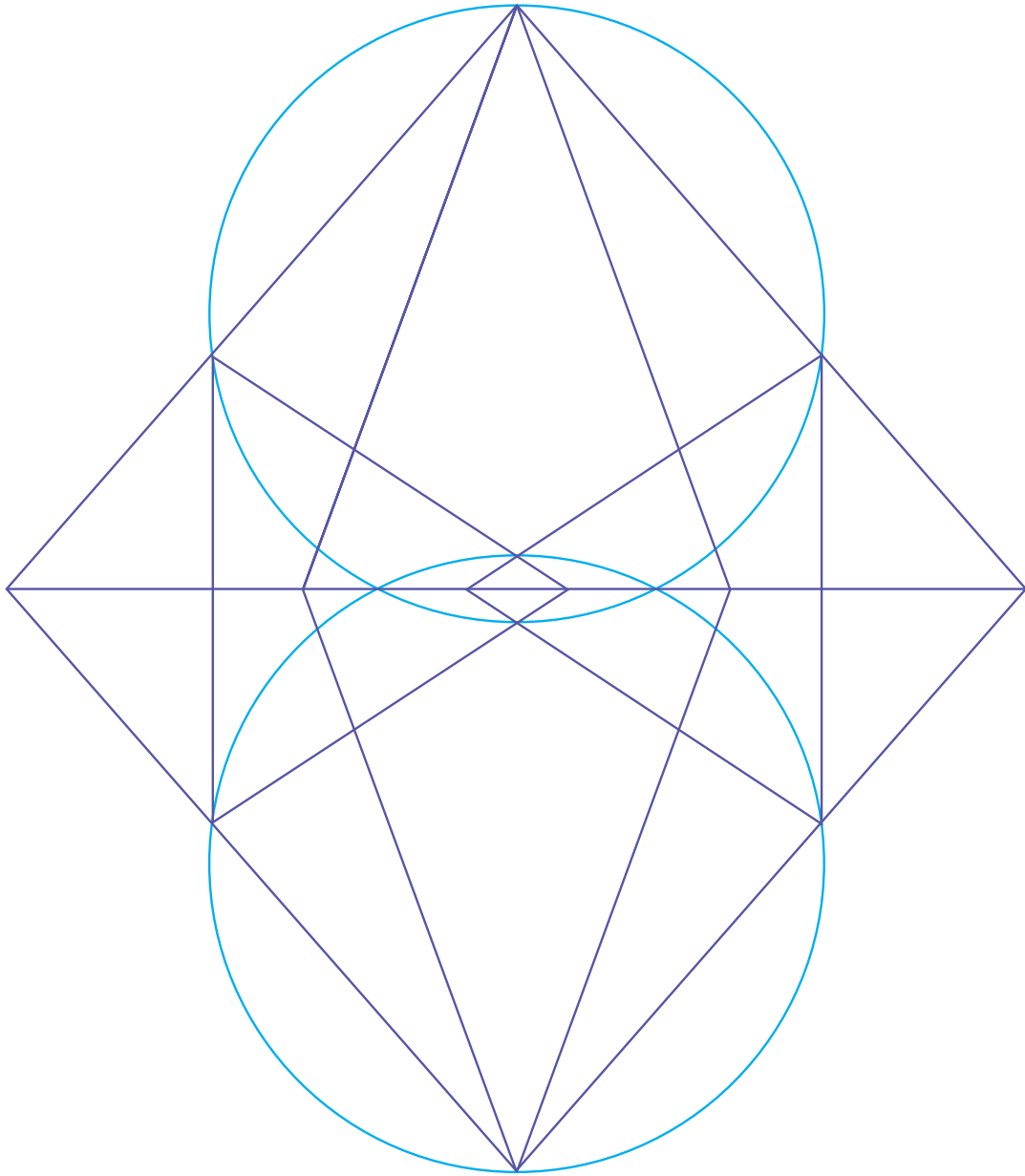




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A Half Century of Macro Momentum



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Executive Summary

I outline a systematic and diversified approach to global macro investing grounded in economic theory, and detail its performance over the last half century. The analysis shows that the strategy has the potential to deliver strong positive returns, low correlation to traditional asset classes across various macroeconomic environments, and to provide diversification in bear equity markets and rising real yield environments. This systematic global macro strategy appears to be a complement to other alternative risk premia — such as trend-following and long-short value, momentum, and carry strategies — and does not appear to be fully exploited by existing global macro managers.

Introduction

“We tend to make money out of surprises... Most surprises unfold gradually”— David Harding, CEO and Founder of Winton Capital Management¹

Macroeconomic forces affect the geopolitical landscape and markets alike, and investors savvy enough to take advantage of macroeconomic developments have historically been able to generate strong returns. Whether it is George Soros betting big against the British pound in 1992, Paul Tudor Jones predicting Black Monday in 1987, or John Paulson foreseeing the bursting of the subprime mortgage bubble, successful managers have been able to read and profit from the underlying macroeconomic drivers that move markets. Global macro strategies currently command about 20% of total hedge fund assets, alluring investors with strong historical performance and their perceived ability to generate returns across a variety of market environments.^{2,3} For example, global macro was one of the few hedge fund strategies to perform positively during the Global Financial Crisis.⁴ Yet, the global macro investment landscape is extremely heterogeneous. While some managers, like the aforementioned Soros, Jones, and Paulson have employed “big picture” forecasting to determine positions and are willing to take large and unhedged bets, others search for relative value opportunities across

markets using more technical themes like *carry* and *trend*.

