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The August of Our Discontent¹

Questions and Answers about the Crash and Subsequent Rebound of Quantitative Stock Selection Strategies²

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There has obviously been some significant turmoil lately in the normally rather staid world of quantitative investing. That's led to a lot of questions about quant investing in general and specific questions about what happened in the few weeks of late July through mid-August. In an effort to help, we've tried to assemble and answer many of the questions or statements we've heard – from the subtle and insightful to the silly. Some of our answers may overlap, but we wanted to address a range of different questions we have received, even where the answers are somewhat similar. Please, while reading this, do not forget we're quants with a vested interest in this debate!

Questions about July/August seem to fall into three general categories: 1) What happened? 2) What are the implications for AQR's investment approach? 3) What are the implications for our investors' overall portfolios?

Although what follows is geared specifically to market-neutral hedge funds, which were at the epicenter of the turmoil, some of the discussion is also relevant for both traditional benchmarked and relaxed-constraint ("130/30") portfolios that use quantitative equity strategies (though the constraints and risk-targets on these portfolios mute the event's significance).

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¹ My AQR editors would not let me continue this title with "Made Less Inglorious Summer By the Rebound of the Dorks."

² Although the next dozen or so pages are mostly deadly serious and dry, I have tried in a few places to inject some levity. If you find this is misplaced, I apologize. I, and all of AQR, could not take this topic more seriously, and in fact that's why we think a bit of levity is sometimes needed. I should also add that all references to any individual mentioned herein are meant in jest so please take them in the spirit in which they are intended.

WHAT HAPPENED?

Q. What happened to quant strategies in early August?

There are really two kinds of quant strategies that were affected. The first is called statistical arbitrage (or stat arb), which involves trading based on short-term price movements, volume, and news events (not a precise definition, but this captures the general idea). Although some people call all quant strategies stat arb, we distinguish it from the popular class of equity strategies that have a longer investment horizon and heavily rely on company fundamentals. These latter strategies typically use valuation, earnings quality, and medium-term momentum indicators (as well as many others) to identify attractive and unattractive stocks. Both of these quant strategies suffered severe losses that began in late July and came to full force in early August. Our discussion will focus mainly on the longer-horizon strategies.

It's important to note that many other "quant" strategies were not victimized. For instance, our macro-oriented quant strategies were fine during this period. This was largely a crisis for strategies that went long cheap companies with good earnings quality and momentum, and short the opposite type stocks (and for shorter horizon strategies that managed to trade their way into that position since they tend to bet on a short-term reversal).

Q. What caused this?

Well, quite simply, an extreme market environment caused an old-fashioned panic in which there were many trying to rush out of the same door at once. Over the last seven years (decades really, but the last seven years in particular), these strategies had been successful, which naturally led to a lot of capital flowing into all forms of them. In addition, since volatility had been relatively calm over the last several years, many managers ran these strategies at high leverage levels, assuming such calm times would continue.

Speculation, which we think is reasonably well-founded but not provable, is that July losses in credit and mortgages and other unrelated areas led some multi-strategy funds that do not specialize in quant strategies to reduce their overall fund risk or to raise cash by unwinding these liquid quant positions. In many cases, these managers may have added quant strategies recently and did not have the expertise or confidence in this approach relative to their other strategies. As losses in the quant strategies (induced in part or all by these liquidations) began to become meaningful, at least one large participant was forced to rapidly unwind its book; it had offered a form of "portfolio insurance" to a large investor that required the manager to return capital as large losses were incurred.

We don't claim to know the whole story and clearly we've only unearthed part of what precipitated the ensuing events. However, the snowball really got rolling downhill in the first couple of days of the week of August 6. In a very nervous world that was already several crises deep for the year, chaos reigned for the next few days as "weak hands" exited the strategy entirely. Even many veterans (such as us) had to trim back, making the 8th and 9th particularly unpleasant experiences. The U.S. was the epicenter for this deleveraging, but Japan was also hurt. Similar strategies in Europe suffered as well but not as severely.

Then, as the markets opened in New York on August 10th, it ended abruptly, as many panics will, and investors who stuck to their strategies throughout the month went on to recover a significant portion of their losses.

