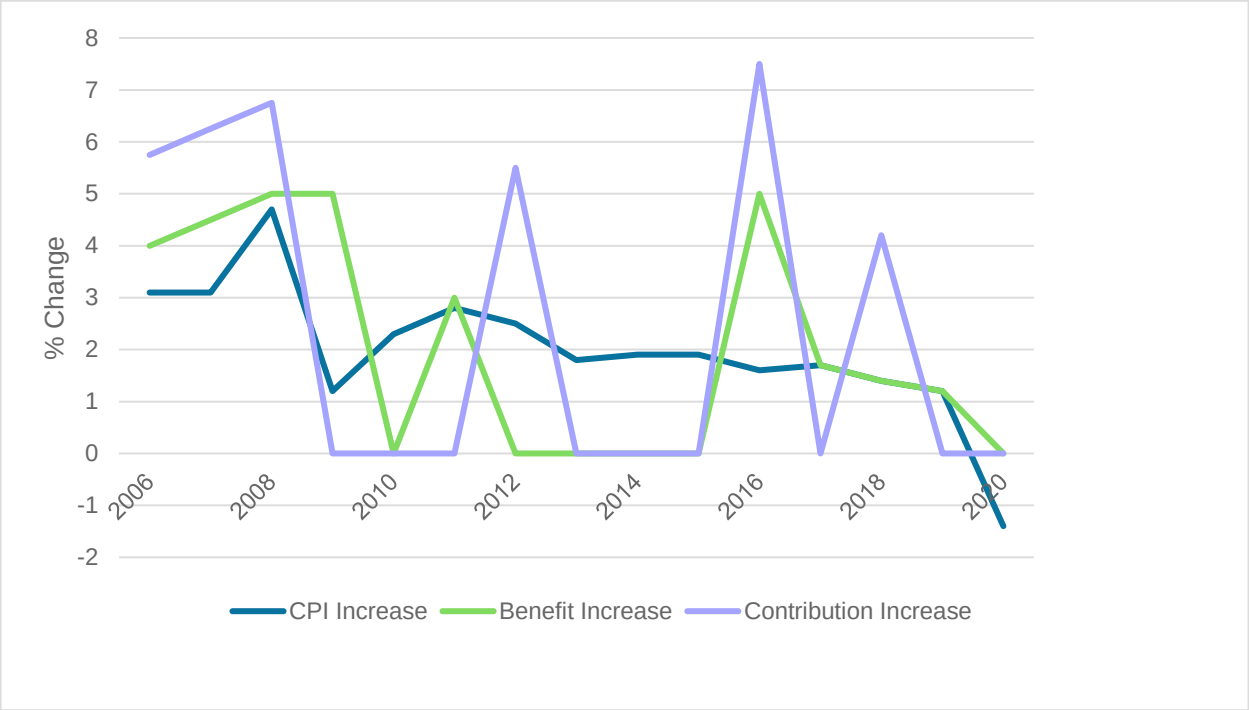
Entitlement to contributory benefits depends on the period for which contributions are paid and on the annual average number of contributions (subject to a minimum contributory period and a minimum annual average). Non-contributory pensions are payable to those ineligible for contributory benefits, subject to certain qualifying criteria. The normal pension age for payments is 65 for both men and women.

Flat-rate contributions are payable by employed persons over school-leaving age, which is defined in the Act as age 18 or later. An equal contribution is payable by the employer. Self-employed persons pay flat-rate contributions equal to the joint amount payable by an employee and employer.

Appendix A summarises the main provisions relating to benefits and contributions.

Benefit and contribution rates are reviewed annually, taking into account the annual increase in prices, as measured by the Consumer Price Index (CPI) in the calendar year prior and the inflation outlook for the near term. Increases to benefits and contributions come into effect from August each year. Figure 1.1 shows historic increases to benefit and contribution rates over the period 2006 to 2020.

Figure 1.1 Benefit and Contribution Rate Increases, 2006 to 2020



Since August 2006, the Government's policy intent for the Fund has been to increase benefit rates broadly in line with prices and contribution rates at 1.75% a year more than benefits (prices). However, contribution rates were frozen from 2009 to 2011. A policy decision was announced in 2010 to increase contributions by 2.5% a year more than benefits. Contribution rates were increased by 5.5% in August 2012 with no further increases until 2016 with a 7.5% increase and 2018 with a 4.2% increase. In June 2020, a temporary amendment was made to the Contributory Pensions Act allowing employees, employers (with employee consent) and self-employed persons to opt to suspend contributions for the period 1 July 2020 to 30 June 2021.

Benefits were increased by 5% in August 2016 and since then increases have followed the growth in the CPI over the previous 12 month period. Table B1 of Appendix B summarises price inflation and benefit and contribution increases in the period since August 2006. Table B2 summarises the rates of benefits and contributions payable in the years commencing August 2008 to August 2020. This report takes account of the benefit and contribution rates that were in effect in August 2020.

All dollar amounts in this report are quoted in 2020 Bermudian dollars.

1.1 Purpose of the Report

The report is prepared in compliance with Section 35(1) of the Act. The purpose is to examine the financial condition and long-term sustainability of the Fund and to investigate the potential financial implications of future contribution and benefit increases for the Fund.

1.2 Scope of the Report

The main purpose of the review is to assess the implications for future contribution rates of maintaining benefits at their present levels in real terms. We understand that the Government intends to continue to increase benefit rates in the future broadly in line with increases in the Consumer Price Index, with contribution rates increasing at 2.5% a year more than benefits. This therefore constitutes the central long-term policy assumption for this review, with consideration for the impact of this policy on the relationship between the contribution rate and the benefit rate. This is further discussed in Section 3 of the report.

The review includes projections of contribution income and expenditure (on benefits, administration and investment), projections of the Fund balance (allowing for an assumed rate of investment return), and projections of the number of years' outgo secured by the Fund. A projection period of 50 years has been used for the review.

The review is based on a long-term population projection, which includes another important indicator of the likely longer-term development of the Fund, namely the projected ratio of the number of contributors to the number of pensioners. This ratio, known as the "Pensioner support ratio", reflects the maturity of the Fund and the impact of demographic changes.

It is important to recognise that the financial projections for future years are based on reasonable assumptions but they should not be taken as forecasts of the outcome. The projections should be updated at successive actuarial reviews in light of the latest information available. In order to indicate the sensitivity of the results to changes in the main assumptions, the review includes alternative projections.

These consider the effects of:

- assuming a higher (5%), lower (2%) and same as previous valuation (3.5%) real rate of investment return on the Fund's assets;
- assuming number of contributors 5% higher than under best estimate over the projection period;
- assuming number of contributors 5% lower than under best estimate over the projection period;
- increasing the retirement age to 70 by 2035; and
- increasing the retirement age to 70 by 2035 and increasing contribution rates at a higher rate of 4% per annum more than benefits.

Finally, the report includes an assessment of the estimated value of accrued benefits as at the effective date of the review. This is included in Appendix I, together with an estimate of the corresponding funding level at the review date.

The effective date of the review is 1 August 2020. The financial projections are expressed in terms of the benefit and contribution rates applicable from August 2020.

1.3 Result of Previous Review

The previous actuarial review was conducted as at 1 August 2017. The main financial projections were expressed in terms of the benefit and contribution rates in effect at August 2017. Benefits were assumed to increase in line with changes in the assumed Consumer Price Index (CPI) for future years.

The main results of the 2017 review indicated that, if contributions were to increase at a rate 2.5% more than the increase in benefits and the Fund were to earn a real return of 3.5% a year then the Fund was projected to increase gradually until 2023 then decline steadily until it is exhausted in 2047. Under variant scenarios of investment returns and contribution and benefit rates, the Fund is projected to be sustainable in the short to medium term. Longer-term Fund sustainability was exhibited under scenarios where contribution rate increases exceeded benefit rate increases by 3% per annum and real investment returns exceed 4% per annum, all other assumptions remaining unchanged.

Although the funding policy for the Fund is one of ‘pay-as –you-go’, which is typical of most social security schemes, we are also asked to provide an estimated funded position to determine what level of accrued benefits can be provided by the current fund, for the current population and beneficiaries. In the previous review this figure was 45% assuming benefits continue to increase in the future with CPI. If benefits were frozen at 2017 levels the Fund was estimated to cover 72.1% of the accrued benefits.

Chapter 2 Data & Experience since Previous Review, August 1, 2017

2.1 Data

Data was provided in a seriatim (individual) form in Excel spreadsheets extracted from the Department's new administration system. For beneficiaries, data covering the period 1 August 2017 to 31 July 2020 was received. For contributors, a record of every contributor who is not yet in receipt of a benefit as of the review date was provided. We noted that contribution history for the three inter-valuation years were nil for several records. These records need to be updated.

We also availed ourselves with the '*2016 Population and Housing Census Report'* and '*Labour Force and Population'* statistics up to 2019 from the Department of Statistics website.

The data was checked for reasonableness by comparing the expected contributions and benefits from the data provided with the contributions and benefits recorded in the unaudited accounts.

We were also provided with copies of unaudited Statements of Financial Position and Statements of Changes in Net Assets for the years ending July 31 2018 (with 2017 comparison), 2019 and 2020.

A copy of the NEPC's report on the invested assets as at June 30, 2020, titled *'June Performance Report, Contributory Pension Fund, June 30, 2020'* was also received.

2.2 Economic Experience

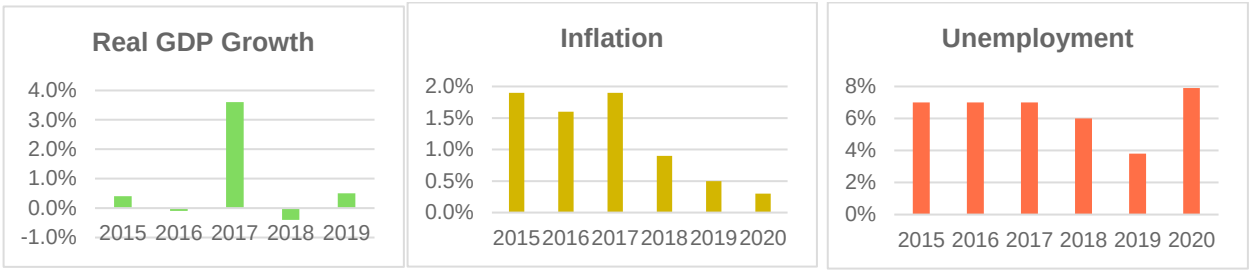
The Fund's two main sources of income, contributions and earnings on investments, are closely linked to economic performance and labour market changes. Benefits are also affected by economic changes as both benefit and contribution rates are adjusted on an ad hoc basis relative to annual inflation.

As shown in the charts in Figure 2.1, the Bermudian economy experienced minimal growth since the last review in 2017 with real GDP performance averaging 0.05% over 2018-2019 (down from 1.3% over 2015-2017).

Inflation (annual average Consumer Price Index) declined from an average of 1.7% over 2015-2017 to 0.4% over 2018-2020.

Unemployment rates have declined from 7% in 2017 down to around 4% by 2019. This trend reversed in 2020, in the wake of COVID-19, with unemployment reaching its highest level since 2015 at close to 8%.

Figure 2.1 Key Economic Indicators, 2015 to 2020



2.3 Fund Experience

2.3.1 Contributions and Benefits

Table C1 of Appendix C summarises the numbers and amount of monthly benefits in payment as at August 1, 2020 and August 1, 2017 for comparison. Table C2 of Appendix C summarizes the average amount of benefits paid in 2020 and 2017.

The number of beneficiaries has steadily increased over the period since the previous review as shown in Figure 2.2 below. This actual number of persons making one or more contributions decreased over the 3 years since the previous review, going from 35,889 in 2017 to 34,629 in July 2020. This has resulted in the ratio of beneficiaries per 100 contributors increasing from 36 in 2017 to 40 in 2020.

Figure 2.2 Beneficiaries and Contributors, 2017 to 2020

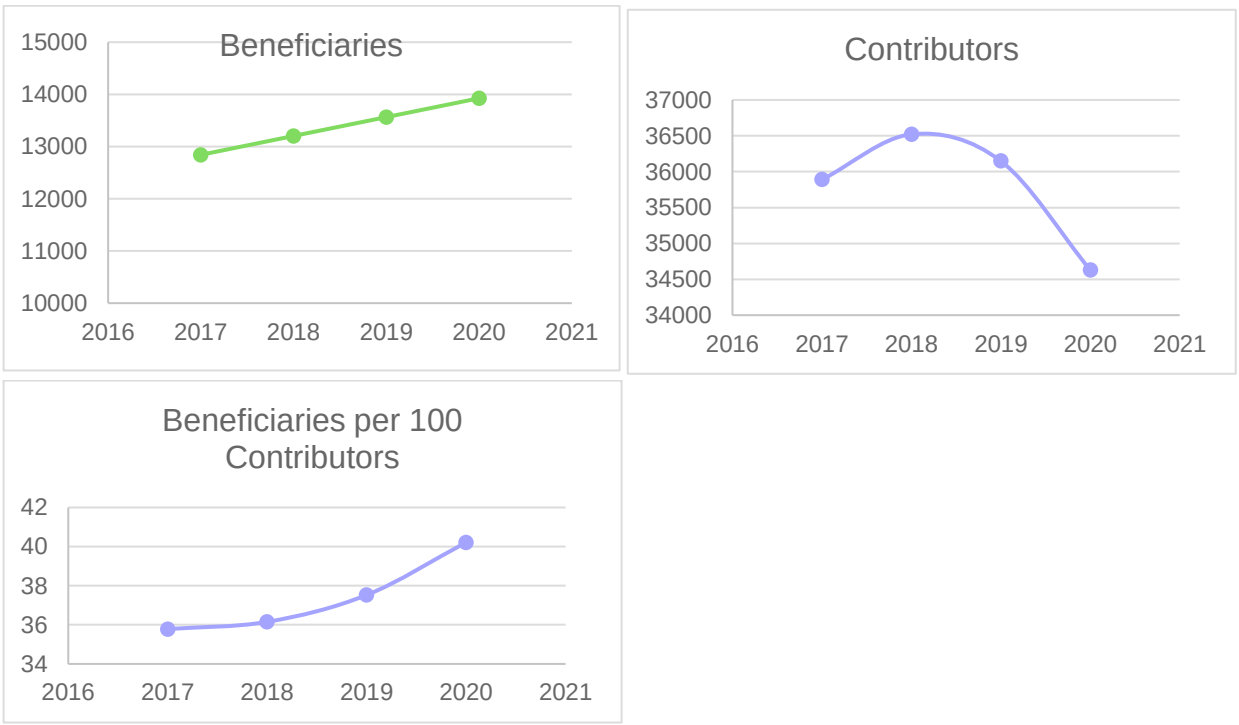


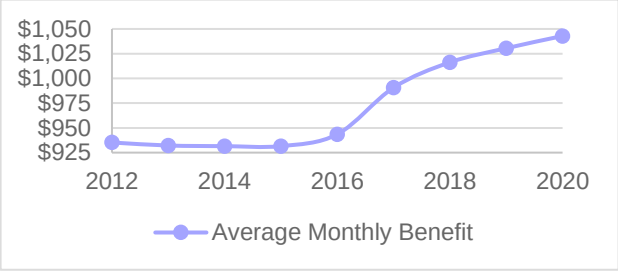
Table C3 of Appendix C summarises the number of persons making one or more contributions, and the average number of weekly contributions per month earned, for the 12-month periods ending 31 July 2018 to 2020. The average number of weekly contributions per month declined from 3.90 to 3.68 over the three years.

