Introduction

1. The Panel engaged Mercer as a consultant to study the feasibility of offering CPF members a low-cost privately managed investment option with the potential to enhance their retirement savings (henceforth referred to as Lifetime Retirement Investment Scheme or the Scheme).

2. The Lifetime Retirement Investment Scheme is designed for CPF members who wish to take on some investment risk to seek higher expected returns than the CPF interest rates, at low cost. Mercer's study focused on the following areas of the proposed Scheme:

   a. The basic design features for offering the Lifetime Retirement Investment Scheme to CPF members.

   b. The possible risk and return characteristics of the Lifetime Retirement Investment Scheme, and hence its feasibility.

Basic Design Features of Lifetime Retirement Investment Scheme

3. Mercer assessed and affirmed that the following design features would be desirable for a Scheme intended to cater to the vast majority of those CPF members who desire a higher expected return and are willing to take on some investment risk, but feel that they lack the financial expertise and/or time and resources to actively manage their investments:

   a. A small number of fund choices are offered within the Lifetime Retirement Investment Scheme framework to facilitate ease of choice by CPF members.

   b. The fund choices offered within the Scheme framework consisted of well-diversified funds. This is in line with the core investment offerings provided by international Defined Contribution retirement systems (additional details in **Appendix A**).

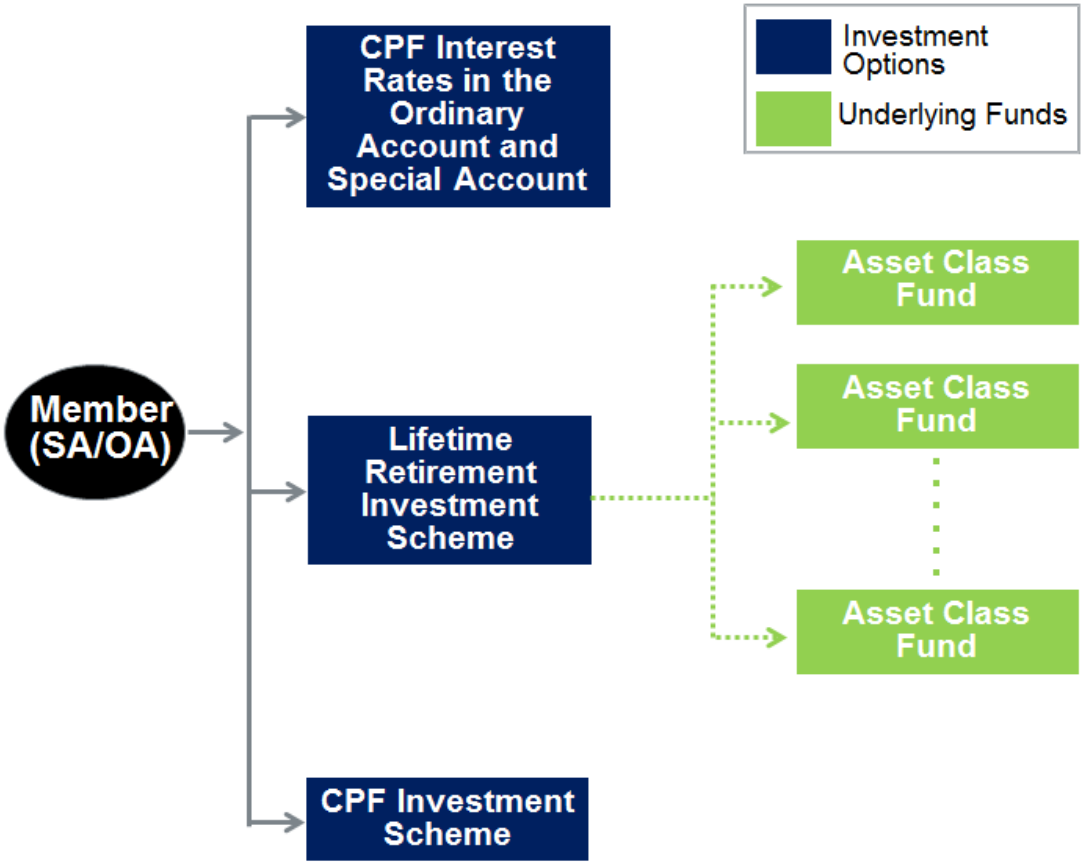
   c. The Scheme has only one administrator to enable it to gain substantial assets from a zero base. This would reduce the expense ratio through economies of scale and also reduce the investment decisions that CPF members need to make as CPF members would only need to choose the fund that they wish to invest in, without having to also choose a fund provider.

