# More than meets the eye

## The impact of volatility on put-writing strategies is much misunderstood | UBS Asset Management

By: **Richard Lloyd**, Head of Engineered & Risk Managed Solutions, Investment Solutions

**Highlights**

- Equity index put-writing strategies have become increasingly popular with institutional investors because they offer a highly liquid, alternative form of equity exposure that has historically outperformed equity markets on a risk-adjusted basis
- A sharp spike in equity market volatility in February 2018, after an extended period of calm markets, led to press reports about the dangers of short volatility strategies
- We believe that put-writing strategies are misunderstood and that comparisons to direct short volatility strategies are misleading. We show that the dynamic nature of a put-writing strategy means that put-writing is not, in fact, short volatility over meaningful time horizons
- We conclude that put-writing can offer the potential to improve risk-adjusted returns in a rising volatility environment while offering long-term investors better diversification and risk management

# Put-writing strategies and volatility

Put-writing strategies—systematically selling short-dated equity index put options—seek to benefit from both the equity premium and the volatility risk premium embedded in option prices. Combining these risk premia has the potential to provide attractive returns while exhibiting significantly lower levels of risk compared to a direct allocation to equities.

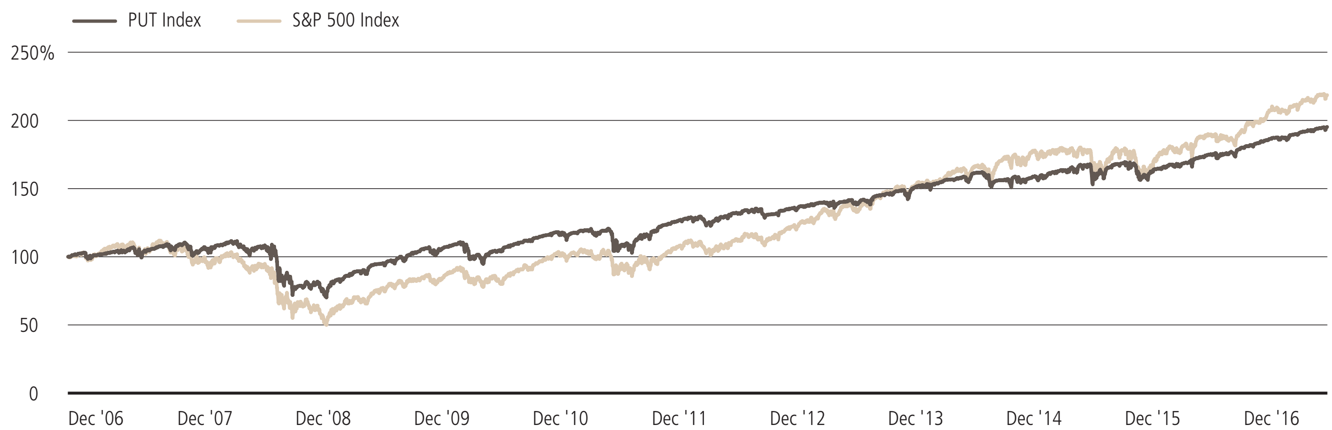
Historically these strategies have delivered superior risk-adjusted returns and provided an attractive opportunity for investors searching for better diversification and risk management. These strategies have become increasingly popular with institutional investors in recent years.

The chart below shows the performance of the CBOE PUT index (hereafter the "PUT index"), a systematic strategy which sells and rolls 1-month put options on the S&P 500 index, against the performance of the S&P 500 index itself. While the S&P 500 index delivered higher total returns over the period chosen, on a risk-adjusted basis the PUT Index outperformed.