In this paper I present a systematic and diversified approach to global macro investing grounded in economic theory. In the spirit of Harding’s quote, the strategy aims to capitalize on the tendency of market participants to underreact to news by positioning on the basis of fundamental macroeconomic trends across currency, equity and fixed income markets.⁵

Using historical data from a number of sources, I build a simple systematic global macro strategy back to 1970,⁶ a nearly half-century long sample containing a wide variety of macroeconomic and financial market environments. I examine the strategy’s performance decade-by-decade, its correlation to traditional asset classes, and its returns in bull and bear equity and fixed income environments. I also compare and contrast the strategy to popular market-neutral alternative investment strategies, including trend-following and long-short style premia (value, momentum, and carry).^{7,8} Finally, I examine the extent to which existing global macro managers are pursuing a similar investment philosophy, and conclude with some thoughts on the role of global macro within an investor’s portfolio.

1 Pederson, L. (2015). *Efficiently Inefficient: How Smart Money Invests & Market Prices are Determined*. New Jersey: Princeton University Press.

2 As of 2016.

3 The Dow Jones Credit Suisse Global Macro Index has realized a Sharpe ratio of 0.8 since 1994.

4 The Dow Jones Credit Suisse Global Macro Index had a positive return (3.3%) from May 2007 - Feb 2009, while the S&P 500 realized a drawdown of 69%.

5 For theories of why investors may systematically underreact to news, see Barberis, Shleifer, and Vishny (1998), Daniel, Hirshleifer, and Subrahmanyam (1999), Hong and Stein (1999), and Frazzini (2006). The empirical literature primarily focuses on individual equities, as in Chan (2003), Frazzini (2006), and Sinha (2016). A notable exception is Bhojraj and Swaminathan (2006), who extend the empirical evidence to international equity indices. Although most of the relevant extant literature focuses on individual equities, the same idea of fundamental momentum — news that moves asset markets contemporaneously tends to predict future asset returns in the same direction — also applies to macro asset classes, my focus here. A forthcoming paper, Brooks, Katz, and Lustig (2017), documents persistent underreaction of bond markets to monetary policy surprises, extending the equity literature to additional markets.

6 Asset classes have varying start dates. See Appendix A for more information.

7 See Moskowitz, Ooi, and Pedersen (2012).

8 See Asness et al (2015).

Building a Macro Momentum Portfolio

Methodology

The systematic global macro strategy involves going long assets for which fundamental macroeconomic trends are improving and short assets for which fundamental macroeconomic trends are deteriorating — an investment style I label *macro momentum*.⁹ I apply this strategy across four major asset classes: global equity indices, global currencies, global government bonds (ten-year maturity), and global interest rates (three-month maturity), focusing on four macroeconomic state variables (or themes) that impact each of the asset classes considered: 1) business cycle, 2) international trade, 3) monetary policy and 4) risk sentiment.¹⁰ Each theme is represented by relatively general measures. For example, business cycle

trends are captured using a 50/50 combination of one-year changes in real GDP growth forecasts and one-year changes in CPI inflation forecasts, while international trade trends are measured using one-year changes in spot FX rates measured against an export-weighted basket.¹¹

For each theme I assert the relationship between the fundamental trend measures and the performance of markets within each asset class. As an example, for equities, increasing growth, declining inflation, improving international trade competitiveness, monetary policy loosening, and improving risk sentiment, are each bullish signals. The indicators for each theme and the relationship between the asset classes and indicators are summarized in **Exhibit 1**.

Exhibit 1

Summary of Macro Momentum Signals

	Business Cycle		International Trade	Monetary Policy	Risk Sentiment
	Increasing Growth: 1y Change in GDP Growth Forecast	Increasing Inflation: 1y Change in Inflation Forecast	Increasing Competitiveness: 1y FX Depreciation (vs. export-weighted average)	Policy Tightening: 1y Change in 2y Yield	Improving Risk Sentiment: 1y Equity Market Return
Equity Indices	+	-	+	-	+
Currencies	+	+	-	+	+
Gov Bonds	-	-	-	-	-
Interest Rates	-	-	-	-	-

Source: AQR. Please see Appendix B for information on the economic rationales.

9 Whether a trend is “improving” or “deteriorating” depends on the asset class in question. For example, increasing economic growth within a country is good for that country’s equity market and currency, but is bad for its fixed income assets. See Appendix B for a discussion on the asserted relationships between fundamental macroeconomic trends and asset class returns.

10 Appendix A details the exact markets I consider and the source and length of the historical return data used.

11 One could, of course, use more sophisticated measures of each theme (and potentially include additional macro momentum themes). I intentionally employ relatively simple measures because they afford long data availability and are less susceptible to concerns about data mining. The strategy is therefore intended as a proof of concept, and can potentially be enhanced by employing additional and improved measures of macro momentum.

Portfolio Construction

For each theme within each asset class, I form two types of portfolios: long-short and directional. Long-short portfolios take long (or short) positions in assets with favorable (or unfavorable) macroeconomic trends *relative to the cross-sectional average*, and are designed to be market neutral at all points in time. Directional portfolios, on the other hand, take long positions in assets with favorable macroeconomic trends and short positions in assets with unfavorable macroeconomic trends, regardless of trends in other markets.¹² While not constrained to be market neutral at all points in time, directional strategies are designed to be market neutral on average.