   d. The funds within the Lifetime Retirement Investment Scheme are passively-managed, as passive management will result in lower expense ratios.

e. In line with the low-cost nature of the funds, these funds are no-load funds. This is different from other retail-oriented funds (such as those offered through CPFIS) which typically include a sales charge of 3%.

f. Such a Scheme could be integrated within the current CPF framework as shown in Figure 1.

Figure 1: CPF Framework with Lifetime Retirement Investment Scheme



4. Mercer further expects that the most cost-efficient approach to be one in which the administrator of the Scheme pools the savings of individual CPF members and appoints passive managers for investment management. Mercer is of the view that a total expense ratio of approximately 50 basis points (i.e. 0.5% per year) or lower could potentially be achieved. This is based on passive management and assumes the Scheme is able to aggregate assets of at least $500 million. However, Mercer notes that a larger fund could lower the total expense ratio even further. The eventual total expense ratio will depend on the actual size of the assets raised, the number of members who participate, and the actual party that is appointed to administer the Lifetime Retirement Investment Scheme.

Possible Risk and Return Characteristics of Funds within the Lifetime Retirement Investment Scheme

5. With the basic design features in mind, Mercer then studied the possible risk and return characteristics of the Lifetime Retirement Investment Scheme, and hence its feasibility.

6. Given that members investing in the Lifetime Retirement Investment Scheme have a "next best alternative" option in the form of the CPF interest rates[1], Mercer is of the view that any analysis of additional investment options should focus on their **potential improved returns as well as the probability and impact of poor returns on their retirement savings**.

7. Given these considerations, Mercer adopted the following measures in assessing the possible fund choices and asset allocations under the Lifetime Retirement Investment Scheme, as outlined in the table overleaf.

[1] The CPF interest rate available to Ordinary Account balances are computed based on the weighted average of 12 month deposit rate (80% weightage) and savings rate (20% weightage), with a floor rate of 2.5%. The CPF interest rate available to Special Account balances are computed based on the 10 year Singapore Government Securities yield plus 1%. The current 4% SA interest rate floor guarantee has been renewed regularly since 2009 and was recently renewed by another year to end December 2016. Mercer's long term projection models simulated the OA and SA interest rates being subject to these floor rates.

Table 1: Metrics for Analysis

Areas of Analysis	How This Was Measured and Assessed
Potential Gains from Lifetime Retirement Investment Scheme relative to CPF Interest Rate	➢ Measured the potential increase that members could expect in their CPF account balances by investing in the Scheme relative to what they would have received if they earned the OA and SA interest rates
Potential Downside from Lifetime Retirement Investment Scheme relative to CPF Interest Rate	➢ Measured the probability that the expected returns of the proposed Scheme were lower than the OA and SA interest rates over the long term
Outlining the projected worst-case scenario	➢ Worst-case outcomes for returns from the Scheme and on the potential reduction in members' CPF account balances relative to what they would have received if they earned the OA and SA interest rates o Mercer generated 2000 possible outcomes based on different scenarios for future investment returns. o The worst case represents the outcomes associated with the worst 5% (or 100) of these outcomes

8. For the purposes of its study, Mercer analysed the following illustrative asset allocations:

   a. **Life-Cycle Fund,** where the investor's exposure to risk reduces according to a preset path as he approaches retirement[2].

   b. **Static Risk Funds with the following asset allocations:**

      i. Moderately Conservative Fund (30% Equities; 70% Bonds)

      ii. Balanced Fund (50% Equities; 50% Bonds)

      iii. Growth Fund (70% Equities; 30% Bonds)

      iv. High Growth Fund (90% Equities; 10% Bonds)

[2] The preset path Mercer used for the analysis of the Life-Cycle Fund is shown in Figure B-1 in the Appendix below.

