The Current Case for Equity Long/Short Hedge Funds

EXECUTIVE SUMMARY

Greycourt has a healthy skepticism about the role of equity long/short hedge funds in investment portfolios. Performance today is dramatically different than in the heyday for these funds, and while they can add diversification and risk reduction in an investor's portfolio, they can also experience losses during equity market drawdowns, precisely when investors look to hedged strategies for support. It prompts the question: why bother?

To provide context for this question, we outline the decline in performance of equity long/short funds over the past three decades. Weaker performance may have resulted from increased competition, changes in how market information is accessed and processed, the rise of systematic strategies that sop up alpha, and emerging challenges in establishing and maintaining short positions.

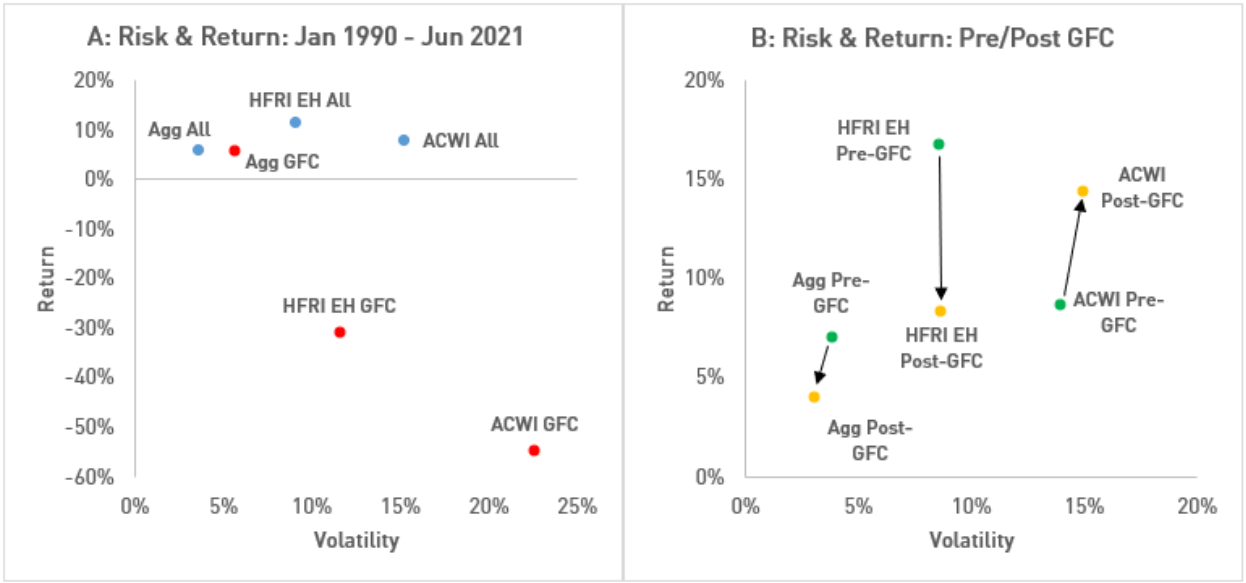
Given this paradigm shift in performance, it is important to ask: what should we try to achieve from owning equity long/short managers? Do we want to reduce the equity market sensitivity of a portfolio? Are we looking to enhance portfolio efficiency (i.e., more return relative to risk)? Are we pursuing the skill of a specific manager?

In this Greycourt White Paper, we outline a framework for defining expectations for risk and return that can support the optimal use of equity long/short hedge funds. We conclude that *some* high-quality equity long/short funds can indeed provide incremental benefits in a diversified portfolio.

There are two important caveats to our work in this memo. First, taxable investors must apply another level of analysis to determine if after-tax returns are attractive. Second, we are addressing in this memo the world of mid-to-high-net exposure equity long/short hedge funds using modest leverage. We do not address higher-leverage, low-net exposure equity long/short strategies nor "diversifying" strategies that rely on arbitrage, relative value, event driven strategies, etc.

A QUICK HISTORY

Charts A and B illustrate the longer-term performance for the HFRI Equity Hedge Index (HFRI EH), the Bloomberg Barclays Aggregate Index, and the MSCI ACWI.



