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THE EFFECT OF ABSOLUTE RETURN STRATEGIES ON RISK-FACTOR DIVERSIFICATION AND PORTFOLIO PERFORMANCE

Abstract

Absolute return strategies attempt to generate positive returns that are uncorrelated with equity or bond markets and can be used to increase diversification and performance within multi-asset class portfolios. The current paper compared diversification and portfolio performance between traditional multi-asset class portfolios and multi-asset class portfolios with the addition of absolute return strategies. Using closing prices from January 1, 2000 – June 30, 2018, this paper back-tested two multi-asset class portfolios, one composed of equities, fixed income securities, and real return strategies, and the other portfolio composed of the same asset classes but with the addition of absolute return strategies. In particular, the absolute return strategies that this paper added were equity market neutral strategies, managed futures, and global macro strategies. Results indicated that the use of absolute return strategies improved diversification by increasing the portfolio's effective number of bets (ENB) and enhanced risk adjusted returns as measured by improved Sharpe ratios, Treynor ratios, Jensen's Alphas, and Sortino ratios. In addition, results showed that the benefits of adding absolute return strategies accrued throughout a full market cycle, which included declines and advances. These results support previous research on the individual absolute return strategies and demonstrate that the portfolio performance and investor wealth can be improved with the addition of these absolute return strategies to multi-asset class portfolios.

Keywords equity market neutral, managed futures, global macro, effective number of bets (ENB)

JEL Classification C12, G10, G11, G19, G23

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INTRODUCTION

To reduce risk, investors traditionally diversify by allocating exposures among different asset classes. Unfortunately, conventional asset classes may be highly correlated (Zakamulin, 2015), especially during periods of market stress (Ang & Bekaert, 2015). As a result, holding numerous traditional asset classes may concentrate risk rather than diversify it, thereby increasing volatility. Given these problems, alternative strategies, known as "absolute return strategies" that truly diversify risk could increase performance.

Absolute return strategies are hedge funds that seek to generate positive returns regardless of equity or bond market conditions. Since absolute return strategies have different risk and return characteristics and, in theory, move independently from stocks, bonds, and real return strategies, they can improve portfolio diversification.

While research on multi-asset class portfolios has included traditional assets and real return strategies, to date, risk factor diversification on

multi-asset class portfolios has not included absolute return strategies. Consequently, the field has a limited understanding of their benefits. The goal of the current study is to fill the gap in the research by exploring risk factor diversification and portfolio performance in multi-asset class portfolios that include absolute return strategies.

1. LITERATURE REVIEW, RESEARCH ANALYSIS, AND HYPOTHESES

Diversification is key to reducing volatility and improving risk-adjusted returns in disparate markets (Bodie et al., 2018). Unfortunately, true diversification is hard to define and is usually explained as "not putting all your eggs in one basket." However, limiting the "baskets" to traditional asset classes does not achieve the diversification investors need. Both Roll (2013) and Roncalli (2013) observed that effective portfolio diversification can only be achieved by distributing exposures evenly across a large number of uncorrelated risk factors rather than by distributing exposures across a large number of stocks or asset classes.

For example, Table 1 shows some common equity asset classes investors use to diversify their equity exposure. These asset classes are correlated at a range of r = .61 to r = .95, with an average correlation of r = .79; therefore, the movement of these asset classes is highly correlated. Though many equity asset classes are used (each representing many more individual stocks), true risk reduction is limited due to the high correlation between the equity asset classes. The same could be said for many bond asset classes. Their high correlation (Duffee, 1998) to one another limits their diversification benefits.

The limited use of alternative assets in portfolios also escalates risk. As stated in the opening, conventional asset classes are often highly correlated (Zakamulin, 2015), especially during periods of market stress (Ang & Bekaert, 2015); therefore, true diversification cannot be achieved (Markowitz, 1952). Investors often react quickly to fear (Baumeister et al., 2001), and, when fear pervades, investors generally sell risk assets, including stocks and bonds (Huang et al., 2015). These risk assets tend to decline when stocks decline, regardless of their asset class. Two strategies that have been shown to improve diversification, however, are real return and absolute return strategies.

