September 2019

Ludwig Marek, Lead Product Strategist USD Short Duration

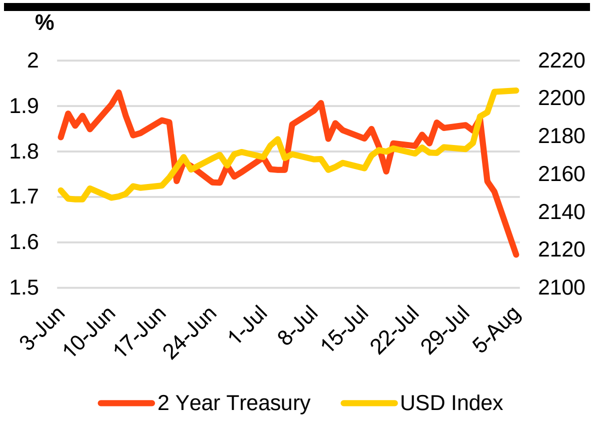
BlackRock®

Reserve Management at Official Institutions: Investing in USD Short Duration Strategies

Market Context

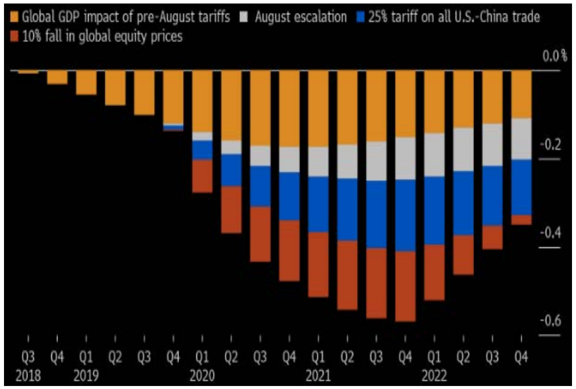
What happened (since the Fed rate cut)?

Market volatility spiked during Powell's Q&A post rate cut on July 31



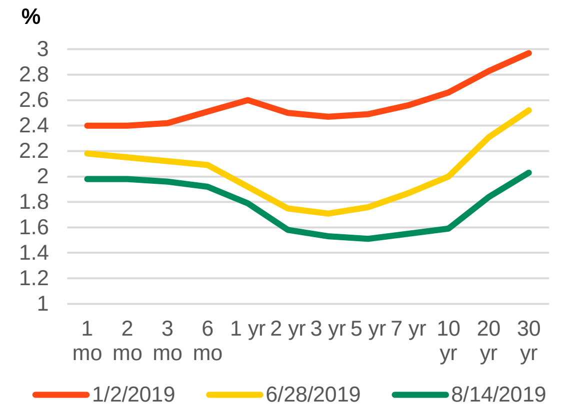
Source: Bloomberg. Data as of August 7, 2019.

Global GDP growth could be cut by 0.6% by 2021 if all current tariffs remain in place



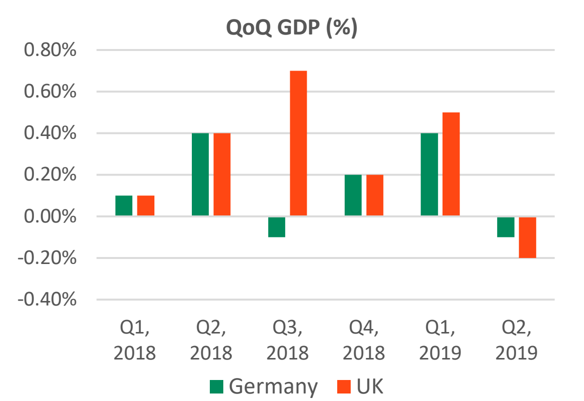
Source: Bloomberg. Data as of August 2, 2019.

The inversion of the US Treasury curve not only steepened but broadened as well



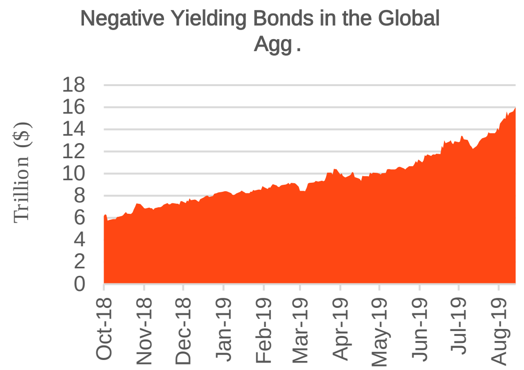
Source: Bloomberg . Data as of August 14, 2019.

Global risk off sentiment deepened with Germany and UK posting negative Q2 GDP



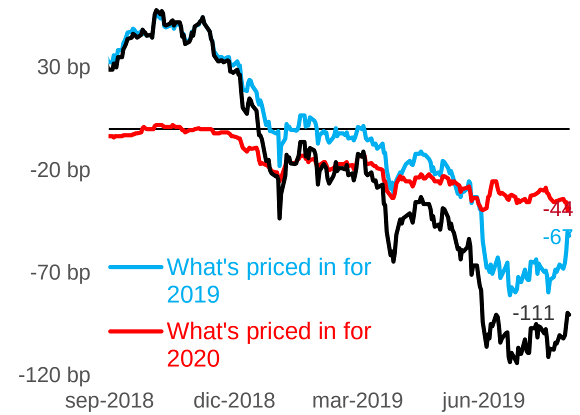
Source: Cornerstone. Data as of July 14, 2019. Green bars show already imposed tariffs.

The stock of negative yielding bonds rose to $16trn, $10trn more since yields peaked



Source: Bloomberg. Data as of August 14, 2019..

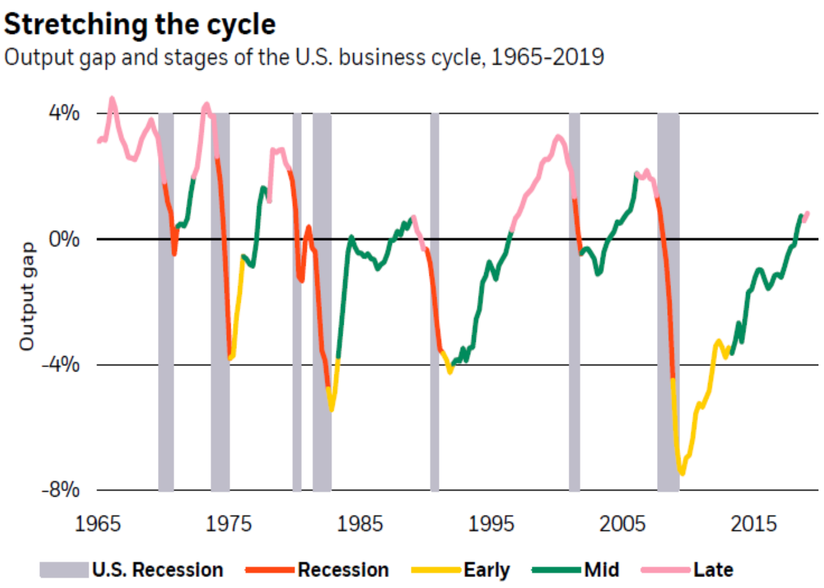
Despite the July rate cut, the markets price another three cuts by year end



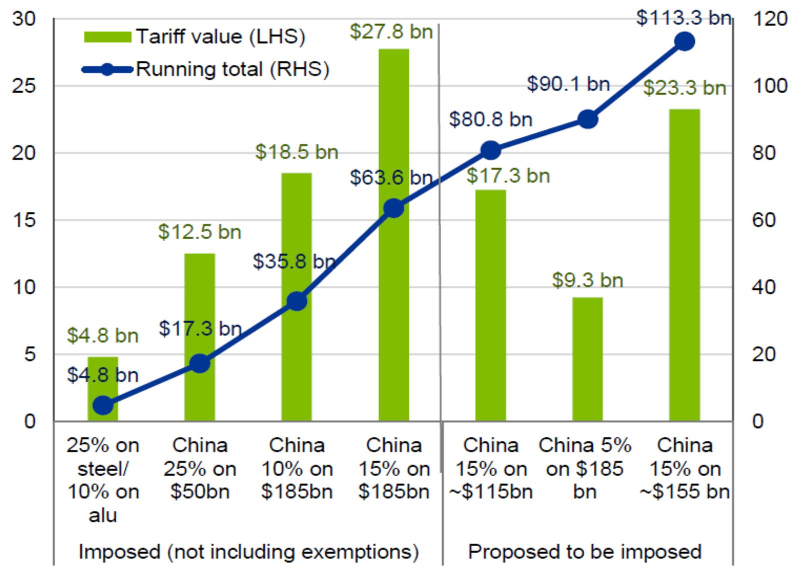
Source: Bloomberg, Blackrock. Report as of August 5 , 2019.

Escalation in trade tensions poses risk to cycle extension

The dovish shift by central banks has depressed long - term yields, which should help extend this long expansion...



...however trade tensions are adding to the uncertainty around this outlook

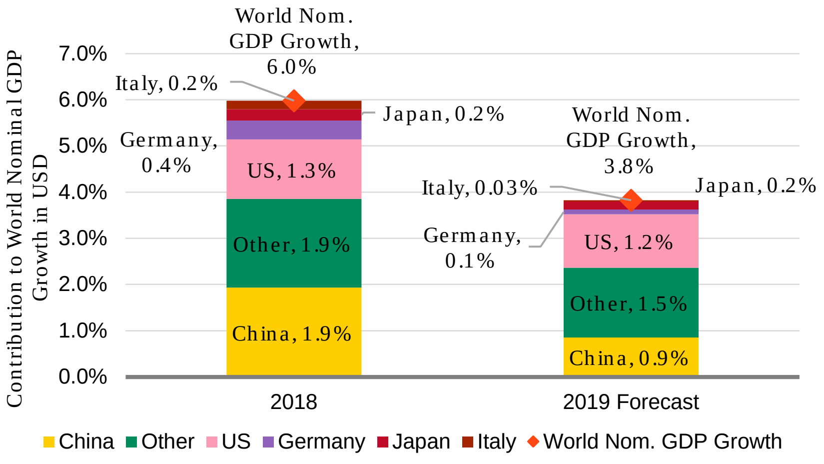


Sources: BlackRock Investment Institute, with data from Refinitiv Datastream, as of July 2019.
Notes: This chart shows an estimate of the U.S. output gap (that is, GDP as a percentage of potential GDP). We have classified different time periods as belonging to certain stages of the business cycle. The classification of the stage is done via a 'cluster analysis' that groups together time periods where economic series have behaved in similar ways.