9. The analysis assumed a monthly investment of $1,000 over an investment horizon of 30 years. This would allow the investor to ride out any short-term market volatility. The assumptions (including the key assumptions, capital market assumptions and expense ratios applicable), path for the Life-Cycle Fund, and the asset allocation for the static risk funds are appended in **Appendix B.**

Mercer's Projections of the Expected Increase in CPF Balances and Probability of Underperforming CPF Interest Rates over a 30-year period

10. Based on Mercer's model, the annualised expected returns over a 30-year period for the CPF Ordinary Account, Life-Cycle Fund, and the Static Risk Funds are shown in Table 2 below.

Table 2: Projected Expected Returns assuming a 30 year Annual Regular Investment of $1,000

Investment Option	Ordinary Account	Special Account	Life-Cycle Fund	Moderately Conservative Fund	Balanced Fund	Growth Fund	High Growth Fund
Expected Return	3.0%	5.2%	6.5%	5.3%	6.3%	6.9%	7.4%

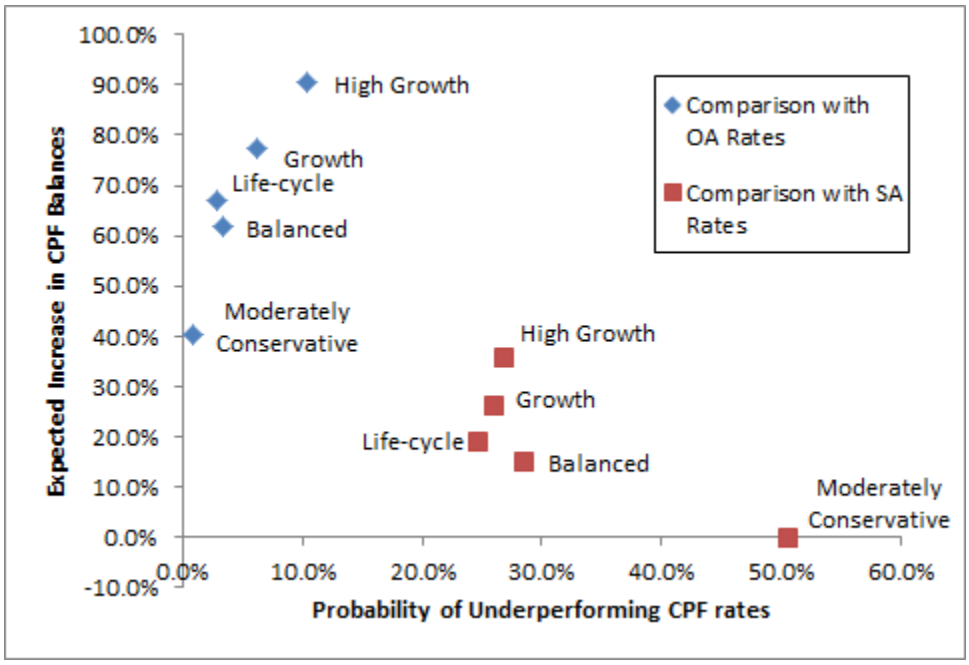
Note: Results are based on expense ratios of 0.5%.

11. It may appear surprising to some that the OA and SA interest rates are projected to be higher than their respective floors going forward, and Mercer's model may appear to be optimistic[3]. However, even if that were to be the case, any possible optimism would be compensated for after comparing the projected risk-return metrics of the funds with the OA and SA interest rates (see Figures 2 to 4).

