Investment Performance of the MPF System in 2018

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Tel	:	2918 0102
Fax	:	2259 8806
Email	:	mpfa@mpfa.org.hk
Website	:	www.mpfa.org.hk

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EXECUTIVE SUMMARY

1. This report is prepared to review the investment performance of the Mandatory Provident Fund (MPF) System in 2018, with the objective of facilitating MPF scheme members in gaining a better and objective understanding of the investment performance of the MPF System and different fund types of MPF constituent funds (MPF funds).

KEY FINDINGS

Performance of the MPF System as a Whole

2. The year of 2018 marked a year of market volatility. According to the Organisation for Economic Co-operation and Development (OECD), the expansion of the global economy peaked out in 2018, attributed to continued trade tensions and tighter financial conditions.[1] On account of a weakening global economy, financial markets in different economies tumbled in 2018.

3. Assets of MPF funds are invested in financial instruments. The ebb and flow of financial markets (e.g. equity, bond and money markets) weigh heavily on the investment performance of the MPF System. As an outcome of the collective choice of scheme members, the MPF System is characterized by a relatively high exposure to equities (65% of total assets as at September 2018), the performance of which has a great impact on the overall return of the MPF System. In this regard, a downturn of equity markets in 2018 dragged down the overall investment performance of the MPF System.

4. In 2018, the MPF System recorded a return of -9.3% after fees and charges.[2] As at December 2018, the MPF System generated an annualized return of 3.2% since its inception in December 2000.

5. In dollar terms, the total assets of the MPF System amounted to $813.0 billion, including $627.0 billion (77%) in net contributions and $186.1 billion (23%) in investment returns net of fees and charges.

Yearly Return of the MPF System (2018)
-9.3%

Annualized Return of the MPF System (since Inception)
3.2%

Total Assets
$813.0 billion
Net Investment Return
$186.1 billion

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[1] OECD. (2018). *OECD Economic Outlook*, Volume 2018 Issue 2, Paris: OECD Publishing. Retrieved from https://doi.org/10.1787/eco_outlook-v2018-2-en.

[2] The return of the MPF System was calculated by way of the IRR, a method commonly known as dollar-weighted return. The IRR method, which takes into account the amount and timing of contributions into and benefits withdrawn from the MPF System, was used as it better reflects the features of cash inflow and outflow of the MPF System. The annualized IRR was calculated by raising the monthly IRR to the power of 12.

Performance of Different Types of MPF Funds

6. In 2018, five MPF fund types (i.e. equity fund, mixed assets fund, guaranteed fund, bond fund and money market fund – other than MPF conservative fund) yielded negative returns. Money market fund – MPF conservative fund was the only fund type with positive return.

7. As a group, equity funds and mixed assets funds registered returns of -13.0% and -10.3% respectively in 2018.[3] Since the inception of the MPF System, equity funds and mixed assets funds posted cumulative returns of 115.5% and 95.1% respectively.

8. Among the sub-groups of equity funds, United States equity funds (-9.6%) performed relatively better than other sub-groups in 2018, while Japan equity funds (-17.5%) registered the greatest decline in return.

9. For mixed assets funds, those with lower equity content posted better return in 2018, mainly due to their lower exposure to equities. While mixed assets funds (21% to 40% equity) reported a return of -5.7% in 2018, mixed assets funds (81% to 100% equity) recorded a return of -13.5%.

10. The overall return of bond funds was -1.1% in 2018. Relatively speaking, Hong Kong dollar bond funds performed better than other sub-groups of bond funds, by generating a return of 0.4% in 2018. Since the inception of the MPF System, bond funds registered a cumulative return of 57.1%.

11. While guaranteed funds recorded a return of -1.5% in 2018, money market fund – other than MPF conservative funds registered a return of -0.2%. Money market fund – MPF conservative funds were able to produce a positive return of 0.6%. In 2018, a gradual increase in interest rates helped improve slightly the investment performance of money market fund – MPF conservative funds. On cumulative terms, the returns of guaranteed funds, money market fund – other than MPF conservative funds and money market fund – MPF conservative funds were 21.6%, 10.1% and 13.6% respectively.

Equity Funds
2018: -13.0%
Cumulative: 115.5%

Mixed Assets Funds
2018: -10.3%
Cumulative: 95.1%

Bond Funds
2018: -1.1%
Cumulative: 57.1%

Guaranteed Funds
2018: -1.5%
Cumulative: 21.6%

Money Market Fund – MPF Conservative Funds
2018: 0.6%
Cumulative: 13.6%

Money Market Fund – Other than MPF Conservative Funds
2018: -0.2%
Cumulative: 10.1%

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[3] In view of the absence of available data on contributions made into and benefit withdrawn from MPF funds, the returns of different types and sub-groups of MPF funds were calculated by way of the time-weighted method instead of the dollar-weighted method. The time-weighted method takes into account the unit price and asset size of each constituent fund at different points in time. For details of the calculation methodology, please refer to Appendix A.

12. Offered in each MPF scheme, the Default Investment Strategy (DIS) is made up of two MPF funds: the Core Accumulation Fund (CAF) and the Age 65 Plus Fund (A65F). In 2018, the CAF and A65F posted returns of -6.1% and -1.6% respectively. Since their launch in April 2017, the CAF and A65F registered cumulative returns of 2.9% and 2.1% respectively.

Core Accumulation Fund
2018: -6.1%
Cumulative: 2.9%

Age 65 Plus Fund
2018: -1.6%
Cumulative: 2.1%

Risk Level of Different Types of MPF Funds

13. The risk level of MPF funds was examined by measuring the standard deviation and range of monthly returns. Among the six types of MPF funds, equity funds had the highest level of risk, followed by mixed assets funds, bond funds, guaranteed funds, money market fund – other than MPF conservative funds, and money market fund – MPF conservative funds.

14. From the perspective of standard deviation from December 2000 to December 2018, equity funds posted a level of 5.19%, which is the highest among all fund types. At the other end of the spectrum, money market fund – MPF conservative funds posted a level of 0.09%. Similarly, from the perspective of range of monthly returns, equity funds were associated with the highest level of risk by having a range as wide as 36.02 percentage points (monthly returns ranging from -20.63% to 15.39%) from December 2000 to December 2018. By contrast, money market fund – MPF conservative funds had a narrow range of 0.53 percentage point (monthly returns ranging from -0.05% to 0.48%).

POINTS TO NOTE

MPF as a Long-Term Investment

15. In terms of investment performance, many MPF funds suffered setbacks in 2018. It should however be noted that MPF is a long-term investment, spanning across a period of more than 40 years. During the period, the investment performance of the MPF System will be subject to different degree of market fluctuations. Despite experiencing downturns of the global economy and financial markets, including the outbreak of the severe acute respiratory syndrome in 2003, the global financial crisis in 2008 and the sharp decline of the local equity market in the second and third quarters of 2015, the MPF System demonstrated resilience over the past years.

16. Market volatility may be viewed as a reminder for schemes members to regularly review their MPF investment to ensure that the investment portfolio (i.e. fund choices) matches their personal circumstances (e.g. investment horizon, goal and risk tolerance level).

17. Scheme members may also consider retaining their MPF savings in their accounts for rollover and continuous investment if there is no urgent need to withdraw them for use upon retirement.

