

MPF Annuitization with Investment and Longevity Pooling

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MPF is a Defined Contribution Scheme:

- Each participant has one or more accounts
- Accounts are invested in MPF approved investment funds
- A retiree's retirement income is dependent on the account balance (from all accounts)
- The account balance is subject to investment volatility, unless invested in stable return funds
- The account balance can be depleted from withdrawals before a retiree's demise
- An age 65 retiree's life expectancy cannot be predicted accurately
- A retiree needs a retirement fund to cover 25 to 30 years of living expenses
- Life expectancy of an age 65 retiree group can be predicted fairly accurately, male 21.6 and female 24.3 years
- Retirees can form a group annuity scheme to manage the investment and longevity risks

Hong Kong Old Age Benefit Enhancements:

- January 2017 Poverty Alleviation and Retirement Protection Report announced changes
- OALA adding a higher tier of \$3,435 monthly income, above the basic \$2,565 amount
- Estimated lump sum value of OALA income at age 65:

	Monthly Income	Discount rate 3%	Discount rate 4%
Male	\$3,435	\$628,451	\$567,996
Female	\$3,435	\$672,988	\$604,374
Male	\$2,565	\$469,280	\$424,137
Female	\$2,565	\$502,537	\$451,301

Note: Lump sums are estimated using US MP-2014 Mortality Table with MP-2015 Mortality Improvement Scale

Hong Kong Old Age Benefit Enhancements:

- OALA benefit qualification is based on income and asset requirements
- OALA benefits are very valuable compared to average September 2016 MPF balance of \$234,000
- Middle to high income MPF participants, contributing since 2001, may have a higher balance
- Many non OALA qualified MPF participants, retiring in the next 5 to 10 years, will have MPF Balance less than OALA lump sum values
- Retirees will need MPF balance and personal savings to generate similar OALA monthly income

Post-retirement Income from MPF and Personal Savings

- It would be useful to identify the retirement income needed to maintain similar pre-retirement living standard
- Income replacement percentage (i.e., retirement income as a percentage of income immediately before retirement)
- Income replacement percentage should reflect the pre-retirement income level, pre and post-retirement income tax rates and living expenses, available post-retirement benefits (i.e., pension, medical and transportation subsidies...etc), inflation and other factors
- Generally, income replacement percentage is 80% or higher for low income retirees, 70% for middle income retirees and 50% to 60% for high income retirees

Post-retirement Income from MPF and Personal Savings

- Lump sum values of 60% to 80% income replacement are shown below:

Retirement Income and Lump Sum Value at Age 65

Male Retirees

Pre-retirement Monthly Income	\$15,000	\$25,000	\$40,000	\$60,000
Post-retirement Income Replacement %	80%	75%	70%	60%
Post-retirement Monthly Income	\$12,000	\$18,750	\$28,000	\$36,000
Lump Sum Value of Income 4% Return	\$1,984,264	\$3,100,413	\$4,629,950	\$5,952,793
Lump Sum Value of Income 3% Return	\$2,195,462	\$3,430,409	\$5,122,744	\$6,586,385

Post-retirement Income from MPF and Personal Savings

- Lump sum values of 60% to 80% income replacement are shown below:

Retirement Income and Lump Sum Value at Age 65 Female Retirees

Pre-retirement Monthly Income	\$15,000	\$25,000	\$40,000	\$60,000
Post-retirement Income Replacement %	80%	75%	70%	60%
Post-retirement Monthly Income	\$12,000	\$18,750	\$28,000	\$36,000
Lump Sum Value of Income 4% Return	\$2,111,352	\$3,298,987	\$4,926,487	\$6,334,055
Lump Sum Value of Income 3% Return	\$2,351,051	\$3,673,518	\$5,485,787	\$7,053,154

Note: The lump sum values are estimated with US MP-2014 Mortality Table and MP-2015 Mortality Improvement Scale with 4% and 3% annual post-retirement investment return.

