

BRC Investment Management LLC

Research Spotlight

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CONCEPTS

Quant Quake

August 2007

During the 5 trading days ending on August 13, the US equity markets were buffeted by what we believe are unprecedented events. Although many strange return patterns were observed during these days, two stand out as deserving special comment. 1) Several of our quantitative models displayed exceptionally large and historically unprecedented return volatility; 2) The historically negative correlation of return between our value and analyst behavior models reversed and instead reached highs which had only once been seen before and had never been sustained.

We believe the causes of these market gyrations stem from the unwinding of leveraged long-short positions inside large multi-factor and quant equity hedge funds, that in-turn, probably stem from a general liquidity crisis instigated by the woes recently experienced in the global credit markets. We do not know how these pressures will resolve, but we believe many large hedge funds that employ leverage are suffering greatly and that the effects on their returns and future

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redemptions are likely to be larger than currently anticipated. Like all supply and demand related shocks, we expect the turmoil to be transitory and will likely lead to positive future returns for investors willing and able to take a longer-term view.

The Makings of a Quake

In recent weeks, the financial press and some brokerage commentary have reported on a so-called “quant quake” which has been buffeting the financial markets for the past weeks. Most of this analysis suggests that many traditional quantitative factors have produced negative returns as of late and have created significant losses for hedge funds that have built leveraged exposures to these factors. Through July, our experience has been somewhat different. Since February, our equity long/short fund advanced relatively steadily through the end of July. The experience of the second week in August, however, has prompted this report.

In the course of our research, we have developed many models which we believe are descriptive of either general forces in the market or future individual stock returns. Typically we calculate decile rankings for each stock and then compare the average return for all stocks within each decile. For about 20 of these factors, we have calculated the decile 1 versus decile 10 returns for each trading day back to January 1998. Importantly, we construct these factors in a way that neutralizes the return effects of both economic sectors and large market capitalization differences. The result is that our factor returns are comparatively pure measures of the characteristics we are trying to measure.

By looking at the daily returns to these factors, we can assess what forces are moving the market as well as which factors are contributing the most to our portfolio's returns. We also look at the correlation of our daily factor returns so that we can measure the diversification impact that is imbedded in our strategies. Those familiar with our process might recall that several of our factors (e.g., our analyst behavior and value models) have historically demonstrated negative correlation characteristics which have benefited our portfolio returns by reducing volatility and minimizing periods of protracted negative relative returns.

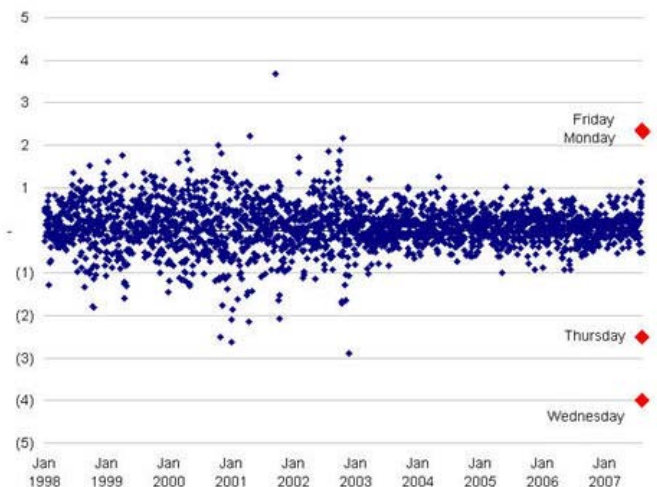
In the interest of brevity, we focus here on two of our factors which represent opposing forces within our portfolios and also may be a proxy for more general quantitative approaches followed by other active managers and hedge funds. The first factor we examined was our 4 week Standardized Sector Revisions model (SSR), which measures the degree to which analysts are either herding positively or negatively vis-à-vis a particular stock's earnings

estimates. The second is our trailing 12 month Earnings/Price model (EP) which is one of our primary valuation models and whose returns are highly correlated with many valuation models used in the investment community. Measured on a daily basis, our SSR model has produced a Decile 1 vs Decile 10 research return of 25.7%, while our value-oriented EP model has produced annualized research returns of around 8.2%. The rolling 20 correlation coefficient between these two models has been -.10.

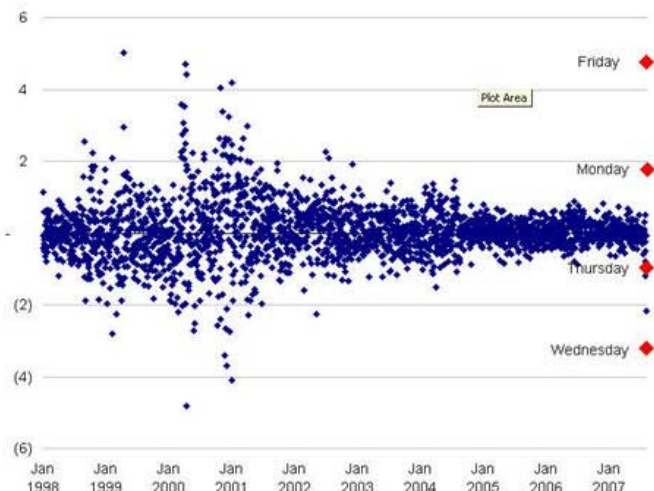
Unprecedented Factor Returns

From Wednesday, August 8 through Monday, August 13, the returns to our SSR model and our EP model were both negative and positive to a point rarely if ever seen in almost 10 years of daily history. Wednesday's SSR return of -398 basis points is about 50% greater in magnitude than any observed loss we have ever measured. In terms of standardized differences to the mean return, the decline on Wednesday was approximately 7.9 standard deviations below the average return for 10 years. Of course, observations such as this confirm that market or factor returns are no where near normally distributed since a deviance like this should only occur once in 643 trillion days if normalcy was an accurate model of price behavior.

