GREENWICH ASSOCIATES

Commissioned by:
BLACKROCK®

Uses of Quantitative Investment Strategies in Asia

Best Practices for Asian Institutions Considering Quantitative Approaches to Investing

Executive Summary

The use of quantitative strategies by Asian investors will likely increase as rapid asset growth prompts institutions throughout the region to incorporate a broader mix of asset classes and investment strategies into their portfolios. Although the share of Asian institutions currently using quantitative strategies is modest relative to the widespread use among U.S. institutions, a new study from Greenwich Associates suggests that Asian institutions are likely to allocate more to quantitative strategies over time as they seek new sources of alpha and investment approaches with low correlations to fundamental managers.

Asian institutions are growing rapidly. As they accumulate assets in an environment of historically low yields and high levels of market volatility, they are venturing beyond the local fixed income and cash investments that once dominated their portfolios and moving into a broader range of asset classes and investment strategies. Currently, about a third of Asian institutions include quantitative investment strategies in this expanding mix. This low rate of adoption can be attributed to several factors, including a general lack of understanding about precisely how these complex strategies generate alpha and the role they should play in an institutional portfolio, as well as negative perceptions about how some quantitative managers have performed during recent periods of extreme market volatility. Compounding these issues for Asian investors is the fact that many quantitative managers house their investment operations half a world away and maintain little permanent presence in local markets.

However, Greenwich Associates believes growing numbers of Asian institutions will be looking for managers who can deliver sources of diversified and consistent returns with low correlations to their existing fundamental exposure. When they do, quantitative investment managers who can clearly articulate the role of their strategies in portfolios and maintain a local presence in Asia will be strong contenders. To assist Asian investors in this process, we completed a study on the use of quantitative strategies among institutions in Asia and the United States. This report presents the results of that research, along with a set of best practices for institutions to follow as they consider and implement quantitative approaches. In general, those best practices relate to two main principles for institutions to consider: gaining a firm understanding of the process by which a quantitative manager generates alpha, and understanding how the quantitative fund will fit with the fundamental strategies that make up the bulk of their portfolios.

Study Participants

Between November and December 2012, Greenwich Associates interviewed 44 institutional asset owners in the United States (22) and Asia (22) to better understand their perceptions and use of quantitative investment strategies. Respondents included pension funds, sovereign wealth funds, insurance companies, endowments and foundations.

Key Study Findings

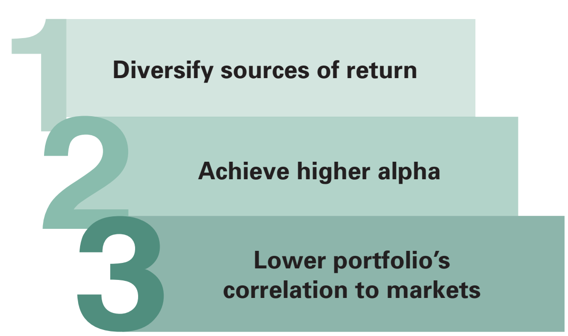
- **Current low penetration** Approximately one-third of responding Asian institutions use quantitative investment strategies, compared with 82% of U.S. institutions.

- **Increasing trend** Approximately 30% of Asian institutions participating in the study that now employ quantitative strategies expect to increase their use of these approaches in the coming three years and none expect to reduce their usage. Thirteen percent of Asian institutions not currently using these strategies expect to add quantitative funds to their portfolios for the first time.

- **Investors have been generally satisfied** Roughly half of participating institutions in Asia and the United States say they are satisfied with the performance of quantitative funds from 2011 to 2012, 17% say returns over the period actually exceeded expectations, and about a third say quantitative strategy performance fell short of expectations.

- **Less understanding of quantitative strategies** No Asian institutions participating in the study claim to have a strong understanding of quantitative models versus a third in the United States, and about 45% of Asian investors find quantitative strategies to be too opaque.

