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Opportunities and Challenges for Systematic Investors

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“Red skies at night, sailors’ delight; red skies at morn, sailors take warn”

Given the stormy weather confronting quantitative investment firms since mid-2007, our colleague Melissa Brown and I felt now would be an opportune time for a survey of the horizon and a forecast of the future. Before we turn to that conversation, a quick review of the roots of quantitative investing and its benefits is in order.

Quantitative - or systematic – investing traces its roots back to at least the 1920’s at Benjamin Graham’s Graham-Newman Corporation. The analysts back in those days – including Warren Buffet – wore lab coats and filled detailed profile worksheets for all stocks traded in the U.S. market. This systematic overview led to Graham-Newman’s purchase and sale ideas, which were incorporated in a broadly diversified portfolio in an attempt to reduce risk. This system led to annualized excess returns of approximately 2.5% over a 20+ year period.

While quants have exchanged the lab coats for hats with propellers, we continue to believe in the systematic approach to uncovering opportunities and careful risk management to control portfolio risk.

What’s changed? Today, quantitative investing relies on statistical analysis of large financial databases using significant computing resources. The processes typically (although not always) use fundamental data used by more traditional managers, and rank one stock relative to others based on a set of characteristics. The characteristics measured may include value-oriented factors such as book/price, measures of growth, for example earnings growth, quality measures, for instance return on capital, and technical factors like relative price strength. So, in many ways a typical quant manager’s process will look similar to what is used by more traditional managers - however, quants typically use the data in a more systematic and disciplined way.

Every quantitative process will use different underlying methods of constructing factors, and even if the factors are similar, they will generally be weighted differently. So, although quant managers look similar to each other from 30,000 feet, their stock assessments are likely to be very different from each other. Thus, each quant manager’s process is very proprietary.

There are several known benefits of systematic investing. As mentioned above, these strategies have a long, successful history. The disciplined, unemotional approach prevents an analyst from being directly misled in the instance of less-than-forthright company management. Similarly, this approach prevents an analyst from falling in love with a stock with a “unique” story. A quantitative forecasting system updates forecasts as new data becomes available. In a traditional fundamental shop, an analyst may cover 20 or so stocks; they’d need several dozen analysts if they were to integrate new information on all stocks very quickly.

On the risk management side of the ledger, quants are known for very careful portfolio construction. The sources of risk in the portfolio should match the manager’s sources of forecasting skill while meeting the client’s objectives. The performance objective of most quants is to consistently hit singles

and doubles (admittedly with the occasional groundout), rather than the more exciting grand slams and strikeouts incurred by higher active risk managers. We believe an enormous benefit to asset owners is that relatively consistent value-added should keep the client invested for the long haul, which is really the number one key to success in equity investing.

A Discussion of Challenges and Opportunities:

Below, Melissa plays the role of a client, consultant, or prospect posing several of the questions of and challenges to quantitative investing we most often hear.

Melissa Brown (MB):

Of course nothing works all the time. Three major challenges to the short term performance of quantitative models are changing sentiment, overuse, and misuse.

Let's start with changing sentiments.

Over the long term, fundamentals will drive stock returns. For example, stocks of companies with better earnings should outperform comparable companies with poor earnings. However, in the shorter term emotion and sentiment can have a dramatic effect. In some circumstances, such as when Russia defaulted on its debt in 1998, the need for liquidity trumps any underlying fundamentals. Investors may dump the most liquid stocks first, regardless of their fundamental characteristics. This often happens quite suddenly and without much warning.

In addition, when the economic outlook changes and especially when overall market sentiment changes (say, from bearish to bullish), it can be quite sudden. Stocks that are deemed to be relative winners in a recession are often dumped in favor of those that are considered early cycle stocks that have generally been quite depressed.

The good news is that liquidity events typically don't last too long, although the liquidity driven market since July 2007 has been quite prolonged. When things settle down, the market goes back to looking at fundamentals and models begin to work again.

Jon Quigley (JQ):

Liquidity-driven events are somewhat similar to inflection points in market sentiment. We can't *eliminate* the impact of either of these occurrences, but at AIP we attempt to *mitigate* the impact in a couple of ways. First, we limit the weight of any characteristic in our models to a 25% maximum, so that we aren't too heavily at risk if and when the market stops rewarding a certain factor. Second, careful portfolio construction prevents us from tilting too heavily toward a given style, market cap, or sector. By implementing these types of risk control, we are sacrificing a bit of the upside, but we feel the downside protection gained is well worth this.

MB:

The scenario is a little different when there is a clear change in the economy's path. Then, the fundamentals that underlie quant models' stock selection have to catch up with reality. So, for example, analysts may revise their earnings estimates, but quarterly reported income statement data may take a while to look more favorable, etc. This is one reason that many models include momentum, because changes in stocks' momentum may precede changes in reported fundamentals. This means momentum can have a temporarily large shortfall in performance due to the sentiment shift, but will also start to work again faster than many of the fundamentally based models.

JQ:

As for more enduring sentiment shifts, we view those as an opportunity rather than a challenge. A model which focuses on a narrow set of valuation characteristics weighted according to past success cannot handle sustained sentiment changes. We've chosen to include a broader set of characteristics in our model, and construct the model so that it can dynamically adapt to prevailing market conditions, rather than statically weighting according to past effectiveness.