Q. How do you know the problem was "deleveraging" vs. just bad stock picking?

Well, there is no single thing, but the following makes a pretty airtight case.

First, the very size of the moves. The world is highly "fat-tailed", meaning very big events happen more often than most models assume (the so-called "Black Swan" problem), particularly at short horizons. This is not something we just discovered; it always has affected the sizing of our bets. The size of bad and good days during this event came along with statements like "well, that was a 25 standard deviation event." What this really means is whoever said that didn't have a good grip on the underlying distribution of returns, since statistics would tell you that such an event doesn't happen. More accurately, it means that the speaker is quoting the standard deviation "in normal times" (when stock returns are driven by fundamentals), and this time was decidedly not normal. That the world can behave non-normally is not new news, but this was a particularly graphic example.

Second, the linear nature of the declines and the comebacks. When they were falling and then when they were rising, these strategies moved in a near straight line throughout the trading day. It looked just like what it was – someone working large orders to take down their risk – and then someone putting that risk back on. It did not look like the random losses or gains of getting many small bets right or wrong.

Third, models are composed of many factors, some of which are low or negatively correlated with each other (value and momentum are the most prominent example of this phenomenon). During this period, all of the more well-known factors performed very poorly. That is a sure sign people were taking down risk in similar models.

Fourth, the specific factors that are the most well-known and popular had the worst performance. For example, within our valuation theme, we look at about 14 separate indicators (with varying degrees of popularity) that are generally very correlated to each other, as they capture a similar concept. During this drawdown, we saw large divergence in the performance of these factors. In particular, the more proprietary factors were down dramatically less than the others. For instance, within our earnings quality theme, the version most widely written up in academia performed terribly, while several of our more proprietary/esoteric factors were flat or only slightly down.

Finally, there's the rumor mill. That many were taking down large amounts of risk in these strategies is simply not in question, both from this anecdotal evidence and the quantitative indicators cited above.

WHAT ARE THE IMPLICATIONS FOR AQR'S INVESTMENT APPROACH?

Q. Isn't it a "cop-out" or an "excuse" to blame other people's selling for losses when obviously you don't want to admit your models did not work?

We have heard this quite a few times, particularly in the press. Of course, when we lose money, our investment process is not working during that period, as that's just a definition (unless, by accident, we bought what the models told us to sell, which happens less than 10% of the time).³ When we venture any explanation of performance, we are explaining *why* we think our process is not working, not making excuses. If performance attribution is now an "excuse," we're all in trouble.

And *why* something is not working is important. We believe losses that come from very sudden changes in strategy allocations by large groups are far more likely to reverse in the near future than losses that come from a change in stock-by-stock fundamentals. Neither kind of loss is pleasant while it's happening, but they make for different outcomes. So, not only is this *not* an excuse, it's vital to understand.

To put this in perspective, consider the performance of our U.S. value factor, which generates a long-short portfolio based on whether we think a given stock is "cheap" or "expensive" relative to its peers. In the internet bubble, this factor fell about 40%, but took 16 months to do so. From the beginning of July to the August trough, this factor fell 30% in just about 5 weeks. Since then, it has only come back about 1/3 of the way (through September 10th), suggesting that future gains for value may lie ahead when valuations return to more normal levels.

³ Past performance is not a guarantee of future performance.

³ For the love of God please understand I'm kidding (and which direction the joke goes).

Q. But don't the events of July and August raise a "red flag" for investors about these models?

First, remember that "these models" are not esoteric constructs but rather, in our view, just thoughtful, intuitive, systematic approaches to choosing stocks and constructing portfolios. We think these are good long-term logical strategies (long cheap, good quality, and improving companies and short the opposite) that have worked for many years because people's behavioral biases go the other way. We believe many of these effects occur because of what is most commonly referred to as "behavioral finance," which encompasses a series of biases investors have that in aggregate affect stock prices. Our approach seeks to profit from these biases systematically. For example, we are betting that the "glamour" stocks will continue to receive multiples that are just too high based on reality and vice versa (this is the value factor), that firms with weaker earnings quality will continue to fool some investors, and that investors like to buy and sell what's been working and not working lately (momentum).

