

AN APPROACH FOR CAPTURING BEHAVIORAL ALPHA

AQIS Strategy Review

January 1, 2019

MARKETS ARE DYNAMIC

Dynamic environments require dynamic strategy, systematically implemented to enhance the durability of alpha capture, and to capitalize on the biases and emotions that often pollute the discretionary investment process.

AUTHOR

K. C. Hamann

Founder and Managing Member

ABOUT

AQIS manages the AQIS Diversified Alpha I Fund, a quantitative hedge fund strategy launched in April of 2017 and focused on systematic long/short equity investing.

AQIS believes stock-picking skill exists, but the average professional investor is a sub-optimal portfolio manager. AQIS finds that on average, the effort of fundamental discretionary managers is seasonal and appears to be impacted by the accumulation of carried interest, position sizing is not a durable skill and is likely polluted by marketing strategy, and style-bias tends to corrupt return consistency. These issues create generally predictable behavioral patterns that have historically diminished the return stream LPs receive. AQIS was founded to transform behavioral issues from a bug polluting the alpha-capture LPs receive, into a feature of human behavior to be profited from.

FOR MORE INFORMATION

To learn more about AQIS, please contact us by email at Information@AQISinvest.com or by phone at 203-433-8103.

Estimated Reading Time: 12 minutes

Authors Note

In the summer of 2010, I found an unusually compelling investment opportunity by analyzing a 13-F filing using a simple mental model. The experience led to the design of a systematic process for identifying investments and since 2011, the AQIS models have identified thousands of investments with favorable asymmetric risk vs. reward as both longs and shorts. This was the impetus for the AQIS strategy.

A Successful Investment

During the second quarter of 2010, a well-regarded multi-billion-dollar hedge fund reported their long portfolio in a 13-F filed with the SEC. The list of large and mid-cap securities in the filing included a peculiar position, an outlier. The firm had accumulated a position in a micro-cap company called Journal Communications ("JRN"), and over the next few quarters, the manager bought more, eventually accumulating 3% of JRN's outstanding shares. The position would ultimately represent a mere 0.40% of the portfolio and to the thoughtful analyst, a story was unfolding.

The hedge fund buying JRN typically invested in large and mid-cap stocks and was rumored to have a cutthroat culture and a disciplined investing committee; yet here was JRN, a company with a \$4.00 stock price and a \$200 million-dollar market capitalization. It was a position that would likely not meaningfully contribute to the firm's return or the bonus of the investment professional who purchased it unless the stock doubled or tripled in price. Such performance is exceedingly rare and if JRN failed as an investment, exiting the highly illiquid position would almost certainly lead to losses.

13-F filings can tell a story. This story was about an investor convincing a CIO to accept significant liquidity risk and behave in a manner that was unusual for the firm. It was a story about a willingness to take career-risk. It was a story that suggested JRN might be an extremely high conviction investment for the firm.

Over the next three years JRN would triple in price before climbing to \$15 per share and being acquired by E.W. Scripps. Journal Communications turned out to be an outstanding investment and it was identified using a process that could be systematized and repeated.

A Strategy is Designed

The case of Journal Communications is an example of identifying signal from noise. First, a well-regarded manager was selected for analysis and second, trading behavior suggesting high conviction was identified. This two-step approach is the foundation of the AQIS strategy to identifying stocks with likely favorable risk vs. return asymmetry as longs and shorts.

Manager Selection – A Sabermetric Approach

AQIS constructed a metric called the Ruth Ratio to rank managers and identify those worth investigating. The Ruth Ratio is inspired by the field of Sabermetrics and is designed to identify skilled managers whose strategies are being rewarded by the current market regime¹. AQIS uses the metric to sort the universe of 13-F filers according to their expected future returns and finds it is a highly effective filtering mechanism².

Figure 1. Sharpe Ratio Identifies Best and Worst Managers

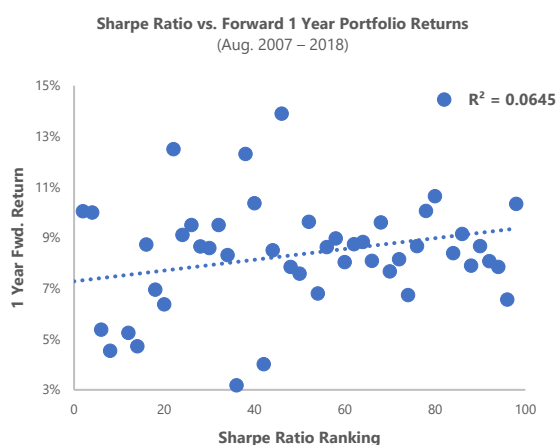
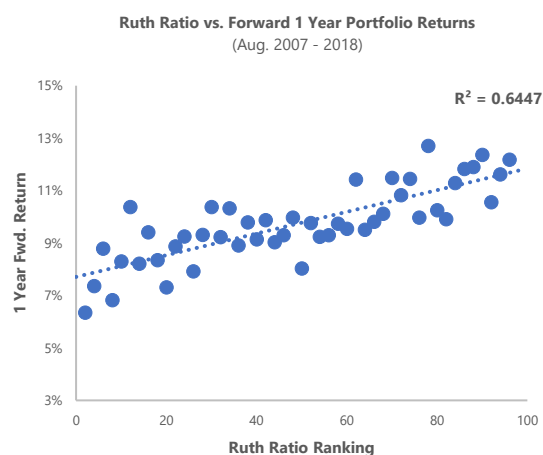


Figure 2. Ruth Ratio Identifies Above Average Managers



¹ Sabermetrics is a field of predictive analytics. Sabermetricians apply statistical analysis to baseball records, especially to evaluate, compare, and forecast the performance of individual baseball players.

² Figure 2 shows the percentile rank of all managers in our universe in terms of Ruth Ratio and their forward one-year return. Each data point shown represents a 2% grouping of percentile rank and represents hundreds of managers. The chart is for illustrative purposes and excludes outlier points which showed extremely high manager returns. Excluding these points does not meaningfully impact the results of the analysis. When implementing the AQIS strategy, we define the best managers as those in the top quintile ranked by Ruth Ratio. The data set extends to August of 2007 because prior to August of 2007, 13-F data is fairly sparse in the universe AQIS mines for alpha.

Stock Selection – Capturing Behavioral Alpha

Step two is designed to find stocks like JRN. AQIS attempts to accomplish this by scoring each position listed in a Form 13-F using proprietary algorithms designed to measure conviction. Stocks are sorted according to their individual expected future return, with the highest ranked stocks of the highest ranked managers selected for the long-portfolio, and stocks with the greatest reversals in conviction selected for the short portfolio.

