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Factors in Crisis

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Factors in Crisis

"In the middle of difficulty lies opportunity" – Albert Einstein

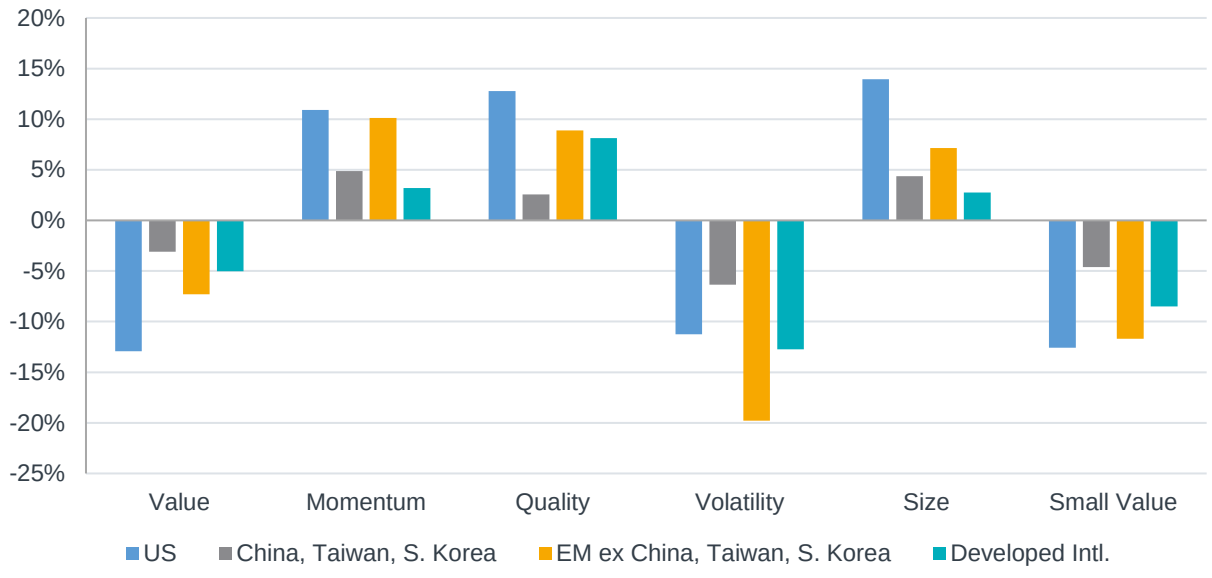
We are living through a truly unprecedented crisis, one that will be remembered for decades to come not just as a market crisis but as one of marked disruption to the very way people live their lives. In such circumstances, it is easy to be swayed by emotions and it is clear there are strong currents of fear and greed driving markets. As quants, we spend every workday trying our best to silence those emotions and build a process founded on data and rigorous objective analysis. Putting aside the daily headlines and focusing on data—from this crisis as well as prior market crises—can add reassuring context for illuminating opportunities and guiding decisions.

In what follows, our focus is on the behavior of equity factors in times of crisis. We first discuss drivers of factor performance during and following crises, then examine the data from past crises and compare to what we are seeing today. While the uncertainty of how this crisis will play out makes forecasting difficult, we are encouraged by past experiences where staying the course has been well rewarded. In the midst of every crisis, it may feel like the world is ending–however that hasn't yet been true!

Recent Factor Performance

Figure 1 illustrates returns for well-known quant factors during the recent crisis across global markets. In a crisis the correlations across markets increase and this is evident in factors as well: Value and Volatility have underperformed everywhere, while Momentum, Size, and Quality have consistently outperformed. It is notable that leading into this crisis low volatility stocks outperformed greatly, while value stocks had experienced prolonged underperformance. Instead of reversing these trends, so far, the crisis has extended them.

Figure 1: Factor Returns Since Start of COVID-19 Crisis[1]



[1] Chart returns are for the period 01/20/2020-03/19/2020.

Market Drivers in Times of Crisis

We think equity factors have generated excess returns over long periods of time for several reasons, including behavioral biases, compensation for risk, and information asymmetries. Periods of crisis magnify these factors, sometimes dramatically. It is hardly surprising then that the pricing of these factor exposures would also change substantially during periods of crisis.