Below we will present some formal evidence that even prior to these events these biases remained intact (we can measure this using what we call the "value spread"), and indeed today this spread is wider than average. In summary, we think there are investor biases that are exploitable. Moreover, despite the increased popularity of quantitative investing, the anecdotal and numeric evidence is that these biases remain and are currently actually larger than normal. Thus, we believe these strategies will continue to benefit our investors.

Q. But can these "quant" strategies still add value if everyone knows about them?

Yes, although they may experience periods of higher volatility as capital invested in them ebbs and flows. What the question really asks is whether certain factors that have been associated with positive returns in the past (noticeably the tendency of cheap stocks to beat expensive ones, and stocks with good recent momentum to beat bad ones) will continue to work now that they are more widely understood. Put simply, these biases have existed for as long as we can measure them and show little sign of going away.

For instance, the spread between expensive and cheap stocks (what we call the “value spread”) was not very tight even before the events of August, and is now wider than the historical norm. If too much capital had been attracted to these strategies, then that spread should have been driven tighter. Since it hasn’t, it is reasonable to believe that the growth in these strategies has at least been matched by the growth in the behavior that makes them work. So, even though clearly these strategies are not secrets, we believe they will continue to pay off in the future as they boil down to good, intuitive, disciplined investing that doesn’t show signs of being arbitrated away. With more people doing them, we may want to assume that over the long-term they will be less profitable than the past, but we don’t believe that is conditionally true right now, particularly as many have left these strategies in recent weeks. Furthermore, we don’t believe they’re ever really going away fully until human nature undergoes some sort of fundamental change. Remember that in 1999 and 2000, people thought value strategies were dead forever, even though they were about to go through a rally of epic proportions. Last month we saw moves of similar proportion occur in a compressed time period.

Q. Was quant equity liquidation risk a risk you had considered in your stress tests?

Yes, this possibility (based on the obvious popularity of the strategies) is certainly something we have talked about many times. We would readily admit the speed and magnitude surprised us, but in sizing our overall strategies we have definitely considered this in the past and will continue to do so in the future.

I have said before that “there is a new risk factor in our world,” but it would have been more accurate if I had said “there is a new risk factor in our world and it is us.” It is our collective action going forward (where “our” refers to quant market-neutral managers or those employing very similar strategies) that now affects a world we didn’t realize we had such influence over, and this is undoubtedly an important short-term risk factor. Having said that, along with new risks also come new opportunities. It’s also important to note that this type of risk factor exists in a range of asset classes and hedge fund strategies, not just quant market-neutral equities. Quant equities just happened to be the victim in August.

Q. On the night quant equity strategies hit their lows, how did you feel getting a phone call from Ken Griffin of Citadel?

I looked up and saw the Valkyries coming and heard the grim reaper’s scythe knocking on my door.⁴ I did my best to run to the light.

⁴ Which is an awkward thing to do with a scythe. You need to turn it around and not use the blade. Ken scratched up a few doors before he figured that one out.

Seriously, with quant market neutral equity only being part of what we do, and given the fact that we always have used common sense as much as any risk model in sizing trades, and based on our consistently strong cash balance and thumbs up from all our bankers, I was generally comfortable about our position (although not happy about having a pretty bad month early in August!) And the call was actually very friendly and fairly general.

Q. According to VAR and stress test results before these events, was the loss experienced in such a short time in the realm of possibility?

No, not for the quantitative equity strategies viewed alone. In July and August, we certainly saw “standard deviation events” for these strategies (and the funds that employ them exclusively) that were the functional equivalent of impossible. Of course, that’s again only true if you believe (and we do not) that this elementary statistical analysis covers all events. Also, the absolute return strategy, our broadest strategy (with a target risk level similar to the risk of equities, but without correlation to equities) was certainly hurt by these strategies, but the strategy’s returns were not at all outside the realm of possibility.

