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Strategies for Effective Risk Mitigation: an Asset Manager' Perspective

Dr. Massimiliano Castelli PhD, MSc
Head of Strategy, Global Sovereign Markets, UBS Asset Management

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FX reserve management evolution

Central banks have become more similar to other institutional investors in terms of asset allocation and diversification

Which of the following instruments are approved at your institution?

Asset Class	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998
Supranationals	93	90	89	94	82	87	76	70	68	70	72	70	74	63	62	60	62	54	63	60
Sovereign eurobonds	89	93	92	90	78	73	64	68	65	66	66	64	60	60	58	58	61	60	66	66
US agencies	74	83	74	49	54	69	55	65	71	84	86	84	82	76	78	75	71	62	68	54
Inflation protected bonds	76	70	61	49	48	40	44	47	45	38	33	28	16	9	na	na	na	na	na	na
Covered bonds	48	53	34	43	40	45	30	38	40	53	58	50	48	44	38	35	37	34	28	12
Bank debt	48	40	42	41	26	33	20	31	29	48	44	48	41	21	24	21	26	20	16	4
Corporates	56	48	42	43	34	33	31	29	26	38	41	40	38	38	32	28	22	20	15	10
MBS / ABS	52	40	39	25	20	22	37	27	38	46	52	44	39	39	27	22	17	19	12	2
Emerging Market debt	26	30	21	18	12	11	22	24	16	16	10	na	na	na	na	na	na	na	na	na
Equities	30	33	26	18	16	24	18	19	14	18	22	18	5	3	2	na	na	na	na	na
Private Equity	19	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Hedge Funds	11	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na

In % of total respondents, multiple responses possible.

Source: UBS AM as of June 2017.

Liquidity and Investment Tranche separation

With FX reserves rising beyond the levels required for monetary and FX policy objectives, liquidity became less binding

Liquidity Tranche

CB Working capital

Objective

- Liquidity management for market operations

Key considerations

- Preservation of capital and liquidity
- Currency mix/reference
- Import Coverage (3-6 months)
- Short term external debt coverage (100%)

Stabilization portfolio

Objective

- Offset oil price movements to fill gap in revenues to fund public expenditure

Key considerations

- Preservation of capital and liquidity
- Precaution/buffer during national emergencies
- Explicit/implicit liabilities
- Diversify natural/structural endowment

Investment Tranche

Savings portfolio

Objective

- Accumulate wealth for future generations
- Managing inflation impact

Key considerations

- Maximise (risk-adjusted) returns over longer time horizons
- Exploit illiquidity premium
- Return above relevant inflation target (reflecting import structure)

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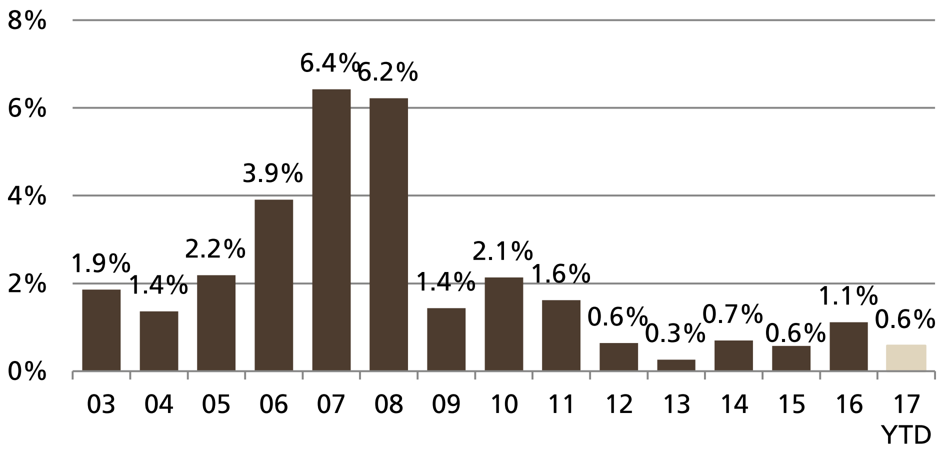
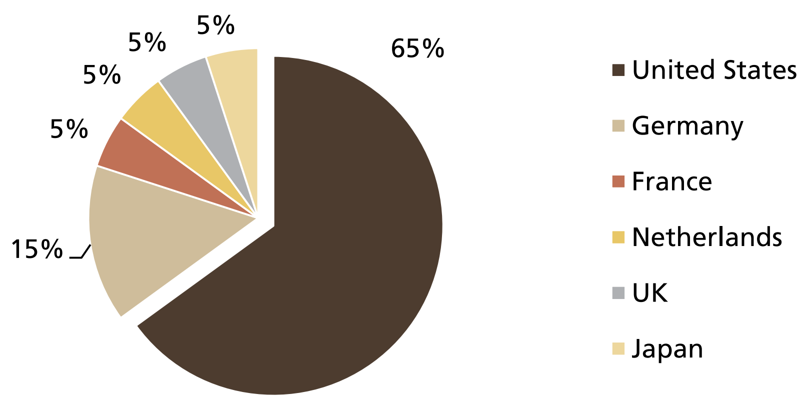
Government Bonds: No longer protecting capital

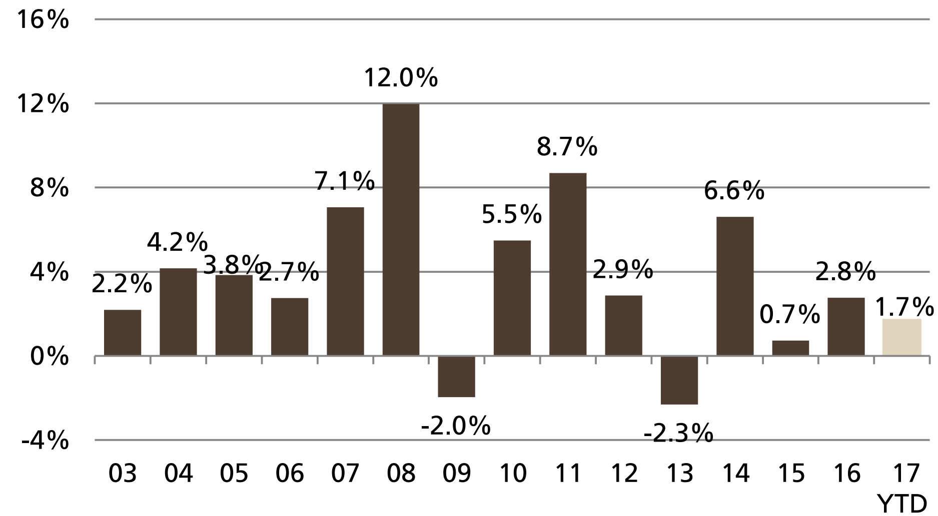
Government bonds no longer provide returns above inflation

Global Government Bond Short Duration (GGB 1 – 3), Hypothetical Returns, %





Global Government Bond Long Duration (GGB), Hypothetical Returns, %



Key features

- Broadly resembling the currency composition of global FX reserves
- Non-USD indexes all hedged in USD

* See Appendix for details on the composition of different portfolios.
Source: UBS AM, Bloomberg. Data as of January 2018. For illustrative purposes only.

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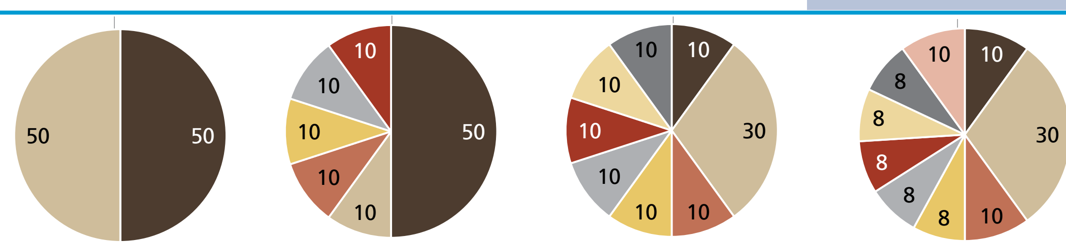
Central banks sample Portfolios

Different levels of risk tolerance and diversification across asset classes

			Liquidity	**Fixed Income Diversification**		**Equity Diversification**
			Most liquid – CB working capital management	Diversification across fixed income to improve risk-adjusted returns		Liquid equity to boost risk-adjusted returns
			CB1	**CB2**	**CB3**	**CB4**
Liquidity	Investment Grade	Cash	50	10	10	10
Liquidity	Investment Grade	GGB 1 – 3	50	50	30	30
Duration	Investment Grade	GGB		10	10	10
Spread	Investment Grade	Supranationals		10	10	8
Spread	Investment Grade	Corporates		10	10	8
Spread	Investment Grade	Securitised		10	10	8
Inflation hedge	Investment Grade	TIPS			10	8
Risk premium		EMD			10	3
Risk premium		Equities				15

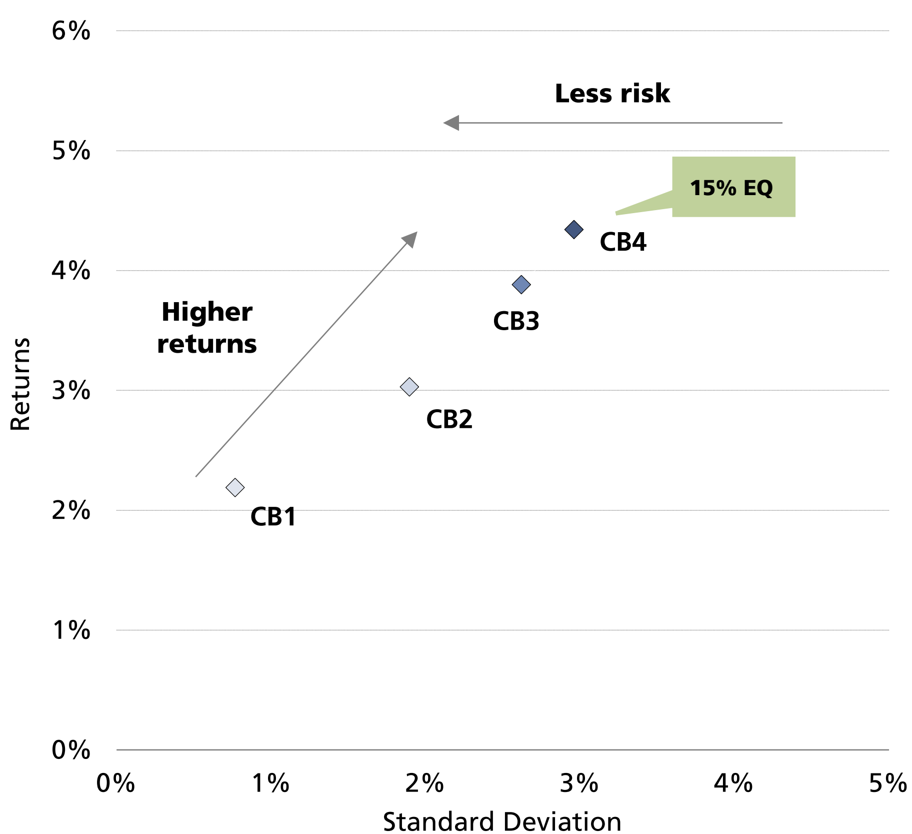


Source: UBS AM. For illustrative purposes only.