Top Reasons for Implementing a Quant Strategy



Note: Study participants were asked: Why would you look to implement a quantitative investment strategy? Rank each of the following factors with 1 as biggest/primary reason down to 3. Source: Greenwich Associates 2012 Quantitative Investment Strategy Study

- **Local presence is crucial** All Asian users of quantitative strategies participating in the study invest in global funds. This practice differs markedly from the approach employed by U.S. investors, among which more than 90% invest in domestic funds and only 53% invest in global funds. This global focus — and the fact that most quantitative funds house their investment operations in Western locations — means that Asian investors will benefit greatly from managers that maintain the local presence required to provide consistent and robust support.

- **Investors need better servicing and stronger capabilities** Investors rate transparency and manager communication as a top criterion in considering a quantitative manager, second in importance only to the strength of managers' quantitative systems and models. Generally, Asian investors see servicing capabilities and the ability to advise on broader investment issues as important factors in selecting a quantitative manager.

Greenwich Associates research reveals growing interest in quantitative strategies among Asian institutions. Approximately one-third of Asian institutional investors employ quantitative strategies, as compared to the more than 80% of U.S. institutions that currently include quantitative strategies in their portfolios. That differential suggests room for substantial growth in Asia.

Assets under management by Asian institutions have grown by approximately 50% since 2009. Asset growth of this magnitude requires dramatic alterations to investment strategies and asset allocations, as well as a significant expansion of in-house staff and capabilities. Many of these institutions are still building out their investment strategies. Lacking hands-on experience with quantitative strategies, many Asian institutions are for now sticking with more familiar fundamental approaches.

However, the research results clearly suggest that once Asian institutions gain first-hand experience with quantitative strategies, they are likely to increase their allocations to quantitative approaches relatively rapidly. Among Asian institutions that have already started using quantitative investment strategies, approximately 30% plan to make more use of these strategies in the next three years and none expect to cut back.

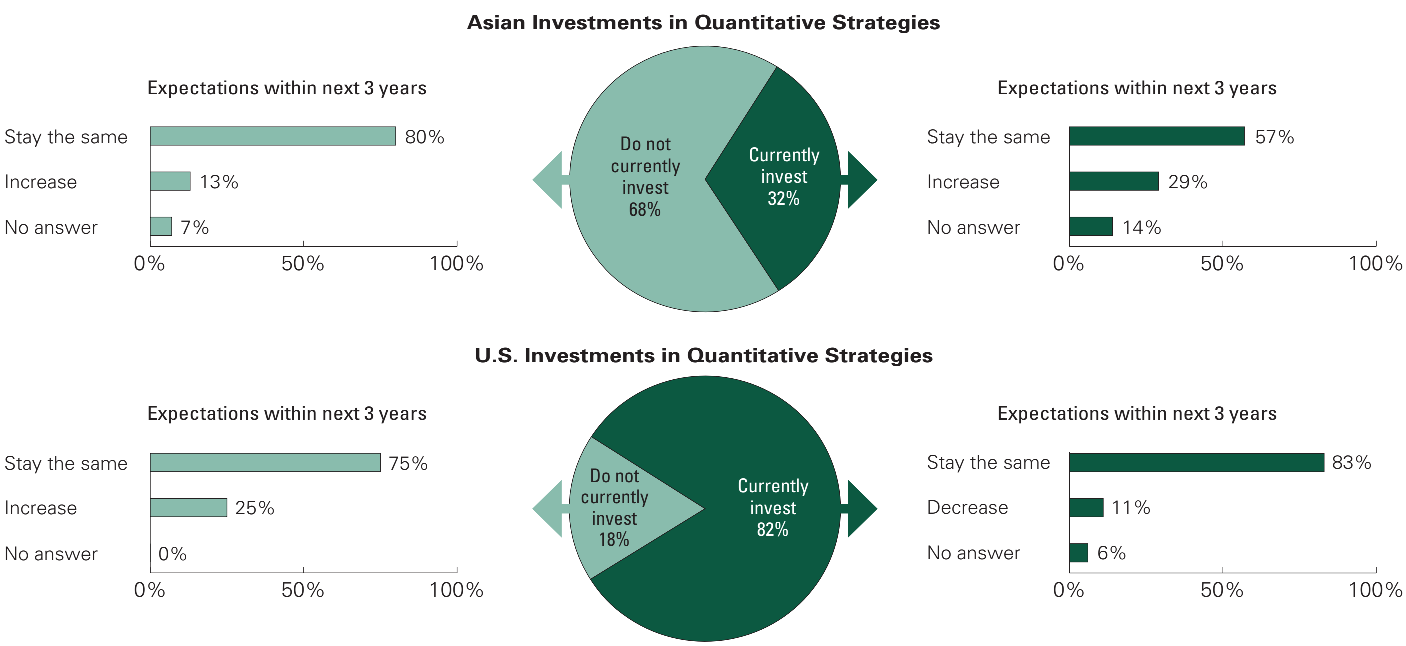
Why Quant?

