QUANTITATIVE MANAGEMENT: The Future is Bright

The year 2007 was apparently a particularly difficult one for quantitative managers, or "quants"; empirical data shows that most managers underperformed the market for the year. However, long-term performance analysis continues to show large risk/return dispersion among managers, with some demonstrating attractive returns. As increased data availability and reliability will allow for evolution and further differentiation, the opportunity set remains attractive for quants.

Beginning in August 2007, quantitatively driven stock selection strategies began a period of underperformance that appeared unprecedented to many observers. The media and investor attention that accompanied the decline brought notoriety to a field where visibility had been confined to academic journals and industry publications. The experience of August 2007, and the months that followed, reinforced the perception that all quantitative managers are very similar, as many quantitatively driven processes failed to deliver.

The purpose of this paper is to examine some of the criticisms about quantitative management and speculation about its future effectiveness. Are there too many quants doing the same thing? Has the opportunity set diminished to the point that it is no longer viable? What lessons have quants learned from 2007?

The Summer of 2007

The most observable financial event of August 2007 was a sudden and immediate repricing of risk. Investors were jarred following the slow decline in volatility experienced in the 2002–2006 period when, in the middle of 2007, volatility suddenly spiked sharply. In his work, the late and recently popular economist Hyman Minsky pointed out that prolonged periods of financial stability, such as the one experienced from 2002 to 2006, were likely to result in conditions ripe for market shocks. The shock was profound as volatility spiked, correlations among stocks increased, and the market was thrown into turmoil. Many quantitative models failed during August and throughout much of the fourth quarter of 2007.

It is often overlooked, however, that quantitatively based managers were not alone in having a difficult time that month. According to Morningstar, 72% of international equity mutual funds underperformed their benchmark in August 2007. It certainly appears that the forces that hurt quantitative managers impacted fundamentally based managers, to some degree, as well. The deleveraging of several well-known quantitative hedge funds placed enormous selling pressure on stocks that were favorites of fundamental and quantitative managers alike.

Too Many Quants?

Quantitative investment management is not a new phenomenon that suddenly emerged after the equity market bubble of 1998–2000. The use of quantitative processes to manage money has a long and rich history dating back to the early 1970s. Its application to non-U.S. equities has been in practice since the mid-1980s. Certainly, though, a lot has changed in the past 25 years, as data availability, integrity, and comparability have vastly improved. Part of these changes is attributable to the large number of entrants into the quantitative space. According to one database, there are now nearly five times as many managers employing quantitative approaches as there were 10 years ago.[1] Moreover, considering the survivorship bias present in the databases, it is clear that the use of quantitative management has increased significantly in the past few

years. In addition, many fundamental firms now use quantitative screens to narrow their active research universes. Still, the assets managed by quantitatively driven processes represent a small minority of total assets managed and, by most estimates, only 10% to 20% of all actively managed portfolios are primarily managed through a quantitative process.[2]

