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Widening anecdotal consensus in recent years suggests that quantitative managers pursue similar alpha factors and similar portfolio construction methodologies, resulting in a "crowded trade." We find no distinguishable trend in return correlations among a broad set of quantitative managers in recent years. When examining the factor loadings of the portfolios, we find little evidence to support the notion of common factor loadings. Also, factor returns have been pronounced in recent years, rather than muted, as would logically be presumed in a "crowded trade" scenario. Finally, the variance in excess return performance among quantitative managers by calendar year has remained wide, rather than converging in recent years.

In 1975, Bubble Yum bubble gum hit the market. It was a huge hit. Soon afterwards, rumors started about spider eggs in the gum. These rumors became so widespread and seemingly entrenched that the parent company Lifesavers actually took out full-page advertisements in national papers to fight the rumors. Similar urban myths, however, persist to this day. As every kid knows, rumor, anecdotal evidence, and supposition are far more powerful in establishing wide-based perceptions than reality ever will be—facts be damned! The world of asset management is not so different.

The general consensus formed among investors and consultants in recent years is that quantitative managers, or "quants," attend the same schools, use the same data, read the same research, employ the same technology, build similar models, and therefore, they have very similar returns. Moreover, it is presumed that these returns have been mostly negative in recent years because any potential alpha has been arbitraged away. This crowded trade theory gained credence after the de-leveraging events in late August and early September of 2007, and the idea that quants are more alike than ever has continued almost unabated ever since. Some quants themselves have even promoted this line of reasoning in an attempt to position their own perceived competitive advantages.

Are quants all fishing in the same small pond? In other words, are all quant alpha models and returns highly correlated? If so, does this stem from using the same tackle box—similar alpha models, risk models, or portfolio construction methods? In this article, we emphasize the empirical data. We look at the correlation of excess returns among an appropriately screened quantitative universe and analyze cyclical return patterns. Additionally, we examine portfolio holdings and portfolio-level factor exposures to determine alpha correlations and also ascertain model intentions. Finally, we offer our perspective on similarities and differences among quants and cyclical versus secular trends.

PRIOR WORK

Over the past few years, most of the research and written pieces on the similarity among quantitative strategies have been produced by the research departments of large investment banks and hedge funds. Matthew Rothman at Lehman Brothers produced one of the first responses to the August 2007 events. This piece, titled "Turbulent Times in Quant Land" (Rothman [2007]), looks at the overlap of alpha signals among holdings provided voluntarily by quant managers and concludes that August was the result of a liquidity crisis and not crowded trade, per se. His follow-up report (Rothman [2008]), released a year later in August 2008, further examines the rankings and returns of "10 of the 15 largest quantitative managers," or "pure quants," and finds overlap in some holdings but no significant coefficients from the regression analysis of return data.

Prior to Rothman's second report, Goldman Sachs Asset Management published a report in March of 2008 titled "Quantcentration: Implications for Quantitative Equity Investing." This piece has been widely cited by those who subscribe to the crowded trade hypothesis and the associated arguments that factors widely used by quants have been arbitraged away. In contrast to Rothman's findings, Goldman concludes that there is evidence of quant crowding based on factor return behavior in recent years. Goldman also posits that more proprietary factors will differentiate managers going forward, which will be evidenced in lower return correlations for such managers.

In November of 2008, in an article in *Institutional Investor,* Clifford Asness and Adam Berger stated that the "reports of the demise of quantitative equity investing are premature" (p. 62). In their article, they examine value and momentum strategies over long historical time frames and conclude that there is still efficacy in both strategies, relating recent difficulties to cyclical, rather than secular, changes.

The most formal discussion of quantitative managers was written by Amir Khandani and Andrew Lo in April of 2008. The topic of this article was relatively narrow: Using simple trading strategies to proxy for factor bets, the authors find evidence of an unwinding of factor-based portfolios during the so-called "liquidity event" of August and September of 2007. While this finding may have some implications for long-only, low tracking error quantitative portfolios that are of relevance to our analysis, the focus of their paper was on long/short equity strategies employing leverage.

Our article builds on the earlier work of Rothman. We also analyze the correlations of excess returns among an appropriately screened quantitative universe and further analyze the pattern of those returns. Like prior work, we review portfolio overlap through holdings and rank analysis. Our primary innovation is to take the analysis one step further by examining cross-sectional portfolio-level factor loadings in order to ascertain model intentions and identify any "common factors." Our findings largely confirm those of Rothman in that we find little evidence of portfolio overlap or higher manager return correlations. We also echo the spirit of Asness and Berger in that we find cyclical elements to the factor returns, and we utilize the factor loadings to explain absolute and relative manager performance.

DATA METHODOLOGY

The label of quant can have different meanings depending on the context, and it is important to define what we mean by the term in this article. Per Wikipedia, quantitative investing is defined as "investing technique typically employed by the most sophisticated, technically advanced hedge funds. These quant shops employ fast computers to find predictable patterns within financial data.... quant investing is implemented by people who have spent time in the physics, math, computer science or statistics disciplines." This extremely broad definition can be applied to a variety of very different investment strategies: statistical arbitrage, pairs trading, market-neutral, mean-reversion, trend-following, and long-only investment management could all fall under this catch-all umbrella. In this study, we focus specifically on long-only, low tracking error, quantitative managers, and all data and conclusions are applied only to this particular segment of the market.