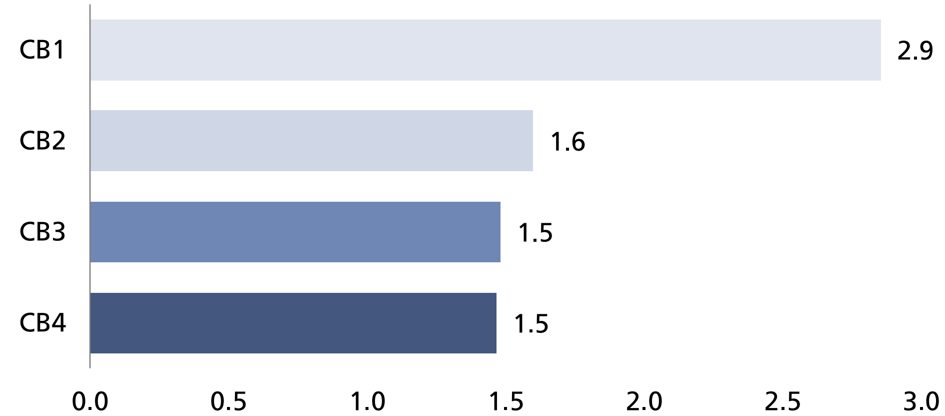
FX reserve diversification paid off

Diversification across fixed income and equity provided a substantial increase in returns

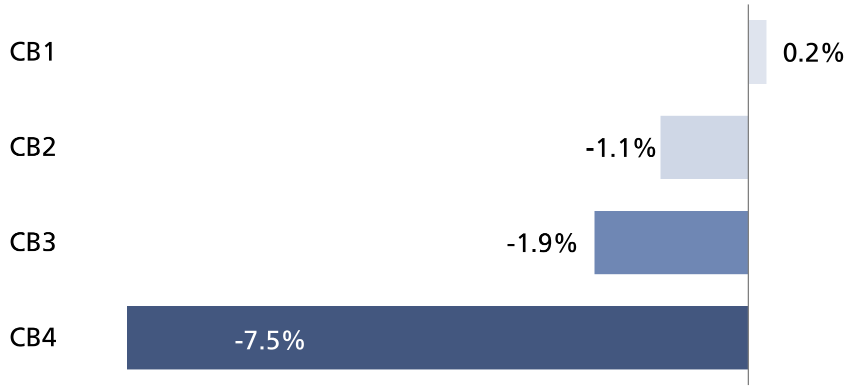
Historical Returns and Standard Deviation, 2002 – 2018YTD



Return/Risk, 2002 – 2018YTD



Worst 12 Months, 2002 – 2018YTD



Source: UBS AM. See Appendix for details about sources
Please note that past performance is not a guide to the future. Data as of end of January 2018.

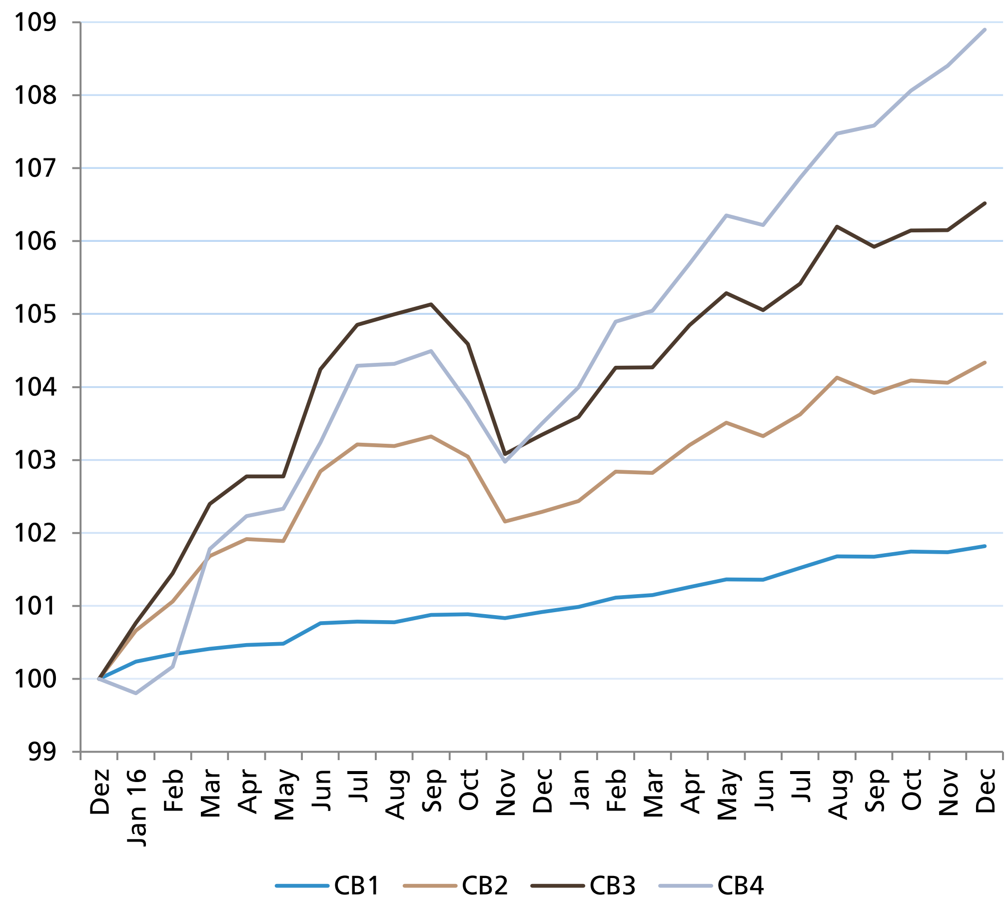
Central Bank portfolios: Recent market performance

In 2016, bonds had a good year but experienced a drop after the US election. The performance 2017 was good for bonds as well as equities.

Sample central bank portfolios tracking model output

	CB1	CB2	CB3	CB4
2016 January	0,24%	0,66%	0,77%	-0,20%
2016 February	0,10%	0,40%	0,67%	0,36%
2016 March	0,08%	0,61%	0,94%	1,61%
2016 April	0,05%	0,23%	0,37%	0,44%
2016 May	0,02%	-0,03%	0,00%	0,10%
2016 June	0,28%	0,94%	1,43%	0,89%
2016 July	0,03%	0,36%	0,58%	1,02%
2016 August	-0,01%	-0,02%	0,14%	0,02%
2016 September	0,10%	0,13%	0,13%	0,17%
2016 October	0,01%	-0,27%	-0,52%	-0,67%
2016 November	-0,05%	-0,86%	-1,44%	-0,78%
2016 December	0,08%	0,13%	0,26%	0,51%
2017 January	0,07%	0,15%	0,24%	0,48%
2017 February	0,12%	0,39%	0,65%	0,87%
2017 March	0,03%	-0,01%	0,01%	0,14%
2017 April	0,11%	0,37%	0,55%	0,61%
2017 May	0,10%	0,30%	0,42%	0,63%
2017 June	-0,01%	-0,18%	-0,22%	-0,12%
2017 July	0,16%	0,29%	0,35%	0,61%
2017 August	0,16%	0,49%	0,74%	0,56%
2017 September	-0,01%	-0,20%	-0,26%	0,10%
2017 October	0,07%	0,16%	0,21%	0,44%
2017 November	-0,01%	-0,03%	0,00%	0,32%
2017 December	0,08%	0,26%	0,35%	0,45%
Performance 2017	**0,89%**	**2,00%**	**3,07%**	**5,22%**

CB sample portfolio performance (indexed, 31.12.2015 = 100)



Source: UBS AM model based on publicly available information, using broad indices and funds to replicate CBs and SWF portfolios.
For illustrative purposes only. Please see appendix for more information on portfolios. Please note that past performance is not a guide to the future.

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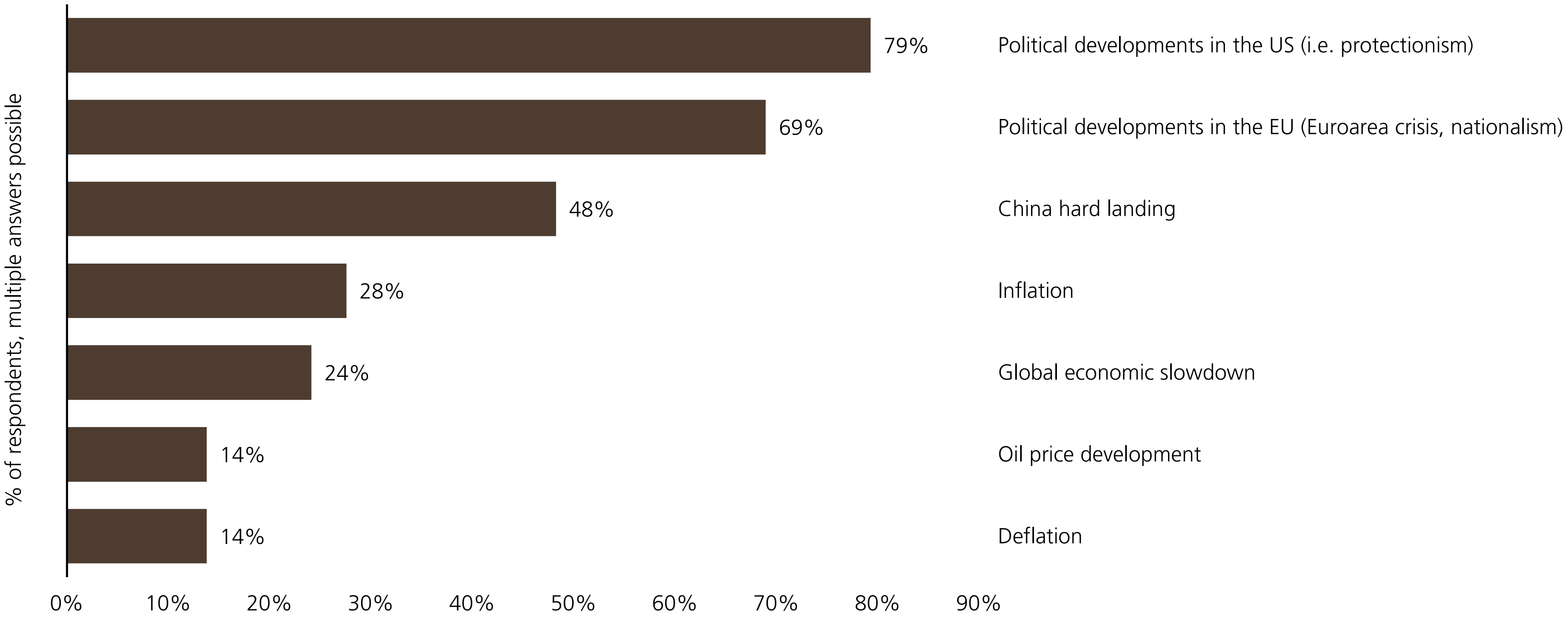
Main concerns impacting the global economy

What are the main risks the global economy is currently facing?



