

Managed futures strategies: Diversifiers, but no tail risk hedge

Quantitative beta strategies

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IN BRIEF

- Some investors view managed futures strategies as a tail risk hedge. While these strategies are generally *uncorrelated* to traditional risk assets and can be useful portfolio diversifiers, they are not *negatively* correlated to traditional risk assets and thus should not serve as a tail risk hedge.
- Two factors, momentum and to a lesser extent carry, explain the majority of these strategies' performance. It is often assumed that momentum performs well in stress markets while carry performs poorly; however, these commonly held views are incorrect. Nonetheless, momentum and carry are both very good diversifiers due to their low correlation to traditional asset classes.
- A portfolio that combines momentum and carry across asset classes may improve risk-adjusted returns and offer the potential to perform through a variety of market environments.

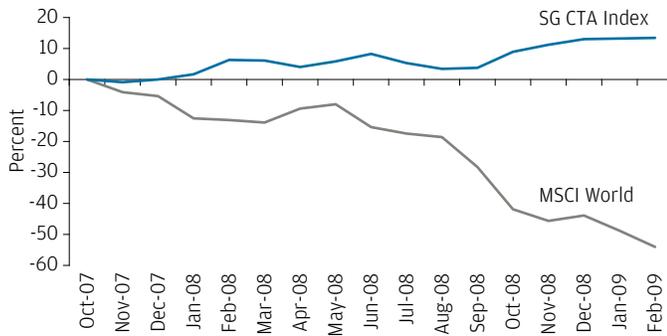
IN THE WAKE OF THEIR STRONG PERFORMANCE DURING THE GLOBAL FINANCIAL CRISIS, MANAGED FUTURES STRATEGIES, WHICH TYPICALLY INVEST LONG AND SHORT ACROSS LIQUID ASSET CLASSES, BECAME WIDELY SEEN AS A WAY TO HEDGE TAIL RISK. Because managed futures strategies offer the potential to provide protection in market downturns while also capturing gains in rising markets, investors have dramatically boosted these strategies' assets under management from roughly \$170 billion in 2006 to nearly \$350 billion in 2017 (**EXHIBITS 1** and **2**).

Managed futures strategies, which have become synonymous with commodity trading advisors (CTAs) and systematic trend-following strategies, can generate absolute returns that are uncorrelated to traditional asset classes. It is crucial, however, to distinguish between strategies that are uncorrelated to traditional risk assets vs. those strategies that are negatively correlated to traditional risk assets and can thus—often at an explicit cost—serve as a true tail hedge. In short, managed futures strategies are quite useful diversifiers, but they may be deficient as tail risk hedges. (The underperformance of these strategies during the February 2018 volatility spike is a recent case in point.)

In the following pages, we examine the behaviour of managed futures strategies during periods of market stress and clarify how they can be used most effectively in portfolio construction. We begin by considering the two well-known factors that form the core of managed futures strategies. The first is momentum: the tendency for assets whose prices have gone up (or down) to continue to go up (or down). The second is carry: the tendency for higher-yielding assets to

Strong performance of managed futures strategies during the financial crisis attracted investors' notice

EXHIBIT 1: PERFORMANCE DURING THE FINANCIAL CRISIS



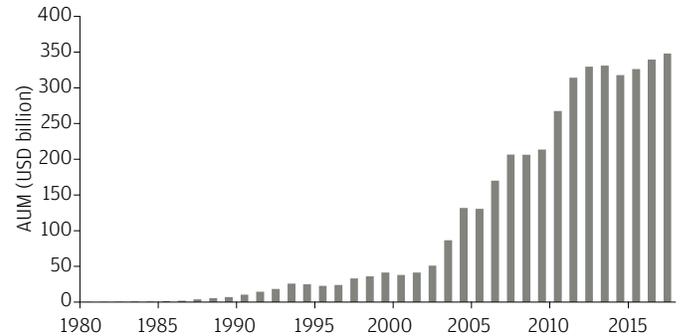
Source: Bloomberg, Société Générale; data as of March 2018.

outperform lower-yielding assets. After reviewing both the academic literature and the economic rationale that underpin these sources of return, we perform empirical analysis across a range of asset classes and markets dating back to 1960 to examine a broad set of stress periods and market environments.¹ We demonstrate that momentum and carry are diversifying both to each other and to traditional risk assets (equities or fixed income), and that their benefits are greatest when they are combined in portfolios. But they cannot claim the essential attribute of a tail risk hedge, which is negative correlation to traditional risk assets. Plainly put, they're no portfolio panacea.