Market Context

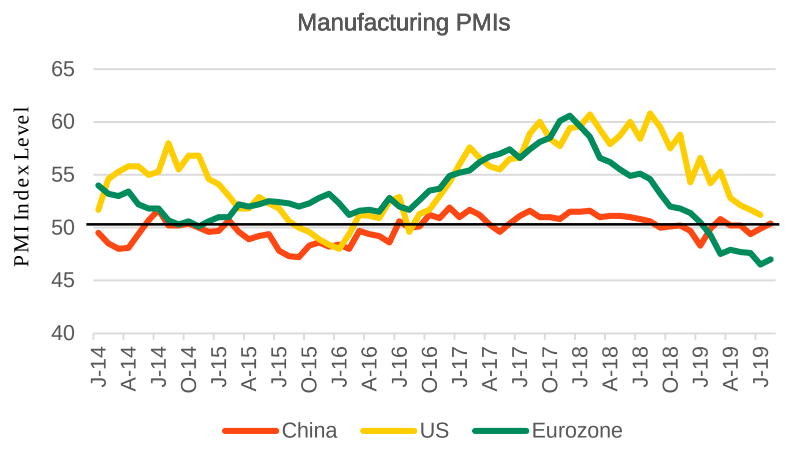
Global growth is slowing, as sentiment remains robust

Momentum in global growth is slowing in 2019



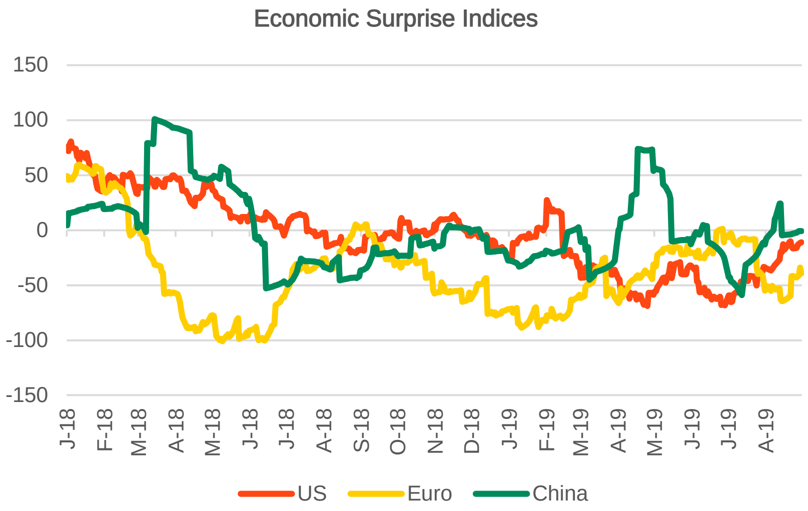
Source: IMF, BlackRock as of June 2019

PMIs started to tumble below the 50-point contraction line



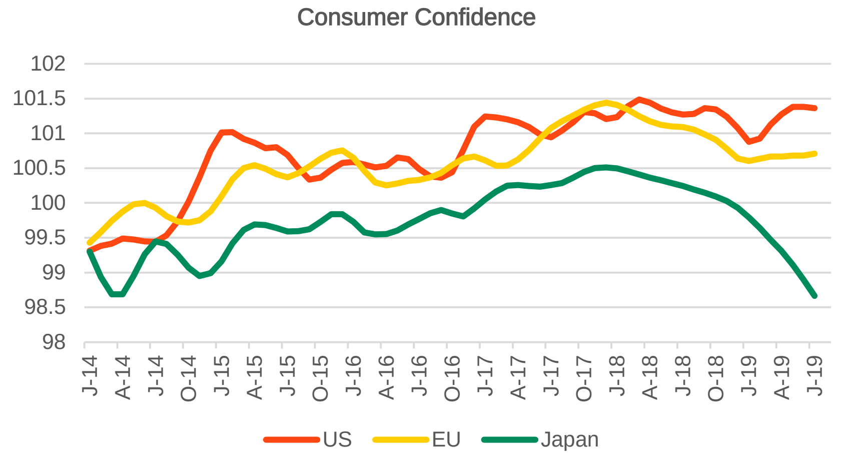
Source: Bloomberg as of 8/30/2019

Economic data barely surprised to the upside this year



Source: Bloomberg as of 8/30/2019.

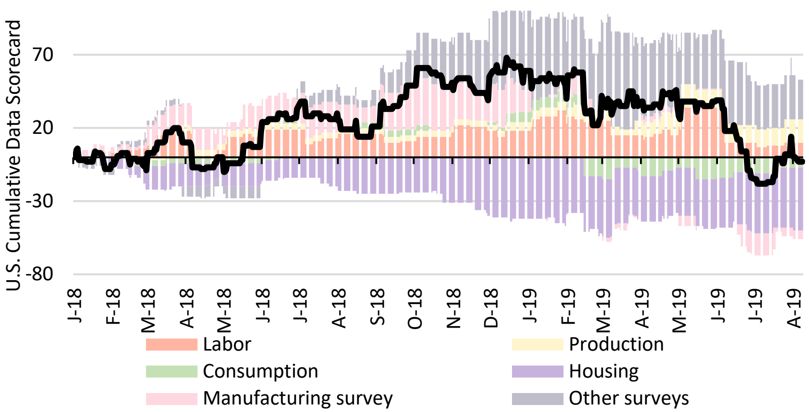
Consumer confidence remains relatively strong – for now



Source: Bloomberg as of 8/30/2019

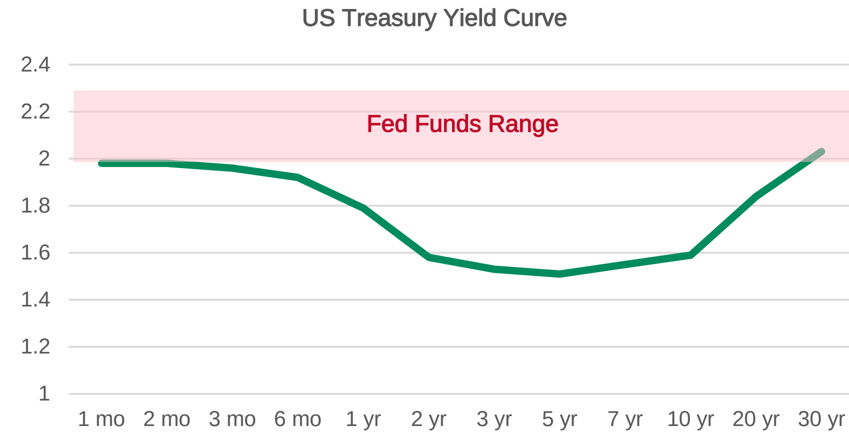
US monetary policy is embarking on a easing-bias cycle

US economy still appears resilient, but with pockets of weaknesses



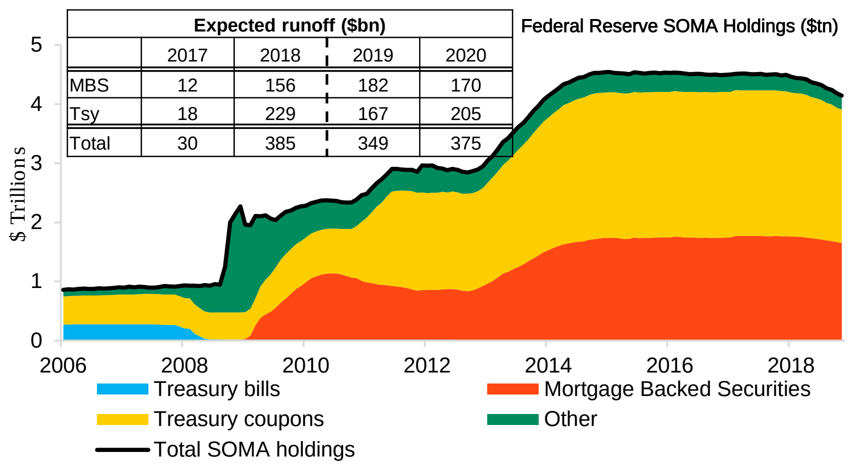
Source: Bloomberg as of August 8, 2019

The entire US Treasury curve in mid-August dropped below the Fed Funds Range of 2-2.25%



Source: Bloomberg as of 31 December, 2018

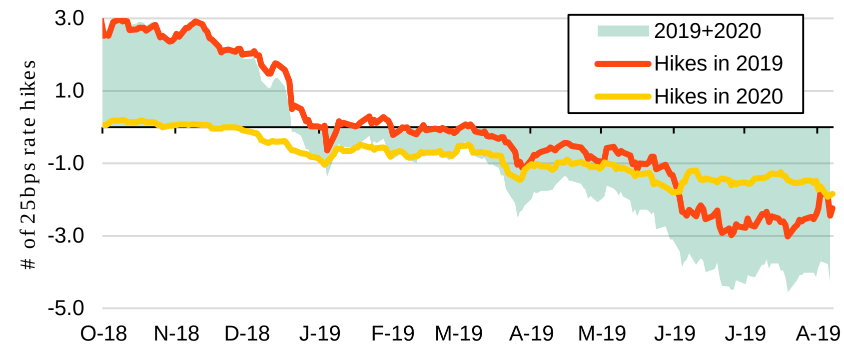
A halt of the Fed's balance sheet reduction should eae pressure on financial conditions



Expected runoff ($bn)				
	2017	2018	2019	2020
MBS	12	156	182	170
Tsy	18	229	167	205
Total	30	385	349	375

Source: Bloomberg, BlackRock. Data as of June 2019

Markets price in more than two rate cuts by the end of 2019 and as many as four by the end of 2020



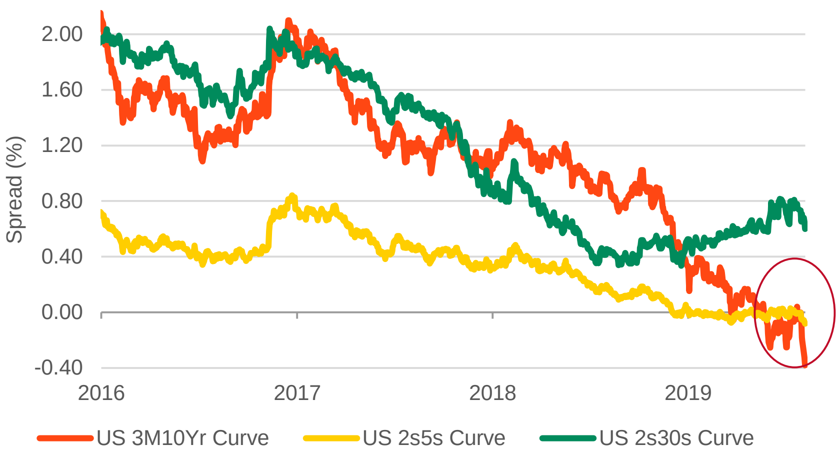
Hikes/Cuts	2019	2020	2021
Fed (Jun '19)	-1.0	1.0	0.0
Market (current)	-2.3	-1.8	0.4

Source: Bloomberg as of August 6, 2019.

Market Context

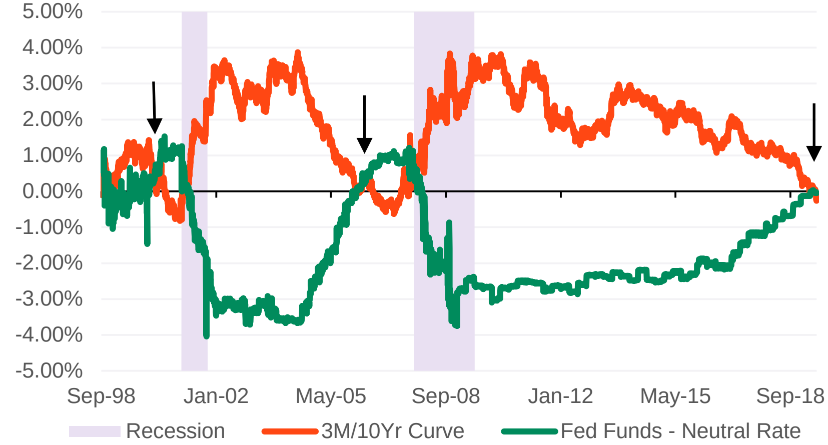
The inversion of the US yield curve may be less onerous as believed

Yield curve inverted at various points



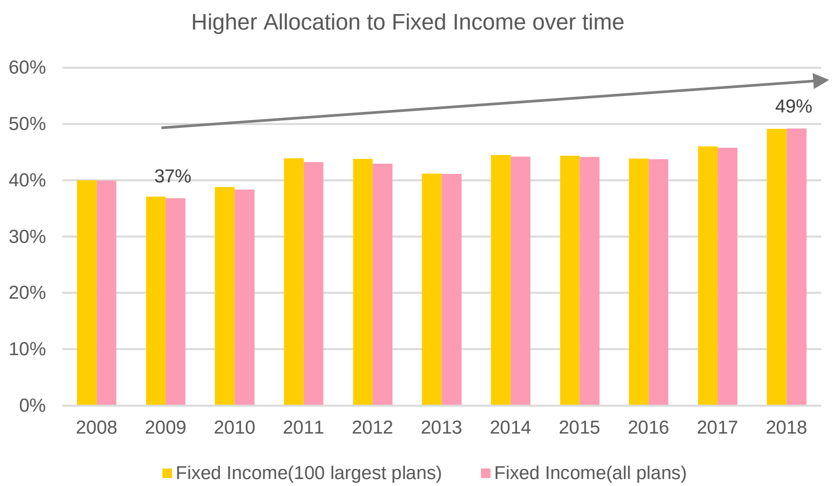
Source: Bloomberg as of 8/7/2019

Curve inversion signals recession when policy is too tight



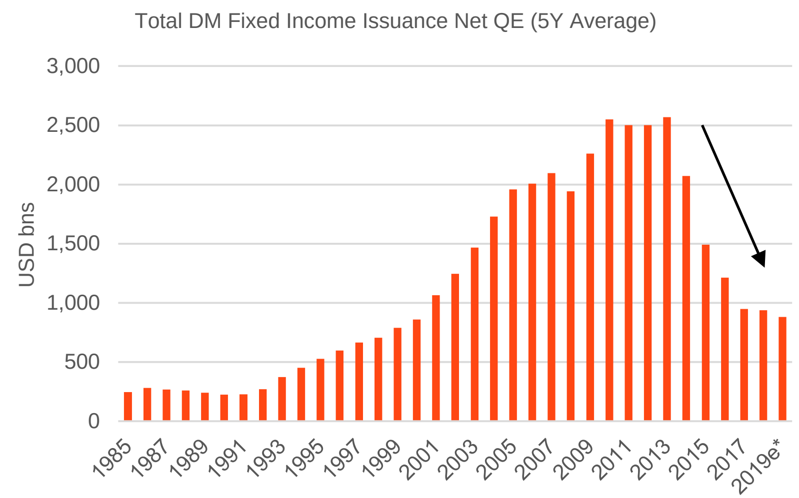
Source: Bloomberg, Federal Reserve as of 7/31/19. Neutral rate represents LW model for neutral rate + inflation.