- Lump sum value of a lifetime income with 3% investment return, compared to 4% return, is 10.6% and 11.3% larger respectively for male and female

Post-retirement Income from MPF and Personal Savings

- Required total monthly MPF contribution and personal savings is shown below:

Monthly Retirement Savings for 35 Years to Age 65

Male Retirees

Pre-retirement Monthly Income	\$15,000	\$25,000	\$40,000	\$60,000
Post-retirement Income Replacement %	80%	75%	70%	60%
Post-retirement Monthly Income	\$12,000	\$18,750	\$28,000	\$36,000
Lump Sum Value of Income 4% Return	\$1,984,264	\$3,100,413	\$4,629,950	\$5,952,793
Lump Sum Value of OAA pension	\$155,868	\$155,868	\$155,868	\$155,868
Lump Value After OAA Offset	\$1,828,396	\$2,944,545	\$4,474,082	\$5,796,925
Monthly Savings with 5% Return	\$1,646	\$2,651	\$4,028	\$5,220
Monthly Savings with 6% Return	\$1,328	\$2,139	\$3,250	\$4,211

Note: The value at age 65 of \$1,325 OAA monthly benefit payable from age 70 is \$155,868 with 4% discount rate. Lump sum values are based on 4% post-retirement return, and monthly savings use 5% and 6% pre-retirement return.

Post-retirement Income from MPF and Personal Savings

- Required total monthly MPF contribution and personal savings is shown below:

Monthly Retirement Savings for 35 Years to Age 65

Female Retirees

Pre-retirement Monthly Income	\$15,000	\$25,000	\$40,000	\$60,000
Post-retirement Income Replacement %	80%	75%	70%	60%
Post-retirement Monthly Income	\$12,000	\$18,750	\$28,000	\$36,000
Lump Sum Value of Income 4% Return	\$2,111,352	\$3,298,987	\$4,926,487	\$6,334,055
Lump Sum Value of OAA pension	\$167,451	\$167,451	\$167,451	\$167,451
Lump Value After OAA Offset	\$1,943,901	\$3,131,536	\$4,759,036	\$6,166,604
Monthly Savings with 5% Return	\$1,750	\$2,820	\$4,285	\$5,552
Monthly Savings with 6% Return	\$1,412	\$2,275	\$3,457	\$4,479

Note: The value at age 65 of \$1,325 OAA monthly benefit payable from age 70 is \$167,451 with 4% discount rate. Lump sum values are based on 4% post-retirement return, and monthly savings use 5% and 6% pre-retirement return.

Post-retirement Income from MPF and Personal Savings

- The monthly savings are 24% higher with 5% pre-retirement investment return compared to 6%
- One may conclude a logical pre-retirement investment strategy is to take maximum risk to achieve 7% to 8% average annual return to reduce monthly savings or accumulate larger lump sums
- Historical investment return data analyses showed the probability of achieving an average return of 8% is lower than an average return of 5%
- High return investments have higher volatility (i.e., large and frequent swings of positive and negative returns)
- Lower probability also applies to achieving the targeted lump value and the corresponding retirement income
- A 1% reduction in annual administration and investment fees would increase pre-retirement lump sum value by 24% and post-retirement income by 11%

Generating Retirement Income with MPF Account Balance

- There are various ways to use the MPF balance to generate income for retirement living expenses
 - Annual withdrawal of 3% to 4% of the MPF balance
 - Annual withdrawal equals to MPF balance divided by the retiree's life expectancy
 - Varying withdrawals based on need and other methods
- Withdrawals can deplete the MPF balance, if returns are low or investment values are down for a period of time
- Withdrawals become very small after 15 to 20 years to conserve the MPF balance
- Annuitize the MPF balance for a lifetime income
- Hong government is introducing a public annuity scheme for retirees

MPF Annuitization

- Convert the MPF balance, at retirement, into a fixed or variable life annuity
- A fixed life annuity (FLA) will provide a fixed amount of annual income
- A variable life annuity (VLA) will likely provide a larger lifetime income than a FLA, but the annual income amount can vary up or down reflecting the investment returns
- There are ways to manage the negative investment returns to stabilize the VLA annual income

Fixed Life Annuity Pricing

- Investments backing the FLAs are mostly invested in government bonds, high quality corporate bonds and other fixed income instruments
- Investment cash flow (i.e., coupon/ interest income and principal repayments) of the fixed income investments are matched with the expected FLA payments
- Current ultra low interest rate environment
 - Hong Kong government bond yields are around .5% for 1-year, 1.53% for 10-year and 1.61% for 15-year
 - lack of fixed income investments beyond 15 years in Hong Kong
 - With Hong Kong currency pegged to US\$, US investments can be considered
 - US government bond yields are 1.24% for 1-year, 2.31% for 10-year and 2.84% for 30-year
 - Citigroup pension yield curve (AA corporate bonds) 1.66% for 1-year, 3.13% for 10-year and 4.09% for 30-year