Avoid Timing the Market

18. To "buy low" and "sell high" is a commonly cited investment strategy. However, it is impossible for investors to have accurate predictions of market conditions consistently. Particularly when the markets are volatile, many may actually end up buying high and selling low. Some researches in fact suggest that trading in and out by timing the market may not be the best way for making investment.[4]

Capitalizing on the Benefits of Dollar Cost Averaging

19. MPF contributions are made to MPF funds at regular intervals. This disciplined investment approach could take advantage of dollar cost averaging (DCA). DCA offers an alternative to strategies that require an investor to speculate on the timing of an investment. Rather than a one-time investment that may count on the timing of market, DCA invests a fixed amount regularly. This prudent investment technique reduces the effects of short-term market fluctuations on investments by averaging out the costs of fund units over time.

Looking at Performance Figures in Conjunction with the Level of Risk

20. Scheme members are reminded that the return figures set out in this report are only intended to give a generalized indication of the performance of the MPF System and funds. The performance is measured without taking into account risks, and scheme members need to consider their risk tolerance level when making fund choice. The report shows that MPF funds had generally exhibited the expected relationship between risk and return, that is, the higher the potential return in the long run, the higher the risk. Scheme members should also note that the System or fund-type return figures set out in the report should not be seen as providing any firm indicators for predicting future absolute performance of MPF funds.

Diversification Tends to Lower Risk

21. Risk may be reduced by means of a diversified portfolio. Diversification is an investment technique of allocating capital to a mix of different investments, aiming to reduce the risk of the portfolio by offsetting the losses of one asset class by the gains of other asset classes. In this regard, MPF funds are required under the MPF legislation to diversify their investment across issuers. To further diversify risks, the most critical element is that price movements of the assets invested are not related to each other. For this purpose, diversification across regions or asset classes tends to lower investment risk.

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[4] See Elton, E.J., Gruber, M.J., & Blake, C.R. (2012). An examination of mutual fund timing ability using monthly holdings data. *Review of Finance*, *16*(3), 619-645. doi: 10.1093/rof/rfr007 and Henriksson, R.D. (1984). Market timing and mutual fund performance: an empirical investigation. *The Journal of Business*, *57*(1), 73-96.

Section 1 – Introduction

Objective

1. This report is prepared to review the investment performance of the Mandatory Provident Fund (MPF) System in 2018, with the aim of assisting MPF scheme members and other stakeholders in gaining an objective and better understanding of the investment performance of the MPF System as a whole and of different fund types of MPF constituent funds (MPF funds).

Scope

2. Each MPF fund included in this report is classified into one of the following six main fund types:
   - i. equity fund;
   - ii. mixed assets fund;
   - iii. bond fund;
   - iv. guaranteed fund;
   - v. money market fund – MPF conservative fund; and
   - vi. money market fund – other than MPF conservative fund.

3. Appendix B outlines the key features of different types of MPF funds.

4. Among these fund types, equity funds (i.e. funds primarily investing in equities) and mixed assets funds (i.e. funds primarily investing in equities and bonds) are the preferred choices of members. The assets of equity funds and mixed assets funds accounted for 39% and 36% of the aggregate net asset value (NAV) of MPF funds respectively as at December 2018. In terms of the total number of MPF funds, these two fund types together accounted for more than 77% of the total number of MPF funds. Instead of investing in growth funds like equity funds and mixed assets funds, quite a number of scheme members have chosen lower-risk funds like money market fund – MPF conservative funds for investing their MPF savings. In this regard, the assets of money market fund – MPF conservative funds accounted for 12% of the aggregate NAV of MPF funds as at December 2018 (Table 1).

5. All MPF investment return figures are net of fees and charges.

Table 1 Net Asset Value and Number of MPF Funds by Fund Type – 31 December 2018

Fund Type	NAV		No. of Funds (%)
	$ million	% of Total	
Equity Fund	318,318	39%	152 (33%)
Mixed Assets Fund	291,804	36%	210 (45%)
Bond Fund	30,946	4%	43 (9%)
Guaranteed Fund	69,582	9%	21 (4%)
Money Market Fund – Other than MPF Conservative Fund	4,218	1%	9 (2%)
Money Market Fund – MPF Conservative Fund	98,156	12%	32 (7%)
Total*	**813,024**	**100%**	**467 (100%)**

* Figures may not sum up to the total or 100% due to rounding.

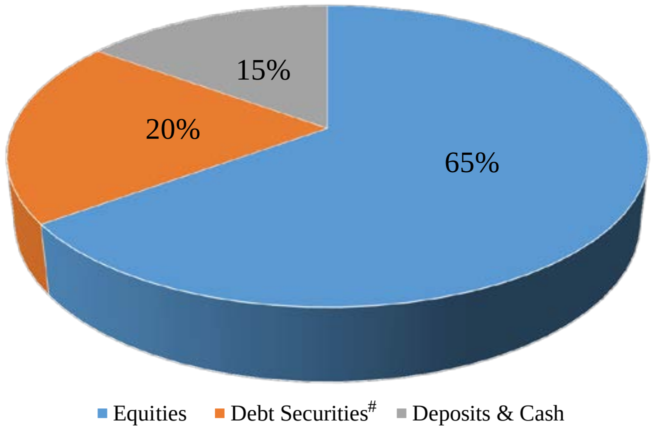
Source: MPFA

Section 2 – Investment Performance of the MPF System as a Whole

6. Since assets of MPF funds are invested in financial instruments, the investment performance of the MPF System hinges on the conditions of the underlying investment markets (e.g. equity, bond and money markets) of MPF funds. In this regard, the choice of funds by scheme members directly affects the overall return of the MPF System. As an outcome of the collective choice of scheme members, the MPF System has significant exposure to equities, mainly through scheme members' investments in equity funds and mixed assets funds.

7. In terms of asset allocation, equities accounted for 65% of the aggregate NAV of MPF funds as at September 2018 (Chart 1).[5]

Chart 1 Asset Allocation of MPF Funds by Asset Class – 30 September 2018



Includes convertible debt securities

Source: MPFA

8. According to the Organisation for Economic Co-operation and Development (OECD), the expansion of the global economy peaked out in 2018, attributed to continued trade tensions and tighter financial conditions.[6] On account of a weakening global economy, financial markets in different economies tumbled in 2018. Against this background, the MPF System as a whole registered a return of -9.3% (net of fees and charges) in 2018[7] (Chart 2).

9. Chart 2 shows the yearly returns of the MPF System from December 2000 to December 2018. Over the past 18 years, the MPF System recorded positive returns in 12 years and

