



## The Pensions Regulator

# Superfund capital requirements: Impact of profit extraction

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welcome to brighter

# Introduction

Mercer has been appointed by The Pensions Regulator (“TPR”) to provide asset liability modelling analysis to consider the following aspects regarding superfund capital requirements.

1. Define new capital buffers for market risk based on the 1 year 99% VaR discounted on a Gilts + 0.75% rate.
2. Review the implications of profit extraction from superfunds on future funding levels over a 20 year time horizon, based on these capital buffers
3. Calculate the probability of depletion under the Probability of Meeting Benefits (POMB) analysis over a 60 year time horizon.

The analysis has been carried out using Mercer’s UK Capital Market Assumptions as at 31 December 2022.

This paper is divided into the following sections:

- Section 1 – Investment strategies
- Section 2 – Capital buffers based on 1 year VaR
- Section 3 – Funding level projections based on 1 year VaR capital buffers
- Section 4 – Probability of meeting benefits (POMB) analysis based on 1 year VaR capital buffers
- Section 5 – Probability of meeting benefits (POMB) analysis based on interim regime capital buffers
- Section 6 – Conclusions

# Investment strategies



# Asset allocations modelled

We have set out below the investment strategies we have modelled. Strategies A and C have similar levels of expected excess return. Strategy B has a higher level of expected excess return and a higher volatility. Strategy E follows a credit based investment strategy, not dissimilar to that an insurer may adopt.

Asset bucket	Asset class	Strategy A	Strategy B	Strategy C	Strategy E
Equity	Global Listed	10%	3%	5%	-
	Private	-	4%	-	-
Infrastructure	Equity	-	20%	-	-
	Renewables	-	2%	-	-
Debt	Investment-grade credit	20%	-	20%	45% <sup>1</sup>
	Liquid multi-asset credit	15%	-	-	-
	ARBS Investment grade	15%	-	-	-
	Private credit	-	9%	10%	20%
	Investment grade ABS	-	3%	10%	-
	High yield ABS	-	2%	-	-
	Listed global high yield and loans	-	3%	5%	-
	Commercial real estate debt	-	-	5%	-
	Infrastructure debt	-	-	5%	-
	Structured credit	-	-	-	5%
Property	Property	-	4%	-	-
LDI	LDI	40%	50%	40%	30%

<sup>1</sup> Mapped to GBP IG credit (all grades), 20% 5 year duration , 15% 10 year duration , 10% 15 year duration

# Risk and return metrics

The risk and return metrics for each of the investment strategies set out on the previous page are shown below under **31 December 2022** capital market assumptions.

Return / risk metrics <sup>1</sup>	Strategy A	Strategy B	Strategy C	Strategy E
Expected return (10 year median p.a.)	Gilts + 1.4%	Gilts + 2.0%	Gilts + 1.5%	Gilts + 1.7%
Absolute volatility (1 year) <sup>2</sup>	10.3%	11.4%	10.1%	9.6%
Volatility vs liabilities (1 year) <sup>2,3</sup>	5.1%	6.7%	5.1%	5.5%
Interest rate hedge ratio <sup>3</sup>	100%	100%	100%	100%
Inflation hedge ratio <sup>3</sup>	100%	100%	100%	100%

<sup>1</sup> As at 31 December 2022

<sup>2</sup> We suggest focusing on volatilities relative to liabilities.

<sup>3</sup> Relative to Gilts + 0.75% liabilities

Between 31 December 2022 and 31 December 2023, our capital market assumptions have evolved as follows:

- Nominal expected returns have increased driven by higher cash rates and gilt yields, whilst excess returns over cash and gilts have decreased.
- Excess returns on credit assets relative to cash decreased as credit spreads narrowed across investment-grade and high yield credit.
- Volatilities, measured by the standard deviation of each asset class were also higher overall, other than on investment-grade credit.

Overall, these changes would lead to slightly lower future funding levels and slightly higher likelihoods of asset depletion over the long-term if the analysis was repeated using the end-2023 assumptions.

**Capital buffers  
based on 1 year VaR**



# VaR results

## As at 31 December 2022

- The table below shows the VaR at a 99<sup>th</sup> percentile over one year, run using 31 December 2022 assumptions.
- The discount rate is based on Gilt yields plus a fixed 0.75% p.a. uplift.

Liability Profile	Percentile	Strategy	Discount Rate	VaR (% total assets)*		
				31-Dec-22		
				Credit and Property	Equity	Total
50% Deferreds / 50% Pensioners	99%	Strategy A	Gilt+0.75%	7.0%	3.9%	10.9%
		Strategy B		4.2%	10.6%	14.8%
		Strategy C		10.6%	1.7%	12.3%
		Strategy E		14.2%	0.0%	14.2%

\* NAV equal to 100% of Gilts+0.75% liabilities PV. Hedge of 100% of liabilities on Gilts+0.75% basis.

- Using the above approach, the total capital buffer required would be the above market risk buffer plus a 3% longevity risk buffer. For example under Strategy A, the total capital buffer required would be 13.9% (= 10.9% for market risk, plus 3% for longevity risk).
- Whilst the above market risk buffers have been calculated without any allowance for longevity risks, in our projections we have tested the total capital buffers against both market and longevity risks.

**Funding level  
projections based  
on 1 year VaR  
capital buffers**





# Capital Buffers Adequacy – 31 December 2022

## Investment Strategy A

Strategy	A
Profile	50/50
Funding basis	G+0.75%
Buffer	13.9%
Distributions (x buffer)	1.33x   1.5x   1.66x

- We have projected the **assets and liabilities** on the **gilts + 0.75%** basis with the asset allocation of **Strategy A**.
- The table below sets out the 99<sup>th</sup> and 50<sup>th</sup> percentile funding levels, based on the initial buffer of 99% VaR + 3% longevity and different profit taking thresholds.

Basis	Initial Buffer	Profit Taking	Percentile	1 year	2 years	3 years	4 years	5 years	6 years	7 years	8 years	9 years	10 years	15 years	20 years	Probability of full funding in 5 years	Probability of full funding in 10 years	Probability of full funding in 15 years
Gilts+0.75%	13.9%		99 <sup>th</sup>	101.91%	98.89%	96.16%	94.37%	93.08%	91.61%	90.10%	88.41%	87.69%	85.31%	77.04%	62.15%	96.02%	94.71%	94.85%
			50 <sup>th</sup>	115.93%	117.70%	119.06%	120.67%	122.58%	124.49%	126.83%	129.43%	132.78%	136.48%	160.62%	205.23%			
		118.4% (1.33x)	99 <sup>th</sup>	101.91%	98.82%	96.12%	94.24%	92.70%	91.15%	89.23%	87.06%	86.24%	84.18%	72.70%	53.57%	95.15%	91.18%	88.95%
			50 <sup>th</sup>	115.93%	116.57%	116.37%	116.14%	115.88%	115.88%	115.70%	115.62%	115.84%	116.03%	115.93%	116.21%			
		120.8% (1.5x)	99 <sup>th</sup>	101.91%	98.82%	96.12%	94.36%	93.01%	91.45%	89.51%	88.00%	87.17%	84.65%	74.87%	58.41%	95.65%	92.80%	91.33%
			50 <sup>th</sup>	115.93%	117.22%	117.55%	117.70%	117.67%	117.92%	117.87%	117.87%	118.22%	118.56%	118.65%	119.24%			
		123.0% (1.66x)	99 <sup>th</sup>	101.91%	98.89%	96.12%	94.37%	93.08%	91.53%	89.88%	88.17%	87.50%	85.09%	75.86%	59.90%	95.88%	93.60%	92.75%
			50 <sup>th</sup>	115.93%	117.53%	118.27%	118.87%	119.21%	119.48%	119.67%	119.88%	120.31%	120.73%	121.21%	122.01%			

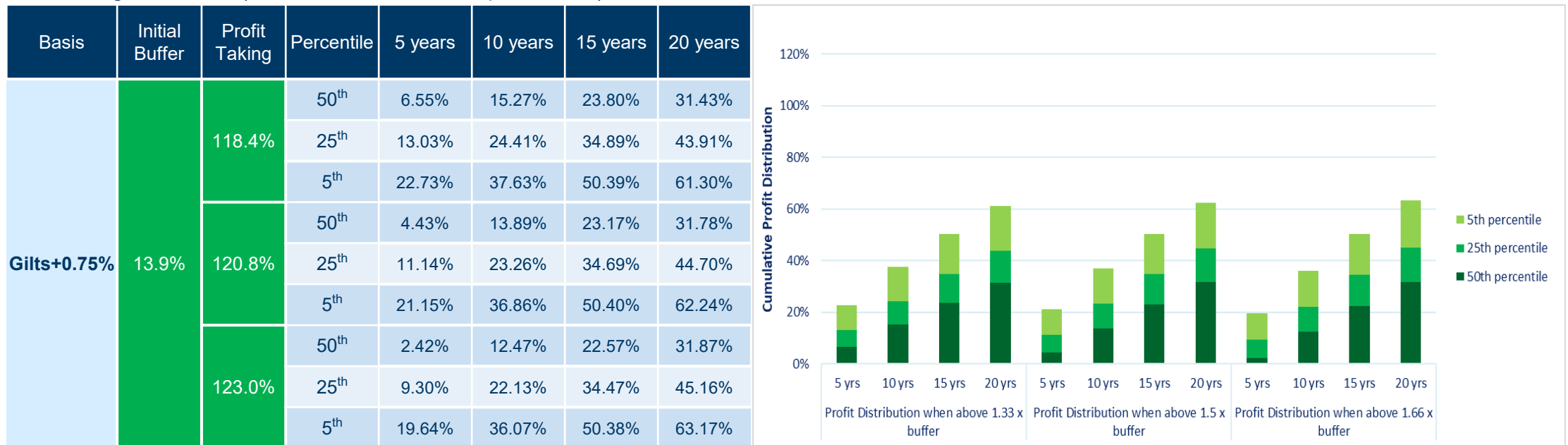
Over a 5 or 10 year time horizon the 99<sup>th</sup> percentile positions are below 100%. Requiring a higher initial buffer would improve these positions. Reducing the threshold for profit distribution does not have a material impact on the 99<sup>th</sup> percentile position, although it does reduce the 50<sup>th</sup> percentile position. The 99<sup>th</sup> percentile year 1 position is higher than 100% as the 1 year 99<sup>th</sup> percentile market and longevity risk stress over is lower than the initial buffer.

# Profit Distribution – 31 December 2022

## Investment Strategy A

<b>Strategy</b>	A
<b>Profile</b>	50/50
<b>Funding basis</b>	G+0.75%
<b>Buffer</b>	13.9%
<b>Distributions (x buffer)</b>	1.33x   1.5x   1.66x

- We have projected the **Cumulative Profit Distributions** on the **gilts + 0.75%** basis with the asset allocation of **Strategy A**.
- The table below sets out the 50<sup>th</sup>, 25<sup>th</sup> and 5<sup>th</sup> percentile cumulative profit distributions (all in % of starting liability value), based on different profit taking thresholds (chart shows cumulative percentiles).



A higher profit distribution threshold results in deferral of distribution but with similar cumulative amounts over the long term.

# Capital Buffers Adequacy – 31 December 2022

## Investment Strategy B

Strategy	B
Profile	50/50
Funding basis	G+0.75%
Buffer	17.8%
Distributions (x buffer)	1.33x   1.5x   1.66x

- We have projected the **assets and liabilities** on the **gilts + 0.75%** basis with the asset allocation of **Strategy B**.
- The table below sets out the 99<sup>th</sup> and 50<sup>th</sup> percentile funding levels, based on the initial buffer of 99% VaR + 3% longevity and different profit taking thresholds.