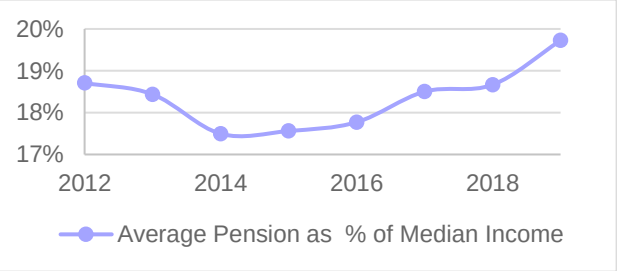
Social Security schemes are designed on the premise that the contributions from the working population together with investment income would be sufficient to pay benefits in any one year. The pensioner support ratio gives an indication of the number of persons in receipt of benefits relative to the number of contributors in the Fund. An increasing trend in this ratio indicates a higher likelihood that contributions would need to be increased above what is currently in place and a declining trend, the opposite. The experience of the Fund shows an increasing trend in this ratio.

2.3.2 Replacement Ratio

Average pensions divided by average insurable earnings is often referred to as the replacement ratio. As there is no insurable wage defined under the Act, we have used the Median Gross Annual Income as per the annual *Employment Survey Tabulation Set* prepared by the Department of Statistics, as a comparator. In 2012, the ratio was 18.7%. Thereafter the ratio declined until 2015 mainly due to level benefit amounts. In 2016 and subsequent years, the ratio has increased steadily in line with benefit increases. In 2019, the ratio stands at 19.7%, the highest level over the period.

Figure 2.3 Average Pensions in Payment & Median Income, 2012 to 2020





2.3.3 Fund Income and Expenditure

The following table provides summary income and expenditure amounts for 2017 to 2020. A more detailed version of the Fund's finances for these years may be found in Appendix D.

Table 2.1 Summary of Fund's Income and Expenditure, 2017 – 2020 (millions of $'s)

	2017	2018	2019	2020
Income				
Contributions	121.7	96.9	118.5	112.3
Investment (net)	152.7	76.4	87.2	41.5
Net Change in FV of Investments	89.8	-15.8	-2.3	46.8
Transfers / Other	9.0	11.2	4.8	0.5
Total	373.2	168.8	208.2	201.1
Expenditure				
Benefits	155.8	163.4	170.7	178.6
Administrative and Investment	6.2	8.2	7.9	8.5
Bad Debt Provision	0.6	-1.9	0	0.2
Total	162.7	169.7	178.6	187.3
Excess of Income over Expenditure	**210.5**	**-0.9**	**29.6**	**13.8**
Net Assets (end of year)	**1,927.7**	**1,926.8**	**1,956.3**	**1,970.0**

Figures may not sum due to rounding

Key highlights of income and expenditure are:

(i) Contributions (on an accrual basis) decreased significantly in 2018 before returning to a similar level as seen in 2017. The 2018 contributions were depressed on account of an adjustment of $18.7m made to correct a revenue overstatement in the prior year. Contributions dipped again in 2020 as a result of the COVID-19 impact on employment levels. Contribution rates were increased effective August 2018 by 4.2%.

(ii) Total investment income was volatile over the period reducing significantly over the period 2017 to 2020.

(iii) Total administrative costs increased during the inter-valuation period. Included in these costs are Investment Management fees of $5.1m, $5.5m and $6.9m for the three years 2017 to 2020, respectively.

(iv) Benefit expenditure increased each year due to the increase in the number of beneficiaries and the increase in benefit rates.

(v) In all three years, benefit expenditure exceeded contribution income. In addition, net income was marginally negative in 2018 and positive in 2019 and 2020.

(vi) Net Assets increased 2.2% over the three years.

2.4 Investments

As at 31 July 2020, the market value of the net assets was $1.970 billion, approximately 11.0 times the benefit outgo in the year ending 31 July 2020. As at 31 July 2017, the corresponding figure was 12.4. If total outgo is considered, the coverage ratio in 2020 drops to 10.5. This means that the assets in the Fund at their current value can cover approximately 10 to 11 years of 2020 benefit payments and expenses. Table 2.2 shows the coverage ratios.

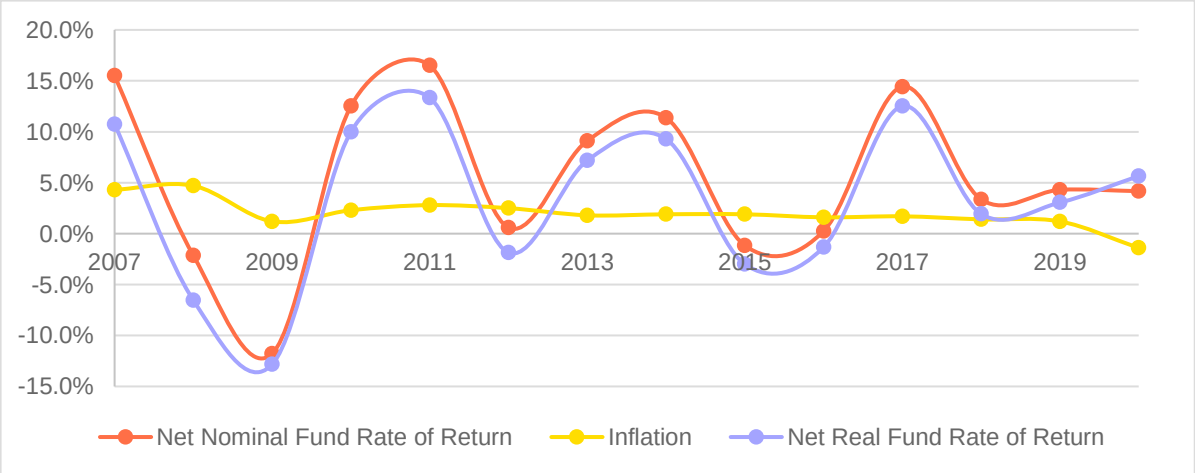
Table 2.2 Years of Benefit Coverage

	2017	2018	2019	2020
Net Assets (end of year)	1,927.7	1,926.8	1,956.3	1,970.0
Benefits	155.8	163.4	170.7	178.6
Total Outgo	162.7	169.7	178.6	187.3
Net Assets / Benefits	12.4	11.8	11.5	11.0
Net Assets / Total Outgo	11.8	11.4	11.0	10.5

Over the three years ended 31 July 2020, the average nominal rate of return earned on the Fund was 4.0% per annum. Allowing for price inflation over the same period, the average real rate of return earned on the Fund over the three years ended 31 July 2020 was 3.6% per annum (see Table D3 of Appendix D). Nominal returns were relatively flat over the 3 year period, however real returns increased over the period as inflation reduced (1.9%, 3.1% and 5.7%).

Over the ten years ended 31 July 2020, the average nominal rate of return earned on the Fund was 6.1% per annum. Allowing for price inflation over the same period, the average real rate of return earned on the Fund over the ten years ended 31 July 2020 was 4.5% per annum. This equals the long-term real rate of return of 4.5% assumed in this review.

Figure 2.4 Fund rate of return, 2007 to 2020



The relationship between investments and net assets, which measures how efficiently available funds are invested, averaged 94% over the 3-year review period. This ratio indicates that there is a high level of efficiency in the investment of the funds. Table D2 provides a breakdown of the total assets in the Fund.

The investments of the Fund are guided by a Statement of Investment Policy & Procedures which sets out investment objectives and guidelines for the Fund and defines the management structure and monitoring procedures for both internal and external investment management. It also includes a desired asset allocation policy for the Fund. Table 2.3 shows the asset mix at June 2017 and 2020 compared with the target ranges. There have been some shifts in the allocations since the previous valuation with the larger ones being a reduction in Global Equity (-6.8%), an increase in Private Markets (+4.8%), an increase in Core Bonds (+4.3%) and the introduction of a new asset category Opportunistic Credit (3.5%).

Figure 2.5 Invested Asset Allocation June 2017

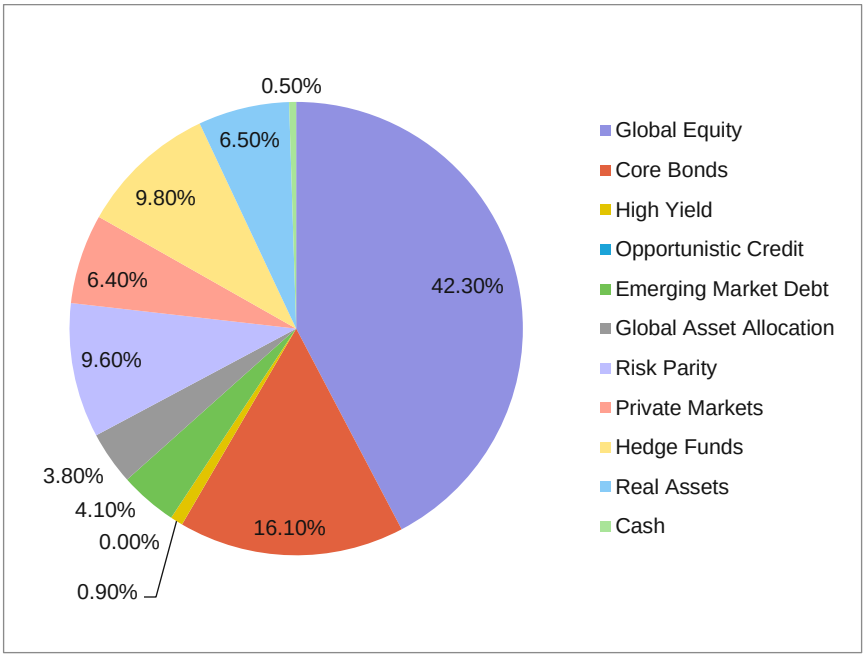


Figure 2.6 Invested Asset Allocation June 2020

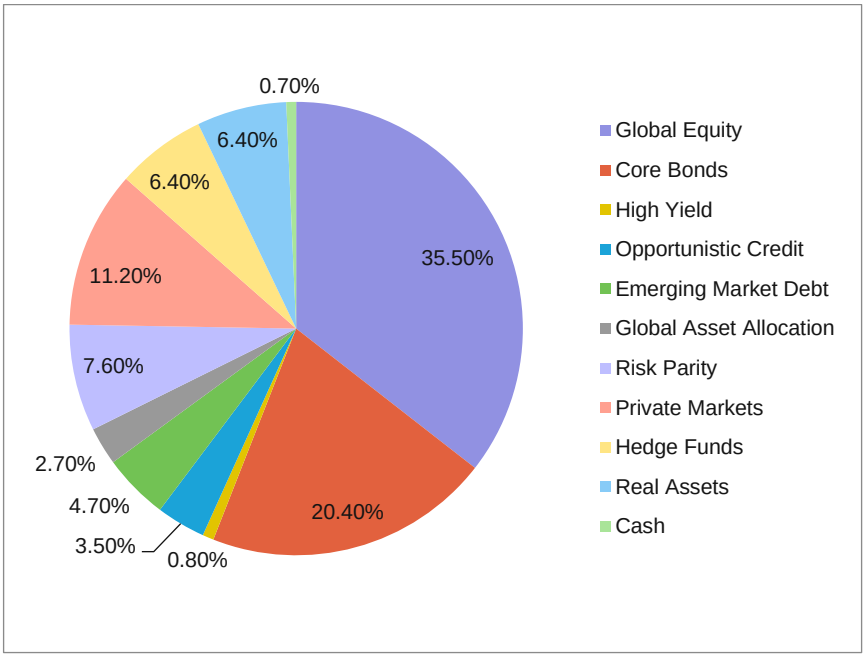


Table 2.3 Actual and Target Asset Allocation June 2017 and 2020

Invested Asset Category	2017 Actual	2017 Target	2020 Actual	2020 Target
Global Equity	42.3%	38.0%	35.5%	35.0%
Core Bonds	16.1%	16.5%	20.4%	19.5%
High Yield	0.9%	1.0%	0.8%	1.0%
Opportunistic Credit	0.0%	0.0%	3.5%	3.0%
Emerging Market Debt	4.1%	5.0%	4.7%	5.0%
Global Asset Allocation	3.8%	3.0%	2.7%	3.0%
Risk Parity	9.6%	10.0%	7.6%	5.0%
Private Markets	6.4%	10.0%	11.2%	15.0%
Hedge Funds	9.8%	9.0%	6.4%	6.0%
Real Assets	6.5%	7.5%	6.4%	7.5%
Cash	0.5%	0.0%	0.7%	0.0%

Source: Investment Performance Reports June 30

2.5 Experience Compared with Projections from Previous Review

Shown below is a comparison of actual cumulative experience over the 3-year period with the projections of the main “best-estimate” scenario of the previous Actuarial Review.

Table 2.4 Projections from Previous Review Compared with Actual Experience

	2018-2020 Projected (millions of $’s)*	2018-2020 Actual (millions of $’s)	% Difference
Contribution Income	$389.1	$327.7	15.8% below projected
Investment Income	$207.3	$250.3	20.7% above projected
Benefit Expenditure	$519.5	$512.8	1.3% below projected
Admin & Inv. Expenditure	$21.5	$22.9	6.6% above projected
2020 Year-end Net Assets	$1,983	$1,970	0.7% below projected
Net Assets/Expenditure Ratio (end of period)	10.2	10.5	2.7% above projected

**Restated in 2020 dollars*

The results show that contribution income was lower than expected due to the $18.7m adjustment made in 2018 to correct a prior year revenue overstatement, the impact of COVID and rate increases being less than expected. Benefit expenditure was slightly lower than expected as rate increases were lower than expected. Administrative and Investment expenditure was higher than expected. Of the $22.94 million, $7.1 million is attributable to pure administrative cost over the three years. Investment income was significantly higher than expected. The assumed real rate of return on the Fund assets was 3.5% for 2018 to 2020. The actual average real rate of return over the three years was 3.6% however this is measured on a 2017 net asset position that was restated to $1,928 million compared to $1,865 million at the prior review. Inflation was assumed to be 3%, while average inflation for the three years was 0.4%. The overall result is a lower than projected Fund value.

2.6 Subsequent Events

This report is being prepared in July 2021. Data post 1 August 2020 has been used in order to estimate how many contributors are expected to temporarily suspend contributions for the period 1 July 2020 to 30 June 2021.