To further reduce risk, assets with risk and return characteristics different than traditional assets ought to be included in portfolios. One group of such assets are called "real return strategies." These assets attempt to provide a real return – a positive return – in relation to inflation and typically include real estate, commodities, infrastructure, and natural resources.

For example, Gorton and Rouwenhorst (2004) found that commodity futures' negative correlation with stock and bond portfolios has been

Table 1. Correlation matrix of common equity asset classes from January 2000 – June 2018

Source: Bloomberg, retrieved November 1, 2018.

Asset Class	US Large Cap Stocks[a]	International Large Cap Stocks[b]	US Small Cap Stocks[c]	International Small Cap Stocks[d]	Emerging Market Stocks[e]
US Large Cap Stocks[a]	1.00				
International Large Cap Stocks[b]	0.86	1.00			
US Small Cap Stocks[c]	0.86	0.66	1.00		
International Small Cap Stocks[d]	0.82	0.95	0.68	1.00	
Emerging Market Stocks[e]	0.75	0.84	0.61	0.84	1.00

Note: a. The S&P 500 Index was used to represent U.S. large cap stocks; b. The MSCI EAFE Index was used to represent international large cap stocks; c. The S&P 600 Index was used to represent U.S. small cap stocks; d. The MSCI EAFE Small Cap Index was used to represent international small cap stocks; and the MSCI Emerging Markets Index was used to represent emerging market stocks.

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especially effective in providing diversification. Similarly, Beckers et al. (2009) determined that commodities and real estate increased diversification benefits when added to traditional portfolios. Finally, Cremers (2013) found that commercial real estate, natural resources (namely timberland and farmland), and energy infrastructure provided significant diversification benefits as well. Real return strategies, then, are one method proven to increase diversification and reduce risk; however, during times of market stress, real return strategies, such as real estate and commodities, can follow a pattern similar to conventional risk assets (Garcia-Feijoo et al., 2012). Other alternative strategies, known as "absolute return strategies," tend to follow different patterns. These strategies attempt to generate high positive returns that are not correlated to equity or bond markets while maintaining a low standard deviation of returns (Papagiannis, 2009).

Klement (2015) analyzed mutual funds pursuing an absolute return objective from September 1994 through November 2014 and discovered negative monthly excess returns during this period. He also found increased correlation between absolute return mutual funds and US equities during times of extreme market stress, highlighting a reduction in their primary diversifying benefit. It is important to note that, in his research, 68% of the funds were available only after the financial crisis in 2008, a period of particular strength for US stocks. In addition, Klement focused on absolute return mutual funds in aggregate, not on individual absolute return strategies. Klement concluded that a few strategies outperformed the overall group of absolute return strategies and that further research was needed to assess their value. Since diversification gains are driven mainly by a well-balanced allocation over different uncorrelated asset classes (Jacobs et al., 2014), it is important to segregate the low- or non-correlated strategies in his study from the more highly correlated strategies to avoid missing the potential diversification benefits of low- or non-correlated absolute return strategies. In response to this limitation, the present study incorporated three low- or non-correlated absolute return strategies within traditional multi-asset class portfolios to determine benefits in diversification and performance.

Protecting against loss during bearish cycles is as important to building wealth as growing assets during bullish cycles (Lebowitz, 2016); given that some absolute return strategies have low correlation to equity markets, these strategies can reduce market risk and provide downside protection during times of market stress, similar to investing in bonds. Because their movement is not tied to bonds, they can be added without increasing interest rate risk (Johnson et al., 2014). In addition, during periods when stocks and bonds move in tandem (i.e., when stocks decline and interest rates rise, as in 2022), non-correlated absolute return strategies can provide a systematic risk buffer. This is not to say that investing in absolute return strategies is risk-free. These strategies come with inherent risk, and the risks vary significantly among the strategies.

Three of the more commonly used absolute return strategies exhibiting low or no correlation to equity and bond markets are (1) equity market neutral strategies, (2) global macro strategies, and (3) managed futures strategies. Table 2 highlights the correlation of these strategies to bonds and stocks. These asset classes are correlated at a range of r = .07 to r = .62, with an average correlation of r = .30 (as compared to r = .79 for traditional asset classes found in Table 1). The following section explores equity market neutral, global macro, and managed futures strategies in greater detail.