Why should Asian institutions care about quantitative strategies — even in the wake of an especially challenging period for many quantitative managers?

At a general level, active fundamental investors and quantitative investors are working to achieve the same goal: To parse information for opportunities to generate alpha. However, the two types of managers approach this task

Use of Quantitative Strategies

The pervasive use of quant strategies in the United States shows the enormous potential for growth in quant use in Asia.



Source: Greenwich Associates 2012 Quantitative Investment Strategy Study

Defining "Quant"

When thinking about institutional use of quantitative strategies in Asia or any other market, it is important to bear in mind that quantitative strategies are not a monolithic set of techniques. To the contrary, the term "quantitative strategies" is a general label applied to a broad and dynamic set of approaches that apply rigorous and systematic analysis to investing. Quantitative investors use multiple sources of information to design consistently applied investment processes to manage portfolios with typically greater breadth than fundamental strategies. Many quantitative managers' approaches are differentiated from so-called "black box" strategies by the fact that investment teams have the ability to intervene to allocate risk dynamically if market conditions call for it, as opposed to implementing purely model-driven processes. Quantitative investing can take the form of long-only and hedge fund strategies, and spans multiple asset classes and geographies.

Quant Strategy Commonalities
Identify the types of assets that outperform.
Measure the exposure of all assets in the underlying market to a range of economically intuitive investment insights.
Emphasize risk control and portfolio construction throughout a repeatable investment process.
Provide a high level of diversification across individual securities and investment ideas.
Deliver maximum exposure to sources of alpha while minimizing exposure to unwanted sources of risk.

Grouped under the "quantitative" umbrella are a diverse array of individual strategies. For example, long-only funds use value, momentum and earnings strategies, while for hedge funds, typical quantitative strategies include equity market neutral, event driven, systemic macro, correlation, and short-term strategies as well as other technical strategies and more esoteric approaches like volatility arbitrage. These strategies vary significantly in underlying methodologies, correlation levels, volatility measures, and performance histories.

In fact, the universe of quantitative strategies is much more diverse today than it was just five to 10 years ago. In the past, quantitative strategies' main distinguishing characteristic was their rigorous, risk-controlled methodology. While that methodology remains in place, quantitative managers are pushing into new sources of return, such as emerging markets, and employing new strategies and more complex and increasingly unstructured information sources. For example, some managers have been able to leverage technology and their own research skill to generate opportunities by processing regulatory filings, conference call transcripts, analyst reports and other textual sources of information with the aim of gauging broker sentiment and measuring management confidence.