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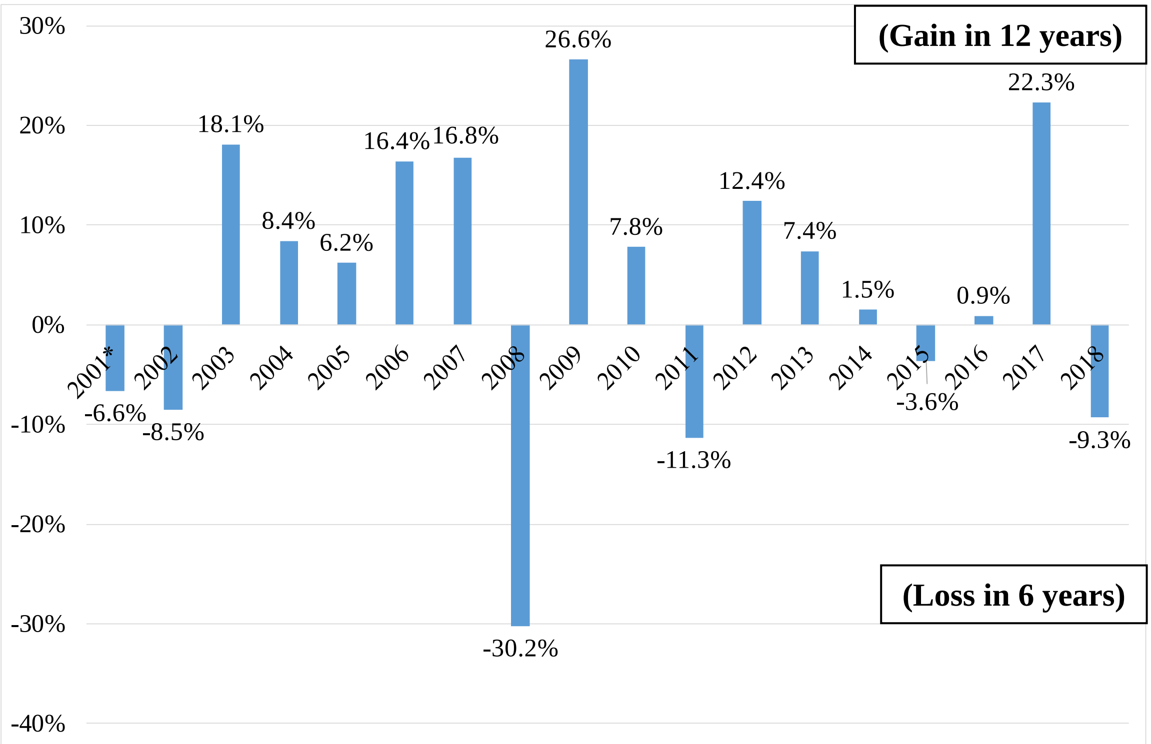
[5] The proportion of different asset classes in the aggregate NAV of MPF funds may also be affected by their respective performances. For example, a downturn of equity markets may lead to a lower proportion of equities in the aggregate NAV of MPF funds.

[6] OECD. (2018). *OECD Economic Outlook*, Volume 2018 Issue 2, Paris: OECD Publishing. Retrieved from https://doi.org/10.1787/eco_outlook-v2018-2-en.

[7] The return of the MPF System was calculated by way of the internal rate of return (IRR), a method commonly known as dollar-weighted return. The IRR method, which takes into account the amount and timing of contributions made into and benefits withdrawn from the MPF System, was used as it better reflects the features of cash inflow and outflow of the MPF System. The annualized IRR was calculated by raising the monthly IRR to the power of 12. For details on the calculation method of the annualized IRR, please refer to Appendix A.

negative returns in six years. On several occasions, setbacks were followed by strong recoveries. For instance, negative returns in 2001 and 2002 were followed by a solid recovery in 2003. Such rebounds repeated in 2008 and 2009, and in 2011 and 2012.

Chart 2 Investment Return of the MPF System since its Inception by Calendar Year



* Refers to the 13-month period from 1 December 2000 to 31 December 2001.

Notes:

1. The investment returns of the MPF System presented in the report are calculated by way of the internal rate of return. For details of the calculation methodology, please refer to Appendix A.
2. Return figures are net of fees and charges.

Source: MPFA

10. Over the past 18 years, the yearly return of the MPF System ranged from -30.2% to 26.6%. As a whole, the MPF System was able to ride out the peaks and troughs of the financial markets by registering a positive annualized return of 3.2% since its inception in December 2000 (Table 2).

Table 2 Annualized Return of the MPF System by Period – 31 December 2018

Past 1 Year	Past 5 Years	Past 10 Years	Since 1 Dec 2000
-9.3%	1.9%	4.0%	3.2%

Source: MPFA

Box 1 – Interpretation of Return Figures – How Relevant is Average Investment Returns to Your Portfolio?

- The overall return of the MPF System reflects the collective investment outcomes of all scheme members. It does not however mean that the MPF accounts of any particular member would be showing the same return as the return of the MPF System. Returns on individual accounts would depend on a range of factors, such as the timing and amount of contributions and fund choice, etc.

- <u>Timing of contributions</u>: The MPF System covers more than four million scheme members who did not join the System on the same day. The MPF investment of scheme members might therefore have experienced different economic cycles, and their individual returns would unlikely be the same as that of the MPF System as a whole.

- <u>Amount of contributions</u>: The MPF account of each scheme member does not necessarily receive the same amount of contributions due to different salary levels and years of joining the MPF System. In particular, whether the scheme member is employed continuously or has gaps in employment (the timing and length of which would be relevant factors) would affect the amount of investment returns and the total MPF savings.

- <u>Fund choice</u>: The funds selected by scheme members have a bearing on the returns of their MPF investment. Different types of funds represent different risk and return characteristics. Generally speaking, funds with higher potential returns are associated with higher risk. The return of the MPF System represents only the collective outcome of scheme members' fund choices.

- If scheme members wish to acquaint themselves with the returns of their MPF investment, the information is available from their Annual Benefit Statement (ABS) sent by trustees. Among others, the ABS contains information on the dollar amount of gain or loss of the account for the relevant financial period as well as since inception of the account.

Section 3 – Investment Performance and Risk Levels of MPF Funds

Investment Performance of Different Fund Types

11. Under the MPF System, approved trustees operate MPF schemes. As at December 2018, there were a total of 32 MPF schemes offering 467 MPF funds.

12. MPF funds are categorized into six fund types, namely equity fund, mixed assets fund, bond fund, guaranteed fund, money market fund – MPF conservative fund, and money market fund – other than MPF conservative fund. Funds of different fund types are often associated with different investment objectives, investment instruments and risk levels.

13. In 2018, on average, five fund types reported negative returns, from -0.2% to -13.0%.[8]

14. Trade tensions, tighter monetary policy and economic slowdown weighed on both equity and bond markets. As a result of a slump in major equity markets, equity funds (-13.0%) and mixed assets funds (-10.3%) recorded greater decline in returns than other fund types in 2018.

15. The investment performance of bond funds (-1.1%) was generally detracted by the interest rate hikes in the US. The depreciation of major currencies like Euro, British Pound and renminbi (RMB) against the US Dollar also dragged down the overall return of global bond funds and RMB bond funds in 2018.

16. Most assets of guaranteed funds were invested in bonds and equities. The lacklustre performance of these two asset classes, particularly equities, undermined the return of guaranteed funds in 2018 (-1.5%). It should however be noted that the above return figure only represents the market values of guaranteed funds as at 31 December 2018 and is not the expected values realized by scheme members upon the fulfillment of qualifying conditions.[9]

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[8] In view of the absence of available data on contributions made into and benefits withdrawn from MPF funds, the returns of different types of MPF funds were calculated by way of the time-weighted method instead of the dollar-weighted method. The time-weighted method takes into account the unit price and asset size of each constituent fund at different points in time. For details of the calculation methodology, please refer to Appendix A.

