

BLACKROCK®

Factor-Based Investing

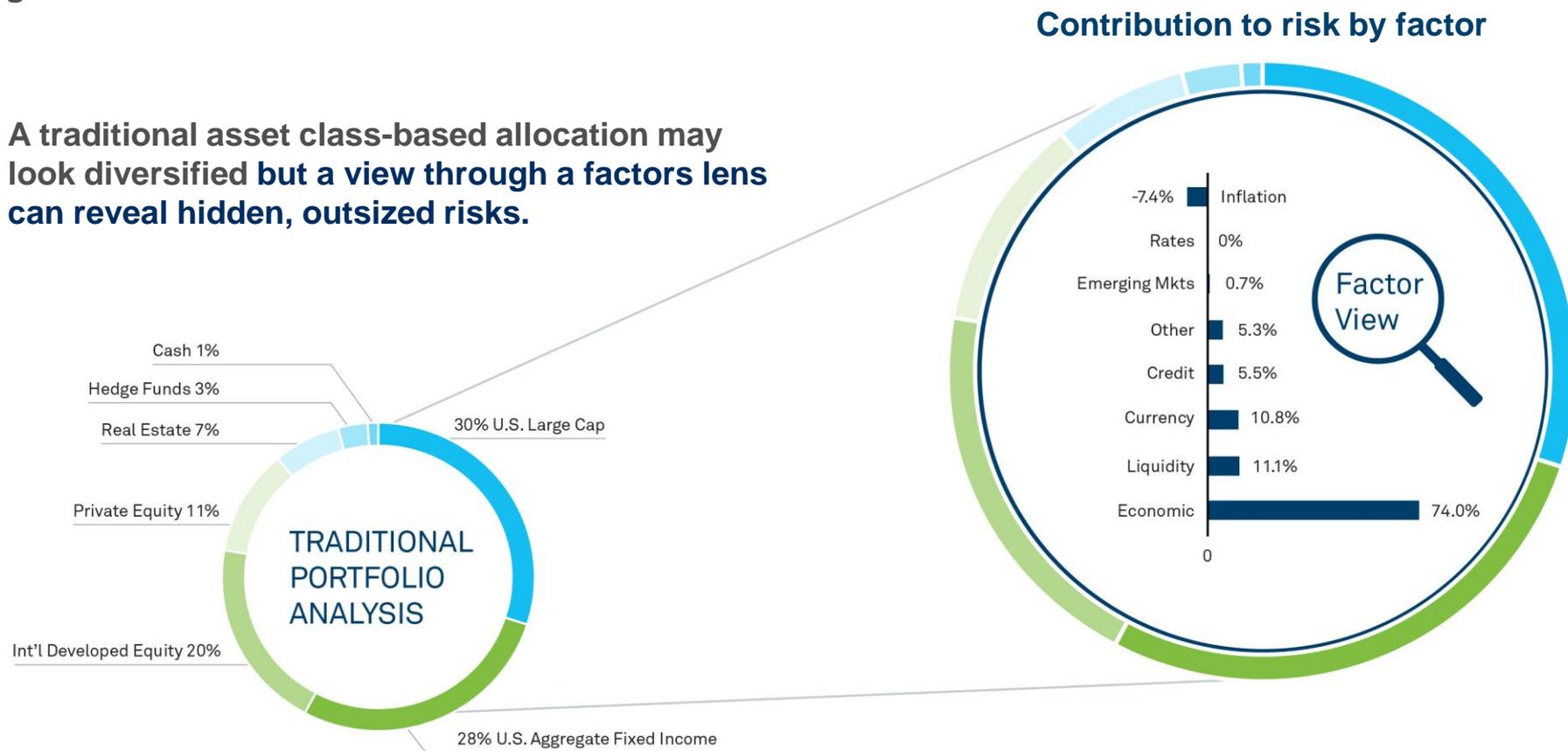
October 2016

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Traditional balanced portfolios may not be as balanced as you think

Factor investing provides an alternative view from traditional portfolio analysis of what is really driving growth and risk, often offering greater clarity as to hidden opportunities — or risks — in a given investment mix.

A traditional asset class-based allocation may look diversified but a view through a factors lens can reveal hidden, outsized risks.



Sample allocations are for illustrative purposes only and should not be construed as a recommended portfolio allocation.

Factor-based investing

Factors are *broad, persistent drivers of return*

- ▶ Historically have earned long run returns within and across asset classes*
- ▶ Many rewarded factors are under-represented in investor portfolios

Factor-based investing targets these intuitive investment styles

- ▶ Takes advantage of economic insight, diversification, and efficient execution
- ▶ Leverages advancements in data and technology



Investors can apply factor-based investing in various ways



Asset allocation

Strategic asset allocation at the enterprise level



Investment strategies

Deliberately target rewarded factors to seek to deliver returns and outcomes



Manager Selection

Common language to evaluate managers' aggregate exposures and return drivers

* Bender, Jennifer, Briand, Remy, Melas, Dimitris, and Raman Aylur Subramanian (2013), "Foundations of Factor Investing", MSCI Research Insight

Risk factors vs investment factors

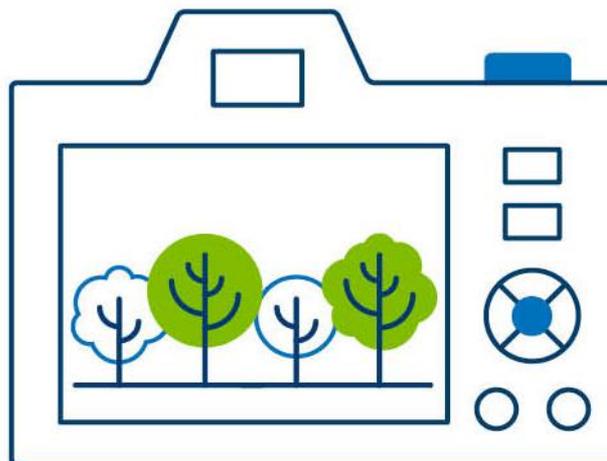
Risk Management Factors



RISK MANAGEMENT FACTORS
ZOOM IN ON THE TINIEST DETAIL

- ▶ Tend to be narrow
- ▶ Nuanced and specific
- ▶ Utilized to help mitigate risk exposures and control losses

Investment Factors



INVESTMENT FACTORS ZOOM OUT
TO THE BIGGER PICTURE

- ▶ Few
- ▶ Broad
- ▶ Persistent
- ▶ Utilized to seek long-term premia

“Investment” factors defined

Factors are *broad, persistent drivers of return*

- ▶ Historically have earned long run returns within and across asset classes*
- ▶ Many rewarded factors are under-represented in client portfolios



Macro Factors:
a reward for bearing systematic risks



- ▶ Economic Growth
- ▶ Credit
- ▶ Inflation
- ▶ Real rates
- ▶ Liquidity
- ▶ Emerging Markets

Style Factors:
a risk premium, structural impediment or behavioral anomaly



- ▶ Value
- ▶ Momentum
- ▶ Quality
- ▶ Size
- ▶ Low Volatility
- ▶ Carry
- ▶ Curve