Long-short and directional portfolios are aggregated to form three composite portfolios. ‘Asset Class’ portfolios (‘Equity Indices’, ‘Currencies’, ‘Government Bonds’, ‘Interest Rates’) are formed by taking an equal weighted average of each of the eight thematic portfolios (four long-short and four directional) within each asset class. ‘Thematic’ portfolios (‘Business Cycle’, ‘International Trade’, ‘Monetary Policy’, ‘Risk Sentiment’) are formed by taking an equal weighted average of each of the eight asset class portfolios within each theme. Finally, an ‘Aggregate Macro Momentum’ portfolio is formed by taking an equal weighted average across all 32 asset class-theme portfolios.¹³

12 For “Business Cycle” within each asset class, I average together the growth and inflation portfolios to form a single business cycle portfolio.

13 Each of the 32 asset class-theme portfolios, as well as the three composite portfolios, is scaled to 10% forecasted annual volatility at each point in time. Appendix C details the portfolio construction process.

Performance of Macro Momentum Since 1970

Exhibit 2 displays the performance of the aggregated macro momentum composite over the full sample since 1970, as well as for each decade over this time period.¹⁴ The performance of macro momentum has been consistent over the last nearly 50 years, a period that features a wide variety of financial market episodes: seven NBER-defined recessions, multiple wars, stagflation, oil price shocks, Volcker disinflation, the Global Financial Crisis, and secular increases and declines in real and nominal interest rates. The strategy has had positive annualized excess returns and Sharpe ratios over every simulated decade, and has also achieved low to negative correlation with U.S. equity and bond markets.

The performance of the hypothetical composite macro momentum strategy is neither driven by a single asset class (*what if I traded on all macro momentum themes, but only in equity markets*) nor by a single theme (*what if I traded on macro momentum in all markets, but only using monetary policy trends*)? As shown in **Exhibit 3**, each asset class and theme has contributed over the full sample and has exhibited broadly comparable performances during that time period.

The full sample stability, however, masks the diversification benefits derived from including multiple themes and applying these themes within multiple asset classes. For example, over

Exhibit 2

Hypothetical Macro Momentum Strategy Shows Consistent Performance over Time

Time Period	Excess Returns (Annualized)	Volatility (Annualized)	Sharpe Ratio (Annualized)	Correlation to U.S. Equity Market	Correlation to U.S. 10y Bond Returns
Full Sample					
Jan 1970-Dec 2016	13.0%	10.7%	1.2	-0.22	0.03
By Decade					
Jan 1970-Dec 1979	10.2%	11.4%	0.9	-0.45	-0.22
Jan 1980-Dec 1989	16.7%	9.7%	1.7	-0.01	-0.09
Jan 1990-Dec 1999	14.1%	10.1%	1.4	-0.46	-0.20
Jan 2000-Dec 2009	15.4%	12.2%	1.3	-0.45	0.25
Jan 2010-Dec 2016	6.5%	9.6%	0.7	0.04	0.02

Source: AQR, Bloomberg, DataStream, Citi, Reuters, and IFS. U.S. Equity Market is measured by the S&P 500. U.S. 10y Bond Returns is measured by the Barclays U.S. 10-Year Bond index. The risk free rate is 3-Month Libor. See the Appendix for details on the simulation. Returns are gross of fees and transaction costs. Hypothetical data has inherent limitations, some of which are disclosed herein.

¹⁴ All returns throughout the paper are hypothetical, gross of transaction costs and fees. Even after adjusting for transaction costs and fees, backtest returns (and Sharpe ratios) are likely overstated, despite best efforts to employ simple and transparent signals, due to unavoidable hindsight bias. Hypothetical data has inherent limitations, some of which are disclosed herein.

the period beginning in 2010, macro momentum within government bonds delivered anemic excess returns of (0.9%), but poor returns in this asset class were mitigated by strong performance of macro momentum within currencies and equities (4.4% and 5.1%, respectively). Similarly, from a thematic perspective, risk sentiment performed poorly since 2010 but was more than offset by strength in international trade and monetary policy. The

combination of comparable average returns and low correlations across both themes and asset classes (the average pairwise correlation across themes and across asset classes are each 0.1) suggests there is a benefit from a combined approach rather than emphasizing any one particular theme or asset class — as evidenced by the improved risk-adjusted returns on the aggregated composite over its subcomponents.

Exhibit 3

Hypothetical Performance is Consistent across Themes and Asset Classes

Annualized Excess Returns by Asset Class, 1970-2016

Time Period	Equities	FX	Bonds	Interest Rate Futures	Aggregate Macro Mom
Full Sample					
Jan 1970-Dec 2016	8.2%	6.8%	5.6%	8.8%	13.0%
Sharpe Ratio	0.7	0.6	0.5	0.8	1.2
By Decade					
Jan 1970-Dec 1979	6.4%	5.3%	5.2%	-	10.2%
Jan 1980-Dec 1989	11.7%	9.5%	7.9%	-	16.7%
Jan 1990-Dec 1999	10.1%	9.9%	6.1%	6.9%	14.1%
Jan 2000-Dec 2009	6.6%	3.3%	6.6%	15.1%	15.4%
Jan 2010-Dec 2016	5.1%	4.4%	0.9%	2.2%	6.5%

Annualized Excess Returns by Theme, 1970-2016

Time Period	Business Cycle	International Trade	Monetary Policy	Risk Sentiment	Aggregate Macro Mom
Full Sample					
Jan 1970-Dec 2016	6.2%	6.5%	9.8%	8.8%	13.0%
Sharpe Ratio	0.5	0.6	0.9	0.7	1.2
By Decade					
Jan 1970-Dec 1979	3.3%	11.2%	9.8%	5.2%	10.2%
Jan 1980-Dec 1989	8.4%	3.7%	10.8%	13.6%	16.7%
Jan 1990-Dec 1999	7.6%	5.7%	9.8%	8.5%	14.1%
Jan 2000-Dec 2009	8.3%	6.3%	11.0%	14.8%	15.4%
Jan 2010-Dec 2016	2.2%	6.9%	6.3%	-1.5%	6.5%

Source: AQR, Bloomberg, DataStream, Citi, Reuters, and IFS. See Appendices A and B for details on the simulation. Returns are gross of fees and transaction costs. Hypothetical data has inherent limitations, some of which are disclosed herein.