We use market data from end December 2006 through to August 2017, for which we have a full data set. However, simulated data is available from June 1986 for the PUT index which demonstrates a similar pattern of superior risk-adjusted performance over a longer history.[1]

**How did put-writing perform when volatility spiked?**
Recent press coverage of put-writing strategies questioned the benefits of put-writing with high-profile articles in the financial press making a case that put-writing is a bet against market volatility and attempting to categorise put-writing alongside leveraged short volatility bets such as inverse VIX products

**Exhibit 1: CBOE PUT index vs S&P 500 index**




| | PUT Index (%) | S&P 500 Index (%) |
|---|---|---|
| **Annual return** | 6.50 | 7.63 |
| **Volatility** | 14.25 | 20.37 |
| **Sharpe ratio** | 0.37 | 0.32 |
| **Worst 1yr drawdown** | -33.30 | -47.50 |

Source: Bloomberg, UBS Asset Management. Indices rebased to 100.00 as at 29 December 2006. Note that indices are not investible instruments and performance does not reflect any fees or expenses which would lower investment returns.

[1] Excerpt from CBOE S&P 500 PutWrite Index (PUT) Fact Sheet (available at www.cboe.com):

| | PUT Index (%) | S&P 500 Index (%) |
|---|---|---|
| **Annual Return** (Jun 1986–Jan 2016) | 9.9 | 9.5 |
| **Volatility** | 10.2 | 15.3 |

which lost almost all of their value when implied volatility spiked.[2] This reflects a misunderstanding of put-writing strategies, which have an exposure to volatility in the very short term but over any longer time period, including the medium-term horizon of institutional investors, are not strongly correlated with the direction of volatility, when viewed relative to equities, and may even benefit from rising volatility.

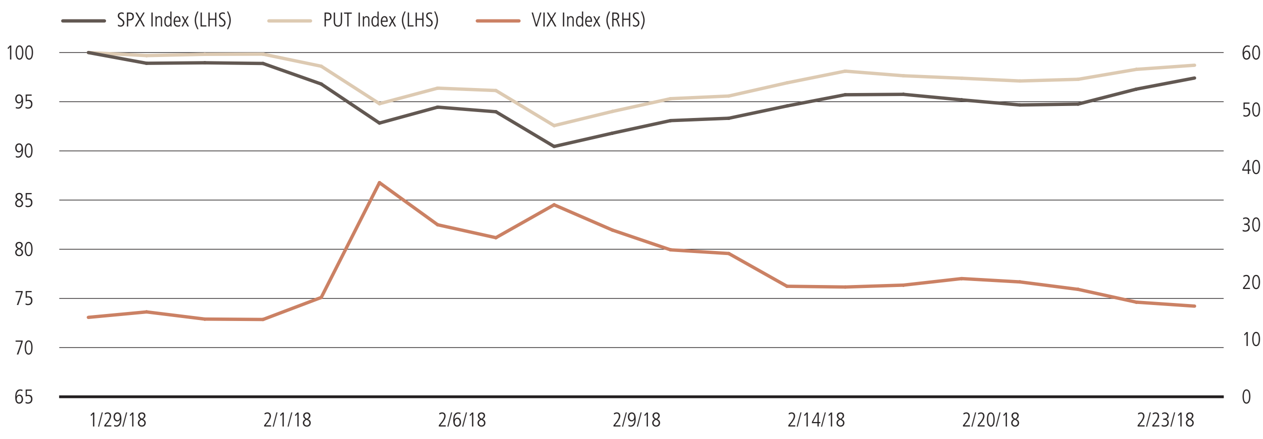
The chart below shows the performance of the PUT index against the performance of the S&P 500 index over the selloff in equity markets in early 2018 with the CBOE VIX index shown alongside for reference. While volatility spiked, with the VIX index rising from the low teens to a closing high of 37.32 on the 5th of February 2018, the PUT index outperformed the S&P 500 index, cushioning the downside as expected from the viewpoint of an equity investor. The performance of the PUT index was largely driven by the performance of the equity market.

Of course historical returns only tell us about the past and we should not assume that these returns will be repeated going forward. When assessing any investment strategy we need to develop an understanding of the sources of risk and return and their relationship to market conditions. In particular, we should ask ourselves whether positive performance in the past was driven by market risk premia which are likely to be persistent or by a tail wind created by specific market conditions.