Equity market neutral strategies seek to make a positive and similar return, regardless of the overall stock market's direction. These strategies involve taking long and short positions in different stocks at the same time, so returns are principally due to a manager's ability to buy stocks that will increase in value and short stocks that will lose value, not due to the general movement of the stock market (Downes & Goodman, 2018). These strategies generally employ a bottom-up analysis to determine the value of a stock relative to other stocks, so that underpriced stocks can be purchased while overpriced stocks can be shorted. By balancing long and short exposure, these strategies can isolate mispricing of securities and remove passive market exposure (Cotton, 2014).

Brandon and Wang (2013) studied a number of hedge fund strategies, including equity market

Table 2. Correlation matrix of global bond, equity market neutral, global macro, managed futures, and global stock, asset classes from January 2010 to June 2018

Source: Bloomberg, retrieved November 1, 2018.

Asset Class	Global Bonds[a]	Equity Market Neutral[b]	Global Macro[c]	Managed Futures[d]	Global Stocks[e]
Global Bonds[a]	1.00				
Equity Market Neutral[b]	0.39	1.00			
Global Macro[c]	0.07	0.17	1.00		
Managed Futures[d]	0.18	0.11	0.62	1.00	
Global Stocks[e]	0.36	0.58	0.37	0.17	1.00

Note: a. the Bloomberg Barclays Intermediate Global Bond Index was used to represent global bonds; b. the Credit Suisse Equity Market Neutral Index was used to represent equity market neutral strategies; c. the Credit Suisse Global Macro Index was used to represent global macro strategies; d. the Credit Suisse Managed Futures Index was used to represent managed futures strategies; and e. the MSCI ACWI Index was used to represent global stocks.

neutral strategies, from 1995 to 2005 to determine the effect of liquidity risk on performance. Liquidity risk stems from the inability to sell or buy a security quickly. While they learned that liquidity risk accounted for most of the excess return in event-driven, emerging markets and long/short equity hedge fund strategies, equity market neutral strategies generated residual alpha after accounting for liquidity risk.

Global macro strategies focus on macroeconomic or political conditions (Chen, 2020). While strategies vary, managers tend to purchase relative value with the goal of profiting from inefficiencies in global capital markets. Investors profit by correctly investing in financial instruments whose prices are influenced by macro events. These strategies seek to gain from market participants, like central banks and governments, who are not trying to maximize profits. A recent example comprises the resignation of the Dutch Prime Minister and the government's collapse from failure to reach an austerity budget in 2012. While government failures are not uncommon in other functioning democracies, this was an unexpected occurrence in the Netherlands. As a result, Dutch government bond prices fell. Global macro managers, who thought this drop was a temporary mispricing, profited when the government reformed. Global macro managers are generally less constrained than other portfolio managers and can invest in all major capital markets: bonds, currencies, commodities, and equities (Downes & Goodman, 2018).

Patton and Ramadorai (2013) established evidence that global macro funds, as well as some other hedge funds, reduced risk in their portfolios more quickly than mutual funds due to speed of trading. The researchers analyzed 15,000 hedge funds and 33,000 mutual funds from 1994 to 2009 using daily closing prices. They discovered that global macro funds were quick to reduce their risk exposures in response to significant market events, whereas mutual funds traded at a much lower frequency when responding to these events.

Managed futures are a category of alternative assets that specialize in using global futures and options markets for investing. In place of stock and bond managers, commodity trading advisors (CTA), invest in futures contracts (Downes & Goodman, 2018). Like global macro managers, CTAs are typically unconstrained and can obtain exposure in all major capital markets; however, CTAs gain exposure through futures and options contracts. Most CTAs attempt to profit by identifying trends. One such strategy, time series momentum, has produced a high Sharpe ratio (an indicator of risk-adjusted returns) in both bull and bear markets (Hurst et al., 2013). In addition, like global macro strategies, managed futures strategies offer investors protection during down markets (Cao et al., 2014).

Cao et al. (2014) studied 7,456 hedge funds (encompassing a variety of strategies) from January 1994 through December 2011 to determine which strategies protected against market downturns. They found that although some strategies magnified downside risk, global macro, managed futures, and multi-strategy styles provided valuable hedges against market declines.