Macro Momentum and Traditional Asset Classes

Macro momentum returns exhibit low, and often negative, correlations to stocks and bonds. However, correlations alone do not tell the full story. Macro momentum has attractive characteristics during periods of market stress, such as equity market drawdowns and rising real yield environments, which can provide particularly beneficial diversification to a canonical 60% equity and 40% bond portfolio.¹⁵

Equity Market Drawdowns

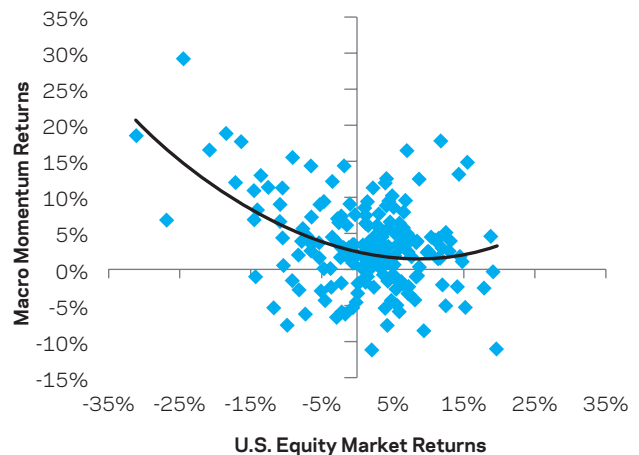
Exhibit 4 plots hypothetical quarterly excess returns of the strategy against excess returns of the U.S. equity market from 1970-2016. Macro momentum exhibits a pronounced ‘smile’ relative to equity market returns: it tends to have negative beta to equities in down-markets and positive beta in up-markets. In the ten worst quarters for equities since 1970 (during which equities averaged -19.9%), macro momentum returned an average of 13.7% in excess of cash.

Why is there a tendency for macro momentum to outperform in bear equity environments? The intuition is that large equity market drawdowns tend not to occur in a vacuum — they tend to be preceded by deteriorating macroeconomic fundamentals (deteriorating growth, contractionary monetary policy, etc.). Macro momentum is positioned long

Exhibit 4

Macro Momentum “Smile”

Hypothetical Quarterly Excess Returns, 1970-2016



Source: AQR, Bloomberg, DataStream, Citi, Reuters, and IFS. U.S. Equity Market is measured by the S&P 500. See the Appendix for details on the simulation. Returns are gross of fees and transaction costs. Hypothetical data has inherent limitations, some of which are disclosed herein.

assets for which fundamental macroeconomic trends are improving and short assets for which fundamental macroeconomic trends are worsening. Inasmuch as equity bear markets tend to be preceded by deteriorating fundamentals, macro momentum will tend to be positioned short equities (and potentially long safe assets), capitalizing on large equity market drawdowns.

¹⁵ By way of concession, I don't know of any investor that actually holds a pure 60/40 portfolio, but it is a reasonable benchmark proxy.

Rising Real Yields

Rising real yield environments may also pose challenges for traditional asset allocations. How does macro momentum fare in these environments? In **Exhibit 5**, I examine the performance of macro momentum in the ten most extreme rising real yield episodes since 1970.

During these ten episodes, real yields rose by an average of 2.8%.¹⁶ While each episode coincides with underperformance of government bonds (U.S. Treasuries are down an average of 14% in these ten periods), equity markets fare better,

generating an average annualized excess return of 11.3%. Taken together, a canonical 60/40 portfolio exhibits positive but anemic excess returns of around 1.1% annualized. Macro momentum appears robust to rising real yields, posting gains in eight of ten rising yield episodes, with average annualized excess returns of 12%. Much the same as bear equity market environments, rising real yield environments tend not to occur in a vacuum, but rather tend to be preceded by changes in macroeconomic fundamentals, suggesting that macro momentum is a good diversifier for a traditional portfolio during periods of rising real yields as well.

Exhibit 5

Macro Momentum had Positive Average Returns during Rising Yield Episodes

Hypothetical Cumulative Excess Returns, 1970-2016

	Change in Real Yield	Macro Momentum	U.S. 10-Year Treasuries	U.S. Equities	U.S. 60/40
Jan 1980-Sep 1981	7.2%	29.3%	-37.7%	-10.0%	-21.1%
Mar 1983-Jun 1984	3.8%	16.7%	-19.5%	-1.8%	-8.9%
July 1979-Feb 1980	3.3%	26.5%	-27.1%	3.1%	-9.0%
Sep 1993-Nov 1994	2.6%	15.2%	-13.1%	-3.0%	-7.1%
Sep 1986-Sep 1987	2.5%	13.4%	-14.4%	24.6%	9.0%
Oct 1998-Jan 2000	2.3%	-3.6%	-11.7%	27.4%	11.7%
Jan 1975-Sep 1975	2.1%	-8.1%	-5.6%	18.4%	8.8%
Jan 2009-Dec 2009	1.8%	6.6%	-5.3%	25.4%	13.1%
Jul 2012-Dec 2013	1.4%	16.9%	-3.9%	33.5%	18.6%
Jul 2005-Jun 2006	1.3%	15.8%	-8.0%	4.3%	-0.6%
Average Annualized Excess Returns		12.0%	-14.2%	11.3%	1.1%

Source: AQR, Bloomberg, DataStream, Citi, Reuters, and IFS. U.S. 60/40 refers to a portfolio of 60% S&P 500 and 40% Barclays U.S. Aggregate Government Bond Index. Source: AQR. See Appendix A for details on the simulation. Returns are gross of fees and transaction costs. Hypothetical data has inherent limitations, some of which are disclosed herein.