First, we examine the excess returns of both quantitative and fundamental portfolios, managed against the S&P 500 at similar risk levels. Using data from the eVestment Alliance database, we select the managers that satisfy the following criteria:

- quantitative product,
- not derivatives based,
- product AUM >$500 million,
- five-year tracking error <5.0%,
- core manager against the S&P 500,
- average style exposure ranging from 60% growth/40% value to 40% growth/60% value.[1]

Next, we gather data on fundamental managers who fulfill similar criteria:

- fundamental product,
- not derivatives based,
- product AUM >$500 million,
- five-year tracking error <5.0%,
- preferred benchmark = S&P 500,
- average style exposure ranging from 60% growth/40% value to 40% growth/60% value.

We also ensure that we do not have overlapping products, so only one product per manager is selected in order to avoid any undue inflation of measured correlations. Additionally, we exclude portfolios that are concentrated, screening for an average number of stocks in the portfolio of at least 50. For the most part, all of these portfolios might be considered diversified core portfolios based upon the style analysis, tracking error, and number of name screens.

With our manager datasets in hand, we calculate excess returns monthly versus the S&P 500 Index, then calculate and summarize average and median pairwise correlations for each respective manager dataset from 1992–2009. In later analyses, we use the Morningstar Direct database to look at the quarterly holdings of the available quantitative managers in our dataset over the most recent three-year period of 2007–2009. These data are used to calculate various measures of overlap among the portfolios, as well as to obtain information regarding loadings to various alpha and risk factors.

RETURNS-BASED ANALYSIS

There are 19 managers that satisfy the quant screen, and 14 managers that satisfy the fundamental screen. The sample includes some of the biggest high-profile firms as well as boutique shops. One of the basic questions we are trying to answer is whether managers pursuing a similar mandate are too correlated, thus creating a crowded trade and arbitraging away all the excess returns. Are there differences among quantitative and fundamental strategies? Are there any trends?

Over the entire time period, the quantitative manager set has an average of 211 stock holdings, with all but one manager holding more than 100 names and eight managers holding more than 200 names. This compares with the average stock holdings of the fundamental universe set of 87 names, where five managers hold more than 100 names and none more than 200. Not surprisingly then, the average tracking error of the quantitative set is lower at 2.19% versus 3.17% for the fundamental group. In statistical terms, therefore, we would have a prior expectation that the specific risk level of the fundamental group will be higher and, accordingly, the average pairwise correlation of excess returns should be lower on a relative basis. We must look to the data, however, to determine overall correlation levels and any associated crowding concerns, as well as any trends in the data.[2]

For the returns-based analysis, we calculated the monthly excess return correlation for each manager on a pairwise basis rather than an overall excess return correlation. This provides a more accurate picture of the correlations between individual managers.[3] Importantly, there is no established "litmus test" regarding manager return correlation levels specifying what is "too high." Based on the overall level of return correlations among quants, however, it does not appear that there would be much reason for concern regarding overly correlated returns and "crowding out" of alpha. From Exhibit 1 and Exhibit 2, we can see that the quantitative managers generally have a higher level of correlation of excess returns relative to fundamental managers recently, but there has been significant variation over time.

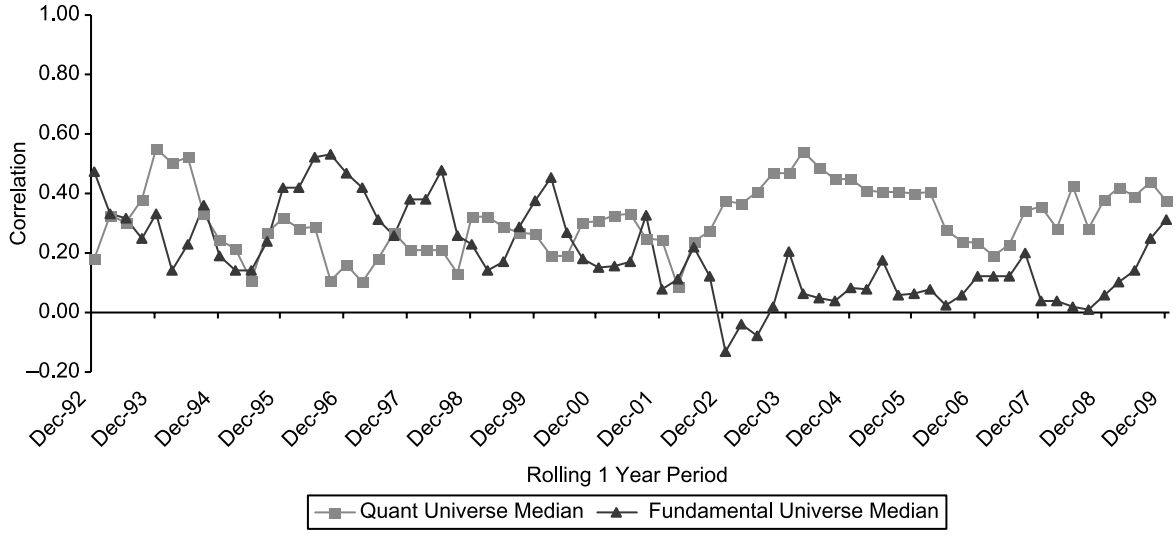
For instance, even though the fundamental correlations have been very low on a relative basis post-2000, there was not a significant difference over the last year, where the median correlation is 0.35 for quants versus 0.31

EXHIBIT 1
Median Pairwise Monthly Excess Return Correlations

	1992–1994	1995–1997	1998–2000	2001–2003	2004–2006	2007–2009
Quant Universe Median	0.35	0.25	0.31	0.30	0.35	0.34
Fundamental Universe Median	0.32	0.40	0.28	0.12	0.13	0.13

Source: eVestment Alliance.