Basis	Initial Buffer	Profit Taking	Percentile	1 year	2 years	3 years	4 years	5 years	6 years	7 years	8 years	9 years	10 years	15 years	20 years	Probability of full funding in 5 years	Probability of full funding in 10 years	Probability of full funding in 15 years
Gilts+0.75%	17.8%		99 <sup>th</sup>	101.61%	97.70%	93.95%	91.03%	89.38%	88.94%	87.19%	85.60%	83.50%	81.48%	72.60%	55.93%	96.01%	95.18%	95.58%
			50 <sup>th</sup>	120.62%	123.24%	125.98%	129.03%	132.20%	135.69%	139.81%	143.96%	149.08%	154.62%	195.10%	269.03%			
		123.7% (1.33x)	99 <sup>th</sup>	101.61%	97.63%	93.78%	90.90%	88.97%	87.21%	85.44%	83.51%	80.73%	78.64%	63.96%	43.27%	95.08%	91.88%	90.07%
			50 <sup>th</sup>	120.62%	121.70%	121.86%	121.72%	121.66%	121.71%	121.46%	121.58%	121.72%	121.86%	121.70%	122.00%			
		126.7% (1.5x)	99 <sup>th</sup>	101.61%	97.70%	93.89%	90.99%	89.31%	88.11%	86.64%	84.75%	82.49%	80.36%	66.09%	46.52%	95.67%	93.34%	92.21%
			50 <sup>th</sup>	120.62%	122.56%	123.51%	123.94%	124.10%	124.37%	124.26%	124.47%	124.80%	125.05%	125.19%	125.75%			
		129.6% (1.66x)	99 <sup>th</sup>	101.61%	97.70%	93.89%	91.03%	89.38%	88.59%	86.99%	84.85%	83.21%	80.93%	68.53%	49.09%	95.85%	94.22%	93.41%
			50 <sup>th</sup>	120.62%	122.97%	124.62%	125.56%	126.05%	126.66%	126.71%	127.12%	127.61%	127.94%	128.48%	129.16%			

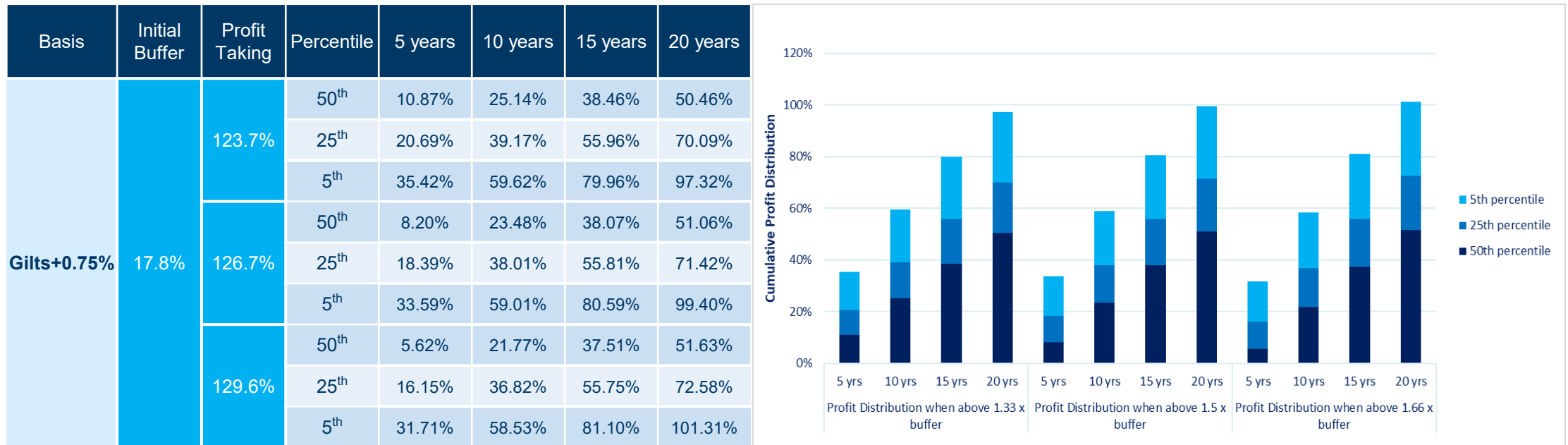
Strategy B shows increased dispersion of outcomes relative to Strategy A, as expected.

# Profit Distribution – 31 December 2022

## Investment Strategy B

Strategy	B
Profile	50/50
Funding basis	G+0.75%
Buffer	17.8%
Distributions (x buffer)	1.33x   1.5x   1.66x

- We have projected the **Cumulative Profit Distributions** on the **gilts + 0.75%** basis with the asset allocation of **Strategy B**.
- The table below sets out the 50<sup>th</sup>, 25<sup>th</sup> and 5<sup>th</sup> percentile cumulative profit distributions (all in % of starting liability value), based on different profit taking thresholds (chart shows cumulative percentiles).



A higher profit distribution threshold results in deferral of distribution but with similar cumulative amounts over the long term. Strategy B's higher risk/return allows for a higher amount of profit distribution.

# Capital Buffers Adequacy – 31 December 2022

## Investment Strategy C

Strategy	C
Profile	50/50
Funding basis	G+0.75%
Buffer	15.3%
Distributions (x buffer)	1.33x   1.5x   1.66x

- We have projected the **assets and liabilities** on the **gilts + 0.75%** basis with the asset allocation of **Strategy C**.
- The table below sets out the 99<sup>th</sup> and 50<sup>th</sup> percentile funding levels, based on the initial buffer of 99% VaR + 3% longevity and different profit taking thresholds.

Basis	Initial Buffer	Profit Taking	Percentile	1 year	2 years	3 years	4 years	5 years	6 years	7 years	8 years	9 years	10 years	15 years	20 years	Probability of full funding in 5 years	Probability of full funding in 10 years	Probability of full funding in 15 years
Gilts+0.75%	15.3%		99 <sup>th</sup>	102.26%	99.69%	98.27%	97.41%	97.14%	96.35%	95.67%	95.39%	94.62%	94.29%	91.53%	85.79%	98.01%	97.62%	97.69%
			50 <sup>th</sup>	117.90%	119.84%	121.65%	123.45%	125.48%	127.82%	130.69%	133.39%	136.57%	140.70%	166.83%	214.71%			
		120.3% (1.33x)	99 <sup>th</sup>	102.26%	99.68%	98.05%	96.90%	96.33%	95.25%	94.19%	93.23%	92.66%	90.98%	85.39%	75.73%	97.53%	95.73%	94.44%
			50 <sup>th</sup>	117.90%	118.77%	118.75%	118.52%	118.34%	118.36%	118.26%	118.29%	118.61%	118.72%	118.77%	119.24%			
		122.9% (1.5x)	99 <sup>th</sup>	102.26%	99.68%	98.21%	97.17%	96.95%	95.87%	95.18%	94.47%	93.78%	92.53%	88.39%	79.39%	97.82%	96.78%	96.04%
			50 <sup>th</sup>	117.90%	119.45%	120.14%	120.31%	120.37%	120.64%	120.66%	120.83%	121.30%	121.49%	121.77%	122.41%			
		125.4% (1.66x)	99 <sup>th</sup>	102.26%	99.69%	98.24%	97.28%	97.03%	96.09%	95.47%	95.08%	94.22%	93.44%	90.22%	82.74%	97.93%	97.19%	96.79%
			50 <sup>th</sup>	117.90%	119.72%	120.95%	121.61%	122.01%	122.52%	122.74%	123.10%	123.59%	123.92%	124.53%	125.35%			

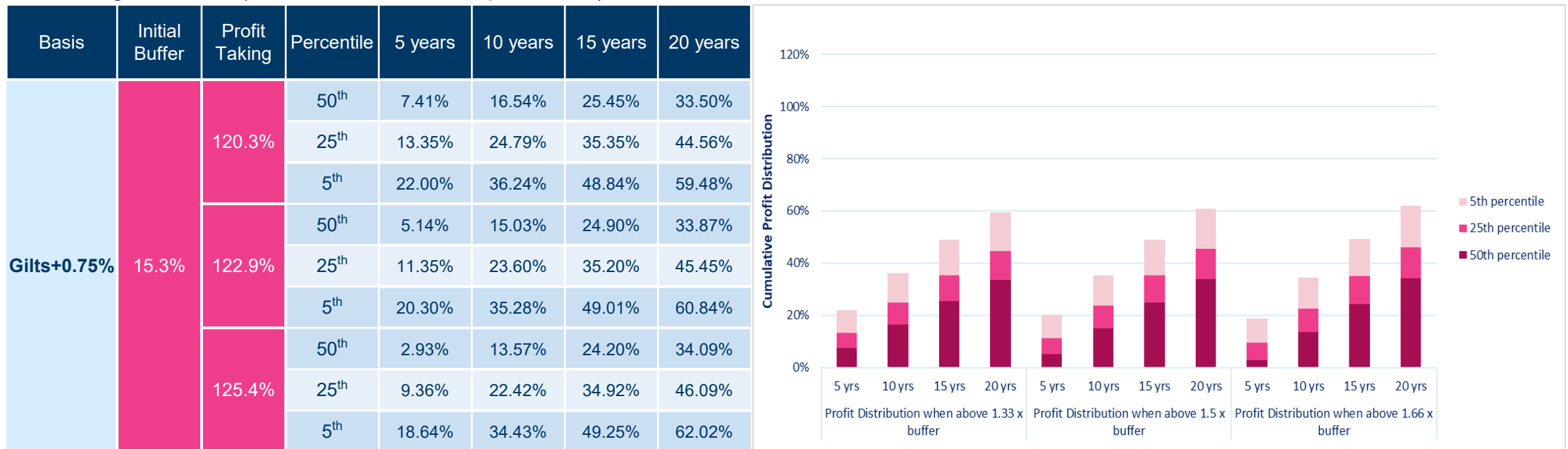
Strategy C shows lower dispersion of 99<sup>th</sup> percentile outcomes relative to Strategy A, reflecting the lower equity and greater credit allocation. The 50<sup>th</sup> percentile outcomes are also higher although this will depend on credit spreads at inception.

# Profit Distribution – 31 December 2022

## Investment Strategy C

<b>Strategy</b>	C
<b>Profile</b>	50/50
<b>Funding basis</b>	G+0.75%
<b>Buffer</b>	15.3%
<b>Distributions (x buffer)</b>	1.33x   1.5x   1.66x

- We have projected the **Cumulative Profit Distributions** on the **gilts + 0.75%** basis with the asset allocation of **Strategy C**.
- The table below sets out the 50<sup>th</sup>, 25<sup>th</sup> and 5<sup>th</sup> percentile cumulative profit distributions (all in % of starting liability value), based on different profit taking thresholds (chart shows cumulative percentiles).



A higher profit distribution threshold results in deferral of distribution but with similar cumulative amounts over the long term.  
Strategy C's profit distributions are similar to Strategy A.

# Capital Buffers Adequacy – 31 December 2022

## Investment Strategy E

Strategy	E
Profile	50/50
Funding basis	G+0.75%
Buffer	17.2%
Distributions (x buffer)	1.33x   1.5x   1.66x

- We have projected the **assets and liabilities** on the **gilts + 0.75%** basis with the asset allocation of **Strategy E**.
- The table below sets out the 99<sup>th</sup> and 50<sup>th</sup> percentile funding levels, based on the initial buffer of 99% VaR + 3% longevity and different profit taking thresholds.

Basis	Initial Buffer	Profit Taking	Percentile	1 year	2 years	3 years	4 years	5 years	6 years	7 years	8 years	9 years	10 years	15 years	20 years	Probability of full funding in 5 years	Probability of full funding in 10 years	Probability of full funding in 15 years
Gilts+0.75%	17.2%		99 <sup>th</sup>	102.78%	101.48%	100.62%	99.94%	100.52%	99.50%	99.79%	99.73%	99.86%	99.96%	100.60%	101.23%	99.17%	98.99%	99.03%
			50 <sup>th</sup>	120.73%	123.44%	125.63%	127.94%	130.43%	133.59%	136.66%	140.14%	144.26%	149.12%	181.08%	238.45%			
		122.9% (1.33x)	99 <sup>th</sup>	102.78%	101.48%	100.16%	99.13%	99.07%	97.52%	97.40%	96.75%	96.17%	95.85%	92.49%	88.48%	98.84%	97.79%	97.21%
			50 <sup>th</sup>	120.73%	121.89%	121.72%	121.52%	121.33%	121.35%	121.24%	121.17%	121.52%	121.68%	121.82%	122.40%			
		125.9% (1.5x)	99 <sup>th</sup>	102.78%	101.48%	100.54%	99.55%	100.11%	98.52%	98.65%	97.97%	97.88%	97.55%	95.66%	92.19%	99.02%	98.45%	98.03%
			50 <sup>th</sup>	120.73%	122.81%	123.50%	123.74%	123.80%	124.01%	124.02%	124.05%	124.49%	124.72%	125.10%	125.86%			
		128.6% (1.66x)	99 <sup>th</sup>	102.78%	101.48%	100.62%	99.94%	100.28%	98.82%	99.61%	98.60%	98.94%	98.73%	97.85%	95.38%	99.11%	98.72%	98.63%
			50 <sup>th</sup>	120.73%	123.21%	124.59%	125.35%	125.83%	126.22%	126.42%	126.60%	127.18%	127.52%	128.16%	128.62%			