The strategy is based on the premise that professional investors have stock-picking-skill, but their skill is sub-optimally monetized. AQIS believes behavioral issues like sub-optimal position sizing, seasonal effort, and style biases, pollute the typical managers portfolio construction and risk management processes and this creates an opportunity for pattern recognition, specifically, deviations from expected behavior provides signaling information that a stock may have a compelling risk vs. reward ratio as a long or short³.

A Model of Returns – Skill, Behavioral Drag, and Beta

AQIS finds that on average, sub-optimal position sizing, seasonality of effort, and style bias, are three significant issues that can reduce the returns of the average hedge fund manager. Together, they create a behavioral drag on returns. The mental model AQIS would advocate one embrace when contemplating the relationship between return, skill, and bias, is as follows:

$$\text{Return} = \text{Skill} - \text{Behavioral Drag} + \text{Beta Exposure}$$

Rearranging the equation reveals returns minus beta exposure, or alpha, equals skill minus behavioral drag.

$$\text{Return} - \text{Beta Exposure} = \text{Skill} - \text{Behavioral Drag}$$

$$\text{Alpha} = \text{Skill} - \text{Behavioral Drag}$$

Investors in fundamental discretionary long/short funds tend to receive a return that is polluted by bias. AQIS seeks to amplify returns by systematically obtaining exposure to skillfully selected investments and reducing exposure to sub-optimal investments that contribute to the behavioral drag that pollutes returns.

The Hedge Fund System

Consider the hedge fund as a system. If one deconstructs a hedge fund into two components that create the system, one component being the manager of the fund and the second component being the investment professionals that answer to the manager, (e.g. analysts and portfolio managers), one observes a system that tends to behave according to durable motivations that create monetizable trading patterns.

Systems Dynamics teaches us that ensuring its own perpetuation, or self-preservation, is typically the heart of a system⁴, and psychology teaches us that wealth-maximization is also a consistent human goal, but it is often pursued in a sub-optimal fashion⁵. The groups comprising a hedge fund system have the same goals of self-preservation and wealth-maximization, but each group pursues these goals in a different way, and with a different bias tilt.

To achieve their goals, managers are incentivized to favor risk-aversion because it promotes durability in assets under management (“AUM”). Managers benefit from stable and growing AUM much more than firm employees, so their motivation is to generate returns that are sufficient for attracting additional assets, but not so high that risk is taken that could introduce uncomfortable drawdowns and threaten AUM growth. Employees have the opposite bias, to achieve their goals they tend to be risk-seeking over risk-averse, because to maximize their compensation, they need to take risk and make investments that perform well enough to increase their bonus payments.

³ See Appendix.

⁴ Meadows, Donella H., and Diana Wright. *Thinking in Systems: a Primer*. Chelsea Green Publishing, 2015.

⁵ Barberis, Nicholas. “Richard Thaler and the Rise of Behavioral Economics.” *SSRN Electronic Journal*, 2018, doi:10.2139/ssrn.3111475.

AQIS believes the typical hedge fund system is defined by these two groups of actors whose risk-appetites tend to tilt in opposite directions. When one analyzes Form 13-F filings in concert with certain technical and fundamental data on the investments being made, a balancing act between risk-seeking and risk-averse behavior is observed. These see-saw patterns in risk-taking give a hedge fund a unique fingerprint, and with an understanding of a funds risk-taking tendencies, these patterns can be monetized to capture behavioral alpha.

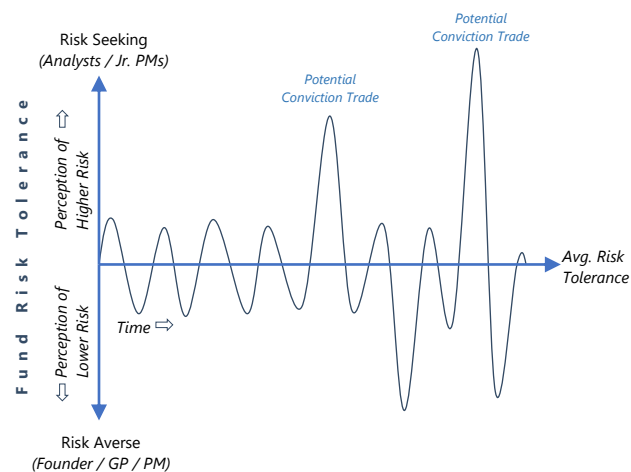
AQIS applies proprietary conviction-based algorithms to rank a manager's positions, transforming a 13-F filing from a data set into a narrative. Figure 3 and Figure 4 display how a series of 13-F filings tell a story of an ongoing balancing act between risk-averse and risk-seeking behavior. AQIS believes high conviction investments can be identified, on average, by identifying abnormal episodes of risk-seeking behavior. Research shows these investments tend to have favorable risk/return asymmetry, on average.

The process of quantifying conviction also leads to the identification of compelling short opportunities because material reversals in conviction tend to represent investments with limited appeal as longs. It is our opinion significant reversals in conviction indicate the seller is likely the educated participant in the transaction, meaning there is an elevated probability the buyer is less familiar with the stock and may represent a "weak" shareholder. This hypothesis is supported by our finding that these stocks tend to underperform.

Figure. 3. The Hedge Fund as a System

	<u>CIO/Founder</u>	<u>PM/Analyst</u>
Shared Goals	Self-Preservation & Wealth Maximization	
Competing Strategies	Grow AUM	Grow Bonus
Bias Tilt	Risk Averse	Risk Seeking

Figure. 4. 13-Fs Reveal a History of Risk-taking



Long and Short Portfolios

After sorting managers by the Ruth Ratio and sorting positions by conviction, on average, AQIS is left with a long portfolio that holds 100-400 positions representing the "best ideas" of the "best managers", and a short portfolio that holds 75-300 positions representing what we believe are significant reversals in conviction.

Figure 5 displays the simulated rolling annual returns to the long-portfolio from 2007 to 2018, and what we observe are returns that are over 2x that of the market.