Pension demand has increased for long-end Treasuries



Source: Bloomberg, BlackRock as of July 22 2019

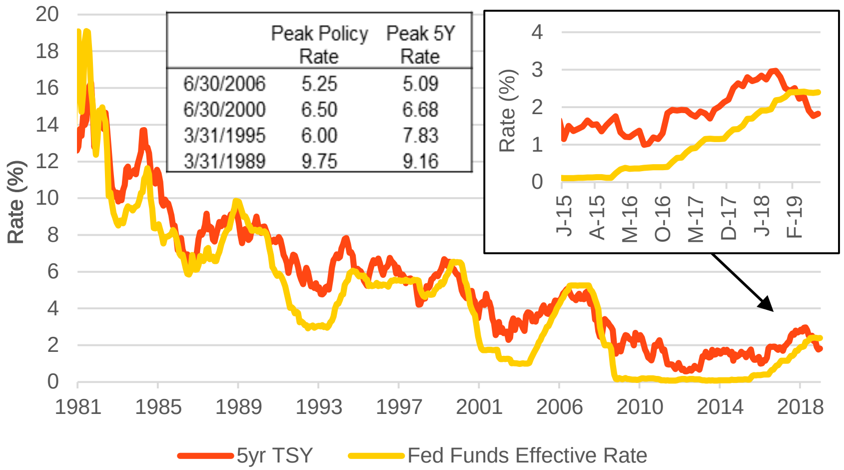
Supply of bonds is contracting while demand is rising, exacerbating flatness of Treasury curve



Source: JPMorgan as of June 2019

Duration enhanced returns in 2019, but for how long?

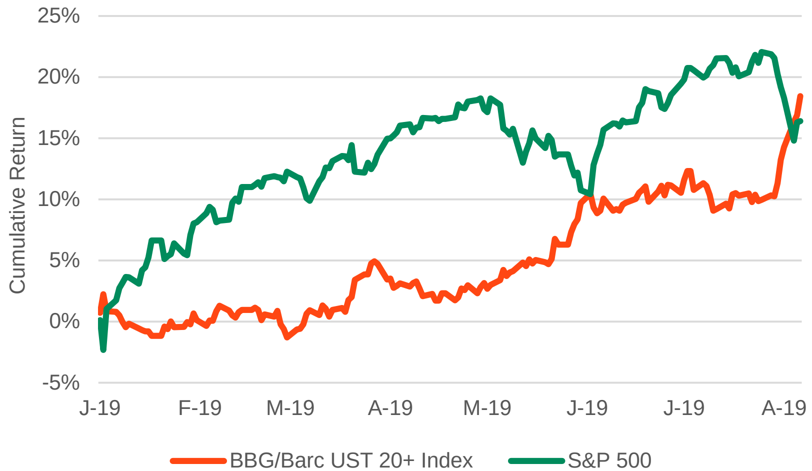
5yr Treasury tends to peak at top of the policy rate cycle



	Peak Policy Rate	Peak 5Y Rate
6/30/2006	5.25	5.09
6/30/2000	6.50	6.68
3/31/1995	6.00	7.83
3/31/1989	9.75	9.16

Source: Bloomberg as of 7/31/2019

Duration working again as a hedge

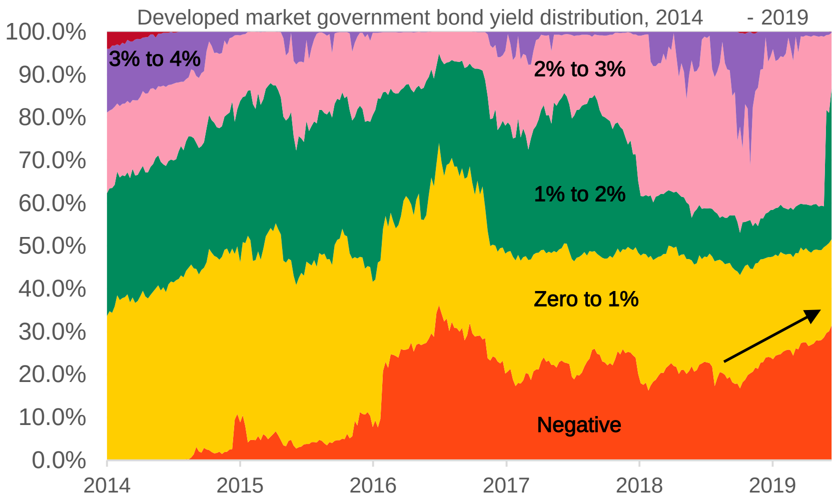


Source: Bloomberg, as of 8/7/19.

Term Premium at historically compressed levels

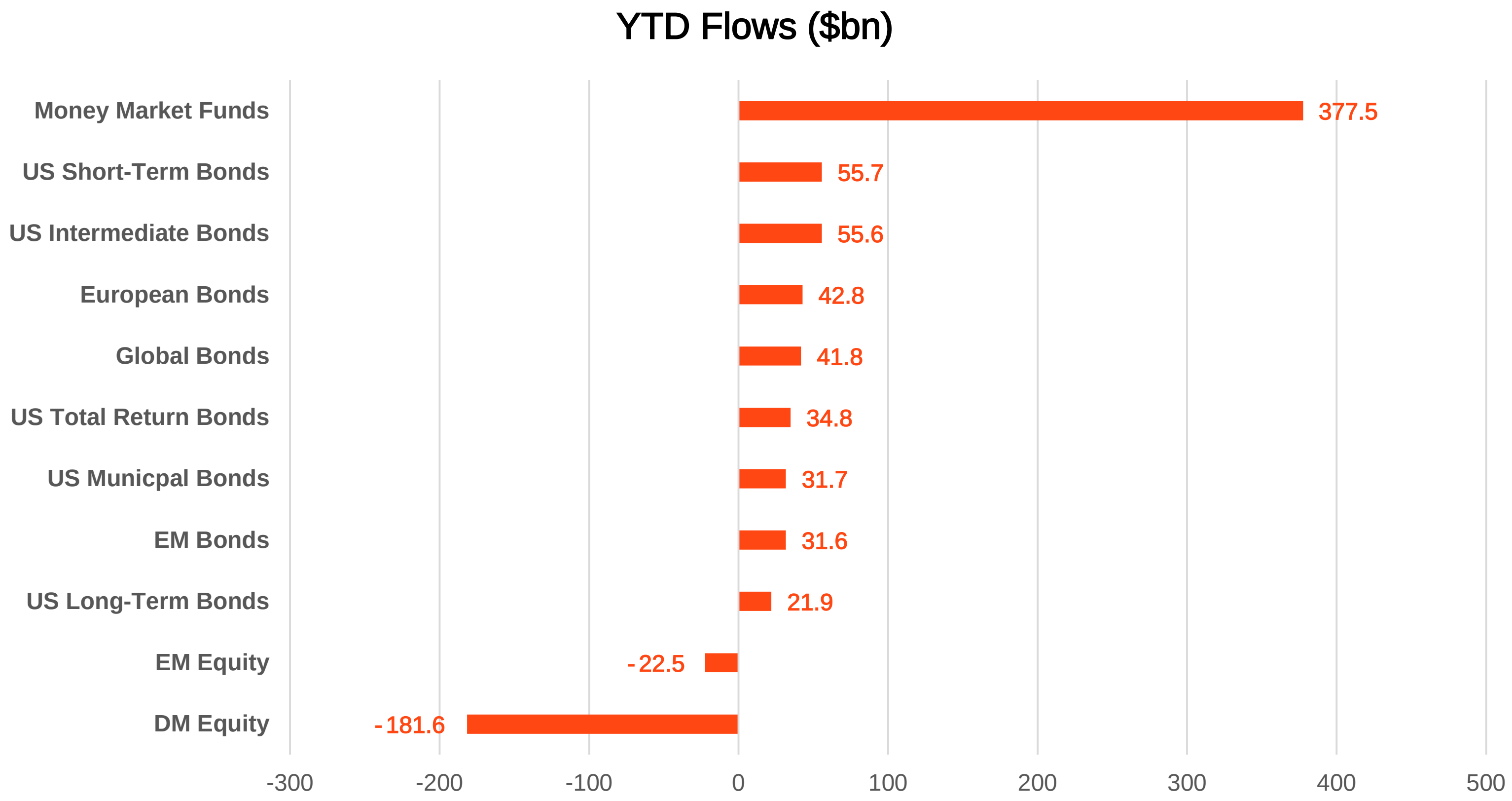
Source: Bloomberg as of 8/6/2019

Global outstanding negative debt back to 2016 highs



Source: Blackrock Investment Institute as of 6/30/2019

Flows went to the front end and out of risk assets, as US rates compressed and the curve inverted



Source: EPFR. Flows are captured for mutual funds and ETFs. As of 28 August 2019.

Volatility in risk assets remains elevated, while global rates post attractive returns on global easing-bias

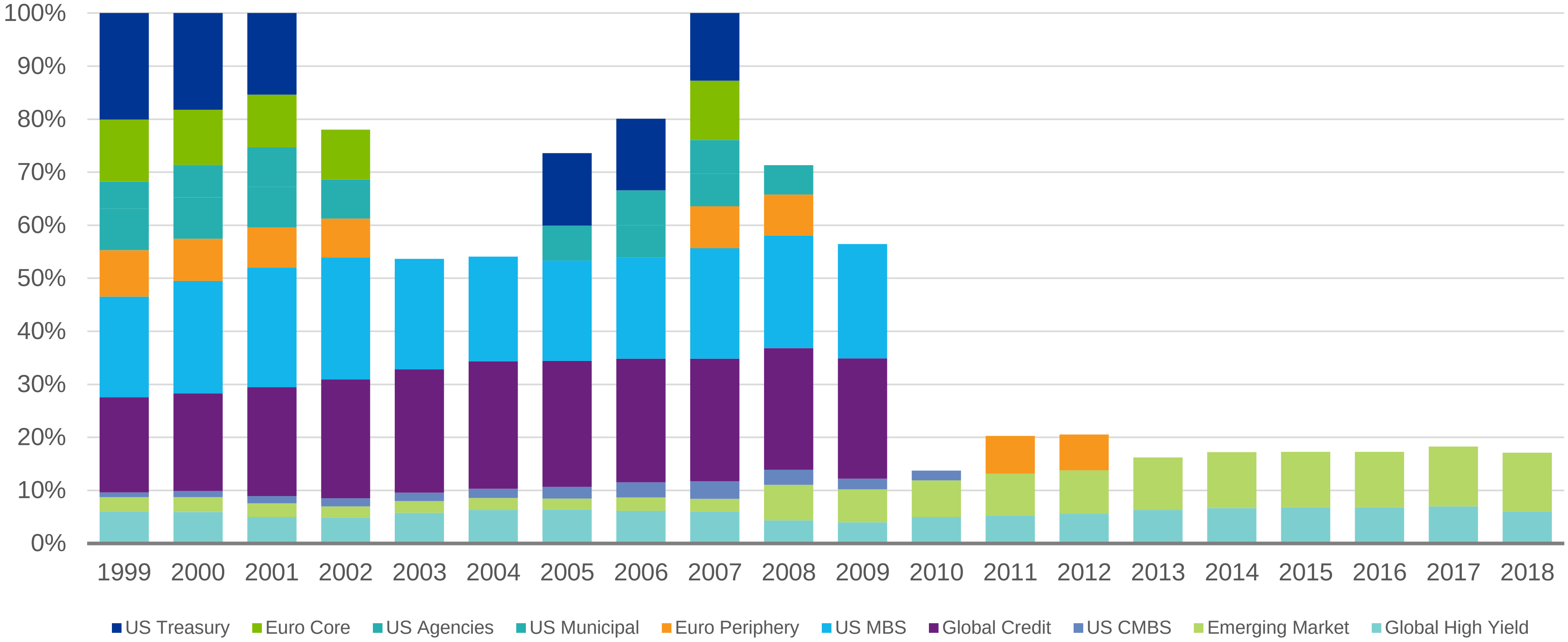
- Volatility for risky assets reemerged along with potentially higher returns, as fixed income could remain range-bound

Source: Bloomberg, BlackRock. Data as of August 30, 2019.

