Albert Desclée
+44 20 7773 3382
albert.desclee@barclays.com
Barclays, UK

Evgeny Katenko
+44 20 7773 0113
evgeny.x.katenko@barclays.com
Barclays, UK

Simon Polbennikov
+44 20 3134 0752
simon.polbennikov@barclays.com
Barclays, UK

Carry in Global Rates Markets

25 January 2017

Introduction

- In global rates markets, carry strategies exploit the empirical finding that rates tend to persist rather than move according to the forwards*
- Within a given market, curve steepness can be an indicator of duration positioning
- Relative steepness across markets can be an indicator of yield spread positioning

- We focus on cross-market positioning based on relative steepness and discuss
  - Performance,
  - Risk properties

- Applications:
  - Stand-alone long-short rate strategy that can describe a carry factor in rates markets
  - Benchmark design: “smart beta” in global rates markets

* See a.o. *Global Fixed Income Investments: The Persistence Effect*, Leibowitz M., L. Bader and S Kogelman, Financial Analysts Journal, 1995 and *Expected Returns*, Ilmanen, Wiley Finance, 2011

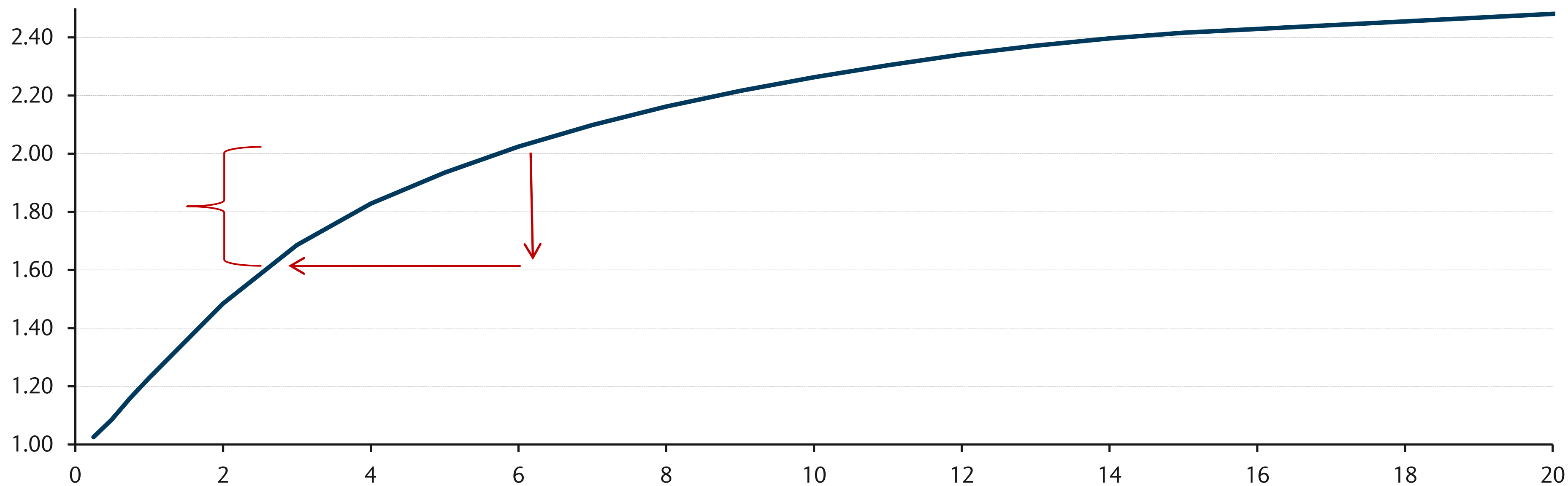
Data

- We study global rates markets using
  - Interest Rate Swaps (Bloomberg swap curves)
  - Treasury bonds (Bloomberg Barclays Bond Indices)
- Swaps
  - 2 periods:
    - Jan 1995 to Sep 2016 (7 markets: USD, CAD, AUD, JPY, GBP, CHF, SEK)
      - 3 tenors: 3y, 5y, 10y
    - Nov 2002 to Sep 2016 (8 markets: USD, CAD, AUD, JPY, GBP, CHF, SEK, EUR)
      - 4 tenors: 3y, 5y, 10y, and 15y
- Treasury bonds
  - Nov 2001 to Dec 2016 (7 major markets: US, CA, AU, JP, DE, GB, SE)
    - 3-7y maturity sector only

Assessing rates carry

- Rates carry can be measured as yield accretion plus roll-down return in excess of the cost of financing
  - Assuming the yield curve remains unchanged at horizon
    - Yield accretion over time
    - Return impact of yield change due to maturity shortening

Carry and Roll Down – Example USD Swap Curve (16 Jan 2017)

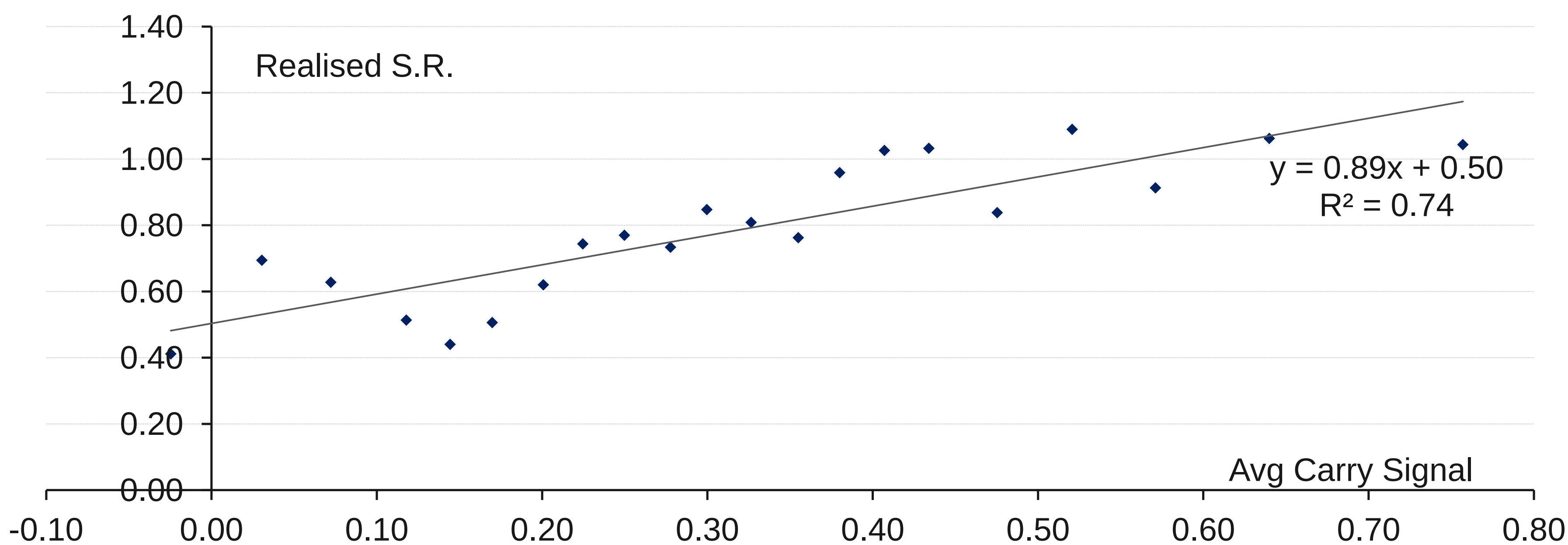


Source: Barclays Research

Does rates carry predict returns?