Alpha:

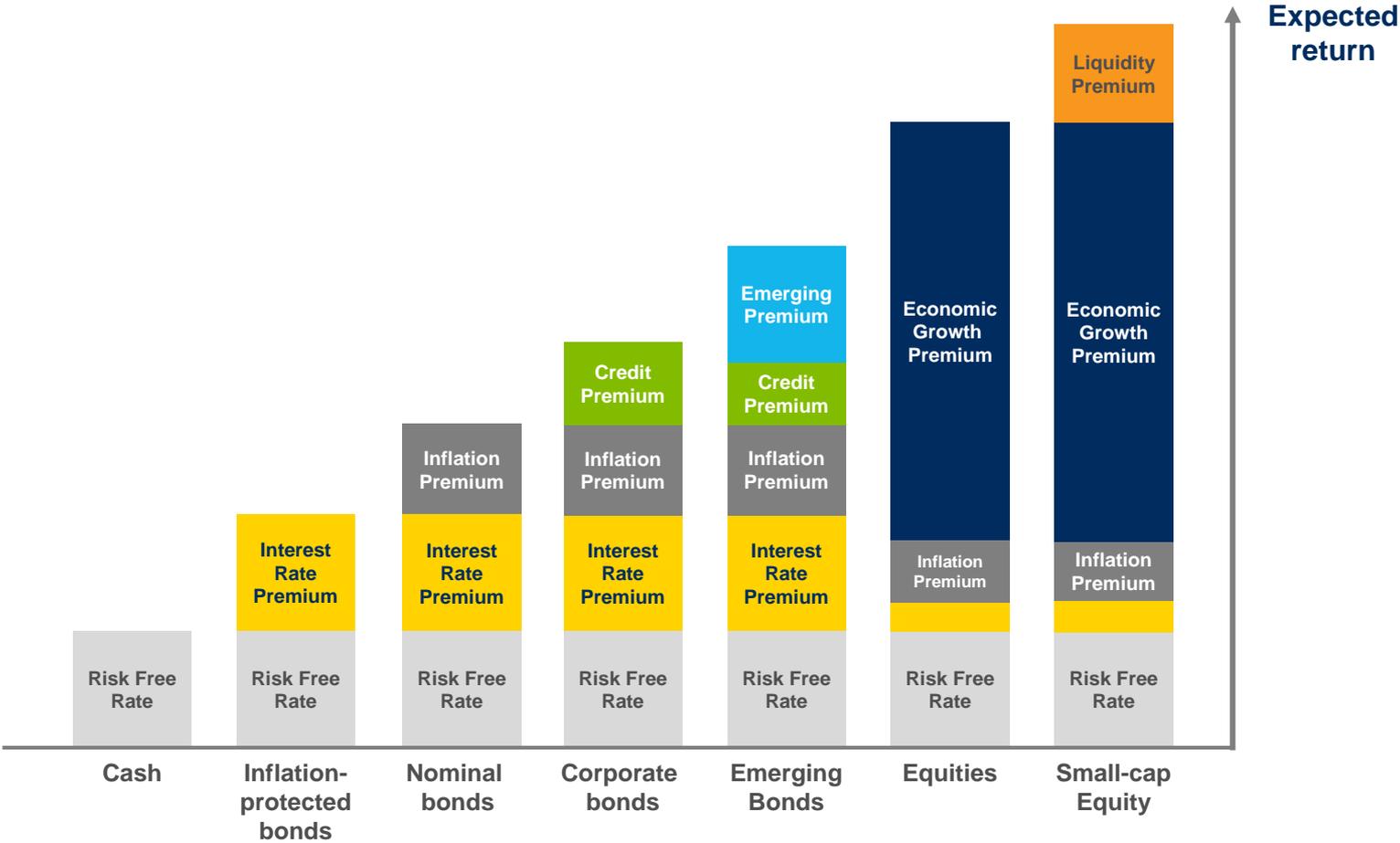
Only managers with skill have historically generated consistently positive returns

- ▶ Security selection
- ▶ Country and industry selection
- ▶ Market and factor timing

*Bender, Jennifer, Briand, Remy, Melas, Dimitris, and Raman Aylur Subramanian (2013), “Foundations of Factor Investing”, MSCI Research Insight.

Asset classes are bundled risk premiums (macro factors)

Sample risk factor decomposition of typical liquid asset classes held in investor portfolios



Risk factor decomposition of selected asset classes

For illustrative purposes only

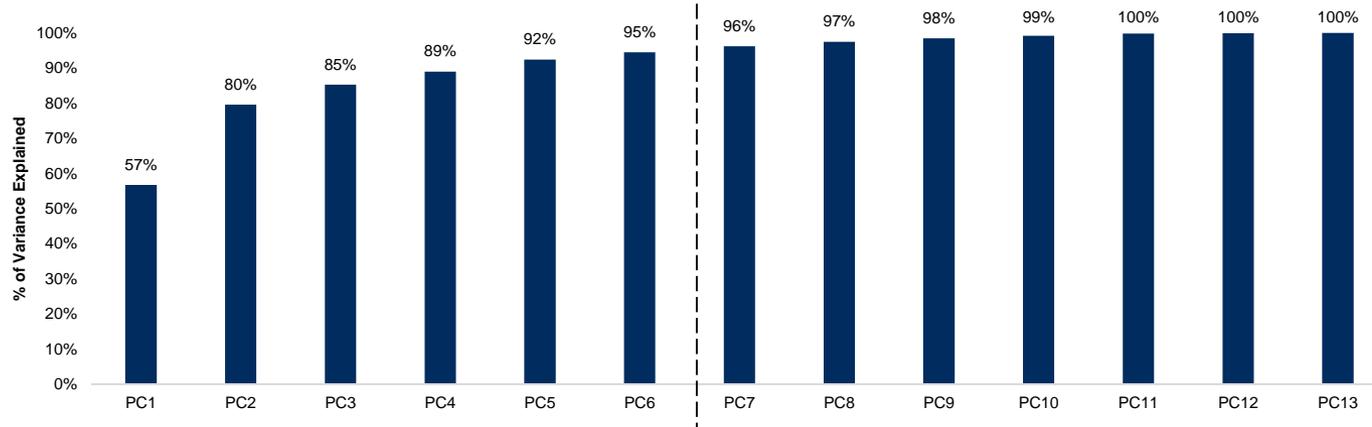
Diversifying beyond growth

Multiple sources of risk premium harvested through the multitude of asset classes