Sources of income generation have dwindled precipitously in recent years – and this won't improve

The current fixed income universe offers very few options for 4% or more in yield despite the rise in US rates

Fixed Income Assets Yielding Over 4%, 1999-2018

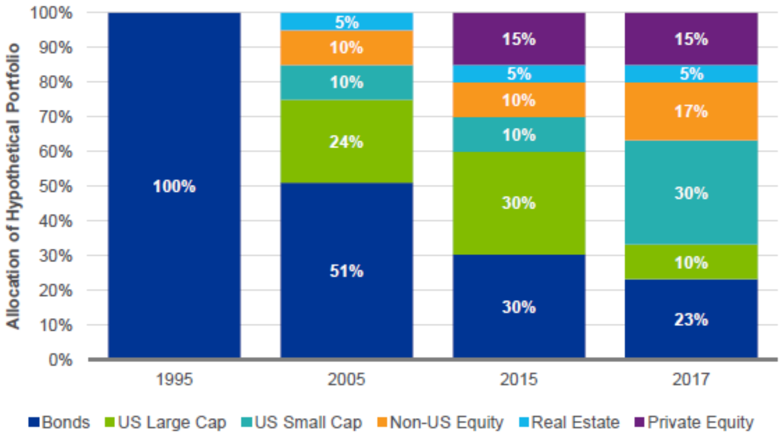


Source: BlackRock Investment Institute, Barclays and Thomson Reuters, December 2018. The bars show market capitalization weights of assets with an average annual yield over 4% in a select universe that represents about 70% of the Barclays Multiverse Bond Index. US Treasury represented by the Barclays US Treasury index. Euro core is based on the Barclays French and German government debt indexes. US Agencies represented by Barclays US Aggregate Agencies index. US Municipal represented by Barclay Municipal Bond index. Euro periphery is an average of the Barclays government debt indexes for Italy, Spain and Ireland. US MBS represented by the Barclays US Mortgage Backed Securities index. Global Credit represented by the Barclays Global Aggregate Corporate index. US CMBS represented by the Barclays Investment Grade CMBS index. Emerging Market combines the Barclays EM hard and local currency debt indexes. Global High Yield represented by the Barclays Global High Yield index.

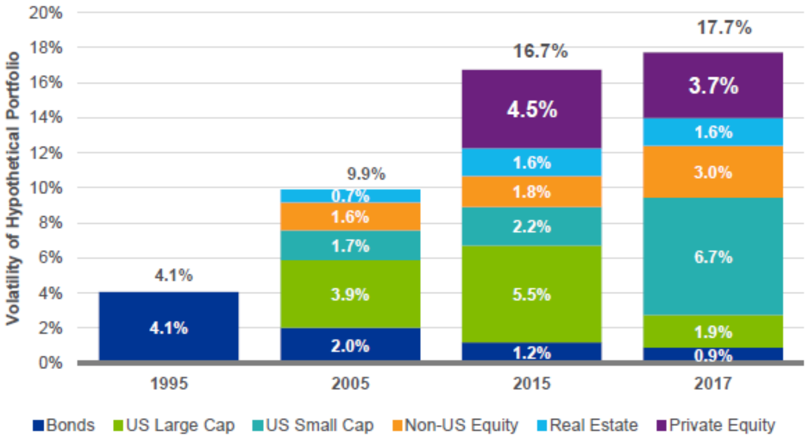
Attractive risk-adjusted income opportunities remain limited

A balanced approach of liquidity and volatility constraints measured against an income objective

Asset allocation required to hit a 7.5% return objective*



The associated volatility of asset allocation**



[1] Sources: BlackRock Investment Institute, Barclays and Thomson Reuters, December 2018. The bars show market capitalization weights of assets with an average annual yield over 4% in a select universe that represents about 70% of the Barclays Multiverse Bond Index. Euro core is based on French and German government debt indexes. Euro peripheral is an average of government debt indexes for Italy, Spain and Ireland. Emerging markets combine external and local currency debt. Indexes are unmanaged and one cannot invest directly in an index. Source: *Wall Street Journal, Callan Associates as of 30 May 2016; **Bloomberg as of December 2017

While liquidity/volatility are key attributes, diversification can go a long way

As expected returns from traditional asset classes are likely going to stay muted, non-traditional sectors may need to be considered to reach yield targets

FI Asset Class	5-Yr Expected Return	10-Yr Expected Return	Long-Term Expected Volatility	Long-Term Correlation to Global Equities*	Long-Term Correlation to Global Bonds**
US cash	1.8%	2.1%	0.0%	-	-
US Treasuries (all maturities)	1.4%	1.7%	5.0%	-0.38	0.77
US Treasuries (10+ years)	-0.4%	0.3%	14.2%	-0.30	0.77
US inflation-linked treasuries	1.3%	1.7%	5.7%	-0.01	0.49
US credit (all maturities)	1.6%	2.3%	5.8%	0.15	0.61
US credit (long bonds)	0.6%	1.9%	12.1%	0.24	0.55
US high yield	4.5%	4.7%	7.8%	0.62	-0.06
US aggregate bond index	1.6%	2.0%	4.0%	-0.16	0.76
Global ex-US Treasuries	1.1%	1.6%	3.3%	-0.22	1.00
USD EM debt	2.9%	3.5%	9.1%	0.36	0.35
Local-currency EM debt (unhedged)	2.7%	3.0%	12.2%	0.52	0.07
US Agency MBS	1.6%	2.0%	2.1%	-0.25	0.57
US bank loans	3.1%	3.5%	8.0%	0.55	-0.26

Source: BlackRock Investment Institute, August 2019.
Notes: We derive our return expectations from our CMAs. Five-year and long-term equilibrium annualised return expectations are in geometric terms. Return expectations for all asset classes are shown in unhedged terms, with the exception of global ex-US Treasuries. Our CMAs generate market, or beta, return expectations. For a list of indices used, visit our Capital Market Assumptions website at blackrock.com/institutions/en-us/insights/portfolio-design/ capital-market-assumptions and click on the information icon in the *Assumptions at a glance* table. We use BlackRock proxies for selected private markets because of lack of sufficient data. These proxies represent the mix of risk factor exposures that we believe represents the economic sensitivity of the given asset class. Global equities in the 60/40 portfolio are represented by the MSCI World ex USA Index in our correlation expectations; global government bonds by the Bloomberg Barclays Global Aggregate Treasury Index ex US. We use long-term volatility and correlation expectations. We break down each asset class into factor exposures and analyse those factors' historical volatilities and correlations over the past 15 years. We combine the historical volatilities with the current factor makeup of each asset class to arrive at our assumptions. This approach takes into account how asset classes evolve over time. Example: Some fixed income indices are of shorter or longer duration than they were in the past. Our expectations reflect these changes, whereas a volatility calculation based only on historical monthly index returns would fail to capture the shifts. Indexes are unmanaged and used for illustrative purposes only. They are not intended to be indicative of any fund or strategy's performance. It is not possible to invest directly in an index. This information is not intended as a recommendation to invest in any particular asset class or strategy or as a promise – or even an estimate - of future performance.

Opportunities for short duration investors in today's market environment

With a continued flat US Treasury curve, investors should consider an alternative approach to generating more attractive risk-adjusted returns from their short-term fixed income exposure.*

Seeking risk-adjusted income

Segment your cash

- Given the flatter yield curve, investors may want to consider segmenting their cash based on liquidity, income and total return. With short-term interest rates yielding above 2%†, investors should reconsider their cash and fixed income allocations.
- Investors should consider using a liquidity tiring framework which may help them determine the balance between the level of liquidity needs and the generation of higher risk-adjusted income.

Diversify your exposure

Expand guideline flexibility

- Our clients have been increasingly seeking to modify their investment guidelines in response to changing dynamics in fixed income markets. Recent examples of guideline changes include:
  - Flexibility to invest in BBB-rated credit due to rating scheme changes by credit agencies
  - Permit an allocation to securitised assets such as ABS and CMBS

Seeking higher alpha

Consider an allocation to a higher-beta Short Duration

- Short duration PLUS focuses on generating yield and total return by utilising "plus" sectors such as high yield, emerging market debt and non-dollar securities within a short duration framework
- The Short Duration PLUS strategy has the flexibility to move to zero duration & help reduce overall interest rate risk in your fixed income portfolio.

Source: BlackRock. *The Treasury curve as represented by yield spreads between the 2 and 10 year Treasury bonds moving from 146 to 21 bps between 1 January 2015 and 31 December 2018. †Short-term rate refers to the two-year Treasury bond. Source Bloomberg as of 31 December 2018. Past performance is not indicative of future results.

Short Duration Portfolio Approach

Three pillars of short duration investment strategies

Increasing credit exposure, duration, and potential return

	Enhanced Income	Short Duration	Short Duration PLUS
Characteristics	▸ Focused on capital preservation and liquidity ▸ Guideline constraints on specific sectors and credit quality for new purchases which can be fairly restrictive in nature	▸ Focused on capital preservation and liquidity ▸ Guideline constraints on specific sectors and credit quality limitations for new purchases	▸ Focused on generating yield and total return ▸ Guideline constraints are not prohibitive in nature and provide flexibility with respect to allowable security types and ability to purchase below investment grade securities
Typical guidelines for separate accounts*	Benchmarks : T-bills, 1 Year Treasury, custom blends Typical duration band : +/-20% of Index Credit quality : Average AA- or better, purchases must be investment grade	Benchmarks : 1-3 year and 1-5 year Treasury or Govt/Corp Typical duration band : +/-20% or +/- 1 year of Index Credit quality : Average A- or better, purchases must be investment grade	Benchmarks: 1-3 year and 1-5 year Treasury or Govt/Corp Typical duration band: 0 – 3 years Credit quality : Average A- or better, 10-20% high yield allocation permissible
Eligible investments	Treasuries Agencies Investment Grade Corporates MBS CMBS (AAA-only) ABS (AAA-only) Municipal Money Markets	Treasuries Agencies Investment Grade Corporates MBS CMBS ABS Municipal Money Markets	Treasuries Agencies Investment Grade Corporates High Yield MBS CMBS ABS Non-dollar Municipal Money Markets

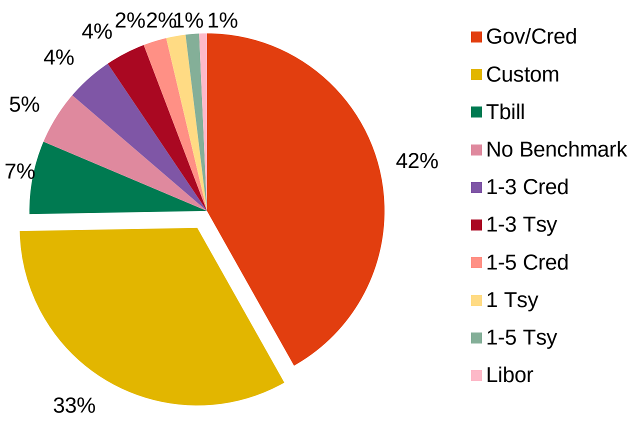
Data as of 30 June 2019.
The credit quality of a particular security or group of securities may be determined either by BlackRock or a statistical rating organization and does not ensure the stability or safety of an overall portfolio. is unrated by a ratings organization, BlackRock may assign an internal rating for purposes of determining credit quality. The products and strategies described may not be suitable for all investors. Strategies include bank coll maintained and managed by BlackRock Institutional Trust Company, which are available only to certain qualified employee benefit plans and governmental plans and not offered or available to the general public. There are str differences between collective funds and mutual funds that may affect their respective fees and performance. In addition the information above includes customized separately managed accounts. *Typical guidelines are bas assumptions made by BlackRock. They are for illustrative purposes only and subject to change.