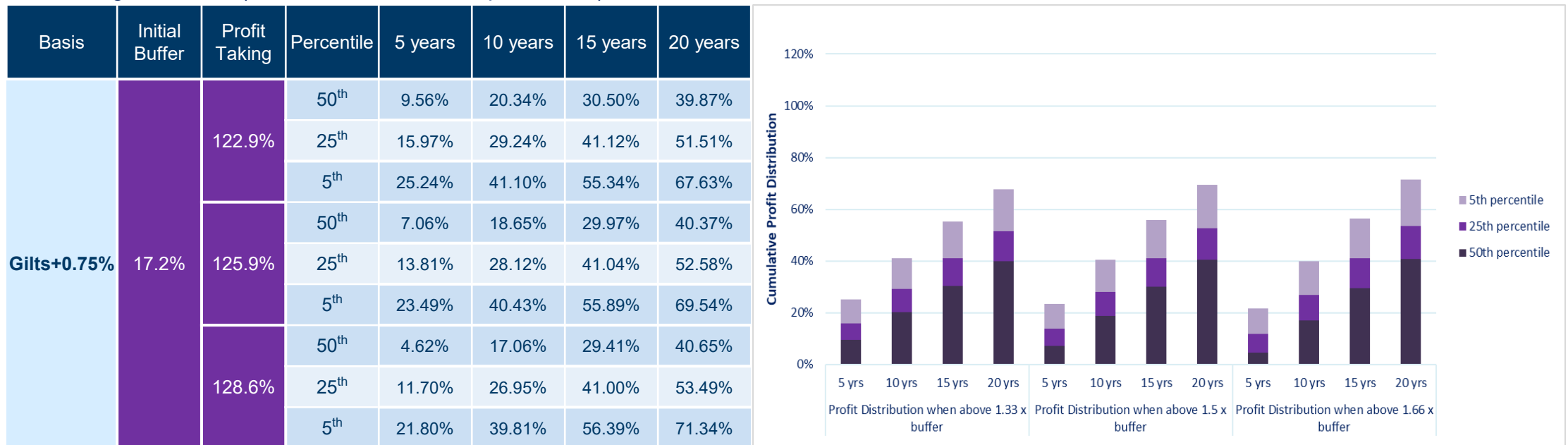
Strategy E shows lower dispersion of 99<sup>th</sup> percentile outcomes relative to Strategy A, reflecting the lower equity and greater credit allocation. The 50<sup>th</sup> percentile outcomes are also higher although this will depend on credit spreads at inception.

# Profit Distribution – 31 December 2022

## Investment Strategy E

<b>Strategy</b>	E
<b>Profile</b>	50/50
<b>Funding basis</b>	G+0.75%
<b>Buffer</b>	17.2%
<b>Distributions (x buffer)</b>	1.33x   1.5x   1.66x

- We have projected the **Cumulative Profit Distributions** on the **gilts + 0.75%** basis with the asset allocation of **Strategy E**.
- The table below sets out the 50<sup>th</sup>, 25<sup>th</sup> and 5<sup>th</sup> percentile cumulative profit distributions (all in % of starting liability value), based on different profit taking thresholds (chart shows cumulative percentiles).



A higher Profit Distribution threshold results in deferral of distribution but with similar cumulative amounts over the long term. Strategy E's profit distributions are slightly higher than those of Strategy A.



# Comparison with prior analysis

The following table summarises the results from this section as well as comparing them to our previous analysis from May 2023. Both have been carried out using 31 December 2022 capital market assumptions. Due to the differences in approach they are not directly comparable.

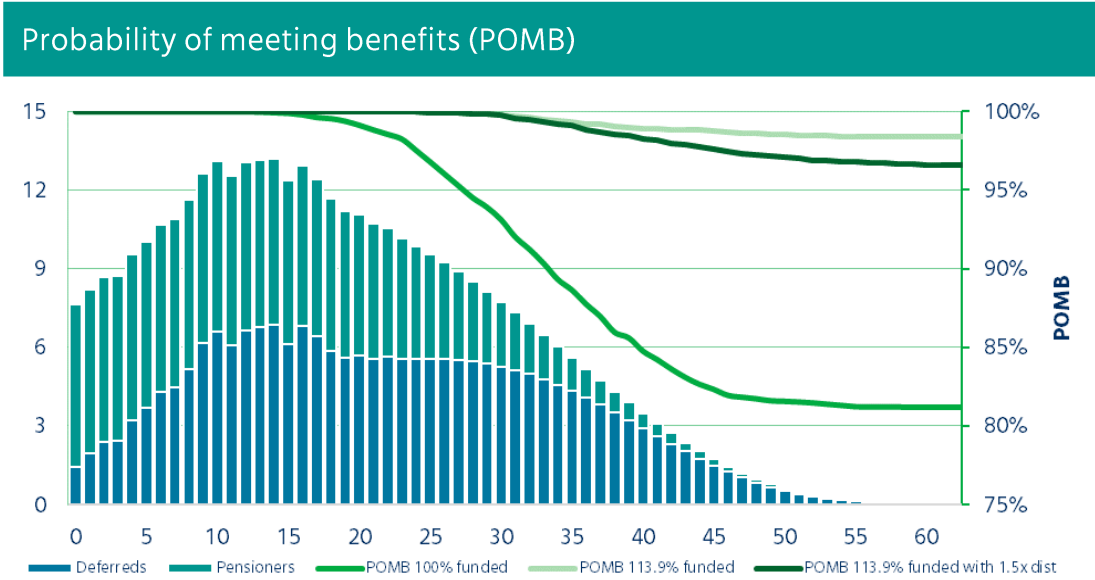
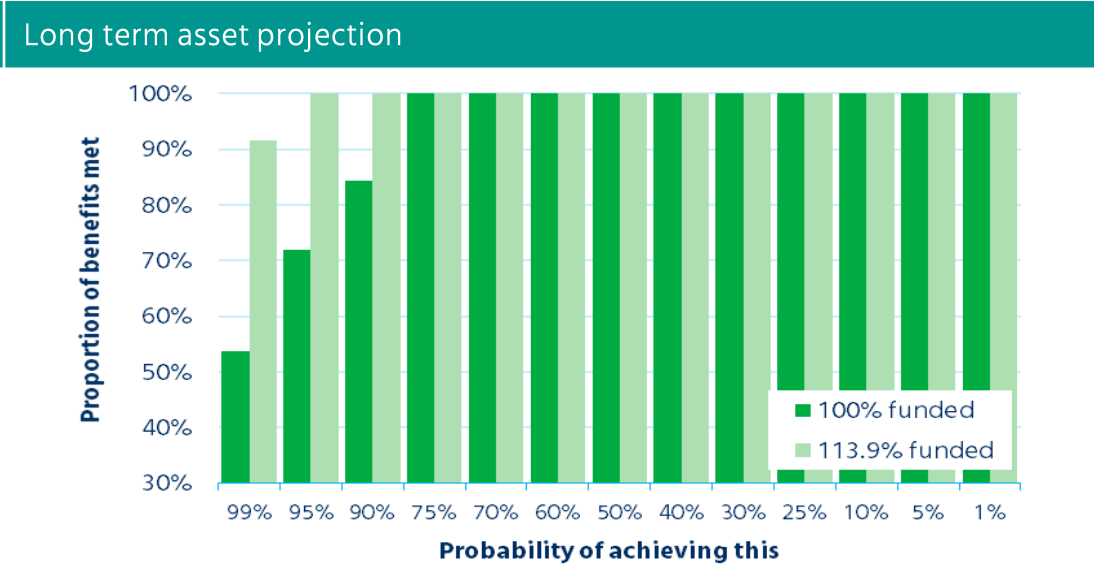
99 <sup>th</sup> percentile funding level	Analysis including longevity risk							Prior analysis excluding longevity risk (3% buffers excluded)						
	G+0.75%							G+0.75%						
	Buffer	No profit taking			Profit taking at buffer x 1.66			Buffer	No profit taking			Profit taking at buffer +10%		
		FL 5 years	FL 10 years	Prob. FF 10 years	FL 5 years	FL 10 years	Prob. FF 10 years		FL 5 years	FL 10 years	Prob. FF 10 years	FL 5 years	FL 10 years	Prob. FF 10 years
Strategy A	13.9%	93.1%	85.3%	94.7%	93.1%	85.1%	93.6%	15.0%	100.0%	100.5%	99.1%	100.0%	99.9%	99.0%
Strategy B	17.8%	89.4%	81.5%	95.2%	89.4%	80.9%	94.2%	24.0%	100.4%	97.0%	98.8%	100.4%	95.9%	98.5%
Strategy C	15.3%	97.1%	94.3%	97.6%	97.0%	93.4%	97.2%	13.0%	100.6%	105.2%	99.7%	100.6%	103.2%	99.6%
Strategy E	17.2%	100.5%	100.0%	99.0%	100.3%	98.7%	98.7%	12.0%	100.7%	105.6%	99.8%	100.2%	102.9%	99.6%

**Probability of meeting  
benefits (POMB) analysis  
based on 1 year VaR  
capital buffers**

**4**

# POMB Analysis – Strategy A - Gilts+0.75%

Scenario details	
Liability Profile	50% Pensioner / 50% Deferred
Funding Basis (initial asset value)	Gilts +0.75%
Investment Strategy	A
Longevity Risk modelled	Yes
Initial Funding Level	100%   100% + <b>13.9% buffer</b>



### Commentary

The chart on the bottom left shows the probability of having assets remaining at each time point under different levels of buffer.

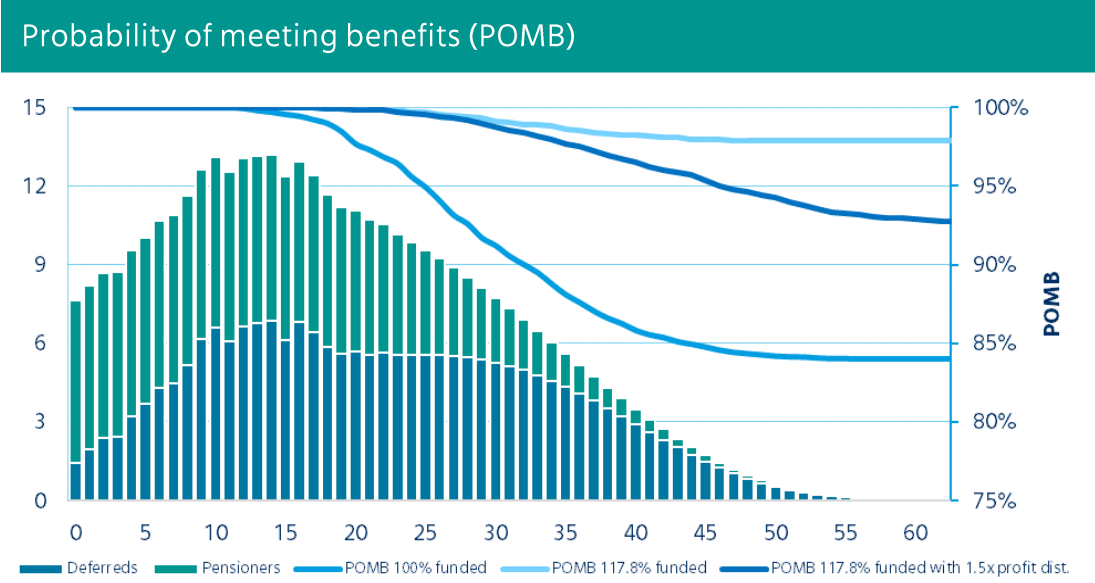
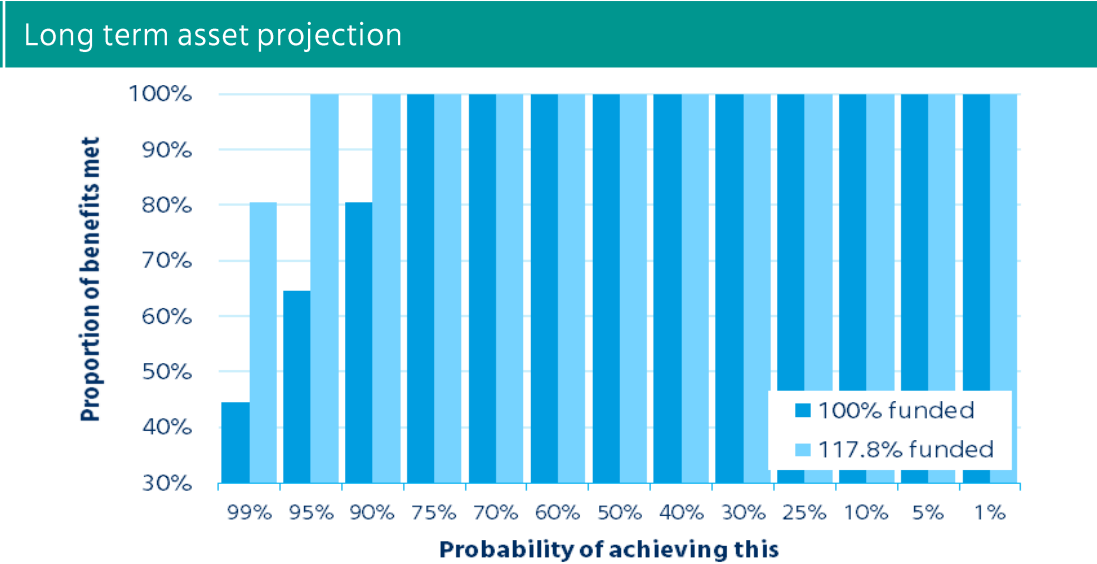
The green line ultimately reaches, at year 80, a POMB of 81.2% for a scenario where the scheme is 100% funded at start.