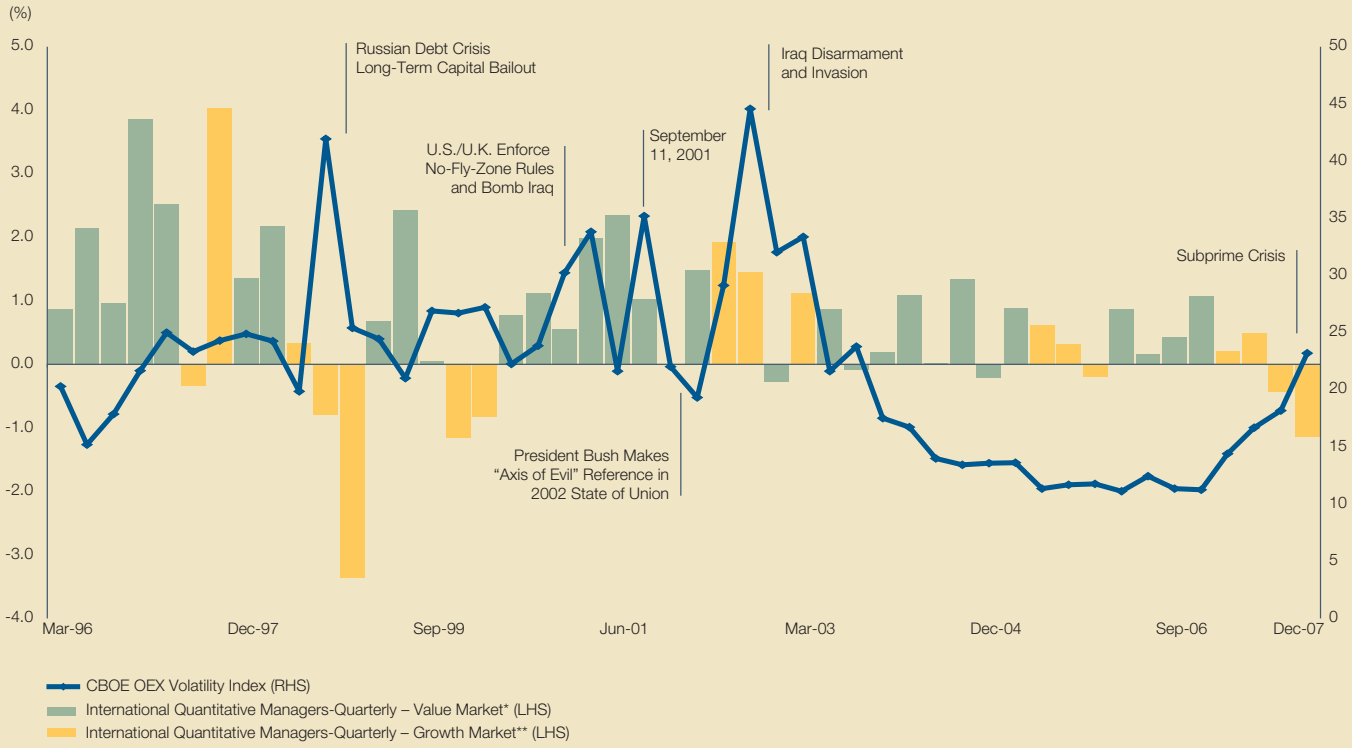
Data reliability makes the execution of a quantitative investment process easier and much less subject to data errors. Additionally, the universe of data is much greater today, and the quantity of information much broader, than it has ever been. This has permitted increased sophistication within the investment process and an improved ability of quantitative managers to discriminate across an expanding global universe. It also has brought more players into the field, each with differing skill sets and levels of sophistication. Innovation and evolution have characterized the most successful firms in the past, and there is no reason to suggest that the quantitative field has stagnated. We believe leading firms will continue to develop new techniques and methods for analyzing data and discriminating across equity universes, resulting in increased differentiation.

An Unprecedented Event?

Significant insight can be gained by looking at returns from quantitative processes over an extended period of time. Data on a statistically meaningful number of quantitative managers is available since 1995; it is possible to analyze quantitative strategies managed against the MSCI EAFE Index in the period from 1996 to 2007. (Some survivorship bias is present in the data, as several companies have removed their performance data from the databases or not entered their track records from earlier periods.)

Over the time period in consideration, there have been five episodes other than the latest "subprime crisis" when market volatility spiked sharply: The fourth quarter of 1998, the fourth quarter of 2000, September 11, 2001, the pre-Iraq war period from September 2002 to March 2003, and the fourth quarter of 2007. Looking at the performance of quantitative managers in these periods, one can observe that they also struggled during the 1997–1998 Thai baht and Russia crises, as volatility spiked in a manner very similar to 2007. Leveraged firms and strategies, most notably Long-Term Capital Management, suffered then fates that were akin to that of Bear