EXHIBIT 2
Median Pairwise Rolling One-Year Correlations



Source: eVestment Alliance.

for the fundamental managers. Certainly, the correlations have been as high as, or higher than, 0.35 among both fundamental and quantitative managers at various times in the past without any concerns being raised about crowded trades.

Perhaps the most persuasive argument against the crowded trade hypothesis is the observation that there has been no discernable trend in increased return correlations among quantitative managers. Exhibit 1 shows that the returns were as correlated, or more correlated, during other historical periods. In particular, the median correlation during the most recent three-year period of 2007–2009, which some might label the "Quant is dead" period, was 0.34, This is essentially identical to the 0.35 correlation over the prior three-year period of 2004–2006, which easily could be characterized as the "Quants are Masters of the Universe" phase. The peak rolling three-year median correlations in our dataset actually occurred almost a decade apart, in September 2005 (0.44) and December 1995 (0.42) (see Exhibit 3).

Moreover, if there are any trends to be found, it is among fundamental managers, where the typical return correlations dropped dramatically post-2000 and very recently moved sharply higher again (see Exhibit 2). We leave it to the reader to speculate what the causes of changing correlations among fundamental managers might be—it does not appear to be cross-sectional volatility, which has cycled over that period—as well as the positive or negative implications of any such change. For quantitative managers, however, we can comfortably say that there has been no meaningful change in the average or median manager excess return correlations. This argues strongly against the hypothesis of overused alpha factors.

HOLDINGS-BASED ANALYSIS

Next, we look at the specific portfolio holdings data of the quantitative managers to see if we can corroborate the initial findings obtained from the returns-based correlation analysis. We are able to gather the actual portfolio holdings for 15 of the 20 managers in our quantitative dataset. We analyze these holdings on a quarterly basis from June 2007 to June 2009. We have the full nine quarters for 11 of the 15 managers, and at least four quarters' worth of holdings for each manager, thus providing a solid basis for calculations regarding portfolio overlap at simultaneous points in time, as well as portfolio factor loadings. We take a slightly different methodological approach than Rothman, who obtained voluntary manager stock rankings and focused on top–bottom spread analysis as well as holdings overlap (Asness and Berger [2008]). Our general findings, however, largely confirm his work.

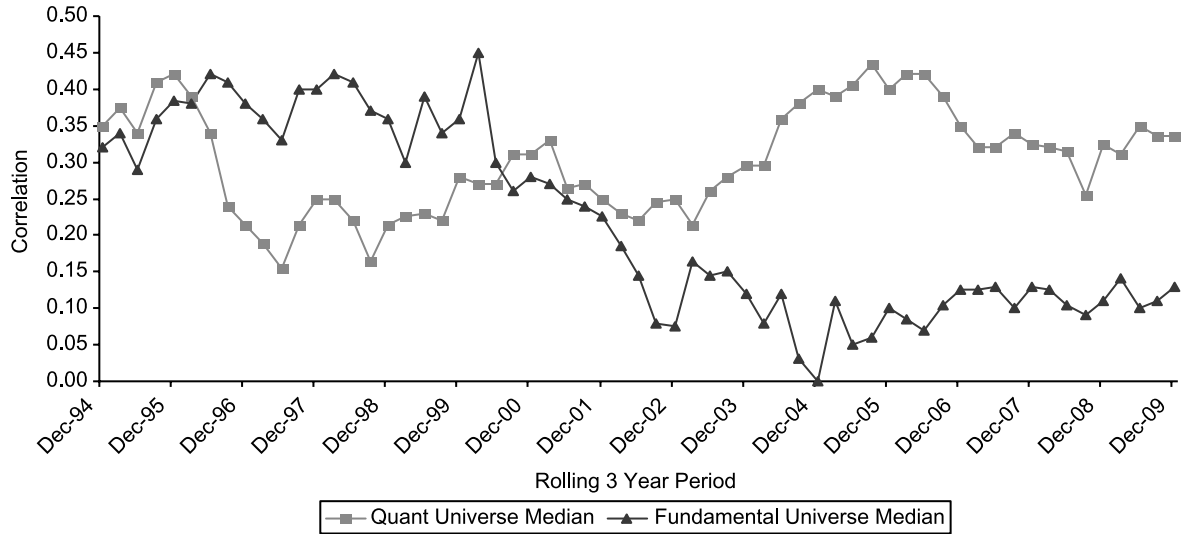
We perform our calculations in several ways, which are displayed in Exhibit 4. The average pairwise total

holdings correlation between managers is the highest at 0.64, because in low tracking error portfolios, the weights are influenced heavily by the benchmark stock weightings. Similarly, there would be a high correlation on this measure between these managers and a passive index portfolio. One means of addressing this problem is to perform a rank-order correlation, where the stocks are sorted based on portfolio weight. This leads to a relatively low average pairwise correlation between holdings of 0.34. This approach, however, is still influenced by the underlying benchmark portfolio, rather than the pure alpha rankings. Interestingly, the results are remarkably close to those obtained earlier based upon overall pairwise excess return correlations. Those data also are influenced by the low tracking error, benchmark-relative construction of the portfolios (i.e., names with substantial index weight or particular risk characteristics may be held in the portfolio even if they are not attractive from an alpha perspective).