Nevertheless, virtually all quantitative strategies continue to share some important characteristics, namely: quantitative managers use a systematic, research-driven approach targeted toward generating consistent returns with an emphasis on risk and a long-term investment horizon.

from vastly different perspectives. Fundamental managers generally look to outperform the market by using their own expertise and information advantages to pick out individual investments with the potential to generate alpha. Quantitative managers feed sources of information into a repeatable and consistently applied process designed to create alpha from a broad portfolio of holdings.

These differences make quantitative strategies complementary to fundamental approaches. Quantitative strategies have low correlations with fundamental strategies, in part because the two approaches use different sources of alpha. In fact, since the 2007–2009 period of deleveraging, quantitative managers have focused on taking advantage of innovations in technology and increased access to data in order to produce unique and uncorrelated sources of excess returns. For example, quantitative managers are now able to employ natural language processing to analyze huge volumes of information and harness "unstructured" information sources that until recently were inaccessible to investors and remain largely untapped by fundamental investors. The addition of quantitative funds that leverage these and other new sources of alpha can increase portfolio diversification.

In addition to diversification, quantitative strategies offer investors the potential for consistent returns. Quantitative models are designed to apply their investment process and risk controls systematically and regularly over the course of the market cycle. Because the investment model and risk controls are independent of both managers' personal views and the macro factors that drive fundamental strategies, returns should be relatively consistent throughout the cycle — even in volatile markets.

It's the Quality (of Returns) That Counts

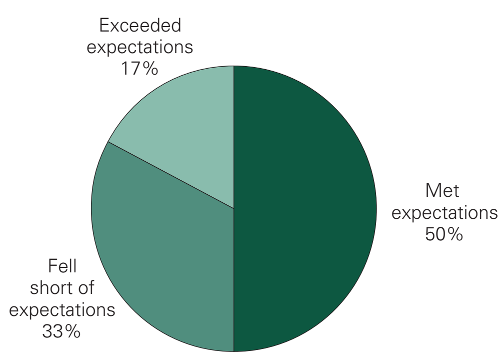
Despite general perceptions that quantitative strategies have failed to live up to their potential during recent periods of extreme market volatility, roughly half of Asian institutions participating in the study say they are satisfied with quantitative performance from 2011–2012 and 17% say returns over the period actually exceeded expectations. About a third of study participants do say quantitative strategy performance fell short of expectations over the period. Some investors' disappointment with their quantitative investments could be explained by past beliefs about quantitative strategy correlation levels, which proved to be much higher than expected during the 2007–2009 period. Over a 10-year period, large cap long-only U.S. fund managers pursuing quantitative strategies marginally outperformed fundamental managers, according to eVestment Alliance data. However, rolling 36-month correlations of quantitative and fundamental returns strengthened to as high as 0.80 just prior to 2007, before dropping to where they are today, around 0.20.

In many cases, those early expectations were inflated by eager managers who marketed their products as "all-weather" strategies capable of delivering strong performance regardless of external market conditions. As a result, many institutions were likely disappointed by performance during a recent period that proved to be the most challenging in history for quantitative strategies.

As the representative of one Japanese pension fund explained:

> *"We had expected stable performance from our quantitative investments even in volatile markets, but it did not happen after [the] Lehman shock. The future of quantitative investment depends on asset managers' efforts to improve their models."*