When allocating capital across our strategies within a fund, we don’t rely too heavily on formal risk models. We size our bets based on a wider consideration of the range of things that can happen. In fact, one way to view this recent period is that if something impossibly bad happened to a subset of your strategies, and you had a bad but eminently survivable tough period, you probably aren’t making a massive bet that the impossible can’t happen!

Clearly, the above discussion is true for our broadest hedge funds investing in many strategies. We do run funds that focus on different subsets of our strategies, with some of them targeting aggressively high volatility. Here, getting aggressive exposure to effectively a single theme is exactly the point, and what our clients have asked us to do in the context of their entire portfolio. In our funds that focus on aggressively pursuing pure stock selection, we certainly saw events that we, and the entire investment community, would have thought extremely unlikely prior to August.

Q. Obviously models cannot anticipate big events, inflection points, etc.

First of all that’s not a question, but I’ll take you at your meaning.

To begin with, non-quants aren’t allowed to say “inflection points”—it’s a quant-only word. Second, nobody can anticipate these things. Some may get a few predictions right for a while, but long-term nobody consistently makes money anticipating giant surprises. Third, models would tell you that what happened in the quant world in early August couldn’t happen. If anyone actually ran their portfolios assuming such events were impossible, they’d probably be out of business by now. We do not make this assumption, nor (we think) do most of our respected competitors.⁵

There is nothing particularly unique about quants here. This is about widely traded popular strategies meeting hot money all trying to leave at once, a mixture that we've seen create ugliness in many a non-quant area. But, it was our community's turn this time and so the barbs are now directed toward us. Gee, geeks getting picked on, I'm having a high school flashback...

Q. Surely you'd agree that quants can't respond as quickly as a manager working on "gut instinct"?

We actually can, since our portfolios tend to be very liquid and our live systems very good, but responding quickly isn't always the best thing. The absolute worst thing to do in this past crisis would have been to decide the world had changed once you saw the serious deleveraging begin. You would have caught most or all of the downside but missed the rebound. Having an investment philosophy that you believe in, and that you stick to with discipline, even when it forces you to make some uncomfortable decisions, is an advantage, not a disadvantage of quantitative investing (or maybe good investing in general, but being a quant sometimes makes it easier). And, it goes without saying that you cannot call me Shirley.

Q. Should quants look for unique factors?

In truth, unique factors would be a great way to avoid the problem of crowding. Even among correlated value indicators, the ones we thought were most unique to AQR suffered the least during August. We don't claim this is because they are so much better (okay, we think they're a little better), but rather the more common the factor, the more subject to deleveraging.

But, here's the problem with unique factors. They are also uniquely susceptible to data-mining and getting the last crisis right. In particular, new research often seems to be directed at "fixing" a model that is often just having a bad period. Thus, more unique factors are great, and if anything the events of August will push us to look harder for them, but we will only add unique factors where we are confident in their fundamental economic basis.

⁵ On the flip side, if anyone ran their portfolios assuming these events were always just around the corner (and hedging accordingly), they would also be out of business (just more slowly), as the costs of the hedge would be punitive.

WHAT ARE THE IMPLICATIONS FOR MY OVERALL PORTFOLIO?

Q. Many press accounts referred to “complex computer models” and “black-box” strategies. Does August teach us that investors should avoid strategies that are not transparent and easily explainable?

To us, the idea of a “black box” implies two things: First, that a strategy relies on secret and mysterious equations that can only be understood by a small cabal of computer wizards.⁶ Second, that the strategy is run by a direct descendant of Hal 9000 that makes all of the decisions. Investing with a secret and mysterious computer is probably an unwise investment move and has never been our style of investing.

We can’t speak for all quants, but by and large much of quantitative investing is about common sense and discipline, rather than about esoteric math and computer algorithms. We look for characteristics, either short- or longer-term, that many non-quant investors would also agree make a security attractive (or unattractive). The computers help us process the data and maintain a diversified and disciplined approach. More often than not, while not as good a story for the press, there is no $E=MC^2$ under the hood, rather it’s about good investing done broadly and without the often dangerous influence of tick-by-tick human emotion. Our strategies are not “black boxes.”