¹ We intentionally use simple definitions of carry and momentum, focusing on the most liquid, familiar markets and aiming to maximise data history for our study. We acknowledge that different methodologies and signals can be used to add value.

From a small base, managed futures assets have grown dramatically

EXHIBIT 2: MANAGED FUTURES STRATEGIES ASSETS UNDER MANAGEMENT



Source: BarclayHedge; data as of June 2017.

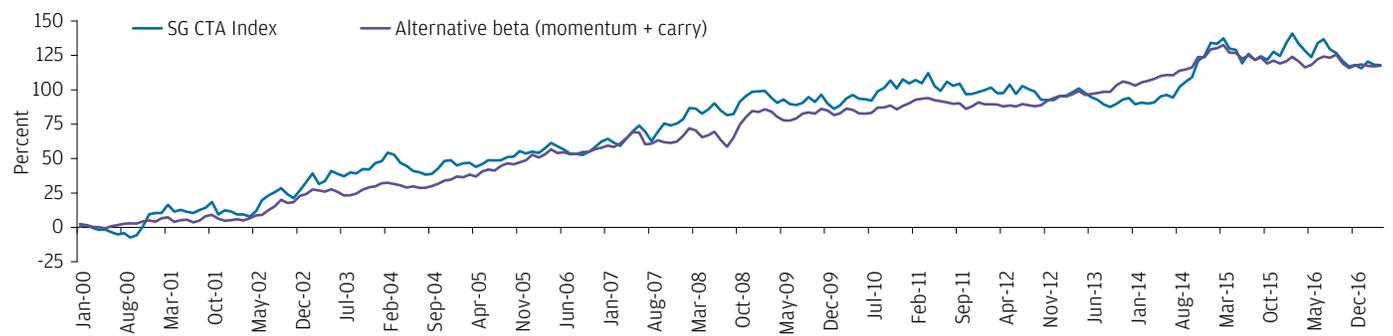
MANAGED FUTURES: MOMENTUM AND CARRY ACROSS ASSET CLASSES

Of the two factors used in managed futures strategies, momentum tends to dominate carry, accounting for a substantial majority of managed futures strategy performance. Empirically, the fit between a well-known managed futures index (SG CTA Index) and an alternative beta portfolio that consists of momentum and carry is maximised when momentum accounts for at least 85% of overall strategy risk (EXHIBIT 3). While the ability of alternative beta factors to explain managed futures/hedge fund returns is explored in detail in our previous paper, "Inside the black box: Revealing the alternative beta in hedge fund returns"², exploring managed futures strategies through the lens of factors allows us to better understand their performance across a range of market conditions.

² J.P. Morgan Asset Management Portfolio Insights, December 2016.

An alternative beta portfolio corresponds closely with managed futures strategies

EXHIBIT 3: ALTERNATIVE BETA PORTFOLIO, MANAGED FUTURES STRATEGIES, 2000-2018



Source: Bloomberg, Datastream, Federal Reserve Economic Data, J.P. Morgan Asset Management; data as of March 2018.

Momentum: Riding the waves of past performance

The momentum factor seeks to profit by going long assets that have been rising in price and short those that have been falling in price. This factor has been well documented in the academic literature^{3,4} with support spanning a range of equity, fixed income, currency and commodity markets on data that extends back multiple centuries.⁵ The momentum factor is primarily supported by the behavioural rationale (rather than risk-based or structural arguments) and reflects the insight that humans—including investors—tend to initially underreact to new information and subsequently overreact once this information becomes more widely recognised and assimilated into a broader story.⁶

Momentum can be expressed in two forms: time-series momentum, typically the largest component of managed futures strategies, and cross-sectional momentum. In time-series momentum, which is akin to trend-following, investors take long positions in assets after they appreciate in value and short positions in assets after they depreciate in value, treating each asset in isolation. In cross-sectional momentum, investors look within a specific set of assets and take positions on a relative value basis, going long top performers and short the worst performers. In a period of rising commodity prices, for example, time-series momentum would be directionally long across commodity markets while relative value momentum would go long those commodities that were performing best and short those that were performing worst (for example, long oil and short gold, such that on an aggregate basis there was no commodities exposure).

Because time-series momentum can go directionally short in down-trending markets, some market participants believe that managed futures can serve as a tail risk hedge within investor portfolios. However, this view implies that markets will already be trending downwards before they crash.