¹⁶ The real bond yield is the benchmark U.S. 10-year Treasury bond yield (from Robert Shiller's website) minus long-term expected inflation. Prior to 1990 it averages surveys from Blue Chip Economic Indicators, Consensus Economics, and the Survey of Professional Forecasters. Since 1990, it uses only the long-term inflation forecasts from Consensus Economics. Inflation expectation is defined as in Ilmanen (2011).

Macro Momentum and Trend-Following Strategies

Having compared returns of macro momentum to traditional assets, I now review macro momentum performance relative to familiar alternative strategies. As macro momentum and trend-following strategies bear similarities to one another, I provide a detailed comparison of the two, with particular attention to the question of their suitability as complements within investor portfolios. I then compare macro momentum to other alternative strategies — including global macro — in the following section.

Similar yet Different

Trend-following (or *time series momentum*) and macro momentum are related investment strategies. Both begin with the premise that the tendency of markets to underreact to news creates investment opportunities that can be exploited by a systematic and diversified investment process. Trend-following exploits the tendency of markets to gradually process new information by positioning on the basis of price trends (taking long positions in assets that have appreciated in value and short positions in assets that have depreciated). Macro momentum, on the other hand, begins with the same premise that markets only gradually process news, but aims to exploit this tendency by positioning on the basis of fundamental news directly, as opposed to the price trends such news engenders. Since price trends and fundamental trends tend to align on average, one would expect trend-following returns

and macro momentum returns to be positively correlated.

There are, however, environments where the performances of these strategies may be expected to diverge. Market turning points are one example. Trend-following, almost by construction, will not immediately adapt to inflection points. Insofar as turning points are preceded by changes in macroeconomic fundamentals, however, macro momentum may be positioned to profit on average. In addition, macro momentum portfolios take long-short relative value views within asset classes, which can further improve its return profile and reduce its correlation with pure trend-following.

Returns Comparisons

Using the methodology detailed in Hurst, Ooi, and Pedersen (2014)¹⁷, I simulate a simple trend-following strategy across the exact same markets already considered. **Exhibit 6** provides a comparison between macro momentum and trend-following strategies. The two strategies realize a correlation of 0.4, a magnitude high enough to confirm the strategies are related, but low enough to indicate they provide significant diversification. The 50/50 combination of the two strategies yields a non-trivial improvement in risk-adjusted returns, as volatility and maximum drawdown declines materially, leading to an improved Sharpe of 1.4 (compared to 1.1-1.2 for the individual strategies).

17 I use an equal weighted average of one-month, three-month, and twelve-month time series momentum strategies applied to the same set of assets as the macro momentum strategy, and scale the portfolio volatility to 10%, similar to our macro momentum strategy.

Exhibit 6

Macro Momentum and Trend-Following are Related but Still Diversifying to One Another

Hypothetical Monthly Excess Returns, 1970-2016

	Trend-Following	Macro Momentum	50/50 Combination
Average Returns	12.1%	13.0%	12.6%
Volatility	11.2%	10.7%	9.3%
Sharpe Ratio	1.1	1.2	1.4
Max Drawdown	-23.5%	-21.6%	-12.8%

Source: AQR, Bloomberg, DataStream, Citi, Reuters, and IFS. Note: An equal weighted average of one-month, three-month, and twelve-month time series momentum strategies was applied to the same set of assets as the macro momentum strategy, and scale the portfolio volatility to 10%, similar to our macro momentum strategy. The risk free rate is 3-Month Libor. See the Appendix for details on the universe. Returns are gross of fees and transaction costs. Hypothetical data has inherent limitations, some of which are disclosed herein.

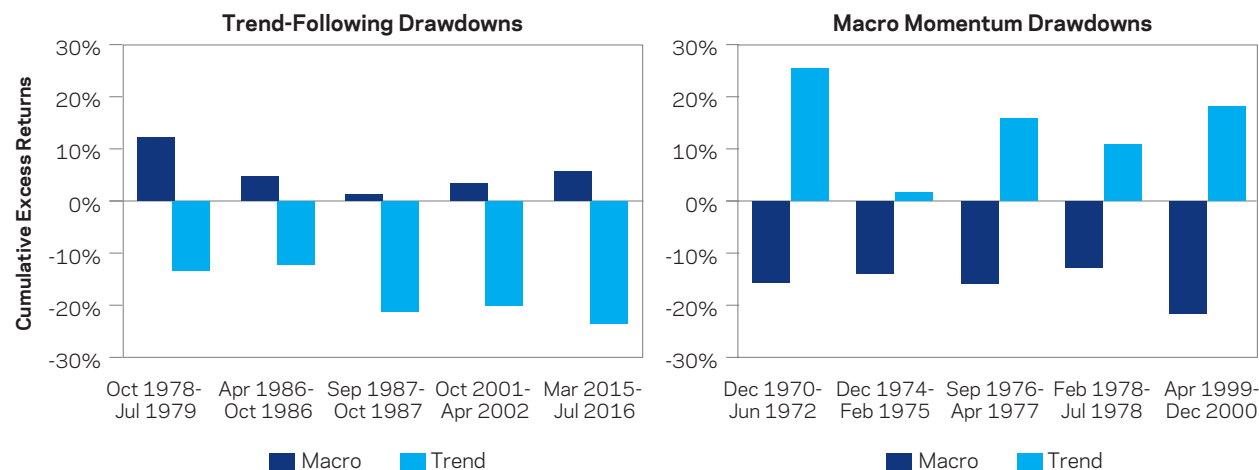
Another characteristic, not apparent in the full sample analysis, is that the two strategies appear to be diversifying when it matters most. Exhibit 7 displays returns of each strategy when the other experienced its five worst drawdowns. Remarkably, in each of the five largest drawdowns for trend-following, macro momentum realized positive returns; and in each of the five largest drawdowns for macro momentum, trend-following realized positive returns. To illustrate, consider the largest and most recent macro momentum drawdown