The light green line reaches, at year 80, a POMB of 98.4% for a scenario where the scheme is 100% funded at start with a 13.9% buffer.

The dark green line reaches, at year 80, a POMB of 96.2% for a scenario where the scheme is 100% funded at start with a 13.9% buffer and a 1.5x profit distribution rule.

# POMB Analysis – Strategy B - Gilts+0.75%

Scenario details	
Liability Profile	50% Pensioner / 50% Deferred
Funding Basis (initial asset value)	Gilts +0.75%
Investment Strategy	B
Longevity Risk modelled	Yes
Initial Funding Level	100%   100% + <b>17.8% buffer</b>



### Commentary

The chart on the bottom left shows the probability of having assets remaining at each time point under different levels of buffer.

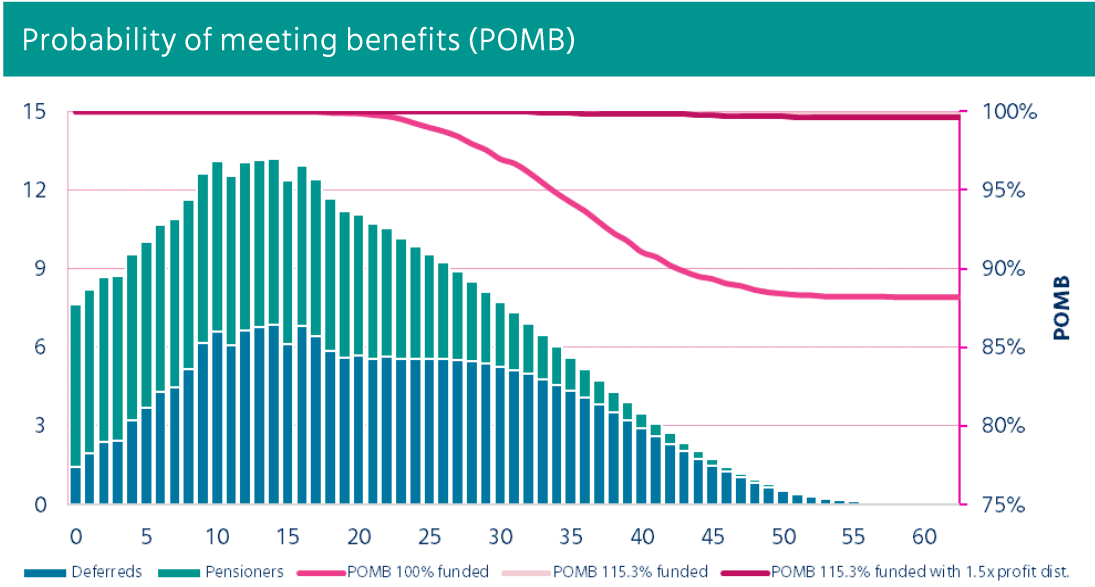
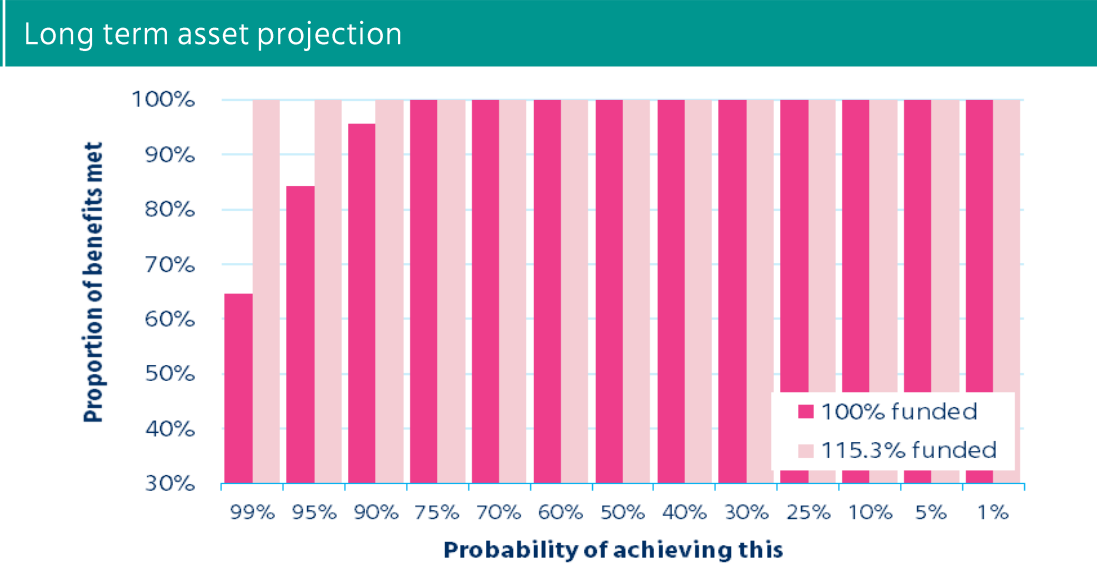
The blue line ultimately reaches, at year 80, a POMB of 84.0% for a scenario where the scheme is 100% funded at start.

The light blue line reaches, at year 80, a POMB of 97.9% for a scenario where the scheme is 100% funded at start with a 17.8% buffer.

The dark blue line reaches, at year 80, a POMB of 91.4% for a scenario where the scheme is 100% funded at start with a 17.8% buffer and a 1.5x profit distribution rule.

# POMB Analysis – Strategy C - Gilts+0.75%

Scenario details	
Liability Profile	50% Pensioner / 50% Deferred
Funding Basis (initial asset value)	Gilts +0.75%
Investment Strategy	C
Longevity Risk modelled	Yes
Initial Funding Level	100%   100% + <b>15.3% buffer</b>



### Commentary

The chart on the bottom left shows the probability of having assets remaining at each time point under different levels of buffer.

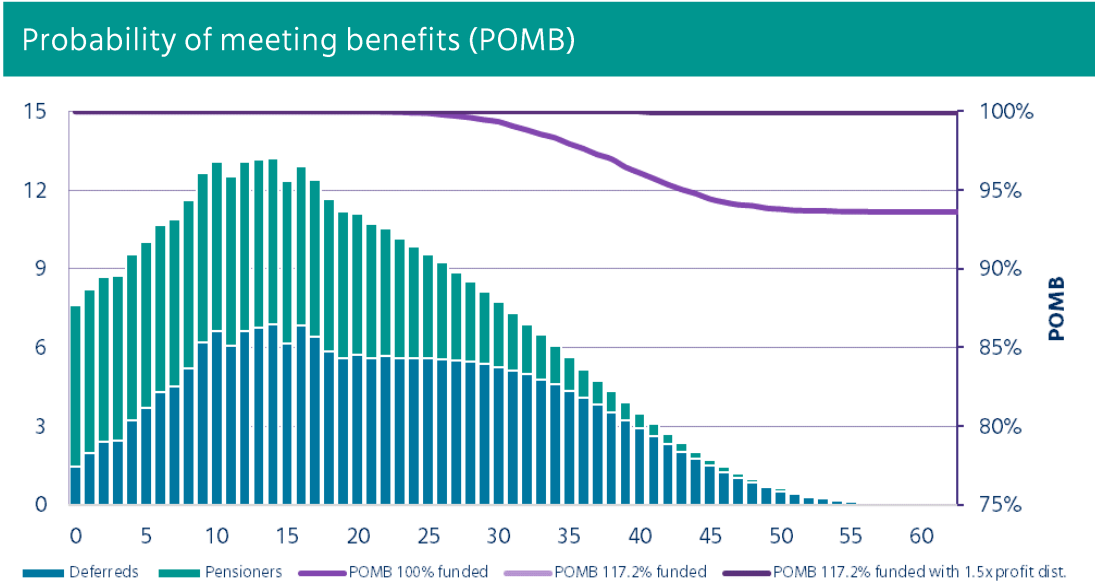
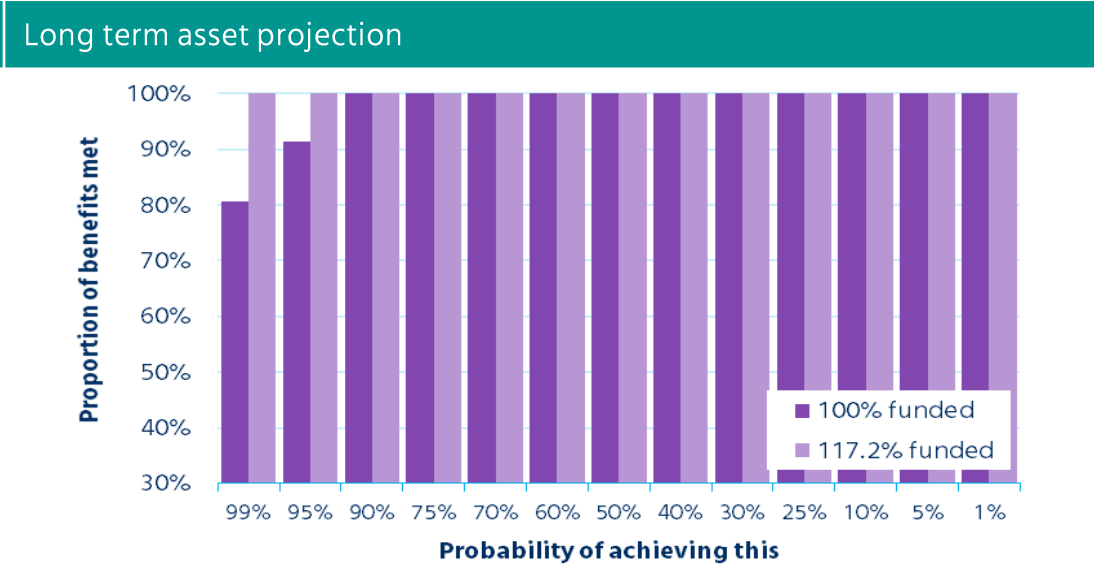
The pink line ultimately reaches, at year 80, a POMB of 88.2% for a scenario where the scheme is 100% funded at start.

The light pink line reaches, at year 80, a POMB of 99.7% for a scenario where the scheme is 100% funded at start with a 15.3% buffer.

The dark pink line reaches, at year 80, a POMB of 99.6% for a scenario where the scheme is 100% funded at start with a 15.3% buffer and a 1.5x profit distribution rule.

# POMB Analysis – Strategy E - Gilts+0.75%

Scenario details	
Liability Profile	50% Pensioner / 50% Deferred
Funding Basis (initial asset value)	Gilts +0.75%
Investment Strategy	E
Longevity Risk modelled	Yes
Initial Funding Level	100%   100% + <b>17.2% buffer</b>



### Commentary

The chart on the bottom left shows the probability of having assets remaining at each time point under different levels of buffer.

The purple line ultimately reaches, at year 80, a POMB of 93.6% for a scenario where the scheme is 100% funded at start.

The light purple line reaches, at year 80, a POMB of 99.9% for a scenario where the scheme is 100% funded at start with a 17.2% buffer.

The dark purple line reaches, at year 80, a POMB of 99.9% for a scenario where the scheme is 100% funded at start with a 17.2% buffer and a 1.5x profit distribution rule.

# POMB Analysis – Summary

The following table summarises the results from this section as well as comparing them to our previous analysis from May 2023. Both have been carried out using 31 December 2022 capital market assumptions. These analyses are comparable, and allow for both market risk and longevity risk.