EXHIBIT 1: QUARTERLY PERFORMANCE OF INTERNATIONAL QUANTITATIVE EQUITY MANAGERS



* Quarters where the MSCI EAFE Value Index outperformed the MSCI EAFE Growth Index.
** Quarters where the MSCI EAFE Growth Index outperformed the MSCI EAFE Value Index.
As of 1 December 2007
Source: eVestment Alliance, Chicago Board Options Exchange (CBOE)

Stearns in 2008. Much like it did in the subprime crisis of 2007, the Federal Reserve then chose to inject liquidity in the financial system to stave off a financial panic. Such so-called "liquidity events" force investors to reprice securities very quickly; given that inexpensive credit suddenly becomes available, lower quality, more growth-oriented companies generally are quickly favored. The models that form the backbone of every quantitative process typically take a quarter or two to recalibrate to this new economic reality. Not unexpectedly, quantitative processes struggled in 1998 – in fact, to a much greater degree than they did in 2007, albeit without the fanfare that surrounded the later period.

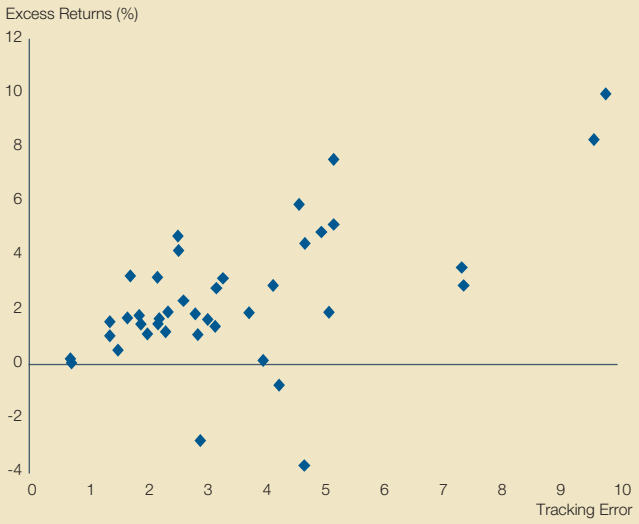
In contrast, very different were the economic impacts of the "irrational exuberance" of the 1999 to 2000 tech bubble, September 11, 2001, or the trepidations leading to the second Iraq war. During each of these periods, investors were apprehensive and the markets were highly volatile, but there was little fundamental change in the underlying financial markets. While the tech bubble and the geopolitical shocks of September 11, 2001, and Iraq drove a sharp spike in volatility, they did not threaten the underpinnings of the financial system or result in significant deleveraging. As Exhibit 1 shows, in the period from 1996 to 2007 quantitative managers performed well in most value markets and in periods of low to moderate volatility. The group encountered difficulties during the relatively short periods when there was a sudden shock to the financial system and extreme deleveraging occurred.

All Quants Are Not The Same

Quantitatively driven investment processes are often viewed as a one-size-fits-all brand. In fact, while every process relies on a series of valuation models to discriminate across a broad range of opportunities, these investment models, their actual mechanics, and the manner in which models are integrated with each other can be substantially different. Additionally, there are meaningful differences in the way managers build portfolios. This is evidenced by looking at the dispersion in risk and returns generated by a sample universe of managers over the past five years (Exhibit 2).[3] Annual dispersion in returns among the quantitative-based approaches ranged from 15% to 20%. This is consistent with the spread seen across all active managers, and, together with the dispersion in risk levels, it suggests that there are broad differences in valuation criteria and portfolio construction. Exhibit 1 would suggest that quantitative managers fare better in value markets, but there are certainly a number of managers whose results were equally good in both value and growth markets. While value biases tend to work over extended periods of time,[4] there is probably little chance of a quick return to the "value-always-wins" environment of the period from 2000 to 2006.

The use of multifactor models tends to mitigate style biases among many quantitative managers. Together with the application of stringent risk controls in portfolio construction, the group of managers selected for this analysis has demonstrated a highly consistent record of outperforming the MSCI EAFE Index. While there is an outperformance bias in value periods, the dispersion of results suggests that several strategies are style neutral in their effectiveness.