In our study of momentum, we review 52 markets (eight equity markets, eight government bond markets, 10 currency markets

Time-series momentum generates attractive risk-adjusted returns across each major asset class

EXHIBIT 4: MOMENTUM, HISTORICAL BACK-TEST RETURNS

	Equities	Bonds	Currencies	Commodities	Diversified momentum
Return	2.3%	4.0%	1.5%	4.1%	5.7%
Volatility	5.0%	5.0%	5.0%	4.9%	5.0%
IR	0.47	0.81	0.30	0.84	1.14
Skew	-0.50	-0.05	0.00	1.83	0.58
Start date	Jan-71	Jan-61	Dec-74	Jan-60	Jan-60

Source: Bloomberg, Datastream, Federal Reserve Economic Data, J.P. Morgan Asset Management; data as of February 2018.

and 26 commodities markets)⁷ with data extending back to the 1960s and 1970s. We focus on time-series momentum to more closely approximate managed futures strategies; we use trailing three-, six-, and 12-month periods as inputs in deciding whether to take long or short positions, ensuring that our model is diversified across time horizons.⁸ As seen in **EXHIBIT 4**, time-series momentum generates attractive risk-adjusted returns across each major asset class, with information ratios (IRs) ranging from 0.30 in currency markets to 0.84 in commodities markets. There is an additional and significant benefit to diversifying across asset classes, with a diversified momentum model exhibiting an information ratio of 1.14, which is 87% higher than the average across asset classes. The higher information ratio reflects the low correlation in implementing momentum across asset classes (**EXHIBIT 5**).

We observe low correlation in implementing momentum across asset classes

EXHIBIT 5: MOMENTUM, LONG-TERM CORRELATION ACROSS ASSET CLASSES

	Equity momentum	Bond momentum	Currency momentum	Commodity momentum
Equity momentum	1.00			
Bond momentum	0.24	1.00		
Currency momentum	0.04	0.03	1.00	
Commodity momentum	0.13	0.11	0.05	1.00

Source: Bloomberg, Datastream, Federal Reserve Economic Data, J.P. Morgan Asset Management; data as of February 2018.

³ Jegadeesh, Narasimhan and Sheridan Titman. "Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency." *Journal of Finance* 48.1 (1993): 93-130.

⁴ Asness, Clifford S., Tobias J. Moskowitz and Lasse Heje Pedersen. "Value and Momentum Everywhere." *Journal of Finance* 68.3 (2013): 929-985.

⁵ Lempérière, Yves, et al. "Two Centuries of Trend Following." arXiv preprint 1404.3274 (2014).

⁶ "Far from the Madding Crowd: Factor Investing Through the Cycle." J.P. Morgan Asset Management Portfolio Insights, March 2018.

⁷ For more information on the universe, please see details and sources in the Bibliography.

⁸ Positions are sized through an equal-risk approach (based on trailing three-year volatility), with the overall factor results scaled on an ex-post basis to a volatility of 5% for illustrative and comparative purposes.

Carry: Collecting profits from stagnant prices

The carry factor, also well established in the academic literature,^{9 10 11 12 13} seeks to profit by going long high yielding assets and short low yielding assets, essentially collecting yield or income, provided that prices do not move too far against the investor’s positions. The factor is supported by both behavioural and risk-based economic rationales. The behavioural rationale centers on status quo bias, the human tendency to resist change, which can extend to investor positioning. The risk-based economic rationale is based on investor aversion to crash risk (or the negative skew that can be associated with carry strategies), as well as demand for compensation in light of the uncertainty around future prices and market environments.

While carry is typically a smaller component of managed futures strategies than momentum, it can similarly be applied across a range of liquid asset classes. We have studied this factor across the same set of 52 markets, using dividend yield as an input within equity markets, yield-to-maturity as an input within government bond markets, interest rates as an input within currency markets and roll yield as an input within commodities markets. At any given point in time, we are long the assets with the highest yield (top 30%) and short those with the lowest yield (bottom 30%).¹⁴

Our analysis shows that the carry factor generates attractive risk-adjusted returns, particularly for fixed income, currency and commodity markets, with information ratios ranging as high as 0.55 (EXHIBIT 6). In addition, there is again a significant benefit to implementing the factor across asset classes, with the information ratio on a diversified carry model increasing to 0.71. Interestingly, while negative skew is generally seen as inherent in carry investing, this phenomenon appears to only materially reside within currency markets and is diversified away when carry is applied in a diversified format across a range of asset classes (EXHIBIT 7).