The assumption behind the press reports is that a put-writing strategy represents a short exposure to volatility so, intuitively, will perform badly in a rising volatility environment. However, the actual relationship between volatility and the performance of a put-writing strategy is much less straightforward. To develop a general understanding of how a put-writing strategy is likely to perform in an environment with rising equity market volatility, we need to take an in-depth look into this relationship and consider the impact of changing volatility on a dynamic strategy from the perspective of an equity investor.

The conclusion from our analysis is surprising and counter-intuitive: while put-writing strategies have a directional exposure to volatility in the very short term, over any longer time period, including the medium term horizon of institutional investors, a put-writing strategy is not strongly correlated with the direction of volatility and may even benefit from rising volatility. Or, to put it another way, put-writing, when viewed as an equity replacement, is not 'short volatility' after all.

**Exhibit 2: PUT index vs S&P 500 index and CBOE VIX index from 29 Jan 2018 to 26 Feb 2018**




Source: Bloomberg, UBS Asset Management. Note that indices are not investible instruments and performance does not reflect any fees or expenses which would lower investment returns. Daily data used with each point representing data for a 252 business day period.

[2] For instance, the VelocityShares Daily Inverse VIX Short-Term ETN which lost 96.1% of its value from close on 1 February 2018 to close on 8 February 2018 and was subsequently liquidated. Source: UBS Asset Management, Bloomberg.

**What does the data say?**
Our analysis is conducted from the viewpoint of an investor evaluating put-writing as an alternative to equity exposure. Consequently, we are interested in the relative performance of the PUT index and the S&P 500 index on a risk-adjusted basis. Volatility generally rises when equity markets are falling, so looking at relative returns will control for this effect and allow us to check whether a put-writing strategy outperforms or underperforms equities in this market scenario as a result of the exposure to volatility embedded in put options.

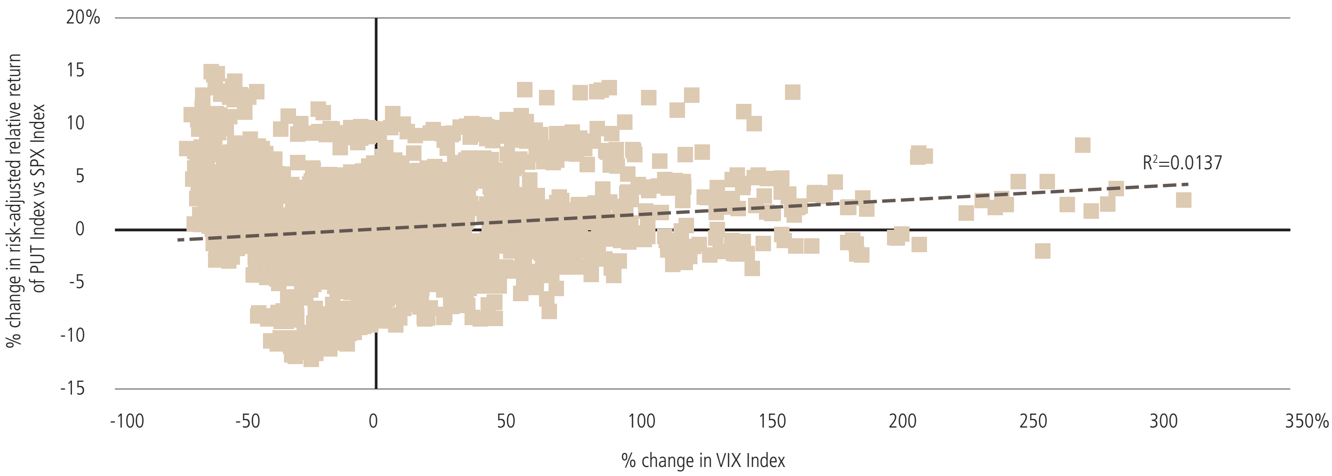
We use the VIX index, which is based on the implied volatility of 1-month S&P 500 index options, as a measure of volatility.