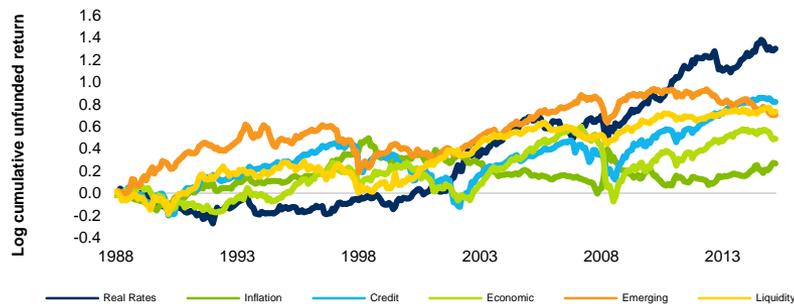
	Growth	Equities, Property, and Commodities
	Real Rates	Global Developed Market Inflation Linked Bonds
	Inflation	Sovereign Developed Market Bonds
	Credit	Investment Grade and High Yield Spreads
	Emerging Markets	Emerging Market Debt & Equities
	Liquidity	Small Cap Equities and Volatility

Factors can provide a more efficient way to harvest macroeconomic risk premia

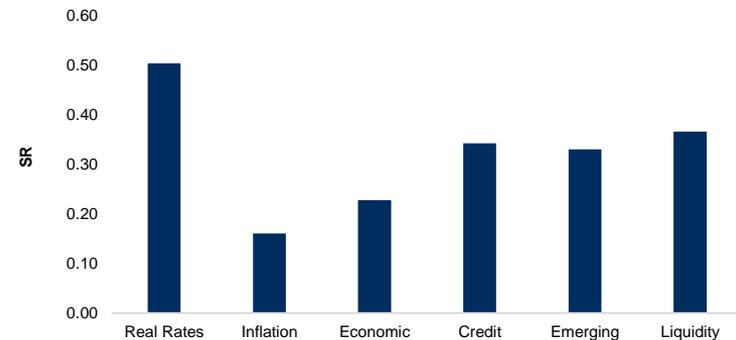
A small number of factors explain a large proportion of variability across asset classes



Macro factors are persistent return drivers ...



... and have comparable risk adjusted returns.

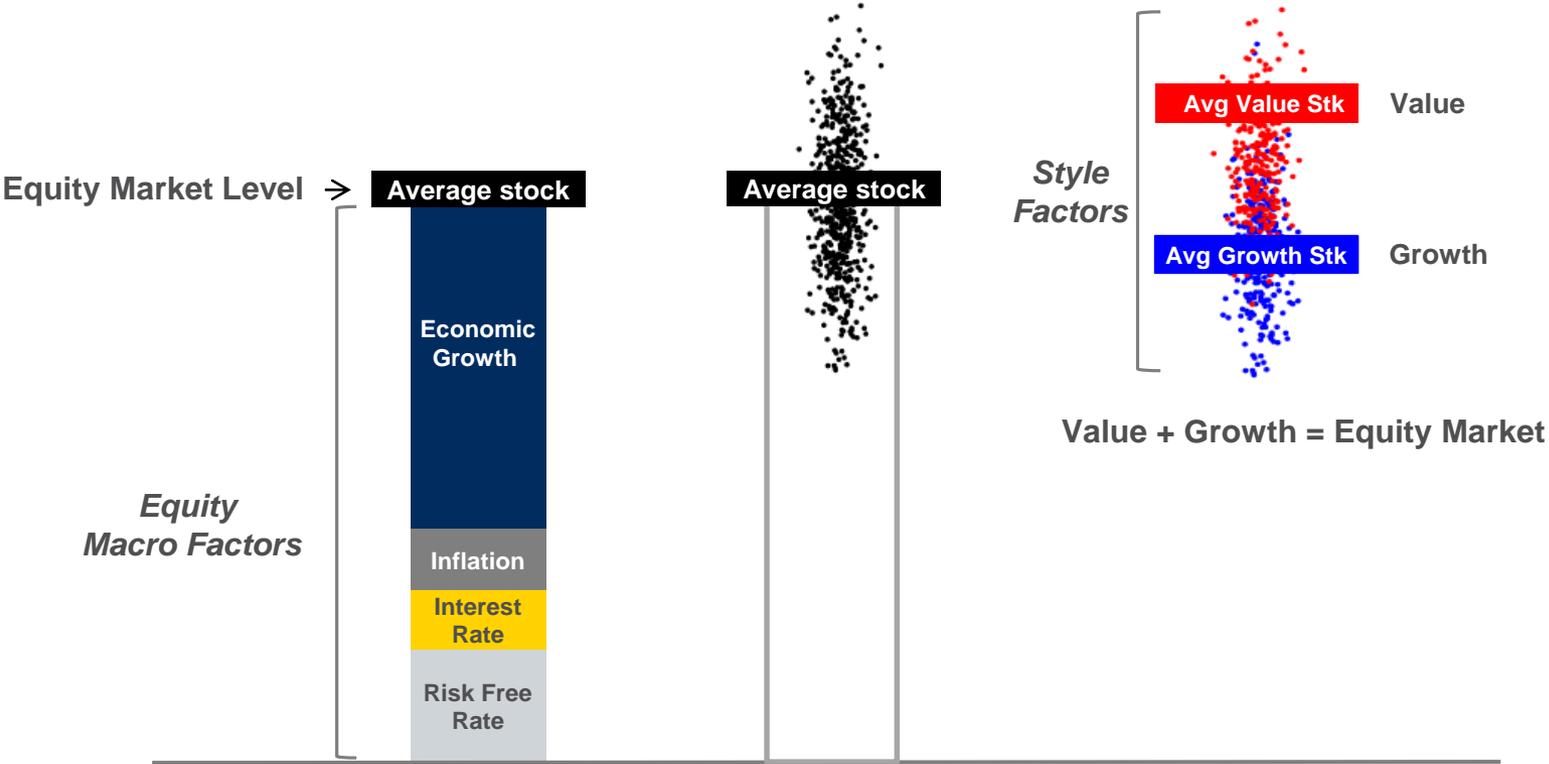


Source: BlackRock. Past performance is not a reliable indicator of future performance. The top chart is a principal component analysis of the covariance matrix of monthly returns for 13 global asset classes (Inflation Linked Debt, Developed Sovereign Debt, IG Debt, EM Sovereign Debt, HY Debt, Developed Equity, Developed Small Cap Equity, EM Equity, Private Equity, Infrastructure, Property, Commodities ex-Energy, and Energy Commodities) from 1997.01 to 2015.09. Risk adjusted returns (lower right) are computed over the same period as the cumulative performance plot shown lower left (1988.08-2015.09).

Style factors seek to build on macro factors to capture return dispersion

Macro factors determine *levels*

Style factors determine *dispersion*



Source: BlackRock, illustrative purposes only

Why have factors earned long-run returns?