Figure 5. AQIS Long Portfolio

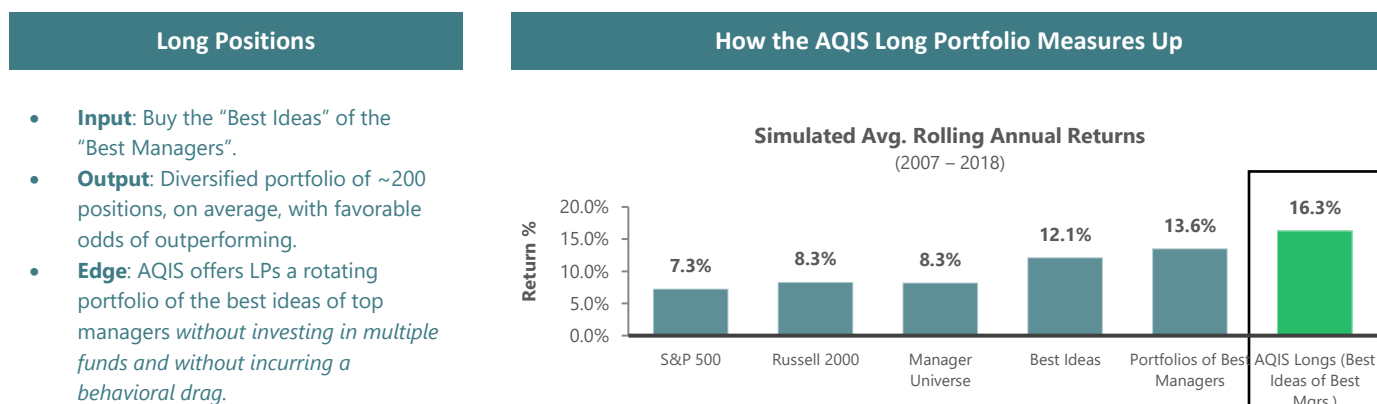
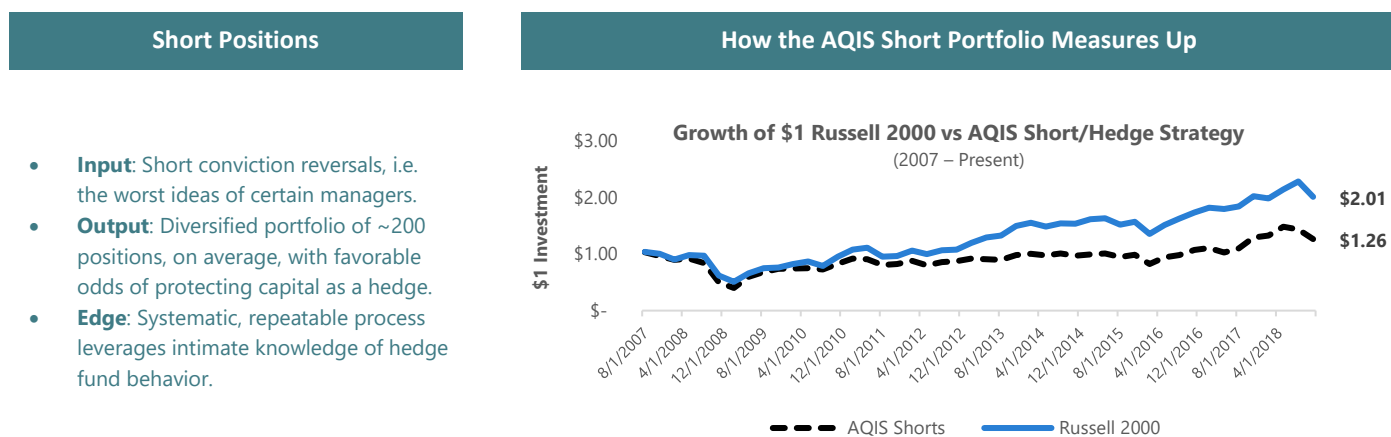


Figure 6 displays the simulated returns to the short portfolio since 2007⁶. Our research as well as the AQIS track record suggests shorting baskets of stocks representing conviction reversals can be an effective hedge.

Figure 6. Short Portfolio



Uncrowded Portfolios

A feature of the AQIS process is a portfolio of stocks that are relatively uncrowded. Figure 7 shows the typical stock in the AQIS long portfolio is 40% less crowded than the average 13-F eligible common stock owned by our peers, who we define as 13-F filers who are relatively concentrated and likely to be fundamental discretionary investors⁷. Figure 8 shows by using conviction as our compass to guide our security selection, the AQIS portfolio is relatively equally distributed across crowdedness quartiles, when crowdedness is measured by the number of fundamental discretionary funds as shareholders. This analysis indicates that despite the primary input to our security selection model being the investing behavior of other hedge funds, by using a behavioral lens to analyze trading and capture high conviction investments and conviction reversals, our portfolio tends to traffic in

⁶ AQIS selects the Russell 2000 as the strategy benchmark because the strategy tends to have a mid and small-cap bias and historically, the returns of the AQIS strategy have been more highly correlated with the Russell 2000 than any other index.

⁷ We consider these to be Peer Portfolios, as referenced in Figure 7. Peer Portfolios consist of a rolling average of roughly 1,000 managers at any point in time. These are 13-F filers who manage relatively concentrated portfolios (75 positions or less) and who AQIS believes are research-oriented fundamental discretionary long/short investors.

uncrowded securities. This finding is a signal that our approach may be novel and lacking significant competition, perhaps because those most equipped to monetize the behavior of discretionary investors, like we have, are those with intimate familiarity of how discretionary investors behave: the discretionary investors themselves. And these investors arguably have little incentive to create a system like ours because such a system could displace them.

Figure 7. AQIS Crowdedness vs. Peers

The average AQIS position is owned by 5 other managers compared to 8 other managers for stocks in peer portfolios.

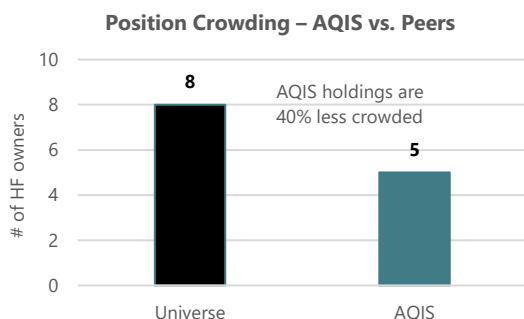
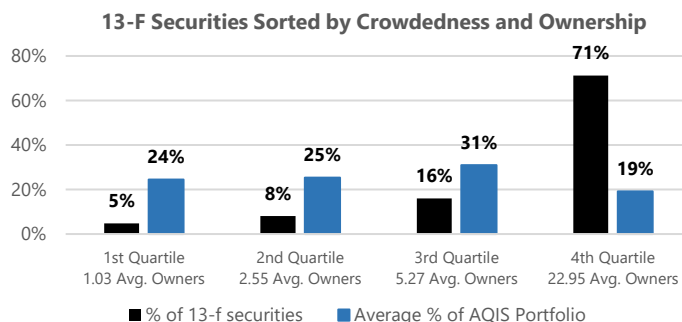