	New analysis				Prior analysis		
	G+0.75%				G+0.75%		
	POMB (no buffer)	Buffer	POMB (with Buffer)	POMB (with buffer and 1.5x dist. rule)	POMB (no buffer)	Buffer (inc 3% longevity loading)	POMB (with buffer)
Strategy A	81.2%	13.9%	98.4%	96.2%	81.2%	18.0%	99.3%
Strategy B	84.0%	17.8%	97.9%	91.4%	84.0%	27.0%	99.4%
Strategy C	88.2%	15.3%	99.7%	99.6%	88.2%	16.0%	99.8%
Strategy E	93.6%	17.2%	99.9%	99.9%	93.6%	15.0%	99.9%

**Probability of meeting  
benefits (POMB) analysis  
based on interim regime  
capital buffers**



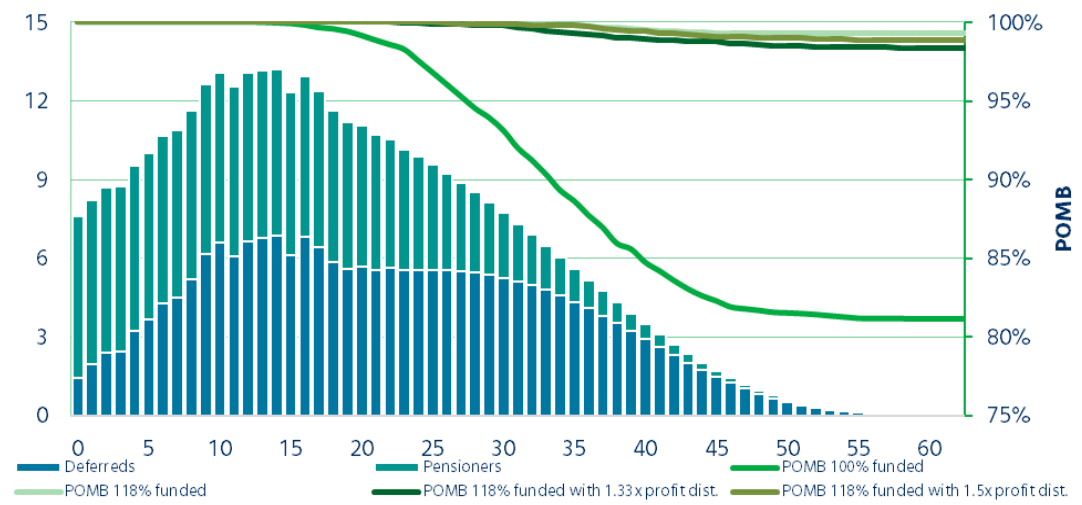


# POMB Analysis – Strategy A - Gilts+0.75%

## Scenario details

Liability Profile	50% Pensioner / 50% Deferred
Funding Basis (initial asset value)	Gilts +0.75%
Investment Strategy	A
Longevity Risk modelled	Yes
Initial Funding Level	100%   100% + <b>18.0% buffer</b>

## Probability of meeting benefits (POMB)



## Commentary

The chart on the bottom left shows the probability of having assets remaining at each time point under different levels of buffer.

The green line ultimately reaches, at year 80, a POMB of 81.2% for a scenario where the scheme is 100% funded at start.

The light green line reaches, at year 80, a POMB of 99.3% for a scenario where the scheme is 100% funded at start with a 18% buffer.

The dark green line reaches, at year 80, a POMB of 98.4% for a scenario where the scheme is 100% funded at start with a 18% buffer and a 1.33x profit distribution rule.

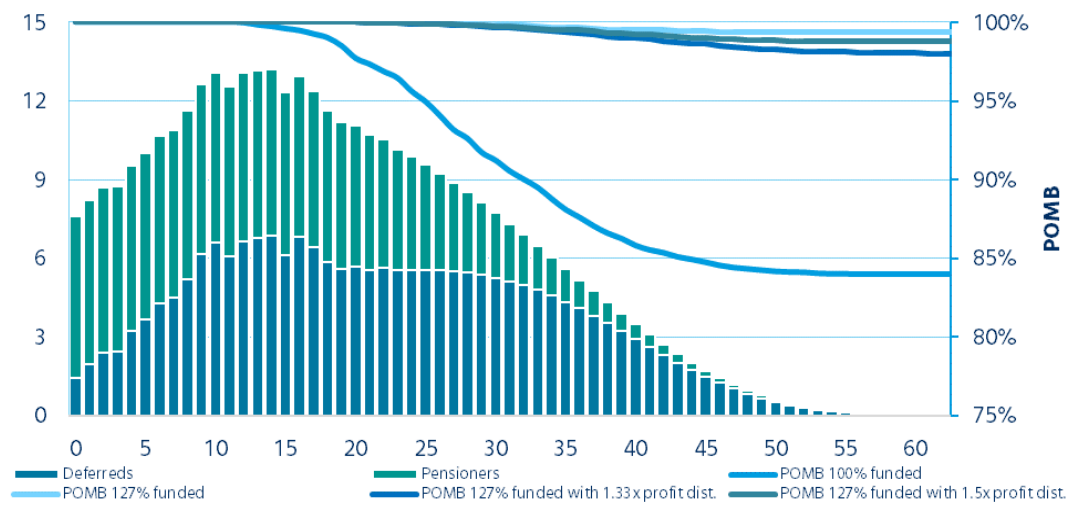
The olive green line reaches, at year 80, a POMB of 98.8% for a scenario where the scheme is 100% funded at start with a 18% buffer and a 1.5x profit distribution rule.

# POMB Analysis – Strategy B - Gilts+0.75%

## Scenario details

Liability Profile	50% Pensioner / 50% Deferred
Funding Basis (initial asset value)	Gilts +0.75%
Investment Strategy	B
Longevity Risk modelled	Yes
Initial Funding Level	100%   100% + <b>27.0% buffer</b>

## Probability of meeting benefits (POMB)



## Commentary

The chart on the bottom left shows the probability of having assets remaining at each time point under different levels of buffer.

The blue line ultimately reaches, at year 80, a POMB of 84.0% for a scenario where the scheme is 100% funded at start.

The light blue line reaches, at year 80, a POMB of 99.4% for a scenario where the scheme is 100% funded at start with a 27% buffer.

The dark blue line reaches, at year 80, a POMB of 97.9% for a scenario where the scheme is 100% funded at start with a 27% buffer and a 1.33x profit distribution rule.

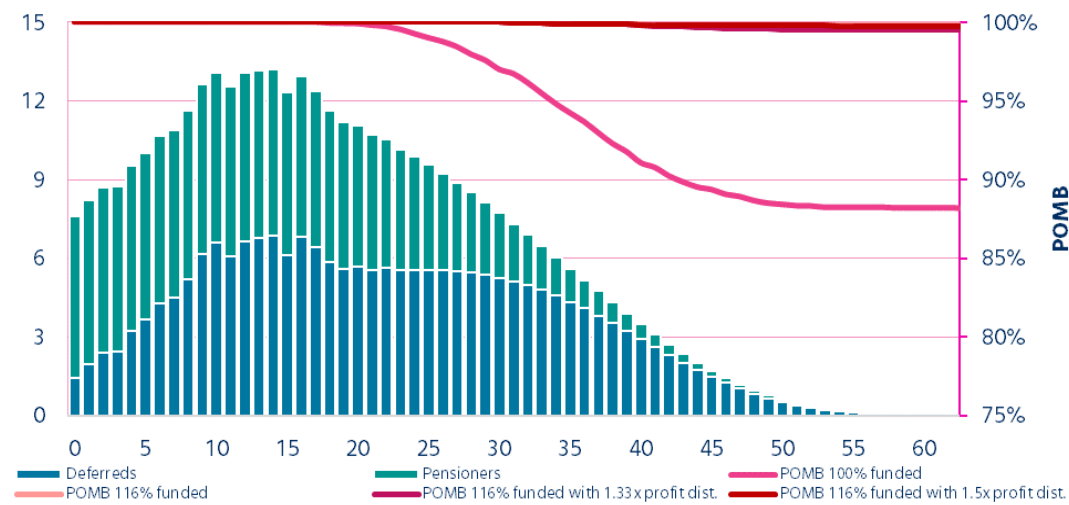
The aqua blue line reaches, at year 80, a POMB of 98.7% for a scenario where the scheme is 100% funded at start with a 27% buffer and a 1.5x profit distribution rule.

# POMB Analysis – Strategy C - Gilts+0.75%

## Scenario details

Liability Profile	50% Pensioner / 50% Deferred
Funding Basis (initial asset value)	Gilts +0.75%
Investment Strategy	C
Longevity Risk modelled	Yes
Initial Funding Level	100%   100% + <b>16.0% buffer</b>

## Probability of meeting benefits (POMB)



## Commentary

The chart on the bottom left shows the probability of having assets remaining at each time point under different levels of buffer.

The pink line ultimately reaches, at year 80, a POMB of 88.2% for a scenario where the scheme is 100% funded at start.

The light pink line reaches, at year 80, a POMB of 99.8% for a scenario where the scheme is 100% funded at start with a 16% buffer.

The dark pink line reaches, at year 80, a POMB of 99.4% for a scenario where the scheme is 100% funded at start with a 16% buffer and a 1.33x profit distribution rule.

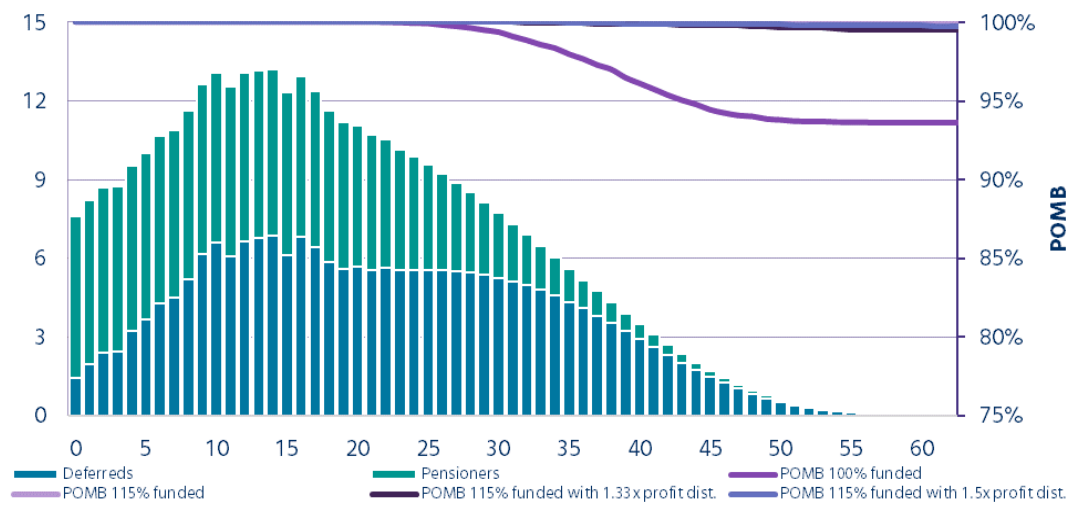
The dark red line reaches, at year 80, a POMB of 99.7% for a scenario where the scheme is 100% funded at start with a 16% buffer and a 1.5x profit distribution rule.

# POMB Analysis – Strategy E - Gilts+0.75%

## Scenario details

Liability Profile	50% Pensioner / 50% Deferred
Funding Basis (initial asset value)	Gilts +0.75%
Investment Strategy	E
Longevity Risk modelled	Yes
Initial Funding Level	100%   100% + <b>15.0% buffer</b>

## Probability of meeting benefits (POMB)



## Commentary

The chart on the bottom left shows the probability of having assets remaining at each time point under different levels of buffer.

The purple line ultimately reaches, at year 80, a POMB of 93.6% for a scenario where the scheme is 100% funded at start.

The light purple line reaches, at year 80, a POMB of 99.9% for a scenario where the scheme is 100% funded at start with a 15% buffer.

The dark purple line reaches, at year 80, a POMB of 99.5% for a scenario where the scheme is 100% funded at start with a 15% buffer and a 1.33x profit distribution rule.

The indigo purple line reaches, at year 80, a POMB of 99.7% for a scenario where the scheme is 100% funded at start with a 15% buffer and a 1.5x profit distribution rule.

# POMB Analysis – Summary

The following table summarises the results from this section as well as comparing them to the results from Section 4. Both have been carried out using 31 December 2022 capital market assumptions. These analyses are comparable, and allow for both market risk and longevity risk.

G+0.75%								
No buffer	Interim regime capital buffers				1 year VaR based capital buffers			
POMB	Buffer	POMB (no dist)	POMB (1.33x dist)	POMB (1.5x dist)	Buffer	POMB (no dist)	POMB (1.5x dist)	
Strategy A	81.2%	18.0%	99.3%	98.4%	98.8%	13.9%	98.4%	96.2%
Strategy B	84.0%	27.0%	99.4%	97.9%	98.7%	17.8%	97.9%	91.4%
Strategy C	88.2%	16.0%	99.8%	99.4%	99.7%	15.3%	99.7%	99.6%
Strategy E	93.6%	15.0%	99.9%	99.5%	99.7%	17.2%	99.9%	99.9%

**Conclusions**



# Conclusions

## 1. Updated approach to calculation of market risk buffer

Using a 1 year VaR approach results in a larger market risk buffer for investment strategies focused on high quality credit assets such as Strategy E. Conversely, diversified investment strategies that incorporate allocations to equity and real assets have lower market risk buffers under this approach than under the interim regime.