Risk-adjusted returns for the carry factor are especially attractive in fixed income, currency and commodity markets

EXHIBIT 6: CARRY, HISTORICAL BACK-TEST RETURNS

	Equities	Bonds	Currencies	Commodities	Diversified carry
Return	0.2%	2.3%	2.0%	2.7%	3.5%
Volatility	5.0%	4.9%	5.0%	4.9%	5.0%
IR	0.04	0.46	0.40	0.55	0.71
Skew	-0.27	0.25	-1.34	0.46	0.24
Start date	Jan-71	Jan-60	Dec-74	Jan-60	Jan-60

Source: Bloomberg, Datastream, Federal Reserve Economic Data, J.P. Morgan Asset Management; data as of February 2018.

We observe low correlation in implementing carry across asset classes

EXHIBIT 7: CARRY, LONG-TERM CORRELATION ACROSS ASSET CLASSES

	Equity carry	Bond carry	Currency carry	Commodity carry
Equity carry	1.00			
Bond carry	0.24	1.00		
Currency carry	0.04	0.03	1.00	
Commodity carry	0.13	0.11	0.05	1.00

Source: Bloomberg, Datastream, Federal Reserve Economic Data, J.P. Morgan Asset Management; data as of February 2018.

MOMENTUM AND CARRY DURING PERIODS OF MARKET STRESS

In exploring the behaviour of momentum and carry during periods of market stress, we examine performance both within asset classes and for a diverse set of approaches to implementation. We have identified six distinct equity crises and six distinct periods of rising rates, and analyse returns during the drawdown periods. We also examine data up to one year from the trough of those crises, such that we include 194 monthly observations during equity stress periods and 256 observations during fixed income stress periods. While there is a commonly held notion that momentum performs well in stress markets while carry performs poorly, we highlight that these relationships are statistically weak. Finally, we observe that both factors can serve important diversifying roles within investor portfolios.

Momentum during stress periods

Throughout our analysis periods, equity time-series momentum has provided an element of downside protection, but the relationship is not universal and it depends on the nature of the crisis. Intuitively, time-series momentum tends to perform well when the market drawdown lasts longer than the time

⁹ Bhansali, Vineer, et al. “Carry and Trend in Lots of Places.” *Journal of Portfolio Management* 41.4 (2015): 82-90.

¹⁰ Fama, Eugene F. “Forward and Spot Exchange Rates.” *Journal of Monetary Economics* 14.3 (1984): 319-338.

¹¹ Fama, Eugene F. and Kenneth R. French. “Commodity Futures Prices: Some Evidence on Forecast Power, Premiums, and the Theory of Storage.” *Journal of Business* (1987): 55-73.

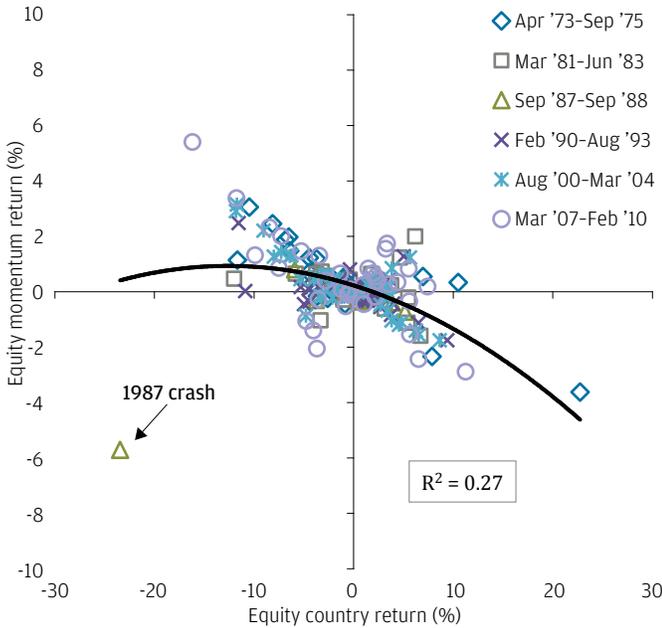
¹² Szymanowska, Marta, et al. “An Anatomy of Commodity Futures Risk Premia.” *Journal of Finance* 69.1 (2014): 453-482.

¹³ Brunnermeier, Markus K., Stefan Nagel and Lasse H. Pedersen. “Carry Trades and Currency Crashes.” *NBER Macroeconomics Annual* 23 (2008): 313-348.

¹⁴ We again size positions through an equal-risk approach based on trailing three-year volatility and scale results on an ex-post basis to a volatility of 5% for illustrative and comparative purposes.