The logical alternative is to perform the correlation analysis on the active weights in the portfolios. This results in similar findings when performed either on active weights or on rank ordering of those weights because the benchmark impact is removed. The average active weight correlation is 0.14, while it is 0.16 on an active stock ranking basis. Much as we found in our analysis of manager excess return correlation, the stock rankings of different quantitative stock models are lowly correlated. In fact, the evidence is even stronger with holdings-based analysis.

With active weight correlations that low, we know that there are substantial differences among the various quantitative alpha forecasts in our dataset. Moreover, with holdings information, we can get an even better look "under the hood" in order to examine model intentions. We can try to determine whether there are any factors that we can truly call common factors, which might in some way define what it means to be a quant.

EXHIBIT 3
Median Pairwise Rolling Three-Year Correlations



Source: eVestment Alliance.

EXHIBIT 4
Calculations

	Total Weight	Total Weight Rank	Active Weight	Active Weight Rank
Average Pair-wise Correlation	0.64	0.34	0.14	0.16

Source: Morningstar Direct and Chicago Equity Partners.

EXHIBIT 5
Quantitative Manager Factor Exposures

Factors	Avg. Net Exposure	Standard Deviation	Minimum Avg. Net Exposure	Maximum Avg. Net Exposure	Manager X Avg. Net Exposure
Risk					
52-Week Beta	−0.01	0.02	−0.06	0.02	0.01
Stock Vol (90-day Std. Dev.)	0.00	0.07	−0.17	0.11	0.04
Stock Vol (PVO)	0.00	0.08	−0.15	0.19	−0.05
Crude Oil Beta	−0.01	0.07	−0.18	0.16	0.02
Interest Rate Term Spread Beta	0.01	0.06	−0.06	0.17	0.00
U.S. Dollar Beta	0.02	0.08	−0.05	0.20	−0.01
Interest Rate Credit Spread Beta	0.04	0.07	−0.03	0.21	0.04
Liquidity–Trading Activity	0.01	0.07	−0.11	0.16	**−0.09**
Liquidity–Dollar Volume	−0.06	0.15	−0.34	0.26	**−0.24**
Size (Log of Market Cap)	−0.09	0.15	−0.36	0.26	**−0.29**
Margins & Turnover					
Net Margin	0.00	0.04	−0.05	0.1	−0.04
ROA	0.07	0.08	0.00	0.30	0.05
Asset Turnover	0.14	0.14	−0.08	0.46	**0.46**
Operating Margin	−0.05	0.04	−0.12	0.02	**−0.12**
ROE	0.08	0.06	−0.01	0.19	**0.17**
CFROIC	***0.14***	***0.10***	***0.01***	***0.33***	0.22
Capital Discipline—Cash Usage					
Dividend Yield	−0.02	0.05	−0.18	0.05	−0.02
Dividend Payout Ratio	−0.06	0.05	−0.17	0.03	−0.08
M & A Activity (Acquisitions)	−0.07	0.06	−0.15	0.04	**−0.15**
Cash Change (Yield)	0.08	0.07	0.00	0.22	**0.22**
Debt Change	0.07	0.06	0.00	0.17	**0.15**
Capex to Trend	0.05	0.04	−0.02	0.14	0.08
Cash to Market Value	0.10	0.08	0.00	0.28	**0.20**
Capex to Sales	−0.08	−0.05	−0.16	0.01	**−0.16**
Shareholder Yield	***0.12***	***0.08***	***–0.03***	***0.28***	***0.24***
Balance Sheet					
S&P Debt Rating	0.03	0.08	−0.13	0.15	0.08
Working Capital Accruals	0.07	0.07	0.00	0.22	**0.18**
Intangible Assets	0.07	0.07	−0.05	0.21	**0.21**
Debt Level (LTD to Assets)	0.11	0.10	0.01	0.33	0.16
Forecasted Earnings Revisions					
Upward Revisions	0.1	0.10	−0.05	0.33	**0.33**
Downward Revisions	−0.06	0.07	−0.24	0.03	**−0.24**
SUE	0.05	0.05	−0.06	0.17	**0.17**
Estimate Momentum	0.07	0.05	0.02	0.18	**0.18**
Price Momentum					
Relative Strength	0.07	0.09	−0.04	0.24	**0.24**
RSP (RS - volatility adjusted)	0.04	0.10	−0.13	0.26	**0.26**
3-Month Price Momentum	−0.02	0.04	−0.10	0.05	**0.05**
6-Month Price Momentum	0.01	0.06	−0.08	0.13	**0.13**
5-Month Price Momentum	0.04	0.07	−0.04	0.18	**0.18**
1-Month Price Reversal	−0.01	0.02	−0.08	0.02	0.00
Forecasted Growth					
Forecast Earnings Dispersion	−0.02	0.04	−0.11	0.07	−0.03
EPS Long term Growth Rate	−0.03	0.07	−0.14	0.10	0.00
EPS FY1 to FY0	0.06	0.07	−0.04	0.23	0.12
Sales FY1 to FY0	0.01	0.08	−0.1	0.22	−0.02
Sales FY2 to FY1	−0.05	0.07	−0.16	0.06	−0.10
EPS FY2 to FY1	−0.09	0.06	−0.17	0.02	−0.07
Historical Growth					
Operating EPS (5-yr Growth)	0.03	0.04	−0.05	0.12	0.06
Sales (5-yr Growth)	−0.02	0.05	−0.13	0.06	−0.03
OIBDP (3-yr Growth)	0.02	0.05	−0.09	0.12	0.03
GAAP Gap	0.02	0.08	−0.09	0.25	0.09