In Exhibit 3, we can see the relationship between volatility and PUT index relative performance. Each point represents a 1-year risk-adjusted relative performance of the PUT Index, on the y-axis, and the percentage change in the VIX index over the same period, on the x-axis. We have plotted points on a daily, overlapping basis with start dates from Jan 2007 to August 2016.

If the put-writing strategy is 'short volatility' relative to equity as hypothesised then we would expect to see more points clustered in the bottom right quadrant of the chart, representing periods when the VIX index rose and the PUT index underperformed. In fact, the chart shows no clear relationship between the two, and there are actually more points in the top right quadrant (689) than the bottom right quadrant (443). The statistics bear this out with a slightly upward sloping trendline and an $R^2$ (a statistical measure of the degree to which the movement in the VIX 'explains' the PUT index risk-adjusted relative performance) of just 0.01. We also see similar results when we run the analysis for shorter periods using the same methodology (10 business days and 30 business days respectively).[3]

This means that, over the period of the sample, even if it had been possible to perfectly forecast the gain or fall in the VIX index over the next year it would not have helped us to forecast the relative performance of the PUT index over the same period. Or to put it another way, we believe any view an investor has about the likely development of market volatility should not sway her decision on whether to invest in a put-writing strategy.

**Exhibit 3: PUT index relative performance[4] vs. % Change in VIX index over 1-year periods**




Source: Bloomberg, UBS Asset Management. Note that indices are not investible instruments and performance does not reflect any fees or expenses which would lower investment returns. Daily data used with each point representing data for a 252 business day period.

[3] Using the same daily data set and methodology we calculated an $R^2$ of 0.01 for 10 day performance and an $R^2$ of 0.00 for 30 day performance.
[4] PUT index relative performance defined as the total return from a hypothetical investment in the PUT index minus the total return over the same period from a hypothetical investment allocated 70% to the S&P 500 index and 30% to USD 3m Libor index at inception.

**Put-writing can also perform well when volatility starts low**

An additional point to consider is whether the starting level of volatility matters. The above considers the movement in the VIX index regardless of the starting point but does the result still hold if we narrow the analysis down to observations where the VIX index starts from a low level?

The scatter chart below uses the same data as Exhibit 3 but only includes points where the initial level of the VIX index was below 14.50, which represents the lowest 25% of VIX observations in our data set. The results show a similar pattern to the full data set, demonstrating that there is limited directional exposure to volatility on a relative, risk-adjusted basis and that put-writing strategies also have the potential to perform well in environments where volatility climbs from initial lows.

**Why isn't put-writing a short volatility strategy?**

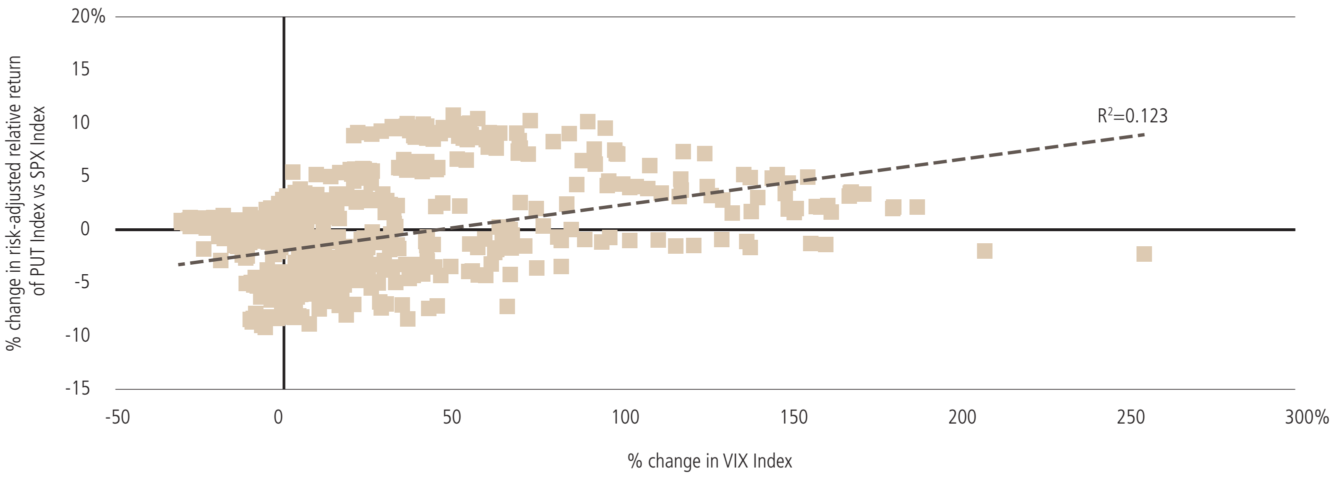
As we note above, the result of our analysis seems counter-intuitive since selling a put option creates a short volatility exposure (a short put option has negative 'vega' in options terminology). So, why doesn't the put-writing strategy underperform in periods of rising volatility?