During market crashes, such as Black Monday, the momentum factor lacks the lead time to turn short

EXHIBIT 8: EQUITY TIME-SERIES MOMENTUM DURING EQUITY STRESS PERIODS



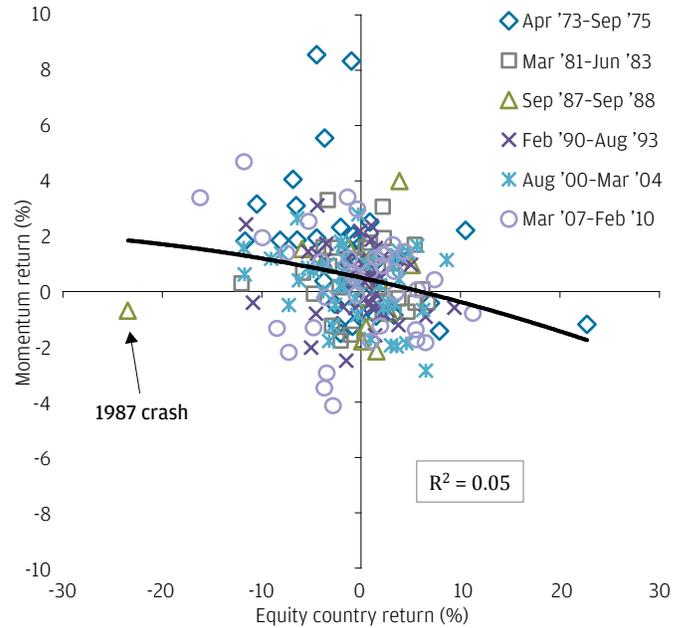
Source: Bloomberg, Datastream, Federal Reserve Economic Data, J.P. Morgan Asset Management; data as of April 2017.

periods used as inputs into the factor—i.e., if the drawdown is longer than 12 months (such as during the global financial crisis), each of the three-month, six-month and 12-month inputs will position momentum to short equities, allowing the strategy to profit from a continued market downturn. Conversely, when markets rapidly correct, such as Black Monday in October 1987, the momentum factor does not have enough lead time to turn short and profit from the drop in prices. Empirically, we can see this distinction in **EXHIBIT 8** with equity time-series returns generally exhibiting positive returns in down markets but not protecting in crash markets, such as Black Monday. While equity drawdowns generally take time to develop, the potential for time-series momentum to experience sharp losses and underperform during sudden market crashes prevents the factor from acting as a reliable tail hedge.

As we highlighted earlier, there is a significant benefit to diversifying time-series momentum across asset classes, and managed futures strategies generally apply the factor across a wide range of markets. Such an approach not only improves risk-adjusted returns but also lessens the sensitivity of the factor to periods of equity market stress. **EXHIBIT 9** highlights a much weaker relationship between time-series momentum returns

Diversifying time-series momentum across asset classes improves risk-adjusted returns and weakens the sensitivity of the factor to periods of equity market stress

EXHIBIT 9: CROSS-ASSET TIME-SERIES MOMENTUM DURING EQUITY STRESS PERIODS



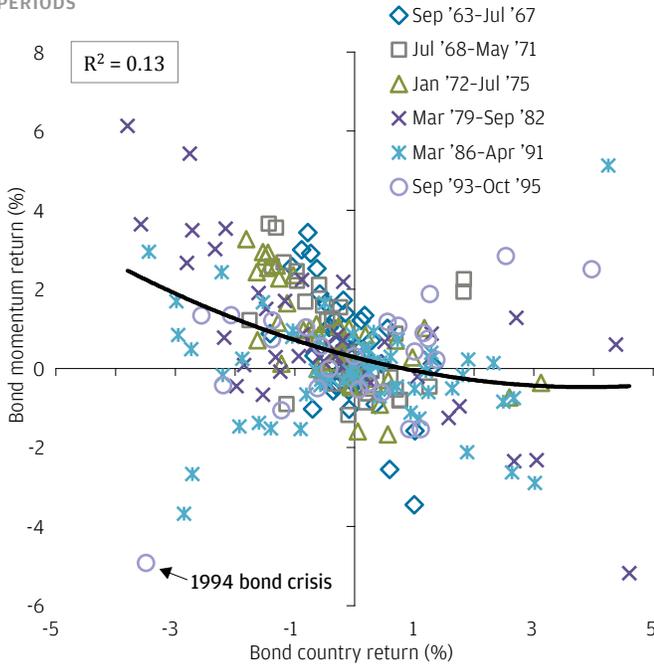
Source: Bloomberg, Datastream, Federal Reserve Economic Data, J.P. Morgan Asset Management; data as of April 2017.

and equity market returns when the factor is implemented across equity, fixed income, currency and commodity markets. In addition, the negative return experienced during the 1987 crash is greatly dampened when equities represent a smaller portion of the factor's overall exposure. Intuitively, the inclusion of a range of asset classes and markets should be beneficial to the strategy, as it is rare for multiple asset classes to draw down simultaneously. Still, there may be periods when a broad set of markets do crash quickly, and a lack of historical correlation does not guarantee that momentum will act as a hedge in future market crises.