Quant Strategy Returns Relative to Expectations
Asian Institutions



Source: Greenwich Associates 2012 Quantitative Investment Strategy Study

Top Ways Firms Measure Quant Strategy Investment Performance

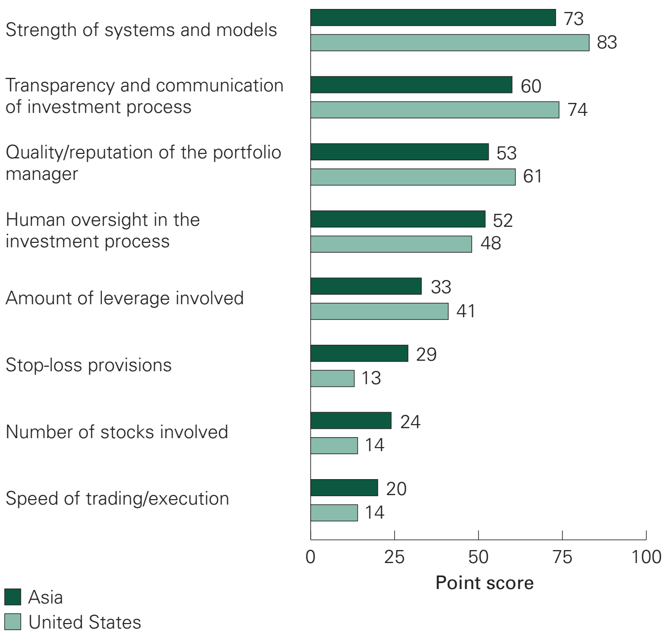
Note: Participants were asked to rank each of the following measurement strategies with 1 as most relevant down to 5 for least relevant.
Source: Greenwich Associates 2012 Quantitative Investment Strategy Study

For investors, the main lesson from the 2007–2009 period of severe underperformance among quantitative strategies is to find managers who are ahead of the game in terms of designing strategies that avoid crowded trades and who are vigilant in monitoring the efficacy of quantitative factors. In this regard, investors may consider asking prospective quantitative managers: What insights do you have into what other quantitative investors are doing? Managers with robust and sophisticated analytics processes and systems can report accurate, up-to-date and detailed risk positions and information ratios for each factor in their quantitative models. Investors should seek managers who are willing to share those risk and information ratio statistics and interpret them for clients.

> Find managers who are ahead of the game in terms of designing strategies that avoid crowded trades and who are vigilant in monitoring the efficacy of quantitative factors.

Risk-adjusted returns are the most popular method of measuring quantitative strategy performance among Asian institutions. However, because so many institutions invest in quantitative strategies not just for the return potential, but also for the benefits these strategies can provide at the portfolio-wide level, a more useful measure might be "quality of returns," a broader metric which would include not only risk-adjusted returns

Most Important Criteria for Assessing Quant Investment Platform



Note: Participants were asked to rank the relative importance of each criterion when assessing a quantitative manager. Point score system is as follows: Rank 1 = 100 points, Rank 2 = 80 points, Rank 3 = 60 points, Rank 4 = 40 points, Rank 5 = 20 points, Rank 6–8 = 0 points.
Source: Greenwich Associates 2012 Quantitative Investment Strategy Study

but also consistency of returns/volatility levels and correlation levels/portfolio diversification benefits.

A representative of an Asian sovereign wealth fund provided a concise definition of the type of high-quality returns institutions should be seeking from quantitative managers:

"We are looking for consistency of performance, the ability to protect the performance during the sharp downturn, and how well the model is developed."

Preparing to Boost Quant Allocations: Focus on Understanding of Investment Processes and Portfolio Fit

The one factor that can truly differentiate quantitative managers today is continuous dedication to research, combined with the ability to process and react effectively to new information. The quantitative investing industry has evolved beyond its early days of boutique fund houses with a few managers. Quantitative investing has become more about processes. Significant scale and resources are now required to research innovative signals, process large and complex data sets and draw unique connections that can produce alpha in a competitive market.

For investors with limited exposure to quantitative strategies, the research and investment processes can seem daunting. Investors in quantitative funds rarely receive access to the specific signals used in manager trading models, and even in cases in which investors do receive such information, most institutions lack the technology infrastructure required to test them.