To understand the performance we need to look in more detail at the composition of the put-writing strategy and the key features which affect the sensitivity to volatility.

First, we note that a put-writing strategy typically holds short dated option positions up to, or close to, expiry. Intra-period changes to implied volatility will affect the mark-to-market valuation but will cancel out as the option gets closer to expiry and the option price converges to the payout formula. The volatility impact over the holding period is determined by the difference between the implied volatility at inception (which determines the premium received) and the realized volatility over the holding period (which determines the distribution of performance for the underlying index), i.e. the strategy is not primarily exposed to the absolute level of volatility but the relative difference between implied volatility when the position is established and realized volatility over the full option holding period.

When realized volatility spikes it is usually as a result of a sharp fall in equity markets. In this scenario a put-writing strategy is exposed to downside volatility in a similar way to a long equity position and the difference between implied and realized

**Exhibit 4: PUT index relative performance vs. % change in VIX index with low starting VIX (below 14.5) over 1-year periods**




Source: Bloomberg, UBS Asset Management. Note that indices are not investible instruments and performance does not reflect any fees or expenses which would lower investment returns. Daily data used with each point representing data for a 252 business day period.

volatility is likely to be negative. However, because a put-writing strategy writes short-dated put options, the exposure will roll off and be renewed at the next roll date, at which point the strategy can take advantage of higher implied volatility and partially offset any losses. This rolling feature of a put-writing strategy is critical as it ensures that an investor is not locked in to an absolute exposure to volatility at a particular level. Instead, implied volatility exposure will rise and fall through time as implied volatility evolves and the positions are rolled. In this way higher volatility can actually deliver a benefit over longer periods as higher option premiums are collected each time a new option is sold. This scenario can potentially be even more attractive for put-writing strategies as a period of market stress may result in elevated implied volatility levels for some time even as realized volatility falls back.

**Conclusion: Put-writing is a strategy that adapts to changing markets**

We believe that put-writing strategies offer an attractive alternative to equity exposure for multi-year investors who are seeking exposure to alternative risk premia and better risk management. Volatility has been at depressed levels for some time but we believe that this is not a permanent feature of equity markets and we are already seeing signs of a regime change to higher and more variable volatility. Our analysis shows that this scenario is not detrimental to put-writing strategies, however, and we believe that put-writing strategies can continue to deliver attractive risk-adjusted returns for investors as market conditions evolve.

**Put-writing provides exposure to the 'volatility risk premium'**

Investors trade options for a variety of reasons. A large group of market participants use options to better manage the risk profile of portfolios, particularly in the form of long positions in put options to limit downside risk. With a systematic put-writing strategy, option sellers are taking the other side of this trade and can earn attractive premium income in exchange for providing pre-defined downside-risk cover.

As with all asset markets, prices for options adjust to match supply and demand, so greater demand for protection means higher put option prices and a positive return expectation to those willing to provide such protection. Put option buyers are also typically motivated by risk control and are therefore less sensitive to price than option sellers, who can require compensation to assume asymmetric downside risk. This compensation is embedded in option prices and is known as the volatility risk premium.