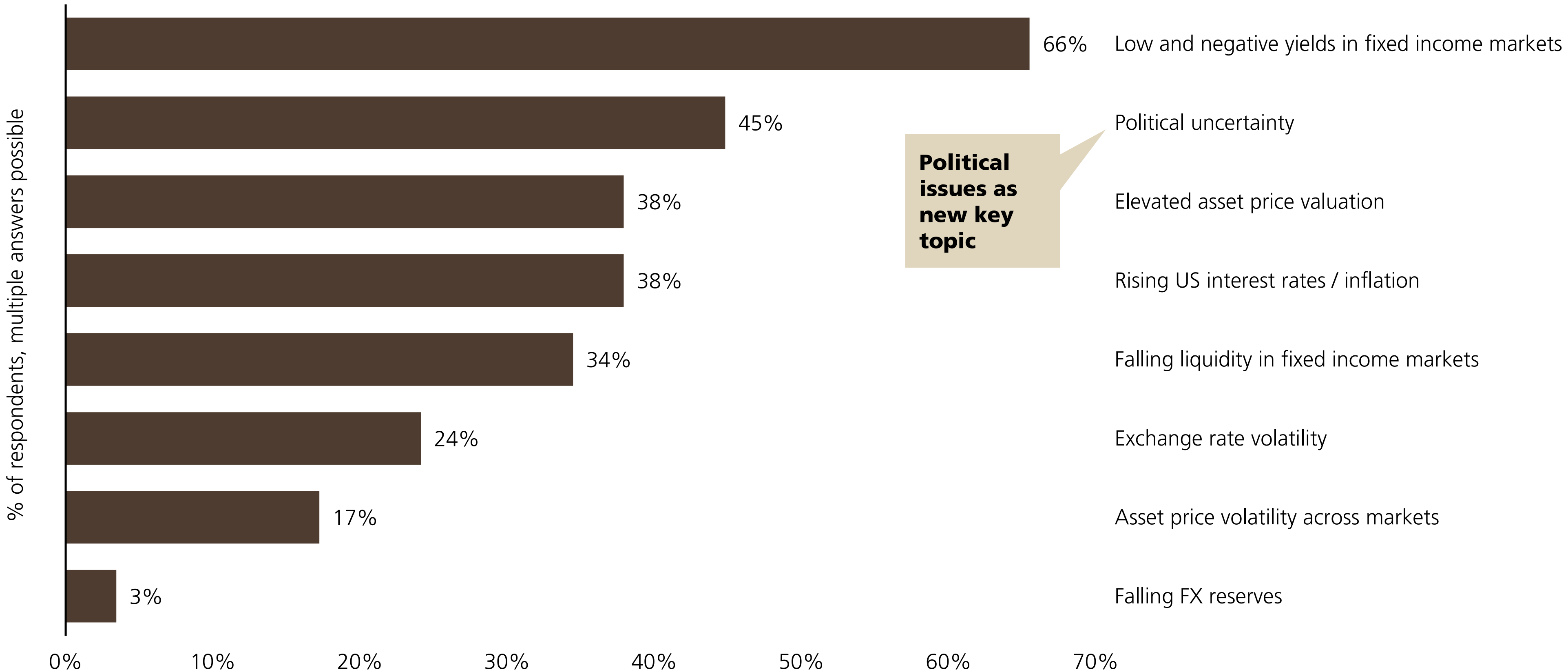
Other notable concerns mentioned by survey participants

- Political Developments in South-East Asia
- Low productivity environment

Source: UBS AM as of June 2017.

Main concerns impacting the levels of FX reserves

What are currently your main concerns when it comes to the investment of FX reserves?



Source: UBS AM as of June 2017.

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Key strategic themes – Is "Goldilocks" over?

Asset prices supported by a pick-up in global growth, but will this finally lead to inflation?

Global growth accelerating: Global growth currently at its fastest pace since 2010 and leading indicators suggest good momentum across both developed and emerging markets. ECB loose policy stance improving consumer and business sentiment, closing the growth gap with the US; earnings going through a period of sustained growth. The US is ahead in the cycle, so is the current pace of growth sustainable?

The inflation puzzle: Inflation in developed markets remains below the policy target, creating uncertainty over the magnitude and timing of monetary policy normalization. Low inflation reflect both structural and cyclical factors. Will inflation ultimately pick up, forcing central banks to accelerate the pace of monetary tightening and balance sheet reduction?

China deleveraging and rebalancing: Current measures indicate that the PBoC is now less concerned about currency depreciation and capital flights, and we expect China's government to prioritize stability of growth as it manages a necessary de-leveraging and rebalancing process. A China slowdown remains a risk, and investors fear a Chinese credit crunch, a hard landing for the country's economy and negative global spillover effects.

(Geo)Politics: Populism and Protectionism still a risk? Where will be the next war or regional conflict? The rise of populism and protectionism across Europe and in the US subsided but could resurface and may eventually pose a real threat to the current cyclical recovery, should there be an escalation. The market's worst fears about (geo)politics have so far proven unfounded; still, concerns can easily resurface in North Korea, the Middle East, the UK or Italy.

Monetary policy normalization and fiscal policy: Developed market central banks are beginning to gradually unwind extraordinarily easy accommodation. But at the same time, policymakers are more willing to provide fiscal stimulus to boost domestic demand. Will the 'Yellen/Powell Put' be replaced by a 'Trump Put'?

Asset prices: Developed market equities are not cheap by historic measures, and bond yields are starting to go up. But earning growth is generally good and interest rates are expected to rise slower than in previous hiking cycles. In the absence of inflation surprises or disappointing growth numbers that point to the next recession, risk assets can still perform well.

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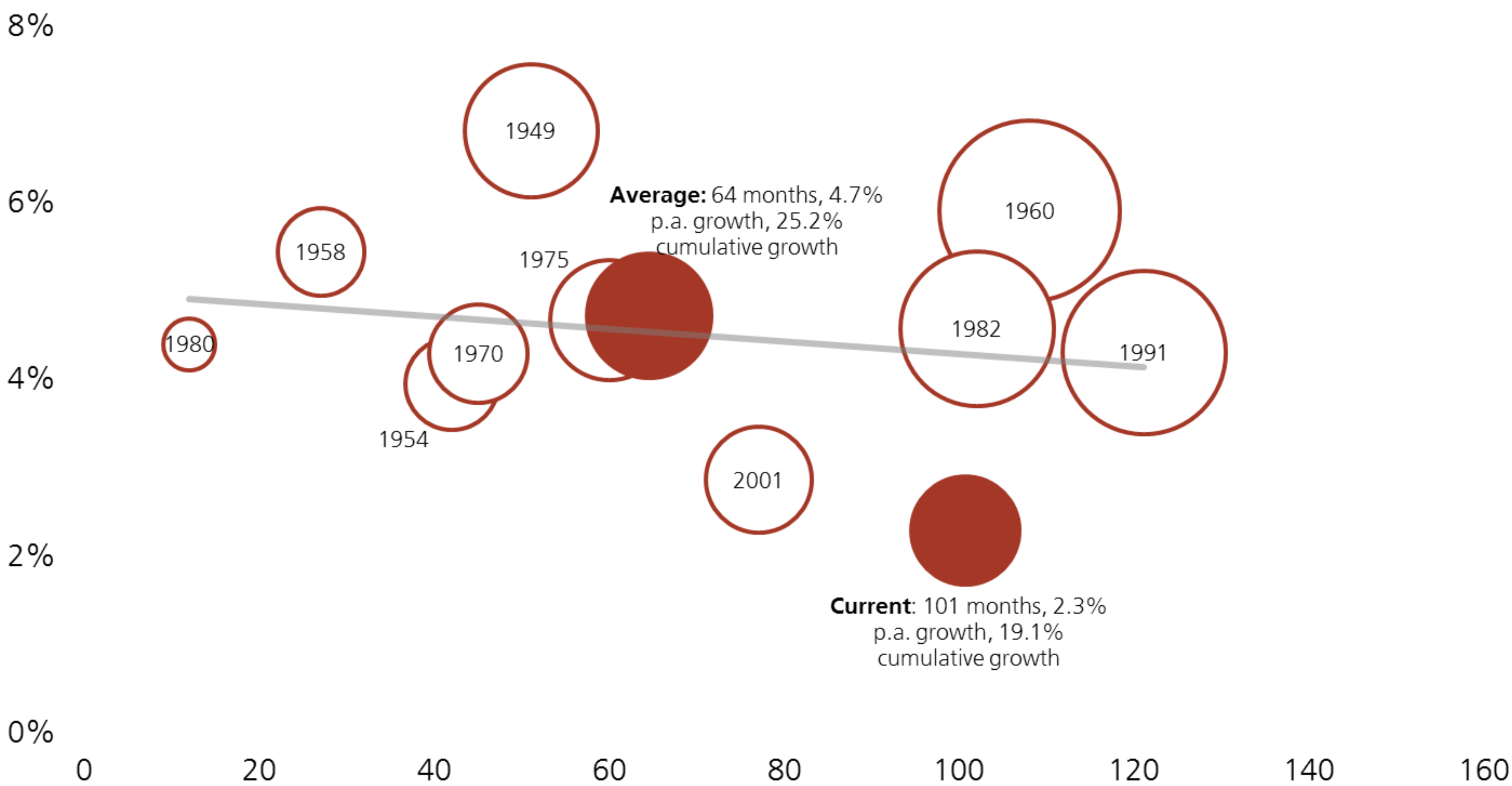
Source: UBS Asset Management as of February 2018.

This recovery has been long, but it has been slow. How will it end?

Length, speed (annualized real GDP growth), and size (total real GDP growth) of US expansions