12. Figure 2 illustrates the projected average expected increase in the CPF balances of CPF members who invested in the Lifetime Retirement Investment Scheme and the probability of underperforming the CPF interest rates over the 30 year period.

[3] The Panel notes that a separate IPS Working Paper projected that Singapore Government bond yields would gradually increase to 5.3% p.a. over 10 years (Source: The Investment Risks in Singapore's Retirement Financing System, 2014).

Figure 2: Investment Outcomes for Lifetime Retirement Investment Scheme over a 30-Year Period compared to the OA and SA



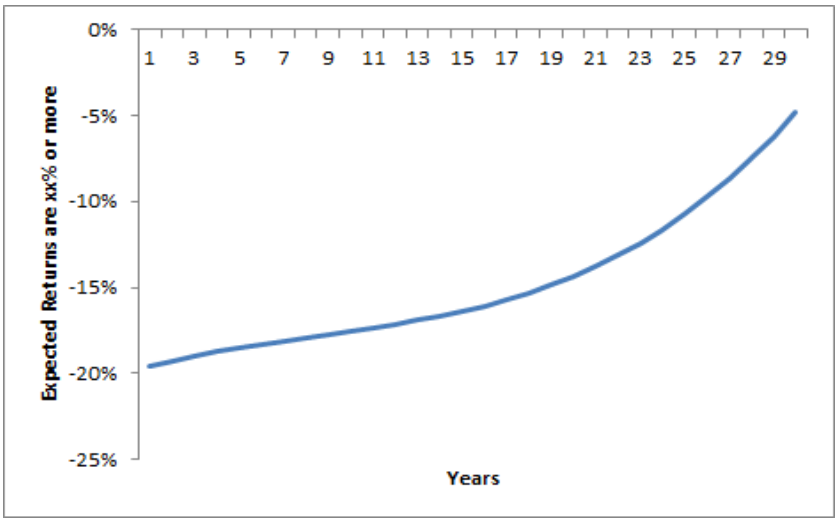
13. Given the higher SA interest rate, it is not surprising that the **Lifetime Retirement Investment Scheme would offer lower expected increase in CPF balances and higher probability of underperforming the SA interest rate**.

14. **In Mercer's simulations, the Life-Cycle Fund offered a slightly better risk/reward trade-off as compared to the Balanced Fund** (i.e. achieves higher expected increase in CPF balances with lower probability of underperforming the CPF interest rates). This could be attributed to the nature of the Life-Cycle Fund, which, for the purposes of the analysis, automatically reduces equity exposure over time to 20% as the member approaches retirement, as compared to the Balanced Fund that continues to maintain a 50% exposure to equities.

Possible "Worst Case" Outcomes

15. Using the Life-Cycle Fund as an illustration, Mercer estimated that members have a 5% chance of their account balances falling by 20% or more in a year at the start of the Life-Cycle Fund when their equity allocations are high (see Figure 3). Members would also have an estimated 5% chance of their account balances falling by 5% or more in the 30th year of the Life-Cycle Fund, when the equity allocation is significantly lower.

Figure 3: "Worst Case" Outcomes for Life-Cycle Fund



Managing "Event Risk"