Of course, “good investing gets clocked as some investors rush for exits” is not as catchy a story as “quant brainiacs follow their computers to a well-deserved doom,” so I’m probably not going to win this battle in the media.

Q. Have we learned that equity market-neutral isn’t quite as market-neutral as we thought?

No, I would not say that. First, the facts. While quant equity strategies were suffering, the equity market was not plummeting. In fact, during the worst week for the quant strategies, the stock market was up. In simple terms, we were not suffering day-to-day because the market was falling. At the same time, it’s fair to say the pan-asset class problems of July also may have precipitated the events of August, so in that sense (taking a longer time horizon) I would agree we acted less than market-neutral in this event.

What’s important to keep in mind is that market-neutral does not mean short the market, and it doesn’t mean we live in a different world. It means if you tell me the market’s direction, I don’t get any information about the returns of my strategy. If, on the other hand, you tell me the market is in turmoil, it’s a near certainty that all strategies of any kind, quant or not, will experience more volatility (both up and down) than normal.

⁶ Frankly, we could do this, but we don’t as the robes chafe.

Now, if our strategy loses money well less than half of the time – in good times and in bad – then in a crisis, both the wins and losses will still likely be bigger. I’ve been doing this since 1995 live and since the late 1980s as a researcher. I’ve seen these strategies hold up very well in the Asian currency-inspired stock market plunge of October 1997; in the LTCM and Russian debt crisis of August 1998; in September 2001; and during the whole post-internet-bubble bear market. Moreover, many of these strategies logged their best returns during these "crisis" periods, rising substantially while markets were falling. If the track record is now that we’ve done poorly in one of the many crises we’ve faced (and I’m still willing to fight this one!), I’m still proud of the record overall, and very confident calling it market-neutral.

It is also worth remembering that for long-term investors, long-term correlations matter more than short-term ones. Measured over years rather than days, we expect these strategies to have no correlation to equity markets. (Over days, we also expect zero correlation, but obviously more variability will occur!) Indeed, in the time we've been running them at AQR, most of the strategies have realized negative correlations to equities (and positive absolute returns), making them even more potent portfolio diversifiers. You’d quickly add a strategy to your portfolio if it does well on average, has a low or negative correlation to equities over the long term, and is up more often than not (though not always) in periods of market distress. This is clearly what we think we’ve achieved.

Q. Do Quants all do the same thing? Do they move in sync in a crash? Are they now “exotic beta”?

There is some truth to this. Strategies like value, earnings quality, and momentum (as well as many others) spring from the academic and practitioner literature we’ve all read and some of us helped write, and the common sense we perhaps all share. I have been personally writing and speaking for years about how strategies are often alpha when first discovered, and then slowly move toward beta, or at least develop an “exotic beta” component over time. Thus, quant strategies should be correlated. Again, we don’t claim prescience; the size/virulence of this move caught us and everyone by surprise, but the fact that quant strategies are correlated is not news.

Now, not all quants strategies are alike. This whole note has been about quantitative stock selection, where there have been a number of managers utilizing similar strategies for many years. We also apply quant models to many other decisions (e.g., asset allocation, country, currency, yield curve, and commodities) that show no signs of being crowded or behaving abnormally. (This may be because these strategies haven't done as well over the last few years, making us more optimistic about the future and reducing any worries about crowding currently — crowds seem to like strong recent returns!) So remember, there are many other quant strategies out there that are completely unrelated to the particular form of stock selection that had problems in August.

Finally, just because quant market-neutral equity strategies share a common “exotic beta” does not mean they're all equal. Suppose Warren Buffett and I each choose a stock to invest in. If a stock market crash comes, it's likely Warren and I will both lose big that day. In fact, given the likely randomness, it's probably my best shot at beating him! But, over the long-term, I think you'd rather have him pick a single stock investment. Correlation and alpha are simply not the same thing.

Q. Is it true that several prominent hedge fund managers operate an illegal dog-fighting ring?

Yes.

Q. Do you care to elaborate?

No.