Collectively, the studies discussed above illustrate the potential downside protection equity market neutral, global macro, and managed futures strat-

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egies can provide during periods of market stress. One logical extension of the previous research on equity market neutral, global macro, and managed futures strategies, is to determine if these absolute return strategies also improve diversification and portfolio performance.

The purpose of the current paper was to compare diversification and portfolio performance in multi-asset class portfolios without absolute return strategies to multi-asset class portfolios with the inclusion of absolute return strategies. Given the arguments above, this paper proposes the following hypotheses:

H1: The addition of absolute return strategies improves diversification in multi-asset class portfolios that already contain equities, fixed income, and real return strategies as compared to multi-asset class portfolios that contain only equities, fixed income, and real return strategies.

H2: The addition of absolute return strategies improves portfolio performance in multi-asset class portfolios that already contain equities, fixed income, and real return strategies as compared to multi-asset class portfolios that contain only equities, fixed income, and real return strategies.

2. METHODS

In this study, risk diversification was measured by using the effective number of bets (ENB) (Meucci, 2009) and extends the research of three previous studies using ENB (Carli et al., 2014; Kind & Poonia, 2015; Sharma, 2017). ENB is based on the entropy of diversification distribution. Entropy measures the uniformity of a distribution or the level of portfolio diversification (Stone, 2016). Diversification distribution is a set of probabilities that sum to one, and a well-diversified portfolio has risk uniformly distributed. A portfolio's level of diversification is revealed by a distribution curve. If the curve displays a large peak, then the portfolio is concentrated in a specific factor. Simply put, ENB measures number of uncorrelated risk factors, and, because it measures independent risk contributions, the greater the ENB, the better the diversification (Shi, 2015). Mathematically, ENB is defined as follows:

$$N = e^{-\sum_{k=1}^{n} \rho_k \ln \rho_k}, \quad (1)$$

where N is equal to the ENB, n is the number of factors, and ρ_k is discrete probability distribution (Meucci et al., 2013). When the risk factors contribute equally to the variance, the ENB is maximized. Conversely, when the risk is concentrated in one factor, the ENB equates to one.

Carli et al. (2014) utilized ENB to examine the performance of defined benefit plans in the 1,000 largest US pension funds investing in equities, fixed income, and real return strategies. The present paper optimized portfolios via ENB using the same asset classes in which the pension plans from Carli et al. (2014) were invested. In this study, a second portfolio was then created, also optimized via ENB and with the same asset classes, while adding absolute return strategies. Finally, the performance of the two portfolios were compared.

The fixed income asset classes used in the present quantitative study included the following: domestic bonds, international/global bonds, high-yield bonds, inflation-linked bonds, mortgages, and cash. The equity asset classes included the following: domestic stocks, international stocks, global stocks, and private equity. Real return strategies were represented by real estate and commodities, again with the same asset classes used by Carli et al. (2014).

In this study, the following indices were used as benchmarks for each asset class:

- Domestic fixed income: Bloomberg Barclays US Government/Corporate Index,
- International/Global fixed income: JP Morgan Global Aggregate Bond Index,
- High-yield bond: FTSE High-yield Market Index,
- Inflation-linked bond: Bloomberg Barclays US Treasury Inflation-linked Index,
- Domestic equity: S&P 500 Index,

- International equity: MSCI EAFE Index,
- Private equity: S&P 600 Small-cap Index,
- Real estate: the FTSE Nareit All Equity REIT Index,
- Commodity: Bloomberg Commodity Index,
- Mortgage: Bloomberg Barclays GNMA Index, and
- Cash: 3-month US Treasury Bill.

In addition to these asset classes, the following strategies were used as absolute return strategies: equity market neutral strategies, managed futures strategies, and global macro strategies. These three strategies were selected given their availability to investors through both private placements and mutual funds and to reduce variables to a workable number. More importantly, prior research on these absolute return strategies has illustrated theses strategies' potential to improve portfolio performance (Brandon & Wang, 2013; Cao et al., 2014; Patton & Ramadorai, 2013). The following indices were used as benchmarks for each strategy:

- Equity market neutral: Credit Suisse Equity Market Neutral Index,
- Managed futures: Credit Suisse Managed Futures Index, and
- Global macro: Credit Suisse Global Macro Index.