Figure 1 Decile 1 vs Decile 10 - 1 Day SSR Model Returns



As negative as our factor returns were on Wednesday and Thursday, they were nearly as dramatically positive on Friday and Monday. On Friday, August 10, our SSR factor model produced a decile difference return of +2.37% and Monday, the positive trend continued with an advance of +2.31%. Based on our daily history of factor returns, these four days each measured more than 4 standard deviations greater than the mean observation.

Figure 2 Decile 1 vs Decile 10 - 1 Day EP Model Returns

The returns to our value-oriented EP factor model have only been slightly less extreme. Wednesday, August 8th's return of -480 basis points was, in absolute terms, worse than our SSR model but, given the more volatile nature of the historical returns to EP, the standardized difference was *only* -6.6 standard deviations. Back in the extremely anti-value days of the tech bubble, we saw a few daily observations more extreme than Wednesday's, but since early 2002, no day has experienced such a decline as experienced during this period. On Friday and Monday, returns to our EP model also sharply rebounded with daily decile differences of +4.76% and +1.77%, respectively.

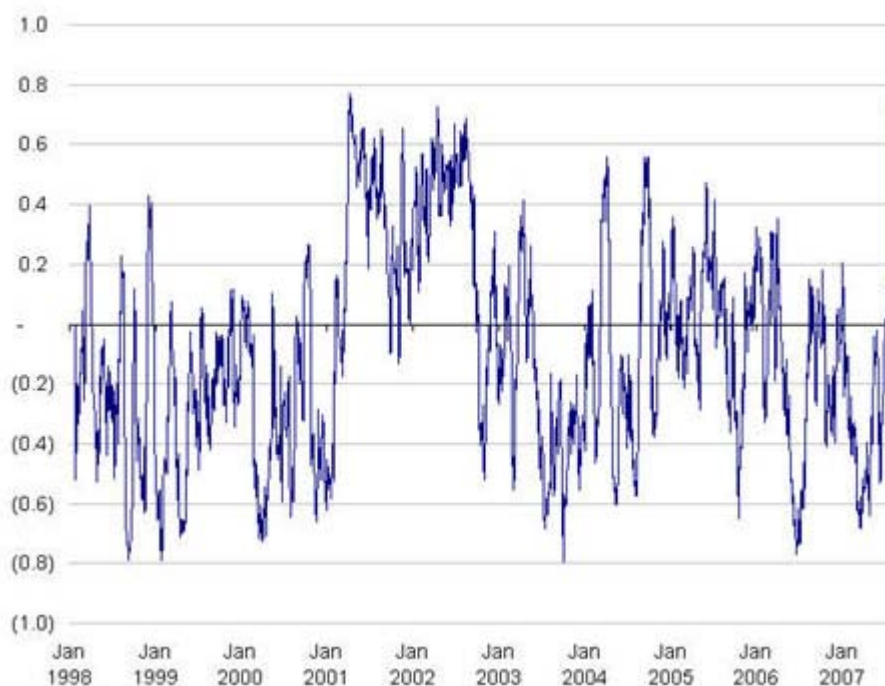
Dramatically Increasing Correlations

Perhaps most significant from a quantitative perspective is the very rapid increase in the correlation of daily returns between our SSR model and our EP model. Since 1998, these two models have enjoyed a negative return correlation that has averaged -.10 measured on a rolling 20 day basis. In the days following August 8th, this correlation surged in the opposite direction to a level of +.75. This level was reached only once before, which was in April 2001. Over the ensuing 18 months, correlations remained generally positive and the market moved down culminating in the very difficult market environment in the late

summer of 2003. As it happens, this past period of high correlation was extremely positive for our combined Alpha model which gained nearly 58% on a Decile 1 versus Decile 10 research basis.

Unlike April 2001, we believe the current volatility in our quant models and the correspondingly dramatic increases in factor return correlations are being driven by the activities of a few very large hedge fund investors. In an effort to de-leverage their portfolios in the face of mounting losses, fund managers are closing both long and short positions in the relatively liquid US Equity market. Closing so many positions so quickly produced strong upward price pressure on the relatively troubled companies the hedge funds were short, and downward pressure on the relatively attractive companies they were long.

The upturn in our factor return models on Friday and Monday was likely the impact of either new cash infused into some of these large funds (e.g., Goldman Sachs was reported to have infused approximately \$2 billion into their Global Alpha Fund) or the repurchase of previously closed positions by hedge funds scrambling to recoup the losses incurred over the prior 2 days. According to one of our investment banking sources, both the initial selling and the subsequent buying back were the result of trades initiated by the same small group of hedge funds and program traders.

Figure 3 Rolling 20 Day Correlation—EP vs SSR Models



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For over 20 years, the investment professionals at BRC have established a reputation for quality investment counsel and exceptional returns. Through the technological and fundamental expertise of our investment team and staff, BRC will strive to maintain its position at the forefront of quantitative, fundamental and behavioral portfolio management techniques.

Losses being posted by quantitative equity funds that utilize high degrees of leverage are starting to be reported and we expect more to follow. As is always the case, too much money chasing too few ideas produces diminishing returns until a cleansing event corrects imbalances and washes away marginal or overexposed participants.

Past returns are no guarantee of future results. Research results are not meant to reflect the results of actual client portfolios or even portfolios that could have actually been created. Decile and quintile returns are used to explore issues relating to market efficiency, security valuation, and the viability of the investment philosophy (as opposed to the investment process) employed by BRC Investment Management LLC. All quantitative models, research findings and construction processes are proprietary to BRC and may not be distributed or duplicated without the permission of BRC.