- Rank all 21 cells (3 maturities and 7 markets) by carry signal every month
  - Carry is normalized for risk
    - Risk can be defined either in terms of duration, or of volatility of historical returns
- Observe average realized return, risk and Sharpe ratio of each bucket in subsequent month
- For each cell, report average signal and realised return

Carry signal and subsequent performance (pooled data) (1995 to 2016)



Source: Barclays Research

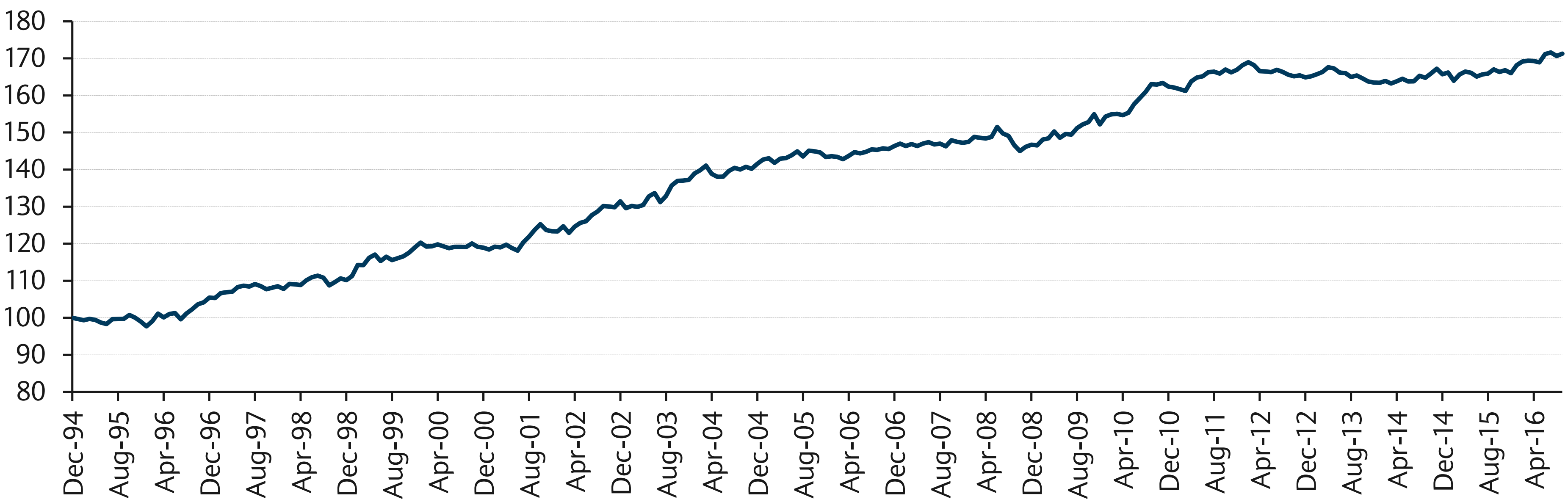
Swap-based strategies

- Long-short strategy
- Every month
    - Go long duration in markets with highest carry (steepest slope) per unit of risk
    - Short markets with lowest carry (flattest or most inverted slope)
- Long and short portfolios are diversified
    - For a single maturity (e.g. 5y):
        - 3 long and 3 short out of 7 markets for dataset starting in 1995
        - 4 long and 4 short out of 8 markets for dataset starting in 2002
    - For all maturity x country cells (pooled strategy)
        - 7 long and 7 short out of 21 cells for dataset starting in 1995
        - 11 long and 11 short out of 32 cells for dataset starting in 2002
- Weighting scheme for individual swaps within long and short legs of the strategy
    - Equal duration contribution (total duration of each leg is 6y)

Long-Short swap strategy

- Long-short swap strategy is:
  - Long duration in markets with steep slope and high carry per unit of risk
  - Short durations in markets with relatively flat slope and low carry
- The example below relates to a long-short strategy in 5y swaps
  - Long the three steepest curves and short the three flattest curves

Cumulative performance of long-short strategy (5y tenor)

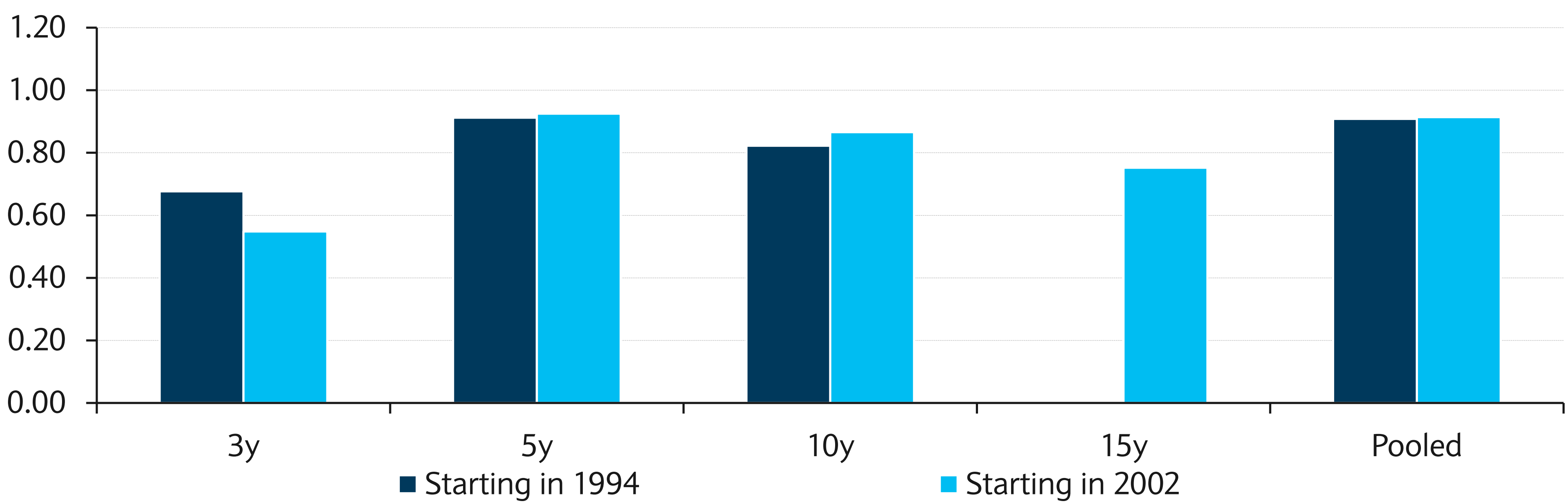


Source: Barclays Research

Swap strategies: summary performance

- Focus on "equal duration contribution" strategy (6 yr of duration in each of long and short legs of the long-short strategy)
- Highest Sharpe ratio observed for intermediate maturities
- Pooled strategy improves Sharpe ratio only marginally

Sharpe ratio by tenor and by period



Source: Barclays Research

Performances of long-short swap strategies

- Performance is generally positive, for all tenors and weighting schemes
- Pooled strategy (consider all countries and maturities) has only small gain in S.R.
- Main attraction of carry signal is cross-market rather than curve positioning

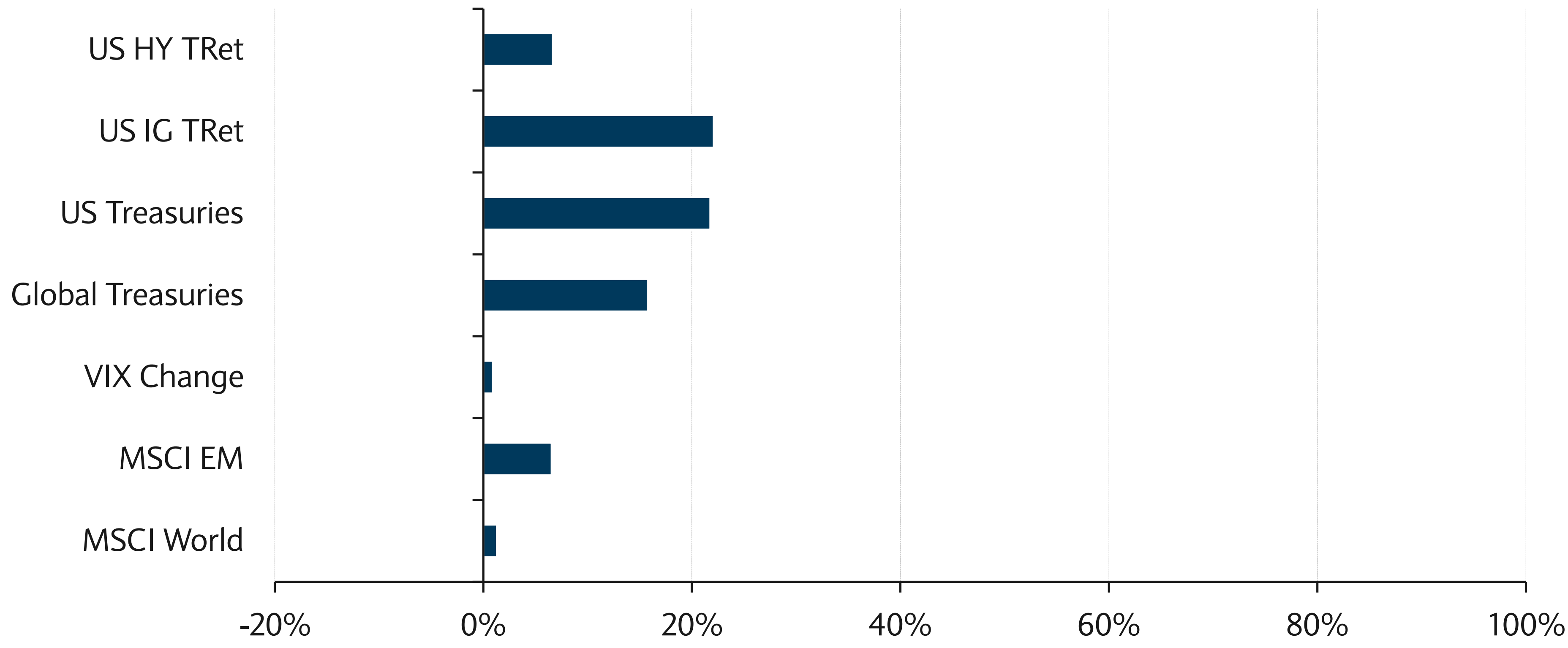
Summary performance					
Starting in 1995 (7 markets)					
	3y	5y	10y		Pooled
Avg Return (%/y)	2.12%	2.50%	2.12%		2.62%
Volatility (%/y)	3.13%	2.75%	2.58%		2.88%
Sharpe Ratio	**0.68**	**0.91**	**0.82**		**0.91**
Max Drawdown	-5.33%	-4.28%	-4.28%		
Starting in 2002 (8 markets)					
	3y	5y	10y	15y	Pooled
Avg Return (%/y)	1.18%	1.88%	1.55%	1.34%	1.92%
Volatility (%/y)	2.15%	2.03%	1.79%	1.78%	2.11%
Sharpe Ratio	**0.55**	**0.92**	**0.87**	**0.75**	**0.91**
Max Drawdown	-4.48%	-3.77%	-3.52%	-3.49%	