Chapter 3 Best-Estimate Assumptions

Many demographic and economic factors, such as changes in the size and age structure of the population, economic growth, employment and inflation, influence the Fund's finances. Therefore, to best assess the Fund's long-term costs and sustainability, projections of Bermuda's total population and the economy are required. For this review 50-year projections have been performed.

In developing the assumptions used for the projections, historical trends and reasonable future expectations, as well as the interrelationships between the various assumptions, have been taken into account. Core projections have been performed using assumptions that reflect best estimates. The demographic and financial projection results based on this assumption set is referred to throughout this report as "*Best Estimate.*"

Given the uncertainty inherent in forecasting long periods, projections using additional sets of assumptions that vary contribution income and outgo (benefits and expenses); and the progression of the Fund balance allowing for investment returns, hereinafter referred to as *"Variant"* have also been performed. These alternative projection sets encompass assumptions that are generally more optimistic and more pessimistic than best-estimate assumptions. Results of the Best Estimate, Variant and Alternative scenarios are presented in Chapters 5 and 6 respectively.

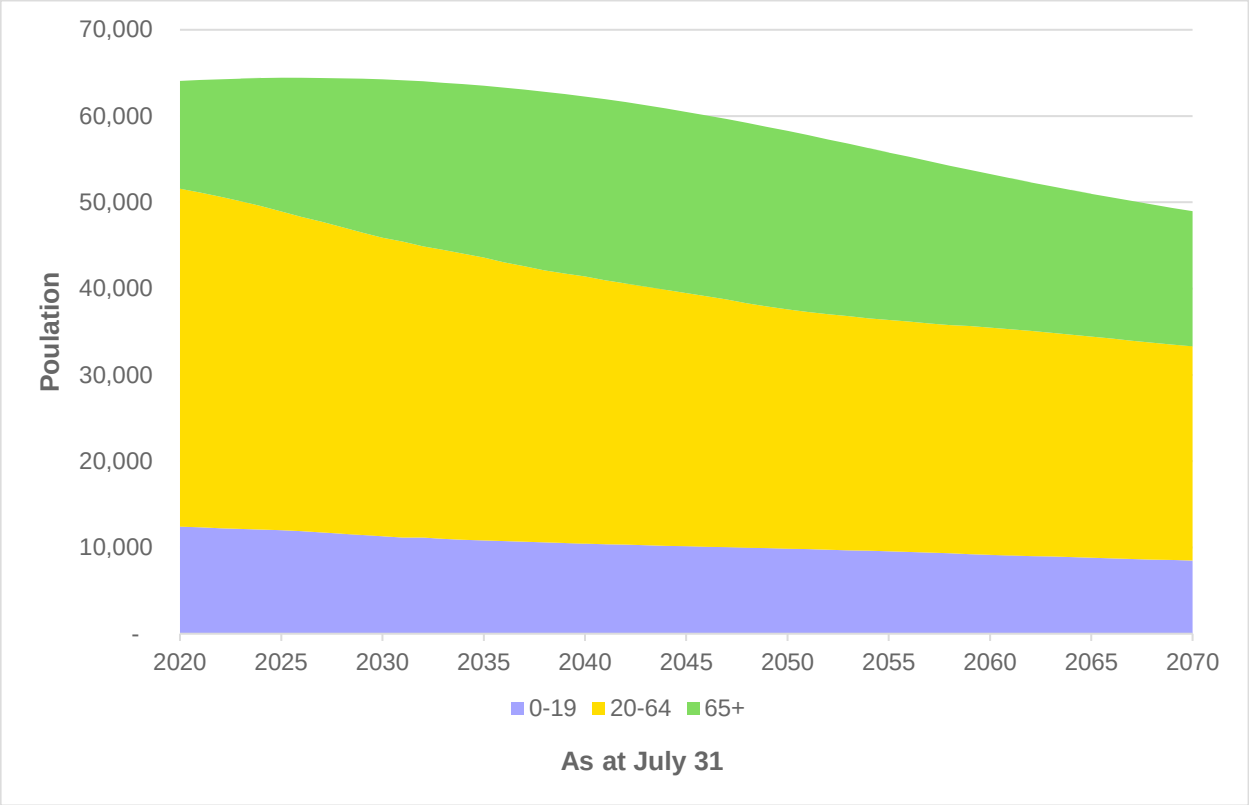
3.1 Demographic projections

This section describes the estimating methods and demographic assumptions adopted for the review. We have used the same methodology that was used in the previous review, except where noted.

3.1.1 Population projections

We produced a long-term population projection for the 50-year period covered by the review (2021 to 2070). The baseline population for the long-term projection is taken from the 2016 census, which showed total numbers of males and females split into five-year age groups. Appendix E contains a description of the assumptions adopted for the projection and the results.

Figure 3.1 Projected Population 2020 - 2070 (Males and Females)



The population over pension age is expected to rise steadily over the next 20 to 25 years, at which point it is projected to be almost 1.7 times the current population over pension age. Thereafter the over pension age population is projected to stabilise, and then gradually decline.

The working age population is expected to decline, gradually at first but more quickly towards the end of the projection period. This decline is due to a combination of the projected continuation of a low birth rate and little or no economic growth. Bermuda's Population Projections 2016-2026 projected a population of 64,054 as at July 1, 2020.

The old-age support ratio (ratio of the number of working age to the number over pension age) is a particularly useful indicator of future trends. As at August 2020, there were 3.1 people of working age per pensioner but over the next fifty years or so, this ratio is projected to fall to 1.6.

The above projections assume that there is no change to the current immigration policy.

3.1.2 Projected Contributors and Beneficiaries

The results of the 50-year population projection are used to project the numbers of contributors (and the number of weekly contributions) and beneficiaries. Appendix F describes the methods and assumptions adopted for this purpose. The assumptions generally reflect the recent experience but with some modifications for the longer-term. The following paragraphs summarise the projected numbers of contributors (and the number of weekly contributions) and beneficiaries. It should be noted that the projections are subject to increasing uncertainty in later years.

3.1.3 Projected Numbers of Contributors and Contributions

The projected numbers of weekly contributions are based on the projected numbers of contributors and the assumed average annual number of weekly contributions per contributor. The projected number of contributors is derived by applying age-specific factors to the projected population in 5-year age groups, with the factors representing the long-term assumed proportions of the population in each age group that will contribute to the Fund. It has been assumed that the proportion of contributors in each 5-year age group will be similar to that obtained from the data provided for the 12-month period ending 31 July 2020. Table 3.1 summarizes the projected number of contributors to the Fund.

Note that the number of contributors considers that persons from all three age groups (0 to 19, 20 to 64 and 65 and over) contribute to the Fund as well as persons who are no longer in the population and have left Bermuda but who are still entitled to a future benefit. Table 3.1 indicates that the projected total number of contributors is reduced by 50% in 2021 to take account of the temporary suspension option thereafter reverting to normal levels before decreasing gradually over the projection period to about 2/3^{rds} of the 2026 figure.

The projected number of weekly contributions paid in a year is based on the projected number of contributors multiplied by the average number of weekly contributions paid by each contributor.

Table 3.1 Projected numbers of contributors

Year ending 31 July	Males	Females	Total
2021	8,968	8,650	17,617*
2026	16,820	16,158	32,977
2031	15,890	15,202	31,092
2036	14,933	14,229	29,163
2041	14,136	13,415	27,550
2046	13,429	12,692	26,122
2051	12,811	12,059	24,870
2056	12,256	11,490	23,746
2061	11,944	11,152	23,096
2066	11,710	10,889	22,600
2071	11,375	10,534	21,909

** Assumed number of contributors not taking contribution holiday in 2020/2021*

3.1.4 Benefits and Beneficiaries

Projected benefit amounts are based on the projected number of beneficiaries (contributory and non-contributory) and the average benefit payable. The distribution of benefits among the population differs from the previous review as the seriatim data was used to inform the revised distribution. Appendix F gives details of the distribution of benefits among the population.

Table 3.2 summarises the projected total numbers of beneficiaries in receipt of contributory and non-contributory old age pension.

Table 3.2 Projected numbers of Beneficiaries (aged 65 or over)

Year ending 31 July	Males	Females	Total
2021	6,008	7,712	13,720
2026	7,489	9,468	16,957
2031	8,861	10,828	19,689
2036	9,734	11,576	21,310
2041	10,206	11,869	22,075
2046	10,216	11,872	22,088
2051	9,953	11,621	21,573
2056	9,208	10,893	20,102
2061	8,392	10,021	18,413
2066	7,783	9,435	17,218
2071	7,450	8,886	16,336

Figure 3.2 Projected Contributors versus Beneficiaries

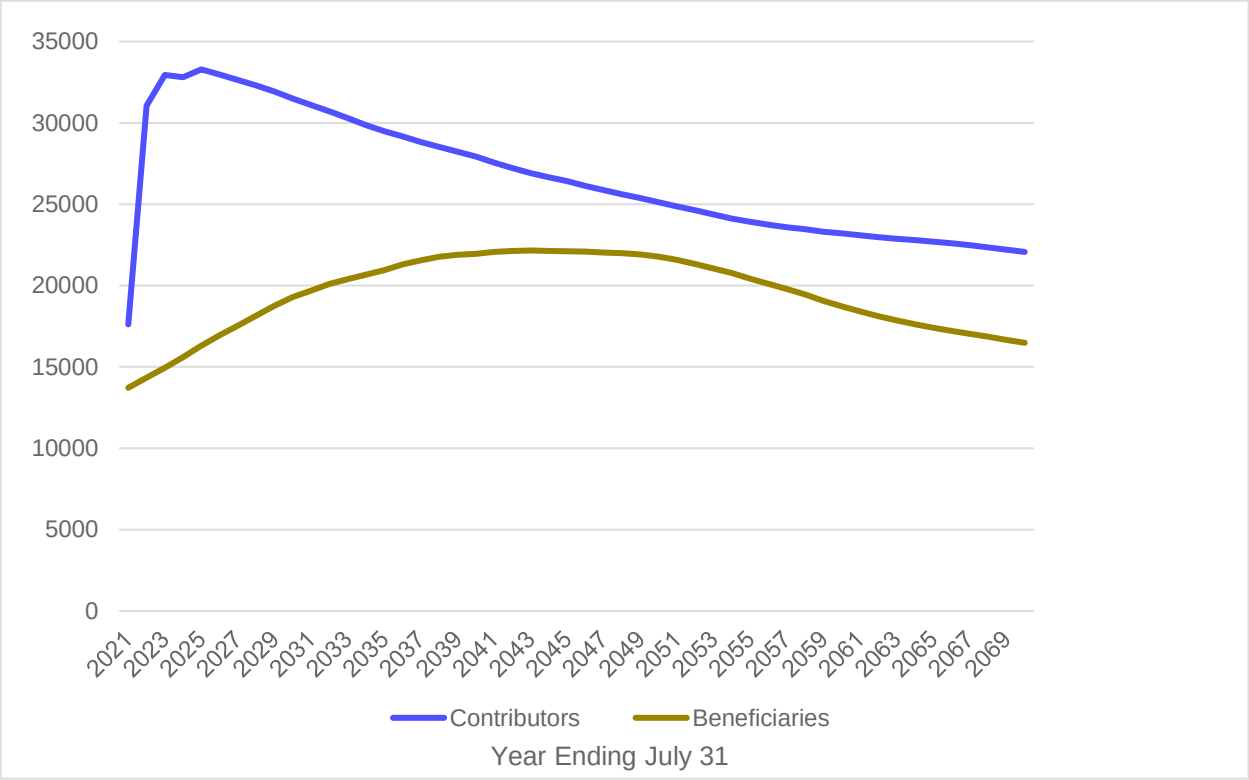


Figure 3.2 indicates that the total number of beneficiaries (contributory and non-contributory) over age 65 is expected to increase steadily, reaching a peak in about 25 years. Thereafter, a gradual decline in numbers is expected. The 2021 figure is the assumed number of persons contributing to the Fund and not taking a contribution holiday.

The male to female ratio of over 65 beneficiaries is reflective of the ratio that exists at the Review Date. The impact of higher male mortality has also resulted in a higher number of females than males in this age grouping.

3.2 Financial Assumptions

The results are shown at constant 2020 price levels. The projections allow for the assumed increases in benefits and contributions, and are then deflated by the assumed rate of price increases. The review takes into account the actual benefit and contribution rates in effect from August 2020.

The main financial assumptions are the rates at which benefits and contributions will increase (relative to prices) from August 2021, the real rate of investment return (in excess of price increases) and rate of increase of the administrative and investment expenses. It is not necessary to make an explicit assumption in respect of future price increases because the assumed increases to both benefit and contribution rates are expressed relative to price increases.

3.2.1 Increases to Benefit and Contribution Rates

It has been assumed that, over the long-term, benefits will increase in line with prices. Contributions have been projected at a rate of 2.5% a year more than benefits (i.e. price increases plus 2.5%).

For this review, contributions are assumed to increase at 2.5% until the year 2034 and thereafter the increase is assumed to be 1.75% more than price increases. This approach is taken so that the projected contribution rate does not surpass the benefit rate and that the ratio of the benefit rate to the contribution rate is approximately 2.5 times under the base scenario. The ratio of benefit rate to contribution rate is 3.5 (2020 and 2021). When benchmarked against Canada and the US, their current ratios of maximum benefit to contribution rate are approximately 1.7 and 2.1 respectively. For other Caribbean countries, the ratio generally ranges from 2.0 to 4.0 averaging 2.9.

3.2.2 Real Rate of Investment Return

The investment of the assets is overseen by the Bermuda Public Funds Investment Committee ('PFIC'). The assets in the CPF are pooled with Bermuda's largest public sector pension fund for investment purposes. The investment is guided by an investment policy and the investments are undertaken by a number of investment managers. As part of the actuarial review, the PFIC provides the actuaries with a 30-year projection of returns for each asset class, which is prepared by the firm NEPC, LLC, an investment consulting firm. Based on the target asset mix of the CPF, an expected long-term rate is developed. As the projections are for more than 30 years one would expect that the further into the future the projection, the less certainty is given to the future rate, so we assume the rate to be less than that used for a 30-year projection.

The elements considered in the development of the gross real investment return assumption are summarized in the table below:

Table 3.3 Real Investment Return Assumption (gross of expenses)

	%
Expected Nominal Return	6.28
Value added for rebalancing and diversification effect	0.50
Inflation Assumption*	(2.00)
Real Investment Return	4.78
Real Investment Return (rounded)	4.50

**2% is the Bermuda Ministry of Finance current assumption used in economic forecasting*

Alternative projections of the Fund balance have been carried out using assumed real rates of return of 2% a year, 3.5% and 5% a year. This seems a reasonable range for the real rate of return in view of the returns achieved over the past decade.

3.2.3 Administration and Investment Expenses

For the purposes of the review, we have assumed that administration and investment expenses will increase at a rate of 1.5% a year in excess of price increases. Total expenses for the year ending 31 July 2020 amounted to $8.5 million. Pure Administrative expenses totalled $1.7 million as stated in the financial statements. The remaining expenses relate to investment management charges and investment monitoring costs.