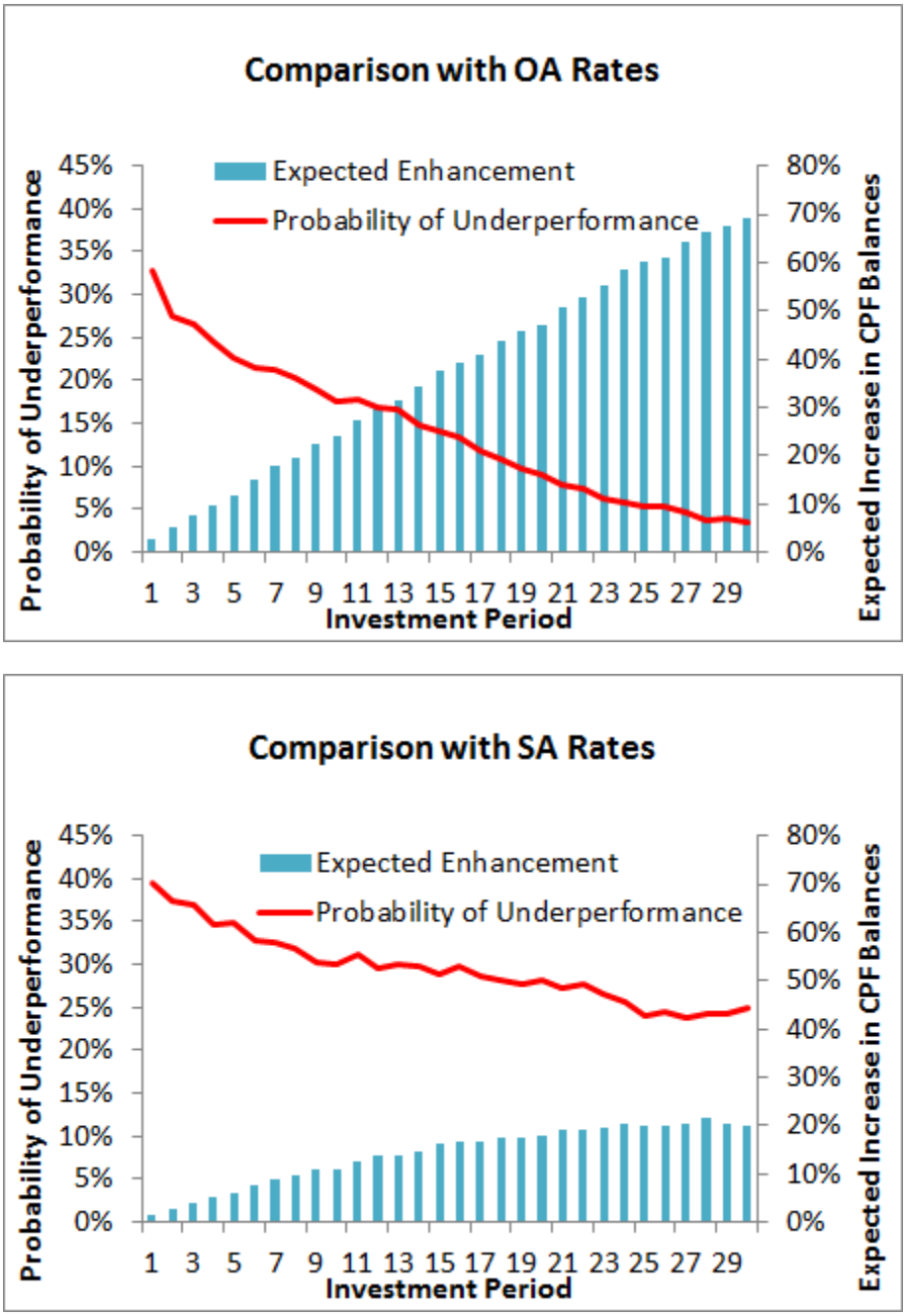
16. The issue of "event risk" relates to the timing of liquidation of a member's investment in the Lifetime Retirement Investment Scheme. In particular, this is the risk that a member might have to liquidate his investments immediately after a significant market fall.

17. **One way to mitigate such "event risk" is via the glide-path of a Life-Cycle Fund which reduces the allocation to risky assets as members approach retirement.** However, even the most conservative Life-Cycle Fund experienced negative returns during 2008/9 global financial crisis. The "event risk" could potentially be further managed by providing members with the ability to remain invested beyond the retirement age.

Impact of Investment Horizon on the Probability of Underperformance

18. In general, **the expected increase in CPF balances and probabilities of underperformance of the Life-cycle Fund compared to the CPF interest rates improves as the investment horizon increases,** as shown in Figure 4. Given the higher SA interest rate, the expected increase of SA balances invested in the Life-Cycle Fund is lower, hence the higher probability of underperformance. This analysis supports the case for members to adopt a long investment horizon if they choose to participate in the Lifetime Retirement Investment Scheme.