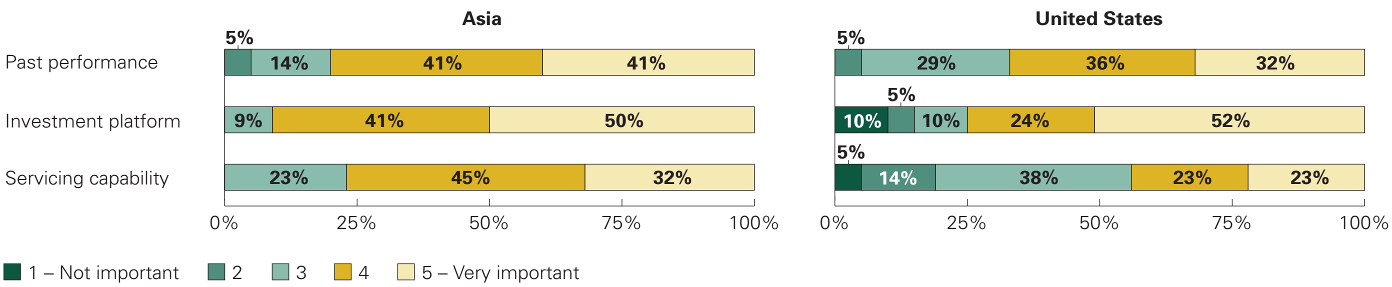
> Asian investors rate transparency and manager communication as a top criterion in considering a quantitative manager, second in importance only to the strength of managers' quantitative systems and models.

Not a single Asian institution participating in the study claims to have a strong understanding of quantitative models. About 45% of the investors find quantitative strategies to be too opaque. Although few institutions say they see quantitative strategies as entirely "black box" strategies, a solid majority of institutions (64%) say they would like their managers to better explain their quantitative strategies. Reflecting that desire, these investors rate transparency and manager communication as a top criterion in considering a quantitative manager, second in importance only to the strength of managers' quantitative systems and models.

These findings reflect the fact that gaining a full understanding of how a manager creates alpha is becoming increasingly important as signals become more diffuse and many financial markets remain correlated with each other. As such, when conducting due diligence on quantitative managers, institutions should be clear in their understanding of the investment approach and models used by the manager. While some aspects of a manager's investment process will remain proprietary, institutions should demand that managers provide transparency with regard to their processes and help the investor understand how the strategy works. Although some quantitative managers still keep portfolio holdings secret, other firms have moved to provide significant amounts of portfolio transparency.

It is critical that institutions develop a disciplined due diligence process that looks beyond past performance. The standard due diligence involves investigating the ability of a manager's investment platform and firm infrastructure to deliver consistent, high-quality returns. In addition, investors should ask quantitative managers detailed questions about how the manager creates alpha. For example, what kind of resources does a fund dedicate specifically for research? How does the manager leverage technology to filter and identify opportunities?

Factors Considered When Assessing Manager Capabilities



Note: May not total 100% due to rounding. Source: Greenwich Associates 2012 Quantitative Investment Strategy Study

How many data feeds does a manager use? Access to data can be crucial for quantitative investing, especially strategies focused on fixed income, which is traded over-the-counter as opposed to on an exchange, where data is readily available.

When considering a quantitative investment, institutions should look closely at a manager's track record in providing detailed strategy explanations as well as overall education and ongoing support to their clients. Upon completing due diligence, investors should feel they have a complete understanding of the process by which a strategy generates alpha and how the strategy will interact with the overall portfolio. Quantitative managers who provide prospective investors with little more than a deluge of data that the institution cannot understand or process signal the likelihood of insufficient communication throughout the future relationship. Investors should seek managers who are willing and equipped to provide the time and support needed to explain their investment process and the role their strategy can play within the portfolio.

Local Support Is a Must

In the United States and other developed markets, institutions rely on investment consultants for education about how quantitative and other innovative investment strategies work and for advice about the role new strategies should play in an institutional portfolio. In the United States, more than 75% of institutions rely on consultant relationships for advice on investment matters. Asian institutions, on the other hand, typically rely on in-house capabilities, with only about 25–30% of institutions using external investment consultants. Based on those factors, it comes as no surprise that Asian institutions focus more than their U.S. counterparts on quantitative managers' servicing capabilities. Less than half of U.S. institutions rate servicing capabilities as "important" or "very important" criteria in selecting a manager.