Chapter 4 Best-Estimate Projections

The Fund is projected to steadily decline until it is depleted in 2044 under the best estimate assumptions:

- contributions increase 2.5% more than benefits until 2034 and by 1.75% more than benefits, thereafter
- contributor levels remain at the 2020 levels as a percentage of the working age population
- Investment returns of 4.5% per annum in excess of inflation

In the previous review, the Fund was expected to be exhausted in 2047. There are several contributing factors which, when combined, have produced these results. These main factors are as follows:

- Benefits were increased each year during the inter-valuation period in line with inflation, however contributions were not increased for 2 of the 3 years. Post the valuation date, 2021 contributions and benefits remained unchanged at the 2020 level.
- The number of contributors at 2020 was 1% lower than what was projected in the 2017 valuation. This decline is reflected in the 2020 valuation. Conversely, the number of pensioners is 4.4% higher than that projected in the 2017 valuation in all future years of the 2020 projection.
- COVID 19 along with the contribution holiday negatively impact the Fund's finances.
- The investment return assumption has increased from 3.5% per annum in excess of inflation at the prior review to 4.5%.

A summary of the impact of the above changes on the life of the Fund is shown below.

Table 4.1 Impact of Changes in Assumptions and Modelling

Changes in Assumptions and Modelling	Year Fund is Expected to be Exhausted	Change in Year Fund is Expected to be Exhausted
Existing model as at the last actuarial review	2047	-
Using actual 2020 Assets (Fund experience)	2048	1
Actual average benefit & contribution rates at 1 August 2020	2046	(2)
Update with new demographic projections	2043	(3)
Update fund expense assumption	2043	-
Actual 2021 contribution rate	2042	(1)
Effect of contribution holiday and COVID 19	2041	(1)
Revise investment return assumption	2044	3

4.1 Projected Income and Outgo

Table 4.2 summarises, at five-yearly intervals, the projected contribution income, increasing in line with prices plus 2.5% a year starting effective August 2021 until 2034 and prices plus 1.75% thereafter, and the projected total outgo of the Fund, at 2020 prices. Table G1 of Appendix G shows results for each of the first 10 years of the projection period.

Table 4.2 Projected income and outgo ($million) at constant 2020 prices

Year ending 31 July	Contribution income	Outgo		
	increasing in line with price increases plus 2.5% to 2034 and 1.75% thereafter	Pension & Other benefits	Expenses	Total outgo[1]
(1)	(2)	(3)	(4)	(5)
2021	58.3	188.5	8.3	196.8
2026	123.5	229.8	9.0	238.7
2031	131.8	262.5	9.7	272.2
2036	137.8	284.2	10.4	294.7
2041	142.0	292.6	11.2	303.8
2046	146.8	293.1	12.1	305.1
2051	152.4	285.8	13.0	298.8
2056	158.7	266.7	14.0	280.7
2061	168.4	246.3	15.1	261.4
2066	179.7	233.9	16.3	250.2
2070	188.0	225.0	17.3	242.2

[1]*Totals may not sum due to rounding*

Total outgo is projected to increase from its current level reaching a peak in 2046 before declining over the rest of the projection period. Over the same period, contribution income is projected to increase sharply as the contribution holiday comes to an end and then more steadily.

Figure 4.1 illustrates the projected amounts of contribution income and total outgo, as shown in Table 4.2.

Figure 4.1 Projected Contribution Income and Total Outgo ($ million at constant 2020 prices)

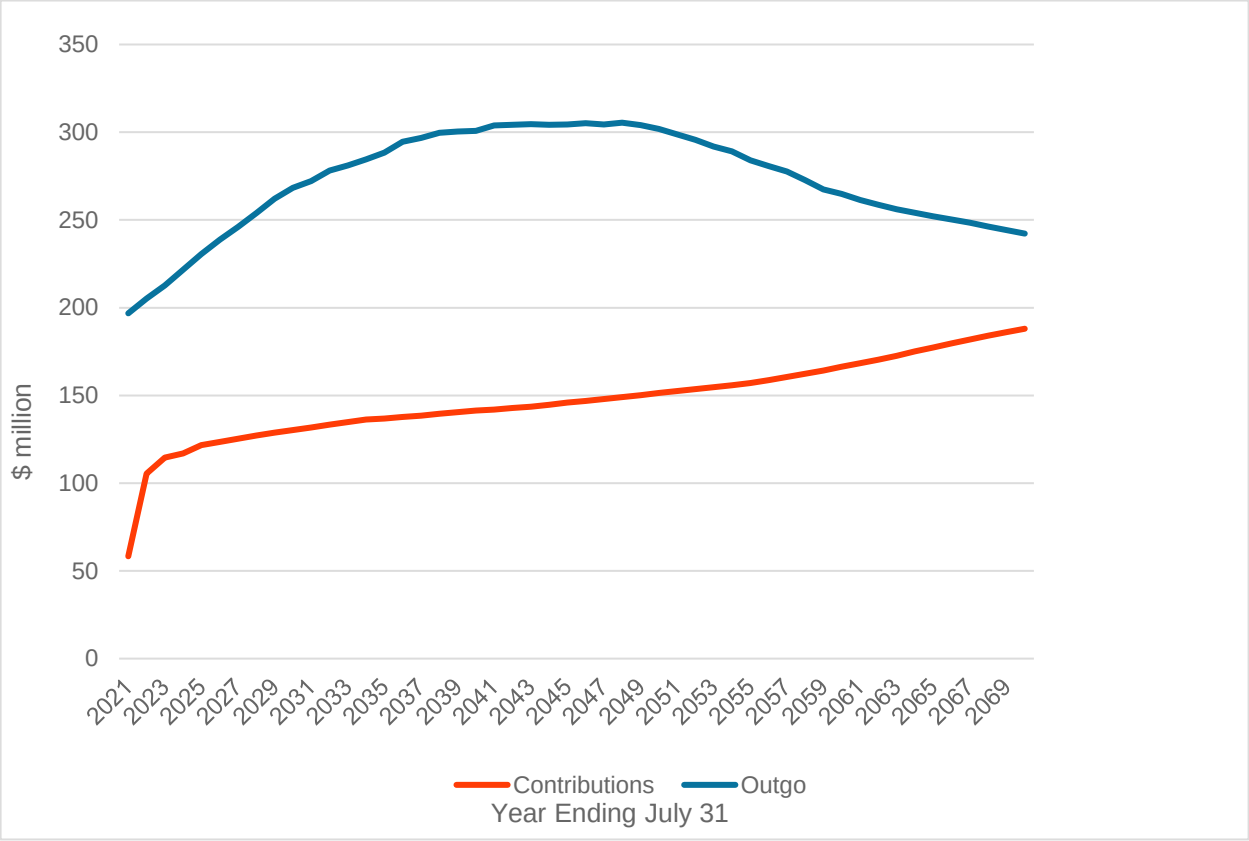
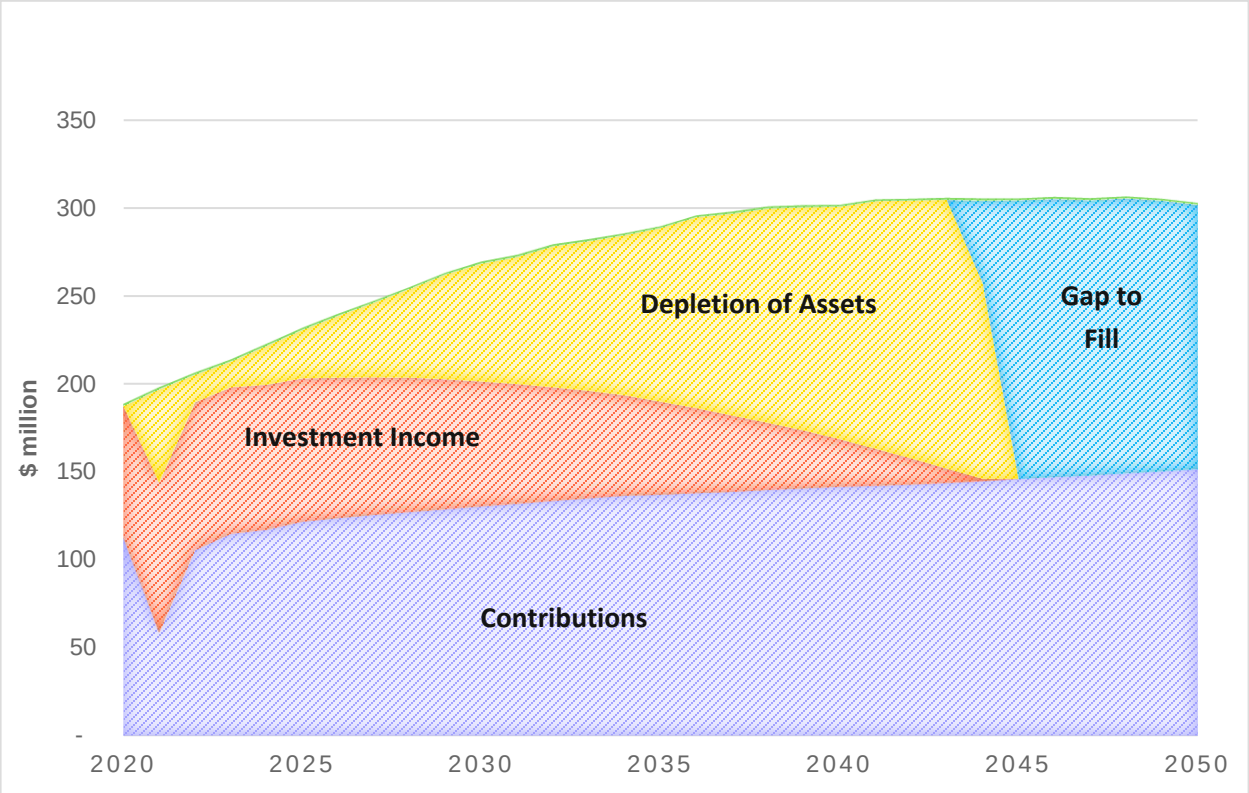


Figure 4.1 indicates that total outgo exceeds contribution income throughout the projection period.

The following chart illustrates how the sources of financing expenditure will change as the Fund moves from a state of expenditure being 67% more than contributions in 2020 to 2.1 times contributions when all reserves are exhausted in 2044.

Figure 4.2 Sources of Financing Expenditure, 2020 to 2050



In 2020, $75m of the $89m in investment income was required to meet expenditure.

With expenditure projected to first exceed contributions (blue section) plus investment income (yellow section) in 2021, assets will have to be liquidated to help meet expenditure (green section).

As more and more assets are sold to meet expenditure they will eventually run out (2044). The income shortfall (orange section) in 2044 is estimated at 32.6% of contribution income increasing to an annual average of 90% from 2045 onwards. The contribution rate would have to almost double thereby reducing the ratio of the benefit rate to the contribution rate from 212% to 111%.

4.2 Projected Fund Balance

Projections of the Fund balance are subject to further uncertainty since they depend not only on the projections of income and outgo, but also on future investment returns and changes in market values. However, this is an important aspect of the financing of the benefits and it is useful to consider the expected long-term pattern of growth under the assumptions adopted for the purpose of the projections.

Figure 4.3 illustrates the projected balance of the Fund in constant 2020 price terms, assuming a real rate of investment return of 4½% a year.

Figure 4.3 Projected Fund Balance, Real Rate of Return of 4½% a year ($ million at constant 2020 prices)

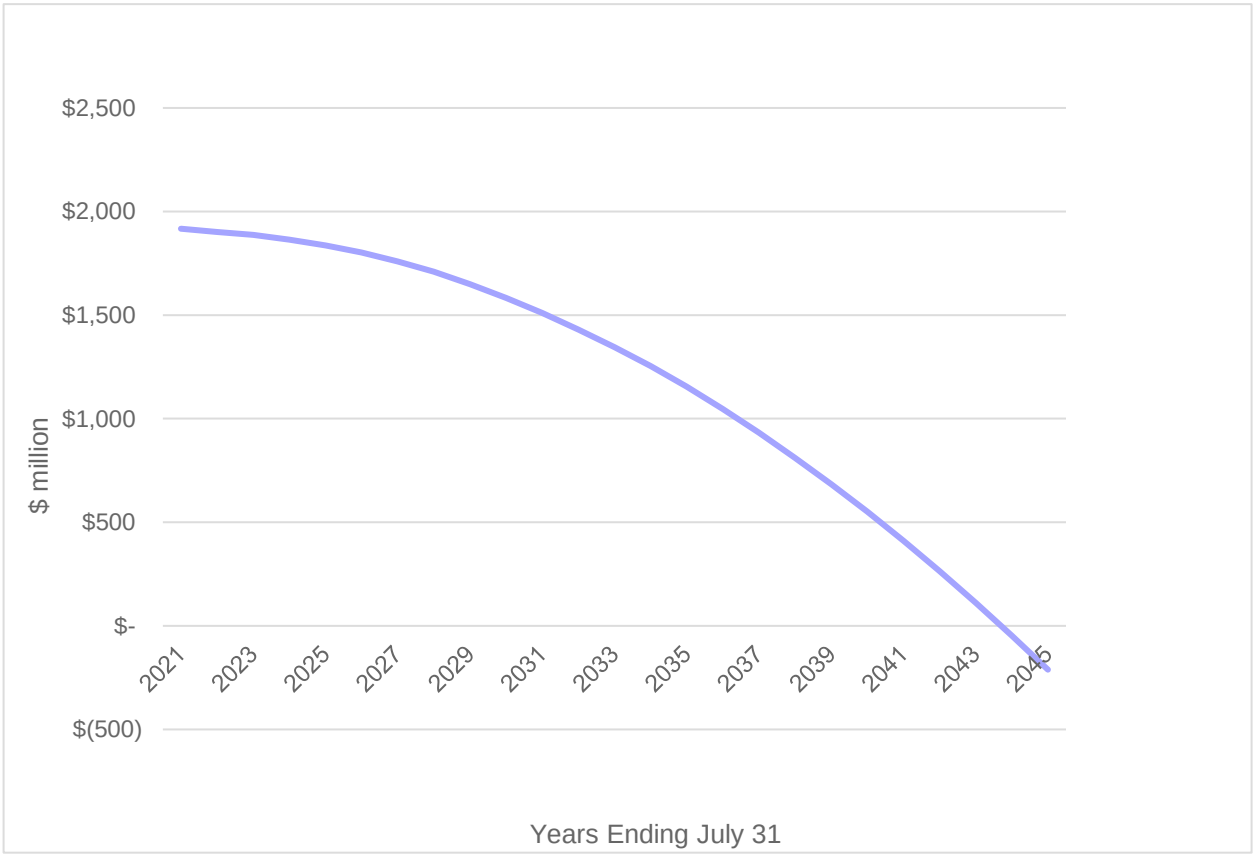


Figure 4.3 indicates that the Fund is projected to decline steadily until it is completely exhausted in 2044, or after 24 years.