Source: StyleAdvisor, Greycourt

In Chart A, it is clear that equity long/short funds were a better place to be invested for the whole period (blue dots; annualized). They experienced large drawdowns during the Great Financial Crisis (GFC) (red dots; Nov. 2007 – Feb. 2009), but protected capital relative to the global equity ACWI index.

However, if we separate the analysis into Pre-GFC (green dots; ending Oct. 2007) and Post-GFC (yellow dots; starting Mar. 2009) time periods, Chart B shows that equity long/short funds have not been able to beat the equity market since the trough of the GFC.[1]

In fact, investors could have simply created an equity/bond portfolio and beat the hedge funds with the same level of volatility, and without the K-1 hassles, illiquidity, and fees. *So why bother with long/short funds at all*?

Equity long/short funds can be used to modulate risk in a broader portfolio since they typically carry lower volatility than equities. But that's not enough, given their performance

[1] For a robust statistical analysis of changes in hedge fund index performance, see: Sullivan, Rodney N. Winter 2021. "Hedge Fund Alpha: Cycle or Sunset?" The Journal of Alternative Investments 23 (3): 55-79.

disadvantage.

The key to using long/short funds successfully is to seek funds that generate an uncorrelated return *beyond that associated with their level of market risk*. In other words, a long/short fund with a 40% exposure to the market that generates a return greater than 40% of the market return while offering a unique source of diversification is useful and desirable.

Below, we outline a framework for assessing the overall contribution of long/short funds to a portfolio, addressing the question, "What do I have to believe, in order to invest successfully in equity long/short funds?"

A FRAMEWORK: THE SECURITY MARKET LINE (SML)

Our framework begins by constructing a "Rate of Return" (RoR) benchmark to measure whether or not a fund is generating an excess return over its market exposure. The RoR benchmark combines the fund's net market exposure with an exposure to the risk-free rate, summing to 100%. If a fund has 120% long exposure and 70% short exposure, and the long and short positions have the same sensitivity to market risk, then the overlap of the short exposure over the long exposure would cancel out that portion of any market risk. The fund would have a positive net exposure of 50% (120% - 70%).

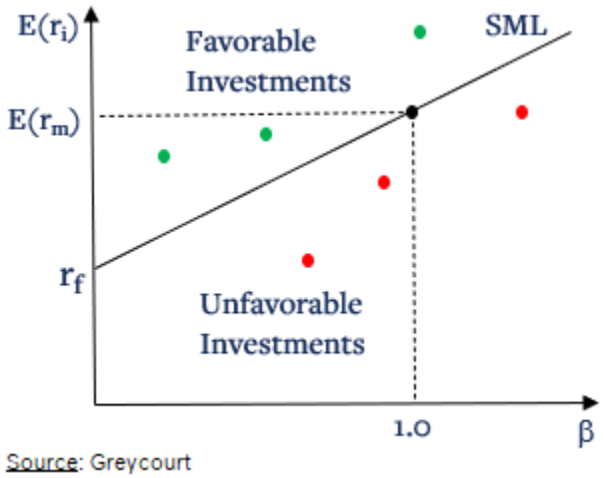
Of course, we expect equity long/short funds to profit from every dollar they invest, long or short, rather than obtaining returns solely via their net exposure alone. However, we believe that the opportunity cost for investing in equity long/short funds is best measured by their net market exposure.

The precise manner of creating the RoR benchmark and relating it to portfolio theory is illustrated in Exhibit A in the appendix for those readers with an interest in the math. But the concept itself is straightforward:

- We create an RoR benchmark equal to the fund's net market exposure plus a risk-free rate. If the market exposure is 40%, the benchmark would consist of 40% market exposure and 60% exposure to the risk-free rate (every dollar invested is expected to earn at least the risk-free rate).
- We compare the fund's return to the benchmark's return to see whether the fund is generating an excess return over its market exposure.
- We can further test whether the fund is adding value from a portfolio optimization

perspective by considering volatility and correlation. We calculate the fund's beta[2]-adjusted net exposure and replace the net market exposure with the beta-adjusted net exposure, and then apply the same comparison. In addition to explicitly taking into account volatility and correlation, this approach accounts for the possibility that long and short exposures may have different betas. For example, value-oriented long/short managers are often long low-beta stocks and short high-beta stocks, resulting in a beta-adjusted net exposure lower than the notional net exposure.