EXHIBIT 5 (*continued*)

Factors	Avg. Net Exposure	Standard Deviation	Minimum Avg. Net Exposure	Maximum Avg. Net Exposure	Manager X Avg. Net Exposure
Value					
P/CF	0.03	0.08	−0.04	0.30	0.01
P/S	0.05	0.05	0.00	0.16	**0.10**
P/B	0.04	0.03	0.00	0.12	0.05
P/Trailing Earnings	0.06	0.04	0.01	0.14	**0.11**
P/Forward Earnings	***0.12***	***0.07***	***0.02***	***0.23***	*0.17*

Note: Factor definitions available upon request.

Source: Morningstar Direct, Compustat, I/B/E/S, Chicago Equity Partners.

Exhibit 5 displays an array of factors that are loosely grouped into categories. The exposures are expressed in active terms relative to the benchmark and in standardized terms. For example, a 0.40 reading would mean an exposure to that variable that is 0.40 standard deviations above the benchmark index. If there is a widely held factor, we would expect there to be a substantially positive or negative loading on that variable and we would also expect relatively low variation among managers. The table displays the average exposure in our dataset, the standard deviation across the managers, the minimum and maximum manager exposures, and also the average exposure of one sample manager, Manager X, for illustrative purposes.

Many of these variables might be considered to be risk factors, or merely descriptive characteristics, by some managers—as opposed to alpha factors that they would emphasize. That is our intention. We are trying to cast a wide net in order to scour for any potential common variable loadings. Some factors might have exposures with certain managers, but this does not necessarily mean that they are considered alpha factors by them. Often, risk comes with reward. A manager might be able to obtain higher exposures to other alpha factors by accepting risk factor exposures in a bounded fashion. There are often these trade-offs among both risk and alpha exposures. Similarly, in order to obtain higher exposures to one alpha factor, one may need to give up substantial exposure to one or more other alpha factors.

Surprisingly, very few factors have a substantially positive or negative mean on average, and even fewer where the mean dominates the standard deviation. If we can't say that there is a clear positive or negative exposure at plus or minus one standard deviation, then it is difficult to say that this is a meaningful, common factor. For instance, the strongest common measure was Price to Forward Earnings. The mean exposure was 0.12, while the standard deviation was 0.07. Therefore, a –1 SD exposure is 0.05, while +1 SD is 0.12. The minimum exposure is 0.02, while the maximum exposure is 0.23. We can say that this factor has a clear and meaningful positive exposure, even though it is not particularly large, on average. The evidence is much weaker for any other value factor specifications, including Price to Book.

Overall, we identify only three factors that we would loosely consider common factors. These factors are Price to Forward Earnings, CFROIC (cash flow return on invested capital), and Shareholder Yield (a combination of dividend yield, change in shares outstanding, change in debt, and change in cash). While there is the most evidence of commonality within these three factors, they are not particularly strong or convincing exposures. These findings strongly dispute the notion of a "quantcentrated" portfolio posited in Goldman Sachs [2008], wherein the authors created an undefined portfolio of "common" factors and tracked it as an index portfolio. That index might very well represent a specific manager strategy, but it cannot represent the diverse strategies in our quantitative manager dataset.

It is important to recognize that a weak mean and high variance do not mean that managers do not take substantial exposures to some of these factors. The substantial minimum and maximum average values in Exhibit 5 dispute that notion. What can happen is that one manager might take high exposures to some variables and take negative exposures to others, while another manager does something very different and these effects cancel out in the aggregate—leading to a lower mean and a higher standard deviation. The example of one specific manager, such as Manager X, can illustrate this point. It is clear that the exposures to many of the variables are substantial and meaningful. In Exhibit 5, we have bolded those characteristics that are more than +1 SD or –1 SD relative to the average exposure. What this relates is the variables that are

most important to Manager X relative to other quantitative managers. Quite simply, this explains "how they are different" based upon empirical measurements.