Source: Bloomberg, UBS, as of November 2017

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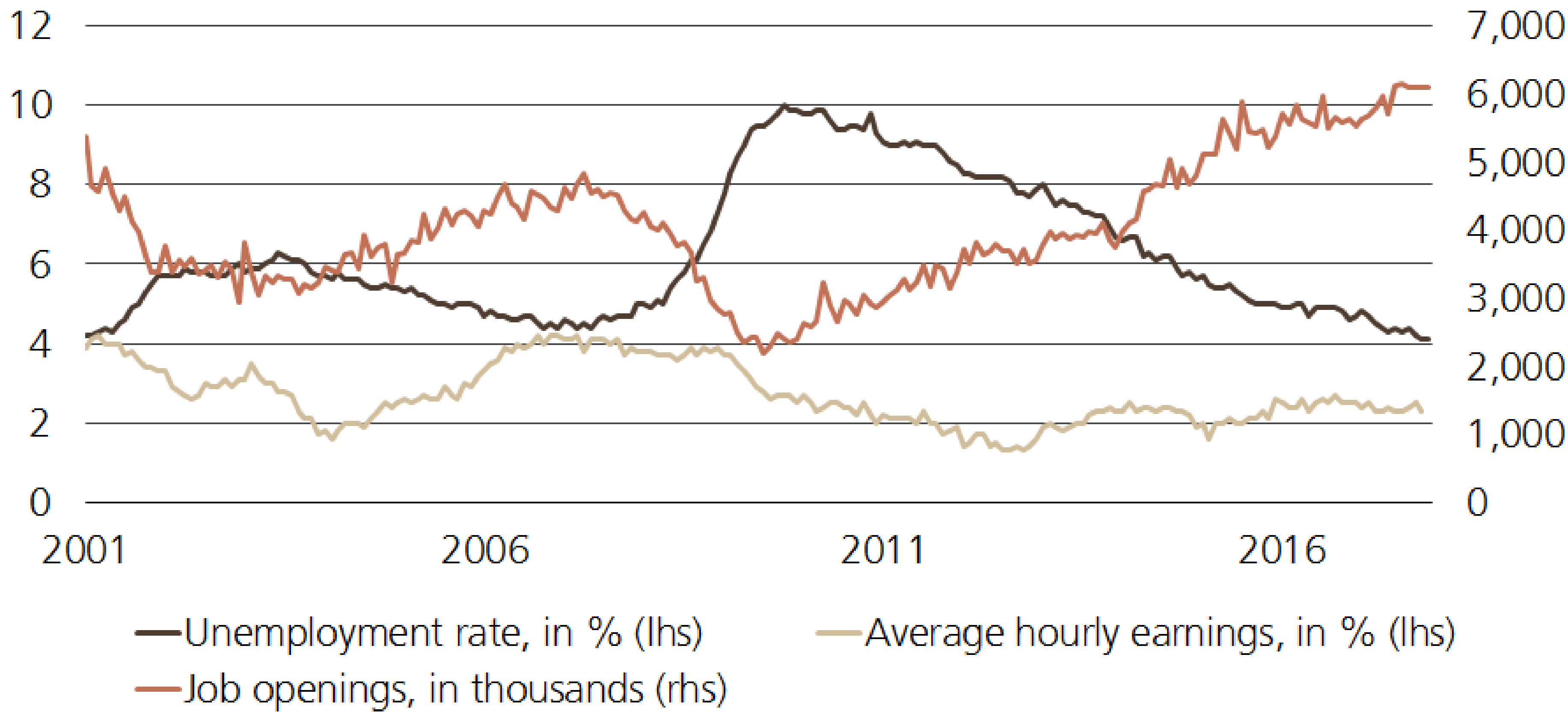
When will a tight US labor market push up inflation?

Unemployment rate and average hourly earnings, both in % (lhs), job openings (in 000s, rhs)

US unemployment is at a post-2001 low, while job openings are near record highs



Source: Bloomberg, UBS WM CIO, as of November 2017

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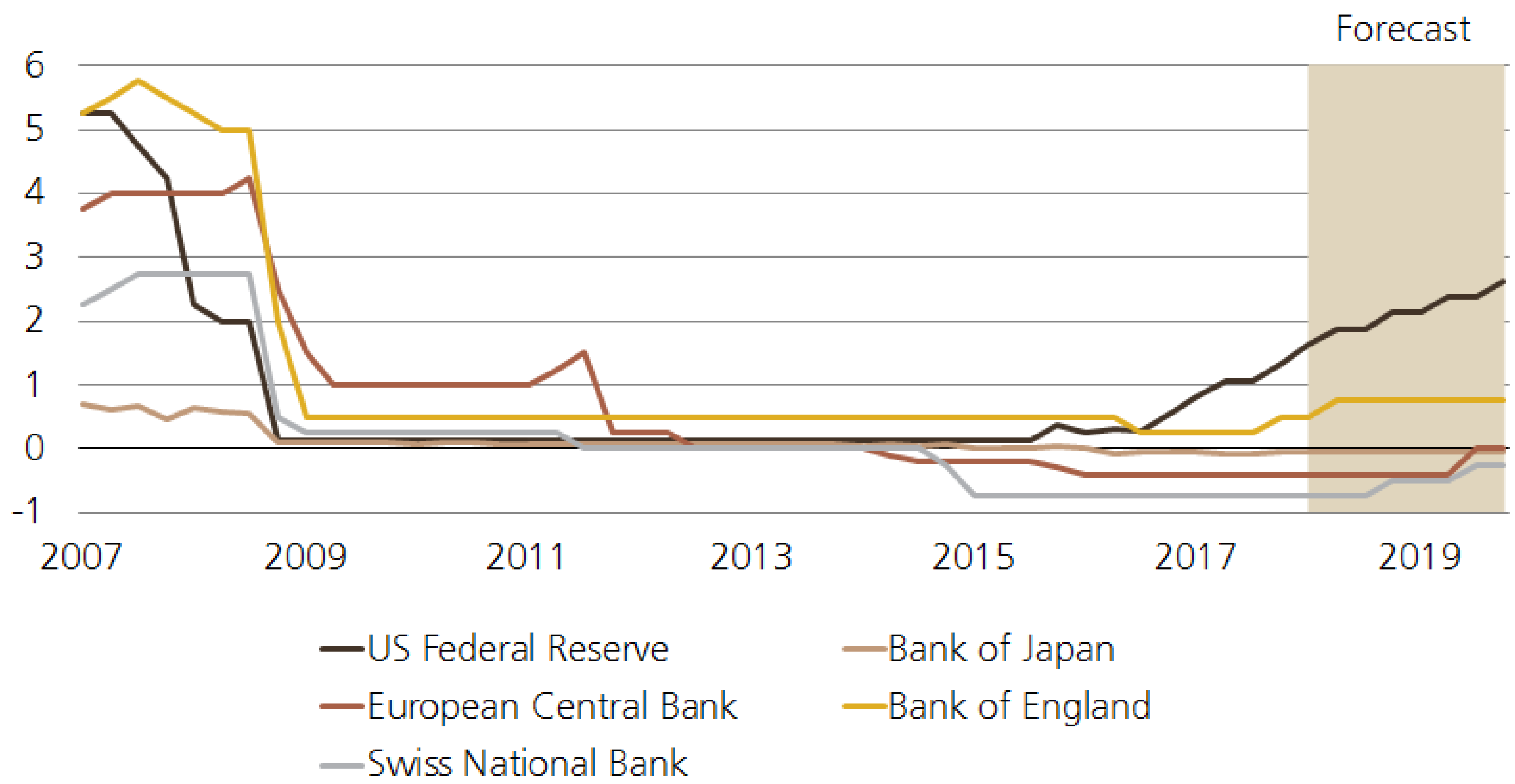
Monetary policy: diverging, but still low rates

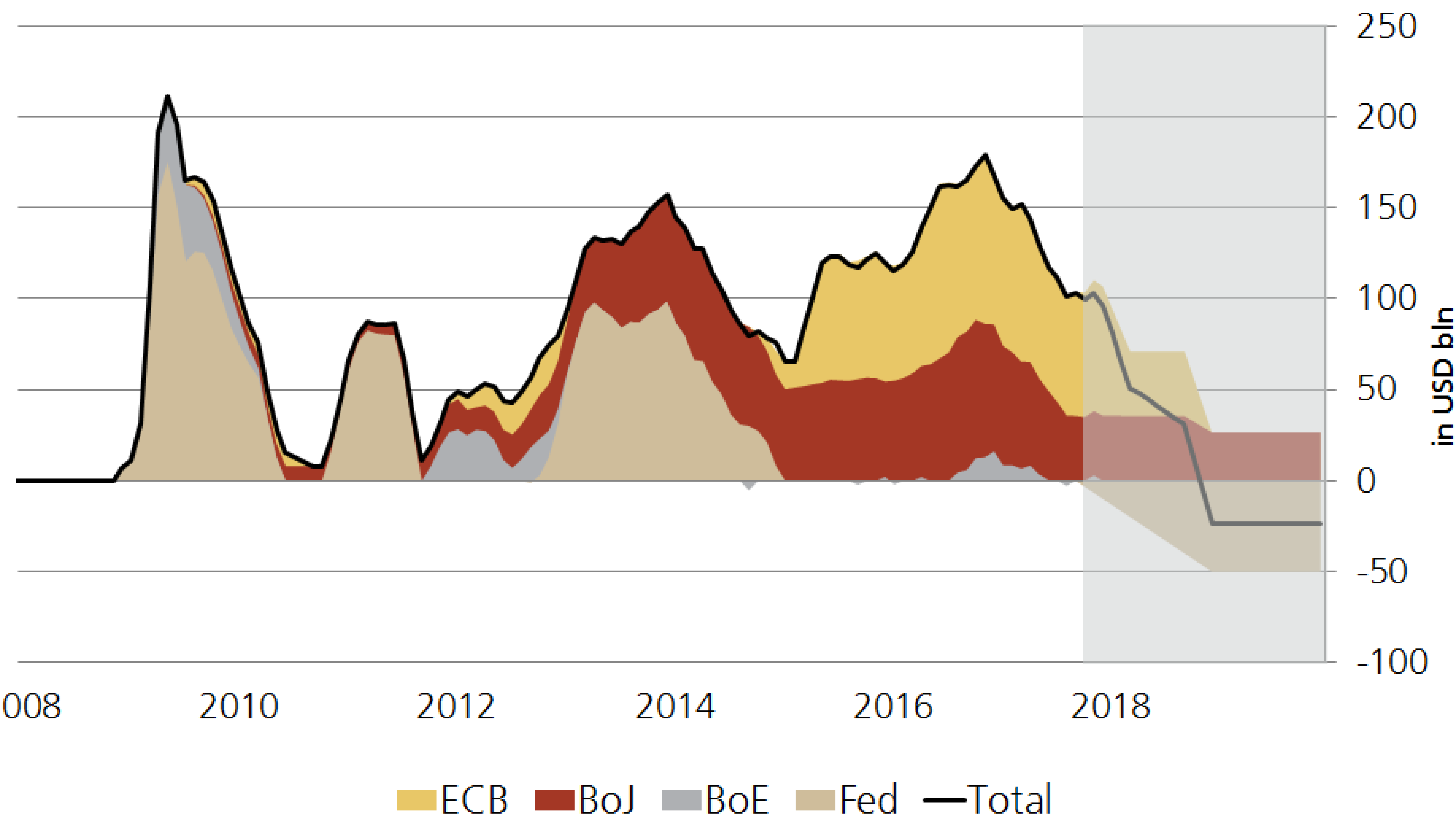
Policy rates (US, Japan, Eurozone, UK, Switzerland) , in % – forecasts in shaded area



Source: CIO WM, February 1, 2018

End of QE: will long-term yields rise?

Monthly net securities purchases (in USDbn)



Source: UBS WM CIO, Haver Analytics, October 2017.
Note: Includes securities purchases of the ECB, Federal Reserve, Bank of England and Bank of Japan (financed by central bank money creation). 3-month moving average until end of 2019.