Source: Barclays Research

Swap strategy: correlation with market variables

- Correlations with market factors are small but positive on fixed income factors
- Correlations can change substantially over time according to strategy positioning and differences in market volatility
- Data below relate to the L/S strategy investing in 5y swaps starting in 1995

Correlations of L/S swap strategy with market indices (1995-2016)



Source: Barclays Research

Swap strategy: performance in macro regimes

- Strong directionality on global tsy market returns and on Fed regimes
- L/S strategy investing in 5y swaps starting in 1995

Performance of 5yr L/S swap strategy (1995 to 2016)

	Freq.	Return (bp/m)	Sharpe Ratio
Fed Easing	31%	15	0.61
Fed Post Easing	**19%**	**47**	**1.62**
Fed Tightening	31%	17	0.87
Fed Post Tightening	20%	11	0.74

	Freq.	Return (bp/m)	Sharpe Ratio
NBER Recession	11%	19	0.68
NBER Expansion	89%	21	0.95

	Freq.	Return (bp/m)	Sharpe Ratio
Global Tsy Up	**64%**	**28**	**1.27**
Global Tsy Down	36%	9	0.36
US Tsy Up	**56%**	**33**	**1.52**
US Tsy Down	44%	6	0.25

	Freq.	Return (bp/m)	Sharpe Ratio
MSCI Up	58%	20	0.89
MSCI Down	42%	22	0.94

Source: Barclays Research

Adjusting the swap strategy for macro variables

- A pure carry indicator which assumes the curve does not change
  - But a steep curve can predict increases in rates :
    - Is this consistent with the macro environment?

- We adjust the carry signal according to macro variables to try predict changes in policy rates
  - Level of rates
  - Inflation
  - Wealth
  - Economic activity

- Adjusted carry signal

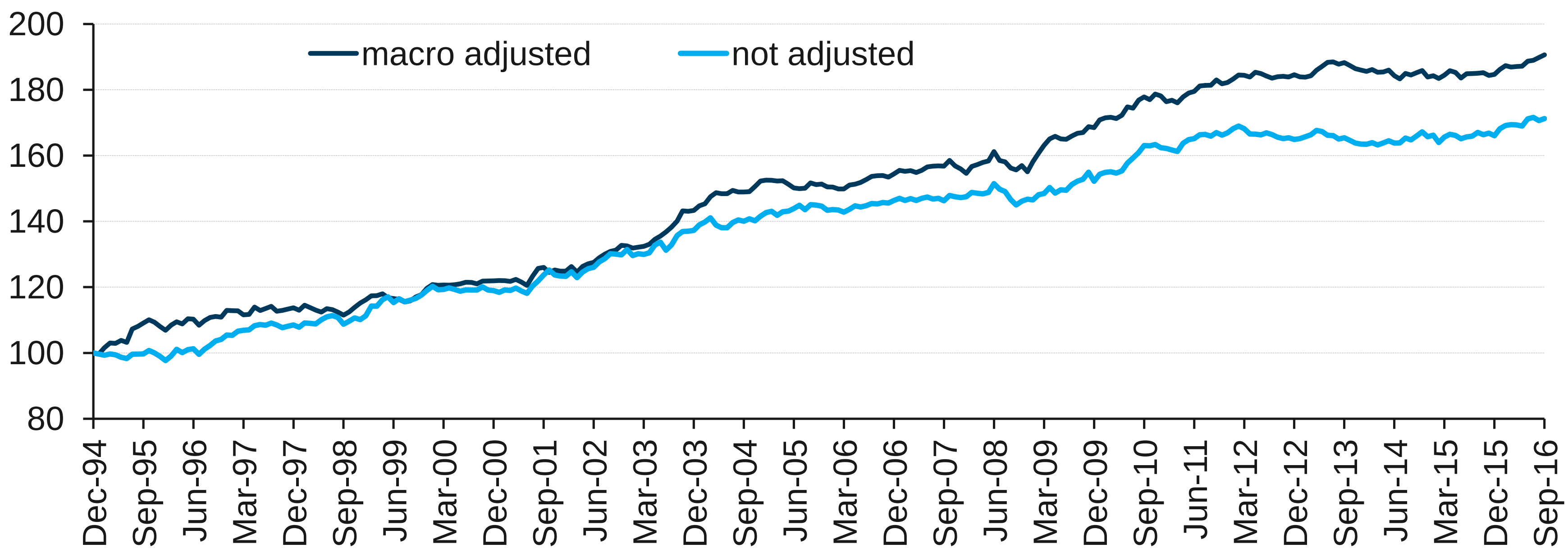
$$CarrySignal = \frac{YieldCarry + Rolldown}{Risk} - MacroAdjustment$$

Source: Barclays Research

Swap strategy with macro data

- The long-short strategy below invests in 5y swaps across 7 markets
  - Long duration in the top three in terms of macro-adjusted carry signal
  - Short duration in bottom three
  - Equal duration contributions
  - Target duration of short and long legs: 6 y

Cumulative Return of L/S swap strategy (5y tenor)