Customized approach to Short Duration Benchmarks

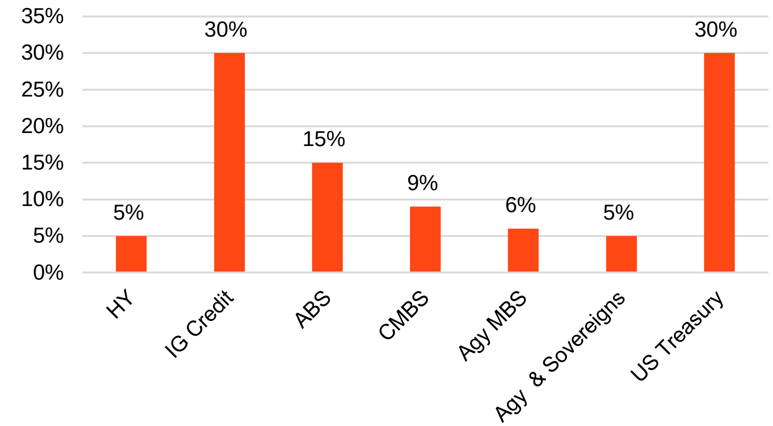
Traditional primary benchmarks offer a limited exposure to additional sectors from the broader fixed income universe.

However, a customized benchmark can be created to reflect the diverse opportunity set on the front-end ranging from enhanced cash to total return oriented short duration portfolios.

Variety of market-based and custom benchmarks* employed by Short Duration clients in BlackRock



An example of a diversified custom benchmark based on the diverse opportunity set



Source: BlackRock. All data as of 30 June 2019. *Customized benchmarks include blended indices created by BlackRock on behalf of clients to target a specific duration/yield profile . The products and strateg
may not be suitable for all investors. Strategies include bank collective trust funds maintained and managed by BlackRock Trust Company, N.A. which are available only to certain qualified emplo
and governmental plans and not offered or available to the general public. There are structural and regulatory differences between collective funds and mutual funds that may affect their respective fees and

A diversified approach to short duration investing

While short duration investing can be approached in different ways, we believe in diversifying the source of income and retain a certain level of flexibility that allows the investment management team to navigate a market environment that has seen a frequent numbers of spikes in market volatility.

Despite this approach, we retain our general view on how much needs to be attributed to sector allocation, security selection as well as yield positioning and duration exposure.

Alpha= Carry + Spread Compression + Tactical Trading

Each component within a portfolio must contribute:

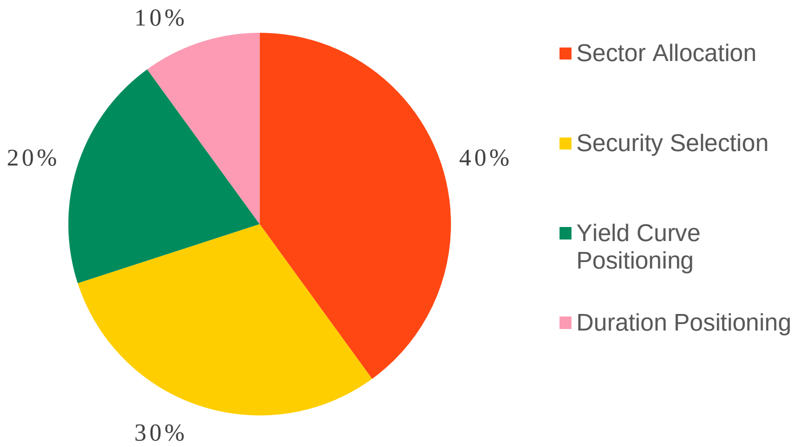
Sector Allocation: Our macro view directly impacts the portfolio construction and sector allocation process to determine the most attractive long-term investment opportunities.

Security Selection: Creating a sound basis to uncover opportunities across sub-sectors and securities underlined by a low correlation theme.

Yield Curve Positioning: Identifying emerging secular market trends to generate alpha at an early stage.

Duration Exposure: Recognizing duration themes for the long and short term and utilize those views for navigating market trends and benefit from short-term tactical investment opportunities.

Overarching Alpha Contribution



Short Duration Opportunity Set: Corporate Credit

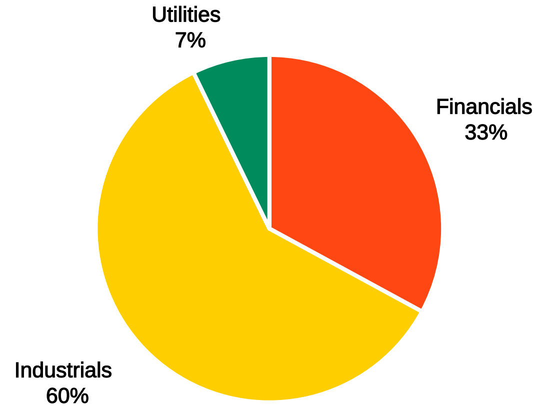
Short Duration Corporate Credit Index Example:

- BofA Merrill Lynch 1-5 Year Corporate Index includes approximately 800+ issuers across 3,200 issues
- Average credit rating of a BofA Merill Lynch 1-5 Year Corporate Index is A3
- Historically, bid–ask spreads under normal market conditions averaged at 3-5 bps, while during the stressed conditions at 10-15 bps
- Issuance is currently dominated by financials and consumer non-cyclical names. Specifically, issuance in the 1-5 year space has comprised roughly 50% of total corporates issuance in the past two years
- Issuance continues to be robust in the primary calendar with $1.1trln in 2018, $800bn YTD in 2019 and an expected $130bn in September 2019

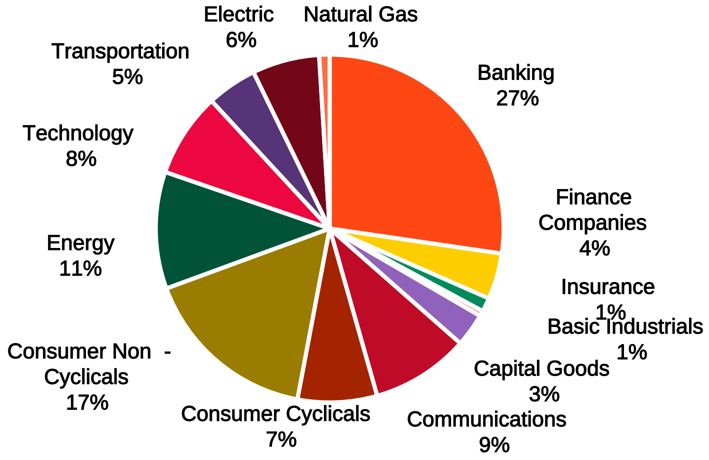
Primary risk: Credit risk of the underlying issuer

Current Role in Short Duration Portfolio: Primarily income

Investment Grade Corporates Allocation



Investment Grade Corporates Sub-Sector Allocation

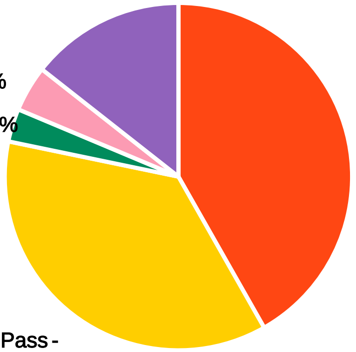


Source: BlackRock. Data as of 31 August 2019.

Short Duration Opportunity Set: MBS

- Primary issuers of agency MBS are Ginnie Mae, Fannie Mae and Freddie Mac offering implicit agency guarantee
- Can be transacted in Cash Pools, To-Be announced (TBAs) or prepayment protected Collateralized Mortgage Obligations (CMOs) format
- Agency MBS is considered to be highly liquid with over $8 trillion in debt outstanding and on average $218bn traded each day. There is around $800bln outstanding in non-agency MBS
- In the past two years gross supply was around $1trln supply ($300mln net)

MBS Sub-Sector Allocation



Primary risk: Prepayment risk

Current Role in Short Duration Portfolio: Tactical trading opportunities and income

Source: BlackRock. Data as of 31 August 2019.

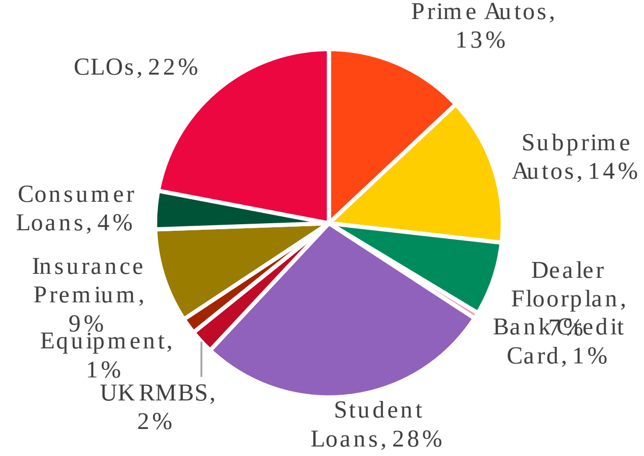
Short Duration Opportunity Set: ABS

- ABS market is dominated by auto loan and credit card securitizations and to a lesser extent by student loans
- Average Rating is AAA
- Historically highly correlated to swap spreads as assets trade off LIBOR
- Natural short duration asset class with the vast majority of issues with greater than 5 years in weighted average life (WAL)
- Market has moved to focus more on consumer credit securitizations with less emphasis on housing
- Historically, bid–ask spreads under normal market conditions averaged at 1-5 bps, while during the stressed conditions at 5-15 bps
- Issuance is dominated by auto ABS and more recently collateralized loan obligations (CLOs) though has been declining in 2019 (2019 YTD: $190bn vs. 2018: $517 bn). This muted supply in 2019 has been a tailwind for ABS.

Primary risk: Credit risk of the underlying pool of loans

Current Role in Short Duration Portfolio: Primarily high quality, risk adjusted income

ABS Sub-Sector Allocation

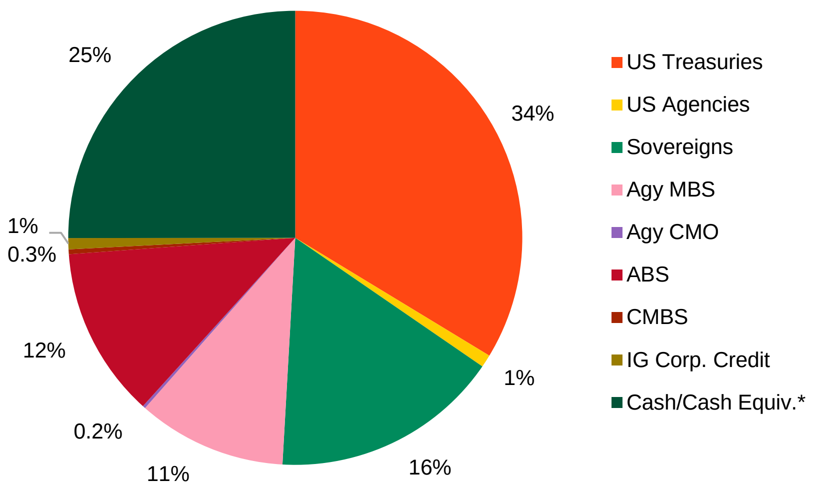


Source: BlackRock. Data as of 31 August 2019.