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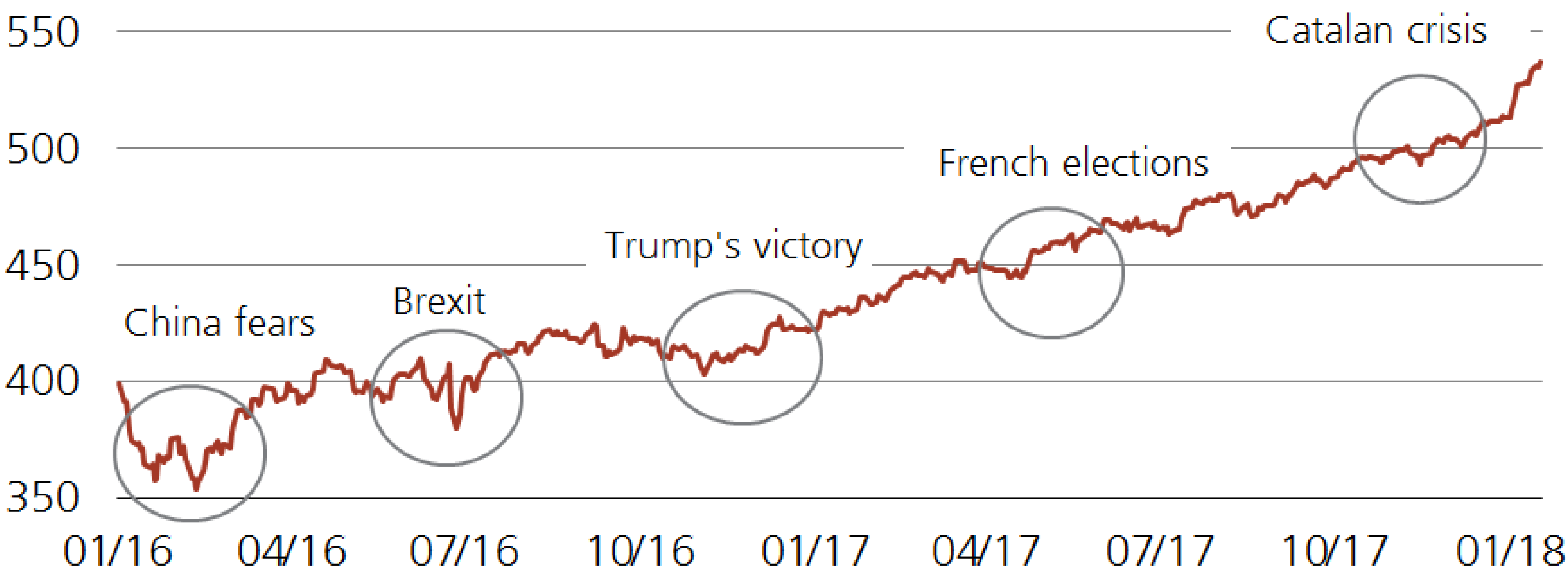
Political flux: limited global impact

MSCI All-Country World Index, since January 2016

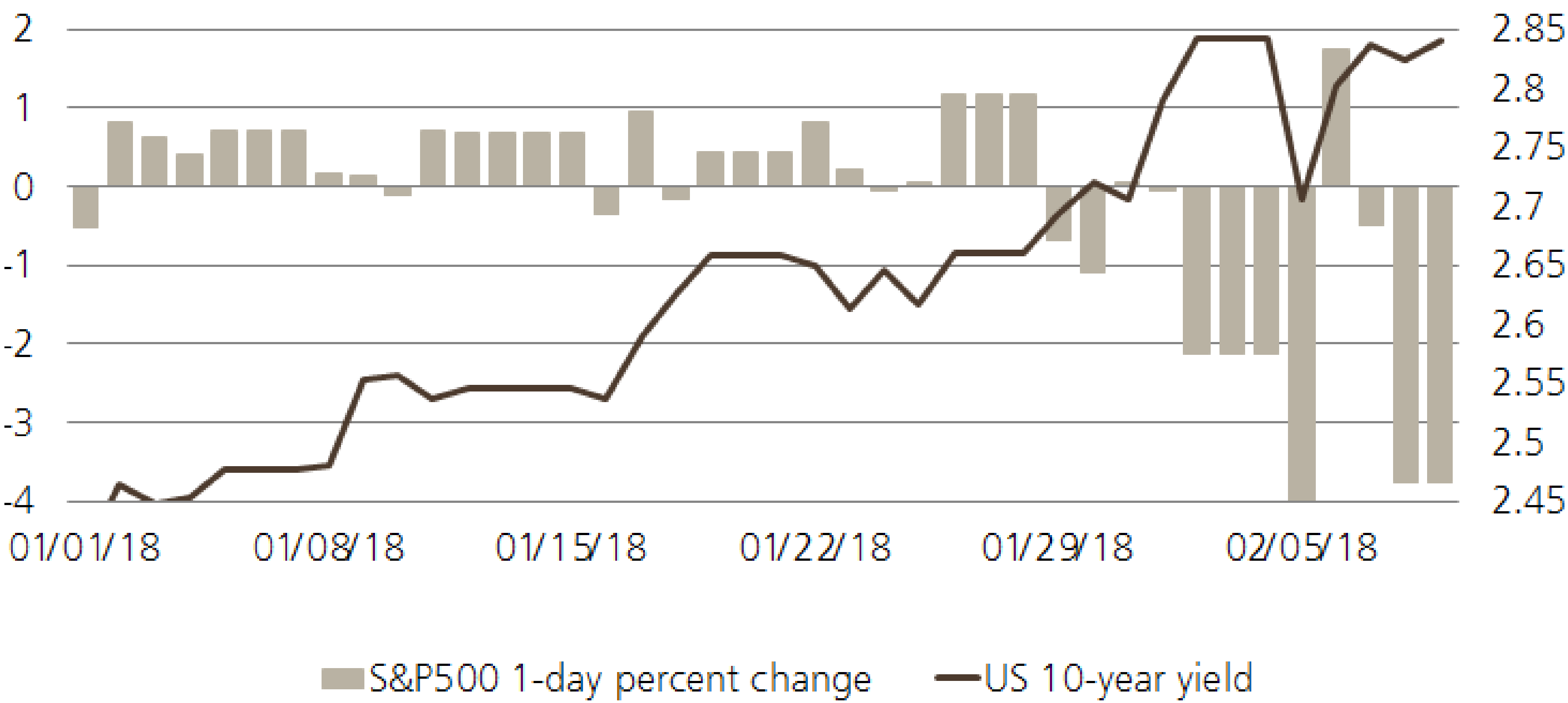


Source: UBS WM CIO, Bloomberg, January 18, 2017

The S&P 500 enters a correction…

…and the 10-year US Treasury yield swiftly regained its highs, suggesting residual concerns about higher inflation.

S&P 500 and US 10-year bond yields

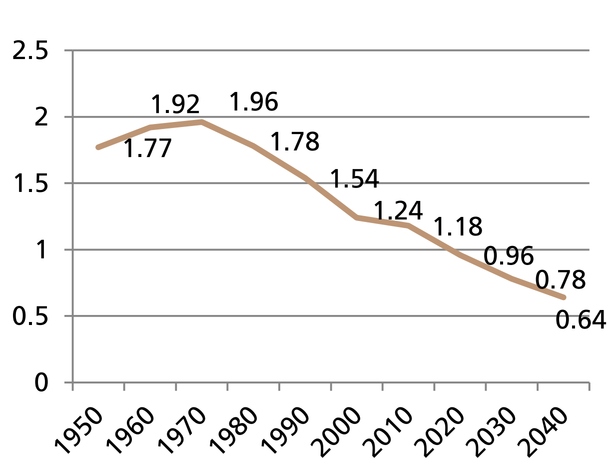


Source: UBS WM CIO, Bloomberg, February 9, 2018

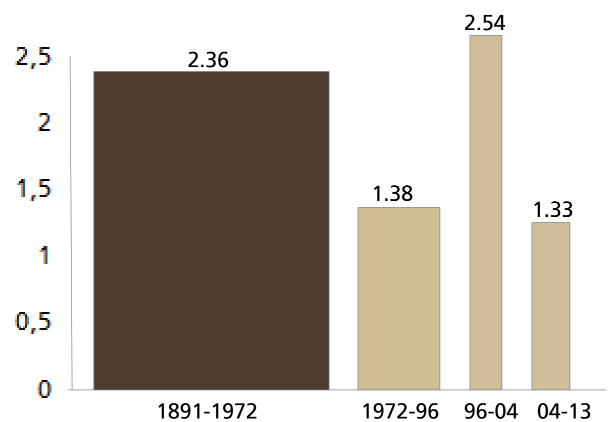
New regime or not?

The global economy is in very good shape what does it mean for assets' prices?

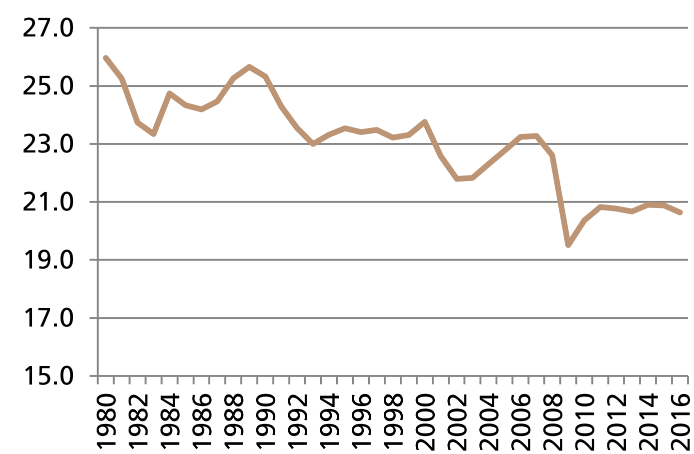
Population growth (%)



Productivity growth (%)



Investment rate (%) Advanced econ



Scenario A: Base case

Scenario A assumptions:

- **Moderate rise in global rates and equity prices**
- **Inflation** (US) at constant 2%
- **US T-Bills** rising to 2.20% over next 5 years
- **US 10-year yields** rising moderately to 3.5% in five years
- **US equities** overvalued, most **non-US markets** undervalued

Scenario B: Recession

Scenario B assumptions:

- **Recession followed by low growth**
- **Inflation** increasing only gradually, reaching 1.5% in five years
- **US T-Bills** declining, reaching 0.0% in five years
- **US 10-year yields** falling to 1.0% in five years
- **Global equities** initially dropping up to 30%, followed by a gradual recovery of 5% annually.