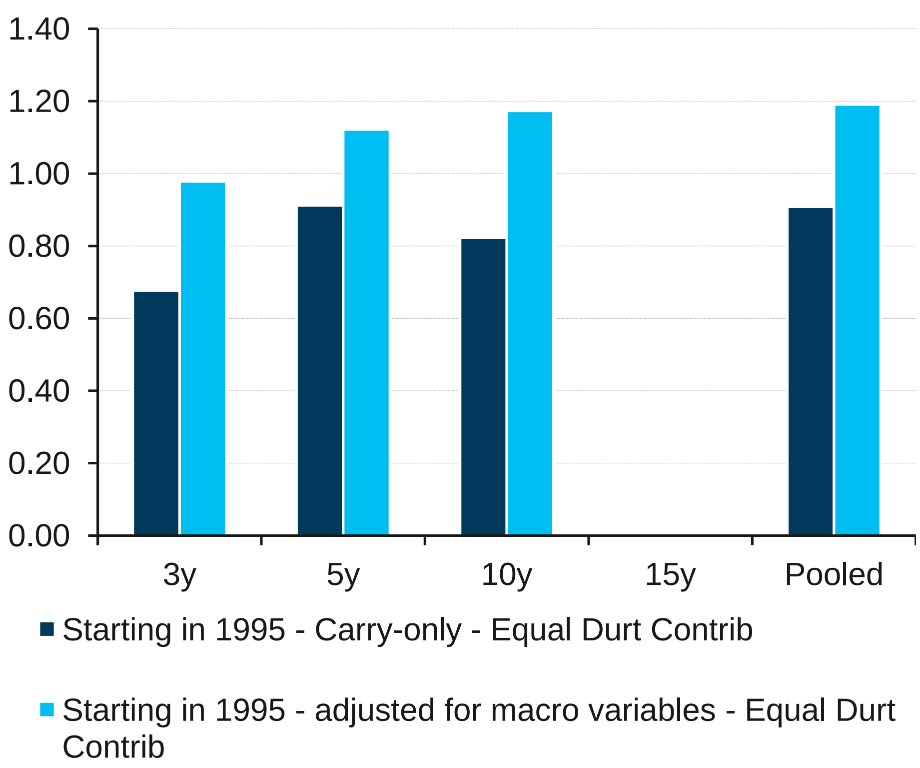


Source: Barclays Research

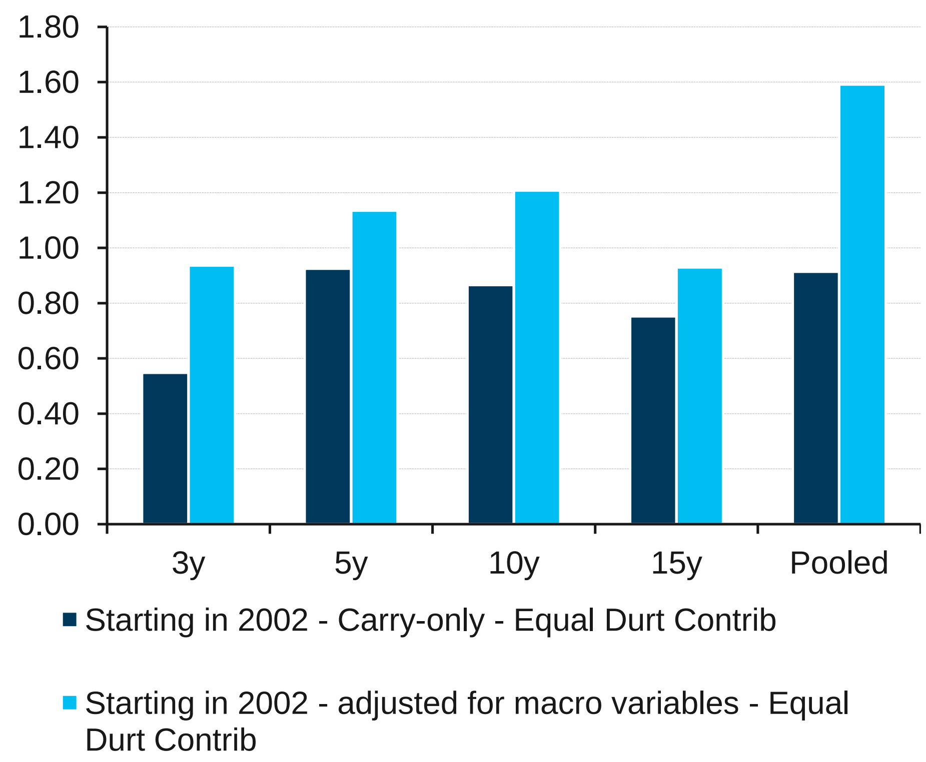
Swap strategies with macro adjustment: performance

- Adding fundamental variables helps improve Sharpe ratios of long-short swap strategies
- Strategies investing in intermediate maturities deliver the best performance

Sharpe ratio (1995-2016)



Sharpe ratio (2002-2016)



Source: Barclays Research

Performances of macro-adjusted L/S swap strategies

- Performance has generally improved vs. carry-only strategies

Performances of macro-adjusted L/S swap strategies

Starting in 1995 (7 markets)

	3y	5y	10y		Pooled
Avg Return (%/y)	2.87%	2.99%	3.00%		3.26%
Volatility (%/y)	2.93%	2.67%	2.55%		2.74%
Sharpe Ratio	**0.98**	**1.12**	**1.17**		**1.19**
Max Drawdown	-4.74%	-3.83%	-3.64%		

Starting in 2002 (8 markets)

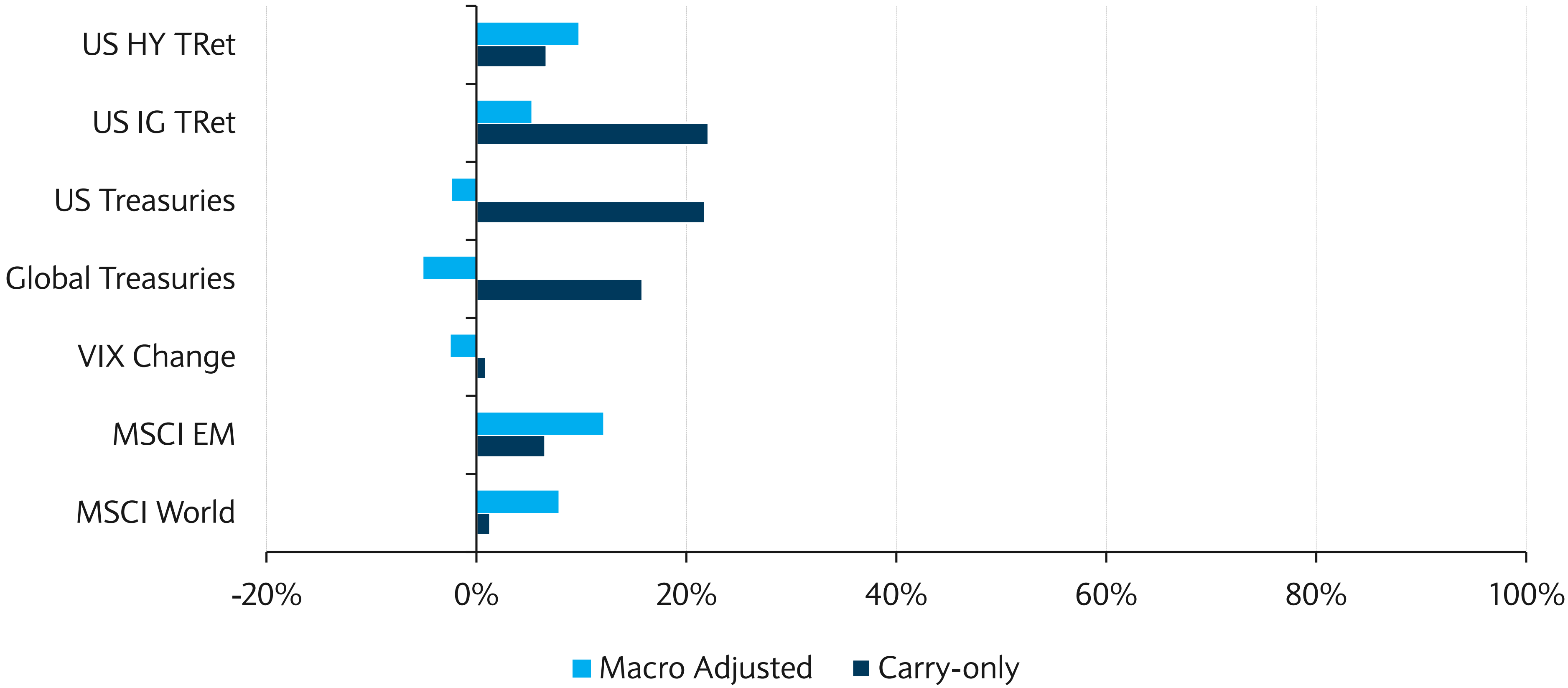
	3y	5y	10y	15y	Pooled
Avg Return (%/y)	1.90%	2.03%	2.16%	1.72%	3.02%
Volatility (%/y)	2.03%	1.79%	1.79%	1.85%	1.90%
Sharpe Ratio	**0.94**	**1.13**	**1.21**	**0.93**	**1.59**
Max Drawdown	-3.84%	-3.01%	-2.76%	-2.66%	

Source: Barclays Research

Swap strategy: correlations with market variables

- Macro-adjusted strategy is slightly less directional on rates market performance
- Long-short swap strategy investing in 5y swaps since 1995