EXHIBIT 2: EXCESS RETURNS VS. TRACKING ERROR FOR A SAMPLE OF INTERNATIONAL QUANTITATIVE EQUITY MANAGERS,[3] 2003-2007



As of 31 December 2007
Source: eVestment Alliance

Is the Market Too Efficient to Add Value?

Are there too many quants all doing the same thing? As noted above, there has been a significant increase in the number of quantitative managers in the past few years. On the other hand, data availability and quality have allowed for more powerful and sophisticated models to identify financial inefficiencies and behavioral anomalies.

One way to illustrate the greater efficiency achieved by quantitative processes would be to look at the secular compression in valuations and other factors that managers use to select securities. Theory would hold that as more players enter, ability to discriminate would be eroded, as long and short quantitative players take advantage of pricing extremes and arbitrage disparities away. Two variables that many quantitative managers consistently seek to exploit are value and market sentiment. Most managers use a value measure in their process to find mispricings within the market. While the actual mechanics of each manager's approach may differ, it is possible

to test this theory by examining general market characteristics. Using price-to-book (P/B) and price-to-earnings (P/E) ratios as proxies for value, one can examine the dispersion between the highest and lowest quintile companies. If many managers were taking advantage of relative value inefficiencies, this dispersion would diminish as inefficiencies were arbitraged away. This would, in turn, undermine the effectiveness of most value-based approaches and hamper managers' ability to find alpha across their universes.

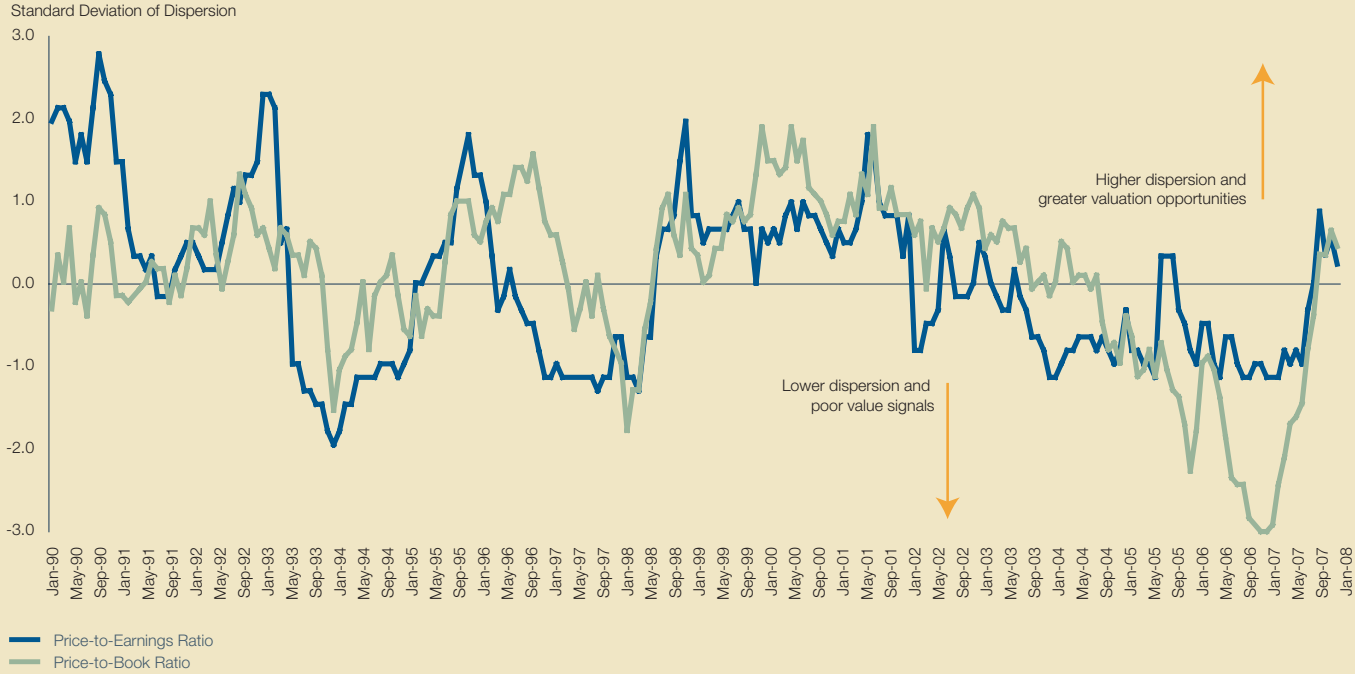
Empirical evidence from 2000 through the middle of 2006 would support this contention. However, with the recent market dislocation, spreads among managers have once again expanded and are now at levels that are above historic norms, as seen in Exhibit 3, which plots the dispersion across European equities. There are several explanations for this. Certainly the challenges faced by the financial services sector in the past year account for some of the increase. Investors' attitude toward risk also increases valuation dispersion. When risk in the market is high (either as a function of investor optimism or pessimism), it is reasonable to expect that investors will have a different perspective on valuation, and spreads will increase. In contrast, during lower volatility regimes investor risk subsides and compression occurs.