Scenario C: Stagflation

Scenario C assumptions:

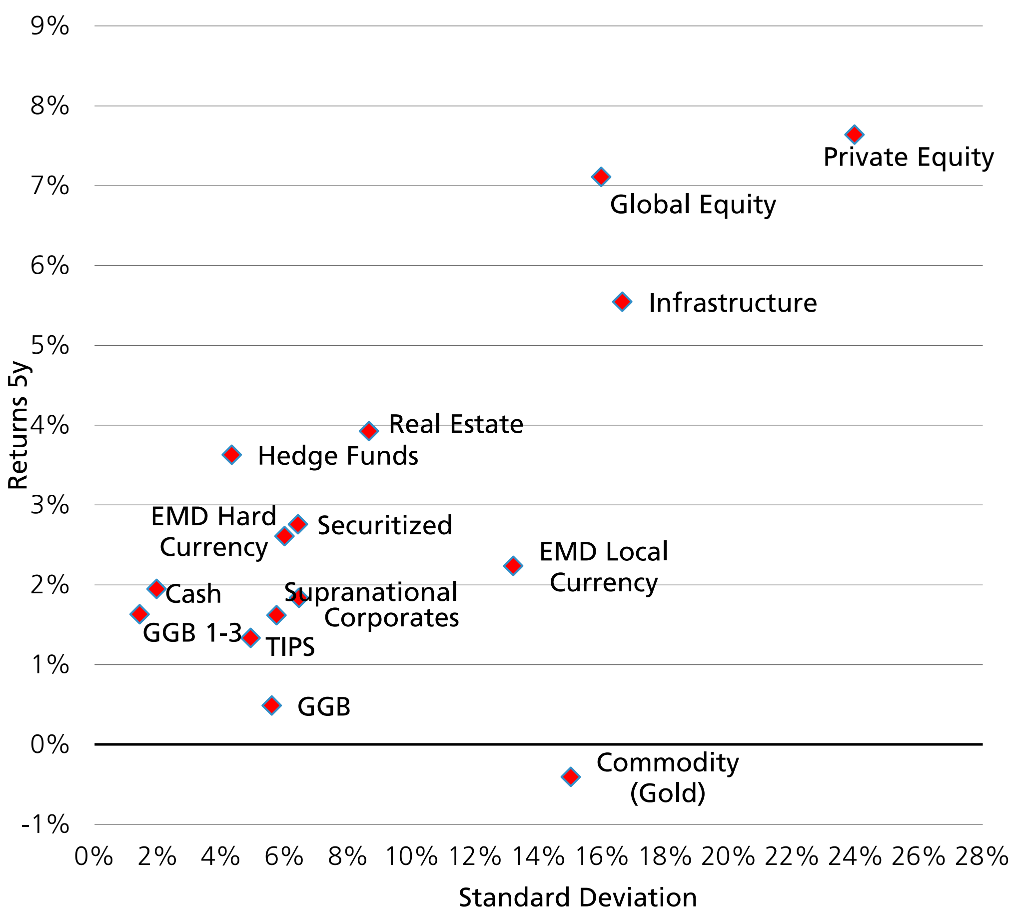
- **Stagflation with steadily rising inflation and lackluster real returns**
- **Inflation** steadily rising, reaching 5% in five years
- **US T-Bills** reaching 3.2% in five years
- **US 10-year yields** rising to 4.5% in five years
- Hard **equity** hit in first year, lackluster real returns subsequently.

Source: United Nations, IMF 2016. UBS AM 2018.

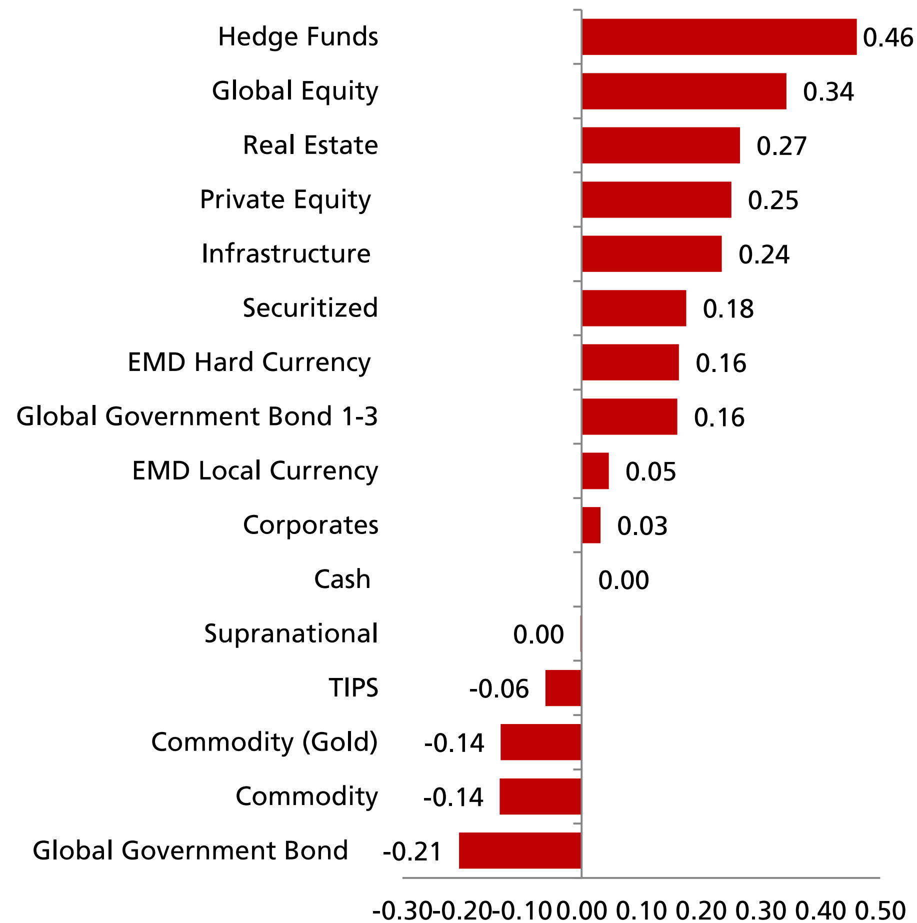
Scenario A (Base case) – Asset Classes

Government bonds worst performing asset class; equity/alternatives outperform

Expected Returns 5 years and Standard Deviation, %



Return/Risk profile

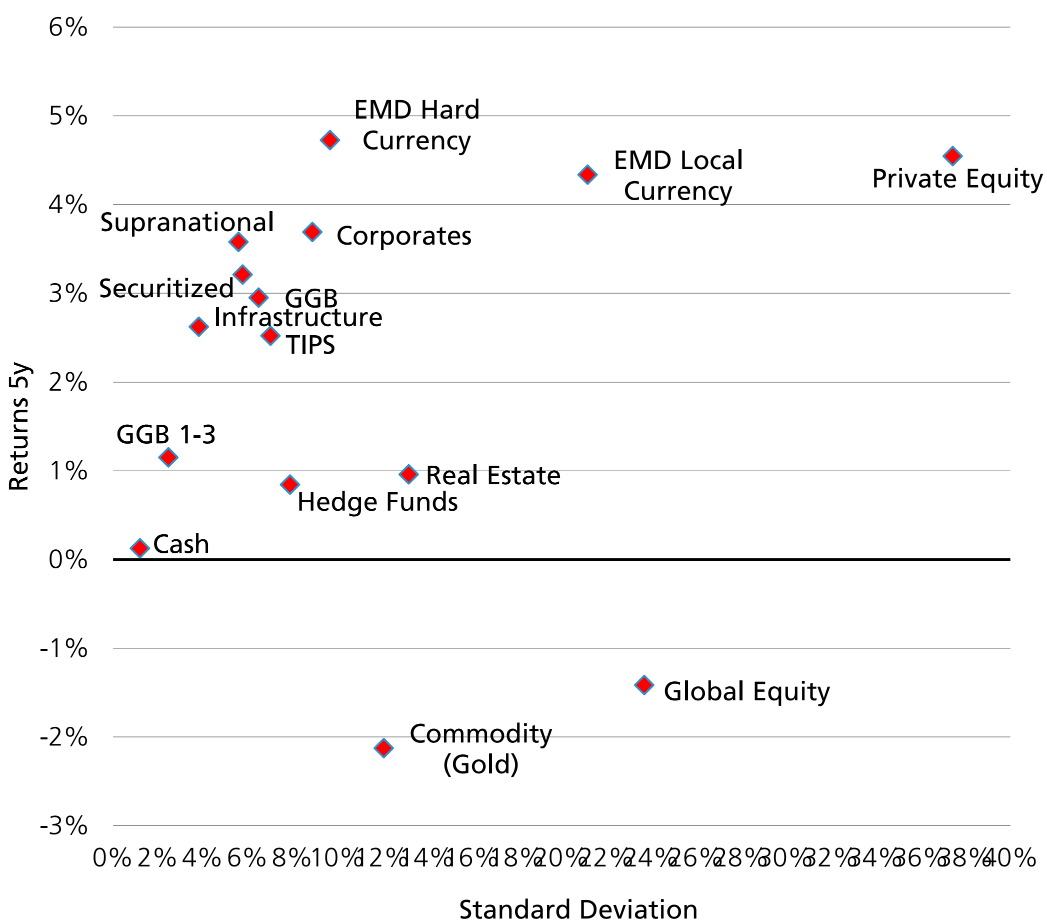


Source: UBS AM. See Appendix for details about sources. Data as of end of January 2018. This does not constitute a guarantee by UBS AG, Asset Management.

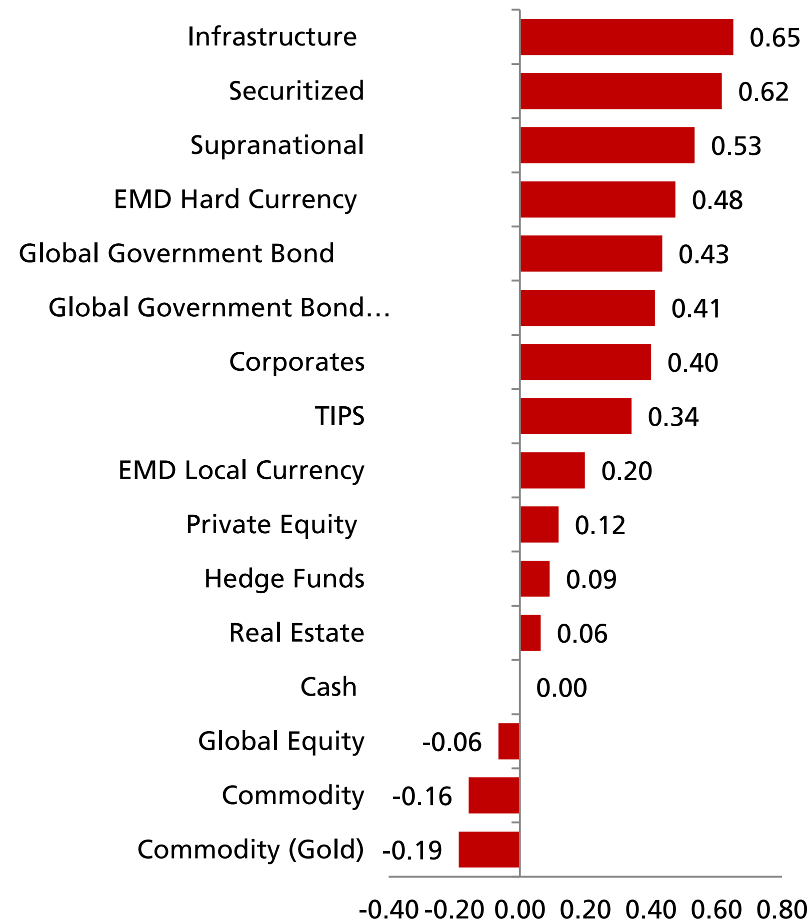
Scenario B (Recession) – Asset classes

Equity underperform, fixed income assets shine while alternatives preserve capital