Factor premiums exist mainly due to three key reasons:



Risk Premium

- ▶ Uncertainty of investment payoff
- ▶ Potential for rare but substantial losses



Market Structure Impediment

- ▶ Benchmarks and return targets
- ▶ Leverage constraints
- ▶ Credit ratings and maturity constraints
- ▶ Non-economic participants

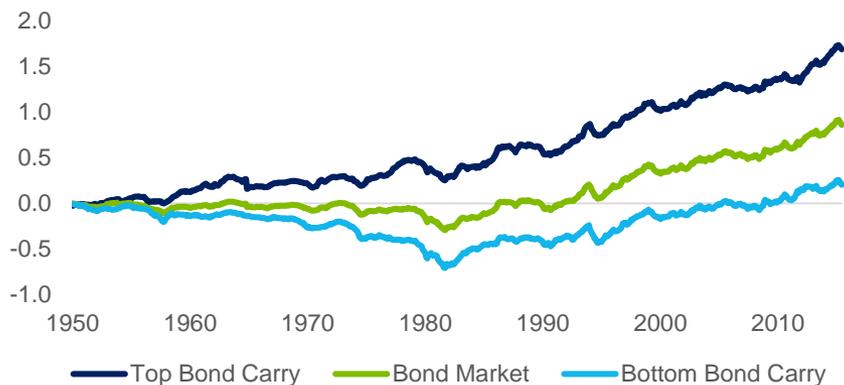


Behavioral Anomaly

- ▶ Lottery-seeking preferences
- ▶ Irrational emphasis on earnings vs. cash flows
- ▶ Slow information dissemination
- ▶ Positive Feedback Trading

Style factor investing evidence: generic carry and momentum in government bonds

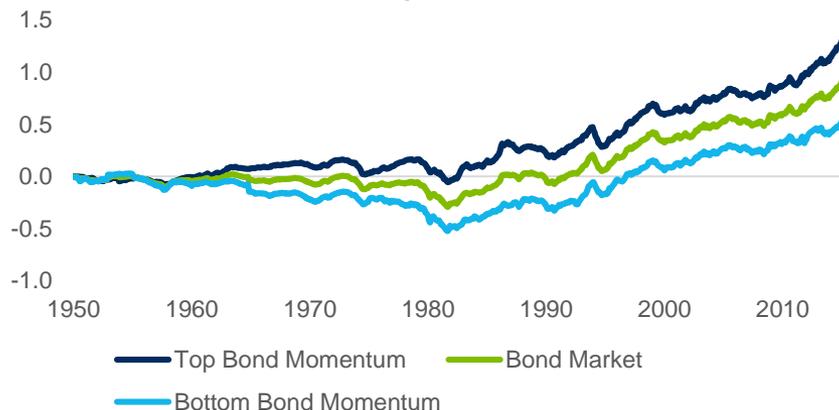
High carry has outperformed low carry in bonds



Long/Short strategies generate more consistent, uncorrelated returns



Recent winners outperform recent losers

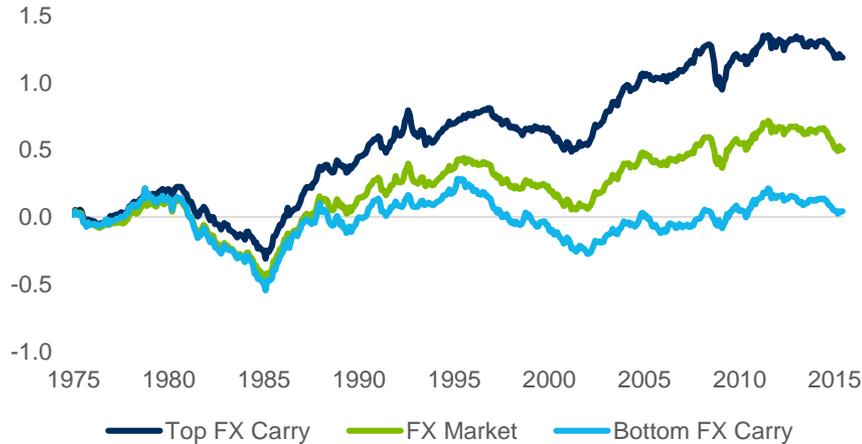


	SR	Corr. w/ Bond Market
Long/Short Bond Carry	0.62	0.12
Top Bond Carry	0.64	0.85
Bottom Bond Carry	0.10	0.85
Long/Short Bond Momentum	0.34	-0.01
Top Bond Momentum	0.52	0.88
Bottom Bond Momentum	0.22	0.90
Bond Market	0.41	1.00

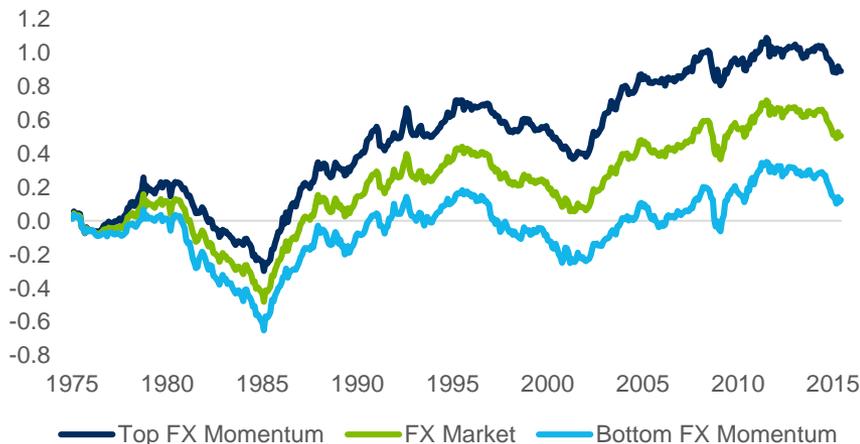
Source: Global Financial Data, BlackRock calculations. Countries include Australia, Austria, Belgium, Canada, Denmark, France, Germany, Italy, Japan, Netherlands, Norway, Spain, Sweden, Switzerland, UK, USA, Finland, New Zealand, and Portugal. Returns are GFD 10 year bond total return indices. "Bond Market" is an equal weighted basket of all available indices. "Top Carry" and "Bottom Carry" are equal weighted portfolios of the top half and bottom half of available indices sorted by difference between the 10 year bond yield and 3-month t-bill yield, respectively. "Top Momentum" and "Bottom Momentum" are equal weighted portfolios of the top half and bottom half of available indices sorted by returns over the prior 12 months (excluding the most recent month), respectively. Long/short strategies are long the top half and short the bottom half, scaled to unit gearing. Portfolios are rebalanced monthly. All graphs are log cumulative unfunded returns. Portfolios are hypothetical and do not represent an actual investment.