We also consider the performance of time-series momentum during periods of fixed income market stress. While government bond markets have generally been in a secular bull market for more than 30 years, our analysis extends back to rising rate periods in the 1970s. In this analysis, we again see generally positive returns for time-series momentum in stress periods. The relationship is not universal, however, with outliers such as the 1994 bond sell-off that started in the U.S. and Japan and spread across developed markets, and the overall relationship is again weak.

The momentum factor has generally profited during bond market stress periods, but there are exceptions

EXHIBIT 10: BOND TIME-SERIES MOMENTUM DURING BOND STRESS PERIODS



Source: Bloomberg, Datastream, Federal Reserve Economic Data, J.P. Morgan Asset Management; data as of April 2017.

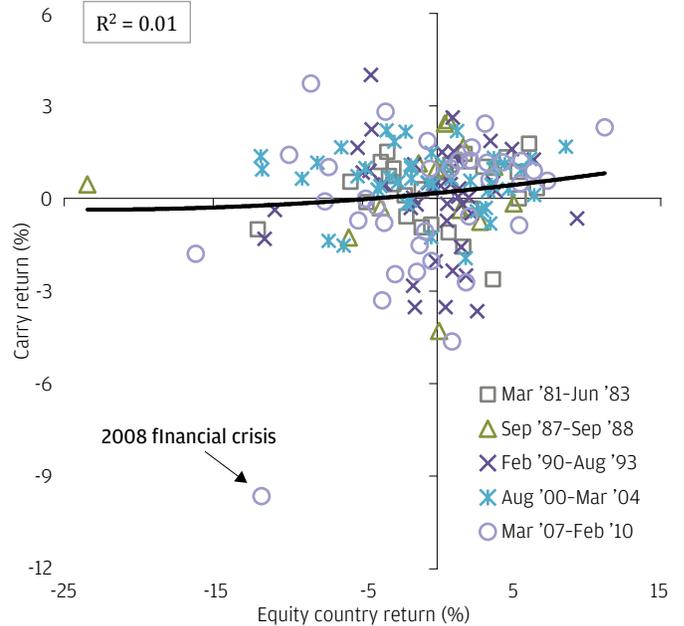
Carry during stress periods

We turn now to an analysis of the carry factor. The performance of FX carry during the financial crisis is often cited as an example of why the carry factor is not as diversifying as momentum. In examining the performance of FX carry across a range of market stress periods, using data going back to the 1980s, we again see that the overall relationship is weak (EXHIBIT 10). In fact, the financial crisis appears to be an extreme outlier, with FX carry positive in 50 of the 81 negative observations in our study (i.e., 62% of the time) (EXHIBIT 11).

Extending the analysis to other asset classes and stress periods, we again see a weak relationship between carry and market returns. EXHIBIT 12 illustrates the performance of bond carry during periods of fixed income market stress dating back to the 1960s. Here the relationship is positive in nature, with bond carry generally performing worse during negative fixed income markets (and better in positive fixed income markets). However, the results are not strong enough to form a meaningful conclusion. A similar story holds when looking at other asset classes, as well as at diversified implementations of carry.

Looking at the performance of FX carry in down markets, the financial crisis appears to be an extreme outlier

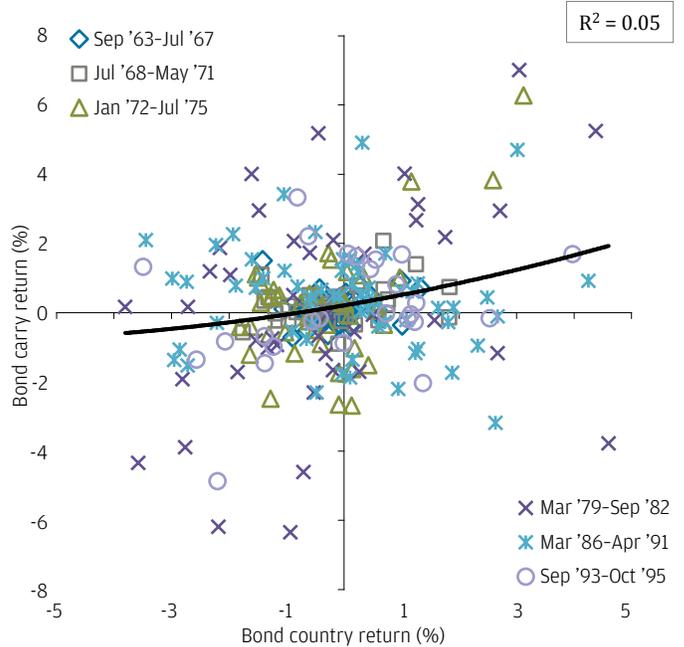
EXHIBIT 11: FX CARRY DURING EQUITY STRESS PERIODS



Source: Bloomberg, Datastream, Federal Reserve Economic Data, J.P. Morgan Asset Management; data as of April 2017.