Correlations of L/S swap strategy with market indices (1995 to 2016)



Source: Barclays Research; Bloomberg

Swap strategy: performance in macro regimes

- Lower directionality on rates market performance than prior to macro adjustments

Performance of 5yr L/S swap strategy – macro adjusted (1995 to 2016)

	Freq.	Return (bp/m)	Sharpe Ratio
Fed Easing	31%	21	0.79
Fed Post Easing	**19%**	**49**	**2.19**
Fed Tightening	31%	17	0.99
Fed Post Tightening	20%	20	1.05

	Freq.	Return (bp/m)	Sharpe Ratio
NBER Recession	11%	28	0.88
NBER Expansion	89%	25	1.19

	Freq.	Return (bp/m)	Sharpe Ratio
Global Tsy Up	64%	24	1.05
Global Tsy Down	36%	27	1.27
US Tsy Up	56%	26	1.21
US Tsy Down	44%	24	1.03

	Freq.	Return (bp/m)	Sharpe Ratio
MSCI Up	58%	28	1.29
MSCI Down	42%	21	0.91

Source: Barclays Research; Bloomberg

Designing a “smart beta” in global rates markets

Customizing global treasury indices

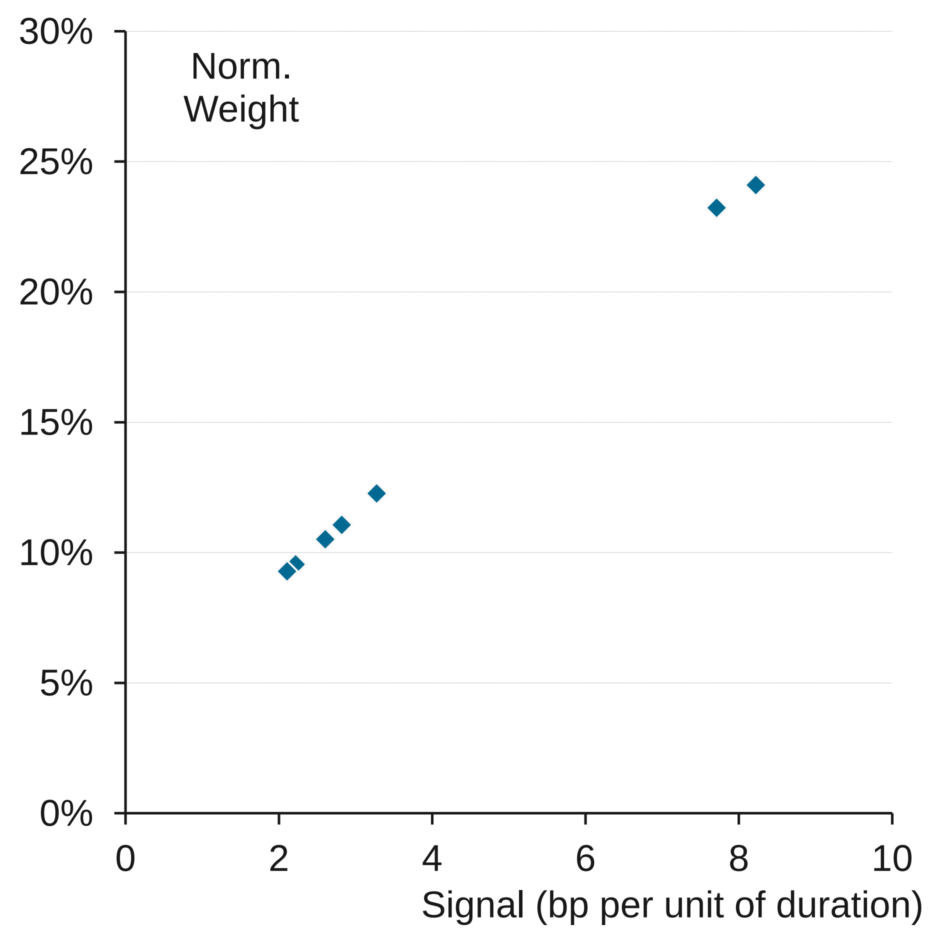
- Popular customization schemes of global treasury indices have focused on controlling risk
  - Issuer Capped Sovereign Indices (QPS 2006)
  - GDP weighted indices (Bloomberg Barclays Indices 2009)
  - Fiscal Strength weighted indices (Bloomberg Barclays Indices, QPS 2011)
- Could a customization based on carry help design a suitable “smart beta” index for global rates?
- Consider as a baseline
  - A global treasury index investing in 7 markets (US, JP, GB, DE, CA, AU, SE), 3-7y maturity
    - Market-capitalization weighted or equal-weighted
    - Returns reported in USD, currency-hedged, in excess of 1M USD Libor
    - Period: Nov 2001 to Sep 2016

Designing a carry-based global bond allocation

- Each month, carry-based signals are produced for each market, based on the shape of its treasury yield curve
- Signals are transformed into weights in a logit function
- Weights are then normalised to 100%
    - So, in this example, portfolio weights are determined independently of any baseline index weights

- Portfolio returns are compared with market-capitalization and equal weighted G7 3-7y treasury indices

Transforming signals into weights

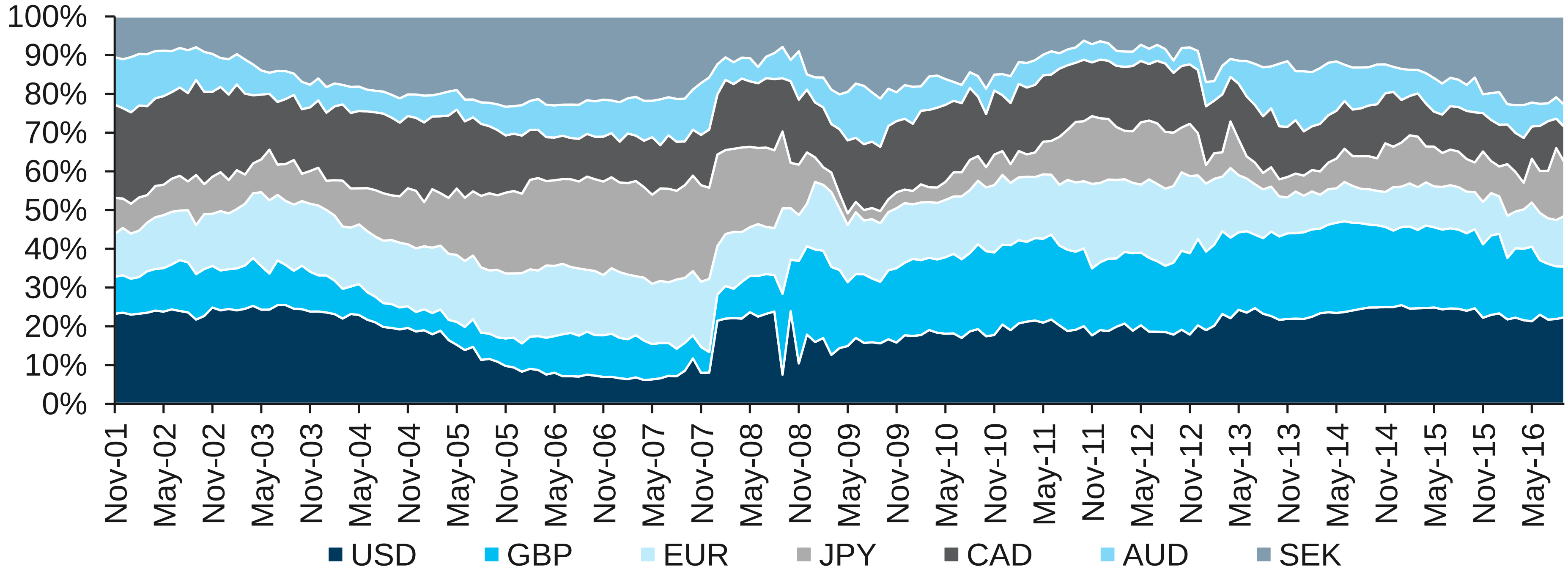


Source: Barclays Research

Historical weights of carry-based 3-7y global bond portfolio

- Weights fluctuate over time but are not extremely volatile
- Different options exist to smooth weights and therefore control turnover
  - Or to anchor weights to relative market capitalizations in order to ensure investability