What things are relatively important to Manager X? Well, they take the minimum or maximum values in many Capital Discipline measures, including M&A activity, Cash Change Yield, and Capex to Sales. They take values near the maximum readings in Debt Change, Shareholder Yield, and Capex Trend. They also post the highest relative reading to Asset Turnover. Another element that stands out is the relative exposures of Manager X to estimate momentum and price momentum measures. While there does still seem to be a positive mean for estimate momentum measures among quants, this is less true for price momentum. Even for the estimate momentum measures, however, the variance overwhelms the mean, as many managers take substantial negative exposures. It appears that, over the years, many quants have abandoned momentum factors or, at least, remain tepid in their support. Conversely, Manager X takes the maximum or minimum relative exposures to all of the estimate momentum and price momentum measures, with the exception of 1-Month Reversal.

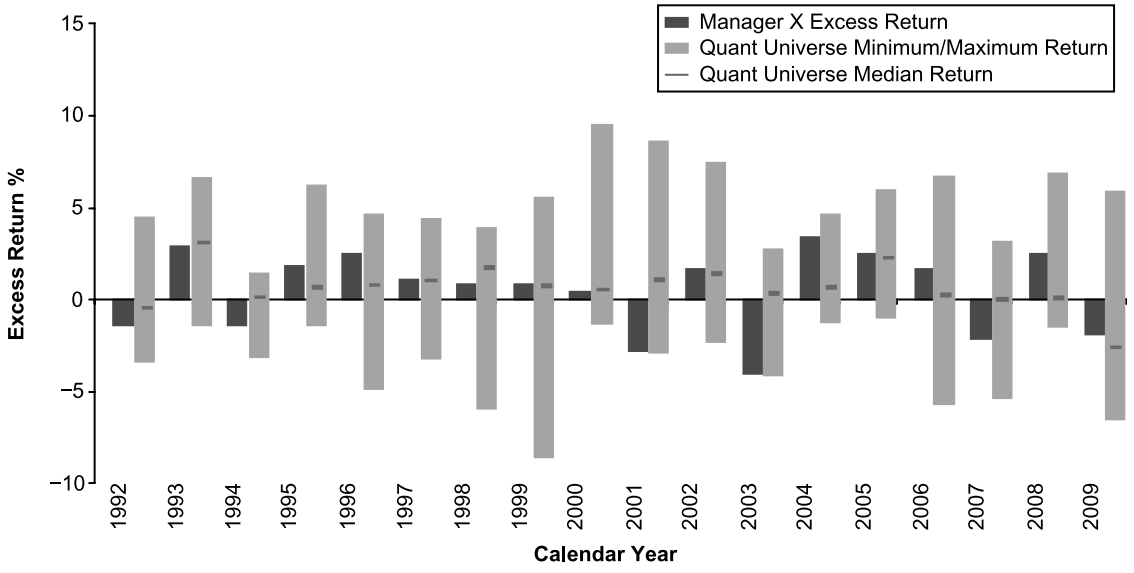
Using portfolio holdings obtained from Morningstar Direct over the 2007–2009 time period, we observed a very low correlation of implied alpha rankings among quant managers. Using the same data, we also have highlighted the specific factor loadings that are held in common among quantitative managers. What we found was that variation overwhelmed the mean to an extent that we could find very few factors that we might even call common quantitative factors! While many quants emphasize some subset of these factors, those which are emphasized vary substantially. In order to emphasize one factor, usually one has to sacrifice something else. Does one emphasize margins or asset turnover? Are estimate momentum and price momentum relatively more important than price to book? Looking under the hood at model intentions corroborates the evidence that we previously obtained from overall manager excess return correlations and specific portfolio holding weightings.

PATTERNS OF RETURNS—MEDIAN VS. DISPERSION CONFUSION

By now, it should be clear that not all quants are the same, but our new-found understanding of the factor loadings can help us to understand historical excess returns and patterns in those returns among quantitative managers. Exhibit 6 highlights the calendar year excess returns of our quant dataset, as well as separately highlighting the excess returns of Manager X.

EXHIBIT 6

Calendar Year Excess Returns (vs. S&P 500 Index)



Source: eVestment Alliance.

At first glance, it is clear what has created a heightened level of concern among investors—the median (and average) return among quantitative managers was extremely weak in each of the last three years and not particularly impressive in 2006 either. Superficially, one could hypothesize that such a string of poor performance stemmed from a crowded trade. In conjunction with the evidence of high correlation from liquidity-driven events in August and September 2007 and increased industry chatter to that effect, who could blame investors and consultants for drawing such conclusions? Well, now that we have the benefit of several years' worth of actual observations, a premium should be placed on empirical data in addressing these issues.

What is most informative in answering questions regarding crowded trades is the dispersion of manager returns, rather than the median or mean. Much as we would expect to see an increased correlation of excess returns among managers if alpha signals were being arbitraged away, so we would expect to see less dispersion among manager returns. No such pattern exists! The range of returns is higher on average in the last three years, 2007–2009, than it was during the preceding three years, 2004–2006, when median returns were solid on average. Moreover, some managers did quite well over these periods of poor median performance in 2007–2009, as indicated by the return range. These results challenge the Goldman claim in their "Quantcentration" paper that "the quantcentrated portfolio has lost steam in 2004–2005, and began to nose dive in 2006–2007" [Goldman Sachs [2008]). The median manager did very well in 2004 and 2005 and was positive in 2006. The hypothetical quantcentrated portfolio does not represent these managers.