Current Central Bank short duration allocations lack diversification & income

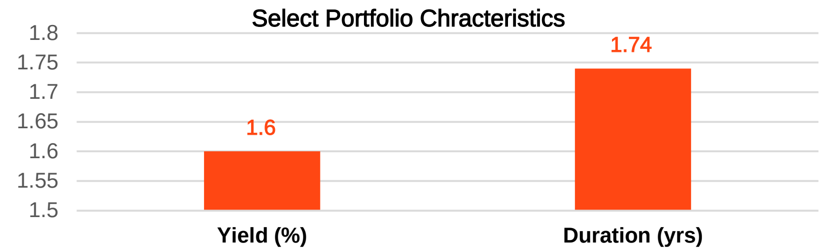
- **With nearly $1.6bn in assets under management, we encounter a logical bias among central bank reserve managers toward liquidity and safety as a primary objective, while returns and correlations seemed to be secondary.**
- **As a result, the allocation to US Treasuries, US Agency debt and Supra-Sovereigns dominate the asset allocation approach within fixed income short duration strategies.**
  - On a weighted-average basis, more than half of the actively-managed short duration fixed income portfolios (59%) are allocated to US Treasuries as well as Cash and Cash Equivalent securities, which can include Commercial Paper and Certificate of Deposits.
  - The allocation to income-generating fixed income sectors with low correlation to government-related securities and equity markets, such as structured credit, is limited at around 12%.
  - As the weighted-average yield on representative short duration strategies for central banks is at 1.6% with a duration of 1.74 years, the broader opportunity set, depending on respective allocation to each, averages a yield of 2.2% with an average duration of 1.85 years.

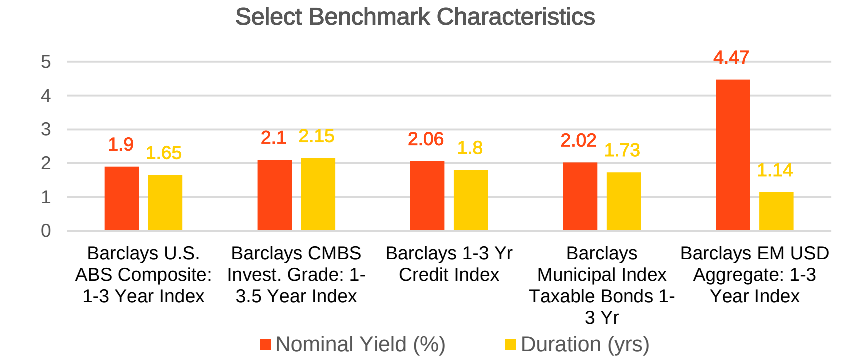
Based on the weighted average of fixed income short duration sector allocations, spread products are largely underweight



Source: BlackRock. Data as of 31 July 2019. *Cash and Cash Equivalent include the allocation to Commercial Paper, Certificate of Deposits as well as any securities with a maturity of less than one year.

Compared to the opportunity set of short duration sectors, current allocations are missing out on risk-adjusted income





Source: BlackRock, Barclays. Data as of 29 August 2019.

Positioning – Relative Value Map*

▼ = Current Month ▼ = 12-Month Average ▼ = 3-Month Average

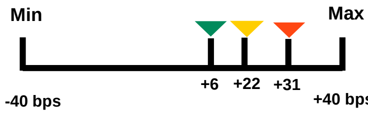
Active Duration

US Rates / Macro

- We have shifted to a neutral duration bias on the belief that while the Fed will potentially cut rates two more times by the end of 2019 given the trade escalation, slowdown in growth and muted inflation, the sharp rally in rates is overdone and starting to show signs of exhaustion.

Global Rates / FX

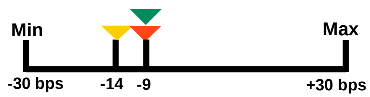
- We reduced our long in UK, Japan and Canada rates on the belief that the markets are overpricing the extent of easing by the global central banks. Given the global slowdown story we prefer to express our global view via long rates instead of active FX.



Relative Value Score based on Spread Duration Contribution

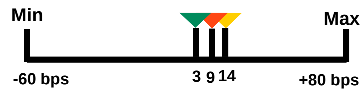
Gov't Guaranteed / Supranationals

- We still view the overall Supranational sector as rich. We continue to add exposure to Canadian mortgages bonds, which are fully backed by the Canadian Mortgage Corp. and tend to provide a better return than Canadian government bonds. We hedge this exposure back to USD.



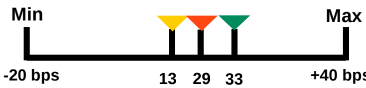
Corporate Credit

- We slightly decreased our allocation to the sector, as it started to look rich given the recent bout of volatility. We remain overweight in Communications as we expect to see de-levering actions in the cable/wireless subsector. We are overweight energy with the preference for independent to integrated names that have high dividend payouts and less flexibility to respond to lower oil prices. We are overweight the banking sector, primarily bulge-bracket banks, on valuations. We have a slight overweight in pharma with the focus on issuers with more diversified portfolio of products.



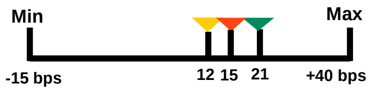
Agency MBS

- We continue to favor Agency 4.5s 15-year and 30-year low-loan balance pass-throughs as they have provided additional prepayment protection and on expectations that there will be a pick-up in demand from banks. Additionally, we began to purchase 30 year 4% TBAs on the belief that the current price now fully reflects the prepayment risk in the coupon.



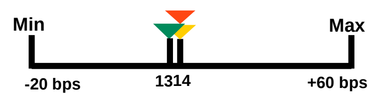
ABS

- Owing to the inverted yield curve we continue to favor front end high-quality AAA-rated ABS, which have been resilient to broader market volatility. Within ABS, we also look for higher-beta sectors with strong collateral performance, such as private student and consumer loans.



CMBS

- With the lack of supply and steady fundamentals, we maintain our allocation to AAA-rated seasoned paper on the belief those factors should keep spreads anchored in the near term. Also, front-end CMBS spread volatility remains muted and provides lower-beta and diversified carry.



*The opinions expressed are as of August 30th, 2019 and are subject to change at any time due to changes in market or economic conditions. Note that strategies may vary depending on individual client guidelines. Relative value score is assigned by the Short Duration Portfolio Team based on the mathematical calculation of duration risk budgets for each respective sector. Market observations are based on data from Bloomberg. Past performance is not a guarantee of future results. Forecasts are based on estimates and assumptions there is no guarantee that they will be achie

Excess returns versus Treasuries

Short Duration Sectors

Duration - adjusted excess returns by sector (in basis points)

BBG Barclays Index	2014	2015	2016	2017	Q3 2018*	Q4 2018*	2018	Jan 2019*	Feb 2019*	Mar 2019*	Q1 2019*	Apr 2019*	May 2019*	June 2019*	Q2 2019*	July 2019*	Aug 2019*	YTD 2019*
*Barclays Agg	12	-53	138	121	53	-102	-101	58	20	4	84	26	-48	38	17	30	-44	92
Agency 1 -3 Yrs	8	-6	12	31	12	-1	12	1	10	4	14	4	4	-7	0	7	3	25
MBS 15 Yrs	85	16	10	37	1	-29	-49	32	-1	7	39	-16	-16	4	-29	18	-51	-24
ABS Float. Rate 1-3 Yrs	62	21	118	96	19	-18	25	12	10	12	34	10	1	4	15	8	2	60
CMBS 1-3.5 Yrs	93	-4	115	81	42	-30	29	21	30	-1	51	10	11	-7	14	6	-7	66
Credit 1 -3 Yrs	43	24	112	113	40	-37	-1	37	20	11	68	10	-10	13	13	14	-1	96
Credit 1 -5 Yrs	56	13	148	162	54	-76	-44	65	33	18	117	17	-23	30	24	21	-8	160
US Float. Rate Credit**	66	41	172	164	46	-120	-33	76	29	9	115	28	-12	13	29	19	-1	165
US High Yield 1 -5 Yrs***	-45	-598	1498	557	207	-550	-162	336	131	-9	465	75	-165	87	-3	38	-85	422

* Unannualized

** Represented by US Floating Rate Corporates Index

*** Barclays US High Yield 1-5 Yr Cash Pay 2% Index

Source: Barclays Capital as of 31 August 2019. Index performance is shown for illustrative purposes only. It is not possible to invest directly in an index. Past performance is not indicative of future returns. Boxes highlighted in yellow represent the current period.

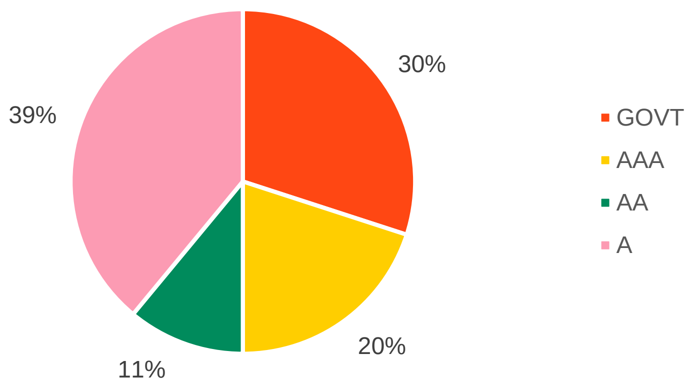
Portfolio guidelines with different degrees of duration and risk exposure

Asset Class	Asset Subtype	Portfolio A (Enhanced Income)	Portfolio B (Short Duration 1 -3 yr)	Portfolio C (Short Duration Plus)
Benchmark(s)		BBG Barclays Short -term Gov/Corp Index	BofA ML U.S. Treasuries 0 -3 Yr	Customized Benchmark (see portfolio slide for details)
Duration Limits		Duration Band: 0-2 Yrs	Max Duration: 2 Yrs (+/-0.5 Yrs within benchmark)	Duration Band: 0-3 Yrs
US Government	Treasuries	No Limit	No Limit	No Limit
	Agencies	No Limit	Maximum: 35% (for Fannie/Freddie)	Maximum: 20% (for Fannie/Freddie)
Sovereign Plus	Non-US Government	Not Eligible	No Limit	Maximum: 100%
	Supranational Bonds	Maximum: 30%	Maximum: 35% (10% limit on non -US SSAs)	Maximum: 100%
Securitized	Agency MBS	Maximum: 20% (with MBS/CMBS/ABS)	No Limit	Maximum: 100%
	ABS	Maximum: 20% (with MBS/CMBS/ABS)	Maximum: 35%	Maximum: 50% (with CMBS/Non -Agy MBS)
	CMBS	Maximum: 20% (with MBS/CMBS/ABS)	Not Eligible	Maximum: 50% (with ABS/Non -Agy MBS)
Corporate	Financials	Maximum: 30%	Not Eligible	Maximum: 100%
	Non-Financials	Maximum: 30%	Not Eligible	Maximum: 100%
Cash Equivalent	Certificates of Deposits, Commercial Papers	Maximum (Certificates of Deposits) : 30% Maximum (Commercial Papers) : 25%	Yes	Yes
Money Market	Yes	Maximum: 20%	No Limit	No Limit
Derivatives	Yes	Futures, Eurodollar Futures	Futures, FX Forwards, Swaps, Options, CDX	Futures, FX Forwards, Swaps, Options, CDX
Other		CPs Max. Maturity: 270 days or less Corporates Max. Maturity: 5 years or less Supras Max. Maturity: 5 years or less Agy MBS/CMOs/ABS Max Maturity: 5 years or less Min. Rating on ABS/MBS/CMBS: AA Min. Rating on Corporates: A Min. Rating on Supras : AA 144As not permitted	Min. Credit Rating: AA - Min. Rating on ABS: AAA FRNs Max. Maturity: 5 years Spread Duration: Max. 2 years 15% limit: FHLMC, FNMA, FHLB 144As not permitted TBAs permitted	Min. Avg. Portfolio Rating: A Max. CLOs/Bank Loans:: 5% Max. Non-Agy MBS:10% Max. Active FX Max: 5% Max. Non-USD Securities: 10% Max. EMD: 5% / HY: 10%