from April 1999 to December 2000 — a time in which macro momentum detracted 22% while trend-following gained 17%. The Tech Bubble is the quintessential environment in which a macro momentum strategy should be expected to underperform. During this time, macro fundamentals and price trends provided conflicting signals on the direction of markets. Increasing inflation expectations and monetary policy tightening by the Federal Reserve had signaled a weakening macroeconomic environment, which

Exhibit 7

Macro Momentum and Trend-Following Tend to Hedge Each Other in Tail Events

Hypothetical Cumulative Excess Returns, 1970-2016



Source: AQR, Bloomberg, DataStream, Citi, Reuters, and IFS. The risk free rate is 3-Month Libor. See the Appendix for details on the universe. Returns are gross of fees and transaction costs. Hypothetical data has inherent limitations, some of which are disclosed herein.

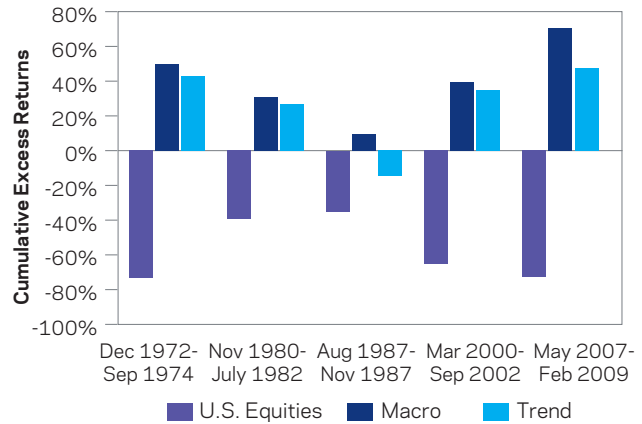
usually precedes falling equity markets, but “irrational exuberance” among investors prodded risk assets higher. As a result, macro momentum suffered losses but trend-following rode price trends to generate strong gains. Conversely, when the Tech Bubble burst in 2001 and 2002, trend-following failed to capture the inflection point and suffered a roughly 20% drawdown. Macro momentum realized gains driven partly by bearish equity positions and bullish U.S. interest rate positions.

Equity Market Drawdowns

Simulations covering the last half century indicate that both macro momentum and trend-following tend to exhibit strong performance in equity bear markets — with macro momentum realizing gains in each of the five largest equity market drawdowns and trend-following posting gains in four of five (**Exhibit 8**). While each strategy on average provided excellent diversification in equity market drawdowns, the economic mechanism driving their performance differs in nature. Macro momentum tends to do well in equity market drawdowns that are preceded by deteriorating macroeconomic fundamentals. Trend-following, on the other hand, tends to do well in equity market drawdowns that evolve gradually. Perhaps not surprisingly, it turns out that most equity market drawdowns tend to be both persistent and preceded by deteriorating fundamentals, which explains why both strategies tend to perform well during these periods. Be it the oil price shocks of the 1970s, Volcker disinflation of the early 1980s, the Tech Bust of the early 2000s, or the Global Financial Crisis, each episode was driven by fundamental macroeconomic

Exhibit 8 Macro Momentum and Trend-Following are Diversifying during Equity Market Drawdowns

Cumulative Excess Returns, 1970-2016



Source: AQR, Bloomberg, DataStream, Citi, Reuters, and IFS. See the Appendix for details on the universe. Returns are gross of fees and transaction costs. Hypothetical data has inherent limitations, some of which are disclosed herein.

catalysts and each was long-lived. The anomalous drawdown is the 1987 stock market crash. This deep drawdown occurred extremely quickly (the S&P 500 declined 35% over a three-month period), causing trend-following to post sharp losses. Macro momentum, on the other hand, realized gains over this period. The strategy was positioned short U.S. equities, based on contractionary monetary policy trends, rising inflation expectations, and declining economic growth. I do not claim that these macroeconomic developments were the driver of the 1987 crash, only that macro momentum can potentially provide diversification in sharp equity market drawdowns that pose difficulties for trend-following.

Macro Momentum and Other Alternative Strategies

I also evaluate the performance of macro momentum relative to other commonly held alternative strategies such as diversified style premia, as well as to global macro strategies managed by a broad range of investment managers (as defined by the Dow Jones Credit Suisse (“DJCS”) Global Macro universe). The intention is to highlight issues to consider when including macro momentum as part of a broader hedge fund portfolio.

Diversified Style Premia

Similar to the approach in the following section, I contrast macro momentum with a simple diversified market-neutral style portfolio (value, momentum and carry) comprised of the same four asset classes, created using the measures proposed in Asness et al (2015).¹⁸ Exhibit 9 displays the performance of diversified style premia, as well

as macro momentum and a 50/50 combination of the strategies.¹⁹ Not surprisingly, given that both strategies operate on different principles, macro momentum exhibits low correlation to diversified style premia (0.2). The 50/50 combination produces a Sharpe ratio in excess of 1.4 and realizes a maximum drawdown of only -10.8%, well below the maximum drawdowns of diversified style premia or macro momentum standalone.