Weights in pro-forma carry-based 3-7y treasury index



Source: Barclays Research; Bloomberg Barclays Bond Indices

Performance summary of 3-7y treasury indices

Performance (2001-2016)

	Return (%/y)	Volatility (%/y)	Sharpe Ratio
AU	1.16%	3.42%	0.34
CA	2.47%	2.94%	0.84
DE	2.68%	2.95%	0.91
JP	1.28%	1.36%	0.94
SE	2.70%	3.13%	0.86
GB	2.32%	3.06%	0.76
US	2.81%	3.90%	0.72
Market Weights	2.04%	2.05%	1.00
Equal Weights	**2.20%**	**2.49%**	**0.88**
Carry Only	**2.55%**	**2.49%**	**1.03**
Macro Adjusted	**2.59%**	**2.47%**	**1.05**

- Allocate portfolio weights according to carry signal
- Risk comparable to EW index
- Positive information ratio relative to both EW and MW indices
- All USD hedged returns in excess of 1M Libor

Tracking Error (2001-2016)

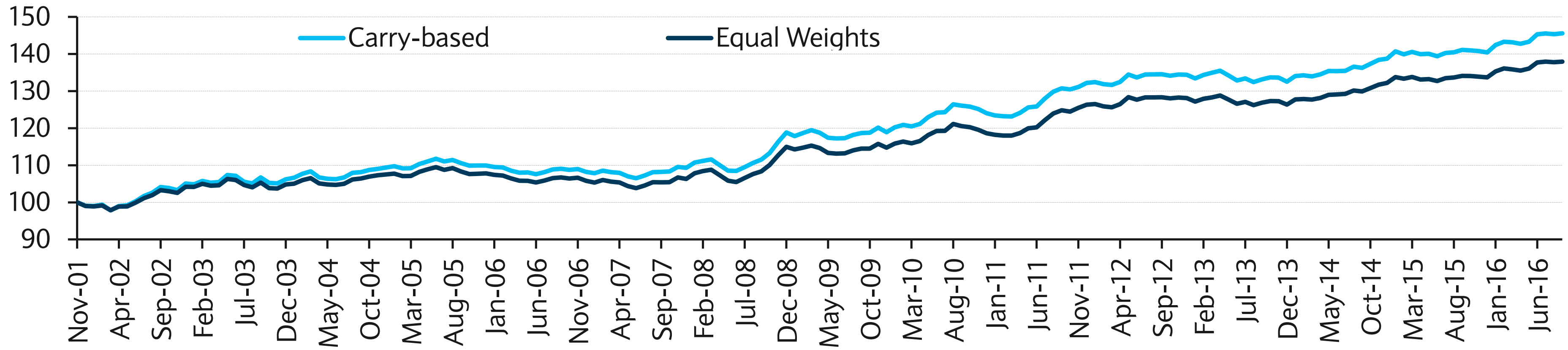
	Avg (%/y)	Vol.(%/y)	I.R.
Carry only			
over MW	0.51%	0.89%	0.58
over EW	**0.35%**	**0.35%**	**1.02**
Macro Adjusted			
over MW	0.55%	0.92%	0.60
over EW	**0.39%**	**0.34%**	**1.17**

Source: Barclays Research; Bloomberg Barclays Bond Indices

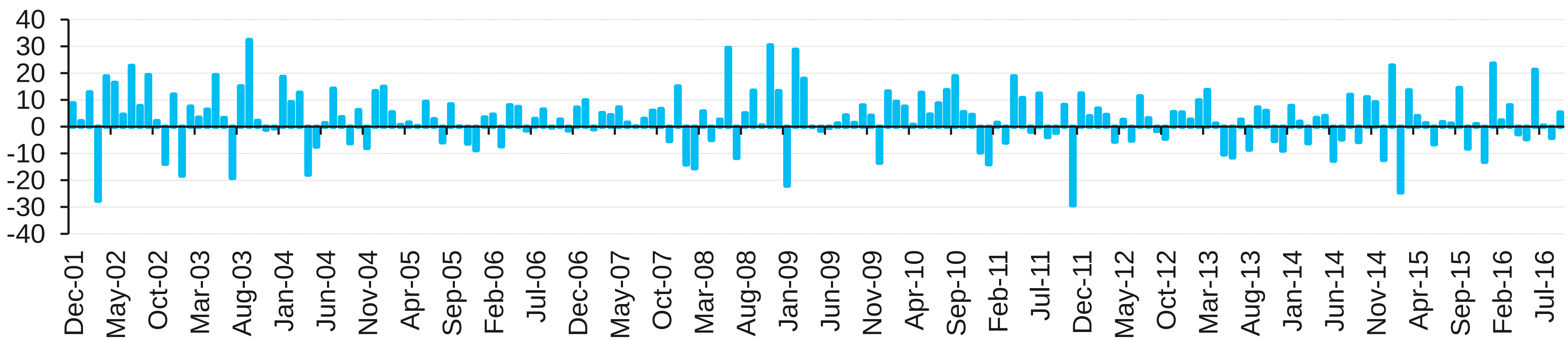
Performance summary of pro-forma 3-7y treasury indices

- Allocate portfolio weights according to carry signal

Cumulative performance of 3-7y treasury indices



Monthly tracking errors of carry-based over equal-weighted index (bp)

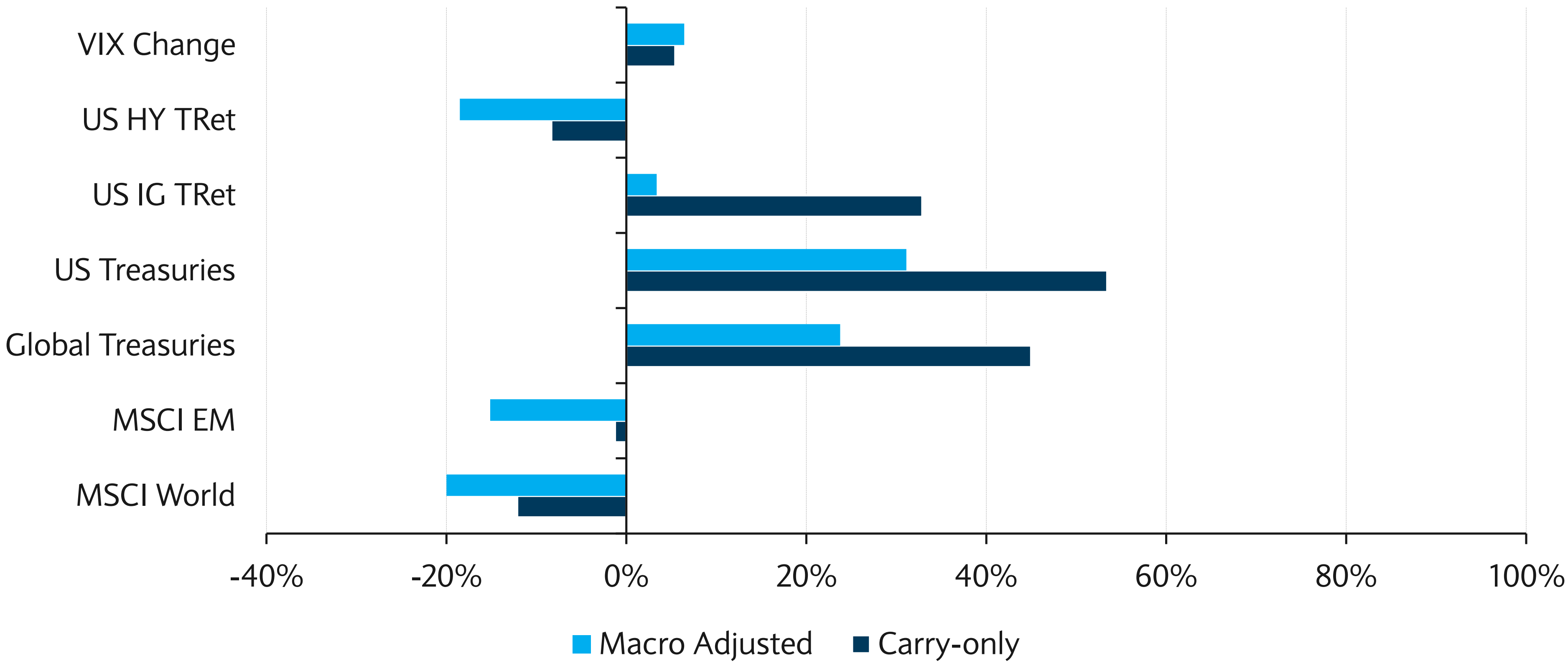


Source: Barclays Research; Bloomberg Barclays Bond Indices

Performance characteristics of global bond portfolios

- Monthly tracking errors remain directional on treasury market returns
    - Even after adjustment for macro variables

Correlations of monthly tracking errors with market indices (2001-2016)



Source: Barclays Research; Bloomberg; Bloomberg Barclays Bond Indices

Conclusion

- A carry strategy based on relative slope of the yield curve could help add value in global rates markets

- Possible applications:
  - Systematic strategies
    - For example, a long-short systematic strategy based on interest rate swaps
  - Benchmark customization for long only portfolios
    - Could represent a “smart beta” in global rates markets

Analyst Certifications and Important Disclosures

Analyst Certification(s)

We, Albert Desclee, Evgeny Katenko and Simon Polbennikov, hereby certify (1) that the views expressed in this research report accurately reflect our personal views about any or all of the subject securities or issuers referred to in this research report and (2) no part of our compensation was, is or will be directly or indirectly related to the specific recommendations or views expressed in this research report.