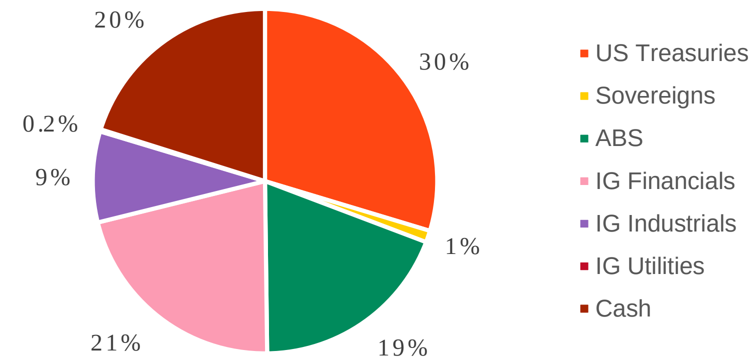
Portfolio A

As of July 2019

Credit Quality (% NAV)



Sector Allocation (% NAV)



Portfolio characteristics

		Portfolio	Benchmark	Difference
Returns	YTD*	1.91	1.69	0.22
	1 Year	2.88	2.67	0.21
	3 Year	N/A	N/A	N/A
	Inception to date (Jul -17)	2.23	2.04	0.19
Effective Duration (years)		0.53	0.54	-0.01
Spread Duration		0.59	0.15	0.44
Yield (%)		2.33	2.21	0.12
Avg Credit Quality (Mdy /S&P)		Aa2/AA-	Aa1/AA	

Ex-Post Statistics +	Portfolio
Tracking Error	0.12
Standard Deviation	0.22
Information Ratio	1.74
Sharpe Ratio	2.42

+ 1 Year

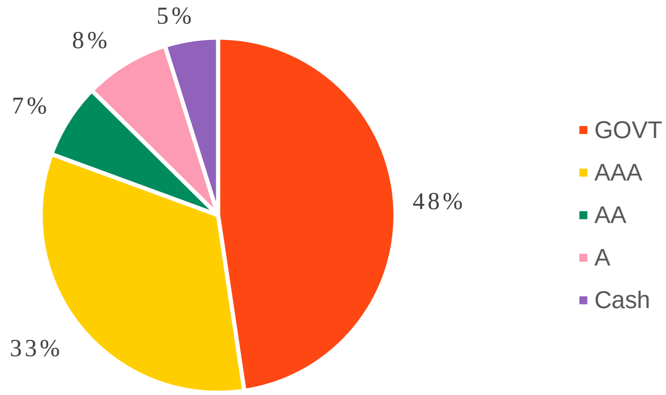
Benchmark:
BBG Barclays Short-term Govt/ Corporate Index

Cash Equivalents include Commercial Paper (CPs) and Certificate of Deposits (CDs). *Returns are non-annualized. Source: BlackRock. All data as of 31 July 2019. **Past performance is not indicative of future results.** Certain performance results do not reflect the deduction of management/advisory fees and other expenses; management/ advisory fees and other expenses will reduce a client's return.

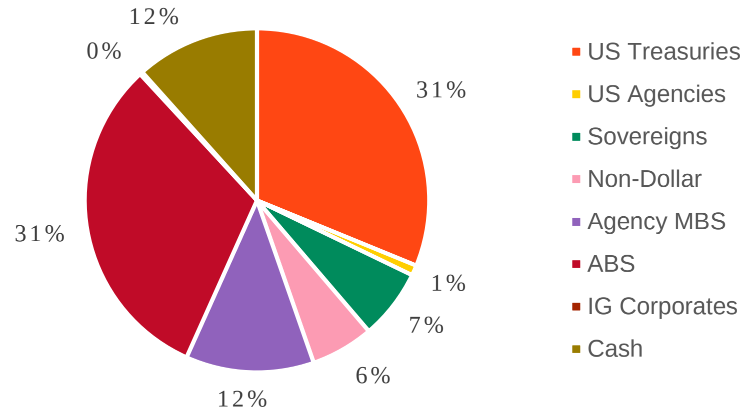
Portfolio B

As of July 2019

Credit Quality (% NAV)



Sector Allocation (% NAV)



Portfolio characteristics

		Portfolio	Benchmark	Difference
Returns	YTD*	2.45	2.09	0.36
	3 Year	1.73	1.35	0.38
	5 Year	1.43	1.15	0.28
	Inception to date (Sep-05)	2.83	2.57	0.26
Effective Duration (years)		1.70	1.46	0.24
Spread Duration		1.06	0	1.06
Yield (%)		2.03	2.01	0.02
Avg Credit Quality (Mdy/S&P)		Aa1/AA+	Aaa/AA+	-

Ex-Post Statistics +	Portfolio
Tracking Error	0.21
Standard Deviation	0.22
Information Ratio	1.52
Sharpe Ratio	2.03

+ Since inception

Benchmark:
BofAML U.S. Treasuries 0-3 Yr

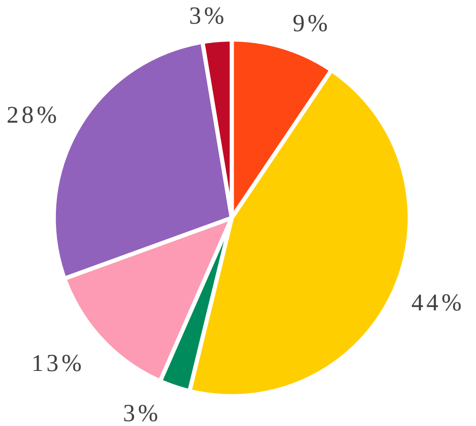
Cash Equivalents include commercial paper and certificate of deposits. *Returns are non-annualized. Source: BlackRock. All data as of 31 July 2019.
Past performance is not indicative of future results. Certain performance results do not reflect the deduction of management/advisory fees and other expenses; management/advisory fees and other expenses will reduce a client's return.

Portfolio Composition & Risk Characteristics

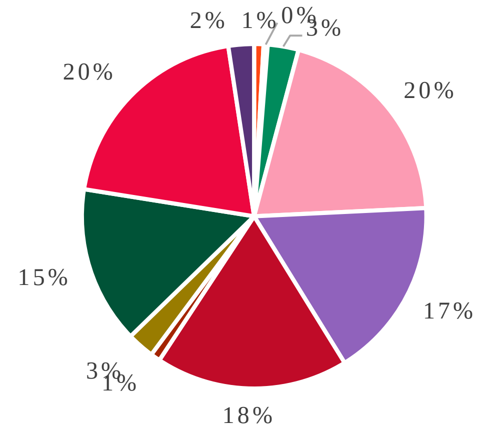
Portfolio C

As of July 2019

Credit Quality (% NAV)



Sector Allocation (% NAV)



Portfolio characteristics

		Portfolio	Benchmark	Difference
Returns	YTD*	4.44	3.93	0.51
	3 Year	2.70	2.17	0.53
	5 Year	2.49	2.19	0.30
	Inception to date (Feb-14)	2.51	2.18	0.33
Effective Duration (years)		2.50	2.20	0.30
Spread Duration		2.86	2.15	0.71
Yield (%)		2.52	2.42	0.10
Avg Credit Quality (Mdy/ S&P)		Aa3/ A+	Aa3/ AA-	-

Ex-Post Statistics +	Portfolio
Tracking Error	0.31
Standard Deviation	0.38
Information Ratio	0.8
Sharpe Ratio	2.4

+3 Year

Cash Equivalents includes commercial paper and certificate of deposits. *Returns are non-annualized. Source: BlackRock. All data as of 31 July 2019

Past performance is not indicative of future results. Certain performance results do not reflect the deduction of management/ advisory fees and other expenses; management/ advisory fees and other expenses will reduce a client's return.

Custom Benchmark:
35% BBG Barclays Corporate 1-5 Yr
15% BBG Barclays ABS 1-3 Year AAA Rated ex Home Equity
15% BBG Barclays CMBS Investment Grade 1-3.5 Yr
15% BBG Barclays MBS 15 Yr
10% BBG Barc Treasury 1-3 Yr
5% BBG Barclays Agency 1-3 Yr
5% BBG Barclays High Yield Corporate 1-5 Yr BB- or better

Stress Test Scenarios

What are the Stress Test scenarios?

- Hypothetical, forward looking scenarios that allow us to stress test client portfolios

Why develop Stress Test scenarios?

- Scenarios allow a broader understanding of the market risks to an asset allocation strategy
- Scenario analysis can be used to help expose particular risk concentrations in a wide range of market conditions, which can influence portfolio design and facilitate a faster response to unfavorable changes in market conditions

How frequently are the scenarios reviewed and updated?

- Quarterly, by a combination of BlackRock's Capital Markets Assumptions Group ("CMAG") and Client Solutions

Do these stress tests represent all possible outcomes?

- No. The sum of the probabilities of our stress tests is not intended to equal 1 – our stress tests are biased towards downside, negative events, which are often most useful in evaluating risk positions

How should we use the stress tests?

- The stress tests are purely indicative. A Euro break-up, for instance, could occur in a number of ways, and not just as per our scenario. The stress tests should be used to illustrate high level portfolio movements only

Stress Test Scenarios – Aggregate Results

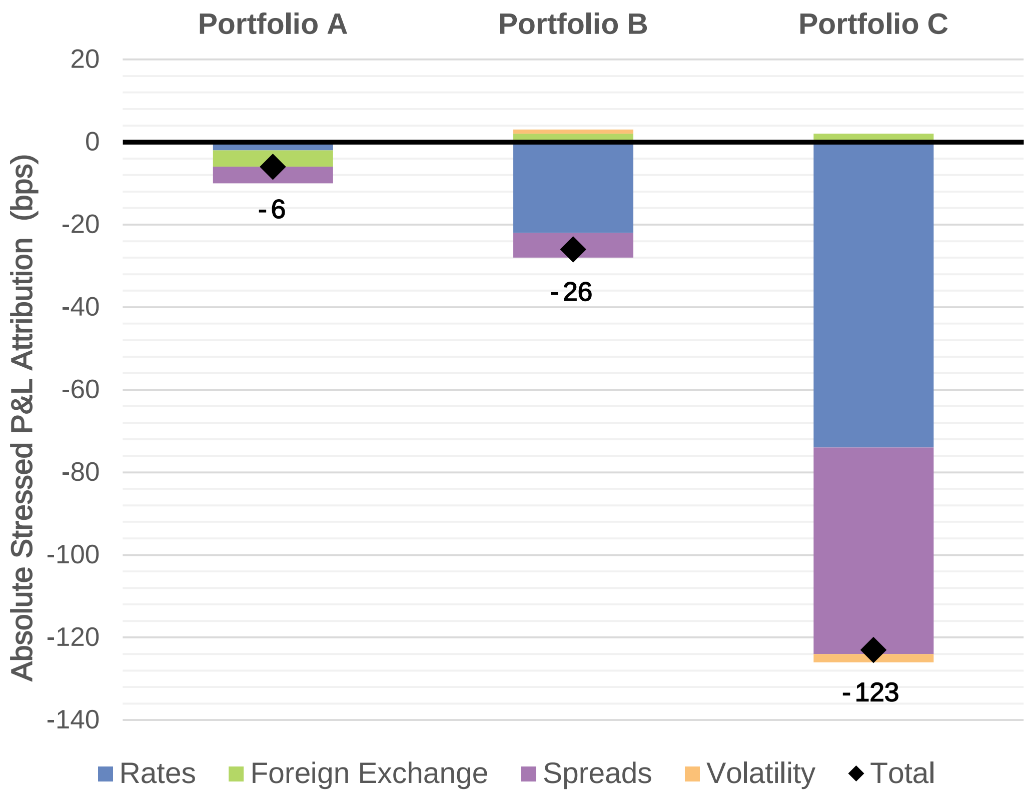
Stress Test Scenario	Stressed P&L (bps)		
	Portfolio A	Portfolio B	Portfolio C
2013 Fed "Taper Tantrum"	**-6**	**-26**	**-123**
2011 US Government Debt Downgrade	**-4**	**-2**	**-30**
US Rate Cut (50 bps)	**21**	**69**	**74**

Source: BlackRock. Data as of 28 August 2019.

Short Duration Model Portfolios – Stress Tests

2013 Fed Taper Tantrum

Description: Tapering Talks stirred the market after a Congress Testimony by Fed Chair Ben Bernanke with both equity and bond markets selling off. Emerging Market suffered badly due to hot money flowing back to the US. Shocks for DxS Factors are spreads.