- Applying this framework graphically, expected returns (denoted as E(r)) are plotted versus the security market line (SML) in the chart below. Along the SML, each investment earns the risk-free rate *plus* compensation for the level of its market risk, measured by beta. In the chart below the equity market has a beta of one and is mapped to the expected return of the market, plotted as $E(r_m)$.
- Investments that have higher or lower market risk have a higher or lower required return and lie somewhere on the SML in an efficient market. Any investments above the line exhibit positive "alpha" as they have expected returns greater than that required by their level of market risk—these are the representative green dots. Investments below the line are generating returns that are below the levels associated with their market risk—these are the representative red dots.



Source: Greycourt

[2] Beta measures a fund's sensitivity to market risk by incorporating the fund's volatility and market correlation.

APPLYING THE FRAMEWORK: HISTORICAL RETURNS

Now that we have developed the SML framework we can examine how equity long/short funds have done in the past and decide what we should require from them in the future.

Asset Class Case

Over the ten years through June 2021, the HFRI EH Index generated an annualized return of 6.5% with a beta of 0.57 to the S&P 500, which itself generated an annualized return of 14.8%. The HFRI EH Index did not beat the market and, using a risk-free rate of 0.6% per year, we can determine that the Index fell 2.2 percentage points below the SML (6.5% - (0.6% + 0.57 x (14.8% - 0.6%))).

If instead of the S&P 500 we use the MSCI ACWI, we find that the HFRI EH Index is above the SML by 0.5 percentage points. Against either a US or global backdrop, we conclude that the Index did not generate a substantial level of alpha, if any, on a pre-tax basis.

Skill Case

Next, we examine the case for individual funds by examining the results of seven funds selected by Greycourt for this analysis. This selection was based on the level of information available to Greycourt to assess the strategy as consistent with this discussion. We acknowledge that studying the historic performance of individual funds is fraught with the risk of selection bias, but we believe that there is enough dispersion around *mean* results to justify hunting for outliers.

The following table outlines historical pre-tax results over a five-year period ending June 2021 for six equity long/short funds and the equity long/short book for a fund of funds. Fund B is shown net of underlying manager fees and carry, but gross of the fund of fund fees; all other funds are net of all manager fees and carry. The funds are measured against the benchmark most relevant to the strategy pursued: the S&P 500 Index for all funds except for Fund A, which uses the Russell 2500 Index, and Fund F, which uses the MSCI Asia Pacific Index (local). Five out of the seven funds beat the SML, generating annual alpha well over 100 basis points.

Fund vs. Index	Fund A	Fund B	Fund C	Fund D	Fund E	Fund F	Fund G	S&P 500
Return	12.3%	14.9%	6.9%	8.0%	13.2%	11.1%	8.0%	17.6%
Volatility	10.2%	8.7%	16.4%	6.6%	11.3%	8.9%	10.2%	15.0%
Correlation	66%	71%	66%	57%	59%	59%	67%	
Beta	0.4	0.4	0.7	0.3	0.4	0.5	0.5	
Alpha	4.8%	7.0%	-6.2%	2.6%	4.7%	2.2%	-0.6%	

Source: Managers, Greycourt, and StyleAdvisor

In this admittedly small sample, five out of seven funds selected are providing incremental benefits in an equity portfolio, residing above the SML. In other words, it is possible for equity long/short funds to add real value even in what is clearly a tougher post-GFC world.

APPLYING THE FRAMEWORK: EXPECTED RETURNS

It is also useful to apply *expected* returns to the SML to create a forward-looking required rate of return for equity long/short funds. We start with Greycourt's ten-year strategic return assumption for global equity markets, which is 6.9%[3]. Using the ten-year Treasury constant maturity yield (as of 6/30/2021) of 1.5% as the risk-free rate, and assuming the average long/short fund beta is 0.40, we get a required return of 3.6%. While this appears to be a low required return, we expect equity returns to be compressed looking forward relative to the levels achieved over the prior decade.