By contrast, three-quarters of Asian institutions rate manager servicing capabilities as "important" or "very important." Contributing to this difference is the fact that Asian institutions are much more likely than U.S. investors to invest in global funds. Among the institutions in this study, all Asian users of quantitative strategies invest in global funds, 57% invest in Asian funds and 42% invest in emerging markets funds. All Asian users also employ quantitative strategies in equities and 43% use them in fixed income.

To that end, one of the top priorities for institutions moving into this space should be ensuring that they access managers with a proven history of providing clients with strong support and high levels of ongoing interaction and education about how these strategies work and the role they should play in an institutional portfolio.

Because of the many unique characteristics of the Asian marketplace, a manager's ability to provide consistent, high-quality coverage and support should receive extra consideration as an important manager selection criterion.

Although the deployment of product specialists and other investment professionals based in Asia puts a manager ahead of competitors, even a local presence does not guarantee the level of service institutions should be seeking for such complex strategies. Rather, Asian institutions should focus on finding managers who have moved beyond the model of selling proprietary quantitative products, and instead embrace the notion of partnership, in which the manager works to understand the needs of its investors and help them achieve their objectives at a portfolio-wide level. The key is to find managers who see it as part of their responsibility to have real conversations with investors in which they listen to the needs of the institutions, explain in detail their own investment philosophy, process and source of alpha, and then work with the investors to determine the proper role for the strategy within the portfolio.

Quant Investments: Best Practices for Asian Institutions

1. **Seek out innovative managers who can truly diversify sources of return.** Asian institutions who are attracted to quantitative strategies mostly appreciate their potential diversification benefits, but they also have concerns about crowded trades and insufficient differentiation among managers. A solid majority (86%) of Asian investors said diversifying sources of return was a reason for implementing quantitative strategies.

   That is why investors should seek innovative managers who have the scale and resources to monitor and develop quantitative strategies, who have access to information that can indicate how crowded some market segments are, and who can clearly explain how their strategies can serve as unique sources of alpha across many geographies. Quantitative investing has evolved since the extreme volatility during the financial crisis, and investors have more opportunities to find managers who have genuinely different strategies and who are not merely trend followers. Gaining exposure to traditional risk premiums such as value and momentum through quantitative strategies has given way more recently to liquidity provisions, idiosyncratic macro themes in emerging markets and other niche areas. Investors should question managers about their research efforts and budgets, and also about any new approaches they are deploying or developing. For example, some cutting-edge quantitative funds are employing innovative technology and methodologies for analyzing new sources of unstructured information for investment signals and correlations. Quantitative fund managers will need to leverage technology to extract more public information about companies and understand the implications sooner than the rest of the market.

2. **Focus on firms with product specialists or other investment-focused personnel on the ground in Asia.** Any institution new to quantitative investing will require relatively high levels of interaction and support from their managers. This is particularly important in Asia, where many institutions lack hands-on experience with quantitative strategies and many investment managers have a limited local presence.

   Institutions should question quantitative managers closely about their ability to provide desired levels of support. Some firms simply cannot afford to maintain a robust local presence or to provide high levels of investor engagement and service to institutions in Asia. Even some large asset management firms have not demonstrated a commitment to providing consistent, high-quality coverage to institutional investors throughout Asia. It's not enough for a firm to claim a local Asian presence or to deploy an Asia-based sales team. Institutions should seek firms with local permanent, full-time product specialists or other investment professionals who can provide timely, high-value coverage. Insist on a certain number of in-person visits, regular calls with investment professionals and avenues for on-going interaction and support.

3. **Look for quantitative managers willing to be a partner with you when it comes to explaining their strategies.** Asian investors will need to hold managers accountable for improving their communication. In Asia, 64% of investors said they would like better communication on principles and processes when it comes to quantitative models, much higher than 18% of U.S. investors. Furthermore, not one Asian investor claimed to have a strong understanding of quantitative models compared with 32% in the United States.