Figure 8. AQIS Crowdedness by Quartile vs. Peers

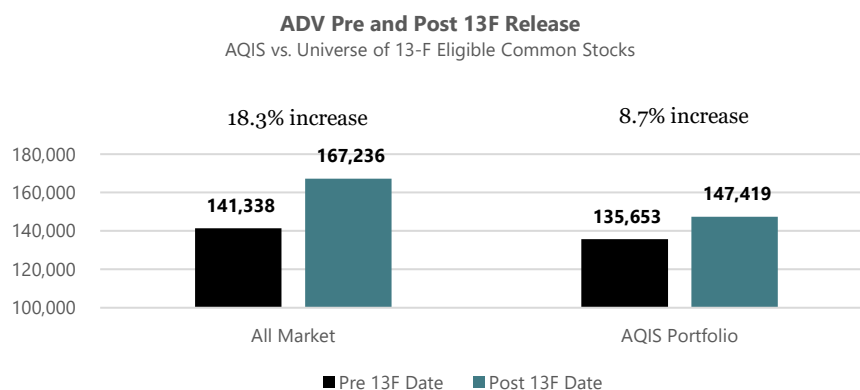
71% of 13-F securities are owned by an average of 22 hedge funds. AQIS is equally as likely to own a stock in the most crowded quartile as the least crowded quartile.



An additional signal our approach may lack competitive pressure is observable from an analysis of volume data the day before and directly after 13-F releases. If the AQIS strategy was being employed by other investors, one would expect to see abnormal increases in volume among the stocks the strategy targets for ownership, but upon analysis, we find no evidence there is abnormal demand for the stocks AQIS targets for ownership.

Figure 9 compares the average volumes for the ten days before and after the release of 13-Fs for the entire market of 13-F eligible securities with an average daily volume (“ADV”) below 500,000 since August 2007 to present. Note that the volume of the average stock increases by an average of 18.3% the ten days after 13-F’s are released whereas the average volume of stocks AQIS owns increase only 8.7% on average. This suggests that relative to the average stock traded in the market, the stocks AQIS targets tend to receive less attention from investors after the release of 13-Fs. We believe this serves as additional evidence the stocks AQIS targets for ownership are uncrowded and suggests AQIS may employ a novel investing approach that lacks meaningful competition.

Figure 9. ADV Comparison: AQIS Target Positions vs. The Market



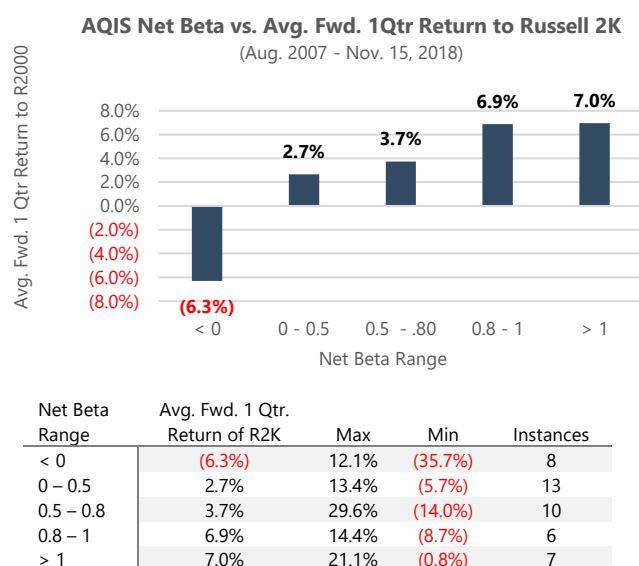
Risk Management – Net Exposure Management

Security selection is at the heart of the AQIS approach, but it is not the only contributor to alpha-capture. Exposure management is also a component of the AQIS strategy and managing net exposure has historically accounted for roughly 18.1% of the AQIS history of simulated and live returns⁸.

An elegant benefit of the AQIS strategy is that when portfolios of hundreds of high-conviction stock picks are assembled, AQIS is provided with insight into the likely direction of broader market flows. AQIS utilizes this information to dynamically and systematically manage the net exposure of the portfolio, creating an additional lever to capture alpha and protect capital during drawdowns.

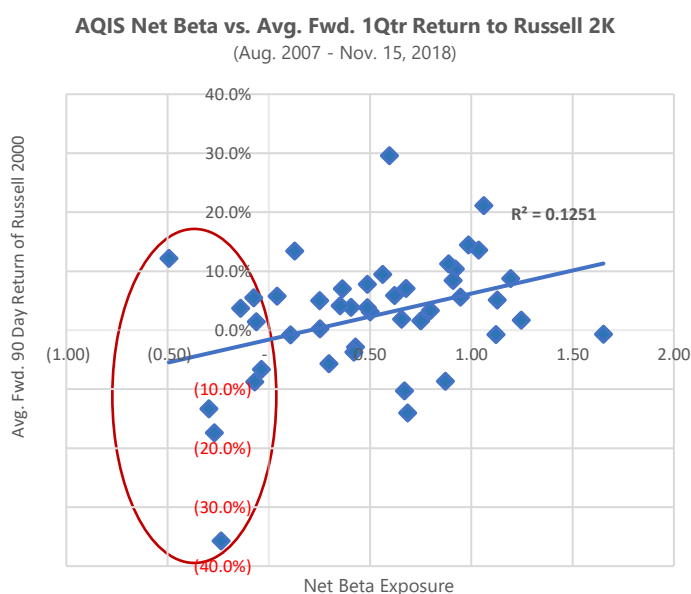
Upon each 13-F release, AQIS averages the beta tilt of the stocks the AQIS models recommend as new long positions. This measure is used to govern net exposure. As the beta tilt of the long-portfolio falls (rises), AQIS reduces (increases) net exposure. This process produces a dynamic net beta tilt for the overall portfolio that is derived from the collective wisdom of the specific crowd of investors AQIS harvests discretionary investing insights from. Figures 10 and 11 illustrate how the net beta tilt of the portfolio tends to be predictive of market performance, especially in the left tail.