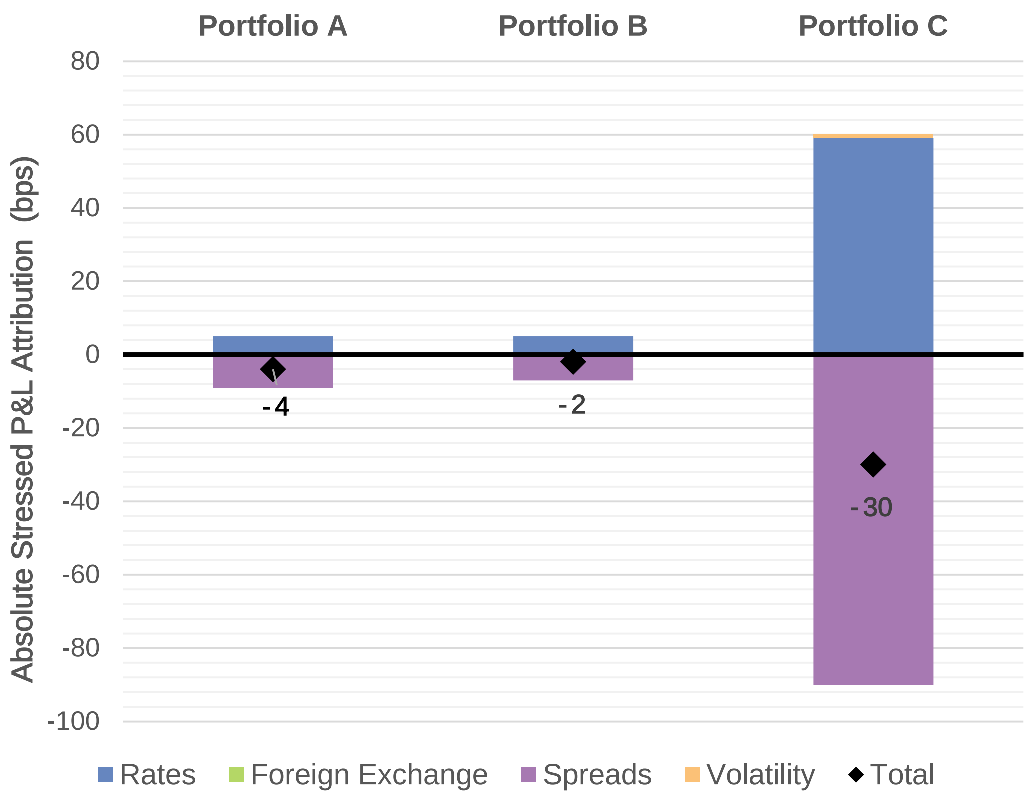
Factors	Portfolio A*	Portfolio B	Portfolio C
Rates	-2	-22	-74
Foreign Exchange	-4	2	2
Spreads	0	-6	-50
Volatility	0	1	-2
Total	**-6**	**-26**	**-123**

Source: BlackRock. Data as of 28 August 2019.

Short Duration Model Portfolios – Stress Tests

2011 US Government Debt Downgrade

Description: The period starts with 50% chance of a potential downgrade of the US Government credit rating from Standard & Poor's and ends with the Operational Twist announcement by the Federal Reserve. Stock market incurred losses while US Treasury yields rallied despite their rating being lowered gains due to investors' flight to safety. Shocks for DxS Factors are spreads.

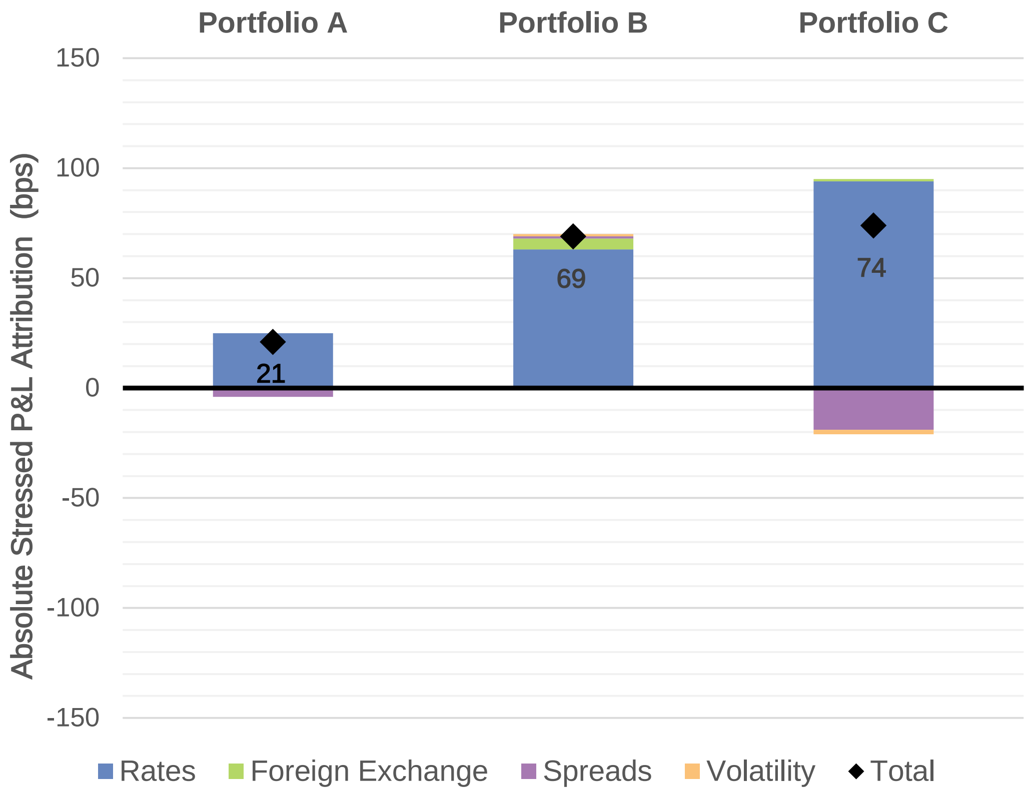


Factors	Portfolio A*	Portfolio B	Portfolio C
Rates	5	5	59
Foreign Exchange	0	0	0
Spreads	-9	-7	-90
Volatility	0	0	1
Total	-4	-2	-30

Source: BlackRock. Data as of 28 August 2019.

US Interest Decline by 50 basis points

Description: This stress test demonstrates a decline in the US interest rate benchmark by 50 basis point with the assumption of a parallel shift of the US Treasury yield curve by the same amount.



Factors	Portfolio A*	Portfolio B	Portfolio C
Rates	25	63	94
Foreign Exchange	0	5	1
Spreads	-4	1	-19
Volatility	0	1	-2
Total	**21**	**69**	**74**

Source: BlackRock. Data as of 28 August 2019.

Summary Page

1. The weaponization of tariffs has led to a new source of market uncertainty which has driven a spike in volatility and an overarching risk-off market sentiment.
2. While we have entered the latter stages of the economic expansion cycle, the slowdown in global growth seems to accelerated more quickly particularly in Europe and China, whose growth potential is likely going to be further hampered by the US tariffs.
3. Despite of the prevailing easing bias across global central banks, which should extend the current expansionary cycle, the exacerbation of the trade war between the US and China may very well undermine these monetary policy efforts.
4. Continued muted inflation expectations, a slowdown in global growth and the continued large supply of shorter term US Treasuries has made the inversion of the US Treasury yield curve less of a forecasting 'tool' for economic woes but rather a reflection of current market technicals. As such, we do not see signs for an imminent recession in the US.
5. After US yields peaked in October 2018 with 10-year US yields reaching 3.24%, the dovish tilt which ultimately led to the Federal Reserve cutting its Fed Funds rate for the first time in 10 years by 25 bps in July, has resulted in the rise of the number of bonds posting a negative yield, which reached $17 trillion in August.
6. Given the scarcity of attractive income in the global fixed income markets, investors need to recalibrate their income expectations OR adjust their investment guidelines that focuses on generating more attractive risk-adjusted returns. This includes to potentially expand the investment guidelines and gain more insights on higher income assets, such a corporate credit and structured credit.
7. The starting point should be the primary benchmark, which should fully reflect a broader opportunity set. In addition, the identification of specific sources of the portfolio's return potential should help construct the investment guidelines, taking into consideration capital preservation, liquidity and income.
8. Within the short duration investment strategies pursued by reserve managers at Central Banks, we continue to encounter a binary approach to fixed income investing, which lacks diversification and income potential amid rising interest rates in the US.
9. We believe greater diversification in a reserve management portfolios with ample flexibility for sourcing return opportunities will allow to generate more attractive risk-adjusted returns while capping the downside risks amid elevated market volatility.
10. After "stress testing" the three basic short duration representative portfolios, the results show that amid continuing declining rates a more flexible short duration investment strategies which has diversified sources of income and a certain duration flexibility is likely to outperform other more traditional investment strategies which are more concentrated between two to three sectors.

Biographies of key investment professionals

Thomas Musmanno, CFA, Managing Director, is Head of US Short Duration and New York Core Portfolio Management (CorePM) within BlackRock's Global Fixed Income group and a member of the Global Fixed Income executive team.

Mr. Musmanno's service with the firm dates back to 1991, including his years with Merrill Lynch Investment Managers (MLIM), which merged with BlackRock in 2006. At MLIM, he was a fixed income and money market portfolio manager. Mr. Musmanno joined MLIM in 1991 as an analyst and held a variety of positions, including fixed income research analyst in trust accounting in Merrill Lynch's Private Client Group.

Mr. Musmanno earned a BS degree in finance in 1991 from Siena College and an MBA degree in finance from St. John's University in 1993.

Scott MacLellan, CFA, Director, is a portfolio manager in BlackRock's Global Fixed Income Group. He is the co-portfolio manager of BlackRock's Low Duration Bond Fund and the BGF USD Short Duration Bond Fund. As a lead portfolio manager on the USD short duration fixed income platform, he also focuses on managing multi sector short duration portfolios and closed end funds.

Prior to assuming his current responsibilities in 2012, Mr. MacLellan was a member of the Global Client Group, covering Japanese clients. He also served as a product specialist for short duration fixed income products. Previously, Mr. MacLellan spent four years with Nomura BlackRock Asset Management (NBAM), a former joint venture between BlackRock and Nomura Asset Management Co., Ltd, in Tokyo as an account manager. Prior to joining NBAM in 2001, Mr. MacLellan spent a year in the Global Finance and Investment Department of IBJ Leasing in Tokyo.

Mr. MacLellan earned a BS degree, with honors, in economics and international development studies from King's College in 1997.

Ludwig J. Marek, Managing Director, is the Lead Product Strategist for the Short Duration team within BlackRock's Global Fixed Income Group.

Prior to joining BlackRock in 2013, Mr. Marek was Vice President of Fixed Income Product Management at Citigroup's hedge fund unit Citi Capital Advisors (CCA). Before joining CCA in 2011, Mr. Marek was Lead Marketing Strategist at Goldman Sachs Asset Management (GSAM) for all fixed income mutual funds and money market products. Prior to joining GSAM in 2009, Mr. Marek was Vice President of Global Institutional Marketing at Knight Capital Group. Mr. Marek was also a journalist at BridgeNews, AFX-News and Bloomberg from 2000 to 2006, covering capital markets, monetary policy and investment strategies.

Mr. Marek earned a BA degree in English Literature from the University of Massachusetts at Lowell in 1998, and an MPA in Economic Policy Management in Emerging Markets from Columbia University in 2007. Mr. Marek holds the Series 7 and 63.

Important Notes

Data Sources:
Unless otherwise noted, all information pertaining to Treasury yields, inflation, breakeven levels and economic data releases are sourced from Bloomberg as of the date/ month referenced on each respective slide. Unless otherwise noted, option adjusted spreads and excess returns are sourced from Barclays. Information provided in the “Market color” and “Issuance” sections of the corporate, ABS and CMBS slides is sourced from the BlackRock trading desk.

Important Notes

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Credit Quality

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Important Notes

Index
It is not possible to directly invest in an unmanaged index.

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