In particular, the 1 year test is more sensitive to credit spread volatility than the 5 year test. Whilst Solvency II adopts such a 1 year test, the Matching Adjustment reduces sensitivity of the resulting capital buffer to credit spread volatility.

	Buffer 1 year VaR approach	Buffer Interim regime (Year 5 test)	Ratio
Strategy A	13.9%	18.0%	77%
Strategy B	17.8%	27.0%	66%
Strategy C	15.3%	16.0%	96%
Strategy E	17.2%	15.0%	115%

## 2. Longevity risk

Under our modelling, a 3% longevity risk allowance is more than needed to cover 1 year 99<sup>th</sup> percentile longevity stresses (pre-diversification), resulting in the 99<sup>th</sup> percentile funding levels after 1 year exceeding 100% in all four investment strategies. Conversely, the 99<sup>th</sup> percentile longevity stress (pre-diversification) over 5 years exceeds the 3% allowance.

## 3. Impact of profit taking

Profit taking has very limited impact on the projected 99<sup>th</sup> percentile funding levels after 5 or 10 years. The key determinant of the 99<sup>th</sup> percentile funding level is the level of investment risk and the initial buffer, with very little extraction of surplus in these scenarios. At the 50<sup>th</sup> percentile there is meaningful extraction of surplus under most of the investment strategies over 5 or 10 years. Altering the threshold at which profits can be extracted can accelerate or defer distributions, however the undiscounted value of distributions is similar over a 20 year time horizon across all of the thresholds considered (1.33x, 1.5x, 1.66x).

The POMB analysis over an 80 year time horizon shows that profit extraction only has a very limited impact on the probability of meeting benefits in full under the credit-biased strategies C and E. However, profit extraction has a greater impact on these probabilities under strategy A and particularly strategy B, which take more risk and have greater reliance on equity and real assets to generate returns.

**Appendix 1:**  
**Impact of profit distribution**  
**without longevity risk**  
**(consistent with June 2023 analysis)**



# Capital Buffers Adequacy – 31 December 2022

## Investment Strategy A

Strategy	A
Profile	50/50
Funding basis	G+0.75%
Buffer	10.9%
Distributions (x buffer)	1.33x   1.5x   1.66x

- We have projected the **assets and liabilities** on the **gilts + 0.75%** basis with the asset allocation of **Strategy A**.
- The table below sets out the 99<sup>th</sup> and 50<sup>th</sup> percentile funding levels, based on the initial buffer of 99% VaR and different profit taking thresholds.

Basis	Initial Buffer	Profit Taking	Percentile	1 year	2 years	3 years	4 years	5 years	6 years	7 years	8 years	9 years	10 years	15 years	20 years	Probability of full funding in 5 years	Probability of full funding in 10 years	Probability of full funding in 15 years
Gilts+0.75%	10.9%		99 <sup>th</sup>	100.76%	98.49%	96.97%	95.85%	95.43%	95.10%	94.68%	93.86%	93.56%	93.50%	92.02%	88.34%	97.25%	97.09%	97.63%
			50 <sup>th</sup>	112.84%	114.33%	115.58%	116.88%	118.42%	120.07%	121.96%	124.05%	126.52%	129.59%	149.84%	186.54%			
		114.5% (1.33x)	99 <sup>th</sup>	100.76%	98.44%	96.87%	95.35%	94.45%	93.87%	93.09%	91.93%	91.36%	90.51%	85.36%	78.78%	96.40%	93.90%	92.74%
			50 <sup>th</sup>	112.84%	113.51%	113.29%	113.24%	113.17%	113.13%	113.11%	113.00%	113.34%	113.40%	113.67%	113.78%			
		116.3% (1.5x)	99 <sup>th</sup>	100.76%	98.48%	96.97%	95.75%	94.97%	94.23%	94.00%	93.07%	92.27%	91.85%	87.39%	83.14%	96.99%	95.35%	94.76%
			50 <sup>th</sup>	112.84%	114.02%	114.33%	114.55%	114.62%	114.78%	114.87%	114.82%	115.26%	115.42%	115.87%	116.13%			
		118.0% (1.66x)	99 <sup>th</sup>	100.76%	98.49%	96.97%	95.84%	95.24%	94.84%	94.41%	93.47%	92.59%	92.34%	88.48%	84.57%	97.16%	96.03%	96.10%
			50 <sup>th</sup>	112.84%	114.22%	115.03%	115.49%	115.83%	116.16%	116.34%	116.46%	116.99%	117.22%	117.92%	118.04%			

Over a 5 or 10 year time horizon the 99<sup>th</sup> percentile positions are below 100%. Requiring a higher initial buffer would improve these positions. Reducing the threshold for profit distribution does not have a material impact on the 99<sup>th</sup> percentile position, although it does reduce the 50<sup>th</sup> percentile position. The 99<sup>th</sup> percentile year 1 position is higher than 100% as the 1 year 99<sup>th</sup> percentile market and longevity risk stress over is lower than the initial buffer.

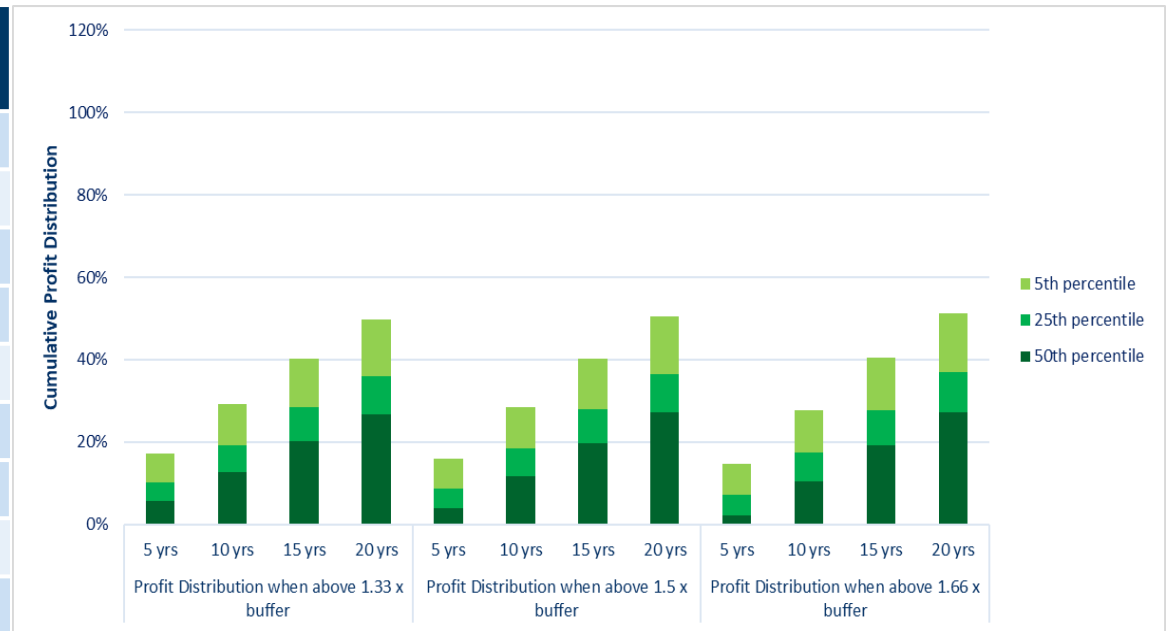
# Profit Distribution – 31 December 2022

## Investment Strategy A

Strategy	A
Profile	50/50
Funding basis	G+0.75%
Buffer	10.9%
Distributions (x buffer)	1.33x   1.5x   1.66x

- We have projected the **Cumulative Profit Distributions** on the **gilts + 0.75%** basis with the asset allocation of **Strategy A**.
- The table below sets out the 50<sup>th</sup>, 25<sup>th</sup> and 5<sup>th</sup> percentile cumulative profit distributions (all in % of starting liability value), based on different profit taking thresholds (chart shows cumulative percentiles).

Basis	Initial Buffer	Profit Taking	Percentile	5 years	10 years	15 years	20 years
Gilts+0.75%	10.9%	114.5%	50 <sup>th</sup>	5.56%	12.76%	20.11%	26.76%
			25 <sup>th</sup>	10.17%	19.33%	28.34%	36.01%
			5 <sup>th</sup>	17.31%	29.16%	40.29%	49.86%
		116.3%	50 <sup>th</sup>	3.89%	11.64%	19.73%	27.12%
			25 <sup>th</sup>	8.59%	18.41%	28.05%	36.54%
			5 <sup>th</sup>	15.92%	28.38%	40.35%	50.53%
		118.0%	50 <sup>th</sup>	2.28%	10.51%	19.22%	27.31%
			25 <sup>th</sup>	7.16%	17.55%	27.84%	37.01%
			5 <sup>th</sup>	14.58%	27.78%	40.37%	51.21%



A higher profit distribution threshold results in deferral of distribution but with similar cumulative amounts over the long term.

# Capital Buffers Adequacy – 31 December 2022

## Investment Strategy B

Strategy	B
Profile	50/50
Funding basis	G+0.75%
Buffer	14.8%
Distributions (x buffer)	1.33x   1.5x   1.66x

- We have projected the **assets and liabilities** on the **gilts + 0.75%** basis with the asset allocation of **Strategy B**.
- The table below sets out the 99<sup>th</sup> and 50<sup>th</sup> percentile funding levels, based on the initial buffer of 99% VaR and different profit taking thresholds.

Basis	Initial Buffer	Profit Taking	Percentile	1 year	2 years	3 years	4 years	5 years	6 years	7 years	8 years	9 years	10 years	15 years	20 years	Probability of full funding in 5 years	Probability of full funding in 10 years	Probability of full funding in 15 years
Gilts+0.75%	14.8%		99 <sup>th</sup>	100.47%	96.61%	94.25%	92.14%	91.00%	89.47%	87.79%	87.66%	85.97%	83.73%	75.68%	65.81%	95.88%	95.84%	96.34%
			50 <sup>th</sup>	117.54%	119.95%	122.32%	124.96%	127.89%	130.84%	134.48%	138.06%	142.71%	147.92%	184.91%	250.49%			
		119.7% (1.33x)	99 <sup>th</sup>	100.47%	96.56%	94.13%	91.70%	89.86%	87.72%	86.86%	85.08%	83.46%	80.95%	68.29%	49.40%	94.81%	91.79%	90.14%
			50 <sup>th</sup>	117.54%	118.53%	118.57%	118.50%	118.47%	118.35%	118.31%	118.23%	118.45%	118.58%	118.64%	118.65%			
		122.2% (1.5x)	99 <sup>th</sup>	100.47%	96.56%	94.19%	91.89%	90.60%	88.72%	87.53%	86.23%	84.52%	81.82%	70.46%	55.02%	95.49%	93.65%	92.42%
			50 <sup>th</sup>	117.54%	119.31%	120.01%	120.27%	120.55%	120.60%	120.74%	120.74%	121.11%	121.22%	121.59%	121.82%			
		124.6% (1.66x)	99 <sup>th</sup>	100.47%	96.61%	94.23%	91.97%	90.85%	89.41%	87.66%	86.87%	84.83%	82.94%	72.87%	60.44%	95.70%	94.53%	94.05%
			50 <sup>th</sup>	117.54%	119.71%	121.00%	121.79%	122.27%	122.60%	122.82%	123.04%	123.40%	123.70%	124.31%	124.59%			

Strategy B shows increased dispersion of outcomes relative to Strategy A, as expected.