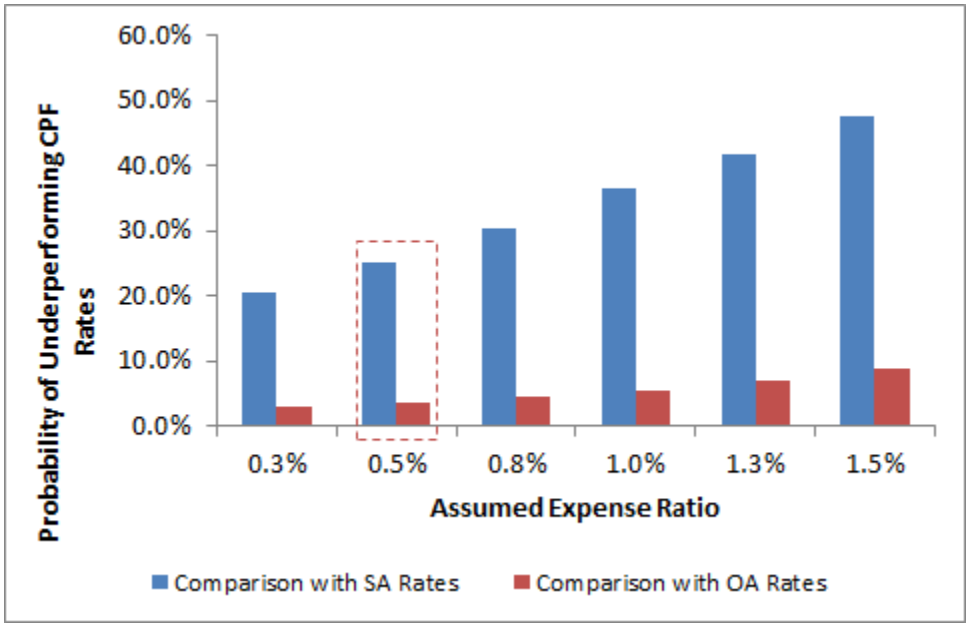
Figure 4: Investment Horizon and Probability of Underperformance



Impact of Expense Ratio of Lifetime Retirement Investment Scheme on Probability of Underperformance

19. Mercer's analysis assumed an expense ratio of 50 basis points for the Lifetime Retirement Investment Scheme. However, the expense ratios actually achieved for the Lifetime Retirement Investment Scheme will have a non-trivial impact on the potential investment outcomes. In general, the **higher the expense ratio, the higher the probability of Lifetime Retirement Investment Scheme underperforming OA and SA interest rates**, as shown in Figure 5.

Figure 5: Expense Ratio and Probability of Underperformance



Summary

20. Mercer's analysis indicates that **under the assumptions made, it is feasible, with a reasonable probability, for funds such as the illustrative Life-Cycle Fund and the static risk funds to enhance account balances for CPF members who are willing to take investment risk by investing their CPF savings**. The expected increase of SA balances for investing SA savings in the Lifetime Retirement Investment Scheme is relatively lower and the probability of underperforming the higher SA interest rate is higher. While static risk funds with higher risk have a reasonable chance of producing enhanced account balances, it needs to be recognised that maintaining these risk profiles till retirement results in "event risk" - namely the risk of a significant negative return arising in the investor's latter years that adversely impacts account balances without sufficient time for recovery.

21. One possible way to manage this "event risk" is through a life-cycle investment approach which reduces the allocation to equities (an increases the allocation to less risky assets) as members approach retirement, while still resulting in similar chances of producing enhanced account balances as the Balanced or Growth Funds.