Table H1 of Appendix H shows the Fund projections in detail under the best estimate assumptions, including the multiple by which the projected Fund balance is estimated to cover annual outgo from the Fund ("ratio of Fund to outgo"). At the Review Date, the Fund can cover 10.5 years of annual outgo. The ratio steadily decreases over the projection period.

Chapter 5 Variant Projections

The projections presented earlier in this report are based on assumptions of contribution increases and investment returns relative to prices. In this section, we look at the results of these projections under variants of these assumptions. The projections are based on the benefits and contributions in effect from August 2021 and are expressed in constant 2020 price terms.

The variant results show projections of:

(i) contribution income and outgo (benefits and expenses); and

(ii) the progression of the Fund balance allowing for investment returns

5.1 Variant Fund Returns

Figure 5.1 illustrates the projected Fund balance in constant 2020 price terms, assuming alternative real rates of investment return of 2%, 3.5% and 5% a year.

Figure 5.1 - Projected Fund balance, Real rates of return of 2%, 3.5%, 4.5% and 5% a year. ($ million at constant 2020 prices)

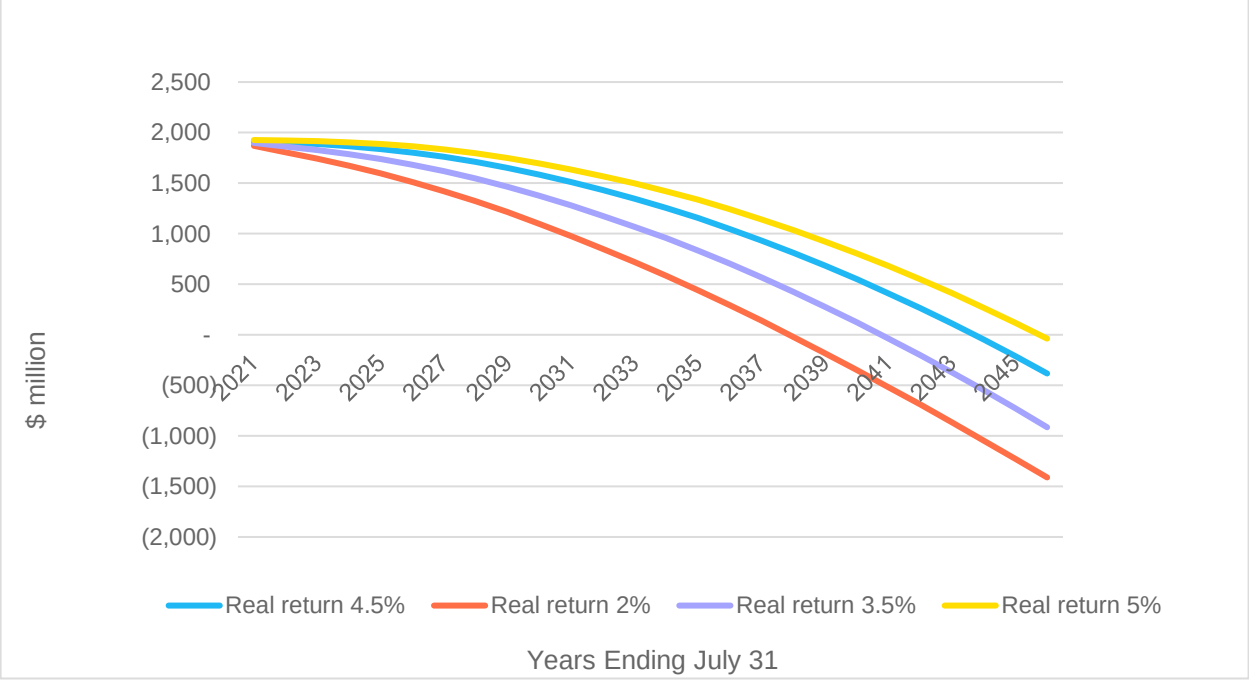


Figure 5.1 shows that reasonable increases or decreases in the assumed rate of real investment return only have minimal impact on when the Fund will be depleted (approx. 2 to 3 years per 1% change).

5.2 Variant: 105% and 95% Contributors

Two additional scenarios were investigated where the number of contributors in the population was 5% higher and 5% lower than under best estimate throughout the projection period. This is analogous to there being lower and higher unemployment without any change in the labour force.

Figure 5.2 - Projected Fund balance, 105% and 95% Contributors ($ million at constant 2020 prices)

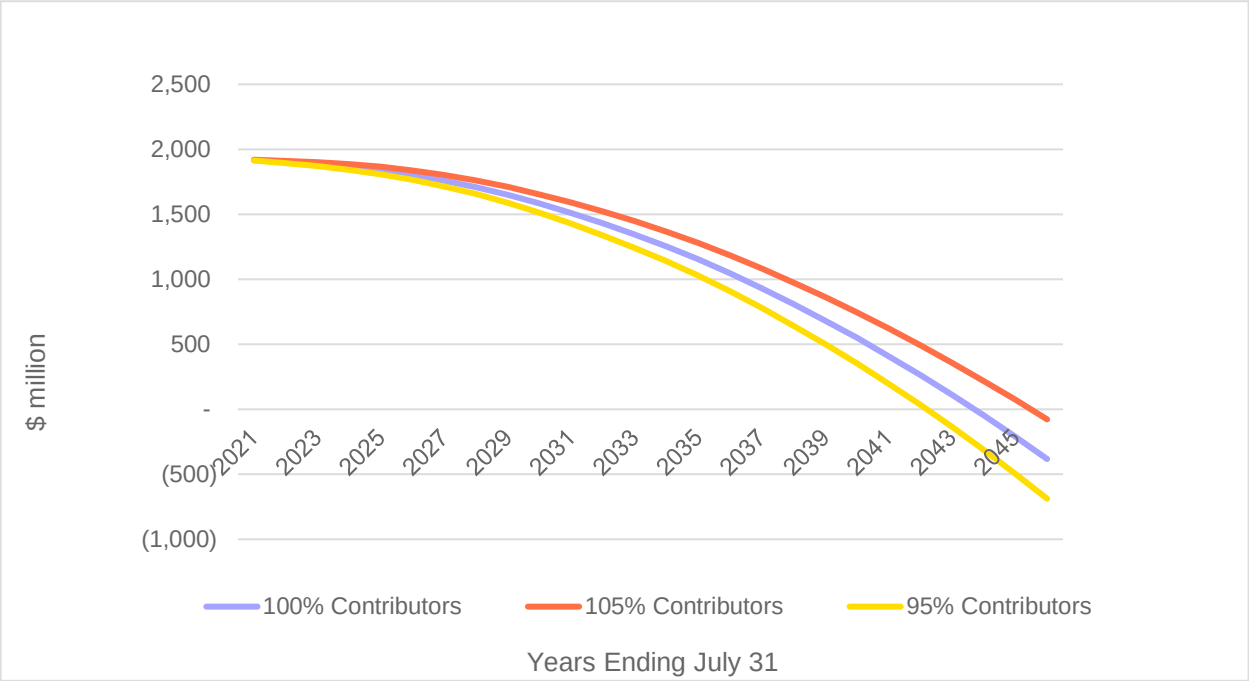


Figure 5.2 shows that a 5% increase or decrease in the number of contributors only has a minimal impact on the life of the Fund.

5.3 Additional Scenarios

Some additional design changes were also explored.

In particular, we looked at:

(i) Increasing the retirement age from 65 to 70 over an 8 year period from 2027 to 2035; and

(ii) Increasing the retirement age from 65 to 70 over an 8 year period from 2027 to 2035 and increasing the contributions by 4% per annum more than benefits until the year 2034; thereafter contributions increase by 1.75% more than benefits

Figure 5.3 - Projected Fund balance, Extend Retirement Age to 70 and Extend Retirement Age to 70 combined with contributions increasing by 4% p.a. greater than benefits ($ million at constant 2020 prices)

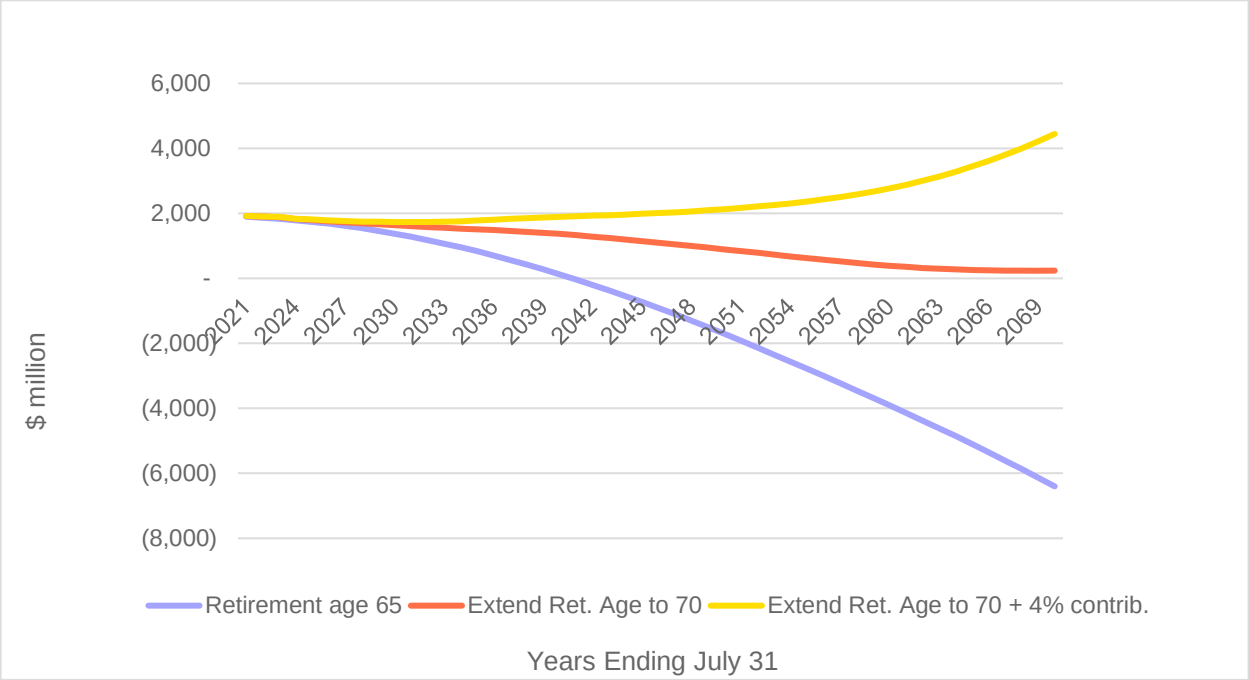


Figure 5.3 shows that extending the retirement age to 70 extends the life of the fund beyond 2070. Extending the retirement age to 70 combined with a 4% per annum contribution increase would make the fund sustainable at the end of the 50 year projection period. At 2070, the ratio of the benefit rate to the contribution rate is projected to be 137% under the best estimate and retirement age 70 scenarios. This ratio is reduced to 113% in the scenario where contributions are increased by 4% more than benefits.

5.4 Further Comments

Tables H1 to H8 of Appendix H show the Fund projections in detail, including the multiple by which the projected Fund balance is estimated to cover annual outgo from the Fund ("Ratio of Fund to Outgo").

The results demonstrate that a lower real rate of return would cause the Fund to decline more rapidly, whereas a higher real rate of return either delays or reduces the decline of the Fund.

An increase of 5% of the number of contributors has a modest positive impact on the Fund but does not result in sustainability of the Fund.

All other things being equal, lower contributions in the short term will give rise to a smaller fund and so, most likely, lead to higher contributions in the longer term.

Overall, the results of the Fund projections demonstrate that in the short to medium term the Fund is sufficient to meet its obligations. However, in the longer term there is considerable uncertainty relating to progress of the Fund in respect of the financial assumptions. Given that seriatim data was provided for the Review and a mortality study was conducted in 2014, there was more certainty around the demographic assumptions, which will continue to be monitored. Since benefit outgo is projected to increase significantly relative to contribution income, there is an argument for smoothing the impact by raising contributions by more than is necessary in the short term, thus building up a sizeable fund. As a result, however, the future outlook would then be more sensitive to the real rates of return achieved in the Fund. It should be noted that historically, the increase in contribution rates has been lower than assumed. As shown in Appendix B, over the last 10 years contributions have increased 1.68% per annum compared to the assumed 4.03% (CPI + 2.5%). The CPI + 2.5% target was a policy set by the Government that dates back to at least 2008. This may need to be reviewed.

The scenarios showing increased contributions and increased retirement age both have significant positive impacts on the sustainability of the Fund. An increase in retirement age would be in line with global retirement age trends and increasing longevity.

5.5 Accrued Benefits

We were also asked to provide as assessment of the accrued and projected benefit obligation of the Fund for existing contributors and beneficiaries at the Review Date.

It should be noted that social security funds, unlike occupational pension plans, are designed and funded on the premise that contribution income from future generations is expected to partly fund the benefits of current beneficiaries. The aim of the Fund should be sustainability rather than full funding while ensuring that there are sufficient assets to meet several years of benefit payments and expenses at any point in time. At the Review Date, the Fund can meet at least 10.5 years of the current level of benefits and expenses. The interpretation of this ratio should take into consideration the relationship between the level of contributions and benefits. For countries with lower ratios, generally their benefit rates are high relative to their contribution rates and vice versa. Maturity of the fund also has an impact on the ratio with younger funds generally having higher ratios.

Based on the valuation assumptions set out in Appendix I, the Fund is estimated to meet 52.6% of projected benefits accrued up to the Review Date in respect of current beneficiaries of the Fund and the current working age population. The Fund is estimated to be 70.6% funded on an accrued basis (no benefit increases). If benefits continue to accrue and contributions are made assuming increases to both, then the Fund is estimated to be 72.2% funded.

Further details of the calculation and the value of accrued and future benefits can be found in Appendix I. We also calculate the present value of the expected benefit payments and gratuities over the next 10 years, which are $1,117 million and $74 million respectively.

Chapter 6 Conclusions and Recommendations

The Fund's performance during the inter-valuation period has had a negative impact on the Fund's financial position. Contribution income was lower and expenses higher than expected. This was tempered by higher than expected investment income and lower than expected benefit payments.

The viability of the Fund in the short to medium term is good with the Fund being able to cover at least 10.5 years of the current expenditure and being positive for the next 24 years.

The projections indicate that the future sustainability of the Fund is sensitive to the real rate of investment returns, the rate of increase in contributions relative to benefits, the level of economic activity and the demographic profile of the Bermuda population. Possible design changes such as increasing the retirement age may also contribute to the Fund's sustainability.

In considering the rate at which the contribution rate increases relative to benefits, one should be mindful that the contribution rate could exceed the benefit rate in the future, which would not be a desirable situation. Hence the reason the rate of contribution increase relative to benefits (2.5%) was applied up to 2034 and then reduced thereafter to 1.75%. If a rate of 2.5% were used throughout the projection period, the contribution rate would exceed the benefit rate in 2069.