Differences in forecasted growth are another opportunity set that many quantitative managers attempt to exploit in their investment processes. The dispersion of earnings forecasts across sectors, between the high- and low-growth sectors, should show a systematic decline as investors see opportunities become more efficiently priced. The actual spread relationship shows some cyclical variability and a well-differentiated set of relationships from which to select. It is worth noting that, despite a relatively modest growth expectation for the market, the average differential between the top and bottom quintiles across sectors is currently above historic averages (Exhibit 4).

A manager equipped with the proper tools to successfully identify those companies and sectors with sustainable growth potential can select from a broad universe of investment opportunities. There is little reason to expect that the market will efficiently price future expectations, as long as opinions differ over a company's outlook and opportunities. Being able to identify actual growth opportunities is a challenge for quantitative managers, but it holds investment rewards and greater consistency for the manager who is successful in doing so.

EXHIBIT 3: VALUATION DISPERSION – EUROPEAN EQUITIES

Normalized dispersion* between the highest and lowest quintile companies in terms of price-to-earnings and price-to-book ratios

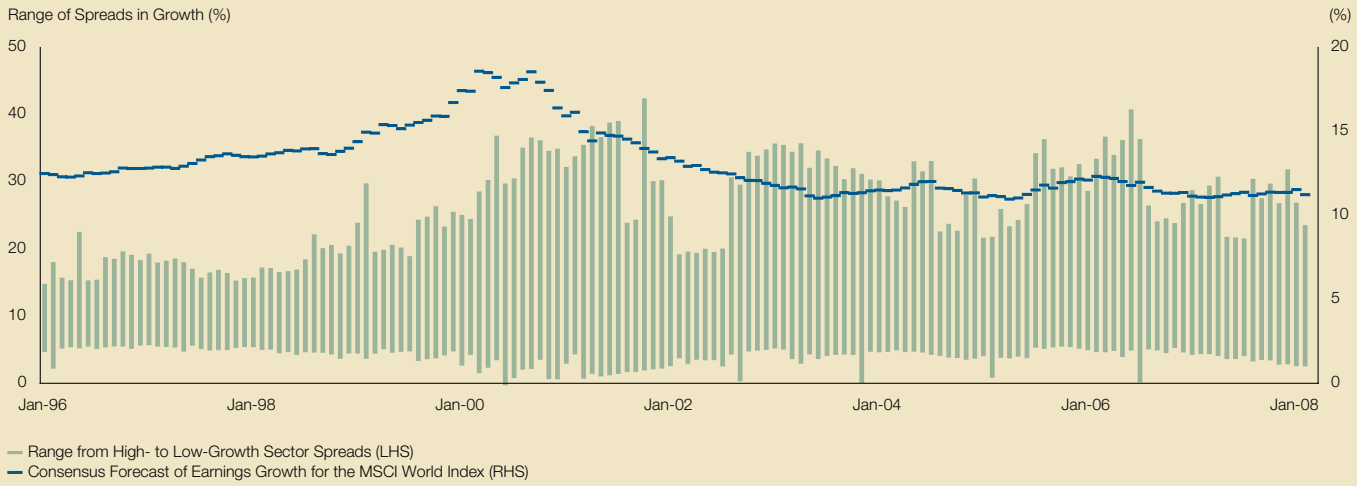


*Normalized to the average dispersion. The value "0.0" on the Y axis represents the average dispersion. A positive or negative value on the Y axis represents a dispersion higher or lower, respectively, than the average dispersion.

As of 30 April 2008

Source: Société Générale

EXHIBIT 4: RANGE OF SPREADS IN FORECASTED SECTOR GROWTH* AND CONSENSUS FORECAST OF GROWTH FOR THE MSCI WORLD INDEX



*Based on I/B/E/S 3-5 year consensus earnings forecasts. For each sector in the MSCI World Index, the spread in forecasted growth is calculated as the difference between the average growth of the first and second quintiles (based on forecasted growth) and the average growth of the fourth and fifth quintiles. The bars show the spread range, from the highest-spread sector to the lowest-spread sector, in each time period.
As of 29 February 2008
Source: FactSet

The practitioners of quantitative money management generally have enjoyed very competitive, consistent investment returns within a universe of active investment managers over long periods of time. The practice of quantitative investment management has led to increasing sophistication and differentiation among managers. The tools available to evaluate and select investment opportunities will continue to evolve, as firms innovate and find opportunities to exploit investors' behavioral