Prior to 2000, pricing data on many absolute return strategies was unavailable. As a result, the present paper examined the period of January 1, 2000 – June 30, 2018. Importantly, this time period represented all phases of a market cycle. Pricing data was collected on a monthly basis because absolute return strategies are priced only monthly. Prices and returns for study indices were obtained via Bloomberg Professional Services. Data were downloaded from Bloomberg Terminal into MathWorks software to determine if adding absolute return strategies could increase ENB (see Deguest et al. 2013; Meucci 2009).

To compare performance, the Bloomberg Terminal time series data were used to create two portfolios on Bloomberg's Portfolio & Risk Analytics platform – one with absolute return strategies and one without absolute return strategies. Optimization via ENB (through MathWorks) determined the portfolio assets' weights. The Bloomberg Terminal times series data was downloaded into Morningstar Direct to calculate performance.

This paper utilized systematic random sampling, with a starting date of January 1, 2000, and a finishing date of December 31, 2018. This start date was chosen due to the limited availability of pricing data for absolute return strategies before this date. The interval for the sampling strategy was monthly, again, due to the limited availability of pricing data. This sampling strategy freed the data from any researcher bias and allowed for an even distribution of the data across the population during the sample period.

3. RESULTS

Hypothesis one stated that the addition of absolute return strategies improves diversification in multi-asset class portfolios that already contain equities, fixed income, and real return strategies compared to multi-asset class portfolios that contain only equities, fixed income, and real return strategies. To calculate the ENB for each portfolio, monthly return data was collected for a period of five years, beginning on January 1, 2000; therefore, the ENB for the two portfolios began on January 1, 2005. Table 3 highlights the annual and mean ENB for each portfolio. The addition of absolute return strategies improved diversification, as indicated by the ENB data presented in Table 3, compared to multi-asset class portfolios that contain only equities, fixed income, and real return strategies: t (13) = 22.25, $p < .001$. Hypothesis one was supported. Full results for hypothesis one can be found in Table 3.

To measure performance between the portfolio with absolute return strategies as compared to the portfolio without absolute return strategies, this paper compared Sharpe ratios (Bodie et al., 2018), Treynor ratios (Bodie et al., 2018), Jensen's alphas (Bodie et al., 2018), and Sortino ratios (Srivastava

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Table 3. Change in portfolio ENB due to absolute return strategies

Year	ENB With Absolute Return Strategies	ENB Without Absolute Return Strategies
2005	9.28	6.93
2006	8.80	6.99
2007	9.25	7.07
2008	10.23	8.00
2009	9.74	7.83
2010	9.28	7.68
2011	9.34	7.61
2012	9.39	7.65
2013	9.62	7.92
2014	9.58	7.27
2015	9.78	7.25
2016	10.36	7.68
2017	10.37	7.91
2018	10.81	8.45
Mean	9.70	7.59

Note: t (13) = 22.25, $p < .001$. Results were calculated with a One-Tailed Paired t Test.

& Mazhar, 2018). Each statistic was calculated in the following ways:

1. The Sharpe ratio measured the excess return of an asset or portfolio over the return of a risk-free rate divided by the standard deviation of returns (Bodie et al., 2018).

2. The Treynor ratio measured the excess return of an asset or portfolio over the return of a risk-free rate divided by the beta of returns (Bodie et al., 2018).

3. Jensen's alpha measured the return of an asset or portfolio in excess of the return predicted by CAPM based on the asset's or portfolio's beta (Bodie et al., 2018).

4. The Sortino ratio measured the excess return of an asset or portfolio over the return of a risk-free rate divided by the downside deviation of returns (Srivastava & Mazhar, 2018).

To compute these statistics, 36 months of performance data were used for each portfolio. Because performance began with the establishment of the portfolios on January 1, 2005, the calculating of these statistics on a monthly basis started on January 1, 2008, and finished on December 31, 2018. Table 4 shows the Sharpe ratio, the Treynor ratio, Jensen's Alpha, and the Sortino ratio of each portfolio on an annual basis based on that 36-month performance period.