CHALLENGES WITH THE FRAMEWORK: BETAS ARE VARIABLE

Our framework assumes that betas are stable, but equity long/short funds tend to have variable market betas, notably during market drawdowns. The table shown in Exhibit B in the appendix outlines eight loss periods for the S&P 500 in the last ten years, along with the ratio of each example fund's return to the S&P 500. All of the funds show some variability, and often *increased* sensitivity to market moves relative to their average betas, precisely when it is undesirable.

Of all the drawdowns over the past decade, January 2021 represents a special case. By now, most people are familiar with the sequence of events: a short squeeze in GameStop, led by frenzied online communication between retail investors on Reddit and Twitter, catalyzed additional short squeezes, forcing managers affected by the short squeezes to reduce single name short positions and to liquidate long positions to fund margin calls—the very definition of an unpalatable feedback loop.

[3] Investing involves risks and you may incur a profit or a loss. Past performance is no guarantee of future results. Examples are shown for illustrative purposes only and are not provided to be indicative of the frequency or likelihood of success among long/short strategies. Results for other managers will have varied widely over the same period. Please see the Disclosures for important additional information.

Ultimately, the equity long/short industry as a whole began to take down overall gross exposure, especially where managers had crowded into common names, both long and short. The final phase is outlined graphically below, showing the level of de-risking relative to past events in terms of gross exposure. In this case, it is represented by the blue line which measures how fast and how far gross exposure is moving away from its running (cumulative) average.

Source: Morgan Stanley Prime Brokerage

January 2021 serves as a powerful illustration of two related forces that drive variable beta: an individual fund's underlying positions may undergo changes in the beta of each long and short position during drawdowns, and this may be exacerbated by the reactions of *other* portfolio managers trying to correct for related security price changes during a drawdown, including by reducing gross exposure.

SHORT SELLING IN TODAY'S MARKET ENVIRONMENT

January 2021 also brought renewed attention to the viability of maintaining a book of single-stock short positions, generating the following questions:

- Are short sales too risky now with pervasive online chatter and herd behavior among retail investors?
- Will it become more costly or harder to find shares available for shorting?
- Will regulators place significant new limitations on short sale practices?

To the extent that some managers may replace single name shorts with index shorts to avoid short squeezes, they are likely limiting their toolkit for generating alpha. On the other hand, portfolio managers that are committed to maintaining a significant single name short book

must master tools to manage various new risks. These include tools for monitoring online chat forums and scanning for any companies that may become susceptible to a short squeeze.

We do not believe it will become persistently more costly to enter into short positions or that it will become harder to find shares for shorting. On the contrary, we have heard from some managers that it may become less competitive to access single name shorts under current conditions.

We also do not believe regulators will make any moves to eliminate the ability of funds to pursue short positions. The long history of shorting demonstrates its importance in driving price discovery for the maintenance of efficient markets. Certain shorting bans were (largely temporarily) enacted during the Great Financial Crisis and there has been debate around whether or not such bans were ultimately helpful to the markets.

MAKING A CASE DESPITE THE CHALLENGES

We note above that some investors desire equity long/short funds for their relatively lower volatility and lower correlation. However, we have demonstrated that not only do some funds not generate more return relative to the market risk taken, but in some cases investors may get *more* market risk exposure from their funds exactly when they do not want it. Notwithstanding these serious challenges, it is empirically true that *some* equity long/short funds can and have added incremental value to an equity portfolio, *but it happens on average over a long timeframe.*