Bond carry generally performs worse during negative fixed income markets vs. positive markets, but it is not a strong correlation

EXHIBIT 12: BOND CARRY DURING BOND STRESS PERIODS



Source: Bloomberg, Datastream, Federal Reserve Economic Data, J.P. Morgan Asset Management; data as of April 2017.

Low pairwise correlation appears across asset classes and across the momentum and carry factors themselves

EXHIBIT 13: MOMENTUM AND CARRY, LONG-TERM CORRELATION ACROSS ASSET CLASSES

	Equity carry	Equity momentum	Bond carry	Bond momentum	Currency carry	Currency momentum	Commodity carry	Commodity momentum
Equity carry	1.00							
Equity momentum	-0.04	1.00						
Bond carry	0.11	-0.05	1.00					
Bond momentum	0.04	0.24	0.07	1.00				
Currency carry	0.05	-0.04	0.02	0.05	1.00			
Currency momentum	0.00	0.04	0.06	0.03	0.05	1.00		
Commodity carry	0.05	0.02	0.02	0.04	-0.01	-0.03	1.00	
Commodity momentum	0.00	0.13	0.01	0.11	0.00	0.05	0.33	1.00

Source: Bloomberg, Datastream, Federal Reserve Economic Data, J.P. Morgan Asset Management; data as of February 2018.

COMBINING MOMENTUM AND CARRY: AN IMPROVEMENT BUT NOT A PANACEA

As we have demonstrated, both momentum and carry are diversifiers across asset classes and exhibit weak relationships to traditional markets during periods of stress. Are there benefits to be found in combining the two factors? The question is especially relevant in a review of managed futures. Indeed, we do find potential benefits; risk-adjusted returns may improve. In an extension of the correlation matrices shown earlier, EXHIBIT 13 illustrates the low pairwise correlation, not only across asset classes but across momentum and carry factors themselves. Due to this diversification benefit, a portfolio that combines momentum with carry across asset classes may improve risk-adjusted returns (EXHIBITS 14 and 15) as well as lead to the more desired “U-shaped” relationship during periods of market stress, with generally positive returns in down months as well as up months. The statistical relationship is still weak, however, and there may be a wide range of market scenarios in which momentum and carry both under-perform during periods of market stress. In fact, in the

smaller, quicker corrections that we have experienced more recently, such as the August 2011 S&P 500 downgrade, the 2013 taper tantrum and the February 2018 volatility spike, both carry and momentum factors experienced losses.

In summary, momentum, and to a lesser extent carry, largely explain the performance of managed futures strategies. The performance of momentum during periods of market stress has led investors to consider managed futures strategies as tail

A portfolio that combines momentum and carry may improve risk-adjusted returns but it may also underperform during periods of market stress

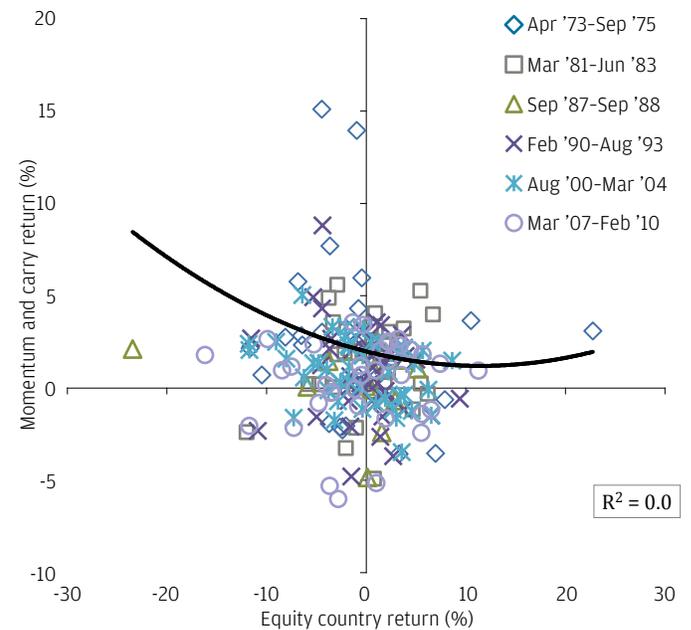
EXHIBIT 14: MOMENTUM AND CARRY, HISTORICAL BACK-TEST RETURNS

	Diversified momentum	Diversified carry	Combined portfolio
Return	2.3%	4.0%	5.7%
Volatility	5.0%	5.0%	5.0%
IR	0.47	0.81	1.14
Skew	-0.50	-0.05	0.58
Start date	Jan-71	Jan-61	Jan-60

Source: Bloomberg, Datastream, Federal Reserve Economic Data, J.P. Morgan Asset Management; data as of February 2018.