Style factor investing evidence: generic carry and momentum in FX

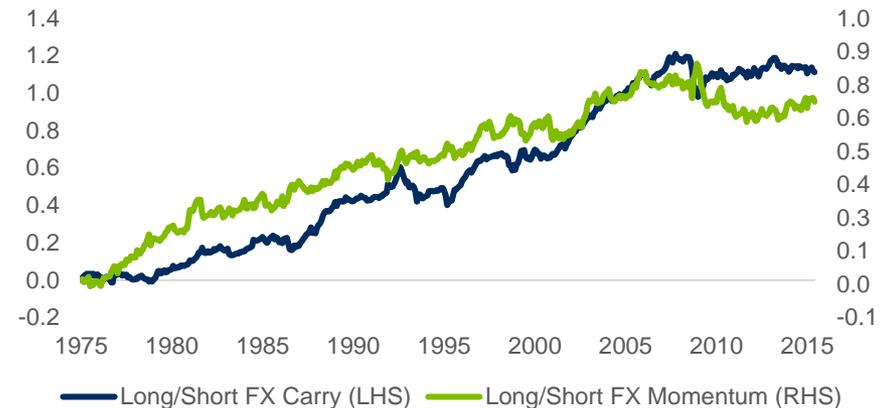
High carry has outperformed lower carry in FX



Recent winners outperform recent losers in FX



Long/short strategies generate more consistent, uncorrelated returns

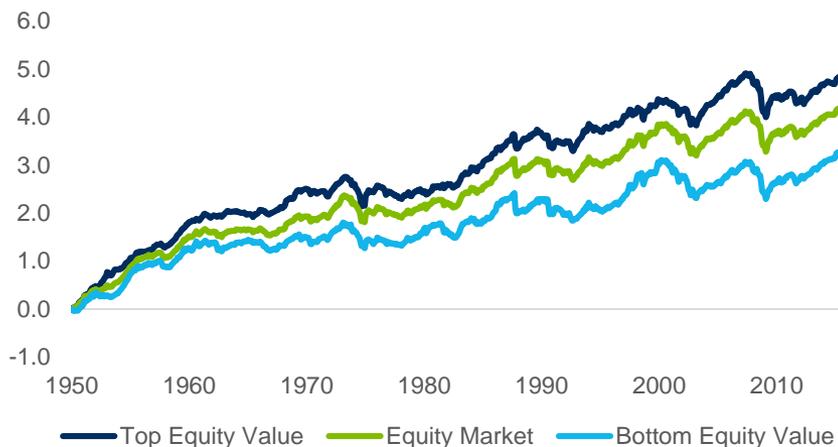


	<u>SR</u>	<u>Corr. w/ FX Market</u>
Long/Short FX Carry	0.55	0.14
Top FX Carry	0.37	0.96
Bottom FX Carry	0.05	0.95
Long/Short FX Momentum	0.35	-0.02
Top FX Momentum	0.29	0.95
Bottom FX Momentum	0.08	0.95
FX Market	0.19	1.00

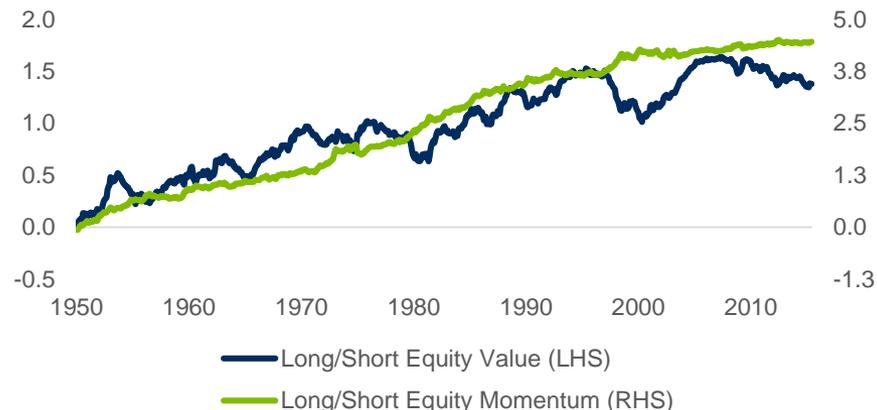
Source: Global Financial Data. GFD tickers can be found on slide 19. Countries include Australia, Austria, Belgium, Canada, Denmark, France, Germany, Italy, Japan, Netherlands, Norway, Singapore, Spain, Sweden, Switzerland, UK, Finland, New Zealand, and Portugal, all versus the USD. Euro members are replaced by the Euro in 1999.01. Returns include spot returns and 3-month t-bill return differentials. "FX Market" is an equal weighted basket of all available currencies. BlackRock calculations of "Top Carry" and "Bottom Carry" are equal weighted portfolios of the top half and bottom half of available currencies sorted by their 3-month t-bill differential versus the USA, respectively. "Top Momentum" and "Bottom Momentum" are equal weighted portfolios of the top half and bottom half of available currencies sorted by returns over the prior 12 months (excluding the most recent month), respectively. Long/short strategies are long the top half and short the bottom half, scaled to unit gearing. Portfolios are rebalanced monthly. All graphs are log cumulative unfunded returns. Portfolios are hypothetical and do not represent an actual investment.

Style factor investing evidence: generic value and momentum in equities

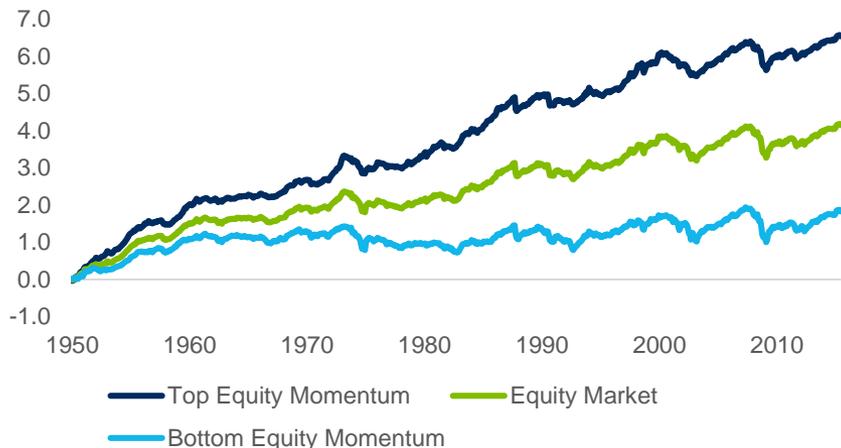
Cheap stocks outperform expensive stocks