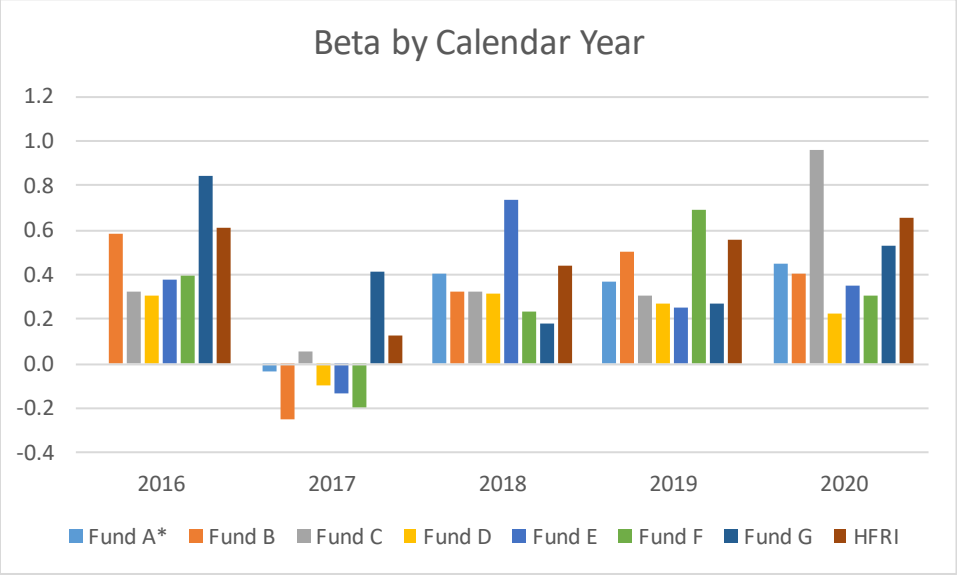
One way to examine how managers seek to optimize their risk/return profile over time is through up/down capture ratios that look at long-term performance records. Using the same sample of funds as above, the following table shows that managers residing above the SML generally have had a higher up capture versus down capture (represented by a ratio above 1.0) and these managers also have tended to make more money in up markets than they lose in down markets. Taken together, they have favorable attributes with respect to their market exposure on average, but – and it's a very big "but" – investors may be disappointed if they expect long/short funds to be a strong hedge for the rest of their portfolio during *abrupt* market drawdowns. In other words, "hedge funds don't always hedge."

Up/Down Capture S&P 500 5 yrs end June 2021	Up/Down Capture Ratio	Average Return	
		Up Market	Down Market
Fund A	1.3	1.7%	-1.6%
Fund B	1.5	1.9%	-1.5%
Fund C	0.7	1.6%	-2.8%
Fund D	1.4	1.1%	-0.8%
Fund E	1.2	1.9%	-1.8%
Fund F	1.5	1.5%	-1.1%
Fund G	0.8	1.5%	-2.3%
S&P 500	1.0	3.1%	-4.6%

Note: The heat maps are generated separately for each column.

Source: Managers, Greycourt, and StyleAdvisor

We now revisit our performance measurement framework and ask the question, "Given that alpha is measured alongside beta, what does alpha look like when beta is variable?" To answer this question, we estimate the funds' alphas and betas versus the S&P 500 on a calendar year basis. We begin by illustrating the variability of fund betas by calendar year below.



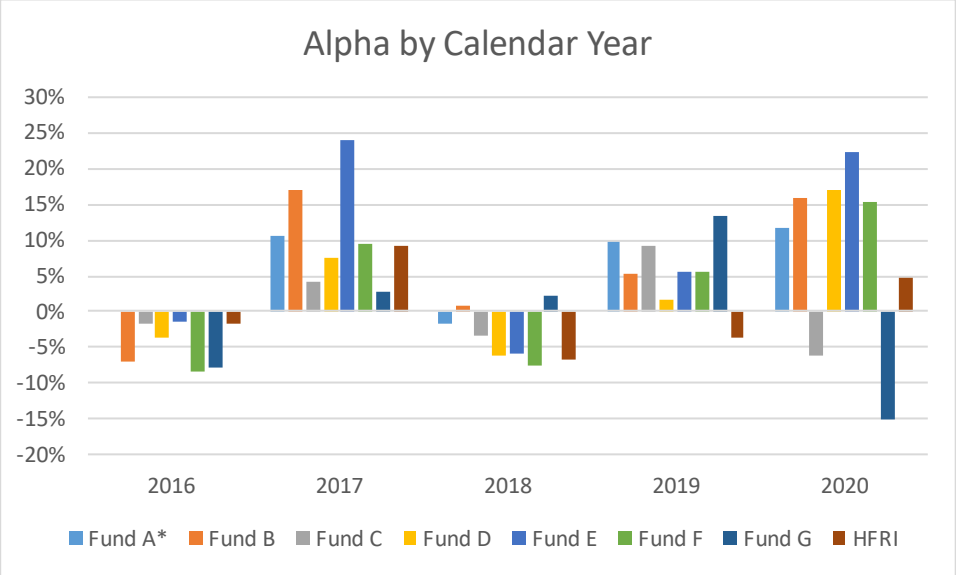
*First full year is 2017

Source: Managers and Greycourt

All of the funds show some variability in their market risk sensitivity, suggesting that allowing beta to vary by using smaller time windows is probably a good idea when measuring alpha. The

year 2017 stands out as a period when all of the funds showed a low or even negative market beta. A possible cause for this is the persistently low correlation between individual stocks that year. Low correlation can open up the opportunity set for managers to find compelling ideas in both long and short opportunities, enhancing the ability to differentiate themselves from the market.