Expected Returns 5 years and Standard Deviation, %



Return/Risk profile

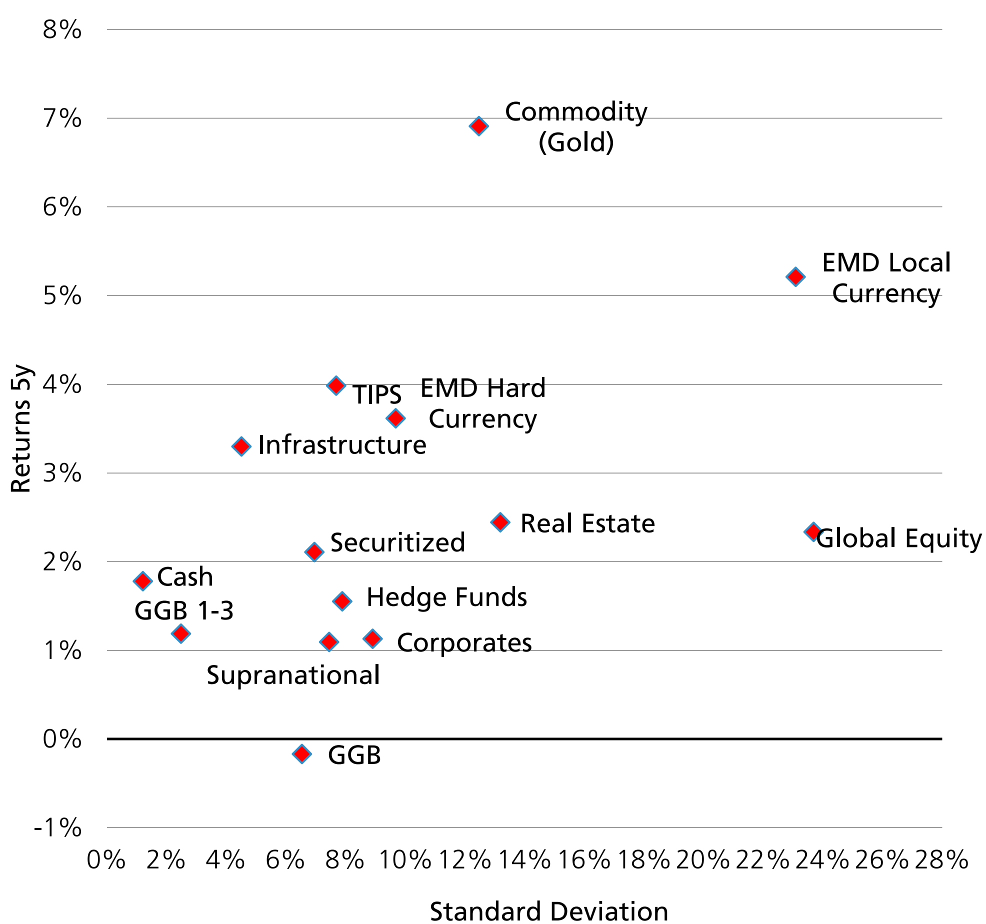


Source: UBS AM. See Appendix for details about sources. Data as of end of January 2018. This does not constitute a guarantee by UBS AG, Asset Management.

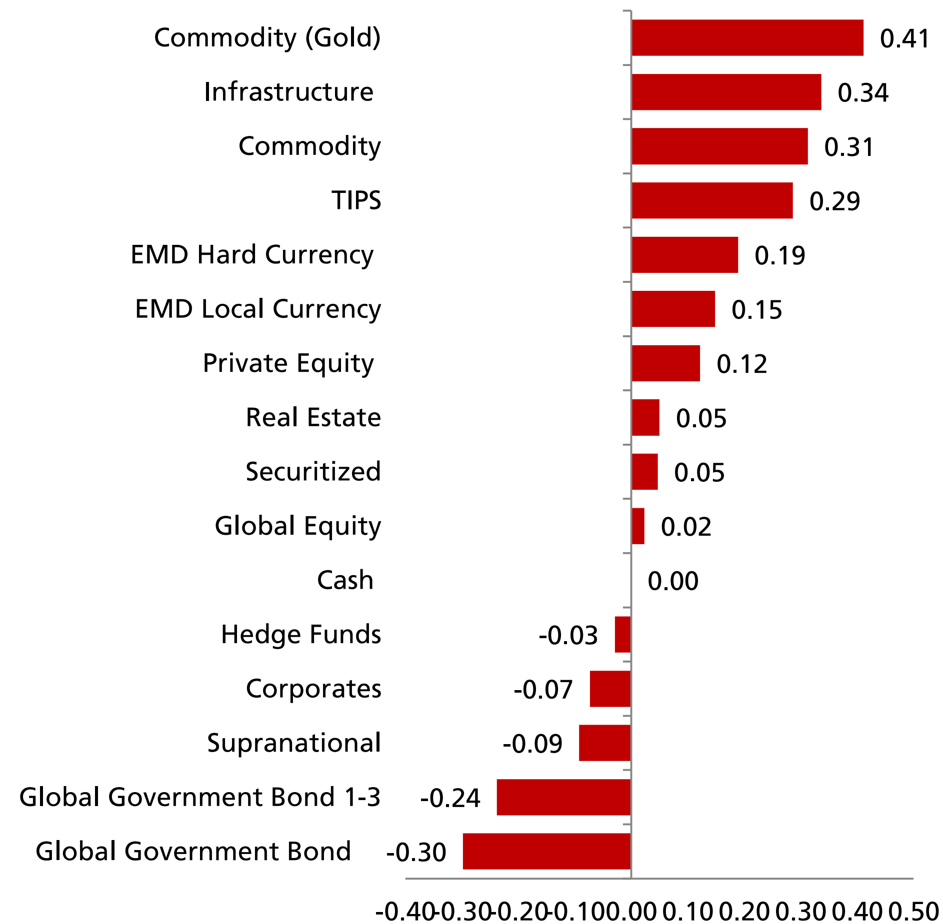
Scenario C (Stagflation) – Asset classes

Real assets perform well, but most asset classes show negative real returns

Expected Returns 5 years and Standard Deviation, %



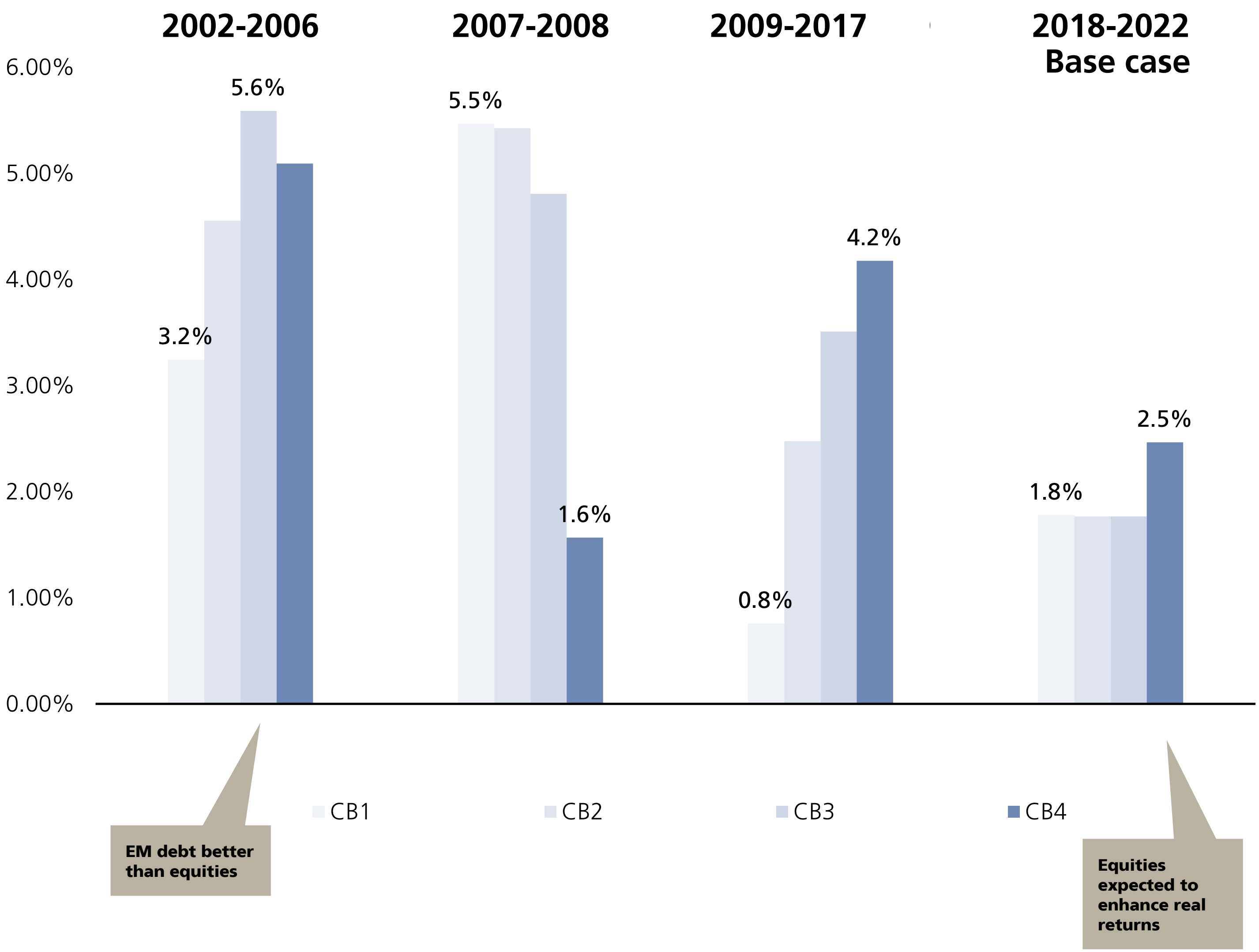
Return/Risk profile



Source: UBS AM. See Appendix for details about sources. Data as of end of January 2018. This does not constitute a guarantee by UBS AG, Asset Management.

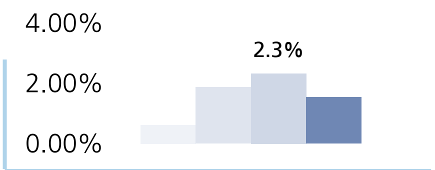
Future returns lower in any scenario

Central Bank sample portfolio performance

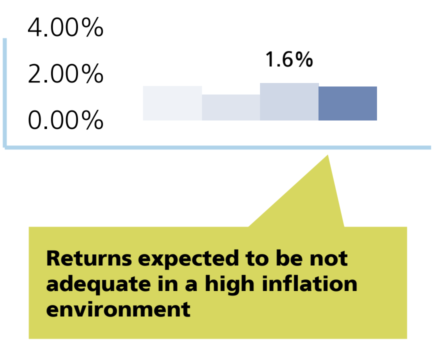


2018-2022 Alternative scenarios

Recession



Stagflation



Source: UBS AM. For illustrative purposes only. This does not constitute a guarantee by UBS AG, Asset Management.