   Institutions without direct experience with quantitative strategies should look for investment managers willing to go beyond the confines of the mandate and required investor service. Seek out managers with investment professionals who will dedicate time to helping you understand how quantitative strategies work, what benefits they can deliver and the proper means of employing these strategies in an institutional portfolio.

4. **Push for transparency in both investment process and portfolio holdings.** Many quantitative managers today have become much more open about their investment process and even their portfolio holdings. While managers will undoubtedly keep secret the specific signals used in their models and other proprietary information, institutions should be aware that some quantitative managers have dramatically increased transparency levels. Managers who refuse to provide minimum levels of transparency regarding their investment processes should be disqualified from consideration.

5. **Demand clarity on consistency of returns and how well a strategy has held up to volatility.** While many Asian investors have been fine with the long-term performance of quantitative strategies, they have not been as satisfied with how managers have done specifically during crisis periods. That sentiment likely fed into the slightly greater emphasis that Asian investors place on the ability of a manager to deliver consistent returns: 84% of Asian investors said consistency of performance was an important factor when selecting a quantitative manager compared with 77% in the U.S.

   When considering employing quantitative strategies, Asian institutions should focus on the overall quality of returns generated by individual managers. The quality of a fund's returns takes into account risk-adjusted performance, consistency of returns/volatility levels and correlation levels/portfolio diversification benefits.

Conclusion

Quantitative strategies will increase in popularity across Asia as rapid asset growth prompts institutions throughout the region to incorporate a broader mix of asset classes and investment strategies into their portfolios. Although the number of Asian institutions currently using quantitative strategies is modest relative to the near-universal use among U.S. institutions, Greenwich Associates research shows that Asian investors who obtain first-hand experience with quantitative funds are quite likely to increase their allocations to the strategy in subsequent years. Among the benefits attracting these institutions is portfolio diversification resulting from low correlation levels between quantitative approaches and the fundamental strategies that make up the bulk of institutional assets, as well as the potential for low volatility levels and consistent returns throughout the market cycle.

In order for institutions to realize those benefits, however, they must pick the right strategies and managers. The complex and often proprietary investment models employed by quantitative funds make manager selection and due diligence a difficult task for any investor. Compounding that challenge is the fact that increasing competition among a fast-growing universe of quantitative funds makes it increasingly difficult for managers to find and exploit opportunities to create alpha. As a result of these factors, it is imperative that institutions contemplating an investment in a quantitative fund first gain a full understanding of the manager's investment philosophy, investment process and source of alpha, and how that strategy will fit into the institutions' broad investment portfolio. As they learn more about the different approaches employed by quantitative managers, investors should focus on innovative firms whose investment processes create a real competitive advantage and truly diversify the institutions' sources of return.

Methodology

Greenwich Associates conducted phone interviews with institutional asset owners including pension funds, government agencies, endowments and foundations. Respondents were asked to provide detailed information on their quantitative strategies usage, application of quantitative strategies, selection of quantitative managers and servicing needs with respect to quantitative investing. Greenwich associates interviewed 22 existing and potential quantitative institutional investors across Asia including Japan, and 22 investors in the United States.

The findings reported in this document reflect solely the views reported to Greenwich Associates by the research participants. They do not represent opinions or endorsements by Greenwich Associates or its staff. Interviewees may be asked about their use of and demand for financial products and services and about investment practices in relevant financial markets. Greenwich Associates compiles the data received, conducts statistical analysis and reviews for presentation purposes in order to produce the final results.

NOTES

GREENWICH
ASSOCIATES

6 High Ridge Park Stamford CT 06905 USA

Tel: +1 203.625.5038/+1 800.704.1027 Fax: +1 203.625.5126 email: ContactUs@greenwich.com www.greenwich.com