A systematic put-writing strategy can be viewed as an alternative way to invest in equities, forfeiting some of the potential upside in favor of a fixed amount, earned at the time of the option sale, which includes the volatility risk premium. This is particularly beneficial when markets realize flat, slightly positive or slightly negative returns, but will not keep track with a direct equity investment if markets rise strongly.

**For marketing and information purposes by UBS. For professional clients / qualified / institutional investors only.**
This document does not replace portfolio and fund-specific materials. Commentary is at a macro or strategy level and is not with reference to any registered or other mutual fund.

**Americas**
The views expressed are a general guide to the views of UBS Asset Management as of March 2018. The information contained herein should not be considered a recommendation to purchase or sell securities or any particular strategy or fund. Commentary is at a macro level and is not with reference to any investment strategy, product or fund offered by UBS Asset Management. The information contained herein does not constitute investment research, has not been prepared in line with the requirements of any jurisdiction designed to promote the independence of investment research and is not subject to any prohibition on dealing ahead of the dissemination of investment research. The information and opinions contained in this document have been compiled or arrived at based upon information obtained from sources believed to be reliable and in good faith. All such information and opinions are subject to change without notice. Care has been taken to ensure its accuracy but no responsibility is accepted for any errors or omissions herein. A number of the comments in this document are based on current expectations and are considered "forward-looking statements." Actual future results, however, may prove to be different from expectations. The opinions expressed are a reflection of UBS Asset Management's best judgment at the time this document was compiled, and any obligation to update or alter forward-looking statements as a result of new information, future events or otherwise is disclaimed. Furthermore, these views are not intended to predict or guarantee the future performance of any individual security, asset class or market generally, nor are they intended to predict the future performance of any UBS Asset Management account, portfolio or fund.

**EMEA**
The information and opinions contained in this document have been compiled or arrived at based upon information obtained from sources believed to be reliable and in good faith, but is not guaranteed as being accurate, nor is it a complete statement or summary of the securities, markets or developments referred to in the document. UBS AG and / or other members of the UBS Group may have a position in and may make a purchase and / or sale of any of the securities or other financial instruments mentioned in this document.

Before investing in a product please read the latest prospectus carefully and thoroughly. Units of UBS funds mentioned herein may not be eligible for sale in all jurisdictions or to certain categories of investors and may not be offered, sold or delivered in the United States. The information mentioned herein is not intended to be construed as a solicitation or an offer to buy or sell any securities or related financial instruments. Past performance is not a reliable indicator of future results. The performance shown does not take account of any commissions and costs charged when subscribing to and redeeming units. Commissions and costs have a negative impact on performance. If the currency of a financial product or financial service is different from your reference currency, the return can increase or decrease as a result of currency fluctuations. This information pays no regard to the specific or future investment objectives, financial or tax situation or particular needs of any specific recipient.

The details and opinions contained in this document are provided by UBS without any guarantee or warranty and are for the recipient's personal use and information purposes only.

This document may not be reproduced, redistributed or republished for any purpose without the written permission of UBS AG. This document contains statements that constitute "forward-looking statements", including, but not limited to, statements relating to our future business development. While these forward-looking statements represent our judgments and future expectations concerning the development of our business, a number of risks, uncertainties and other important factors could cause actual developments and results to differ materially from our expectations.

**UK**
Issued in the UK by UBS Asset Management (UK) Ltd. Authorised and regulated by the Financial Conduct Authority.

**APAC**
This document and its contents have not been reviewed by, delivered to or registered with any regulatory or other relevant authority in APAC. This document is for informational purposes and should not be construed as an offer or invitation to the public, direct or indirect, to buy or sell securities. This document is intended for limited distribution and only to the extent permitted under applicable laws in your jurisdiction. No representations are made with respect to the eligibility of any recipients of this document to acquire interests in securities under the laws of your jurisdiction.