biases. Similarly, the manner in which portfolios, and their risks, are managed is an important differentiator. Ultimately, there was considerable variation in returns in August 2007. Despite the appearance of well-honed risk-management procedures, several firms fell significantly short of the benchmark (something which was supposed to be unlikely–a "six sigma" event), while the performance of other firms was within stated tracking error expectations.

Conclusion

While alpha is ultimately a function of a firm's models and the approach used to apply them, portfolio construction and risk measurement processes should not be ignored, as they can have a meaningful impact on near- and intermediate-term returns.

Quantitative managers have the ability to evaluate an enormous universe of investment opportunities in an expeditious and dispassionate manner. Thus, multidimensional, well-constructed investment processes will likely continue to enjoy success, provided that they continue to evolve and adapt to changing market conditions. The events of late 2007 and early 2008 were not without precedent, and the impact of such events has historically been short-lived. In our opinion, there is no compelling reason to believe that the environment is materially different today. Current valuations and forward-looking expectations all argue that the opportunity set remains strong for the skilled manager.

NOTES

1 Source: eVestment Alliance, Lazard Asset Management.

2 Frank J. Fabozzi, Sergio M. Focardi and Caroline Jonas, "Challenges in Quantitative Equity Management," *The Research Foundation of CFA Institute*, April 2008.

3 List of managers reported; several firms offer multiple strategies:

Acadian Asset Management, AQR Capital Management, Arrowstreet Capital, Barclays Global Investors, Batterymarch Financial Management, BlackRock, Calvert Asset Management Company, ClariVest Asset Management, DB Advisors / Deutsche Asset Management, Goldman Sachs Asset Management, Grantham, Mayo, Van Otterloo & Co., ICC Capital Management, KBC Asset Management International, Lingohr & Partner North America, Lazard Asset Management, LSV Asset Management, MRM Asset Allocation Group, Navellier and Associates, Nicholas-Applegate Capital Management, PanAgora Asset Management, Philadelphia International Advisors, Principal Life Insurance Company - Pension, Putnam Investments, Quantitative Management Associates, Research Affiliates, State Street Global Advisors, Strategic Development Investments, Vanguard, WisdomTree Asset Management.

4 Eugene F. Fama and Kenneth R. French, "Common Risk Factors in the Returns on Stocks and Bonds," *Journal of Financial Economics*, vol. 33, no. 1, February 1993.

IMPORTANT INFORMATION

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