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2018
INSIGHTS

Speaking of Correlation...

For the most part, we assume that as investors we cannot consistently predict, or time, the market. Because of this, many investors diversify their portfolio by investing in stocks, bonds, and cash. The idea here is quite simple: Investors solely allocated to stocks during the financial crisis of 2007 would have likely seen their portfolio cut in half. Therefore, it makes sense not to put all your eggs in one basket, so to speak.

Placing all of your money into a single investment... In most cases it's too risky; in other cases, it's not risky enough.

HIGHLIGHTS

- Correlation does not need to be negative or zero for investors to benefit from diversification
- One factor driving the growing popularity of managed futures is the low to negative correlation between managed futures and equities

Such a philosophy, as Modern Portfolio Theory (discussed in further detail on page 2) explains, may either be too risky or not risky enough. Most investors understand that they can reduce their overall risk by diversifying across "different" investments. For example, two stocks which have relatively the same risk, but whose price movements are unrelated, will each be riskier on its own than if both are held in the same portfolio. A basic principle of portfolio composition is the desirability of combining investments that have acceptable expected rates of return but whose prices or values "do not always move in the same direction." This is an intuitive way to describe investments that are "non-correlated." Of course, no level of diversification or non-correlation can ensure profits or guarantee against losses.

The correlation coefficient, a number that must lie within the range −1.00 to +1.00, is a numerical measure of the similarity (or difference) in the returns earned by two investments. Two investments that always move in lockstep would have a correlation of +1.00 or perfect positive correlation. For example, the returns on the first investment are +1%, −3%, +2%, while the returns on the second investment for the same periods are +2%, −6%, +4%. If the two investments always moved in lockstep but in opposite directions, they would have a correlation of −1.00 or perfect negative correlation. For example, the returns on the first investment are +1%, −3%, +2%, while the returns on the second investment for the same periods are −2%, 6%, −4%. Finally, investments whose movements are completely unrelated to each other would have a correlation of zero, and are said to be perfectly uncorrelated.[1]

[1]*Cash, whose return tends to be almost constant (and close to zero!), has a correlation of very close to zero with stocks, for example.*

Definitions of Terms and Indices can be found on page 7.

The following graph depicts two hypothetical investments that exhibit perfect negative correlation. In real life, it is virtually impossible to find two such investments; however, the graph illustrates the important concept of variability in performance of two investments. Note that it is also equally difficult to find perfectly correlated investments, or perfectly uncorrelated investments. However, combining investments that tend to move in different directions (i.e., whose correlation is negative, or positive but close to zero) may tend to mitigate or dampen the overall portfolio's risk or fluctuations in value. Conversely, combining similar investments tends to amplify risk: a portfolio of technology stocks may likely be risker than a portfolio of stocks picked from a number of different industry sectors.

FIGURE 1

Illustrative pattern of rate of return over time with perfect negative correlation

Correlation does not need to be negative or zero for investors to potentially benefit from diversification. Even investments with low, positive correlation may help to lower the risk of a portfolio. Many institutions with large endowments may allocate significant amounts to alternative asset classes with low correlations to stocks and bonds, seeking to benefit from reduced risk and enhanced performance. Yale University, as an example, targeted an allocation as high as 71% to alternative assets, including Absolute Return, Real Assets, and Private Equity for the fiscal year 2012 (as reported in Yale News, September 28, 2011).

In thinking about correlation, it is important to recognize that each investment has an expected rate of return, expected risk, and correlations with other investments. Combining different investments does not affect expected rates of return: the average expected return of the portfolio is simply the weighted average of the returns on the individual investments. However, thoughtful portfolio composition can potentially reduce portfolio risk so that it is lower than the average of the individual risks. Reducing the risk while keeping the expected return the same provides the opportunity to improve the portfolio's "risk-adjusted return." This idea is one of the keystones of Modern Portfolio Theory– ideas developed by Harry Markowitz and William Sharpe, co-recipients of the 1990 Nobel Prize in Economics. Investors must recognize that if they want to earn higher returns, they typically need to take on more risk. What is important is not return in isolation, but return "scaled" by risk.[2]

One last point: our research indicates many investors tend to invest a high percentage of their portfolios in stocks and other equity-like investments.