Long/short strategies generate more consistent, uncorrelated returns



Recent winners outperform recent losers

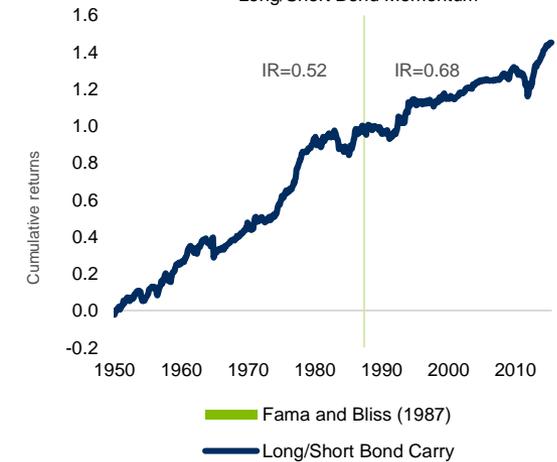
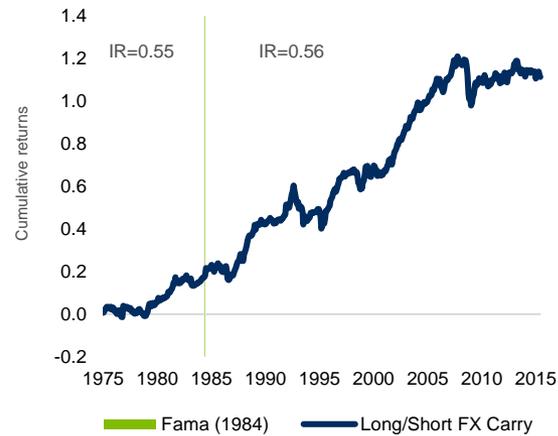
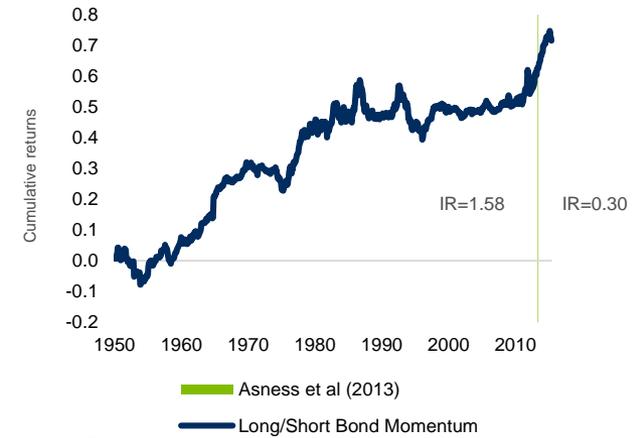
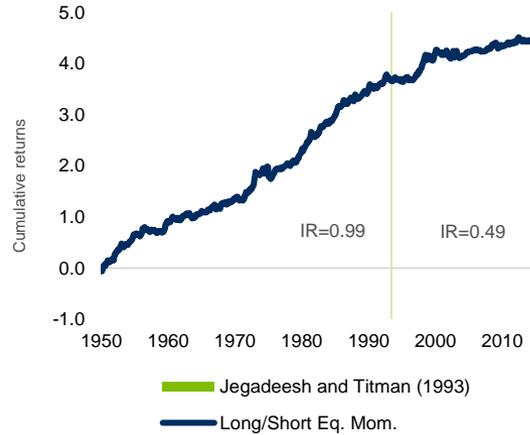
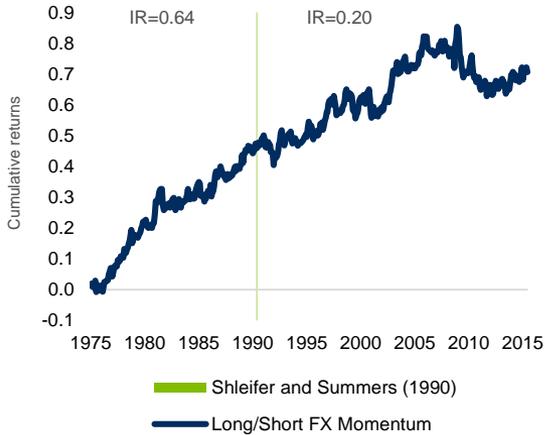


	<u>SR</u>	<u>Corr. w/ Equity Market</u>
Long/Short Equity Value	0.30	0.01
Top Equity Value	0.62	0.94
Bottom Equity Value	0.45	0.95
Long/Short Equity Momentum	0.83	-0.04
Top Equity Momentum	0.83	0.94
Bottom Equity Momentum	0.28	0.95
Equity Market	0.58	1.00

Source: Global Financial Data, Datastream. GFD tickers can be found on slide 19. Countries include Australia, Austria, Belgium, Canada, Denmark, France, Germany, Hong Kong, Italy, Japan, Netherlands, Norway, Singapore, Spain, Sweden, Switzerland, UK, USA, Finland, New Zealand, Ireland, and Portugal. MSCI country indices are used after 1970.01, and GFD Total Return Indices are used prior to 1970.01. "Equity Market" is an equal weighted portfolio of all available indices. BlackRock calculations of "Top Value" and "Bottom Value" are equal weighted portfolios of the top half and bottom half of available indices sorted by B/P after 1970.01 and by dividend yield prior to 1970.01. "Top Momentum" and "Bottom Momentum" are equal weighted portfolios of the top half and bottom half of available indices sorted by returns over the prior 12 months (excluding the most recent month), respectively. Long/short strategies are long the top half and short the bottom half, scaled to unit gearing. Portfolios are rebalanced monthly. All graphs are log cumulative unfunded returns. Portfolios are hypothetical and do not represent an actual investment.

Style factor returns are persistent

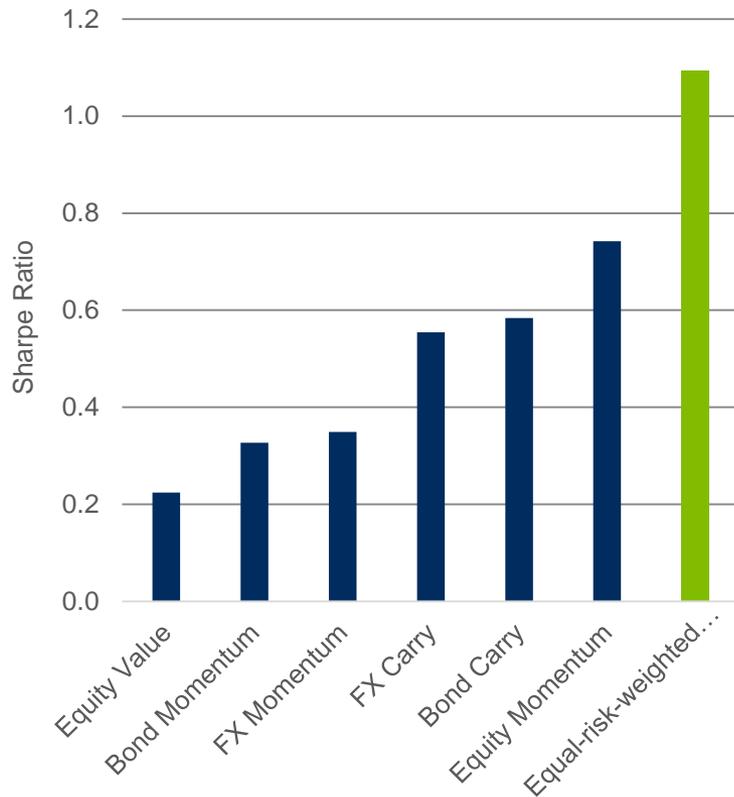
Style factors have continued to endure long after they are well understood by academics and practitioners