Global Macro Managers

To what extent are existing global macro managers providing exposure, whether explicitly or implicitly, to macro momentum? To assess the degree to which other managers are pursuing a similar investment strategy, I analyze the performance of the DJCS Global Macro index, as well as, a hypothetical portfolio that equal weights the 15 largest global macro managers in the index,

Exhibit 9

Hypothetical Macro Momentum is Lowly Correlated with Diversified Style Premia Monthly Excess Returns, 1970-2016

	Diversified Style Premia	Macro Momentum	50/50 Combination
Average Returns	10.8%	13.0%	11.9%
Volatility	11.0%	10.7%	8.3%
Sharpe Ratio	1.0	1.2	1.4
Max Drawdown	-21.3%	-21.6%	-10.8%

Source: AQR, Bloomberg, DataStream, Citi, Reuters, and IFS. See Appendix A for details on the universe. Returns are gross of fees and transaction costs. Hypothetical data has inherent limitations, some of which are disclosed herein.

- 18 I build long-short style portfolios for each style within each asset class following the long-short portfolio construction methodology outlined earlier. “Diversified Style Premia” takes an equal weighted average across style premia portfolios, rescaled to 10% forecasted volatility.
- 19 It may initially be surprising that the in-sample performance of macro momentum (1.2 Sharpe ratio) exceeds that of diversified style premia (1.0 Sharpe ratio), given that the latter is a more “diversified” strategy. Recall, however, that macro momentum includes both market-neutral long-short and directional portfolios, while diversified style premia is purely long-short. In addition, we do not include style premia within stock selection.

rebalanced annually at year-end (“Top 15”). I regress excess returns for each portfolio against excess returns of six independent variables: equities (S&P 500), bonds (Barclays Global Aggregate) and the four macro momentum theme portfolios, to investigate the components that drive manager returns.

Both regressions tell very similar stories (**Exhibit 10**). First, both portfolios load significantly on stocks and bonds. This may indicate prudent tactical bets by global macro managers over the last 20+ years, but more likely reflects a passive allocation to traditional risk premia.²⁰ This contrasts with macro momentum which shows low to negative correlation with stocks and bonds (as documented in the following section).

Second, global macro funds load significantly on monetary policy but loadings on other

macromomentum themes are mixed. Managers seem to be reacting to changes in the monetary policy outlook, consistent with anecdotal evidence of “central bank watching.”²¹ Beyond that, positioning on the basis of trends in business cycles, international trade, or risk sentiment, appears largely unexploited despite evidence that they provide equally strong returns.

The relatively low R²s of these regressions (14-15%) imply that much of the manager return variation is not captured, and while statistically insignificant, both the DJCS and Top 15 portfolios have economically non-trivial alpha. As such, I conclude that macro managers (at least the ones we focus on) by and large are pursuing different investment philosophies than what we have outlined, suggesting that a macro momentum strategy may be complementary to existing global macro managers.²²

Exhibit 10

Hypothetical Macro Momentum is Complementary to Existing Global Macro Managers

Dow Jones Credit Suisse Global Macro Index Monthly Excess Returns, 1994-2016

	Business Cycle	Intl Trade	Monetary Policy	Risk Sentiment	S&P 500	Global Agg	Intercept	R ²
Beta	-0.03	0.04	0.14	0.07	0.17	0.30	0.3%	15.3%
T-Stat	-0.5	0.9	2.6	1.6	5.2	3.2	1.6	

Top 15 Managers by AUM Monthly Excess Returns, 1991-2016

	Business Cycle	Intl Trade	Monetary Policy	Risk Sentiment	S&P 500	Global Agg	Intercept	R ²
Beta	-0.12	0.11	0.22	0.00	0.09	0.36	0.3%	14.1%
T-Stat	-2.2	2.2	3.8	-0.1	2.4	3.6	1.7	

Source: AQR, Bloomberg. See Appendices A and B for details on the simulation. Returns are monthly, gross of fees and transaction costs. Hypothetical data has inherent limitations, some of which are disclosed herein.

20 As a rudimentary test of “market timing” ability I compare the three-year rolling betas to the S&P 500 and the Barclays Global Aggregate to contemporaneous three-year rolling returns of each market: were market exposures relatively larger (smaller) in periods in which the market outperformed (underperformed)? This test indicates macro managers have had some equity market timing skill, but very limited bond market timing skill. E.g., for the Top 15 portfolio the correlation of rolling three-year the S&P 500 beta rolling three-year the S&P 500 returns is 0.4, while for the analogue for the Global Aggregate is 0.1.

21 See <http://money.cnn.com/1998/09/29/bizbuzz/briefcase/> for a classic, and literal, example of central bank watching.

22 Brooks, Tsuji, and Villalon (2017) examine style loadings of “Superstar Investors” — Warren Buffet, Bill Gross, Peter Lynch, and George Soros — and find, in the case of Buffet, Gross, and Soros, that persistent style exposures explain a good portion of their returns. In the case of Soros, a prominent global macro manager, trend-following (both in macro assets and in individual stocks) and fundamental currency investing (risk sentiment and value investing in currency markets) explained a large portion of his performance.