APPENDIX A

1. There are two main approaches used for the design of well-diversified investment options within Defined Contribution (DC) retirement funds globally. These are Static Risk Funds or Variable Risk Funds. The features of each are summarized below:

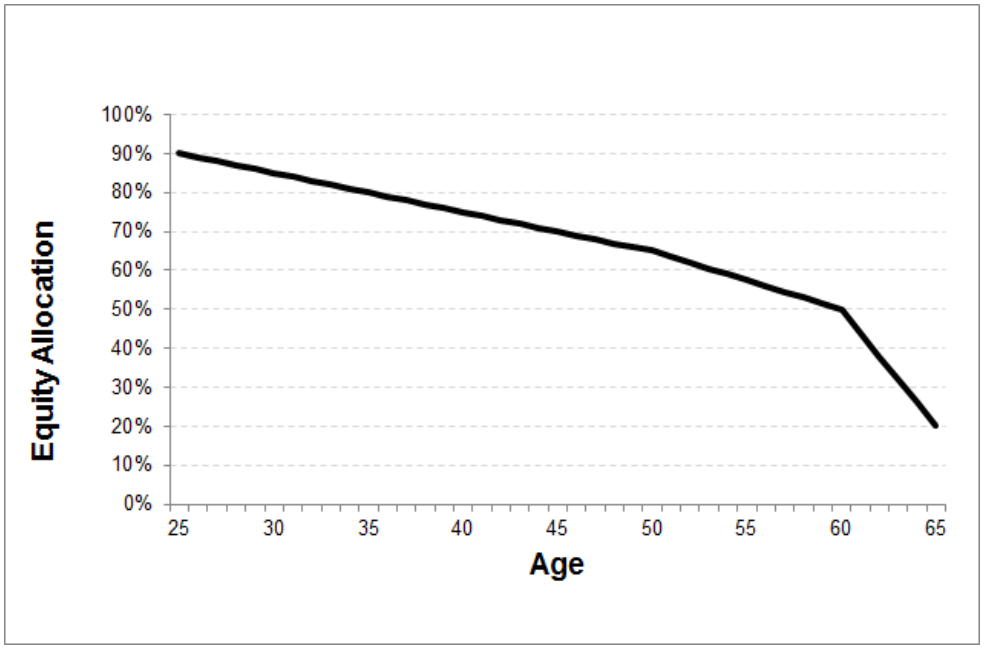
Static Risk Funds	Variable Risk Funds
• Static risk funds typically involve the establishment of 3 to 6 funds covering a variety of risk profiles • These funds could range from a purely cash portfolio for capital preservation purposes, through to purely equity portfolio for maximum potential capital appreciation • Between these two extremes, there might, for example, be Conservative, Balanced, Growth and High Growth Funds with differing risk/return expectations • Participants choose the fund that best suits them, with one fund being selected as a default option for those who do not exercise an active choice • Participants are required to make an active decision to move towards a more conservative option as they approach retirement to reduce "event risk" • They are also known as "life style" funds	• Designed such that the asset allocation becomes more conservative as the target date (usually retirement) approaches • The introduction of these funds has been one key risk mitigation approach that many DC funds have introduced to manage "event risk" in the sense that the participant's exposure to risky assets automatically reduces as they approach retirement • The manner in which the asset allocation changes over time is known as the "glide path" • They are also known as "life-cycle" or target date funds.

APPENDIX B

1. Mercer made some assumptions, as summarized below, in order to test the extent to which the Lifetime Retirement Investment Scheme might be expected to enhance returns for CPF members.

Key Assumptions	
Cash flows	**Regular level contributions assumed to be made throughout investment period**
Approach for Lifetime Retirement Investment Scheme	Static Risk Funds and the Life-Cycle Fund in the Lifetime Retirement Investment Scheme are assumed to be globally diversified, but with dedicated Singapore allocations. The 'glide path' used for Mercer's analysis of the Life-Cycle Fund in the Lifetime Retirement Investment Scheme is shown below in Figure B-1 below.
Capital Market Assumptions	**Mercer's assumptions used for future asset class returns and how these are expected to vary over time. These are outlined below.** *The analysis makes allowance for OA and SA rates to be reflective of market rates, subject to prescribed minimums*
Expense Ratio for Lifetime Retirement Investment Scheme	**Assumption for expense ratio for the illustrative Life-Cycle Fund is 50 basis points per annum, based on passive management and Lifetime Retirement Investment Scheme raising aggregate assets of around $500 million.**