MB:

When too many investors are using the same criteria to choose stocks, the benefit of a model may be arbitrated away, as investors have to act ever more quickly to get in or out ahead of the next guy. This is not only a hazard of quant models – witness the swiftness with which the internet bubble burst as soon as the market decided that the internet may not deliver everything it was expected to. This “tragedy of the commons” can affect quant models as well, though, as was demonstrated clearly in August 2007. Although most quants had different alpha, risk and trading models, they were similar enough that when a liquidity crisis hit a specific segment of the market everyone seemed to be buying and selling the same stocks. This was a crisis that seemed to hit only the quants, and was probably related to required delevering in quant based hedge funds, that may have been a result of the credit crisis. It also became a self fulfilling prophecy, as the short covering and selling created even worse performance in the equity portion of the portfolio, which created more margin calls, which in turn necessitated more buying to cover and selling. These funds may have been buying the unattractive stocks and selling the attractive ones, not because they changed their views but because they had to raise capital. So, one possible solution would be to have factors so unique that they won't get caught up in someone else's liquidity crisis.

JQ:

In our view, proprietary factors are inevitably arbitrated away. If there were no academic and practitioner journals, no conferences, and personnel turnover in the industry was zero, you might be able to keep a factor secret, but that's just not reality. So, rather than trying to differentiate ourselves from the herd by relying solely on proprietary factors, we rely on several other points of differentiation in our process.

We've already discussed the fact that we use a very broad array of factors in our models. Another way to use information differently is to not assume a factor can only work in one direction. By that, I mean

that simply because low P/E stocks tend to outperform over time, one shouldn't assume that you always want to have a low P/E bias in your portfolio. For example, in the late 1990's, the market appeared to reward stocks with high P/E multiples. While that may not make intuitive sense viewed in isolation, it does make sense when we think of this as a second-order effect. That is, investor preference was for high earnings growth (i.e., the first-order effect), regardless of the price. Our model will allow us to accommodate complementary second-order effects and tilt toward such seemingly counter-intuitive behavior.

MB:

Finally, models can fail because they're not constructed or used correctly.

Not everyone with a computer and a database can be a "good quant." Successful quant equity investing is based on a few principles: A good model is one that is right more often than it isn't, but no model is right 100% or even 80% of the time. Models require adequate diversification in the portfolio to be effective, you can't just choose one stock that looks attractive and expect it to outperform (If you could, we would probably all run much more concentrated portfolios). Another point is that the size of the exposure should be proportional to the strength of the view. If the model doesn't make big distinctions between stocks, then the size of overweights and underweights should be small. Finally, the process should be repeatable. This means that you need to have the opportunity to apply your process often. If your process can only emphasize a rare event, like large stocks will substantially beat small stocks, then you have to be right very often, because the opportunity to benefit from that insight doesn't happen very often.

JQ:

We take a balanced approach to position concentration. We're modeling expected investor behavior, and tilting the portfolio towards certain characteristics. We know the law of large numbers says we should own as many stocks as possible to benefit from our modeling insights. However, the reality is that many of our clients do not want to own hundreds of stocks in their portfolio, and for smaller accounts that isn't feasible anyway. We've found holding 55-70 stocks in a portfolio addresses both concerns.

MB:

Also, not all models work across the board. So a factor that fares well in, say, technology may perform very differently for cyclical stocks. Also, what works for large cap stocks, which tend to be well diversified companies and have other characteristics like exposure to foreign markets, may not work for small stocks, which, for example, may be much more sensitive to the local economy.

JQ:

You mention that not all models will produce good security selection in all segments of the market. We address this directly by isolating market segments and customizing models for these segments. We cleave the market into eight style-based groups (along market cap and growth/value lines), as well as into 11 economic sectors, and independently determine the most effective stock selection factors for

each segment. We often find that something like earnings revisions will work for the broad market, but does not work at all for stocks within a certain economic sector.

MB:

Quants tend to assume the relationships they discover will remain stationary, not get overly crowded, etc. But there are, for example, bull market factors like momentum that work less well in bear markets, and there are bear market factors, like low volatility, that may not work in bull markets. And externalities, such as a credit crisis, can have a significant effect, while being difficult to foresee or model. For example, value models should fare well when stocks are falling, but because of concerns about credit in this recent bear market, value has not done what it was expected to.

JQ:

A couple of the challenges you point out have to deal with factor selection. As far as selecting factors based on recent behavior, we attack that in two ways. The first is to test factor behavior back into the 1980's. But that's not good enough, because we want our model to include factors that will allow us to outperform in a variety of conditions. So, we break the study period into 4 distinct time periods, and select a subset of the best factors from each of those regimes. We'll then add a few additional factors which provide diversity to our factor set while still leading to expected outperformance. This leads to a group of factors with low correlation, and gives our model a robustness to outperform in a variety of circumstances.

The Forecast:

Turning back to our original question about the conditions for quants as we move forward, after several years of stock returns driven by systematic factors such as industry exposures and beta, we believe stock-level dispersion should increase as market volatility recedes from very high levels. Valuation spreads remain at very high levels, despite the recent market rally. The tepid economic recovery should translate into clear intra-industry winners and losers. Each of these conditions leave ample opportunity for investment strategies which focus on stock selection rather than style or sector bets as a primary source of value added. This also means that portfolios will need to be adequately diversified in order to control risk.

We've undergone two severe liquidity events in the past 20 months; as we move towards what some are calling the "new normal", having an adaptive model which capitalizes on emerging investment opportunities will be very important. The "old" static method of investing may no longer work.

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