[9] A guaranteed fund provides some form of guarantee to scheme members investing in the fund, usually on the capital invested or on a minimum rate of return. The majority of guaranteed funds in the MPF market are conditional guaranteed funds which require fulfilment of a set of qualifying conditions in order for the guarantees to be applicable. The remaining guaranteed funds provide guarantees without imposing any qualifying conditions. In this regard, typical examples of qualifying conditions include:

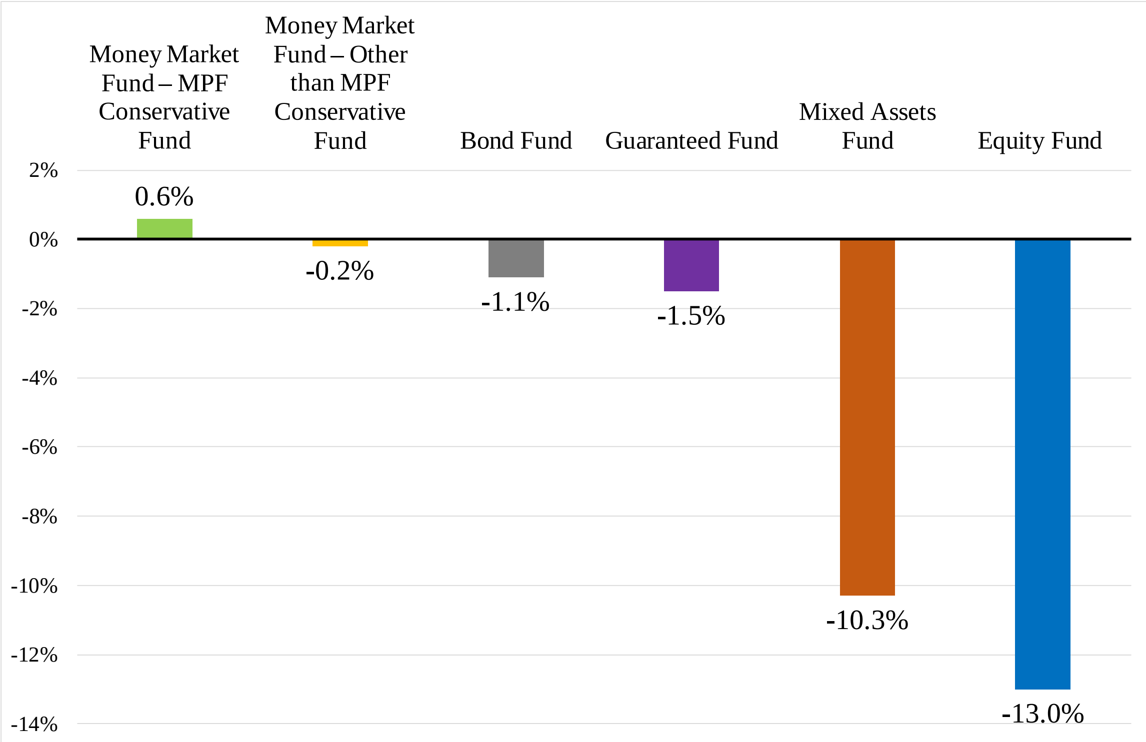
a. Minimum investment period – In respect of each contribution, there may be a minimum period that must be invested in the guaranteed fund. If one switches or transfers some or all benefits out of the guaranteed fund (including under the Employee Choice Arrangement) or if the employer switches to another scheme during this period, the guarantee becomes void; and

b. Withdrawal of benefits from the guaranteed fund – The guarantee may only be applicable to withdrawal of benefits under specific circumstances such as reaching age 65, early retirement, death, total incapacity, etc.

As at December 2018, conditional guaranteed funds accounted for 66% ($46,214 million) of total NAV of guaranteed funds, while guaranteed funds without qualifying conditions accounted for the remaining 34% ($23,368 million).

17. Chart 3 shows the annualized returns of different fund types of MPF funds in 2018. All return figures are net of fees and charges.

Chart 3 Investment Return of MPF Funds by Fund Type in 2018



Source: MPFA

18. Table 3 shows the investment performance of different fund types over different investment horizon. Equity funds registered a negative return of -13.0% in 2018. However, taking a longer investment horizon (e.g. since December 2000), the annualized return of equity funds (4.3%) was the highest among all fund types as at December 2018. While money market fund – MPF conservative funds recorded a positive return of 0.6% in 2018, the return of this fund type since December 2000 was only 0.7%. Scheme members therefore need to take note of the trade-off between risk and return.

Table 3 Investment Return of MPF Funds by Fund Type and Period – 31 December 2018

Fund Type	Annualized Return				Cumulative Return Since 1 Dec 2000
	Past 1 Year	Past 5 Years	Past 10 Years	Since 1 Dec 2000	
Equity Fund	-13.0%	2.9%	7.6%	4.3%	115.5%
Mixed Assets Fund	-10.3%	1.6%	5.3%	3.8%	95.1%
Bond Fund	-1.1%	0.6%	1.4%	2.5%	57.1%
Guaranteed Fund	-1.5%	0.3%	1.0%	1.1%	21.6%
Money Market Fund – Other than MPF Conservative Fund	-0.2%	0.2%	0.1%	0.5%	10.1%
Money Market Fund – MPF Conservative Fund	0.6%	0.2%	0.1%	0.7%	13.6%

Source: MPFA

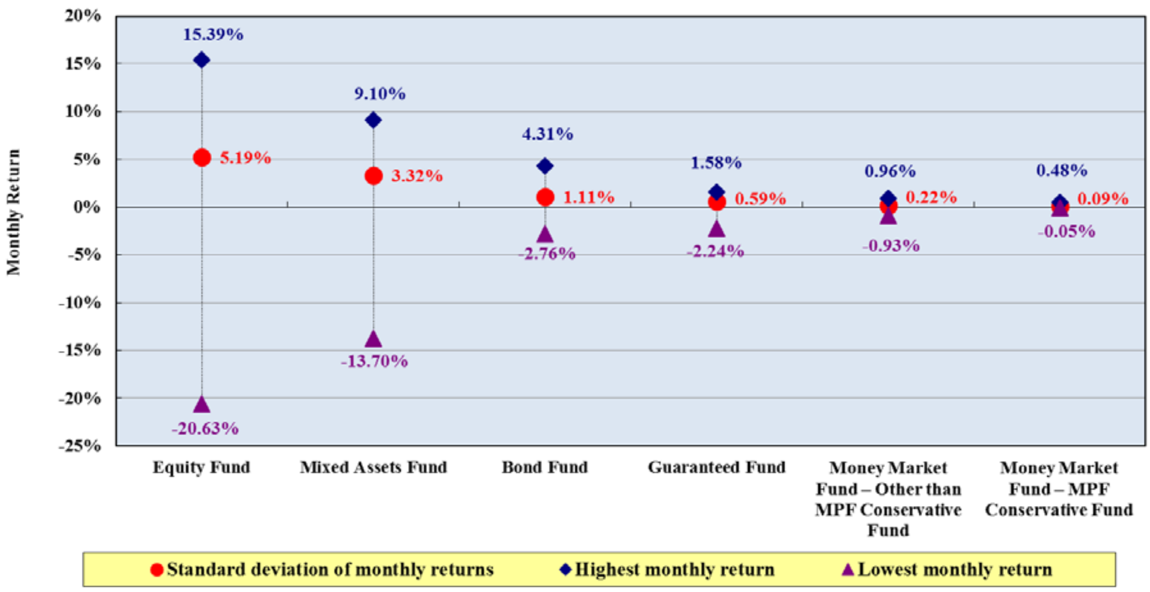
Risk Levels of Different Fund Types

19. Return figures need to be considered in conjunction with the level of risk taken in achieving those returns. Risk can be measured and expressed in different ways. One way of expressing risk is in terms of volatility, as measured by the standard deviation of monthly returns. Generally speaking, the higher the standard deviation, the higher the volatility, which can be considered as a higher level of risk. An alternative way of expressing risk is by measuring the range of monthly returns generated over a period of time. Applied in the current context, a fund type with wider range, that is with returns rising and falling substantially over a certain period, denotes a higher level of risk. Conversely, a fund type with narrower range denotes a lower level of risk.

20. Looking at the risk level from the perspective of standard deviation from December 2000 to December 2018, among the six types of MPF funds, equity funds indicated the highest level of risk, followed by mixed assets funds, bond funds, guaranteed funds, money market fund – other than MPF conservative funds, and money market fund – MPF conservative funds (Chart 4).