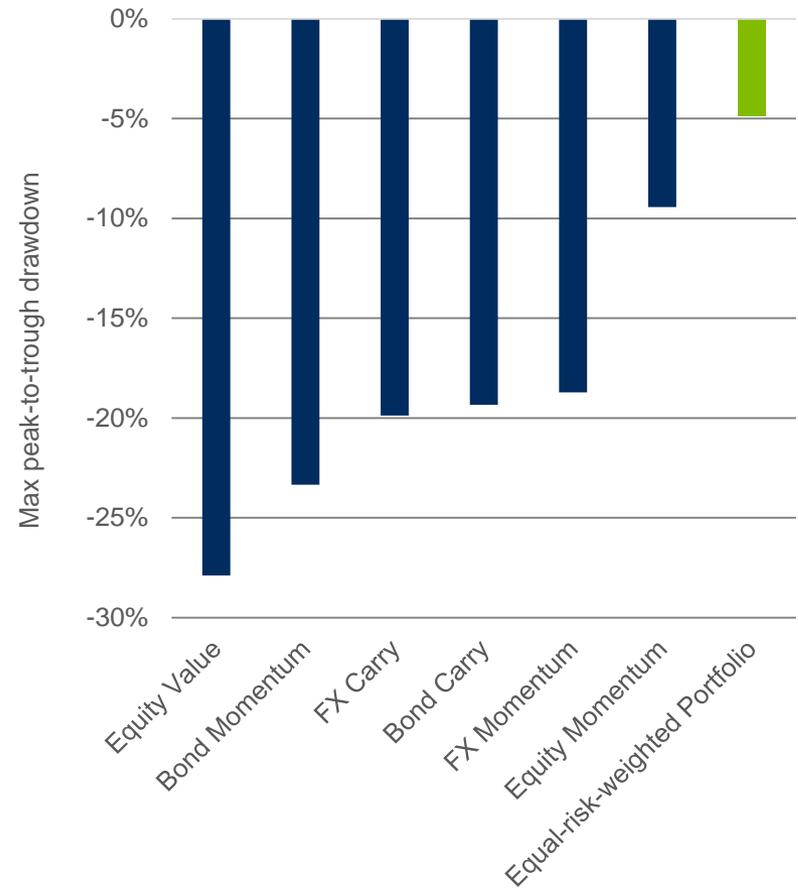
Source, BlackRock, 2015. For illustrative purposes only. Past performance is not a reliable indicator of future performance. Portfolios are hypothetical and do not represent an actual investment. Each one of these return series is computed using the methodology on the previous slides, which is described in the footnote on slides 11-13.

Style factor returns are time-varying and lowly correlated: Diversify!

Diversifying across style factors improves Sharpe Ratios...



... and reduces drawdowns



Note: The portfolios are constructed based on the methodology described in slides 11 - 13. The equal-risk-weighted portfolio is constructed by sizing the allocation to each strategy by the inverse of realized ex-post volatility of the strategy. All portfolios are scaled to 5% ex-post risk for comparability. Portfolios are hypothetical and do not represent an actual investment.

Style Factors have been lowly correlated to traditional asset classes

Style Factors vs. Style Factors Correlations

	Bond Carry	Bond Momentum	Equity Momentum	Equity Value	FX Carry	FX Momentum
Bond Carry						
Bond Momentum	-0.3					
Equity Momentum	-0.1	0.1				
Equity Value	0.2	-0.1	-0.4			
FX Carry	0.2	0.0	0.0	0.2		
FX Momentum	0.0	0.2	0.3	-0.2	0.1	

Style Factors vs. Traditional Asset Class Correlations

	Bond Carry	Bond Momentum	Equity Momentum	Equity Value	FX Carry	FX Momentum
US Treasury	0.0	0.2	0.2	-0.1	-0.1	0.0
HY Spreads	0.1	-0.1	-0.2	0.3	0.5	-0.1
Commodities	0.1	0.0	-0.1	0.2	0.4	-0.1
US Equities	0.1	-0.1	-0.2	0.0	0.4	0.0

Source: Source: Global Financial Data, BlackRock calculations. September 1996 – June, 2015 monthly correlations. Synthetic Beta Regression Indexes: Equities: MSCI World Index – Risk Free Rate, US Treasury: Barclays US Treasury index – Risk Free Rate, HY Spreads: Barclays High Yield Index, and Commodities: GSCI Index– Risk Free Rate. Risk Free Rate is the 1-month TBill return from Ibbotson and Associates.

Summary

1. “Investment” factors are *broad, persistent drivers of returns*
2. Factor-based investing targets these intuitive characteristics
3. Global institutions have recently adopted factors into their asset allocations, investment strategies, and active manager selection process

Appendix:

1. Principle Components Reference
2. Style Factors Appendix
3. Data sources for long-horizon cash, bond, and stock returns on slide 11 to 13
4. Style Factor vs. Macro Correlations

Appendix: Principal Components Reference

Asset Class	Index
Cash	Citigroup 3 Month T-Bills
Inflation Linked Debt (Linkers)	Barclays World Govt Inflation Linked Bond Index TR
Developed Sovereign Debt (Govt Bonds WGBI)	Citigroup WGBI 7-10 Year TR
Investment Grade Debt (Inv Grade Credit)	Barclays Global Aggregate Corporates TR
Emerging Sovereign Debt (EM Debt)	JPMorgan EMBI Plus Composite TR
High Yield Debt (High Yield US)	Barclays US Corporate High Yield TR

Asset Class	Index
Developed Equity (DM Equities)	MSCI World Standard Core Gross Total Return Index
Developed Small Cap Equity (Small Cap)	MSCI World Small Core Gross Total Return Index
Emerging Equity (EM Equities)	MSCI Emerging Market Standard Core Gross Total Return Index
Property	FTSE EPRA/NAREIT TR
Commodities Ex-Energy (Commodities non-energy)	S&P GSCI Non-Energy TR
Energy	S&P GSCI Energy TR

Appendix: Style Factors Appendix

FX Carry and Momentum: Source: Global Financial Data. Countries include Australia, Austria, Belgium, Canada, Denmark, France, Germany, Italy, Japan, Netherlands, Norway, Singapore, Spain, Sweden, Switzerland, UK, Finland, New Zealand, and Portugal, all versus the USD. Euro members are replaced by the Euro in 1999.01. Returns include spot returns and 3-month t-bill return differentials. “FX Market” is an equal weighted basket of all available currencies. BlackRock calculations of “Top Carry” and “Bottom Carry” are equal weighted portfolios of the top half and bottom half of available currencies sorted by their 3-month t-bill differential versus the USA, respectively. “Top Momentum” and “Bottom Momentum” are equal weighted portfolios of the top half and bottom half of available currencies sorted by returns over the prior 12 months (excluding the most recent month), respectively. Long/short strategies are long the top half and short the bottom half, scaled to unit gearing. Portfolios are rebalanced monthly. All graphs are log cumulative unfunded returns. Portfolios are hypothetical and do not represent an actual investment.

FX Equity and Momentum: Source: Global Financial Data, Datastream. Countries include Australia, Austria, Belgium, Canada, Denmark, France, Germany, Hong Kong, Italy, Japan, Netherlands, Norway, Singapore, Spain, Sweden, Switzerland, UK, USA, Finland, New Zealand, Ireland, and Portugal. MSCI country indices are used after 1970.01, and GFD Total Return Indices are used prior to 1970.01. “Equity Market” is an equal weighted portfolio of all available indices. BlackRock calculations of “Top Value” and “Bottom Value” are equal weighted portfolios of the top half and bottom half of available indices sorted by B/P after 1970.01 and by dividend yield prior to 1970.01. “Top Momentum” and “Bottom Momentum” are equal weighted portfolios of the top half and bottom half of available indices sorted by returns over the prior 12 months (excluding the most recent month), respectively. Long/short strategies are long the top half and short the bottom half, scaled to unit gearing. Portfolios are rebalanced monthly. All graphs are log cumulative unfunded returns. Portfolios are hypothetical and do not represent an actual investment.