Next, we illustrate the alpha generation for each manager by calendar year in the following chart. It is clear that managers share a common sensitivity to the market environment in terms of when they are better or worse at generating alpha. It also evident that the low correlation among individual companies in 2017 fostered an environment of alpha generation. It should be noted that, while there was a huge spike in correlation in early 2020, it declined sharply over the course of the year.



*First full year is 2017

Source: Managers and Greycourt

While alpha has been negative in some environments, we display the average alphas across the five calendar years below to illustrate the long-run trajectory. The average alphas are higher than those shown in an earlier table, but this is a slightly different time window that does not include the challenging performance of January 2021. In general, the average calendar year results still suggest a positive impact in equity portfolios for most of the funds.

Ave.: 5 years	Fund A*	Fund B	Fund C	Fund D	Fund E	Fund F	Fund G	HFRI
Beta	0.4	0.3	0.4	0.2	0.3	0.3	0.5	0.5
Alpha	7.6%	6.5%	0.4%	3.3%	8.9%	2.9%	-1.0%	0.4%

*First full year is 2017.

Source: Managers, Greycourt

In summary, while hedge funds may experience variable levels of market risk under changing market conditions, on average over long periods of time they can add value.

LOOKING AHEAD

Looking ahead, investors should consider a potential environment of compressed equity market returns and high quality long/short funds to be more meaningfully accretive on a relative basis. This of course begs the question whether alpha will be higher or lower in such an environment, but we leave that to further research.

To synthesize, we think that investors having one or more of the following perspectives can sensibly defend allocating a portion of a portfolio to equity long/short funds:

- Investors may hold the view that the equity market is going to be weak. Rather than reducing equity exposure to the very low end of their long-term strategic targets, they could adjust the risk of their overall equity book to have lower market sensitivity (beta) by substituting long/short funds that can also deliver alpha. Investors may come out ahead versus simply selling equities and holding lower risk-cash.
- Investors may believe that a specific manager's alpha generation is strong enough to be additive in absolute terms for the portfolio. This might argue for making such an investment *without* allowing overall equity (or portfolio-wide) beta to drop below long-term targets. In that case, the beta of positions elsewhere in the portfolio (likely within the equity segment) could be intentionally ratcheted up to compensate for the lower market sensitivity of the long/short positions.
- Investors may be excited about a narrow opportunity set that is best (or only) expressible via an equity long/short fund. This could include accessing less-liquid or less-efficient sectors of the market, such as biotech, certain small cap stocks, or certain emerging markets regions.

In any event, we propose using a proper performance measurement framework such as the security market line-based framework can help identify when a particular equity long/short fund has generated meaningful incremental portfolio benefits.

CONCLUSION

While the average performance of equity long/short hedge funds has declined over the last few decades, our SML framework shows that the bar for generating incremental value for equity portfolios is lower than investors may think. That said, investors need to maintain a realistic perspective. We do not expect equity long-short strategies to "beat" equity markets outright. Further, variable beta and alpha mean that, even for funds that *can* generate long-term returns in excess of their market risk, the benefits do not always occur when you think they will. Finally, the hedging in hedge funds is not always (or even often) going to occur during sharp downdrafts.

These challenges notwithstanding, equity long/short strategies are not useless. Investors must set clear goals for allocating to equity long/short strategies and be prepared for these strategies to move with the market to some degree in abrupt drawdowns. Investors can monitor both alpha and beta over time to determine the degree to which they are meeting their goals and, relatedly, how and when to make changes elsewhere in a portfolio to intentionally amp up missing equity beta.