Combining momentum and carry may lead to the more desired “U-shaped” relationship, with generally positive returns in down months as well as up months

EXHIBIT 15: MOMENTUM AND CARRY DURING EQUITY STRESS PERIODS



Source: Bloomberg, Datastream, Federal Reserve Economic Data, J.P. Morgan Asset Management; data as of April 2017.

risk hedges. But our analysis, drawing on data back to the 1960s and extending across asset classes, shows that momentum is best classified as a diversifier, given the potential for underperformance in sudden market crashes. The combination of momentum and carry might offer the best of both worlds—the potential for gains in extended market run-ups or declines, as well as for steadier performance during choppy market environments.

What role can such a diversifying strategy play in broad investor portfolios? (EXHIBITS 16 and 17) Given that a combined portfolio of momentum and carry factors (a managed future strategy) offers low correlation to equities and fixed income, along with positive returns, its inclusion in a broad portfolio may improve the efficient frontier for investors. That is, it may allow for higher returns and lower risk across a range of equity/bond allocations—a useful role indeed in any investor’s portfolio.

A combination of momentum and carry is essentially uncorrelated to equities and fixed income

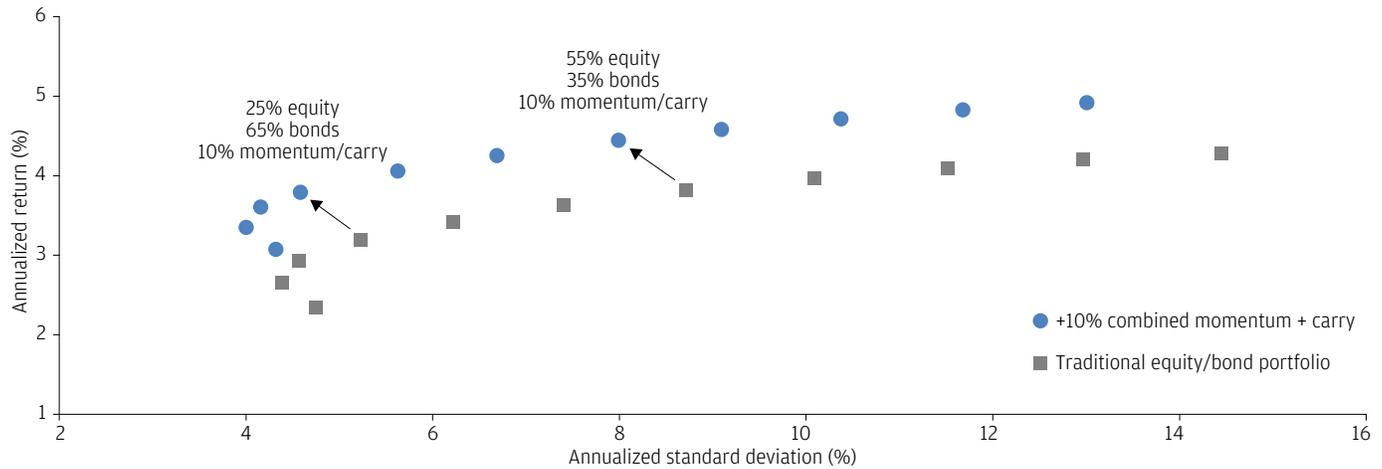
EXHIBIT 16: CORRELATION OF MANAGED FUTURES TO EQUITY, FIXED INCOME

Combined portfolio (momentum + carry)	
vs. Equity	-0.03
vs. Bond	-0.02

Source: Bloomberg, Datastream, Federal Reserve Economic Data, J.P. Morgan Asset Management; data as of April 2017.

Addition of momentum and carry can improve efficient frontier

EXHIBIT 17 EFFICIENT FRONTIER ACROSS PORTFOLIOS



Source: Bloomberg, Datastream, Federal Reserve Economic Data, J.P. Morgan Asset Management; data as of April 2017.

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