Figure B-1: Glide Path for Life-Cycle Fund



Expense Ratio

2. Assuming that asset classes that can be passively managed will be managed passively together with an allowance for other costs (e.g. custody, record-keeping, etc.), the total expense ratio of 45 basis points per annum is assumed for the Moderately Conservative, 50 basis points for Balanced, 55 basis points for Growth and 60 basis points for High Growth.

Table B-1: Illustrative Asset Allocation for Static Risk Fund[4]

	Moderately Conservative	Balanced	Growth	High Growth
Developed Market Equities	15%	28%	38%	50%
Emerging Market Equities	4%	7%	10%	13%
Singapore Equities	8%	15%	21%	27%
Global Aggregate Bonds	21%	13%	7%	0%
Singapore Govt Bonds	28%	18%	10%	0%
Singapore Corp Bonds	14%	9%	4%	0%
Asian Credit	10%	10%	10%	10%
Cash	0%	0%	0%	0%
Total	**100%**	**100%**	**100%**	**100%**

[4] For the purposes of this study, Mercer's Capital Market Assumptions were input into Mercer's Portfolio Structuring Toolkit to generate an efficient frontier. Thereafter, a range of portfolios with varying risk and return were selected. These portfolios are then run through stochastic modelling to obtain their return and risk characteristics.

Capital Market Assumptions

3. The following table summarizes the capital market assumptions that Mercer has used in the analysis and is based on a starting date of 1 January 2015.

30Y Market Aware			Geometric Return	Standard Deviation (Volatility)
Equities	Singapore Equity		7.6%	26.3%
	Global Developed Large Cap Equity	Unhedged / Hedged	6.5% / 6.8%	19.3% / 18.9%
	Emerging Markets Equity	Unhedged	8.1%	26.7%
Fixed Income	Singapore Cash		2.4%	1.1%
	Singapore Government Bonds		3.7%	5.3%
	Singapore Non-Government Bonds		4.0%	4.2%
	Global Aggregate Bonds	Hedged	3.3%	4.9%
	Asia (Hard Currency) Bonds	Hedged	5.1%	6.0%

4. In setting assumptions, although Mercer considers long-run historical performance, the assumptions are based on Mercer's guiding principles and beliefs and are developed through a forward-looking framework. Mercer's approach to setting return assumptions is detailed and relies on initial market yields and valuations, together with longer-term expectations.

5. As such, the assumptions are conditional upon the initial market valuations and acknowledge that short- to medium-term asset valuations can vary, sometimes significantly, from longer-term expectations. Mercer's assumptions include the effect of such short-term fluctuations disappearing over time as initial conditions gradually revert to the steady state conditions.

6. Mercer's equity return assumptions are driven by underlying economic assumptions such as real GDP growth, inflation and corporate profitability. Consideration is given to the impact of market valuations mean-reverting or GDP growth/inflation trending up or down over the forecast period, and the ramifications these may have for equity markets. Mercer's fixed income return assumptions make allowance for the expected impact of the bond yields moving from their current position to an expected 'steady state' over time. Finally, currency movements are also modelled to bring all the simulations back into the required currency frame of reference, which is the SGD in this instance.

Capital Market Stochastic Model

7. Mercer's Capital Market Simulator produced 2000 random simulations for the purpose of this analysis. Through this model, Mercer has taken into account expected movements in the OA and SA interest rates subject to the floor rates described in footnote 3 of the main Annex D.

8. The OA interest rate is projected to result in a geometric average return of 3.0% p.a. and a standard deviation of 0.7%. The SA interest rate is projected to result in a geometric average return of 5.2% p.a. and a standard deviation of 0.9%.

Figure B-2: Simulated OA and SA Interest Rate