APPENDIX

EXHIBIT A: ROR Benchmarks and the Security Market Line (SML)

Consider a hedge fund with a net market exposure of 40%, with the market return given by, r_m, and the risk-free rate given by, r_f, the RoR benchmark is then:

$$RoR = 0.4\, r_m + 0.6\, r_f \quad (1)$$

We can test if a fund is adding value above its net market exposure by observing whether or not the fund's return (r_i) is greater than the RoR benchmark:

$$r_i > 0.4\, r_m + 0.6\, r_f \quad (2)$$

Next, we expand equation (2) to test whether or not a fund is providing a portfolio optimizing effect, by incorporating the volatility and correlation. First, we rearrange equation (2) assuming for now that a fund's return equals its RoR benchmark:

$$r_i = 0.4\, r_m + 0.6\, r_f$$

then rewrite 0.6 rf:

$$r_i = 0.4\, r_m + r_f - 0.4\, r_f$$

rearranging terms:

$$r_i = r_f + 0.4\,(r_m - r_f) \quad (3)$$

Now the benchmark is starting to look like the capital asset pricing model (CAPM) from financial theory, separating a fund's return into a risk-free and a market risk component.

Next, we introduce "beta" (β), measuring an investment's sensitivity to market risk. If a fund's beta is 0.4, we generally expect it to move 40% of the amount by which the market moves on average. The formula for beta incorporates the volatility of the market (σ_m), the volatility of a given fund (σ_i), and the correlation (ρ_{im}) between the fund and the market as shown below:

$$\beta_i = \rho_{im}\left(\frac{\sigma_i}{\sigma_m}\right)$$

Now we replace 0.4 in equation (3) with beta and get the following:

$$r_i = r_f + \beta_i(r_m - r_f) \quad (4)$$

Equation (4) is the SML, a very useful output from the CAPM model. When a fund is generating a return higher than the right-hand side of equation (4), it is adding incremental value by delivering more than what is required to compensate for the risk-free rate plus its market risk. The incremental value is commonly referred to as alpha.

EXHIBIT B: Directional L/S Equity Performance in S&P 500 Drawdowns

Fund	Fund A	Fund B	Fund C	Fund D	Fund E	Fund F	Fund G	S&P 500	
Ave S&P 500 Beta SI	0.4	0.4	0.5	0.2	0.5	0.3	0.5	Return	Period
Ratio of the Fund's Return to the S&P 500 Return During the Period Shown		0.3	0.6	0.3				-12.8%	May 10 - Jun 10
		0.3	0.6	0.3				-16.3%	May 11 - Sep 11
		0.1	0.1	0.4				-6.6%	Apr 12 - May 12
		0.6	0.6	0.2	0.7	0.2	0.6	-8.4%	Aug 15 - Sep 15
		1.2	0.1	0.4	0.7	1.0	1.2	-6.6%	Dec 15 - Feb 16
	0.7	0.3	0.3	0.6	0.9	0.4	0.2	-13.5%	Oct 18 - Dec 18
	0.5	0.3	1.0	0.1	-0.1	0.1	0.6	-19.6%	Jan 20 - Mar 20
	3.2	5.9	10.4	2.7	4.6	0.2	9.8	-1.0%	Jan 21
Ave Ratio	1.5	1.1	1.7	0.6	1.4	0.4	2.5		

Source: Managers, Greycourt, and StyleAdvisor

Investing involves risks and you may incur a profit or a loss. Past performance is no guarantee of future results. Examples are shown for illustrative purposes only and are not provided to be indicative of the frequency or likelihood of success among long/short strategies. Results for other managers will have varied widely over the same period.

DISCLOSURES

This paper was written by Mark Thomas of Greycourt & Co, Inc., an independent investment adviser based in Pittsburgh, PA. All statements concerning future market or economic trends reflect the opinion of Greycourt's investment professionals and are subject to change without notice. Certain information presented in this report has been obtained from third parties. While Greycourt believes these sources to be reliable, Greycourt has not independently verified this information.

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Strategy Illustrations (Funds A-G)

Managers used in these illustrations were selected by Greycourt based on information available to us. Greycourt has at some point performed due diligence on these managers and their firms and certain products may be or may have been recommended to Greycourt clients. It is not known whether these managers are participants in the index to which they are compared – the HFRI Equity Hedge Long/Short Directional Index (described further below). While the strategies are consistent with the benchmark, the results may not be typical among index participants.