Figure 10. Net Beta of AQIS Portfolio vs. Russell 2000



Data from August 2007 through November 2018 (most recent 13-F release date)

Figure 11. AQIS Sector Tilt vs. Index and Fwd. Returns



Using the beta tilt of the long portfolio to manage net exposure and ultimately drive the net beta tilt of the portfolio is a risk management approach that harnesses the wisdom-of-crowds phenomenon AQIS observes after aggregating the highest-conviction investments among managers AQIS ranks the highest. While the above analysis is helpful to illustrate the relationship, a more thorough statistical analysis reveals the merits of leveraging the

⁸ Our test defining the return contribution from net exposure management comes from the quantitative methods presented by Andrew Lo in his 2007 paper, “Where Do Alphas Come From? A New Measure of the Value of Active Management”. For a detailed discussion of our analysis, please see the Appendix.

beta tilt of the long-portfolio as a governor on net exposure. To institute a test, we define a beta tilt greater than (less than) one as a forecast for positive (negative) market returns. Our dataset extends to August of 2007, so our sample consists of 45 periods of 90-day windows.

If the beta indicator is *not* able to forecast forward 90-day performance better than chance, then the number of instances the market generates positive returns when the beta indicator is above one can be expected to be no greater than what we might find if we sampled randomly from the universe. The data are as follows:

Russell 2000 Forward 90 Day Returns when Beta Tilt > 1					
August 2007 to January 2018					
	<u>Periods</u>	<u>Market Up</u>	<u>% of time</u>	<u>Market Down</u>	<u>% of time</u>
Russell 2000	45	31	69%	14	31%
AQIS Long Beta > 1	29	23	79%	6	21%

S&P 500 Forward 90 Day Returns when Beta Tilt > 1					
August 2007 to January 2018					
	<u>Periods</u>	<u>Market Up</u>	<u>% of time</u>	<u>Market Down</u>	<u>% of time</u>
S&P 500	45	32	71%	13	29%
AQIS Long Beta > 1	29	24	83%	5	17%

The beta indicator selected 79% of Russell 2000 up-markets and 83% of S&P 500 up-markets, yielding 3 more periods of up-markets for the Russell 2000 and S&P 500 than we'd expect by chance.

Is this significant? The relevant probability distribution to use here is the hypergeometric because we require a statistical experiment that has a sample n selected without replacement (as opposed to a binomial experiment, which requires the probability of success be constant on every trial), from a population of N terms.

Upon analysis, the odds the results observed above occurred by chance are 3.7% (or $\sim 1/27$) when forecasting the performance of the Russell 2000, and 2.1% (or $\sim 1/47$) when forecasting the performance of the S&P 500.

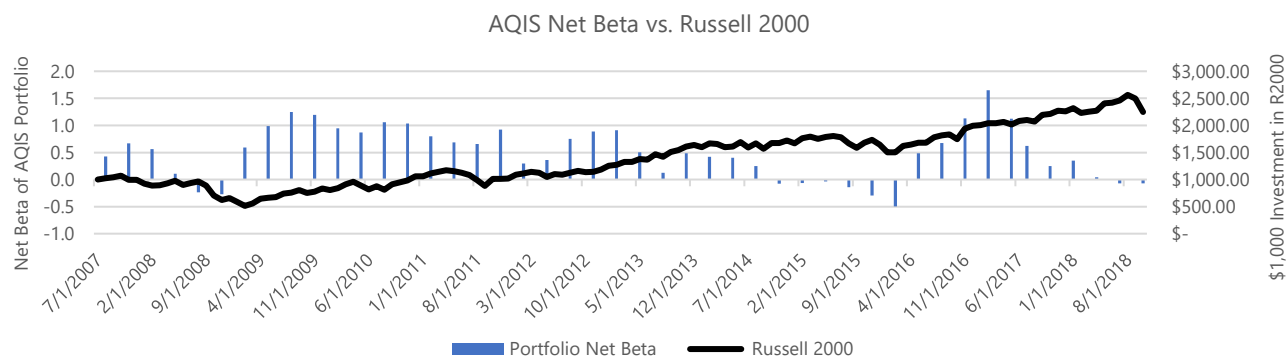
We do not say the beta indicator does or does not have the ability to predict the direction of the market. No *ex post facto* test can resolve such a question, but the statistical results are highly suggestive (p-value of 0.02, below the commonly accepted threshold of 0.05 for statistical significance).

AQIS leverages this predictive insight by systematically adjusting the net exposure of the overall portfolio in response to the beta tilt of the long portfolio. When the average beta of the names AQIS observes managers expressing the greatest level of conviction in is high, say above a beta of 1.0, it signifies risk taking is less likely to be punished and we observe that the market tends to perform well. Alternatively, the opposite is true when the average beta of these positions drops below 1.0.

The beta tilt of the AQIS long portfolio tends to be prescient and this has historically made it an excellent governor on net exposure. Using beta exposure as a compass for risk-management results in a net beta tilt for the portfolio that has typically protected capital during market drawdowns and increased returns in bull markets. Figure 12 displays the merit of the AQIS approach to risk management by showing how the beta tilt of the portfolio tends

to be prescient. Using the beta tilt of the AQIS long portfolio to govern net exposure was particularly effective at protecting capital in October of 2018 and into Q4 of 2018, when the beta tilt became defensive prior to the October 2018 market drawdown that continued into year-end.

Figure 12. Historical Net Beta of AQIS Portfolio (live and simulated) vs. the Russell 2000



Risk Management – Factor Exposure Management

AQIS has historically operated with highly diversified portfolios and on average, has held hundreds of long and short positions at a time. With broad exposure to the equity markets, adopting a factor aware strategy to manage and protect the portfolio from unintended factor risks is an important part of risk management. AQIS manages factor risks across Styles and Sectors using the Axioma U.S. Equity Risk Model, arguably the most robust risk model available to institutional investors.

Exposures to Style factors are managed monthly, generally restricting beta loadings on individual Style factors to a beta loading of ± 0.50 each month when the portfolio is in a market neutral position (Figure 13). Exposures to Sector factors are also managed monthly, generally restricting loadings on individual Sector factors to a beta loading ± 0.2 each month when the portfolio is in a market neutral position (Figure 14).