[2]*This idea can be summarized by measures such as the Sharpe Ratio, which measures, the expected return in excess of the risk-free rate, per unit of portfolio risk.*

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Thus, one of the primary goals of portfolio diversification is to mitigate this "equity market" risk. This can be done by combining stocks with traditional assets like bonds or cash, or with alternative assets like managed futures, which have historically displayed low correlations to stocks.[3]

MANAGED FUTURES: A RAPID-GROWTH ASSET CLASS

Managed futures have been one of the most rapidly growing asset classes, with an estimate $344 billion in AUM as of 2017.[4]

One factor driving the growing popularity of managed futures is the low to negative correlation between managed futures and equities, as shown in the table below.

TABLE 1

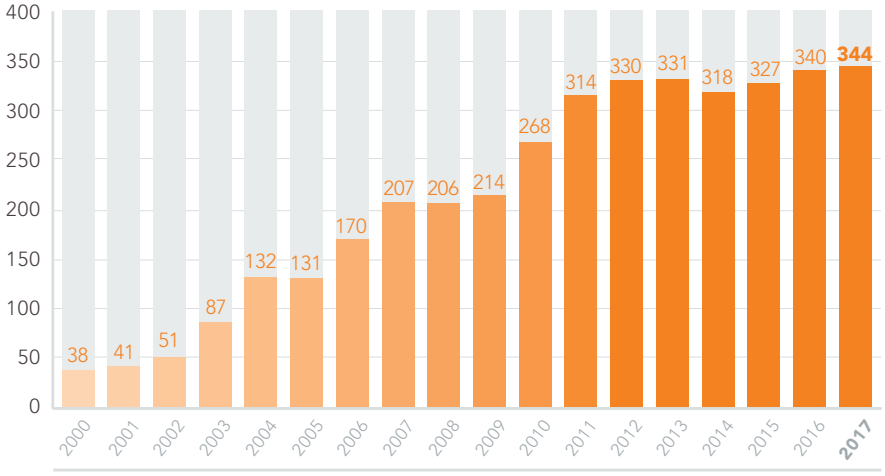
Correlation across asset classes (2000-2017)

	Barclay BTOP50 Index®	Barclay CTA Index	Barclay Aggregate Bond Index®	S&P 500® GSCI Total Return Index	MSCI EAFE-Gross-USD	MSCI EM-Gross-USD*	S&P 500® Total Return Index	Russell 2000 Index
Barclay BTOP50 Index®	**1.00**							
Barclay CTA Index	0.93	**1.00**						
Barclay Aggregate Bond Index®	0.26	0.26	**1.00**					
S&P 500® GSCI Total Return Index	0.06	0.18	-0.04	**1.00**				
MSCI EAFE - Gross - USD	-0.06	0.00	0.02	0.41	**1.00**			
MSCI EM - Gross - USD*	-0.04	0.00	0.05	0.45	0.86	**1.00**		
S&P 500® Total Return Index	-0.17	-0.13	-0.09	0.29	0.87	0.78	**1.00**	
Russell 2000 Index	-0.12	-0.08	-0.13	0.29	0.76	0.73	0.83	**1.00**

FIGURE 2

Growth of managed futures: Assets under management[4]

($ Billion)



**MSCI EM - Gross - USD is as of 1/2001*

[3]Note that alternative asset classes like junk bonds, real estate, private equity, etc. tend to have equity-like risks, and may have appreciable correlations to stocks, particularly during a crisis. This was one of the lessons learned during the crisis of 2008. Managed futures, as we discuss later, have tended to display low correlations to most other asset classes, including stocks, during both normal times as well as during crises.

[4]Source: Barclay Hedge as of 9/30/2017

Definitions of Terms and Indices can be found on page 7.

Indices are unmanaged and not available for direct investment.

RECENT PERFORMANCE

The table below examines the performance of the Barclay BTOP50 Index®, representing managed futures, and the S&P 500® Total Return Index (equities) from January 2000 – December 2017. As the table reveals, the correlation coefficient from January 2000 – December 2017 between the managed futures index and the stock index is −0.16. However, this average (slightly negative) value of the coefficient reveals an even more interesting underlying pattern: the correlation coefficients during the bull market years of 2004-2007 were as high as 0.65, which is a fairly high degree of positive correlation. Conversely, during the bear market years of 2000, 2001, 2002, and 2008, managed futures showed fairly high negative correlations, as low as −0.67. This analysis provides further evidence about the value of a diversified portfolio in offering return potential at varying times.