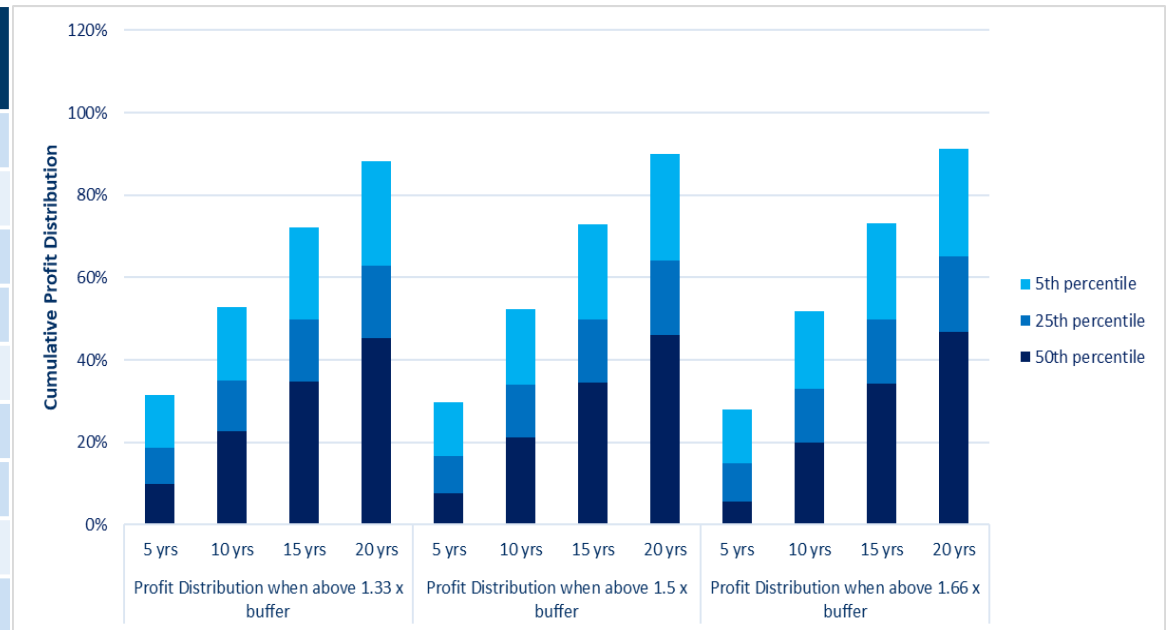
# Profit Distribution – 31 December 2022

## Investment Strategy B

<b>Strategy</b>	B
<b>Profile</b>	50/50
<b>Funding basis</b>	G+0.75%
<b>Buffer</b>	14.8%
<b>Distributions (x buffer)</b>	1.33x   1.5x   1.66x

- We have projected the **Cumulative Profit Distributions** on the **gilts + 0.75%** basis with the asset allocation of **Strategy B**.
- The table below sets out the 50<sup>th</sup>, 25<sup>th</sup> and 5<sup>th</sup> percentile cumulative profit distributions (all in % of starting liability value), based on different profit taking thresholds (chart shows cumulative percentiles).

Basis	Initial Buffer	Profit Taking	Percentile	5 years	10 years	15 years	20 years
Gilts+0.75%	14.8%	119.7%	50 <sup>th</sup>	9.96%	22.66%	34.81%	45.35%
			25 <sup>th</sup>	18.64%	35.06%	49.81%	62.97%
			5 <sup>th</sup>	31.37%	52.90%	72.25%	88.31%
		122.2%	50 <sup>th</sup>	7.73%	21.31%	34.53%	46.08%
			25 <sup>th</sup>	16.70%	34.09%	49.86%	64.09%
			5 <sup>th</sup>	29.63%	52.37%	72.78%	90.02%
		124.6%	50 <sup>th</sup>	5.59%	19.99%	34.13%	46.70%
			25 <sup>th</sup>	14.81%	33.07%	49.80%	65.03%
			5 <sup>th</sup>	27.94%	51.83%	73.21%	91.30%



A higher profit distribution threshold results in deferral of distribution but with similar cumulative amounts over the long term. Strategy B's higher risk/return allows for a higher amount of profit distribution.

# Capital Buffers Adequacy – 31 December 2022

## Investment Strategy C

Strategy	C
Profile	50/50
Funding basis	G+0.75%
Buffer	12.3%
Distributions (x buffer)	1.33x   1.5x   1.66x

- We have projected the **assets and liabilities** on the **gilts + 0.75%** basis with the asset allocation of **Strategy C**.
- The table below sets out the 99<sup>th</sup> and 50<sup>th</sup> percentile funding levels, based on the initial buffer of 99% VaR and different profit taking thresholds.

Basis	Initial Buffer	Profit Taking	Percentile	1 year	2 years	3 years	4 years	5 years	6 years	7 years	8 years	9 years	10 years	15 years	20 years	Probability of full funding in 5 years	Probability of full funding in 10 years	Probability of full funding in 15 years
Gilts+0.75%	12.3%		99 <sup>th</sup>	101.13%	99.92%	98.96%	98.75%	99.85%	100.38%	101.07%	101.65%	102.29%	104.20%	110.48%	119.77%	98.96%	99.59%	99.80%
			50 <sup>th</sup>	114.93%	116.74%	118.34%	119.89%	121.56%	123.40%	125.55%	127.85%	130.59%	133.67%	156.19%	196.02%			
		116.3% (1.33x)	99 <sup>th</sup>	101.13%	99.83%	98.52%	97.66%	98.60%	98.13%	97.98%	97.87%	97.69%	97.84%	97.49%	97.20%	98.53%	98.22%	98.43%
			50 <sup>th</sup>	114.93%	115.87%	115.91%	115.85%	115.84%	115.88%	115.99%	115.93%	116.20%	116.30%	116.35%	116.35%			
		118.4% (1.5x)	99 <sup>th</sup>	101.13%	99.92%	98.88%	98.29%	99.31%	99.49%	99.54%	99.53%	99.63%	99.63%	100.01%	100.34%	98.86%	98.95%	99.00%
			50 <sup>th</sup>	114.93%	116.50%	117.16%	117.49%	117.67%	117.83%	118.09%	118.08%	118.42%	118.44%	118.44%	118.44%			
		120.4% (1.66x)	99 <sup>th</sup>	101.13%	99.92%	98.94%	98.62%	99.80%	99.87%	100.42%	100.23%	100.71%	101.28%	102.00%	102.66%	98.94%	99.23%	99.37%
			50 <sup>th</sup>	114.93%	116.68%	117.84%	118.58%	119.09%	119.51%	119.82%	119.95%	120.41%	120.41%	120.41%	120.41%			

Strategy C shows lower dispersion of 99<sup>th</sup> percentile outcomes relative to Strategy A, reflecting the lower equity and greater credit allocation. The 50<sup>th</sup> percentile outcomes are also higher although this will depend on credit spreads at inception.

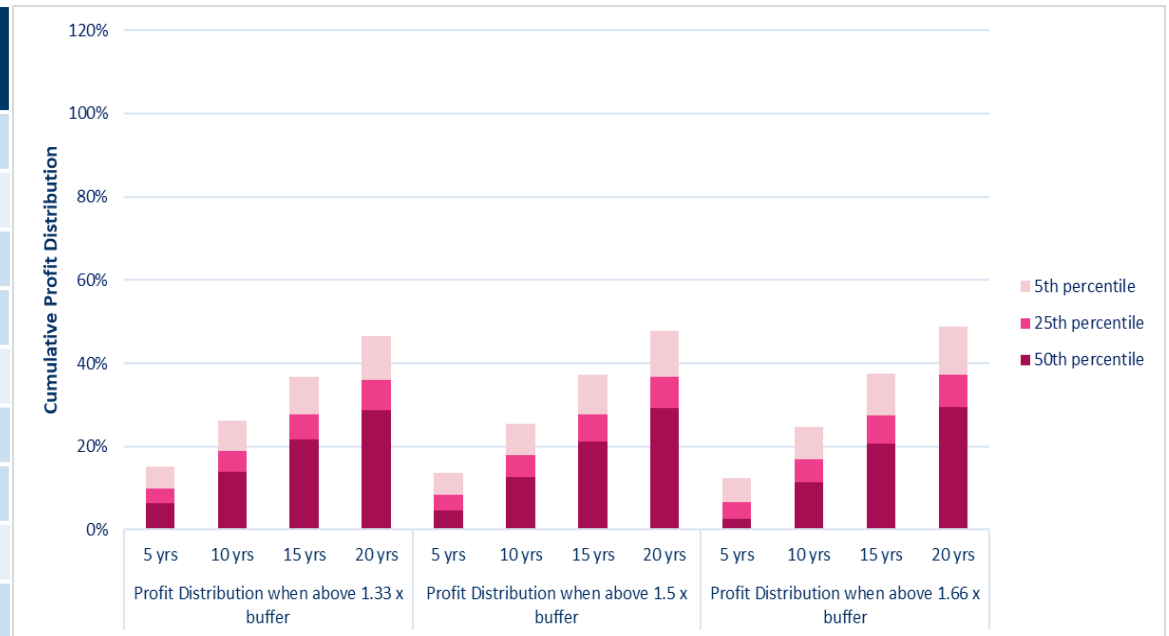
# Profit Distribution – 31 December 2022

## Investment Strategy C

Strategy	C
Profile	50/50
Funding basis	G+0.75%
Buffer	12.3%
Distributions (x buffer)	1.33x   1.5x   1.66x

- We have projected the **Cumulative Profit Distributions** on the **gilts + 0.75%** basis with the asset allocation of **Strategy C**.
- The table below sets out the 50<sup>th</sup>, 25<sup>th</sup> and 5<sup>th</sup> percentile cumulative profit distributions (all in % of starting liability value), based on different profit taking thresholds (chart shows cumulative percentiles).

Basis	Initial Buffer	Profit Taking	Percentile	5 years	10 years	15 years	20 years
Gilts+0.75%	12.3%	116.3%	50 <sup>th</sup>	6.38%	13.80%	21.59%	28.78%
			25 <sup>th</sup>	9.94%	18.88%	27.78%	35.86%
			5 <sup>th</sup>	15.17%	26.08%	36.75%	46.50%
		118.4%	50 <sup>th</sup>	4.53%	12.63%	21.20%	29.15%
			25 <sup>th</sup>	8.30%	17.93%	27.67%	36.64%
			5 <sup>th</sup>	13.71%	25.43%	37.11%	47.74%
		120.4%	50 <sup>th</sup>	2.71%	11.41%	20.78%	29.45%
			25 <sup>th</sup>	6.67%	17.00%	27.48%	37.26%
			5 <sup>th</sup>	12.28%	24.78%	37.38%	48.85%



A higher profit distribution threshold results in deferral of distribution but with similar cumulative amounts over the long term.  
Strategy C's profit distributions are similar to Strategy A.

# Capital Buffers Adequacy – 31 December 2022

## Investment Strategy E

Strategy	E
Profile	50/50
Funding basis	G+0.75%
Buffer	14.2%
Distributions (x buffer)	1.33x   1.5x   1.66x

- We have projected the **assets and liabilities** on the **gilts + 0.75%** basis with the asset allocation of **Strategy E**.
- The table below sets out the 99<sup>th</sup> and 50<sup>th</sup> percentile funding levels, based on the initial buffer of 99% VaR and different profit taking thresholds.

Basis	Initial Buffer	Profit Taking	Percentile	1 year	2 years	3 years	4 years	5 years	6 years	7 years	8 years	9 years	10 years	15 years	20 years	Probability of full funding in 5 years	Probability of full funding in 10 years	Probability of full funding in 15 years
Gilts+0.75%	14.2%		99 <sup>th</sup>	101.54%	101.06%	101.14%	100.69%	102.93%	103.57%	104.36%	105.76%	106.38%	108.40%	115.65%	125.97%	99.45%	99.90%	99.97%
			50 <sup>th</sup>	117.79%	120.13%	122.18%	124.09%	126.37%	128.86%	131.58%	134.51%	137.82%	142.02%	170.04%	220.10%			
		118.9% (1.33x)	99 <sup>th</sup>	101.54%	100.85%	100.50%	99.15%	100.55%	99.92%	99.90%	99.79%	100.47%	100.81%	100.87%	101.52%	99.13%	99.15%	99.21%
			50 <sup>th</sup>	117.79%	118.82%	118.81%	118.65%	118.54%	118.57%	118.59%	118.64%	118.83%	118.94%	118.94%	118.94%			
		121.4% (1.5x)	99 <sup>th</sup>	101.54%	100.90%	101.03%	99.91%	101.79%	101.66%	101.45%	101.90%	102.49%	103.07%	103.37%	104.12%	99.31%	99.61%	99.58%
			50 <sup>th</sup>	117.79%	119.66%	120.36%	120.60%	120.73%	120.94%	121.03%	121.11%	121.36%	121.36%	121.36%	121.36%			
		123.6% (1.66x)	99 <sup>th</sup>	101.54%	100.94%	101.13%	100.24%	102.36%	102.75%	102.86%	103.74%	104.00%	104.89%	105.63%	106.58%	99.39%	99.73%	99.75%
			50 <sup>th</sup>	117.79%	120.01%	121.32%	122.05%	122.51%	122.96%	123.19%	123.31%	123.64%	123.64%	123.64%	123.64%			

Strategy E shows lower dispersion of 99<sup>th</sup> percentile outcomes relative to Strategy A, reflecting the lower equity and greater credit allocation. The 50<sup>th</sup> percentile outcomes are also higher although this will depend on credit spreads at inception.