Figure 13. Management of Style Factor Betas

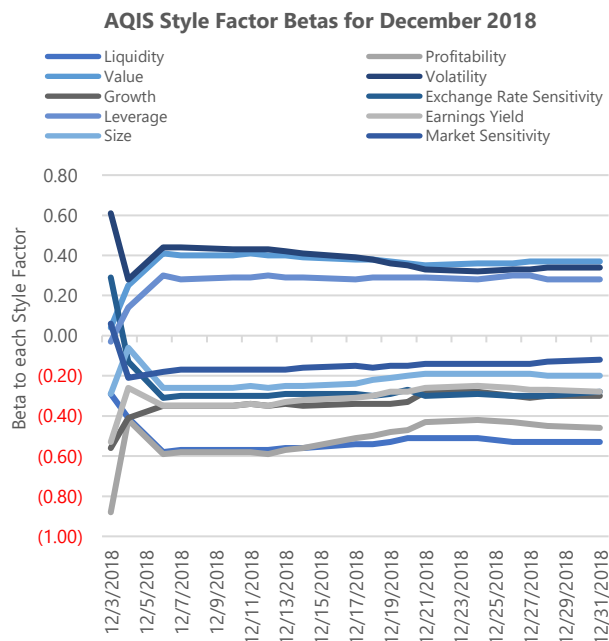
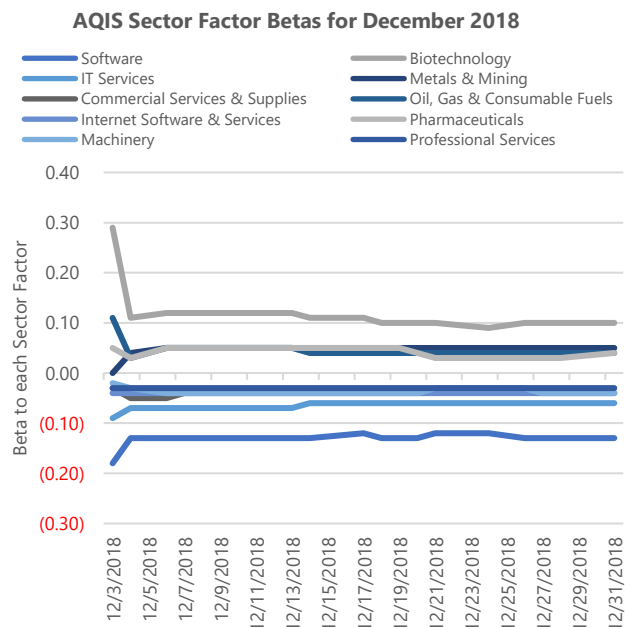


Figure 14. Management of Sector Factor Betas



Concluding Commentary

The key belief of AQIS is that hedge funds have fingerprints. The personalities and biases of their team members produce an observable statistical personality at the firm level. Their behavioral preferences can be understood by analyzing their trading behavior in concert with fundamental and technical factors corresponding to the market environment and the stocks the funds trade. By tracking these preferences, AQIS has historically identified investments with favorable risk vs. reward asymmetry and constructed compelling long and short equity portfolios governed by a wisdom-of-crowds risk management process that dictates net exposure.

The goal of AQIS is to generate positive returns over any rolling twelve-month period and beat the indices over any trailing three-year period. AQIS believes stock-picking skill exists but the traditional fundamental discretionary investing approach is a sub-optimal strategy for accessing and monetizing that skill. The returns of traditional discretionary managers are often compromised by biases and behaviors that systematically erode alpha-capture. The investing approach AQIS takes is designed to drive alpha-capture using the fuel of discretionary insights but do so in a systematic fashion that transforms the behaviors that corrupt the typical discretionary investing process and turn them into features of human behavior that can be repeatedly harvested and monetized. The result is a process that captures behavioral alpha, a truly durable source of returns because it is derived from the insights of talented professional investors heavily incentivized to make sound investments and it is identified through a behavioral lens.

For additional information, please contact us at Information@AQIS.com.

Appendix A – Pervasive Behavioral Inefficiencies Across the Hedge Fund Landscape

Sub-Optimal Behaviors of Hedge Funds

An understanding of hedge fund behavior is an aid to measuring conviction. Three common examples of durable investor behaviors that AQIS believes pollute returns are sub-optimal position sizing, seasonal effort, and style-bias.

1. **Sub-optimal position sizing:** AQIS finds that on average, position-sizing skill is a toss-up. Roughly half of all 13-F filers in our universe add alpha from position sizing, and half do not. It does not appear to be a durable edge and those that fail to size their portfolios well, suffer dearly in terms of lost performance.
2. **Seasonal effort:** AQIS also finds that manager effort is seasonal. Investing decisions and the pursuit of alpha appear to be directly related to the year-to-date performance of a fund on a calendar basis.
3. **Style bias:** A third example of behavior polluting alpha-capture is the pervasive and enduring style-bias of most managers. Regime change occurs with a frequency that inevitably punishes managers unwilling to be flexible in their pursuit of alpha. This relegates LPs invested with traditional fundamental discretionary managers to earn sub-optimal returns.

The AQIS process is a potential remedy for these illnesses that plague the discretionary investing industry.

Sub-optimal position sizing

AQIS finds that the largest positions in a managers' portfolio are typically not the positions with the most favorable risk vs. reward relationship. Position sizing skill is not a skill maintained by most managers. Research by AQIS and others has shown that roughly half of all managers exhibit consistent stock-picking skill and outperform equal-weighted versions of their portfolios, whereas the other half, consistently underperform equal-weighted versions of their portfolios⁹. In fact, research by AQIS finds that roughly half of managers underperform equal-weighted versions of their portfolios by an average of 135% per quarter (our data extends from August of 2007 to present and reviews thousands of hedge funds).

AQIS believes position sizing is polluted by marketing efforts and the pressure to grow assets, which increases management fee revenue. As we've already reviewed, hedge fund managers are incentivized to be risk-averse over risk-seeking, and this risk-aversion is likely related to the asymmetric benefit they enjoy from stable and growing AUM. It is much easier to market and raise assets for a fund when the ballast of the fund portfolio, meaning the largest positions, consists of relatively safe or popular investments. However, it is often the case these investments, while they may have merit, and often do¹⁰, are inferior to other investments in the managers portfolio. They may be *good* investments, but AQIS finds they are rarely the *best* investments in a portfolio. History shows that the best investments are usually somewhat controversial and often found through contrarian thinking, so inherently, these are sub-optimal positions for marketing purposes. The AQIS approach is successful, in part, because the algorithms designed to capture conviction take into the account how marketing efforts tend

⁹ See research by Novus at www.novus.com. Specifically, the article, "The Skill of Prediction: Hedge Fund Position Sizing" by Stanley Altshuller reports the results of a study conducted from 2010 to 2015 that found 41% of managers lose 1.6% of alpha per year through poor position sizing.

¹⁰ See "The Concentration Manifesto" by Cameron Hight of AlphaTheory. Available at www.AlphaTheory.com.

to pollute the position sizing decisions of fundamental discretionary managers. What this means is the amount of capital allocated to an idea needs to be de-emphasized in a predictive algorithm for identifying investments that likely have the most favorable risk vs. reward ratios in a portfolio.

Seasonal Effort

Position sizing isn't the only component of bias drag in a fundamental portfolio. Seasonality of effort is another sub-optimal feature of investor behavior and AQIS estimates it reduces returns by an average of 1% per year.