Individual Manager Performance: Performance data is presented to illustrate the results of portfolios employing equity long/short strategies. It is not a representation of results earned by or on behalf of Greycourt clients. The performance information cited for these strategies is reported by the manager of the respective strategies. Data for the previous calendar year may be subject to audit revision. Data for the current calendar year may not be final and is subject to revision.

Strategy returns include the reinvestment of any dividends and other earnings and are net of management fees paid to the respective managers as well as any expenses incurred in the execution of the strategy. Manager results are independent of Greycourt involvement and do not reflect Greycourt investment management fees. Greycourt fees and any account level expenses that apply will reduce the returns cited.

The following is a hypothetical example of the impact over time of fees charged to a client account. It is not meant to suggest actual fees, which may vary, and does not reflect actual returns. Assuming an initial investment of $1,000,000 and an average annual return of 10%, an annual fee of 1% would result in account level fees of $10,891 the first year, $35,671 over three years, and $65,064 over five years. Greycourt fees are subject to negotiation on a client-by-client basis.

Index Descriptions

The S&P 500 Index (SPX) consists of stocks of 500 companies chosen for market size, liquidity, and industry group representation. It is a market-value weighted index designed to provide a performance benchmark for the U.S. equity markets.

The Bloomberg Barclays U.S. Aggregate Index (AGG) measures the performance of the U.S. market of taxable, fixed-rate, dollar-denominated, investment-grade bonds with at least one year to maturity.

The MSCI All-Country World Index (ACWI) is a free float-adjusted market capitalization weighted index that is designed to measure the equity market performance of developed and emerging markets.

The Hedge Fund Research Institute Equity Hedge Long/Short Directional Index (HFRI EH) measures the performance of a subset of hedge funds employing equity long/short strategies that are not market neutral. The Index is equal weighted among reporting funds, which report returns net of fees and in U.S. dollars.

Indices are provided to illustrate overall market results for the periods shown. In practice, manager strategies may vary materially from the assets reflected in benchmark indices, including higher concentrations in certain asset types, sectors or industries, and/or geographic regions. Return and volatility measures would be expected to vary, sometimes materially, were these factors reflected.

Indices are not available for direct investment. Investment in a security or strategy designed to replicate the performance of an index will incur expenses, such as management fees and transaction costs, which would reduce returns.

All investments carry some degree of risk. This report uses return volatility, as measured by standard deviation, of asset classes as a proxy for risk. Volatility serves as a collective, quantitative estimate of risks present to varying degrees in the respective asset classes (e.g., liquidity, credit, and default risks). Some risks may be underrepresented by this measure. Investors should develop a thorough understanding of the risks of any investment prior to committing funds.

Market Capture (Upside & Downside)- Upside capture ratio is calculated by taking the portfolio return during periods when the benchmark had a positive return and dividing it by the benchmark return in those periods. Downside capture ratio is calculated by taking the portfolio return during the periods of negative benchmark performance and dividing it by the benchmark return. Calculations use geometric average (annualized) returns for both the portfolio and the index. An upside capture over 1 indicates a portfolio has generally outperformed the benchmark during periods of positive benchmark returns. Meanwhile, a downside capture ratio over 1 indicates that a portfolio has lost more than its benchmark in periods when the benchmark was negative. If a portfolio generates opposite returns – e.g., negative when the benchmark is positive – the market capture ratio will be negative.

Upside / Downside Capture

Greycourt's *ten-year strategic return assumption for global equity markets* is based on our Strategic Portfolio Design (SPD) forecasts. SPD constitutes the informed judgments and opinions of Greycourt about likely future capital market performance. The SPD is subject to a number of assumptions regarding future returns, volatility, and the interrelationship (correlation) of asset classes. Assumptions may vary by asset class. Actual events or results may differ from underlying estimates or assumptions, which are subject to various risks and uncertainties. No assurance can be given as to actual future market results or the results of Greycourt's investment products and strategies. Estimates contained in this material constitute Greycourt's judgment as of the date of these materials and are subject to change without notice. The information in this presentation has been obtained or derived from sources believed to be reliable, but no representation is made as to its accuracy or completeness.

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