We recommend that the Department of Social Insurance set a target ratio of benefits to contributions which would help guide how much they could increase contributions relative to benefits in the future. One way of determining this is to project the actual contribution rate for say 40 years at various rates of increase and compare it to average wages which one can assume increases at 1% above prices. Then determine which contribution increases (above prices) are feasible and affordable.

Due to the inherent uncertainty in both the future demographic experience and investment returns on the Fund, the progress and funding level of the Contributory Pension Fund should be kept under regular review.

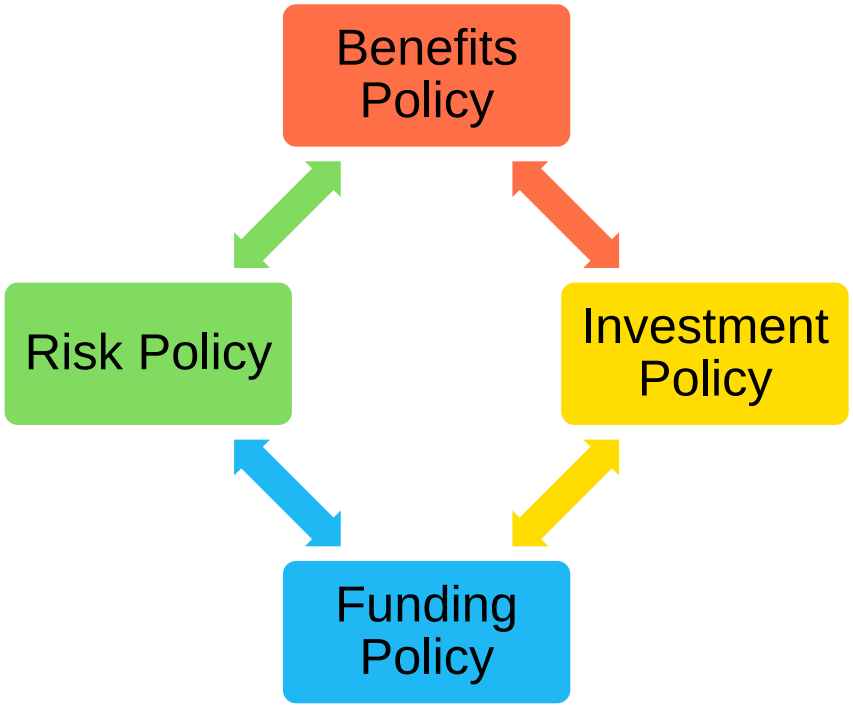
As presented in Chapter 4 and Appendix I, the CPF is not financially sustainable for the long-term:- assets are 52.6% of projected accrued liabilities and the fund is projected to be exhausted around 2044. While full funding is not required for national pension systems, there should be a viable financing strategy that ensures that future generations will not be overly burdened or forced to receive significantly reduced benefits.

CPF sustainability is inextricably linked to the local economy for contributions. Investment returns are primarily linked to US financial markets. A "good economy' that experiences sustained economic growth with increasing employment and wage levels is considered the first of the four ingredients necessary for long-term CPF sustainability. The other three ingredients, over which policymakers have greater control, are:

1. Good design – a system that provides relevant, equitable and affordable benefits that are consistent with prevailing socio-economic and labour market conditions, other employment linked benefits and available technology.
2. Efficient & effective administrative systems – low cost accurate record keeping that enables timely and transparent benefit processing.
3. Honest & responsible government (good governance) – proactive and prudent decision making in the best long-term interest of Bermuda at all governance levels.

Good governance not only requires best practices and guidelines for day-to-day operations, but it also requires the following three interconnected policies to prevent undesired outcomes and appropriate and timely responses to actual outcomes.

Figure 6.1. Interconnected Policies for Long-term Sustainability



Benefits Policy	Funding Policy	Investment Policy	Risk Policy
•What are you trying to accomplish? •What are you trying to to avoid? •If some objectvies conflict, what are your priorities?	•Financing strategy with explicit objectives such as maximum desired contribution rate and target funding levels for medium & long terms •Triggers that determine when & by how much contribution rate is increased	•Where to invest? •How will conflicting objectvies (safety, yield, liquidity, social utility) be balanced? •What if losses are suffered?	•Potential Risks •Prior Incidents •Likelihood of ocurrence •"Treatment Plan" – how to avoid & how to handle •Track risk management successes & failures

An Investment Policy is already in place but the CPF does not have a Benefits Policy, Risk Policy or a Funding/Contribution Policy.

Given the financial challenges that lie ahead and the lack of any reforms to the CPF, even after the NPS was introduced, we recommend that a comprehensive review of all pension programs in Bermuda be conducted. While the 2013 SAGE report contained several recommendations, this review should focus on the following six “good design” objectives:

1. **Coverage:** How well workers of all sectors are covered for income security in old age.
2. **Adequacy**: The ability of pensions to provide a decent standard of living while not being overly generous to any specific groups or categories of workers.
3. **Financial sustainability**: The affordability of the system to future contributors and taxpayers.
4. **Work incentives**: Having rules that do not encourage people to cease working but instead encourage them to work longer.
5. **Administrative efficiency**: Maintaining accurate records while keeping operating and management costs as low as possible.
6. **Diversity**: Income security in old age coming from various sources with different financing mechanisms.

Chapter 7 Statement of Actuarial Opinion

This opinion is given with respect to the Bermuda Contributory Pension Fund (the “Fund”).

We performed a review of the Fund as at 1 August 2020. Our review reflects the provisions of the Fund in effect on 1 August 2020, and in addition, takes into account the contribution and benefit rates effective August 2020.

The financial status of the Fund as at 1 August 2020 was determined based on the Fund information and actuarial assumptions appropriate as at that date.

We hereby certify that, in our opinion, as at 1 August 2020:

- The data on which the actuarial review is based is sufficient and reliable for the purposes of the review.
- The assumptions used are, in aggregate, appropriate for the purposes of the review.
- The methods employed in the review are appropriate for the purposes of the review.

This report has been prepared, and our opinions given, in accordance with *Actuarial Practice Standard 3 (APS3) Social Security Programs of the Caribbean Actuarial Association*. The assumptions that form each actuarial basis used in the report were reasonable at the time this actuarial review report was prepared.

The opinions are given exclusively from a financial viewpoint. This report does not constitute a legal opinion on the rights or duties of the Government of Bermuda, or the members over the Fund. Actuarial reviews are performed based on assumptions and methods that are in accordance with accepted actuarial practice. Emerging experience differing from these assumptions may result in gains or losses, which may affect future results. These will be revealed in future actuarial reviews. The next actuarial review should be performed not later than as at 1 August 2023.

LifeWorks (formerly Morneau Shepell)

Marcia Tam-Marks
Fellow of the Society of Actuaries

Simone Balkissoon
Fellow of the Institute and Faculty of Actuaries

July 2021

Appendix A Main Provisions of Scheme from August 2020

Benefits

A **contributory old-age pension** is payable to any person over age 65, provided that:

(i) at least 484 contributions have been paid or credited in respect of the person (the minimum was previously 250 contributions and was changed with effect from 4 August 1986 under the Contributory Pensions (Amendment of Contributions and Benefits) Order 1986); and

(ii) an average of not less than 25 paid or credited contributions a year has been achieved between attaining age 21 (or 5 August 1968 if later or age 18 if contributions started after the date on which the Age of Majority Act 2001 came into effect) and commencement of pension.

The full rate of pension, payable if the yearly average contributions paid or credited is 50 or more, is $247.89 a week plus increments of $1.46 for every 26 contributions paid or credited in excess of 484. The increments are at half this rate for contributions after age 65. If the contribution average is between 25 and 50, lower rates of pension are payable. Although the lower limit for increments was raised from 250 to 484 in 1986, it has remained the same since then. Since 1986, the increment rate has been increased only in line with prices. Effective August 2019 the full rate of pension and excess increment increased to $247.89 and $1.46 respectively.

A **non-contributory old-age pension** is payable to any person aged over 65, who possesses Bermudian status and has been ordinarily resident in Bermuda for a period of not less than 10 years during the 20 years immediately preceding the application for non-contributory pension. These pensions are payable only to persons who are not entitled to a contributory old-age pension. Effective August 2019, the rate of pension is $113.75 a week, increased to $117.07 a week for persons whose income from all sources does not exceed $4,000 a year excluding any pension granted under the scheme.

A **contributory old-age gratuity** is payable to any person reaching age 65 whose contribution record is insufficient to entitle them to an old-age pension. The gratuity is equal to the total of all contributions paid by the person and their employer.

A **contributory widow's allowance** is payable to any widow whose husband has satisfied the contribution requirements for a contributory old age pension at the date of death. If a person becomes a widow under 50 years of age the benefit is for 26 weeks or continues if she has children under school leaving age (the benefit continues until the last child is over school leaving age) or is incapable of self-support, in which case the benefit could continue to age 65. If a person becomes a widow after age 50, the benefit continues to age 65 at which time the person can choose between the widow's allowance and their own pension and will normally choose whichever is higher. In each case, a choice is made at age 65.

The rate of allowance is $247.89 a week (subject to reduction if the husband's contribution average was less than 50) with an additional $24.73 a week for each child under school-leaving age.
Where a widow is eligible for a contributory old-age pension, she may elect to receive it in lieu of the widow's allowance. In satisfying the contribution conditions and in arriving at the amount of the contributory pension, her husband's record of contributions may be substituted for her own in respect of any completed contribution year during the period while they were married.
A **contributory widow's gratuity** is payable to a widow whose husband's contribution record is insufficient to entitle her to a widow's allowance, so long as no claim had been made by her husband for an old-age gratuity. The gratuity is equal to the total of all contributions paid by or in respect of her husband.

A **contributory widower's allowance or contributory widower's gratuity** has been payable to widowers whose wives died on or after 16 April 1985, under the same terms and conditions as the corresponding widows' benefits.

A **contributory disability pension** of $165.23 a week is payable to persons who are incapacitated for a continuous period of 52 weeks or more, subject to certain contribution conditions. In 1988 and 1989, contributory disability pensions were increased only in line with prices. In 1990, however, contributory disability pensions were increased substantially, so as to equal two-thirds of the full rate of contributory old-age pension, excluding increments. This relationship has been maintained.

A **non-contributory disability pension** of $113.75 a week is payable if a person does not qualify for a contributory disability pension, is over age 18 and under pension age, has lived in Bermuda for 10 years immediately preceding application for the benefit, and is permanently incapacitated. Since 1985, non-contributory disability pension has been at the same rate as the lower rate of non-contributory old-age pension.

Contributions

Contributions are payable in respect of employed and self-employed persons. The employer pays $35.92 per week ($34.47 before August 2018) for each employee, and the employee pays an equal amount if he is under the age of 65. Self-employed persons pay a contribution equal to the joint contribution of employee and employer. Contributions are credited in the case of an unemployed widow(er) under pension age entitled to widow(er)'s allowance. They may also be credited in respect of a person incapacitated from work, if he has paid not less than 150 contributions and was employed immediately prior to his incapacity. There has been no change to contribution rates since August 2018. However, a temporary amendment was made to the Contributory Pensions Act allowing employees, employers (with employee consent) and self-employed persons to opt to suspend contributions for the period 1 July 2020 to 30 June 2021.

Increases to Benefits and Contributions

Benefit and contribution rates are reviewed annually by reference to the increase in the CPI over the previous calendar year. Contributions increased by 7.5% in August 2016 and by 4.21% in August 2018. Benefits were increased by 5.0% in August 2016, 1.7% in August 2017, 1.4% in August 2018 and 1.2% in August 2019.

Appendix B Benefit and Contribution Rates, 2006 to 2020

Increases to Benefits and Contributions

Table B1 summarises the annual increases to benefit and contribution rates since August 2006, together with the increase in the CPI over the prior 12 months to July of the respective year.

Table B1 - Annual increases in CPI, benefits and contributions

	Increase in	Increase in	Increase in
Year	**CPI ***	**Benefits †**	**Contributions †**
2006	3.1%	4.0%	5.75%
2007	3.1%	4.5%	6.25%
2008	4.7%	5.0%	6.75%
2009	1.2%	5.0%	0.0%
2010	2.3%	0.0%	0.0%
2011	2.8%	3.0%	0.0%
2012	2.5%	0.0%	5.5%
2013	1.8%	0.0%	0.0%
2014	1.9%	0.0%	0.0%
2015	1.9%	0.0%	0.0%
2016	1.6%	5.0%	7.5%
2017	1.7%	1.7%	0.0%
2018	1.4%	1.4%	4.2%
2019	1.2%	1.2%	0.0%
2020	-1.4%	0.0%	0.0%
Average (3 years to 2020)	**0.39%**	**0.86%**	**1.38%**
Average (10 years to 2020)	**1.53%**	**1.22%**	**1.68%**

** CPI increase over previous 12 months to July.*
† Increase in August of calendar year.

Source: https://www.gov.bm/bermuda-business-statistics

Benefit and contribution rates, 2008 to 2020

Table B2 summarises the main rates of benefits and contributions in force for the years commencing August 2008 to August 2020.