Hypothesis two stated that the addition of absolute return strategies improves portfolio performance in multi-asset class portfolios that already contain equities, fixed income, and real return strategies compared to multi-asset class portfolios that contain only equities, fixed income, and real

Table 4. Annual Sharpe ratio, Treynor ratio, Jensen's Alpha and Sortino ratio of the two portfolios

Performance Period	Sharpe Ratio		Treynor Ratio		Jensen's Alpha		Sortino Ratio	
	With	Without	With	Without	With	Without	With	Without
Jan 2008 – Dec 2010	0.24	0.14	3.22	0.56	1.88	0.00	0.33	0.18
Jan 2009 – Dec 2011	0.87	0.87	15.02	14.86	0.07	0.00	1.48	1.47
Jan 2010 – Dec 2012	0.75	0.75	9.76	9.66	0.05	0.00	1.23	1.22
Jan 2011 – Dec 2013	0.75	0.73	8.10	7.82	0.21	0.00	1.18	1.14
Jan 2012 – Dec 2014	1.24	1.21	9.96	9.74	0.19	0.00	2.04	2.00
Jan 2013 – Dec 2015	0.56	0.48	4.18	3.48	0.55	0.00	0.91	0.77
Jan 2014 – Dec 2016	0.40	0.38	3.11	2.89	0.14	0.00	0.64	0.62
Jan 2015 – Dec 2017	0.75	0.71	5.37	5.03	0.26	0.00	1.25	1.19
Jan 2016 – Dec 2018	0.49	0.52	3.58	3.80	-0.22	0.00	0.66	0.71

return strategies. This hypothesis was tested using Sharpe ratios, Treynor ratios, Jensen's Alphas, and Sortino ratios, as discussed earlier in this section. The addition of absolute return strategies improved portfolio performance, as indicated by the Sharpe ratio, t (96) = 8.23, p < .001, the Treynor ratio, t (96) = 6.26, p < .001, Jensen's Alpha, t (96) = 6.34, p < .001, and the Sortino ratio, t (96) = 6.71, p < .001, as compared to multi-asset class portfolio that contained only equities, fixed income, and real return strategies Hypothesis two was fully supported. Full results related to hypothesis two can be found in Table 5.

Thirty six-month rolling period performance was also compared to verify if the outperformance was consistent. The results showed that the outperformance of all four measures was consistent. Regarding Alpha ratios, 79 of the 97 periods outperformed. Essentially, the portfolio with absolute return strategies outperformed the portfolio without absolute return strategies 81% of the time. The outperformance was also consistent using Treynor ratios, with 80 of the 97 periods demonstrating outperformance. Similarly, the monthly Jensen's Alphas of the two portfolios illustrated outperformance in 79 of the 97 periods. Finally, the monthly Sortino ratios were consistent as well, with 70 of the 97 periods indicating outperformance.

The Sharpe ratios, Treynor ratios, Jensen's Alphas, and Sortino ratios (see Table 4 and Table 5) all indicated that the addition of absolute return strategies improved portfolio performance in multi-asset class portfolios that already contained equities, fixed income, and real return strategies compared to multi-asset class portfolios that contained only equities, fixed income, and real return strategies. While not absolute, the outperformance remained consistent throughout the study period for all four performance statistics. Accordingly, these results established that the addition of absolute return strategies to multi-asset class portfolios that contain equities, fixed income, and real return strategies compared to multi-asset class portfolios that contain only equities, fixed income, and real return strategies expanded the portfolio's ENB (e.g., enhanced its diversification) and improved its performance as compared to portfolios that did not include absolute return strategies.

4. DISCUSSION

This paper investigated diversification and portfolio performance by examining traditional multi-asset class portfolios and multi-asset class portfolios with added absolute return strategies. Results indicated that adding absolute return strategies increased diversification, as determined by ENB, and portfolio performance as compared to a traditional multi-asset class portfolio.