TABLE 2

Recent performance (%)

YEAR	MANAGED FUTURES[5]	EQUITIES[5]	CORRELATION COEFFICIENT	OBSERVATION[6]
2000	6.61	-9.09	-0.22	"Down" stock market: Managed futures negatively correlated
2001	3.85	-11.88	-0.64	
2002	13.67	-22.10	-0.67	
2003	**15.52**	**28.68**	**0.10**	**Transition year in long-term equity trends**
2004	0.87	10.88	0.55	"Up" stock market: Managed futures positively correlated
2005	2.40	4.91	0.65	
2006	5.59	15.80	0.54	
2007	7.58	5.49	0.54	
2008	13.58	-37.00	-0.65	"Down" stock market
2009	-4.76	26.46	-0.04	"Up" stock markets
2010	6.40	15.07	0.50	
2011	-4.25	2.11	-0.23	
2012	-1.83	16.00	-0.28	
2013	0.76	32.39	0.49	
2014	12.32	13.69	0.42	
2015	-0.92	1.41	-0.06	
2016	-4.44	11.96	-0.39	
2017	-0.58	21.83	0.16	
2000-2017	3.85	5.40	-0.16	

Sources: barclayhedge.com; PerTrac Financial Solutions

[5]*Annualized Rate of Return*

Managed Futures: *Barclay BTOP50 Index®*

Equities: *S&P 500® Total Return Index*

Indices are unmanaged and not available for direct investment.

[6]*"Up" and "Down" stock market as provided by the S&P 500® Total Return Index.*

Definitions of Terms and Indices can be found on page 7.

If we look at the graph below representing the rolling correlation of the S&P 500® Total Return Index and the managed futures index for the same period of time as the previous table, we note some interesting facts.

- When the VAMI (Value Added Monthly Index) of the S&P 500® Total Return Index declined following October 2007, the 12-month rolling correlation with the Barclay BTOP50 Index® again reverted to negative.
- When the VAMI of the S&P 500® Total Return Index returned to an upward trend in March 2009, the correlation with the Barclay BTOP50 Index® again reverted to positive

Managed Futures: *Barclay BTOP50 Index®*

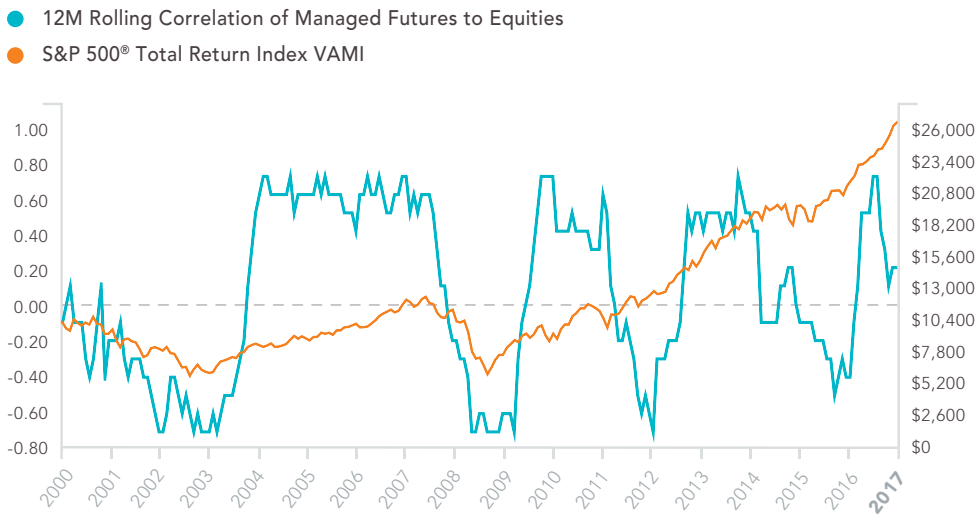
Equities: *S&P 500® Total Return Index.*

Definitions of Terms and Indices can be found on page 7.