Table B2 - Benefit and contribution rates, 2015-2020

Benefits	16/08/15	16/08/16	16/08/17	16/08/18	16/08/19	16/08/20
Contributory Old-Age Pension						
Full pension p.w.	$226.22	$237.53	$241.57	$244.95	$247.89	$247.89
Limit for increments	484	484	484	484	484	484
Increment p.w.	$1.33	$1.40	$1.42	$1.44	$1.46	$1.46
Non-Contributory Old-Age Pension						
Income limit p.a.	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000
Pension, for those below limit, p.w.	$106.83	$112.17	$114.08	$115.68	$117.07	$117.07
Pension, for those above limit, p.w.	$103.81	$109.00	$110.85	$112.40	$113.75	$113.75
Contributory Widow's or Widower's Allowance						
Personal rate p.w.	$226.22	$237.53	$241.57	$244.95	$247.89	$247.89
Addition per child p.w.	$22.57	$23.70	$24.10	$24.44	$24.73	$24.73
Contributory Disability pension p.w.	$150.79	$158.33	$161.02	$163.27	$165.23	$165.23
Non-Contributory Disability Pension p.w.	$103.81	$109.00	$110.85	$112.40	$113.75	$113.75
Rate of increase in benefits	0.0%	5.0%	1.7%	1.4%	1.2%	0.0%
	04/08/15	**01/08/16**	**01/08/17**	**01/08/18**	**01/08/19**	**01/08/20**
Contributions p.w.	$32.07	$34.47	$34.47	$35.92	$35.92	$35.92
Total Contributions p.w.	$64.14	$68.94	$68.94	$71.84	$71.84	$71.84
Rate of increase in contributions	0.0%	7.5%	0.0%	4.2%	0.0%	0.0%

Table B2 (continued) - Benefit and contribution rates, 2008-2014

Benefits	16/8/08	16/08/09	16/08/10	16/08/11	16/08/12	16/08/13	16/08/14
Contributory Old-Age Pension							
Full pension p.w.	$209.17	$219.63	$219.63	$226.22	$226.22	$226.22	$226.22
Limit for increments	484	484	484	484	484	484	484
Increment p.w.	$1.23	$1.29	$1.29	$1.33	$1.33	$1.33	$1.33
Non-Contributory Old-Age Pension							
Income limit p.a.	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000
Pension, for those below limit, p.w.	$98.78	$103.72	$103.72	$106.83	$106.83	$106.83	$106.83
Pension, for those above limit, p.w.	$95.99	$100.79	$100.79	$103.81	$103.81	$103.81	$103.81
Contributory Widow's or Widower's Allowance							
Personal rate p.w.	$209.17	$219.63	$219.63	$226.22	$226.22	$226.22	$226.22
Addition per child p.w.	$20.87	$21.91	$21.91	$22.57	$22.57	$22.57	$22.57
Contributory Disability pension p.w.	$139.43	$146.40	$146.40	$150.79	$150.79	$150.79	$150.79
Non-Contributory Disability Pension p.w.	$95.99	$100.79	$100.79	$103.81	$103.81	$103.81	$103.81
Rate of increase in benefits	5.0%	5.0%	0.0%	3.0%	0.0%	0.0%	0.0%
	04/08/08	**04/08/09**	**04/08/10**	**04/08/11**	**04/08/12**	**04/08/13**	**04/08/14**
Contributions p.w.	$30.40	$30.40	$30.40	$30.40	$32.07	$32.07	$32.07
Total Contributions p.w.	$60.80	$60.80	$60.80	$60.80	$64.14	$64.14	$64.14
Rate of increase in contributions	6.75%	0.0%	0.0%	0.0%	5.50%	0.0%	0.0%

Appendix C Membership Data

Table C1 - Numbers and amounts of monthly benefits in payment

	As at 1/8/17		As at 1/8/20	
Benefit	**Number in payment**	**Amount ($000 pm)**	**Number in payment**	**Amount ($000 pm)**
Contributory old-age pension	9,651	10,658	10,691	12,344
Non-contributory old-age pension:				
higher rate	1,024	499	1,094	557
lower rate	386	183	348	172
Contributory widow's allowance	1,152	1,036	1,148	1,071
Contributory widower's allowance	99	84	109	100
Contributory disability pension	200	106	207	116
Non-contributory disability pension	330	156	329	163
Total	**12,842**	**12,723**[1]	**13,926**	**14,523**[1]

[1]: Totals may not sum due to rounding.

Table C2 - Average monthly benefits in payment

Benefit	**Average benefit ($ pm)**	
	2017	**2020**
Contributory old-age pension	1,104.35	1,154.65
Non-contributory old-age pension:		
higher rate	487.41	508.69
lower rate	473.63	494.27
Contributory widow's allowance	899.59	933.21
Contributory widower's allowance	847.53	921.86
Contributory disability pension	530.41	560.57
Non-contributory disability pension	473.63	494.27
Gratuity[1]	-	-
Total	**990.71**	**1,042.89**

[1]: Not sufficient credible data to determine an average.

Table C3 - Contributions data

	2017*	2018	2019	2020
Number of contributors[1]	35,889	36,521	36,148	34,629
Av. no. of weekly cont. per month	3.90	3.84	3.84	3.68

[1]: No of persons making contributions in the 12-month period ending July 31 as per contributions data received

**restated compared to the prior report to include Government workers*

Appendix D Financial Data

Table D1 - Income and Expenditure - 2018 to 2020 ($ million)1

	Year ending 31 July			1 August 2017 to 31 July 2020
	2018	**2019**	**2020**	
Fund at start of year	**1927.7**	**1926.8**	**1956.3**	**1927.7**
Income				
Contributions	96.9	118.5	112.3	327.7
Interest and dividends	17.4	16.4	15.2	48.9
Realised gains (losses)	53.2	71.2	30.8	155.3
Unrealised gains (losses)	-15.8	-2.3	46.8	28.7
F/X gains/(losses)	5.8	-0.4	-4.4	1.0
Other	11.2	4.8	0.5	16.5
Total income	168.8	208.2	201.1	578.0
Expenditure				
Pensions	163.4	170.7	178.6	512.8
Investment Management Fees	5.1	5.5	6.9	17.5
Administrative Costs	3.1	2.4	1.7	7.1
Increase in Bad Debt Provision	-1.9	0.0	0.2	-1.7
Total expenditure	169.7	178.6	187.3	535.7
Excess of income over expenditure	-0.9	29.5	13.7	42.4
Fund at end of year	**1926.8**	**1956.3**	**1970.0**	**1970.0**

Figures may not sum to totals due to rounding

[1]Draft Financials for 2018, 2019, 2020

Table D2 - Fund assets at market value, 30 June 2020

Asset	$ million[1]	%[1]
Global Equity	662	35.5%
Core Bonds	379	20.4%
High Yield	15	0.8%
Opportunistic Credit	64	3.5%
Emerging Market Debt	87	4.7%
Global Asset Allocation	51	2.7%
Risk Parity	142	7.6%
Private Markets	209	11.2%
Hedge Funds	119	6.4%
Real Assets	120	6.4%
Cash	13	0.7%
Total Invested Assets	**1,862**	**100.0**
Non-Invested Assets	108	
Net Assets Available for Benefits	**1,970**	

[1] *Numbers may not sum to totals due to rounding*

Figures are based on quarterly investment reports

Table D3 - Annual net investment returns of Fund

Year ending 31 July	Nominal % p.a.	Inflation % p.a.	Real % p.a.
	(1)	(2)	(3)
2008	-2.2	4.7	-6.5
2009	-11.8	1.2	-12.8
2010	12.5	2.3	10.0
2011	16.5	2.8	13.3
2012	0.6	2.5	-1.9
2013	9.1	1.8	7.2
2014	11.4	1.9	9.3
2015	-1.2	1.9	-3.0
2016	0.3	1.6	-1.3
2017	14.4	1.7	12.5
2018	3.4	1.4	1.9
2019	4.3	1.2	3.1
2020	4.2	-1.4	5.7
Average (3 years)	**4.0**	**0.4**	**3.6**
Average (10 years)	**6.1**	**1.5**	**4.5**

The inflation rates have been restated to reflect the increases from July of year y to year y+1.

Appendix E Population Projection

Introduction

This Appendix describes the assumptions used to prepare the 50-year population projection for Bermuda required for actuarial review of the CPF as at 1 August 2020.

The population projection was based on the latest total population count as at December 31, 2019 as set out in the 2020 Bermuda Digest of Statistics, and using a distribution by age group as set out in Bermuda's Population Projections 2016-2026. Both of these publications are published by the Bermuda Department of Statistics. The fertility and migration assumptions utilized are mostly consistent with those used in the last actuarial review. The mortality assumption was unchanged.

Base year

The base year for the projections starts at January 31, 2020 (middle of the fiscal year). The population distribution as at January 31, 2020 was assumed to be the same as the December 31, 2019 population as derived from both the 2020 Bermuda Digest of Statistics and Bermuda's Population Projections 2016-2026. This population was used to determine the cash flows for the period August 1, 2019 to July 31, 2020. Projections in future years incorporate a similar methodology. Table E1 summarizes the estimated population in 2020.

Table E1 - Estimated population as at January 31, 2020

Age last birthday	2020 [1]		
	Males	Females	Total
0-19	6,295	6,187	12,481
20-64	19,230	20,120	39,349
>65	5,231	6,847	12,078
All ages	30,755	33,153	63,908

[1] *December 31, 2019 population as derived from both the 2020 Bermuda Digest of Statistics and Bermuda's population projections 2016-2026*

Mortality

A mortality study was conducted as part of the 2014 valuation and the results indicate that actual mortality was lighter than assumed mortality for past actuarial reviews. For this review, we have maintained the same assumption, namely, the 2014 Canadian Private Mortality Table (Sex Distinct) with generational mortality improvement for ages 18 and above, and the UK GAD interim life table 2005-2007 (sex distinct) for ages less than 18. A mortality study would be conducted at the next review.

Table E2 summarises the projected life expectancy for males and females under the mortality assumptions adopted for the projection.

Table E2 - Expectation of Life

Year to 31 July	Expectation of life at birth		Expectation of life at age 65	
	Males	Females	Males	Females
2020	85.4	89.1	20.9	23.1
2030	86.1	89.5	21.4	23.6
2040	86.7	90.0	21.9	24.0
2050	87.2	90.4	22.3	24.4
2060	87.8	90.8	22.8	24.8
2070	88.3	91.3	23.2	25.2

Fertility

We have assumed a long-term total period fertility rate (TPFR) of 1.5. This is broadly consistent with the assumption used in the *Bermuda Population Projections 2016 to 2026*. That study states that

"The assumed total fertility rate (TFR) in 2026 of 1.4 children per woman was based on a three-year average of births recorded from 2015 to 2017. This is in alignment with the United States Census Bureau's recommendations where the TFR is assumed to remain constant for the next 10 years if the most recent estimated TFR is less than 1.7 births per woman".

The impact of an increase in fertility rate to 2.0 and 2.5 was investigated under the variant scenarios in a previous actuarial review and projected an extension of the life of the Fund by zero and three years respectively.

We have retained the male/female sex ratio of future births of 1.05:1 as was used at the prior actuarial review.

Migration

The projection does not include any allowance for future migration, either inward or outward. This is consistent with the assumption used in the *Bermuda Population Projections 2016 -2026*. The same assumption was made for the previous review.

Results

Tables E3 summarises, at five-yearly intervals, the projected numbers below age 20, between ages 20 and 64, and over age 65. The table also shows the projected numbers of births and the ratio of the number of people between ages 20 and 64 to the number over age 65, commonly known as the "old-age support ratio".

Table E3 - Projected population 2020 - 2070 (Males and Females)

Males and Females						
Year to 31 July	**Births**	**Ages 0-19**	**Ages 20-64**	**Ages 65+**	**Total**	**Old-age support ratio**
2020	557	12,417	39,165	12,487	64,070	3.1
2025	521	11,987	36,953	15,488	64,428	2.4
2030	499	11,289	34,623	18,337	64,249	1.9
2035	493	10,827	32,785	19,895	63,507	1.6
2040	482	10,456	30,953	20,852	62,262	1.5
2045	464	10,130	29,364	20,999	60,493	1.4
2050	443	9,859	27,729	20,686	58,274	1.3
2055	421	9,536	26,841	19,406	55,783	1.4
2060	406	9,159	26,325	17,794	53,278	1.5
2065	394	8,800	25,641	16,544	50,986	1.5
2070	384	8,486	24,822	15,659	48,967	1.6

Appendix F Estimating Methods

Introduction

This Appendix describes the methods and assumptions used to project future amounts of benefits and contributions. The assumptions generally reflect the recent experience but with some modifications for the longer-term. It should be noted that the projections are subject to increasing uncertainty in later years.

Benefits in respect of current beneficiaries

The projected amount of future benefits payable to current beneficiaries is based on seriatim data of persons receiving benefits as at 31 July 2020. This included the person's benefit amount, benefit type, date of birth, sex and contribution history, among other things. In projecting future amounts of benefits payable to current beneficiaries, allowance was made for future mortality and future increases to benefits.

Benefits in respect of future beneficiaries

Future benefit awards are derived from the projected difference between the Bermuda population and the remaining beneficiaries, and the average benefit rates at the time of the award, trended for future variation (for contributory benefits only). Thereafter new awards are projected allowing for future mortality and future increases to benefits.

In each year of the projection period, the projected population as described in Appendix E is grouped into five categories, which are used to determine the number of persons entitled to specific benefits:

- Projected population greater than or equal to age 65 adjusted for migrant beneficiaries no longer resident in Bermuda: This consists of all persons greater than or equal to age 65 adjusted by a factor of 105.3% to account for other persons that have satisfied the requirements to receive pension but are no longer resident in the country. This factor was derived as the difference between the actual number of beneficiaries greater than or equal to age 65 in the beneficiary data received, and the number greater than or equal to age 65 as inferred from the population projections as at 31 July 2020.
- Projected age 65 population adjusted for migrant beneficiaries no longer resident in Bermuda: This consists of all persons age 65 adjusted by a similar factor of 105.3% to account for persons that have satisfied the requirements to receive gratuities but are no longer resident in the country.
- Projected males greater than or equal to age 18: This is inferred from the population projections without adjustment.
- Projected females greater than or equal to age 18: This is inferred from the population projections without adjustment.
- Projected males and females greater than or equal to age 18: This is inferred from the population projections without adjustment.

Corresponding beneficiary Information from actual data was then used to assign various proportions of the projected population categories, as drivers for the number of beneficiaries for a particular type of benefit, in each projection year. This is detailed in the table below.

This approach takes into consideration all non-Bermudians and over age 65 contributors, hence no separate assumptions have been made in respect of these persons.

Table F1 - Summary of benefit distribution assumptions

Benefit	Population Category Driver	Proportion
Contributory old-age pension	Projected greater than or equal to age 65 population adjusted for migrant beneficiaries no longer resident in Bermuda	81.3%
Non-contributory old-age pension: higher rate	Projected greater than or equal to age 65 population adjusted for migrant beneficiaries no longer resident in Bermuda	8.3%
lower rate	Projected greater than or equal to age 65 population adjusted for migrant beneficiaries no longer resident in Bermuda	2.6%
Contributory widow's allowance	Projected females greater than or equal to age 18	4.1%
Contributory widower's allowance	Projected males greater than or equal to age 18	0.4%
Contributory disability pension	Projected males and females greater than or equal to age 18	0.4%
Non-contributory disability pension	Projected males and females greater than or equal to age 18	0.6%
Gratuity	Projected age 65 population adjusted for migrant beneficiaries no longer resident in Bermuda	Varies by type[1]

[1] *See below for details*

For all benefits except gratuities, the above numbers are multiplied by the respective average benefit amounts, as detailed in Table C2 of this report, and trended for future variation (for contributory benefits only) to determine projected cash flows for each benefit type in each of the projected years.

For non-contributory gratuities, these were assumed to be received by all non-contributory pension recipients at age 65. For widows and widowers gratuities, these were assumed to be 2.3% and 0.7% respectively, of the projected age 65 population adjusted for migrant beneficiaries no longer resident in Bermuda and estate gratuities were also implicitly accounted for in these numbers. Estimated gratuity amounts varying by type and the projected year were then calculated using contribution history from the actual beneficiary data together with historical (and future indexations) of contribution rates.

Overall, about 96% of the expenditure on benefits is in respect of persons aged over 65. Also, about 94% of expenditure is in respect of contributory benefits.

Contributions

The projected amount of contributions is derived from the projected number of future contributors and the proportion of a full 50 weekly contribution premium assumed for each contributor.
The data provided for this review included seriatim data consisting of people contributing for the period 1 August 2017 to 31 July 2020. This included the person's date of birth, sex and the amount of contributions in each of the last three years, among other things.