Summary and Discussion

Macro momentum, a systematic approach to global macro investing that takes long positions in assets with improving fundamental trends and short positions in assets with deteriorating fundamental trends, has performed consistently over nearly the last half century. The strategy is highly diversifying to traditional assets, tending to provide an excellent hedge in both large equity market drawdowns and rising real yield environments. Macro momentum is related to trend-following — with the former positioning on the basis of fundamental trends and the latter positioning on the basis of price trends — but the two strategies are complementary. Their low average correlation, tendency to drawdown at different times, and complementary equity tail-hedging properties suggests that investors may be well-served to have exposures to both of these investment strategies within their portfolio.

The analysis of global macro hedge funds, suggests that investors are not getting sufficient macro momentum exposures from existing global macro managers. Inasmuch as existing managers implicitly or explicitly position on the basis of fundamental macro trends, the evidence suggests they are primarily focused on monetary policy,

which is but one of four profitable dimensions I have identified. Given the systematic macro momentum strategy outlined in this paper tends to be more diversified across both assets and themes than the global macro space in general, and given its appealing tail performance, a diversified macro momentum-based strategy is potentially suitable to be a core global macro holding, and can be accompanied by other, more concentrated, global macro managers.²³

This paper makes a strategic case for macro momentum on the basis of its strong historical performance over nearly 50 years, its tendency to be diversifying to traditional assets, and its low correlation to other alternative risk premia. Given the current (as of July 2017) elevated level of equity valuations and historically low real yields on bonds, there are strong reasons to believe medium-term performance for traditional assets will not be as impressive as in the past. This strengthens the tactical case for alternative strategies in general, and macro momentum in particular, given its propensity to perform well in bear stock and bond market environments.

23 This might be akin to an investor making a core allocation to a diversified style premia portfolio, while also maintaining some exposure to more “traditional” concentrated fundamental managers.

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Appendix A

Equity index return data is from Bloomberg. Start dates are

- 1970: Australia, Germany, Canada, Spain, France, Italy, Japan, Netherlands, U.K., U.S.
- 1975: Switzerland
- 1980: Denmark, Hong Kong, Sweden
- 1988: New Zealand

Government bond return data is from Bloomberg and DataStream. Start dates are

- 1970: Germany, Canada, U.K., U.S.
- 1980: Japan
- 1981: Switzerland
- 1985: Denmark
- 1986: Australia
- 1987: Sweden

Currency return data is from Citi and Reuters. Start dates are

- 1971: Germany, Japan, Switzerland, U.K.
- 1972: Australia, Canada
- 1978: New Zealand, Sweden

Interest rate futures return data is from IFS. Start dates are

- 1987: U.S.
- 1988: U.K.
- 1989: Australia, Europe (Euribor)
- 1991: Canada, New Zealand, Switzerland

Appendix B

Business Cycle:

Business cycle trends are captured using one-year changes in forecasts of real GDP growth and CPI inflation. From 1990 onward forecast data is from Consensus Economics. Prior to 1990, I use one-year changes in realized year-on-year real GDP growth and CPI inflation, lagged one quarter (this definition is equivalent to changes in forecasts assuming that real GDP growth and CPI inflation follow random walks). Both series are from the OECD. Increasing growth is assumed to be bullish for equities (cash-flow impact) and currencies (Balassa-Samuelson hypothesis), and bearish for fixed income (both government bonds and interest rates) via both inflationary pressures and upward pressure on real interest rates. Increasing inflation is assumed to be bearish for equities (see Katz and Lustig (2017)), bullish for currencies (see Clarida and Waldman (2008)), and bearish for fixed income.

International Trade:

International trade trends are captured using one-year changes in spot exchange rates against an export-weighted basket. Data is from DataStream. A depreciating currency is bullish for equities (exports become more competitive), bearish for currencies (very similar to price momentum) and bearish for fixed income (other things equal, a depreciating currency reduces the pressure on a central bank to reduce interest rates).

Monetary Policy:

Monetary policy trends are captured using one-year changes in the front end of the yield curve. From 1992 onwards, I use two-year yields, while prior to 1992 I use Libor and its international equivalents. Both data series are from Bloomberg. Expansionary monetary policy is bullish for equities (see Bernanke and Kuttner (2005)), bearish for currencies (see Eichenbaum and Evans (1995)), and bullish for fixed income.

Risk Sentiment:

Changes in risk sentiment are captured using one-year equity market excess returns. Data is from DataStream. Increasing risk sentiment — i.e., strong equity market returns — is bullish for equities and currencies, and bearish for fixed income.

Appendix C

Long-short portfolio construction:

For each theme within each asset class, I form constant forecasted volatility long-short portfolios. I first rank the universe of securities by the raw macro momentum measure. I then standardize the ranks by subtracting the mean rank from each rank and dividing each rank by the standard deviation of ranks to convert them into a set of standardized weights. This step creates a set of positive weights and a set of negative weights that add up to zero, and which will form the basis of our long-short portfolios. I then volatility-adjust the resulting long and short positions such that the long-short portfolio is at 10% annual forecasted volatility using a three-year rolling risk model on monthly returns. This methodology results in balanced long-short portfolios in which each side targets similar risk levels, and in which each macro momentum theme in each asset class targets the same amount of volatility, which will facilitate combining multiple themes into a single portfolio.

Directional portfolio construction:

For each theme within each asset class, I take a long position in assets in which the fundamental trend is positive and a short position in assets in which the fundamental trend is negative (since one-year equity returns are positive on average, I compare to an expanding mean). Therefore, each theme holds either a long or short position in every market (and, contrary to long-short thematic portfolios, every asset may be long or short if fundamental trends are all positive or all negative in each market). Each individual position is sized to target the same amount of volatility, both to provide diversification and to limit the portfolio risk from any individual market. I then scale the theme portfolio across all assets to target 10% forecasted annual volatility.

Notes

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