21. Looking at the risk level from the perspective of range of monthly returns, the results were same as those based on the standard deviation perspective. Again, equity funds had the highest level of risk with a range as wide as 36.02 percentage points (monthly returns ranging from -20.63% to 15.39%) from December 2000 to December 2018, while money market fund – MPF conservative funds had a narrow range of 0.53 percentage point (monthly returns ranging from -0.05% to 0.48%).

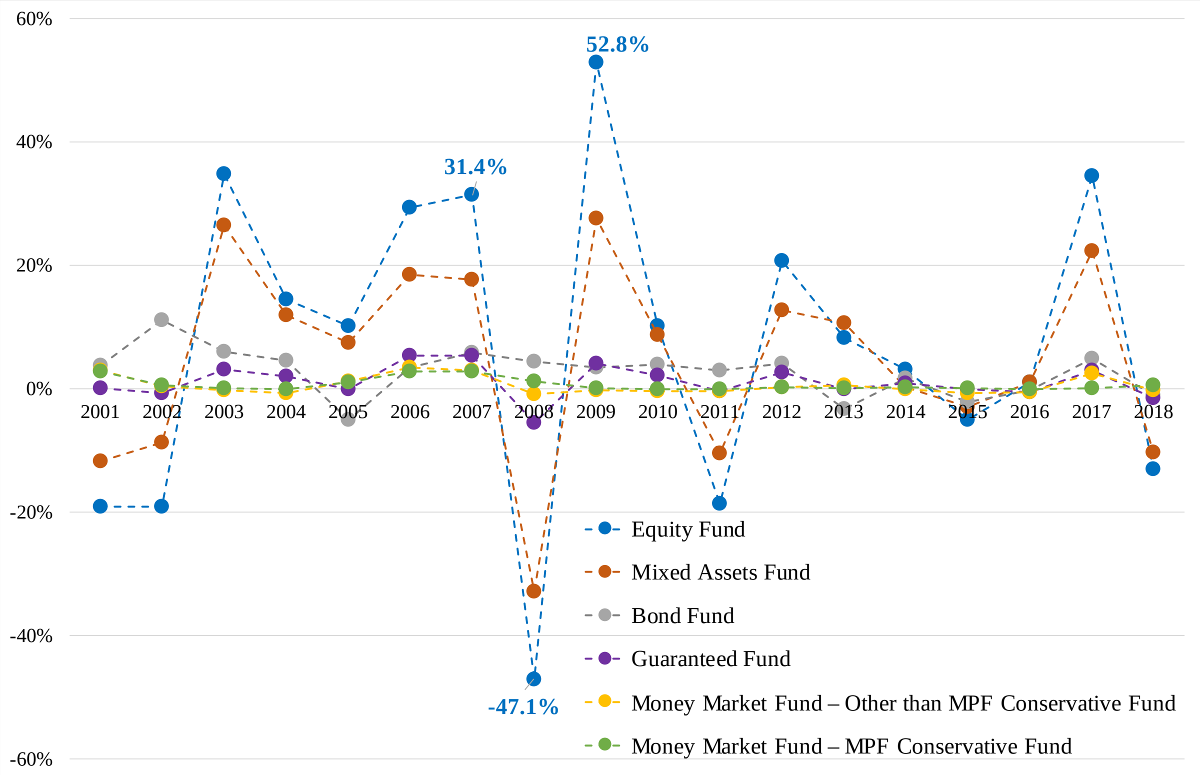
Chart 4 Standard Deviation, Highest and Lowest Monthly Returns of MPF Funds (December 2000 – December 2018)



Source: MPFA

22. As shown in Chart 5, the risk level of each fund type can also be demonstrated by the fluctuations in their yearly investment returns. For instance, equity funds experienced a promising return of 31.4% in 2007. After a sharp decline in return to -47.1% in 2008, the return of equity funds rebounded strongly to 52.8% in 2009. In comparison, the yearly returns of money market fund – MPF conservative funds hovered between 0.01% and 2.84% from 2001 to 2018.

Chart 5 Investment Return by Fund Type and Calendar Year



Note

The dotted line between two observations is only used to show the direction of yearly changes in return and does not correspond to the actual return rates over the period.

Source: MPFA

Box 2 – Diversification of Risk

- The market volatility in 2018 underscores the importance of diversification of risk, particularly for scheme members approaching retirement age. After years of savings, when a scheme member approaches his/her retirement age, he/she has already accumulated a larger amount of MPF assets. Managing risk properly is therefore of utmost importance as when scheme members approach their retirement age, there would be limited opportunity for them to recoup large losses incurred immediately before retirement. In view of this, scheme members may consider reviewing carefully their MPF investment and conceiving an investment plan (e.g. fund choices) suitable for their personal circumstances well before their retirement.

- According to a study of the MPFA[10], while scheme members as a whole gradually reduced their investment in equity funds on reaching their 40s, they continued to prefer

[10] MPFA. (2018). *Statistical Analysis of Accrued Benefits Held by Scheme Members of Mandatory Provident Fund Schemes.* Hong Kong: MPFA. Retrieved from http://www.mpfa.org.hk/eng/information_centre/statistics/MPF_Statistical_Report/files/Statistical_Analysis_of_Accrued_Benefits_Held_by_Scheme_Members_2018.pdf

funds with higher growth potentials (i.e. equity funds and mixed assets funds), albeit the higher level of investment risk. To illustrate this observation, for the age group of 60-64, equity funds and mixed assets funds still accounted for 35% and 40% of their total MPF assets respectively. Regarding their investment in mixed assets funds, around 65% of them were invested in those mixed assets funds with equity exposure of 60% or above.

Distribution of Assets of MPF Scheme Members by Age Group and Fund Type

Age Group	Fund Type						
	Equity Fund	Mixed Assets Fund	Money Market Fund - MPF Conservative Fund	Guaranteed Fund	Bond Fund	Money Market Fund - Other than MPF Conservative Fund	Total*
<=24	38%	36%	13%	8%	5%	1%	100%
25-29	46%	33%	9%	6%	5%	1%	100%
30-34	50%	32%	8%	6%	4%	#	100%
35-39	50%	34%	7%	6%	3%	#	100%
40-44	48%	35%	8%	6%	3%	#	100%
45-49	44%	37%	9%	7%	3%	#	100%
50-54	39%	40%	10%	8%	3%	#	100%
55-59	33%	43%	12%	9%	3%	#	100%
60-64	35%	40%	12%	10%	3%	#	100%
>=65	28%	45%	12%	13%	2%	#	100%
Overall	43%	37%	9%	7%	3%	#	100%

Notes:
** Figures may not sum up to 100% due to rounding.*
 # denotes less than 0.5%.
Data as at December 2017
Source: MPFA

- It should however be noted that how much investment risk one should take depends on his/her risk tolerance level. While age is an important factor to consider, other relevant factors include the scheme member's investment objective and net worth, etc.

- In this regard, diversification is a strategy to try to reduce the risk of a portfolio by choosing a mix of investments. Generally speaking, a portfolio is more diversified if it contains a variety of asset types (e.g. equities, bonds and money market instruments) or invests in different markets (e.g. domestic and other markets). The key to diversification is to choose asset types whose price movements are not closely related to each other or invest in markets that are relatively independent of or less likely to be affected by each other.

Section 4 – Further Analysis of the Investment Performance of Different Types of MPF Funds

Equity Funds

23. Equity funds could be further categorized into different sub-groups with reference to the allocation of assets by geographical region of the funds (Table 4).

24. In 2018, among the sub-groups of equity funds, United States equity funds (-9.6%) performed relatively better than other sub-groups, while Japan equity fund (-17.5%) registered the greatest decline in return.