Stagflation? The worse scenario for central banks

In the post-Trump era, we see an increased risk of higher inflation and stock market volatility; correlations between equities and fixed income could turn positive

- Traditionally, we can observe a negative correlation between equities and fixed income
- However, correlations are not stable over time, which can have a severe impact on expected portfolio losses
- Especially in the US post-Trump, a stagflation scenario with the potential for a parallel sell-off in fixed income and equities is possible

Sample 15% EQ portfolio	Allocation	Duration Contribution	Spread Duration Contribution	Stress Loss Contribution
Govt Bond	75.00	1.07		-1.61%
Corp Bond	10.00	0.27	0.28	-0.62%
Equity	15.00			-3.75%
Total Portfolio	100.00			-5.98%

Sample 20% EQ portfolio	Allocation	Duration Contribution	Spread Duration Contribution	Stress Loss Contribution
Govt Bond	70.00	1.00		-1.50%
Corp Bond	10.00	0.27	0.28	-0.62%
Equity	20.00			-5.00%
Total Portfolio	100.00			-7.12%

Assumptions for shocks

- Equities loss **-25%**
- Interest Rates increase **+150bp**
- Credit spread widening **+75bp**

Observations

- In a stagflation scenario, stressing correlations may lead to a break of the popular 5% risk tolerance also when equity allocation is only at 15%
- **In such a scenario, institutions should strongly consider the introduction of a risk mitigation strategy (Hedging).**

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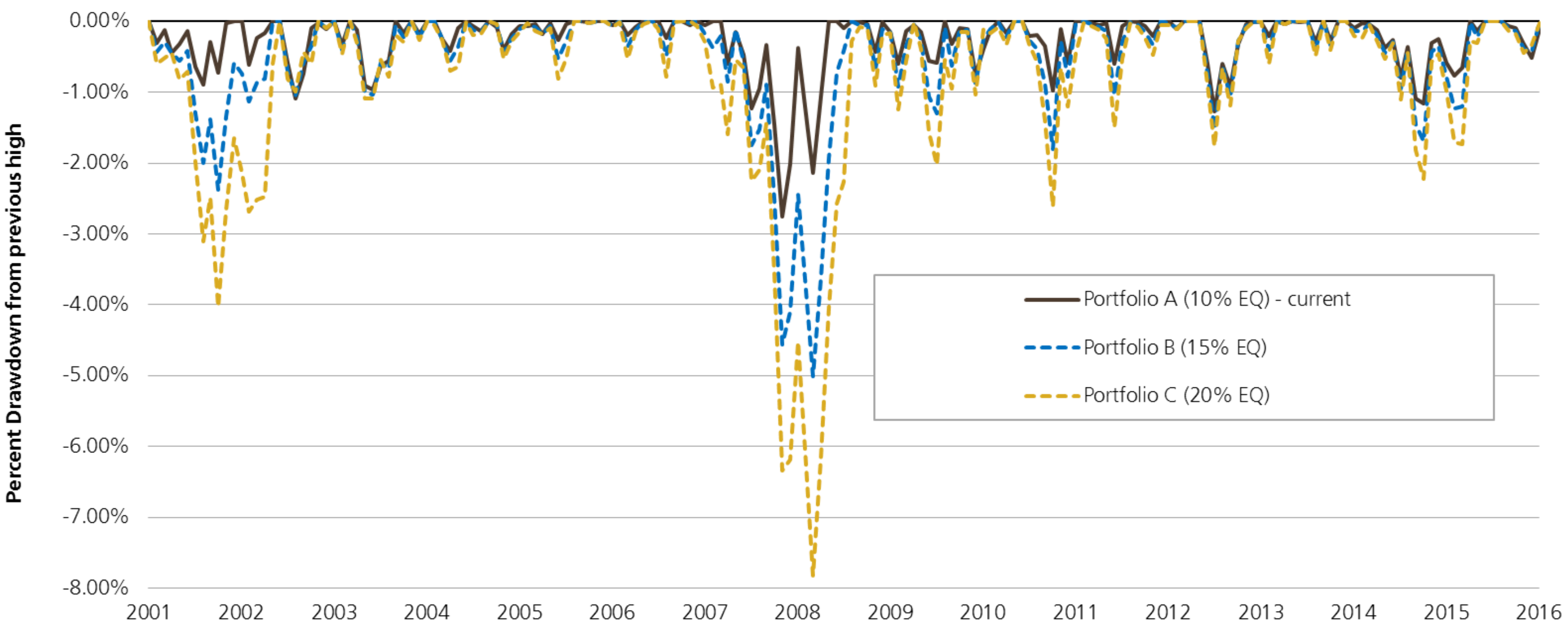
Source: UBS Asset Management. For illustrative purposes only. Past performance is not a reliable indicator of future performance.

Historical Drawdown Analysis

Simulated drawdowns over the last 15 years for simple EQ/FI portfolios

Drawdown analysis at different levels of equity allocation

- Over the past 15 years, large allocations to safe haven assets have provided an effective buffer against equity market volatility
- Even in extreme scenarios like the Great Financial Crisis of 2008, a simple portfolio that was comprised of 15% EQ / 85% FI never suffered a drawdown of more than 5% from the previous high.



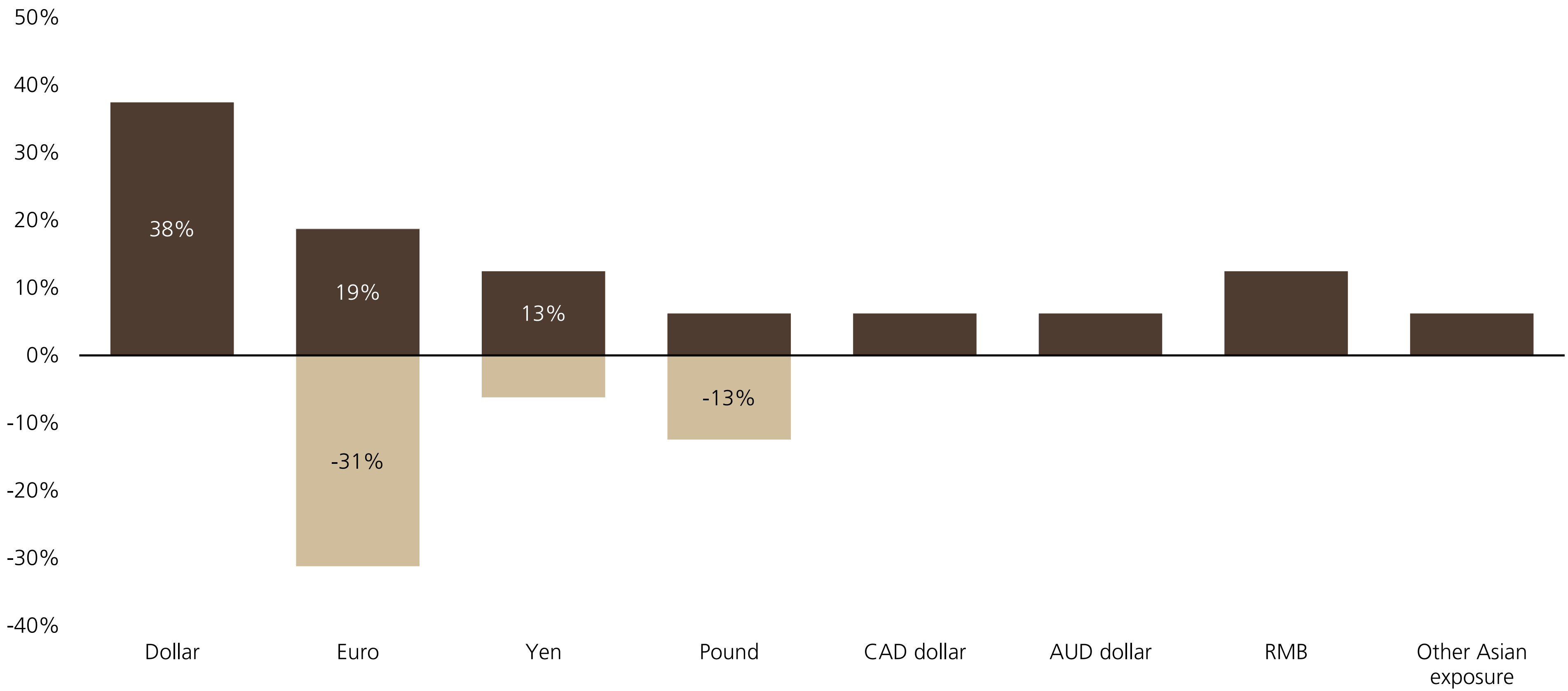
For illustrative purposes only. All information based on monthly return data, USD hedged, gross of management fees.

Source: UBS Asset Management, Bloomberg; 31.01.2001 – 31.12.2016. performance is not a reliable indicator of future performance.

Diversify away from the USD?

The USD puzzle: rising interest rate differential but falling currency

Going forward, how do you expect your currency allocation will be adjusted?



- Like in 2016, survey participants remain convinced that the US Dollar will play an increasing role in their reserves going forward, at the expense mainly of Euro.

Source: UBS AM as of June 2017.

Key issues for FX reserve managers

We are shifting from the post-financial crisis era of zero interest rates and to a new regime (normal?) likely to be characterized by higher yields and increased volatility. How should FX reserve managers adapt?

- Divergent Monetary Policies: the US is normalizing and Europe might eventually follow but short-term interest rates will remain historically at low levels over the next few years. Low returns on fixed income likely to persist globally
- Inflation: Inflation is a rising risk but the probability of an unexpected large rise in consumer price is currently low
- Fixed income: Government bonds are expected to provide the lowest returns and in a rising interest environment returns could turn negative. Diversification should and will remain a key trend among central banks
- Equities: Equities remain attractive despite valuation concerns and increased volatility. More central banks are expected to diversify into this asset class
- Alternatives: Should central banks move into illiquid asset classes such as real estate or infrastructure? In CBs portfolios illiquid asset classes could play the role played by fixed income in the past
- Currency: Will the USD go up or down? Hedging or not? The rise of the RMB as a reserve currency is just a question of time

Historical review shows that diversification paid off, increasing absolute and risk-adjusted returns. We believe this will be the case also in the future

Source: UBS Asset Management. Past performance of investments is not necessarily an indicator of future results.
This does not constitute a guarantee by UBS AG, Asset Management.

Section 7

Contacts

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Contact information

Dr Massimiliano Castelli
Head of Strategy & Advice
Global Sovereign Markets
Tel: + 41 79 84 99 448
massimiliano.castelli@ubs.com

Philipp Salman
Strategy & Advice
Global Sovereign Markets
Tel: + 41 44 234 66 27
philipp.salman@ubs.com

www.ubs.com

UBS

Massimiliano Castelli, PhD, MSC

Head Global Strategy, Global Sovereign Markets
Managing Director

Years of financial industry experience: 15
Education: University of Rome (Italy), PhD; University of London (UK), MSc

- As Head of Strategy he analyzes the market trends affecting the investment behavior of central banks, sovereign wealth funds and other state-controlled investment institutions and work closely with the investment teams in providing investment advice and developing tailored investment solutions for this client segment
- Max established himself as a global thought leader on the macroeconomic, financial and political trends in sovereign wealth management. He has often been called in by leading institutions as an expert on global economic and financial matters. Max has recently published The New Economics of Sovereign Wealth Funds in the Wiley Finance Series, a book providing a thorough guide to sovereign wealth funds, covering the drivers of the industry, how it operates and grows, the interest from and in Western markets and the pivotal role that sovereign wealth funds play in the world economy
- In his fifteen year long international professional career, Max has been Head of governmental affairs for UBS in Europe, Middle East and Africa, Senior Economist for the Middle East region at UBS and consultant advising governments and corporates in emerging markets on behalf of international institutions
- Max holds a PhD in Economics from the University of Rome where he lectured and a Msc in Economics from the University of London.

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