Fixed Life Annuity Pricing

- US interest rate development process for annuity pricing involves:
 - detailed stochastic projections on policyholder demographics
 - investments and cash flow matching
 - required regulatory reserve...etc
 - under various financial and economic scenarios
- For illustration, simplified interest rate development process focused on a group of age 65 retirees
- The interest rate derived from matching the expected annuity payments from age 65 is:
 - 1.52%, based on Hong Kong government bond yields with the yield after 15 years equal to the 15th year yield
 - 2.42% using US government bond yields
 - 3.41% using the Citigroup pension yield curve
- The low annuitization interest rates greatly reducing the annuity income

Variable Life Annuity Pricing

- US variable annuity insurers, with guaranteed lifetime withdrawal benefit policies, are investing in high quality corporate bonds and managed volatility funds
- Managed volatility funds invest in equity, bond...etc index with an allocation adjustment process reflecting market volatility (replicating a put option) for downside protection
- Using a portion of the investments to match the Citigroup pension yield curve with annuity payments for 10 years and the remainder in a S&P 500 Index managed volatility fund
 - an interest rate of 5.25% can be achieved

Conversion of MPF Balance into Lifetime Income

- A comparison of the annual annuity income, under various interest rates, is presented below:

Conversion of MPF Balance into Lifetime Income

Male Age 65 Lifetime Monthly Income from MPF Balance

	Interest Rate	\$500,000	\$750,000	\$1,000,000	\$1,250,000	\$1,500,000
HK Government Bonds	1.52%	\$2,497	\$3,745	\$4,993	\$6,242	\$7,490
US Treasury Bonds	2.42%	\$2,746	\$4,119	\$5,492	\$6,865	\$8,238
Citi Pension Yield Curve	3.41%	\$3,031	\$4,546	\$6,062	\$7,577	\$9,093
Variable Annuity	5.25%	\$3,579	\$5,368	\$7,158	\$8,947	\$10,737

Note: The annual income is determined with US MP-2014 Mortality Table and MP-2015 Mortality Improvement Scale and the corresponding interest rate.

Conversion of MPF Balance into Lifetime Income

- A comparison of the annual annuity income, under various interest rates, is presented below:

Conversion of MPF Balance into Lifetime Income

Female Age 65 Lifetime Monthly Income from MPF Balance

	Interest Rate	\$500,000	\$750,000	\$1,000,000	\$1,250,000	\$1,500,000
HK Government Bonds	1.52%	\$2,306	\$3,459	\$4,612	\$5,765	\$6,918
US Treasury Bonds	2.42%	\$2,553	\$3,830	\$5,107	\$6,384	\$7,660
Citi Pension Yield Curve	3.41%	\$2,839	\$4,258	\$5,678	\$7,097	\$8,517
Variable Annuity	5.25%	\$3,387	\$5,080	\$6,774	\$8,467	\$10,161

Note: The annual income is determined with US MP-2014 Mortality Table and MP-2015 Mortality Improvement Scale and the corresponding interest rate.

- The above summary showed a VLA can provide a 18% and 19% larger annual income for male and female respectively over the retirement lifetime compared to a FLA using the Citigroup Pension Yield Curve.
- Taking into account the possibility of a 10% to 15% downside annual income adjustment for VLA, the adjusted annual income is still larger than FLA payments

Group Variable Annuity Scheme Design

- Participation in the group annuity scheme should be automatic with an opt-out option to have more effective pooling of healthy and less healthy retirees
- US 401(k) plan studies, for the years 2013 to 2015, showed automatic participation with op-out option has 88% to 91% participation rates compared to 60% to 70% for voluntary participation
- A standard form of annuity payment guaranteeing 15 years of payments or total payment equal to the account balance at retirement can assure retirees that early demise would not result in a total loss of the account balance
- The group annuity scheme can allow retirees to have their MPF balance in both fixed and variable annuity, instead of one or the other
- It would be beneficial to permit MPF participants to include personal savings/ investments along with the MPF balance to convert to an annuity income

MPF Annuitization Administration and Operation

- Manage the selection of actuarial, investment and benefit payment service providers
- Manage and evaluate the performance of providers
- Retain or outsource annuitization communication, enrollment and customer service

Conclusions

- Interest rate development process does not have to invest in US investments
- Higher pre-retirement investment returns of 5% to 6% to accumulate a lump sum at retirement to generate a reasonable level of lifetime income
- The Ascent of Money: A Financial History of the World, Niall Ferguson wrote about risk management using hedging

“This financial revolution has effectively divided the world in two: those who are (or can be) hedged, and those who are not (or cannot be). You need money to be hedged. That means that most big corporations can afford to be hedged By comparison, most ordinary households cannot afford to hedge at all and would not know how to even if they could.”