25. Since the inception of the MPF System, Asia equity funds (6.3%), Hong Kong equity funds (6.1%) and Hong Kong equity funds (index tracking) (5.1%) posted relatively higher annualized returns than other sub-groups like global equity funds (2.5%), United States equity funds (2.2%), Japan equity funds (0.7%) and Europe equity funds (0.6%).

Table 4 Annualized and Cumulative Returns of Equity Funds by Sub-Group and Period – 31 December 2018

Sub-Group	Annualized Return				Cumulative Return Since 1 Dec 2000
	Past 1 Year	Past 5 Years	Past 10 Years	Since 1 Dec 2000	
United States Equity Fund	-9.6%	5.1%	10.2%	2.2%	48.7%
Hong Kong Equity Fund (Index Tracking)	-11.2%	4.8%	8.3%	5.1%	144.0%
Global Equity Fund	-12.0%	2.3%	7.1%	2.5%	57.4%
Hong Kong Equity Fund*	-14.2%	3.2%	7.9%	6.1%	192.5%
Asia Equity Fund	-14.7%	2.0%	7.7%	6.3%	199.8%
China Equity Fund	-16.1%	3.1%	6.7%	#	#
Europe Equity Fund	-16.9%	-1.2%	4.9%	0.6%	11.3%
Japan Equity Fund	-17.5%	1.7%	4.0%	0.7%	13.4%

Data not available as no equity funds were classified as China equity funds as at 1 December 2000.

* The sub-group "Hong Kong Equity Fund" excludes funds under the sub-group "Hong Kong Equity Fund (Index Tracking)".

Source: MPFA

Mixed Assets Funds

26. Mixed assets funds could be classified based on their equity content. The sub-groups of mixed assets funds include:
    - Mixed assets funds (81% to 100% equity)
    - Mixed assets funds (61% to 80% equity)

- Mixed assets funds (41% to 60% equity)
- Mixed assets funds (21% to 40% equity)

27. Since mixed assets funds generally invest in equities and bonds, their investment returns hinge on the performance of these two markets. Generally speaking, both equity markets and bond markets did not perform well in 2018, particularly equity markets which displayed greater volatility of returns. Against this background, those mixed assets funds with higher equity content posted relatively lower level of returns. While mixed assets funds (81% to 100% equity) reported a return of -13.5% in 2018, mixed asset funds (21% to 40% equity) registered a return of -5.7% (Table 5).

28. In respect of the annualized return since the inception of the MPF System, mixed assets funds (61% to 80% equity) posted a return of 3.9%, the highest return among all sub-groups of mixed assets funds.

Table 5 Annualized Return of Mixed Assets Funds by Sub-Group and Period – 31 December 2018

Sub-Group	Annualized Return				Cumulative Return Since 1 Dec 2000
	Past 1 Year	Past 5 Years	Past 10 Years	Since 1 Dec 2000	
Mixed Assets Fund (81% to 100% Equity)	-13.5%	1.8%	6.2%	3.7%	92.9%
Mixed Assets Fund (61% to 80% Equity)	-10.7%	1.7%	5.5%	3.9%	99.3%
Mixed Assets Fund (41% to 60% Equity)	-8.3%	1.3%	4.3%	3.8%	96.1%
Mixed Assets Fund (21% to 40% Equity)	-5.7%	0.8%	2.8%	3.3%	81.1%

Source: MPFA

Bond Funds

29. Bond funds could be further categorized into different sub-groups with reference to the allocation of assets by geographical region/currency exposure of the funds. In 2018, the overall return of bond funds was -1.1%. Relatively speaking, Hong Kong dollar bond funds performed better than other sub-groups of bond funds, by generating a return of 0.4% in 2018. While RMB bond funds and global bond funds reported returns of -0.1% and -1.7% respectively in 2018, Asia bond funds registered a return of -1.8% (Table 6).

30. Since the inception of the MPF System, global bond funds and Hong Kong dollar bond funds posted annualized returns of 2.9% and 1.9% respectively.

Table 6 Annualized and Cumulative Returns of Bond Funds by Sub-Group and Period – 31 December 2018

Sub-Group	Annualized Return				Cumulative Return Since 1 Dec 2000
	Past 1 Year	Past 5 Years	Past 10 Years	Since 1 Dec 2000	
Hong Kong Dollar Bond Fund	0.4%	1.5%	1.1%	1.9%	41.6%
RMB Bond Fund	-0.1%	0.1%	0.4%	#	#
Asia Bond Fund	-1.8%	1.2%	#	#	#
Global Bond Fund	-1.7%	0.3%	1.5%	2.9%	67.8%

Data not available as bond funds under these sub-groups were launched after the start date of the relevant reporting periods.

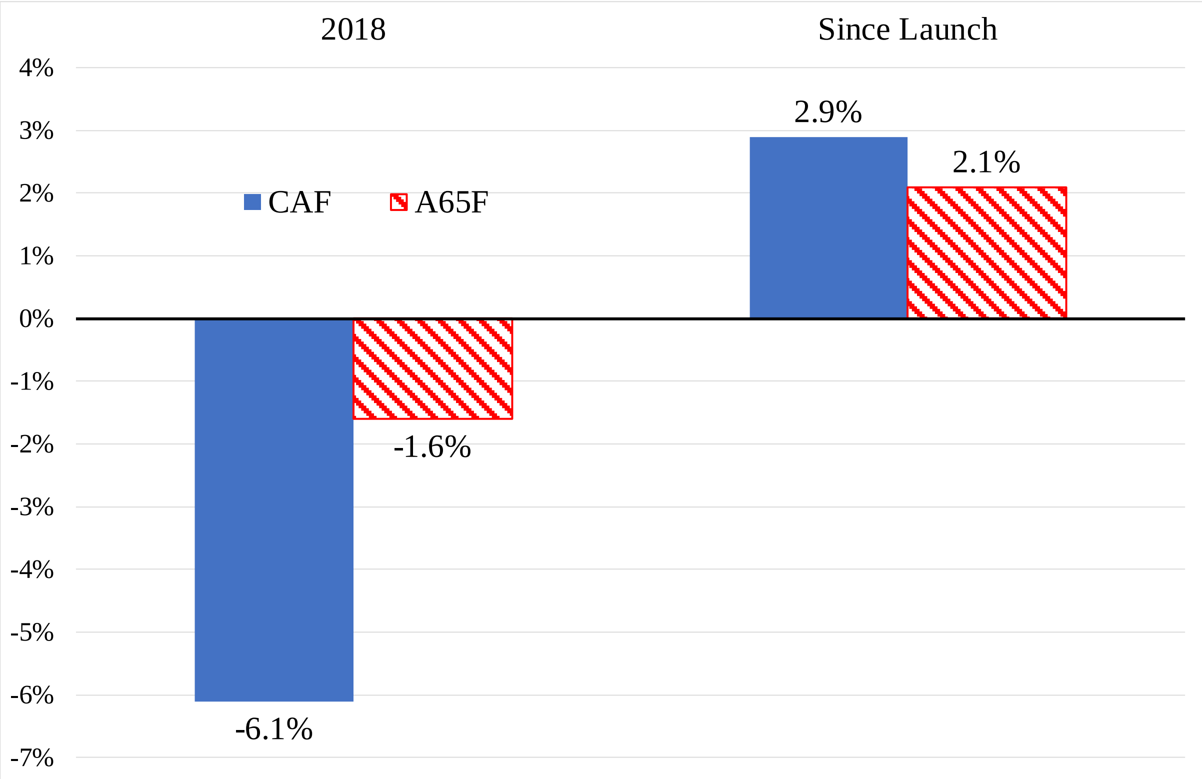
Source: MPFA

Constituent Funds under the Default Investment Strategy (DIS)

31. Launched on 1 April 2017, the DIS provides scheme members with a ready-made investment solution which seeks to balance long-term risks and returns. There are three major features of the DIS:
    i. Automatic reduction of investment risk according to scheme members' age;
    ii. Fee caps; and
    iii. Globally diversified investment.