Sources: barclayhedge.com; Morningstar Direct

FIGURE 3

Managed futures correlation in bull and bear markets



These trends suggest that managed futures offer the possibility of positive returns during rising stock markets. Correspondingly, when stock markets are in decline, managed futures still have profit potential. This duality is a strong reason to consider managed futures in changing market environments. It also shows that it may be difficult or even futile to try to tactically time managed futures (or, for that matter, any other asset class), because historical performance may not necessarily be the best predictor of future performance, and future short-term performance for the most part tends to be unpredictable.

MANAGED FUTURES DURING FINANCIAL CRISES

The table below examines 15 financial crisis over the past 30 years. As you can see, managed futures were positive during 12 of the 15 periods, while equity returns ranged from -6.5% to -46.4% during the same time periods. This data suggest that significant market disruptions have historically created favorable return environments for managed futures. Of course, there is no guarantee that these patterns will repeat during futures crises, should they occur.

TABLE 3

Event risk and correlation (%)

Managed futures returns during significant financial market disruptions[7]

PERIOD	EQUITY RETURNS	MANAGED FUTURES RETURNS	DESCRIPTION OF CRISIS
SEP-NOV 1987	-29.7	8.5	Black Monday
JUL-OCT 1990	-14.1	13.5	Iraq invades Kuwait
FEB-MAR 1994	-7.0	1.0	First Fed hike since 1989
JUL-AUG 1998	-15.4	5.4	Russian default and LTCM crisis
SEP-NOV 2000	-13.1	6.0	USS Cole; Mad Cow outbreak; Bush v Gore
FEB-MAR 2001	-14.9	5.3	Bush inaugurated; US and Britain attack Iraq
JUL-SEP 2001	-14.7	4.1	Events leading up to 9/11 attacks
APR-SEP 2002	-28.4	18.7	Enron and WorldCom; End of tech bubble
DEC-FEB '02-03	-9.7	17.5	War in Iraq, SARS outbreak
JUN-FEB '08-09	-46.4	7.2	Global financial crisis (The Great Recession)
MAY-JUN 2010	-12.8	-2.8	Greek crisis
MAY-SEP 2011	-16.3	-2.1	Eurozone debt crisis; US credit downgrade
APR-MAY 2012	-6.6	2.2	Continuing European crises
AUG-SEP 2015	-8.4	-0.2	Chinese currency crisis
DEC-JAN '15-16	**-6.5**	**1.3**	**Draghi stimulus fiasco; first Fed hike since 2006**

As with any asset class, managed futures will experience periods of loss or relative underperformance. This variability is the nature of investing. However, managed futures may offer investors an opportunity to diversify their portfolio with an asset class that has historically displayed a low to negative correlation with traditional investments, while posting returns on par with those of equities.[8] As such, we believe that they warrant consideration as a diversifying alternative asset class in investor portfolios.

Managed Futures: Barclay BTOP50 Index®

Equities: S&P 500® Total Return Index.

[7]Source: Morningstar Direct

[8]Ibbotson Associates, "Managed Futures and Asset Allocation: August 2006;" p. 9 and 12.

Bibliography: "Much Ado About Correlation," Christopher C. Finger, RiskMetrics Group. "A Stress Test To Incorporate Correlation Breakdown," Jongwoo Kim and Christopher C. Finger, RiskMetrics Group. "Correlation," EMC Capital Management.

Indices are unmanaged and not available for direct investment.

APPENDIX

DEFINITIONS

Annualized rate of return (AROR) is the geometric average return for a period greater than or equal to one year, expressed on an annual basis or as a return per year.

Correlation Coefficient is a statistical measure of how two investments move in relation to each other. A correlation of +1.0 implies that as one investment moves, either up or down, the other investment will move lockstep, in the same direction. A correlation of -1.0 means that if one investment moves in either direction the other investment will move in the opposite direction. A correlation of 0 indicates that the movements of the investments have no correlation; they are completely random.

Modern Portfolio Theory (MPT) is a theory on how risk-averse investors can construct portfolios to optimize or maximize expected return based on a given level of market risk, emphasizing that risk is an inherent part of higher reward.