Hypothesis one stated that the addition of absolute return strategies improves diversification in multi-asset class portfolios that already contain equities, fixed income, and real return strategies compared to multi-asset class portfolios that contain only equities, fixed income, and real return strategies. The results indicated that the addition of absolute return strategies did improve diversification in multi-asset class portfolios. Improvement in risk factor diversification, as determined by ENB, is important as previous research has demonstrated direct links between ENB and portfolio performance. Meucci et al. (2013) compared two risk factor diversification approaches and found that better diversification was achieved using an ENB approach as compared to a traditional approach. Carli et al. (2014) analyzed the performance of a number of stock indices and multi-asset class pensions before and after the financial crisis. The results demonstrated a significant positive relationship between ENB prior to the financial crisis and portfolio performance after the financial

Table 5. Overall difference in the performance statistics

Statistics	Sharpe Ratio	Treynor Ratio	Jensen's Alpha	Sortino Ratio
With Absolute Return Strategies	0.70	7.57	0.30	1.20
Without Absolute Return Strategies	0.67	7.15	0.00	1.16
Degrees of Freedom (df)	96	96	96	96
t Score	8.23*	6.26*	6.34*	6.71*

Notes. *p < .001. All statistics were calculated using a One-Tailed Paired t Tests.

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crisis. Similarly, Sharma (2017) found that the risk and return characteristics improved significantly when diversifying through ENB as compared to other diversification strategies. Clearly, previous research demonstrates the value of increasing risk factor diversification as demonstrated by ENB. As traditional asset classes are often highly correlated (Zakamulin, 2015), the addition of absolute return strategies to multi-asset class portfolios can provide important risk reduction by increasing diversification.

Hypothesis two stated that the addition of absolute return strategies improves portfolio performance in multi-asset class portfolios that already contain equities, fixed income, and real return strategies compared to multi-asset class portfolios that contain only equities, fixed income, and real return strategies. The results demonstrated that the addition of absolute return strategies (equity market neutral, global macro, and managed futures) did improve portfolio performance in multi-asset class portfolios as indicated by the Sharpe ratios, Treynor ratios, Jensen's Alphas, and Sortino ratios. Brandon and Wang (2013) examined numerous hedge fund strategies and found that equity market neutral strategies had a positive residual alpha after accounting for the liquidity risk. Patton and Ramadorai (2013) found evidence that the addition of global macro funds reduced risk in portfolios. Finally, Cao et al. (2014) observed that both global macro and managed futures provided valuable hedges against market declines. Hurst et al. (2013) discovered that time series momentum, a common managed futures strategy, produced high Sharpe ratios in both bull and bear markets. Given the results of this previous research, the addition of equity market neutral, global macro, and managed futures strategies likely increases performance to multi-asset class portfolios due to the downside protection absolute return strategies offer during times of market stress or market decline (Cao et al., 2014).

While these findings are encouraging, future research should explore how performance is affected by absolute return strategies during market declines specifically. Further, future research should examine the value of each of these strategies individually, and how each contributes to the overall performance of a multi-asset class portfolio. Finally, future research should examine other absolute return strategies such as event driven and arbitrage to determine if they improve diversification and portfolio performance as well.

CONCLUSION

The purpose of this paper was to contribute to the diversification literature by examining the efficacy of absolute return strategies. Current diversification methods tend to create suboptimal portfolios and inadvertently impose more risk on investors than needed; the addition of absolute return strategies could help solve both of these issues. As such, this paper tested if adding absolute return strategies to a multi-class portfolio could improve both risk diversification and portfolio performance.

The present study's results indicate that the addition of absolute return strategies improved risk factor-based diversification by expanding ENB in multi-asset class portfolios that already contain equities, fixed income, and real return strategies. These results support research previous research on absolute return strategies, which demonstrated the potential diversification benefits of the individual absolute return strategies.

As indicated by improved Sharpe ratios, Treynor ratios, Jensen's Alpha and Sortino ratios, the results also demonstrate that the addition of absolute return strategies improved performance in multi-asset class portfolios that already contain equities, fixed income, and real return strategies. These results demonstrate that portfolio performance and investor wealth can be improved with the addition of these strategies. Therefore, investors should consider adding equity market neutral, global macro, and managed futures when building multi-asset class portfolios.

AUTHOR CONTRIBUTIONS

Conceptualization: Richard Cloutier, Alan C. Mikkelson.
Data curation: Richard Cloutier.
Formal analysis: Richard Cloutier.
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