32. Offered in each MPF scheme, the DIS is made up of two MPF funds: the Core Accumulation Fund (CAF) and the Age 65 Plus Fund (A65F).
    - CAF: about 60% of the assets of the fund is invested in higher risk assets (mainly global equities), and the rest in lower risk assets (mainly global bonds).
    - A65F: about 20% of the assets of the fund is invested in higher risk assets (mainly global equities), and the rest in lower risk assets (mainly global bonds).

Chart 6 Investment Return of CAF and A65F in 2018 and Since their Launch in April 2017



Source: MPFA

33. In 2018, the CAF and A65F posted returns of -6.1% and -1.6% respectively. Since their launch in April 2017, the CAF and A65F registered cumulative returns of 2.9% and 2.1% respectively (Chart 6).

Box 3 – Dollar Cost Averaging

- MPF contributions are made to MPF funds at regular intervals. This disciplined investment approach could take advantage of dollar cost averaging (DCA). DCA is a technique of buying a fixed amount of an investment on a regular schedule. More units are purchased when prices are low, and fewer units when prices are high. This investment technique averages out the costs of units and therefore reduces the effects of short-term market fluctuation on the overall investment in the long run. The example below shows how DCA works.

- A invested $2,000 each month in an equity fund from January to June. During the six-month period, the equity market went up and down, and so did the unit price of the fund. At the end of the sixth month, A has bought altogether 1 034.25 units of the fund with an average unit cost of $11.60. The market value of his investment amounted to $13,000 by the end of June.

Month	Contribution	Unit Price	Units Bought
January	$2,000	$13.34	149.93
February	$2,000	$11.77	169.92
March	$2,000	$16.76	119.33
April	$2,000	$9.73	205.55
May	$2,000	$8.68	230.41
June	$2,000	$12.57	159.11
Total	**$12,000**		1 034.25

Average Unit Cost: $11.60
Market Value as at June: $13,000
(All market values are approximate figures rounded to nearest hundred)

- In another case, B invested the same amount as A, i.e. $12,000. Instead of acquiring the units on a monthly basis, B preferred to time the market by buying the units in one go in March (purchased 715.99 units of the same equity fund as A at $16.76 per unit). By the end of June, the market value of his investment amounted to $9,000, which was somewhat lower than that of A's investment ($13,000). This example shows that DCA helps reduce the effect of short-term market fluctuation on A's investment as well as lower the fund's unit cost, resulting in a better investment return when compared with B's investment which suffered from a bad market timing.

- It should however be noted that DCA does not guarantee a profit or represent a strategy superior to that of lump sum investment. For instance, assuming that another investor, C, who was lucky enough to perfectly time the market and bought the fund units in one go in April (i.e. purchased 1 233.30 units at $9.73 per unit). By the end of June, the market value of C's investment would be $15,500 which was higher than that of A.

- The examples above indicate that if investing in a lump sum, the timing of investment may make a lot of difference in the outcome. Since prices of investments can rise and fall, it is hard for scheme members or even for professional fund managers to pick the best time to buy or sell. It will be particularly difficult if numerous market timing decisions have to be made over a long investment horizon. By spreading the costs of investments across a longer period of time, DCA may help reduce the risk of speculating on the timing of an investment, particularly when markets are volatile.

Disclaimer: The examples (including all values and figures) given in Box 3 are hypothetical examples intended for illustration purposes only. All values and figures indicated in Box 3 do not represent, promise or guarantee the actual amount of MPF accrued benefits a member will receive. None of these examples shall be taken as recommendation or advice on how a scheme member's investment choice or strategy should be.

Section 5 – Concluding Remarks

MPF as a Long-Term Investment

34. In terms of investment performance, many MPF funds suffered setbacks in 2018. It should however be noted that MPF is a long-term investment, spanning across a period of more than 40 years. During the period, the investment performance of the MPF System will be subject to different degree of market fluctuations. Despite experiencing downturns of the global economy and financial markets, including the outbreak of the severe acute respiratory syndrome in 2003, the global financial crisis in 2008 and the sharp decline of the local equity market in the second and third quarters of 2015, the MPF System demonstrated resilience over the past years.

35. Market volatility may be viewed as a reminder for schemes members to regularly review their MPF investment to ensure that the investment portfolio (i.e. fund choices) matches their personal circumstances (e.g. investment horizon, goal and risk tolerance level).

36. Scheme members may also consider retaining their MPF savings in their accounts for rollover and continuous investment if there is no urgent need to withdraw them upon retirement for use.

Avoid Timing the Market

37. To "buy low" and "sell high" is a commonly cited investment strategy. However, it is impossible for investors to have accurate predictions of market conditions consistently. Particularly when the markets are volatile, many may actually end up buying high and selling low. Some researches in fact suggest that trading in and out by timing the market may not be the best way for making investment.[11]

Capitalizing on the Benefits of Dollar Cost Averaging

38. MPF contributions are made to MPF funds at regular intervals. This disciplined investment approach could take advantage of dollar cost averaging (DCA). DCA offers an alternative to strategies that require an investor to speculate on the timing of an investment. Rather than a one-time investment that may count on the timing of market, DCA invests a fixed amount regularly.

39. DCA operates in a manner that when the unit price is high, the same amount buys fewer units; when the unit price is low, the same amount buys more units. This investment technique reduces the effects of short-term market fluctuations on investments by averaging out the costs of fund units over time.

[11] See Elton, E.J., Gruber, M.J., & Blake, C.R. (2012). An examination of mutual fund timing ability using monthly holdings data. *Review of Finance*, *16*(3), 619-645. doi: 10.1093/rof/rfr007 and Henriksson, R.D. (1984). Market timing and mutual fund performance: an empirical investigation. *The Journal of Business*, *57*(1), 73-96.

Looking at Performance Figures in Conjunction with the Level of Risk

40. Scheme members are reminded that the return figures set out in this report are only intended to give a generalized indication of the performance of the MPF System and funds. The performance is measured without taking into account risks, and scheme members need to consider their risk tolerance level when making fund choice. The report shows that MPF funds had generally exhibited the expected relationship between risk and return, that is, the higher the potential return in the long run, the higher the risk. Scheme members should also note that the System or fund-type return figures set out in the report should not be seen as providing any firm indicators for predicting future absolute performance of MPF funds.

Diversification Tends to Lower Risk

41. Risk may be reduced by means of a diversified portfolio. Diversification is an investment technique of allocating capital to a mix of different investments, aiming to reduce the risk of the portfolio by offsetting the losses of one asset class by the gains of other asset classes. In this regard, MPF funds are required under the MPF legislation to diversify their investment across issuers. To further diversify risks, the most critical element is that the price movements of the assets invested are not related to each other. Diversification across regions or asset classes tends to lower investment risk. For instance, the standard deviation of monthly returns of mixed asset funds is lower than equity funds as a whole. As such, scheme members who have only one regional or country equity fund in their portfolios may wish to consider diversifying their portfolio geographically by adding other MPF funds investing in other regions to balance the overall risk exposure where it is possible to do so. Likewise, scheme members who invest entirely in equity funds may consider diversifying the investment risk by adding other MPF funds of lower volatility into their MPF investment portfolio. Scheme members should however be aware of the trade-off between risk and return.