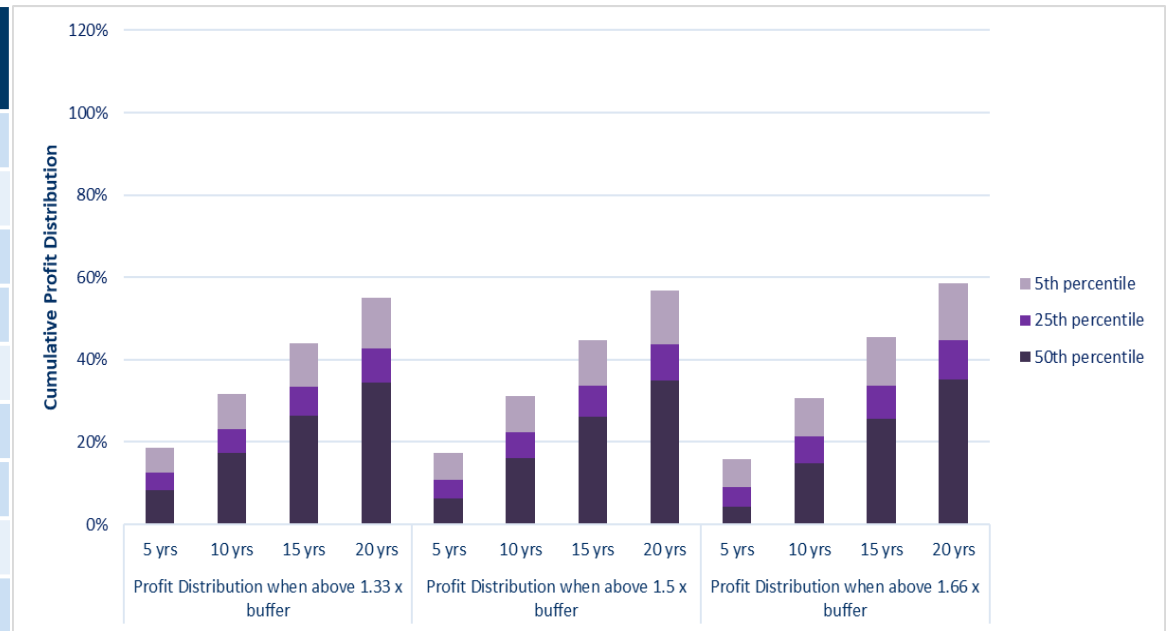
# Profit Distribution – 31 December 2022

## Investment Strategy E

<b>Strategy</b>	E
<b>Profile</b>	50/50
<b>Funding basis</b>	G+0.75%
<b>Buffer</b>	14.2%
<b>Distributions (x buffer)</b>	1.33x   1.5x   1.66x

- We have projected the **Cumulative Profit Distributions** on the **gilts + 0.75%** basis with the asset allocation of **Strategy E**.
- The table below sets out the 50<sup>th</sup>, 25<sup>th</sup> and 5<sup>th</sup> percentile cumulative profit distributions (all in % of starting liability value), based on different profit taking thresholds (chart shows cumulative percentiles).

Basis	Initial Buffer	Profit Taking	Percentile	5 years	10 years	15 years	20 years
Gilts+0.75%	14.2%	118.9%	50 <sup>th</sup>	8.37%	17.46%	26.40%	34.42%
			25 <sup>th</sup>	12.66%	23.23%	33.48%	42.76%
			5 <sup>th</sup>	18.69%	31.57%	44.05%	54.96%
		121.4%	50 <sup>th</sup>	6.27%	16.20%	26.10%	34.94%
			25 <sup>th</sup>	10.85%	22.32%	33.60%	43.84%
			5 <sup>th</sup>	17.28%	31.10%	44.86%	56.87%
		123.6%	50 <sup>th</sup>	4.27%	14.93%	25.64%	35.28%
			25 <sup>th</sup>	9.10%	21.43%	33.63%	44.83%
			5 <sup>th</sup>	15.86%	30.67%	45.60%	58.52%



A higher Profit Distribution threshold results in deferral of distribution but with similar cumulative amounts over the long term. Strategy E's profit distributions are slightly higher than those of Strategy A.



# Comparison with prior analysis

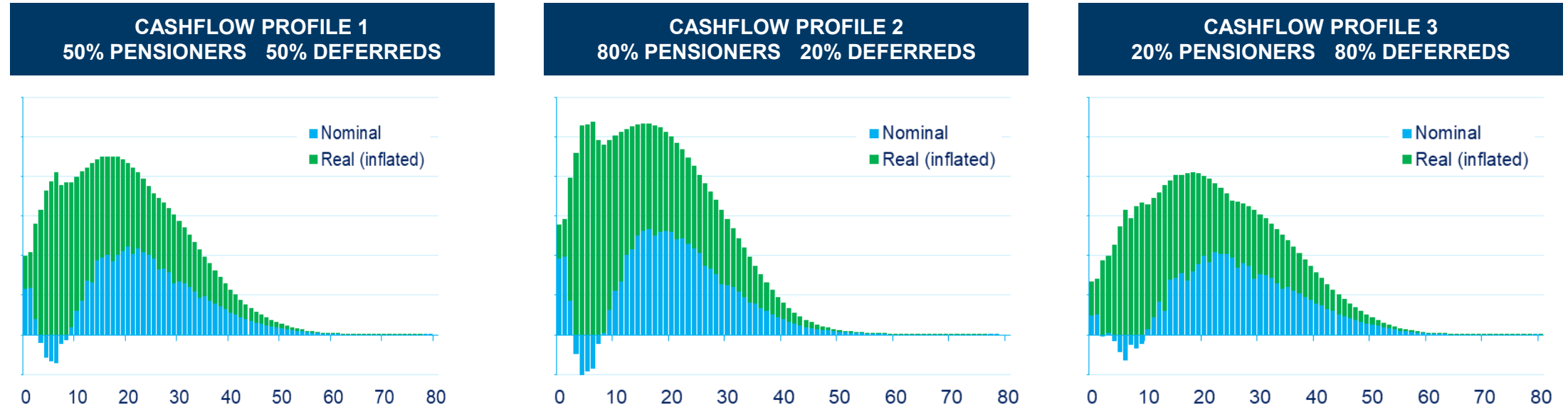
The following table summarises the results from this section as well as comparing them to our previous analysis from May 2023. Both have been carried out using 31 December 2022 capital market assumptions. These analyses are comparable.

99 <sup>th</sup> percentile funding level	Analysis excluding longevity risk (3% buffers excluded)							Prior analysis excluding longevity risk (3% buffers excluded)						
	G+0.75%							G+0.75%						
	Buffer	No profit taking			Profit taking at buffer x 1.66			Buffer	No profit taking			Profit taking at buffer +10%		
		FL 5 years	FL 10 years	Prob. FF 10 years	FL 5 years	FL 10 years	Prob. FF 10 years		FL 5 years	FL 10 years	Prob. FF 10 years	FL 5 years	FL 10 years	Prob. FF 10 years
Strategy A	10.9%	95.4%	93.5%	97.1%	95.2%	92.3%	96.0%	15.0%	100.0%	100.5%	99.1%	100.0%	99.9%	99.0%
Strategy B	14.8%	91.0%	83.7%	95.8%	90.9%	82.9%	94.5%	24.0%	100.4%	97.0%	98.8%	100.4%	95.9%	98.5%
Strategy C	12.3%	99.9%	104.2%	99.6%	99.8%	101.3%	99.2%	13.0%	100.6%	105.2%	99.7%	100.6%	103.2%	99.6%
Strategy E	14.2%	102.9%	108.4%	99.9%	102.4%	104.9%	99.7%	12.0%	100.7%	105.6%	99.8%	100.2%	102.9%	99.6%

# Appendix 2: Assumptions

# Cashflow Profiles – 31 December 2022

- The charts below illustrate the proposed cashflow profile used within the asset-liability modelling analysis, split by nominal and real cashflows. The pensioner proportions under the profiles are 50%, 80% and 20% (from left to right).
- The demographic assumptions underlying these profiles are set out in the table below.



Assumptions	
Commutation	We have assumed that 20% of the total value being a lump sum is equivalent to c. 25% of a member's pension being commuted (spouse's pension isn't commutable and this is estimated to be c. 20% of total value).
Proportion married	85%
Spouse's fraction	50%
Expenses	We have assumed an allowance for expenses is capitalized into the liability value and expenses are proportional to benefit cashflow.

# Assumptions underlying liability cashflow profiles

- The table below shows the main assumptions that were used to construct the liability cashflow profiles.

Assumption	
Pre and post retirement discount rate	Gilts + 0.75% p.a.
Pension increases	Assumptions derived in line with best-estimate assumptions
Mortality	<ul style="list-style-type: none"> <li>Pensioners: 100% of S2PA, CMI2018 Core parameters, LTR 1.75%</li> <li>Deferreds: 100% of S2PA, CMI2018 Core parameters, LTR 1.75%</li> </ul>
RPI – CPI wedge	<ul style="list-style-type: none"> <li>None</li> <li>CPI linked cashflows modelled as RPI cashflows</li> </ul>
Mortality risk	<ul style="list-style-type: none"> <li>Not modelled</li> </ul>
Mortality age rating	<ul style="list-style-type: none"> <li>0 years</li> </ul>
Mortality weighting	<ul style="list-style-type: none"> <li>100% for males and females</li> </ul>
Guarantee	<ul style="list-style-type: none"> <li>5 years</li> </ul>
RPI	<ul style="list-style-type: none"> <li>Assumption derived in line with best-estimate, with no IRP</li> </ul>
Spouse's age	<ul style="list-style-type: none"> <li>Females are assumed to be 3 years younger than males</li> </ul>
Membership profile gender	<ul style="list-style-type: none"> <li>60% of liabilities are associated with males and 40% with females</li> </ul>

# Liability durations – 31 December 2022

Cashflow Profile	Duration (years, G+0.75% basis)	Inflation Proportion
80% Pensioners 20% Deferreds	13.0	61.7%
50% Pensioners 50% Deferreds	14.3	62.3%
20% Pensioners 80% Deferreds	16.2	61.9%

# Notes on, Data, Assumptions, Risk Identification and Model

## Asset Liability Modelling

This report complies with the requirements of the technical actuarial standard TAS 100 version 2.

### Data

Slide 4 covers the data used in the analysis presented in this report. This includes the asset allocation modelled. The liability data within the ALM modelling is based on a liability benchmark portfolio derived for the purpose of this analysis as described on slides 40-42.

### Assumptions

The key assumptions used in carrying out the analysis shown in this report are the expected returns on assets and the volatility of these returns. These assumptions are summarised on slide 44.

### Risk Identification

The analysis shown in this report includes stochastic analysis. This means many potential outcomes were projected to illustrate the uncertainty around the return that may be achieved from investments and the potential development of the value placed on the liabilities. We consider this to be a good way to consider risk associated with market prices, interest rates, inflation and credit.

### Model

We consider our ALM model to be robust for the requirements of the analysis shown in the work. We have used a model that provides 10,000 simulations for VaR and Profit Distributions analysis and 5,000 simulations for POMB analysis and we consider this a good indication of the range of potential outcomes. We do, however, highlight some limitations.

- The use of annual time steps (rather than a shorter step) means some effects of dynamic derisking or rebalancing may not be fully reflected.
- The model does not allow for tracking error in liability hedging strategies. i.e. a strategy with 100% hedging provides zero interest rate/inflation risk.
- The model ignores transition costs associated with rebalancing or changing investment strategy.

# Capital market assumptions as at 31 December 2022

- Our asset/liability and capital market modelling is driven by economic simulations generated on the basis of the following assumptions. These assumptions represent our best view based on historical and forward looking analysis and are combined with market conditions to calibrate our models.
- The 31 December 2022 assumption set has been used. The risk-return characteristics are summarised in the table below. The annualized returns are over a 10-year horizon and expressed relative to cash. Volatility is over a 1-year horizon and expressed in absolute terms.

Assumption	Standard deviation (p.a.)	Mean excess return (p.a.)	Median excess return (p.a.)
Fixed interest gilts	11.7%	0.1%	-0.2%
Index-linked gilts	9.9%	-0.4%	-0.9%
Sterling non-gilts	8.1%	1.3%	1.1%
Developed Global Equity (Hedged)	17.6%	4.6%	3.5%
Emerging Market Equity	25.1%	6.5%	4.3%
Conventional Property	15.0%	3.1%	2.2%
High Lease Value Property	8.9%	1.8%	1.5%
Hedge Funds (Standard)	7.3%	2.2%	2.1%
High Yield Debt (Hedged)	13.0%	2.6%	2.3%
Emerging Market Debt (LC)	15.8%	3.2%	2.2%
Emerging Market Debt (HC)	10.9%	2.7%	2.4%
Infrastructure Unlisted Equity	17.1%	4.3%	3.3%
Junior Private Debt	16.0%	4.7%	4.0%
Senior Private Debt	12.3%	3.4%	3.0%
Private Equity	27.1%	6.8%	4.0%
Multi Asset Credit	10.9%	3.9%	3.7%
Absolute Return Fixed Income	3.2%	1.5%	1.4%

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