Labour force participation along with employment and unemployment rates are first determined from the 2019 Labour Force Survey Report published by the Bermuda Department of Statistics. These rates are extrapolated for the various age groups, trended for future years and combined with the population projection to determine an employed population for each of the projected years. The contributor population is then taken as 97.6% of the employed population as this is the adjustment required to equate to the number of contributors who made at least one contribution in the 12 month period ending 31 July 2020 according to the actual contributor data. The number of contributors in the period ending 31 July 2020 was 34,629 which was lower than the number of contributors in the period ending 31 July 2017 (35,889). Adjustments were made to the projected contributors to account for those electing to suspend contributions and for the impact of COVID-19 on employment levels over the following 5 years.

The proportion of a full 50 weekly contribution paid was assumed to be 92.16% for each contributor. This was derived from the median of the average number of contributions paid per contributor in each year over the period July 31, 2016 to July 31, 2020.

Note that any indexation of contributions was only assumed to be effective after the year ending July 31, 2021.

Administration and Investment expenses

Administration and investment expenses charged to the Fund for the year ending 31 July 2020 totalled $8.5 million. Similar amounts of $7.9 million and $8.2 million were recorded for the years ending 31 July 2019 and 2018, respectively. Of the total expenses in each of the three years, actual administrative costs were $1.7 million, $2.4 million and $3.1 million, respectively. Administration expenses would be expected to be broadly related to both the number of beneficiaries and the level of earnings. Over the long term, it would be reasonable to assume some reduction relative to current expense levels, due to efficiency savings. Investment expenses would be expected to be related to asset size and mix.

For the purposes of the review, we have assumed that total expenses will increase at a real rate of 1.5% a year (i.e. in excess of price increases).

Table F2 - Summary of baseline projection assumptions

Contribution annual increase over CPI	2.50% (1.75% after the year ending July 31, 2034)
Administration expense increase (real)	1.50%
Fund rate of return (real)	4.50%
Joint Contribution rate in 2020	$ 71.84
- Projection Basis	Bermuda's Population Projections 2016-2026
- Mortality Assumption	2014 CPM Private table (sex distinct) for ages greater than or equal to age 18 and UK GAD interim life table 2005-2007 (sex distinct) for ages less than 18
- Mortality Improvement	2014 CPM Improvement Scale B for ages greater than or equal to 18 and UK GAD 2006 population projection, 50% the applicable improvement for males, 100% for females for ages less than 18
- Fertility Rate	1.5%
- Newborn sex ratio	1.05:1 male to female ratio
- Net In-migration	0 throughout the projection period
- Benefit rates	Updated to in force July 31, 2021
- Rate of benefit increase	Actual for 2021 and thereafter to match inflation (CPI)
- Gratuity amounts	Based on contribution assumptions
- Pension amounts	In accordance with Table C2
- Rate of contribution increase	Actual for 2021 and thereafter CPI plus 2.50% (CPI plus 1.75% after the year ending July 31, 2034)
- Employed population	Based on extrapolations from the 2019 Labour Force Survey Report
- Contributing proportion	Static percentage of employed population based on contribution data for the month ending 31 July 2020

Appendix G Detailed Results

Table G1 - Projected income and outgo $ million at constant 2020 prices

Year ending 31 July	Contribution income, increasing in line with prices plus 2 ½%[2]	Outgo		
		Benefits	Expenses	Total outgo[1]
(1)	(2)	(3)	(4)	(5)
2021	58.3	188.5	8.3	196.8
2022	105.4	196.7	8.4	205.1
2023	114.6	204.1	8.6	212.7
2024	117.0	212.9	8.7	221.6
2025	121.6	221.8	8.8	230.6
2026	123.5	229.8	9.0	238.7
2027	125.3	236.9	9.1	246.0
2028	127.1	244.7	9.2	253.9
2029	128.7	252.7	9.4	262.1
2030	130.2	258.9	9.5	268.4
2031	131.8	262.5	9.7	272.2
2036	137.8	284.2	10.4	294.7
2041	142.0	292.6	11.2	303.8
2046	146.8	293.1	12.1	305.1
2051	152.4	285.8	13.0	298.8
2056	158.7	266.7	14.0	280.7
2061	168.4	246.3	15.1	261.4
2066	179.7	233.9	16.3	250.2
2070	188.0	225.0	17.3	242.2

[1]*Totals may not sum due to rounding.*
[2]*Increases up to 2034 and 1.75% thereafter*

Appendix H Projections of Fund Balance

Table H1 - Contributions increase at prices plus 2½%, Real rate of return of 4½% pa, constant 2020 prices

Year ending 31 July	Contribution income $ million	Total Outgo $ million	Estimated Fund $ million	Ratio of Fund to outgo = (4)/(3)
(1)	(2)	(3)	(4)	(5)
2021	58.3	196.8	1,917.1	9.7
2026	123.5	238.7	1,801.8	7.5
2031	131.8	272.2	1,510.2	5.5
2036	137.8	294.7	1,046.8	3.6
2041	142.0	303.8	410.4	1.4
2046	146.8	305.1	(382.8)	(1.3)
2051	152.4	298.8	(1,332.9)	(4.5)
2056	158.7	280.7	(2,403.5)	(8.6)
2061	168.4	261.4	(3,582.6)	(13.7)
2066	179.7	250.2	(4,909.6)	(19.6)
2070	188.0	242.2	(6,119.6)	(25.3)

Table H2 - Contributions increase at prices plus 2½%, Real rate of return of 2% pa, constant 2020 prices

Year ending 31 July	Contribution income $ million	Total Outgo $ million	Estimated Fund $ million	Ratio of Fund to outgo = (4)/(3)
(1)	(2)	(3)	(4)	(5)
2021	58.3	196.8	1,869.5	9.5
2026	123.5	238.7	1,511.4	6.3
2031	131.8	272.2	976.5	3.6
2036	137.8	294.7	292.7	1.0
2041	142.0	303.8	(517.1)	(1.7)
2046	146.8	305.1	(1,411.0)	(4.6)
2051	152.4	298.8	(2,361.4)	(7.9)
2056	158.7	280.7	(3,303.5)	(11.8)
2061	168.4	261.4	(4,197.8)	(16.1)
2066	179.7	250.2	(5,051.7)	(20.2)
2070	188.0	242.2	(5,719.6)	(23.6)

Table H3 - Contributions increase at prices plus 2½%, Real rate of return of 3.5% pa, constant 2020 prices

Year ending 31 July	Contribution income $ million	Total outgo $ million	Estimated Fund balance $ million	Ratio of Fund to outgo = (4)/(3)
(1)	(2)	(3)	(4)	(5)
2021	58.3	196.8	1,898.0	9.6
2026	123.5	238.7	1,681.1	7.0
2031	131.8	272.2	1,278.9	4.7
2036	137.8	294.7	704.1	2.4
2041	142.0	303.8	(36.0)	(0.1)
2046	146.8	305.1	(914.9)	(3.0)
2051	152.4	298.8	(1,921.2)	(6.4)
2056	158.7	280.7	(3,005.5)	(10.7)
2061	168.4	261.4	(4,141.9)	(15.8)
2066	179.7	250.2	(5,352.9)	(21.4)
2070	188.0	242.2	(6,402.0)	(26.4)

Table H4 - Contributions increase at prices plus 2½%, Real rate of return of 5% pa, constant 2020 prices

Year ending 31 July	Contribution income $ million	Total outgo $ million	Estimated Fund balance $ million	Ratio of Fund to outgo = (4)/(3)
(1)	(2)	(3)	(4)	(5)
2021	58.3	196.8	1,926.6	9.8
2026	123.5	238.7	1,864.6	7.8
2031	131.8	272.2	1,635.5	6.0
2036	137.8	294.7	1,242.0	4.2
2041	142.0	303.8	679.8	2.2
2046	146.8	305.1	(37.8)	(0.1)
2051	152.4	298.8	(915.0)	(3.1)
2056	158.7	280.7	(1,919.8)	(6.8)
2061	168.4	261.4	(3,045.3)	(11.7)
2066	179.7	250.2	(4,337.5)	(17.3)
2070	188.0	242.2	(5,539.8)	(22.9)

Table H5 - Same as H1 except 105% of contributor population

Year ending 31 July	Contribution income $ million	Total outgo $ million	Estimated Fund balance $ million	Ratio of Fund to outgo = (4)/(3)
(1)	**(2)**	**(3)**	**(4)**	**(5)**
2021	61.2	196.8	1,920.0	9.8
2026	129.7	238.7	1,838.0	7.7
2031	138.3	272.2	1,591.2	5.8
2036	144.7	294.7	1,185.8	4.0
2041	149.1	303.8	622.8	2.0
2046	154.1	305.1	(77.7)	(0.3)
2051	160.0	298.8	(910.7)	(3.0)
2056	166.7	280.7	(1,833.8)	(6.5)
2061	176.8	261.4	(2,826.7)	(10.8)
2066	188.7	250.2	(3,918.7)	(15.7)
2070	197.4	242.2	(4,897.5)	(20.2)

Table H6 - Same as H1 except 95% of contributor population

Year ending 31 July	Contribution income $ million	Total outgo $ million	Estimated Fund balance $ million	Ratio of Fund to outgo = (4)/(3)
(1)	**(2)**	**(3)**	**(4)**	**(5)**
2021	55.4	196.8	1,914.1	9.7
2026	117.3	238.7	1,765.7	7.4
2031	125.2	272.2	1,429.2	5.3
2036	130.9	294.7	907.9	3.1
2041	134.9	303.8	198.1	0.7
2046	139.4	305.1	(687.9)	(2.3)
2051	144.8	298.8	(1,755.1)	(5.9)
2056	150.8	280.7	(2,973.2)	(10.6)
2061	159.9	261.4	(4,338.4)	(16.6)
2066	170.7	250.2	(5,900.4)	(23.6)
2070	178.6	242.2	(7,341.6)	(30.3)

Table H7 - Extend Retirement Age to 70

Year ending 31 July	Contribution income $ million	Total outgo $ million	Estimated Fund balance $ million	Ratio of Fund to outgo = (4)/(3)
(1)	(2)	(3)	(4)	(5)
2021	58.3	196.8	1,917.1	9.7
2026	123.5	238.7	1,757.2	7.4
2031	141.4	237.4	1,608.4	6.8
2036	154.0	240.4	1,486.8	6.2
2041	158.4	258.5	1,328.1	5.1
2046	163.7	263.1	1,095.6	4.2
2051	170.2	260.9	839.3	3.2
2056	174.2	252.7	569.2	2.3
2061	183.5	235.7	354.1	1.5
2066	197.2	219.9	245.7	1.1
2070	206.8	213.9	238.1	1.1

Table H8 - Extend Retirement Age to 70, Contributions 4% greater than benefits, 4.5% real rate of return

Year ending 31 July	Contribution income $ million	Total outgo $ million	Estimated Fund balance $ million	Ratio of Fund to outgo = (4)/(3)
(1)	(2)	(3)	(4)	(5)
2021	58.3	196.8	1,917.1	9.7
2026	132.8	238.7	1,784.2	7.5
2031	163.5	237.4	1,734.1	7.3
2036	186.0	240.4	1,807.6	7.5
2041	191.3	258.5	1,910.2	7.4
2046	197.7	263.1	2,008.4	7.6
2051	205.5	260.9	2,171.8	8.3
2056	210.4	252.7	2,430.1	9.6
2061	221.6	235.7	2,881.6	12.2
2066	238.2	219.9	3,617.7	16.4
2070	249.8	213.9	4,444.2	20.8

Appendix I Accrued Benefits

The Department has asked us to provide an assessment of accrued benefits as was done in the previous review. The assessment is in respect of existing and future beneficiaries from the existing population as of 31 July 2020. In particular, an assessment of the following is provided:

- The Accrued Benefit Obligation (the ABO). This is the value of the pension and other benefits accrued in respect of contributions paid to date into the Fund excluding allowance for future increases to benefits.
- The Projected Benefit Obligation (the PBO). This is the same as the ABO except that allowance is made for future increases to benefits.
- The Present Value of Future Benefits (the PVFB). This is the value of the total benefits payable to existing members and beneficiaries in the future in respect of past and future expected contributions. Allowance is made for future benefit increases.
- The present value of retired liabilities over the next 10 years for existing beneficiaries.
- The present value of expected gratuity payments over the next 10 years.

It should be noted that the assessments mentioned above in this appendix do not include any provision for future administrative expenses.

It should also be noted that the funding policy for the Fund is not based on full actuarial funding but based on sustainable funding. That is, contributions plus investment income should cover benefits and administration expenses on an annual basis while the fund builds up sufficient reserves to cover several years of benefits and expenses to withstand future adverse circumstances.

Assumptions

The ABO has been estimated by discounting expected future payments, excluding administration expenses, at 6% a year nominal, which is broadly equivalent to assuming future price increases of about 2% a year and a real rate of return (in excess of prices) of 4% a year. The PBO and PVFB have been estimated by assuming that benefits increase in line with future prices discounting future benefit payments in respect of both past and future service at a real rate of return of 4% a year.

All other applicable demographic and financial assumptions mentioned in appendix Table F1 were used in estimating these amounts. The assessment is based on the actual demographic and benefit data provided for the review and no new entrants are assumed.

Table I1 - The ABO, PBO and PVFB as at 31 July 2020

($million at constant 2020 prices)

Yr. Ending 31 July	2020[2]		
	ABO	**PBO**	**PVFB**
Accrued Rights			
Current Beneficiaries	1,496	1,731	1,731
Future Beneficiaries[1]	1,296	2,017	2,017
Total accrued rights	**2,792**	**3,748**	**3,748**
Future Service Rights	-	-	-
Future Beneficiaries[1]	-	-	1,716
Total service rights	**2,792**	**3,748**	**5,465**
Present Value of Future Contributions	-	-	1,973
Assets per accounts	1,970	1,970	1,970
Total Assets	**1,970**	**1,970**	**3,943**
Ratio	**71%**	**53%**	**72%**

[1]Includes non-contributors who are entitled to future benefits

[2]Totals may not sum due to rounding

The ABO, which assumes no further increases to benefits, is estimated to be $2,792 million as at 31 July 2020. The Fund at $1,970 million covers approximately 71% of the accrued benefits (excluding future administration expenses).

As at 31 July 2020, the estimated accrued liability assuming future increases to benefits and valued at a real return of 4% per annum, is $3,748 million. The Fund at $1,970 million covers approximately 53% of the accrued benefits (excluding future administration expenses). This level of coverage is higher than that indicated in the previous review (45.0%).

The PVFB for the total expected period of participation in the Fund is estimated to be $5,465 million as at 31 July 2020. The present value of expected future contributions is estimated to be $1,973 million as at 31 July 2020. The Fund along with future contributions covers approximately 72% of both current and future benefits (excluding future administration expenses).

Present value of retired liabilities and gratuities

As at 31 July 2020, the present value of retired liabilities for existing beneficiaries over the next 10 years is estimated to be $1,117 million.

The present value of gratuities expected to be paid over the next 10 years, assuming that contribution rates increase at 2.5% a year in excess of benefit increases is estimated to be $74 million.

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