Bond Carry and Momentum: Source: Global Financial Data, BlackRock calculations. Countries include Australia, Austria, Belgium, Canada, Denmark, France, Germany, Italy, Japan, Netherlands, Norway, Spain, Sweden, Switzerland, UK, USA, Finland, New Zealand, and Portugal. Returns are GFD 10 year bond total return indices. “Bond Market” is an equal weighted basket of all available indices. “Top Carry” and “Bottom Carry” are equal weighted portfolios of the top half and bottom half of available indices sorted by difference between the 10 year bond yield and 3-month t-bill yield, respectively. “Top Momentum” and “Bottom Momentum” are equal weighted portfolios of the top half and bottom half of available indices sorted by returns over the prior 12 months (excluding the most recent month), respectively. Long/short strategies are long the top half and short the bottom half, scaled to unit gearing. Portfolios are rebalanced monthly. All graphs are log cumulative unfunded returns. Portfolios are hypothetical and do not represent an actual investment.

Appendix: Data sources for long-horizon cash, bond, and stock returns on slide 11 to 13.

The data described below is sourced from Global Financial Data.

Country	Stock Total Return Ticker	Stock Total Return Start Date	Bond Total Return Ticker	Bond Total Return Start Date	Bill Total Return Ticker	Bill Total Return Start Date
Australia	_AXJOAD	1882.09	TRAUSGVM	1857.05	TRAUSBIM	1834.10
Austria	_ATXTRD	1969.12	TRAUTGVM	1923.06	TRAUTBIM	1860.06
Belgium	_BCSHD	1950.12	TRBELGVM	1831.11	TRBELBIM	1848.06
Canada	_TRGSPTSE	1933.12	TRCANGVM	1852.12	TRCANBIM	1933.12
Denmark	_OMXCGID	1969.12	TRDNKGVM	1788.08	TRDNKBIM	1863.12
France	TRSBF250D	1895.01	TRFRAGVM	1796.12	TRFRABIM	1800.01
Germany	_CDAXD	1869.12	TRDEUGVM	1923.12	TRDEUBIM	1814.12
Hong Kong	_HSIDVD	1969.12	TRHKGGVM	1993.05	TRHKGBIM	1967.12
Italy	_BCIPRD	1924.12	TRITAGVM	1807.12	TRITABIM	1867.11
Japan	_TOPXDVD	1920.12	TRJPNGVM	1870.04	TRJPNBIM	1882.09
Netherlands	TRNLDSTM	1950.12	TRNLDGVM	1788.08	TRNLDBIM	1813.12
Norway	_NTOTD	1969.12	TRNORGVD	1822.02	_ST1XD	1818.10
Singapore	TRSGPSTM	1969.12	TRSGPGVM	1987.11	TRSGPBIM	1959.03
Spain	_BCNPR30	1940.03	TRESPGVD	1788.08	TRESPBIM	1882.12
Sweden	_OMXSBGI	1918.12	_RXTBD	1868.07	_RXVXD	1835.12
Switzerland	_SSHID	1966.01	_SDGTD	1915.01	TRCHEBIM	1894.12
UK	_TFTASD	1694.08	TRGBRGVM	1932.12	TRGBRBIM	1800.01
United States	_SPXTRD	1800.01	TRUSG10M	1790.10	TRUSABIM	1835.12
Finland	_OMXHGID	1912.10	TRFINGVM	1959.12	TRFINBIM	1866.12
New Zealand	_NZGID	1986.06	TRNZLGVD	1861.09	TRNZLBID	1922.12
Ireland	_IVRTD	1988.01	TRIRLGVM	1897.02	TRIRLBIM	1899.12
Portugal	_BVLGD	1988.01	TRPRTGVM	1975.12	TRPRTBIM	1883.12

Appendix: Style Factor vs. Macro Correlations

	Bond Carry	Bond Momentum	Equity Momentum	Equity Value	FX Carry	FX Momentum
Bond Carry						
Bond Momentum	-0.3					
Equity Momentum	-0.1	0.1				
Equity Value	0.2	-0.1	-0.4			
FX Carry	0.2	0.0	0.0	0.2		
FX Momentum	0.0	0.2	0.3	-0.2	0.1	

	Bond Carry	Bond Momentum	Equity Momentum	Equity Value	FX Carry	FX Momentum
Real	0.0	0.3	0.1	0.0	0.2	0.0
Inflation	-0.1	0.1	0.1	-0.3	-0.4	0.1
Credit	0.0	-0.1	-0.2	0.2	0.4	0.0
Economic	0.1	-0.1	-0.2	0.2	0.6	0.0
Emerging	0.1	-0.1	-0.2	0.3	0.5	0.0
Liquidity	-0.1	0.0	-0.1	0.2	0.2	-0.1

Source: Source: Global Financial Data, BlackRock calculations. September 1996 – June, 2015 monthly correlations. Synthetic Beta Regression Indexes: Equities: MSCI World Index – Risk Free Rate, US Treasury: Barclays US Treasury index – Risk Free Rate, HY Spreads: Barclays High Yield Index, and Commodities: GSCI Index– Risk Free Rate. Risk Free Rate is the 1-month TBill return from Ibbotson and Associates.

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Performance and Fees

Past performance is not a guarantee or a reliable indicator of future results. Certain performance figures do not reflect the deduction of investment management fees, but they do reflect commissions, other expenses (except custody), and reinvestment of earnings. Such fees that a client may incur in the management of their investment advisory account may reduce the client's return. For example, assuming an annual gross return of 8% and an annual management/advisory fee of .40%, the net annualized total return of the portfolio would be 7.58% over a 5-year period. The “net of fees” performance figures reflect the deduction of actual investment advisory fees but do not reflect the deduction of custodial fees. All periods longer than one year are annualized.

Back-tested Index Data

Index returns are for illustrative purposes only and do not represent any actual fund performance. Index performance returns do not reflect any management fees, transaction costs or expenses. Indexes are unmanaged and one cannot invest directly in an index. Past performance does not guarantee future results.

Data for time periods prior to the index inception date is hypothetical and is provided for informational purposes only to indicate historical performance had the index been available over the relevant time period. Hypothetical data results are based on criteria applied retroactively with the benefit of hindsight and knowledge of factors that may have positively affected its performance, and cannot account for risk factors that may affect the actual fund performance. The actual performance of the strategy or fund may vary significantly from the hypothetical index performance due to transaction costs, liquidity or other market factors. Index methodology available upon request.

Indexes

It is not possible to invest directly in an index.

Forecast

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Important notes (cont.)

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