Highlighting the specific experience of Manager X over the last four years further illustrates this diversity. The returns were strong in two of those years and well above median, while poor in the other two years, although still above median in 2009. This is not supportive of the twin hypotheses that quant models are all the same and that there are no longer any returns to alpha factors. In fact, only considering that the cumulative excess return over the last three to four years is flat or negative entirely misses the variation in returns. Furthermore, this perspective also misses the fact that factor returns actually have been extreme rather than muted! These factor returns have experienced a cycle over the last three years, which often accompanies economic inflection points. We're pretty sure there isn't a boat in the water that didn't feel the economic turbulence over the last few years, but as Asness and Berger point out, "investors that can hold on through a market cycle have … always made back their money and then some" [2008, p. 62].

PATTERNS OF RETURNS—FACTOR EXPLANATIONS OF ABSOLUTE AND RELATIVE PERFORMANCE

During the latter portion of recessionary periods, the market turns to extreme risk-seeking behavior. It favors tail-oriented exposures to beaten-down stocks that are low-priced, highly volatile, generally low quality, and cheap on book-to-price measure. This is a challenging environment for portfolios with broad-based moderate exposures to a balance of factors. This was true in 1992 and 2003, which were generally weak periods for quantitative managers. It was certainly true in 2009, which accompanied the most dramatic economic downturn in the last 60 years and a pronounced market rebound off the bottom. We do not see much different in 2009 than in these earlier periods, other than the fact that the cycle and the factor returns have been much more extreme.

We can explain the absolute, as well as the quant-relative, performance of Manager X observed in Exhibit 6 from what we already have determined in terms of the absolute and relative factor loadings. Manager X exhibited many quality measures that are more than 1 standard deviation above the mean relative to other quantitative managers, but one factor group that stands out is the momentum group, which encompasses estimate revisions and price momentum. As we noted earlier, Manager X takes the highest exposure among peers in these categories. These trend-oriented factors will invariably get turned around at economic inflection points, as what worked well is no longer working, and this can lead to negative results during these periods. Exhibit 7 shows the univariate regression factor coefficients for value, represented by Book to Price (BP), momentum represented by Volatility-Adjusted Relative Strength (RSP), and stock price volatility, represented by the PVO measure. Value factors are positive. Momentum factors are negative. Price volatility is sought by the market, indicating risk-seeking behavior.

Logically, one might presume that there should be a built-in hedge in the positive value factor exposures present in the typical quant portfolio, but during the early stages of an economic and market inflection, the returns to value are very tail-driven and work best on Book to

EXHIBIT 7
Factor Returns

	BP	RSP	PVO
Economic/Market Rebounds Risk-Seeking			
1992	0.32	−0.14	0.03
2003	0.34	−0.21	0.69
2009	0.99	−0.78	1.66
Other Market Inflection Points			
1994	0.24	−0.15	−0.18
2001	1.08	−0.10	−0.34
2007	−0.67	0.62	0.18

Note: Numbers reflect the average one-month univariate coefficients over a large-cap universe.

Source: Compustat, Chicago Equity Partners.

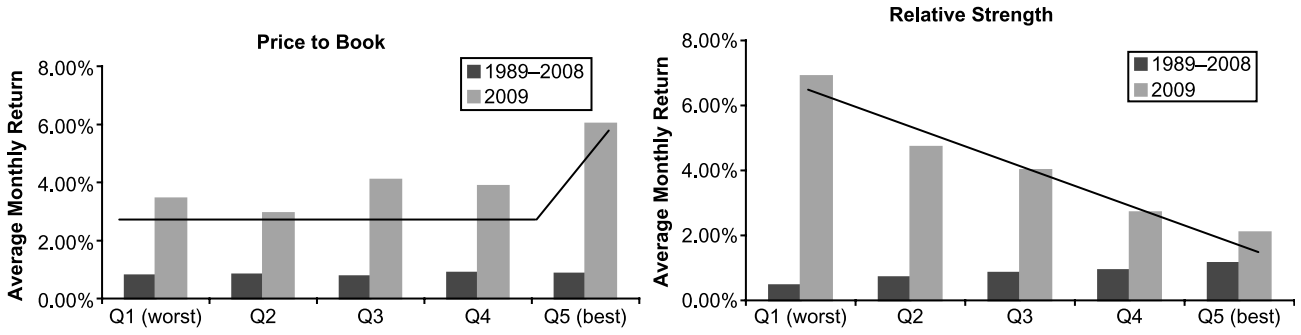
Price measures. For instance, Earnings to Forward Price, which we identified as a common quant factor, had an average coefficient of –0.01 in 2009. Exhibit 8 demonstrates this by displaying the quintile returns for Relative Strength (RS) versus Book to Price (BP) in 2009. Moderate positive exposures to BP garnered very little in the way of return, but moderate positive exposures to RS were punished. The results were similar in 2003, when Manager X was actually the worst relative performer in our quant dataset. So, these exposures can help us to understand absolute and relative performance during the economic and market rebounds in 1992, 2003, and 2009.