Important Disclosures:

Barclays Research is a part of the Investment Bank of Barclays Bank PLC and its affiliates (collectively and each individually, "Barclays")

All authors contributing to this research report are Research Analysts unless otherwise indicated. The publication date at the top of the report reflects the local time where the report was produced and may differ from the release date provided in GMT.

Availability of Disclosures:

For current important disclosures regarding any issuers which are the subject of this research report please refer to http://publicresearch.barclays.com or alternatively send a written request to: Barclays Research Compliance, 745 Seventh Avenue, 13th Floor, New York, NY 10019 or call +1-212-526-1072.

Barclays Capital Inc. and/or one of its affiliates does and seeks to do business with companies covered in its research reports. As a result, investors should be aware that Barclays may have a conflict of interest that could affect the objectivity of this report. Barclays Capital Inc. and/or one of its affiliates regularly trades, generally deals as principal and generally provides liquidity (as market maker or otherwise) in the debt securities that are the subject of this research report (and related derivatives thereof). Barclays trading desks may have either a long and / or short position in such securities, other financial instruments and / or derivatives, which may pose a conflict with the interests of investing customers. Where permitted and subject to appropriate information barrier restrictions, Barclays fixed income research analysts regularly interact with its trading desk personnel regarding current market conditions and prices. Barclays fixed income research analysts receive compensation based on various factors including, but not limited to, the quality of their work, the overall performance of the firm (including the profitability of the Investment Banking Department), the profitability and revenues of the Markets business and the potential interest of the firm's investing clients in research with respect to the asset class covered by the analyst. To the extent that any historical pricing information was obtained from Barclays trading desks, the firm makes no representation that it is accurate or complete. All levels, prices and spreads are historical and do not represent current market levels, prices or spreads, some or all of which may have changed since the publication of this document. The Investment Bank's Research Department produces various types of research including, but not limited to, fundamental analysis, equity-linked analysis, quantitative analysis, and trade ideas. Recommendations contained in one type of research may differ from recommendations contained in other types of research, whether as a result of differing time horizons, methodologies, or otherwise. In order to access Barclays Statement regarding Research Dissemination Policies and Procedures, please refer to http://publicresearch.barcap.com/static/S_ResearchDissemination.html. In order to access Barclays Research Conflict Management Policy Statement, please refer to: http://publicresearch.barcap.com/static/S_ConflictManagement.html.

All pricing information is indicative only. Prices are sourced from Thomson Reuters as of the last available closing price at the time of production of the research report, unless another time and source is indicated.

Explanation of other types of investment recommendations produced by Barclays FICC Research:

Trade ideas contained herein that have been produced by the Credit teams within Barclays Research are valid at current market conditions and may not be otherwise relied upon.

Trade ideas contained herein that have been produced by other research teams within Barclays FICC Research shall remain open until they are subsequently amended or closed in a future research report.

Disclosure of previous investment recommendations produced by Barclays FICC Research:

Barclays FICC Research may have published other investment recommendations in respect of the same securities/instruments recommended in this research report during the preceding 12 months. To view previous investment recommendations published by Barclays FICC Research in the preceding 12 months please refer to https://live.barcap.com/go/research/ResearchInvestmentRecommendations.

Barclays legal entities involved in publishing research:

Barclays Bank PLC (Barclays, UK)

Barclays Capital Inc. (BCI, US)

Barclays Securities Japan Limited (BSJL, Japan)

Barclays Bank PLC, Hong Kong branch (Barclays Bank, Hong Kong)

Barclays Capital Canada Inc. (BCCI, Canada)

Absa Bank Limited (Absa, South Africa)

Barclays Bank Mexico, S.A. (BBMX, Mexico)

Barclays Securities (India) Private Limited (BSIPL, India)

Barclays Bank PLC, India branch (Barclays Bank, India)

Barclays Bank PLC, Singapore branch (Barclays Bank, Singapore)

Disclaimer

This publication has been produced by the Investment Bank of Barclays Bank PLC and/or one or more of its affiliates (collectively and each individually, "Barclays"). It has been distributed by one or more Barclays legal entities that are a part of the Investment Bank as provided below. It is provided to our clients for information purposes only, and Barclays makes no express or implied warranties, and expressly disclaims all warranties of merchantability or fitness for a particular purpose or use with respect to any data included in this publication. To the extent that this publication states on the front page that it is intended for institutional investors and is not subject to all of the independence and disclosure standards applicable to debt research reports prepared for retail investors under U.S. FINRA Rule 2242, it is an “institutional debt research report” and distribution to retail investors is strictly prohibited. Barclays also distributes such institutional debt research reports to various issuers, regulatory and academic organisations for informational purposes and not for the purpose of making investment decisions regarding any debt securities. Any such recipients that do not want to continue receiving Barclays institutional debt research reports should contact debtresearch@barclays.com. Barclays will not treat unauthorized recipients of this report as its clients and accepts no liability for use by them of the contents which may not be suitable for their personal use. Prices shown are indicative and Barclays is not offering to buy or sell or soliciting offers to buy or sell any financial instrument.

Without limiting any of the foregoing and to the extent permitted by law, in no event shall Barclays, nor any affiliate, nor any of their respective officers, directors, partners, or employees have any liability for (a) any special, punitive, indirect, or consequential damages; or (b) any lost profits, lost revenue, loss of anticipated savings or loss of opportunity or other financial loss, even if notified of the possibility of such damages, arising from any use of this publication or its contents.

Other than disclosures relating to Barclays, the information contained in this publication has been obtained from sources that Barclays Research believes to be reliable, but Barclays does not represent or warrant that it is accurate or complete. Barclays is not responsible for, and makes no warranties whatsoever as to, the information or opinions contained in any written, electronic, audio or video presentations of third parties that are accessible via a direct hyperlink in this publication or via a hyperlink to a third-party web site (‘Third-Party Content’). Any such Third-Party Content has not been adopted or endorsed by Barclays, does not represent the views or opinions of Barclays, and is not incorporated by reference into this publication. Third-Party Content is provided for information purposes only and Barclays has not independently verified its accuracy or completeness.

The views in this publication are those of the author(s) and are subject to change, and Barclays has no obligation to update its opinions or the information in this publication. If this publication contains recommendations, those recommendations reflect solely and exclusively those of the authoring analyst(s), and such opinions were prepared independently of any other interests, including those of Barclays and/or its affiliates. This publication does not constitute personal investment advice or take into account the individual financial circumstances or objectives of the clients who receive it. The securities discussed herein may not be suitable for all investors. Barclays recommends that investors independently evaluate each issuer, security or instrument discussed herein and consult any independent advisors they believe necessary. The value of and income from any investment may fluctuate from day to day as a result of changes in relevant economic markets (including changes in market liquidity). The information herein is not intended to predict actual results, which may differ substantially from those reflected. Past performance is not necessarily indicative of future results.