Our model for thinking about this is based on our work measuring the risk appetite of a firm over a calendar year. Our proxy for risk appetite is measuring the liquidity risk a firm takes on a quarterly basis and how this changes in the second half of the year vs. the first half of the year. In data extending back to August of 2007, we find the average fund reduces their risk appetite by an average of 17% in the second half of the calendar year compared to the first half of the calendar year.

The table below shows the average days of volume a manager's buying behavior represented in new long positions entering a hedge fund portfolio (measured each quarter back to 2007). For example, in Q1 of 2008, the average fund manager we track was willing to consume half a day of volume on new long positions. We find that the typical fund manager we track is 17% more cautious, on average, in the second half of the calendar year than the first half of the calendar year, (if one believes cautiousness is inversely correlated to the level of liquidity risk a manager takes).

Figure 1-A. Average Daily Volume Consumed by New Long Positions on Calendar Basis

Year	Q1 ADV	Q2 ADV	Q3 ADV	Q4 ADV	1st Half of Yr.	2nd Half of Yr.	Change
2008	0.52	0.42	0.48	0.33	0.47	0.40	-14%
2009	0.64	0.71	0.50	0.48	0.68	0.49	-28%
2010	0.47	0.37	0.39	0.39	0.42	0.39	-7%
2011	0.55	0.43	0.39	0.41	0.49	0.40	-19%
2012	0.52	0.48	0.43	0.45	0.50	0.44	-11%
2013	0.54	0.46	0.47	0.37	0.50	0.42	-16%
2014	0.62	0.58	0.47	0.51	0.60	0.49	-18%
2015	0.47	0.34	0.32	0.32	0.40	0.32	-20%
2016	0.38	0.25	0.23	0.21	0.31	0.22	-30%
2017	0.27	0.26	0.26	0.27	0.26	0.27	1%
2018	0.35	0.34	0.27	0.27	0.34	0.27	-20%
Average							-17%

We find evidence that this seasonal risk-taking behavior is related to loss aversion and has a negative impact on returns. A related finding was reported in a 2011 academic paper written by Andrew Clare and Nick Motson, titled "Locking In The Profits or Putting It All on Black – an Empirical Investigation Into The Risk Seeking Behavior of Hedge Funds"¹¹. The researchers looked at the standard deviation of fund returns over time and found funds with

¹¹ Clare, Andrew D., and Nick E. Motson. "Locking in the Profits or Putting It All on Black? An Empirical Investigation into the Risk-Taking Behaviour of Hedge Fund Managers." SSRN Electronic Journal, 2009, doi:10.2139/ssrn.1342266.

carry to protect were more likely to “lock-in” their gains, which was demonstrated by lower volatility of returns in the second half of the calendar year (the researchers looked at this phenomenon a number of additional ways and the phenomenon passed all robustness checks).

It is also noteworthy that a perfectly rational approach to money management would arguably be to continuously allocate capital to the best risk/return opportunities regardless of what time of year it is or what the carry position of the firm is. The goal should be to always maximize the long-term CAGR of the Fund, which consequently, should maximize the long-term wealth accumulation of the manager, employees, and LPs. But the data reveals managers appear to have a myopic attitude to compensation and their LPs likely suffer as a result. LPs pay the exact same management fees in the second half of the calendar year, but on average, their managers arguably don’t work as hard to compound their capital in the second half of the calendar year. Instead, the managers appear to de-risk and attempt to lock-in their carry.

Style-Bias

Style-bias is a well-known feature of behavior among fundamental discretionary investors and allocators often construct portfolios using style-bias as their guide. The problem with this approach is that even portfolios designed to pair strategies in a manner that offsets the troughs in returns of one strategy with the peaks in returns of another, undergo sustained periods of underperformance when historical factor correlations reverse. For example, pairing value and momentum strategies is arguably the most popular factor strategy on Wall Street because their respective return streams have historically had a complimentary correlation, but correlations break down, and this is problematic. June of 2018 was a period where both factors generated significant losses at the same time, trading down in near lock-step and undergoing uncomfortable drawdowns (Figure 2-A).

Figure 2-A. The Simultaneous Declines of Value and Momentum



Evidence suggests managers tend to be victims of style-bias. We find most managers tend to invest with consistent factor exposure tilts, providing LPs with access to return streams with somewhat weak but consistent factor tilts (and a significant management fee and carried interest fee taken out). This finding is strongly confirmed by results from a 2010 academic paper, “Financial Product Differentiation Over the State Space in the Mutual Fund industry” by Shujing Li and Jiaping Qiu, which showed that 95.7% of cross sectional mutual fund performance is explained by the traditional four Carhart factors: exposure to market beta, small-capitalization stock exposure, value exposure, and momentum exposure. Their finding implies only 4.3% of mutual fund managers are providing

alpha. The rest are providing a factor exposure or set of factor exposures with a substantial fee drag. AQIS finds hedge funds are not meaningfully different from their mutual fund brethren.

Further evidence of style-bias was reported in a 2007 paper called “The Fund Performance Illusion” by Daniel Wessels and Niel Krige, who reported that on average, between 1988 and 2003 only 8% of equity mutual funds stay in the same decile of performance over three year rolling periods and only 6% of managers in the top tertile maintain their position over a three year rolling period. This lack of persistence aligns with the frequency of regime change among factor returns, suggesting managers lack a dynamic process to switch among factors and maintain alpha-capture on a consistent basis. What we observe is that to consistently earn high returns requires flexibility, in both mandate and investing ability.

AQIS solves for the issue of style-bias by constructing portfolios using conviction as the compass for security selection, a tool that is factor agnostic and instead, behavioral.

Appendix B – Alpha Through Active Management

In the 2007 paper, “Where Do Alphas Come From? A New Measure of the Value of Active Investment Management”, the Author, Andrew Lo, introduces a quantitative method to calculate the percentage of a return that comes from active management. We apply that model in our case to evaluating the management of net exposure using our beta metric.