The years 1994 and 2001 were other inflection points with a factor return profile that was similar to these periods just highlighted but which might be better described as risk-averse, rather than risk-seeking, based on the sign of return for PVO (see Exhibit 7). Also, the underlying causes of the inflections obviously were different than for the economic/market rebound inflections, but both the alpha factor behavior (negative momentum and positive value) and the portfolio excess returns (negative) were largely similar. A similar factor return profile led to similar portfolio returns.

Another illustrative example would be a period such as 2007, which is a fascinating case. On the surface, this should have been a very good year for momentum-oriented strategies. Momentum was strongly positive, on average, and value factors were inverse. Superficially, this was similar to 1998 and 1999. The year 2007 was also a risk-seeking market that saw investors reaching for yield in an environment where spreads were very compressed. This was achieved by piling into whatever was working from a price-trend perspective and was carried out in a very narrow and levered manner. The market became narrower and narrower. In many ways, it was most similar to the factor environment in very late-1999 and early-2000, at the peak of the tech bubble—but most quants managed to eke out decent excess returns in those years. The year 2007 was a twisted and narrower version from a factor perspective, much as 2009 was a narrow version of 2003. The relative returns to value and momentum in 2007 were almost the mirror image of what is shown in Exhibit 8 for 2009. The returns to BP were increasingly negative across the spectrum, while RS worked at the tails. Momentum only worked when it was combined with negative value scores and low quality characteristics.

Yes, a conscientious objector might reasonably point out that there also was a major deleveraging liquidity event that took place in late 2007 and spread like ripples on

EXHIBIT 8
Quintile Analysis: 2009 vs. Last 20 Years



Source: Compustat, Chicago Equity Partners.

a pond. This topic is covered by Khandani and Lo [2007] analyzing the events of August 2007. We have already proven that specific overlap between any two managers in terms of stock holdings was low during this period—so, too many common names was not the direct cause of contagion. Logically, one can posit that risk control measures, common among quantitative managers, fed this problem, as some managers sold off positions experiencing large negative moves in order to maintain overall portfolio risk level targets. This could occur even in long-only portfolios, but largely the temporary moves would have been driven by leveraged strategies and simply mirrored in the daily paper losses on long-only strategies. As would be expected, though, such a liquidity-driven event was short-lived and paper losses largely reversed. It is critical to note that the negative returns associated with the underlying factors were in place consistently since April of 2007—well before the deleveraging event—having continued unabated in a very narrow market. The negative returns did not start or end with the August/September 2007 event. That consistently perverse factor environment likely contributed to the need for deleveraging in the first place. This concentrated episode led many observers to mistakenly conclude a dominant "value" orientation among quants, given the very negative value returns and equally buoyant momentum returns that year. As we demonstrated earlier, this is not a universally accurate description and certainly not true in the case of Manager X. Not surprisingly, this time period also witnessed the genesis of rumblings about crowded trades.

CONCLUSION

We have examined the theory that quantitative investment over the last few years has become a crowded trade from many angles. Through returns-based correlation analysis, we do find that recent correlations among quants are higher than the correlations among fundamental managers. These correlations have been higher in the past than they are now, however, and there is no discernable trend in the data to suggest a shift in behavior in recent time periods. From a holdings-based perspective, the conclusion that we draw is one of low correlations between the stock rankings of different quantitative stock models. Furthermore, after examining the factor loadings of quant portfolios over the last three years, we find very few common factors. Instead, we find high variances in the factor loadings among managers to a wide range of alpha and risk variables. What is very clear is that there are distinct differences both in the factors used and in those emphasized by quantitative managers and that these differences can be significant.

Returns to factors have not disappeared in recent years, and in many instances, have been more pronounced than ever. Certainly, these factor returns have been volatile and skewed in many instances, making them difficult to capture on a consistent basis. The real issue, however, is whether that observation is consistent with the hypothesis of a "crowded trade" and of factor returns that have been arbitraged away—especially when the bulk of returns-based and holdings-based empirical analysis argues against such a conclusion. Yes, quants might all be fishing for the highly desired "alpha" fish, but they fish in different places, with different lures and with different techniques. Some search for bigger fish, which are fewer in number, while others are happy to fish for smaller fish in greater quantities. Either way, odds are something will be cooking on the fire when the sun goes down.

Small factor loading differences and the accumulation of seemingly minor decisions can lead to very divergent portfolios. Accordingly, these differences can have large impacts on portfolio performance. While it is true that all the quantitative shops have access to the same databases, likely read the same research, and employ similar technology, the ways in which all of this information can be combined and implemented into a portfolio are as numerous as the vast number of proteins that are coded from the same four basic RNA building blocks. Using a more typical quant analogy, it is similar to decisions along a binomial tree—starting at the same point, one different decision along the way results in a very different outcome. Quantitative managers are not all fishing in the same small pond with the same tackle box over by the old, sunken log that everyone else already knows about and that is now over-fished.

ENDNOTES

[1]The style analysis was determined using a rolling 24-month style exposure based on holdings using Stylus.

[2]The tables and charts show data for our manager universes starting in 1992. We felt it useful to supply as much information as possible, but the datasets obviously become more populous over time. By way of comparison, there were 17 quant managers with one year's worth of observations in December 1999 and 8 fundamental managers.

[3]We chose to show median results, but averages produced largely similar findings.

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