Q. Come on.

Okay, it's Steven A. Cohen and Paul Tudor Jones, but you didn't hear it from me.⁷

Q. Aren't quant strategies over-capitalized?

There are undoubtedly more quants using these strategies than ever before. But, again, we estimate that the “value spread” (particularly in the U.S., where the measurements are most accurate) is wide, not tight, versus history. In addition, we estimate (or more accurately, guesstimate) that as much as one-third of the positions based on similar models were liquidated during the recent crisis. For now, we believe the answer is clearly no.

⁷ No animals were harmed in the August quantitative tumult.

Q. Should I be worried that I have exposure to quantitative managers in multiple places in my portfolio – not just in hedge funds, but also in traditional equities and 130/30?

Now, of course, nobody ever said your whole portfolio should be quantitative stock selection! These are good strategies for the long-term. Putting some money in them is a sensible idea. Dividing that money across, say, four different managers is safer than giving it all to one manager, even if quants are correlated. Furthermore, you certainly should attempt to look at this exposure across the different “buckets” of your portfolio.

It is clear that a common “exotic beta” is shared among these strategies, and like all commonalities when you get the giant event they will seem more correlated (because a good model will be down a ton and a bad one will be down two tons, but both will be down). Fundamentally, what matters is whether these are good strategies. Long-term investors should worry less about daily correlations in a subset (quant) of a subset (hedge funds) of their portfolios (even after allowing for similar exposures in some other buckets) and worry more about whether these long-term very good strategies are still selling at reasonable prices (they are) and whether they are uncorrelated to negatively correlated with the rest of your portfolio (as quant market-neutral has been in most crises we’ve seen). How correlated the “quant” part of your portfolio is with the rest of your portfolio is far more important than the correlation among quants themselves.

Q. Shouldn’t we pursue less complex, lower levered strategies now that the world is riskier?

Some argue this, but when you follow that path, it almost always leads to some combination of beta, often with illiquidity to hide the risk (as those are the ways to take risk but not use leverage and not look riskier). We believe people making this move are literally moving from the frying pan to the fire, they just don’t get daily marks on the flames.

We are, however, studying changes to portfolio construction that will make our portfolios a bit less leveraged for the same level of risk. This may help to reduce our tail risk and, as a side benefit, transaction costs, too. Like all research in progress it remains to be seen whether we ultimately decide that this improves the portfolio.

Q. If all these quant strategies have common left-tail risk, shouldn't that cause us to reduce exposure to them, since they're not as risk-lowering as we thought?

Possibly. There certainly may be investors with too much in any single style, such as quantitative stock selection. But, consider the following:

First, again, worry most about portfolio level risk. How does tail risk affect not your quant hedge funds, not your hedge funds in general, but your overall portfolio? We are guessing that the effect is much smaller when viewed this way, and besides, when viewed over multiple market crises, these strategies are probably a risk reducer.

Second, take a long-term horizon. We find in so many cases that diversification looks like a failure when investors expect it to protect them from panics, but looks like a success over longer horizons (which we're supposed to care more about!) Often, managers who share some similarities are exposed to suffering a "left tail week" together, but can deliver much less correlated results over longer time horizons. And, again, for the quant portfolios we are discussing, even that "left tail week" happens more often than not when the rest of the portfolio is fine or going up. This diversification effect (a benefit of quant strategies) is a far more important macro concern than the realized correlations between quant managers.

Q. In summary, what is the general outlook for quant market neutral equity going forward and how has that changed after August?

Well, my answers won't be a surprise given the above. In our view, cheap companies with high-quality earnings and improving prices and fundamentals are still going to beat their counterparts over the long-term. As for now, substantial money has left the strategy (through deleveraging) and value spreads are above historic norms, both of which are positive for the medium-term. However, short-term investors may view the strategy as riskier than it used to be, which could cause further reductions in positions. We are not in the business of predicting the short-term. But, to be doing the same strategies we've done for years (albeit using today's versions which we think are better than in the past) at wider spreads and with fewer competitors makes us fairly excited about the medium-term prospects, and much more excited than we've been in quite a while. These strategies were everyone's darling two months ago as the world was rushing to add them. Today, they are a whipping boy, while being undeniably more attractive by a healthy margin. We like that trade-off.

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