Appendix A: Methodology – Calculation of Return

Return of MPF System

1. The return of the MPF System is calculated by way of the **internal rate of return** (IRR), a method commonly known as dollar-weighted return. The IRR method, which takes into account the amount and timing of contributions into and benefits withdrawn from the MPF System, is used for the calculation of the return of the MPF System as it better reflects the feature of cash inflow and outflow of the MPF System.

2. The monthly internal rate of return of the MPF System (MIRR) is the discount rate that equates the net present value of all the net monthly contributions made to the MPF System within the review period to the net present value of the accrued benefits at the end of the period.

$$NAV_B + \sum_{i=0}^{n-1} \frac{CF_i}{(1+MIRR)^i} = \frac{NAV_E}{(1+MIRR)^n}$$

Where	NAV_B	:	Net asset values of the MPF System at the beginning of the period
	n	:	Total number of months
	CF_i	:	Net monthly contributions made to the MPF System, i.e. sum of contributions received and benefits transferred from other schemes minus sum of benefits paid out from the MPF System in month i
	$MIRR$	:	Monthly Internal Rate of Return of the period
	NAV_E	:	Net asset values of the MPF System at the end of the period

3. Assumption: All the net monthly contributions made to the MPF System occurred at the beginning of the month.

4. The annualized dollar-weighted return for the MPF System is calculated by raising the MIRR to the power of 12:

   Annualized Internal Rate of Return = $(1+MIRR)^{12} - 1$

Return of Different Types of MPF Funds

5. The returns of different types of MPF funds are calculated by way of the time-weighted method. The time-weighted method takes into account the unit price and asset size of each MPF fund at different points in time. Unlike the IRR method, it does not capture the impact of the contributions into and benefits withdrawn from MPF funds.

6. The **investment return** (IR) of an MPF fund for month *t* is calculated by dividing the difference between the unit price of the MPF fund at the end of month *t* and the unit price of the MPF fund at the end of the previous month *t-1* by the unit price of the MPF fund at the end of the previous month *t-1*.

$$IR_t = \frac{P_t - P_{t-1}}{P_{t-1}}$$

where

IR_t	:	Return of the MPF fund for month t
P_{t-1}	:	Unit price of the MPF fund at the end of month $t-1$
P_t	:	Unit price of the MPF fund at the end of month t

7. The **NAV-weighted monthly return** of MPF funds by type is calculated by dividing the sum of the product of the return of each MPF fund and its net asset value of the same type for a specific month by the net asset value of all of the MPF funds of the same type of the same period.

$$IR(type\ A)_t = \frac{\sum_{i=1}^{n(typeA)} NAV_{(t,i)} \times IR_{(t,i)}}{\sum_{i=1}^{n(typeA)} NAV_{(t,i)}}$$

where

$n(type\ A)$	:	Number of MPF funds grouped under *type A*
$NAV(t,i)$	:	Net asset value of the i^{th} MPF fund grouped under *type A* at the beginning of month t
$IR_{(t,i)}$	:	Return of the i^{th} MPF fund grouped under *type A* of month t

8. The **cumulative return** (CIR) of MPF funds by type for any period (totally N months) is calculated by the geometric link of the NAV-weighted monthly returns of the MPF funds within the same type for the period.

$$CIR(type\ A) = \prod_{t=1}^{N} (1 + IR(type\ A)_t) - 1$$

where

$IR(type\ A)$	:	NAV-weighted monthly return of the MPF funds grouped under *type A*
N	:	Total number of months

9. The **annualized return** (AIR) of MPF funds by type for any period is calculated by adjusting, on an annualized basis, the cumulative return of MPF funds within that specific type for the period.

$$AIR\ (type\ A) = \sqrt[12/N]{1 + CIR(type\ A)} - 1$$

where

$AIR(type\ A)$	:	Annualized return of the MPF funds grouped under *type A* for the period
$CIR(type\ A)$	:	Cumulative return of the MPF funds grouped under type A for the period
N	:	Total number of months

Adjustments

10. Due to data limitations, the following adjustments were made in deriving the returns of certain money market fund – MPF conservative funds and guaranteed funds:

    (a) Money Market Fund – MPF Conservative Funds
    During the review period, several money market fund – MPF conservative funds charged fees via deduction of units. The return figures for these MPF conservative funds had been adjusted to eliminate, as far as possible, any errors caused by charging fees via deduction of units.

    (b) Guaranteed Funds
    For those guaranteed funds without a unit price, the declared rates of return were used as the returns for the funds.

Appendix B: Features and Categorization of Different Types of MPF Funds

General Features of Different Types of MPF Funds

Fund Type	Investment Objective	Investment Instrument	Risk Level	Major Risk	Points to Note
Equity Fund	To achieve capital appreciation and a return higher than inflation over the long term	Stocks	Relatively high	Stock market volatility, exchange rate fluctuation and overall conditions of listed companies	• There are generally three types of equity funds: single market, regional market or global market. • They invest mainly in stocks listed on stock exchanges approved by the MPFA.
Mixed Assets Fund	To achieve capital appreciation over the long term through investing in a combination of stocks and bonds with risk profile depending on the proportion of stocks and bonds invested by the fund	Stocks and bonds	Medium to high	Stock market volatility, interest rate fluctuation, exchange rate fluctuation, bond credit ratings and credit risk	• Different mixed assets funds have different proportions of stocks and bonds. In general, greater proportion of stocks is associated with higher risk.
Bond Fund	To earn stable income from interest and coupon rate and make profits from bond trading	Bonds	Low to medium	Fluctuations in interest rates, exchange rates, bond credit ratings and credit risk	• The bonds must meet the minimum credit rating or listing requirements prescribed by the MPFA.

Fund Type	Investment Objective	Investment Instrument	Risk Level	Major Risk	Points to Note
Guaranteed Fund	To provide a guarantee on the capital invested, or to achieve a guaranteed rate of return	Bonds, stocks or short-term interest-bearing money market instruments	Relatively low (but also depends on the guarantee conditions)	The guaranteed rate of return may be modified with prior notice. If the assets of the guaranteed fund are invested in an insurance policy, the fund may be exposed to the credit risk of the insurance policy issuer.	• A guaranteed fund provides some form of guarantee to scheme members investing in the fund, usually on the capital invested or on a minimum rate of return. • To qualify for the guarantee, all guarantee conditions such as minimum investment period and withdrawal requirements must be met.

Fund Type	Investment Objective	Investment Instrument	Risk Level	Major Risk	Points to Note
Money Market Fund – MPF Conservative Fund	To earn a rate of return similar to the Hong Kong dollar savings rate	Short-term bank deposits and short-term bonds	Relatively low	Fluctuation in interest rates	• The law requires that each MPF scheme offers at a minimum an MPF conservative fund. • An MPF conservative fund is a low-risk fund, but its return may not be able to beat inflation and may not even be positive. • Administrative expenses can only be deducted from an MPF Conservative Fund when the returns of the fund for the month exceed the monthly Prescribed Savings Rate ("PSR") published by MPFA. If the return of an MPF Conservative Fund exceeds the PSR in any one of the following 12 months, trustees can recoup uncollected administrative expenses to the extent of the excess return.
Money Market Fund – Other than MPF Conservative Fund	To earn a rate of return comparatively higher than that of bank deposits or short-term certificates of deposit	Short-term interest bearing money market instruments such as short-term bank deposits, government bills or commercial papers	Relatively low	Fluctuations in interest rates and exchange rates	• A money market fund is a low risk fund, but its return may not be able to beat inflation or may not even be positive.