Mr. Lo breaks down a portfolio of long securities on a weighted basis. Consider a portfolio of n securities each with weight w and return R . The time averaged total return of the portfolio is the sum of all the products between w and R averaged over t time periods. That formula can be broken down into its passive and active components over t time periods.

$$\begin{aligned}
 E[R_{pt}] &= \sum_{i=1}^n E[\omega_{it} R_{it}] \\
 &= \sum_{i=1}^n (\text{Cov}[\omega_{it}, R_{it}] + E[\omega_{it}]E[R_{it}]) \\
 &= \sum_{i=1}^n \text{Cov}[\omega_{it}, R_{it}] + \sum_{i=1}^n E[\omega_{it}]E[R_{it}] \\
 &\equiv \delta_p + v_p,
 \end{aligned}$$

The passive component is the average of the weights over t time periods multiplied by the returns of t time periods. The active component is the co-variance of weights vs. returns over the same t time periods. The more the weights move with the returns, the higher the active component and the better the manager is at weighting positions based on timing.

$$\begin{aligned}
 \delta_p &\equiv \sum_{i=1}^n \text{Cov}[\omega_{it}, R_{it}] \quad (\text{Active Component}) \\
 v_p &\equiv \sum_{i=1}^n E[\omega_{it}]E[R_{it}] \quad (\text{Passive Component}) \\
 \theta_p &\equiv \frac{\delta_p}{\delta_p + v_p} \quad (\text{Active Ratio}).
 \end{aligned}$$

The final ratio is essentially the percentage of total return comprised of active return. Any positive value indicates skill in active management and anything above 10% or so suggests a notable degree of skill.

For this example, we are interested not in individual security weights but in the management of net portfolio exposure for a long/short portfolio. That leaves us with the equivalent portfolio of $n=2$. Our long portfolio and

short portfolio, which we actively weight each month based on our beta indicator. We have calculated the passive and active component of our returns for the history of our model and the results yield a value of 21% (August 1, 2007 – January 1, 2019), meaning this is the percentage of our returns that can be explained by active exposure management.

It is important to note this examination, as well as the probability analysis in the body of the paper, are backward looking, but there is an intuitive and economic rationale for why these results might continue in the future. The beta indicator harnesses a wisdom-of-crowds effect of a very particular crowd and includes very specific episodes of conviction trading. Professional investors are incentivized to compound capital and while evidence suggests their effort is often compromised by behavioral biases and sub-optimal, often myopic decision making, there is ample evidence that is highly suggestive stock-picking skill exists. By aggregating instances of high conviction, we distill signal from noise and our beta indicator suggests our approach is a useful barometer for measuring risk appetites of investors and providing us with a lever to capture alpha through active exposure management.

Disclaimer

This document is not an offer to sell securities of any investment fund or a solicitation of offers to buy any such securities. Securities of AQIS Diversified Alpha I Fund LP (the “**Fund**”) managed by AQIS LLC (the “**General Partner**,” “**AQIS**,” “**we**” or “**our**”) are offered to selected investors only by means of a complete offering memorandum and related subscription materials which contain significant additional information about the terms of an investment in the Fund (such documents, the “**Offering Documents**”). Any decision to invest must be based solely upon the information set forth in the Offering documents, regardless of any information investors may have been otherwise furnished, including this presentation.

An investment in any strategy, including the strategy described herein, involves a high degree of risk. There is no guarantee that the investment objective will be achieved. Past performance of these strategies is not necessarily indicative of future results. There is the possibility of loss and all investment involves risk including the loss of principal. Securities of the Fund are not registered with any regulatory authority, are offered pursuant to exemptions from such registration, and are subject to significant restrictions.

The information in this document was prepared by the General Partner and is believed by the General Partner to be reliable and has been obtained from public sources believed to be reliable. General Partner makes no representation as to the accuracy or completeness of such information. Opinions, estimates and projections in this presentation constitute the current judgment of General Partner and are subject to change without notice. Any projections, forecasts and estimates contained in this presentation are necessarily speculative in nature and are based upon certain assumptions. It can be expected that some or all of such assumptions will not materialize or will vary significantly from actual results. Accordingly, any projections are only estimates and actual results will differ and may vary substantially from the projections or estimates shown. This presentation is not intended as a recommendation to purchase or sell any commodity or security. The General Partner has no obligation to update, modify or amend this presentation or to otherwise notify a reader thereof in the event that any matter stated herein, or any opinion, project on, forecast or estimate set forth herein, changes or subsequently becomes inaccurate.

This presentation is strictly confidential and may not be reproduced or redistributed in whole or in part nor may its contents be disclosed to any other person without the express consent of the General Partner. The results presented in this presentation may include simulated performance results, which are unaudited and do not reflect actual results of a fund managed by AQIS. The simulated performance results presented here (i) cover the period from August, 2007 through and including December 31, 2015 ; and (ii) are net of assumed trading costs, but gross of fees and other expenses; accordingly, performance of individual investors may vary based upon differing management fee and incentive allocation arrangements, as well as allocation of Fund expenses. The model performance results presented here also exclude companies with market capitalizations below \$100 million. Model performance results are for illustrative purposes only and are not necessarily indicative of performance that would have been actually achieved if an investment utilized the strategy during the relevant periods, nor are these simulations necessarily indicative of future performance of the strategy. Inherent limitations of model performance may include: 1) model results are generally prepared with the benefit of hindsight; 2) model results do not represent the impact that material economic and market factors might have on an investment adviser's decision-making process if the adviser were actually managing client money; 3) there are numerous factors related to the markets in general, many of which cannot be fully accounted for in the preparation of hypothetical performance results and all of which may adversely affect actual investment results.

References to market or composite indices, benchmarks, or other measures of relative market performance over a specified period of time are provided for information only. Reference or comparison to an index does not imply that the portfolio will be constructed in the same way as the index or achieve returns, volatility, or other results similar to the index.

Indices are unmanaged, include the reinvestment of dividends and do not reflect transaction costs or any performance fees. Unlike indices, the Fund will be actively managed and may include substantially fewer and different securities than those comprising each index. Results for the Fund as compared to the performance of The Russell 2000 Index (“**Russell 2000**”), as discussed in this slide, are for informational purposes only. The AQIS Strategy does not mirror the Russell 2000 and the volatility may be materially different than the volatility of the Russell 2000.

Direct comparisons between the Fund's performance and equity market indices are not without complications. The Fund's portfolio may contain options and other derivative securities, fixed income investments, may include short sales of securities and margin trading and may not be as diversified as market indices. The indices may be unmanaged, may be market weighted, and unlike the Fund, indices do not incur fees and expenses. Due to the differences among the Fund's portfolio and the performance of equity market indices, no such index is directly comparable to the investment strategy of the Fund.

The description herein of the approach of AQIS and the targeted characteristics of its strategies and investments (the “**AQIS Strategy**”) is based on current expectations and should not be considered definitive or a guarantee that the approaches, strategies, and investment portfolio will, in fact, possess these characteristics. These descriptions may change over time. Past performance of these strategies is not necessarily indicative of future results. There is the possibility of loss and all investment involves risk including the loss of principal.