Using, copying, redistributing or republishing any part of this document without prior written permission from UBS Asset Management is prohibited. Any statements made regarding investment performance objectives, risk and/or return targets shall not constitute a representation or warranty that such objectives or expectations will be achieved or risks are fully disclosed. The information and opinions contained in this document is based upon information obtained from sources believed to be reliable and in good faith but no responsibility is accepted for any misrepresentation, errors or omissions. All such information and opinions are subject to change without notice. A number of comments in this document are based on current expectations and are considered "forward-looking statements". Actual future results may prove to be different from expectations and any unforeseen risk or event may arise in the future. The opinions expressed are a reflection of UBS Asset Management's judgment at the time this document is compiled and any obligation to update or alter forward-looking statements as a result of new information, future events, or otherwise is disclaimed.

You are advised to exercise caution in relation to this document. The information in this document does not constitute advice and does not take into consideration your investment objectives, legal, financial or tax situation or particular needs in any other respect. Investors should be aware that past performance of investment is not necessarily indicative of future performance. Potential for profit is accompanied by possibility of loss. If you are in any doubt about any of the contents of this document, you should obtain independent professional advice.

**Australia**
This document is provided by UBS Asset Management (Australia) Ltd, ABN 31 003 146 290 and AFS License No. 222605.

**China**
The securities may not be offered or sold directly or indirectly in the People's Republic of China (the "PRC"). Neither this document or information contained or incorporated by reference herein relating to the securities, which have not been and will not be submitted to or approved/verified by or registered with the China Securities Regulatory Commission ("CSRC") or other relevant governmental authorities in the PRC pursuant to relevant laws and regulations, may be supplied to the public in the PRC or used in connection with any offer for the subscription or sale of the Securities in the PRC. The securities may only be offered or sold to the PRC investors that are authorized to engage in the purchase of Securities of the type being offered or sold. PRC investors are responsible for obtaining all relevant government regulatory approvals/licenses, verification and/or registrations themselves, including, but not limited to, any which may be required from the CSRC, the State Administration of Foreign Exchange and/or the China Banking Regulatory Commission, and complying with all relevant PRC regulations, including, but not limited to, all relevant foreign exchange regulations and/or foreign investment regulations.

**Hong Kong**
This document and its contents have not been reviewed by any regulatory authority in Hong Kong. No person may issue any invitation, advertisement or other document relating to the Interests whether in Hong Kong or elsewhere, which is directed at, or the contents of which are likely to be accessed or read by, the public in Hong Kong (except if permitted to do so under the securities laws of Hong Kong) other than with respect to the Interests which are or are intended to be disposed of only to persons outside Hong Kong or only to "professional investors" within the meaning of the Securities and Futures Ordinance (Cap. 571) and the Securities and Futures (Professional Investor) Rules made thereunder.

**Japan**
This document is for informational purposes only and is not intended as an offer or a solicitation to buy or sell any specific financial products, or to provide any investment advisory/management services.

**Korea**
The securities may not be offered, sold and delivered directly or indirectly, or offered or sold to any person for re-offering or resale, directly or indirectly, in Korea or to any resident of Korea except pursuant to the applicable laws and regulations of Korea, including the Capital Market and Financial Investment Business Act and the Foreign Exchange Transaction Law of Korea, the presidential decrees and regulations thereunder and any other applicable laws, regulations or rules of Korea. UBS Asset Management has not been registered with the Financial Services Commission of Korea for a public offering in Korea nor has it been registered with the Financial Services Commission for distribution to non-qualified investors in Korea.

**Taiwan**
This document and its contents have not been reviewed by, delivered to or registered with any regulatory or other relevant authority in the Republic of China (R.O.C.). This document is for informational purposes and should not be construed as an offer or invitation to the public, direct or indirect, to buy or sell securities. This document is intended for limited distribution and only to the extent permitted under applicable laws in the Republic of China (R.O.C.). No representations are made with respect to the eligibility of any recipients of this document to acquire interests in securities under the laws of the Republic of China (R.O.C.).

Source for all data and charts (if not indicated otherwise): UBS Asset Management



© UBS 2018. The key symbol and UBS are among the registered and unregistered trademarks of UBS. All rights reserved.
17-0958 3/18
www.ubs.com/am

Professional clients/institutional investors only.