Risk-adjusted return is a concept that refines an investment's return by measuring how much risk is involved in producing that return, which is generally expressed as a number or rating. Risk-adjusted returns are applied to individual securities and investment funds and portfolios.

VAMI (Value Added Monthly Index) is an index that tracks the monthly performance of a hypothetical $1000 investment. The calculation for the current month's VAMI is:
= Previous VAMI x (1 + Current Rate of Return).

INDEX DESCRIPTIONS

The **Barclay BTOP50 Index® (BTOP50)** seeks to replicate the overall composition of the managed futures industry with regard to trading style and overall market exposure.

The **Barclays Capital US Aggregate Bond Index®** covers the USD-denominated, investment-grade, fixed-rate, taxable bond market of SEC-registered securities. The index includes bonds from the Treasury, Government-Related, Corporate, MBS (agency fixed-rate and hybrid ARM pass-throughs), ABS and CMBS sectors. The US Aggregate Index is a component of the US Universal Index in its entirety. The index was created in 1986, with index history backfilled to January 1, 1976. Source: barcap.com.

The **MSCI® EAFE® Index** (Europe, Australasia, Far East) is a free float-adjusted market capitalization index that is designed to measure the equity market performance of developed markets, excluding the US & Canada. As of May 2009 the MSCI EAFE Index consisted of the following 21 developed market country indices: Australia, Austria, Belgium, Denmark, Finland, France, Germany, Greece, Hong Kong, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland and the United Kingdom. Source: msci.com.

The **MSCI Emerging Markets Index** captures large and mid cap representation across 23 Emerging Markets (EM) countries (Brazil, Chile, China, Colombia, Czech Republic, Egypt, Greece, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Peru, Philippines, Poland, Russia, Qatar, South Africa, Taiwan,Thailand, Turkey and United Arab Emirates). With 836 constituents, the index covers approximately 85% of the free float-adjusted market capitalization in each country.
Source: msci.com.

Russell 2000 Index is an index measuring the performance approximately 2,000 small-cap companies in the Russell 3000 Index, which is made up of 3,000 of the biggest US stocks. The Russell 2000 serves as a benchmark for small-cap stocks in the United States.

The **S&P 500® Total Return Index** is widely regarded as the best single gauge of the US equities market. This world-renowned Index includes 500 leading companies in leading industries of the US economy. Although the S&P 500® focuses on the large cap segment of the market, with approximately 75% coverage of US equities, it is also an ideal proxy for the total market. Total return provides investors with a price-plus-gross cash dividend return. Gross cash dividends are applied on the ex-date of the dividend. Source: standardandpoors.com.

The **S&P GSCI® Total Return Index** is widely recognized as a leading measure of general price movements and inflation in the world economy. It provides investors with a reliable and publicly available benchmark for investment performance in the commodity markets, and is designed to be a "tradable" index. The index is calculated primarily on a world production-weighted basis and is comprised of the principal physical commodities that are the subject of active, liquid futures markets. Source: standardandpoors.com.

A WORD ABOUT RISK

THE PURCHASE OF A MANAGED FUTURES INVESTMENT INVOLVES A HIGH DEGREE OF RISK. SPECIFICALLY, YOU SHOULD BE AWARE THAT, IN ADDITION TO NORMAL INVESTMENT RISKS, MANAGED FUTURES INVESTMENTS ENTAIL CERTAIN RISKS, INCLUDING, IN ALL OR SOME CASES:

- MANAGED FUTURES OFTEN ENGAGE IN LEVERAGING AND OTHER SPECULATIVE INVESTMENT PRACTICES THAT MAY INCREASE THE RISK OF INVESTMENT LOSS.
- MANAGED FUTURES CAN BE HIGHLY ILLIQUID.
- MANAGED FUTURES ARE NOT REQUIRED TO PROVIDE PERIODIC PRICING OR VALUATION INFORMATION TO INVESTORS.
- MANAGED FUTURES MAY INVOLVE COMPLEX TAX STRUCTURES AND DELAYS IN DISTRIBUTING IMPORTANT TAX INFORMATION.
- MANAGED FUTURES ARE NOT SUBJECT TO THE SAME REGULATORY REQUIREMENTS AS MUTUAL FUNDS.
- MANAGED FUTURES OFTEN CHARGE HIGH FEES

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