This document is being distributed (1) only by or with the approval of an authorised person (Barclays Bank PLC) or (2) to, and is directed at (a) persons in the United Kingdom having professional experience in matters relating to investments and who fall within the definition of "investment professionals" in Article 19(5) of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005 (the "Order"); or (b) high net worth companies, unincorporated associations and partnerships and trustees of high value trusts as described in Article 49(2) of the Order; or (c) other persons to whom it may otherwise lawfully be communicated (all such persons being "Relevant Persons"). Any investment or investment activity to which this communication relates is only available to and will only be engaged in with Relevant Persons. Any other persons who receive this communication should not rely on or act upon it. Barclays Bank PLC is authorised by the Prudential Regulation Authority and regulated by the Financial Conduct Authority and the Prudential Regulation Authority and is a member of the London Stock Exchange.

The Investment Bank of Barclays Bank PLC undertakes U.S. securities business in the name of its wholly owned subsidiary Barclays Capital Inc., a FINRA and SIPC member. Barclays Capital Inc., a U.S. registered broker/dealer, is distributing this material in the United States and, in connection therewith accepts responsibility for its contents. Any U.S. person wishing to effect a transaction in any security discussed herein should do so only by contacting a representative of Barclays Capital Inc. in the U.S. at 745 Seventh Avenue, New York, New York 10019.

Non-U.S. persons should contact and execute transactions through a Barclays Bank PLC branch or affiliate in their home jurisdiction unless local regulations permit otherwise.

Barclays Bank PLC, Paris Branch (registered in France under Paris RCS number 381 066 281) is regulated by the Autorité des marchés financiers and the Autorité de contrôle prudentiel. Registered office 34/36 Avenue de Friedland 75008 Paris.

This material is distributed in Canada by Barclays Capital Canada Inc., a registered investment dealer, a Dealer Member of IIROC (www.iiroc.ca), and a Member of the Canadian Investor Protection Fund (CIPF).

Subject to the conditions of this publication as set out above, the Corporate & Investment Banking Division of Absa Bank Limited, an authorised financial services provider (Registration No.: 1986/004794/06. Registered Credit Provider Reg No NCRCP7), is distributing this material in South Africa. Absa Bank Limited is regulated by the South African Reserve Bank. This publication is not, nor is it intended to be, advice as defined and/or contemplated in the (South African) Financial Advisory and Intermediary Services Act, 37 of 2002, or any other financial, investment, trading, tax, legal, accounting, retirement, actuarial or other professional advice or service whatsoever. Any South African person or entity wishing to effect a transaction in any security discussed herein should do so only by contacting a representative of the Corporate & Investment Banking Division of Absa Bank Limited in South Africa, 15 Alice Lane, Sandton, Johannesburg, Gauteng 2196. Absa Bank Limited is a member of the Barclays group.

Disclaimer (continued)

All research reports are distributed to institutional investors in Japan by Barclays Securities Japan Limited. Barclays Securities Japan Limited is a joint-stock company incorporated in Japan with registered office of 6-10-1 Roppongi, Minato-ku, Tokyo 106-6131, Japan. It is a subsidiary of Barclays Bank PLC and a registered financial instruments firm regulated by the Financial Services Agency of Japan. Registered Number: Kanto Zaimukyokucho (kinsho) No. 143.

Barclays Bank PLC, Hong Kong Branch is distributing this material in Hong Kong as an authorised institution regulated by the Hong Kong Monetary Authority. Registered Office: 41/F, Cheung Kong Center, 2 Queen's Road Central, Hong Kong.

All Indian securities-related research and other equity research produced by the Investment Bank are distributed in India by Barclays Securities (India) Private Limited (BSIPL). BSIPL is a company incorporated under the Companies Act, 1956 having CIN U67120MH2006PTC161063. BSIPL is registered and regulated by the Securities and Exchange Board of India (SEBI) as a Research Analyst: INH000001519; Portfolio Manager INP000002585; Stock Broker/Trading and Clearing Member: National Stock Exchange of India Limited (NSE) Capital Market INB231292732, NSE Futures & Options INF231292732, NSE Currency derivatives INE231450334, Bombay Stock Exchange Limited (BSE) Capital Market INB011292738, BSE Futures & Options INF011292738; Depository Participant (DP) with the National Securities & Depositories Limited (NSDL): DP ID: IN-DP-NSDL-299-2008; Investment Adviser: INA000000391. The registered office of BSIPL is at 208, Ceejay House, Shivsagar Estate, Dr. A. Besant Road, Worli, Mumbai – 400 018, India. Telephone No: +91 2267196000. Fax number: +91 22 67196100. Any other reports produced by the Investment Bank are distributed in India by Barclays Bank PLC, India Branch, an associate of BSIPL in India that is registered with Reserve Bank of India (RBI) as a Banking Company under the provisions of The Banking Regulation Act, 1949 (Regn No BOM43) and registered with SEBI as Merchant Banker (Regn No INM000002129) and also as Banker to the Issue (Regn No INBI00000950). Barclays Investments and Loans (India) Limited, registered with RBI as Non Banking Financial Company (Regn No RBI CoR-07-00258), and Barclays Wealth Trustees (India) Private Limited, registered with Registrar of Companies (CIN U93000MH2008PTC188438), are associates of BSIPL in India that are not authorised to distribute any reports produced by the Investment Bank.

Barclays Bank PLC Frankfurt Branch distributes this material in Germany under the supervision of Bundesanstalt für Finanzdienstleistungsaufsicht (BaFin).

This material is distributed in Brazil by Banco Barclays S.A.

This material is distributed in Mexico by Barclays Bank Mexico, S.A.

Barclays Bank PLC in the Dubai International Financial Centre (Registered No. 0060) is regulated by the Dubai Financial Services Authority (DFSA). Principal place of business in the Dubai International Financial Centre: The Gate Village, Building 4, Level 4, PO Box 506504, Dubai, United Arab Emirates. Barclays Bank PLC-DIFC Branch, may only undertake the financial services activities that fall within the scope of its existing DFSA licence. Related financial products or services are only available to Professional Clients, as defined by the Dubai Financial Services Authority.

Barclays Bank PLC in the UAE is regulated by the Central Bank of the UAE and is licensed to conduct business activities as a branch of a commercial bank incorporated outside the UAE in Dubai (Licence No.: 13/1844/2008, Registered Office: Building No. 6, Burj Dubai Business Hub, Sheikh Zayed Road, Dubai City) and Abu Dhabi (Licence No.: 13/952/2008, Registered Office: Al Jazira Towers, Hamdan Street, PO Box 2734, Abu Dhabi).

Barclays Bank PLC in the Qatar Financial Centre (Registered No. 00018) is authorised by the Qatar Financial Centre Regulatory Authority (QFCRA). Barclays Bank PLC-QFC Branch may only undertake the regulated activities that fall within the scope of its existing QFCRA licence. Principal place of business in Qatar: Qatar Financial Centre, Office 1002, 10th Floor, QFC Tower, Diplomatic Area, West Bay, PO Box 15891, Doha, Qatar. Related financial products or services are only available to Business Customers as defined by the Qatar Financial Centre Regulatory Authority.

This material is distributed in the UAE (including the Dubai International Financial Centre) and Qatar by Barclays Bank PLC.

This material is not intended for investors who are not Qualified Investors according to the laws of the Russian Federation as it might contain information about or description of the features of financial instruments not admitted for public offering and/or circulation in the Russian Federation and thus not eligible for non-Qualified Investors. If you are not a Qualified Investor according to the laws of the Russian Federation, please dispose of any copy of this material in your possession.

This material is distributed in Singapore by the Singapore branch of Barclays Bank PLC, a bank licensed in Singapore by the Monetary Authority of Singapore. For matters in connection with this report, recipients in Singapore may contact the Singapore branch of Barclays Bank PLC, whose registered address is 10 Marina Boulevard, #23-01 Marina Bay Financial Centre Tower 2, Singapore 018983.

This material is distributed to persons in Australia by Barclays Bank plc. Barclays Bank plc does not hold an Australian financial services licence and instead relies on an exemption. This material is intended to only be distributed to “wholesale clients” as defined by the Australian Corporations Act 2001.

IRS Circular 230 Prepared Materials Disclaimer: Barclays does not provide tax advice and nothing contained herein should be construed to be tax advice. Please be advised that any discussion of U.S. tax matters contained herein (including any attachments) (i) is not intended or written to be used, and cannot be used, by you for the purpose of avoiding U.S. tax-related penalties; and (ii) was written to support the promotion or marketing of the transactions or other matters addressed herein. Accordingly, you should seek advice based on your particular circumstances from an independent tax advisor.

BRCF2242