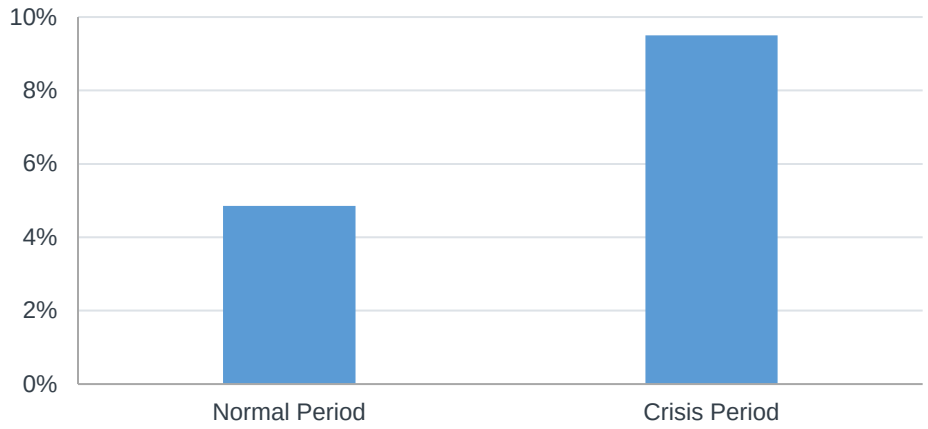
Consider, for example, the many human behavioral biases to which we are all subject. Two biases you may relate to in recent days include action bias (that strong pressure you feel to *do something* in a period of crisis, even if all you can do is hoard toilet paper!) and loss aversion (the asymmetrical emotional payoff to winning and losing, pushing you to flee risky assets and run toward those that are safer). These biases become strongly activated during periods of stress which can dramatically deepen performance differences across factors. Smaller or more volatile stocks, especially those that had been underperforming (like value) are typically the first casualties in these periods as we can see in Figure 1 above.

Even those who resist the urge to act may be forced into action during crisis periods due to risk or liquidity needs and portfolio constraints. As investor reactions drive performance, optimization models penalize riskier assets that have recently underperformed in favor of more stable securities. Betting against the herd is not only unpopular and contrary to our human wiring, it also appears increasingly risky as the crisis develops. This is a vicious cycle!

Of course, every crisis (so far) ends, and as markets realize this, the vicious cycle ceases and then reverses. Smaller, cheaper stocks that have become incredible bargains are once again favored, fear is replaced by greed, and loss aversion is replaced by FOMO ("Fear of Missing Out'). Larger, safer, expensive stocks, which during the crisis command a large premium, are then sold and return to more reasonable relative valuations. Given the leads, lags, and human natures involved, this entire cycle can take days, months, or years. Unfortunately, timing and magnitude depend on the particular crisis and the conditions which preceded it, making precise market timing a fool's errand.

Managing a portfolio through these cycles is difficult even for the rational investor who understands all of the above. Negative returns to smaller cheaper companies are also driven by fundamentals. In economic downturns, business prospects degrade and credit markets seize up, creating material economic risk for these companies. It can be an extremely challenging task for investors to properly gauge these risks in periods of profound uncertainty. For example, in relation to the current crisis, responses from a survey of experts conducted on March 24th forecasting the number of COVID-19 cases in the United States as of the end of March range from 50,000 to 500,000 (FiveThirtyEight.com). The economic impact of those outcomes is vastly different. Each piece of new information—news reports, promise of stimulus, CDC policies, etc.—can whipsaw these expectations from one end of the distribution to the other.

Figure 2: Factor Return Volatility



Uncertainty in future outcomes paired with massively heightened human behavioral biases yields a volatile and unpredictable path for markets and factors. It is no surprise that factor volatilities spike in periods of crisis as illustrated in **Figure 2** above. The more interesting question is—what can we learn from the data on past crises that can inform what the path forward might look like today?

Case Studies of Past Crises

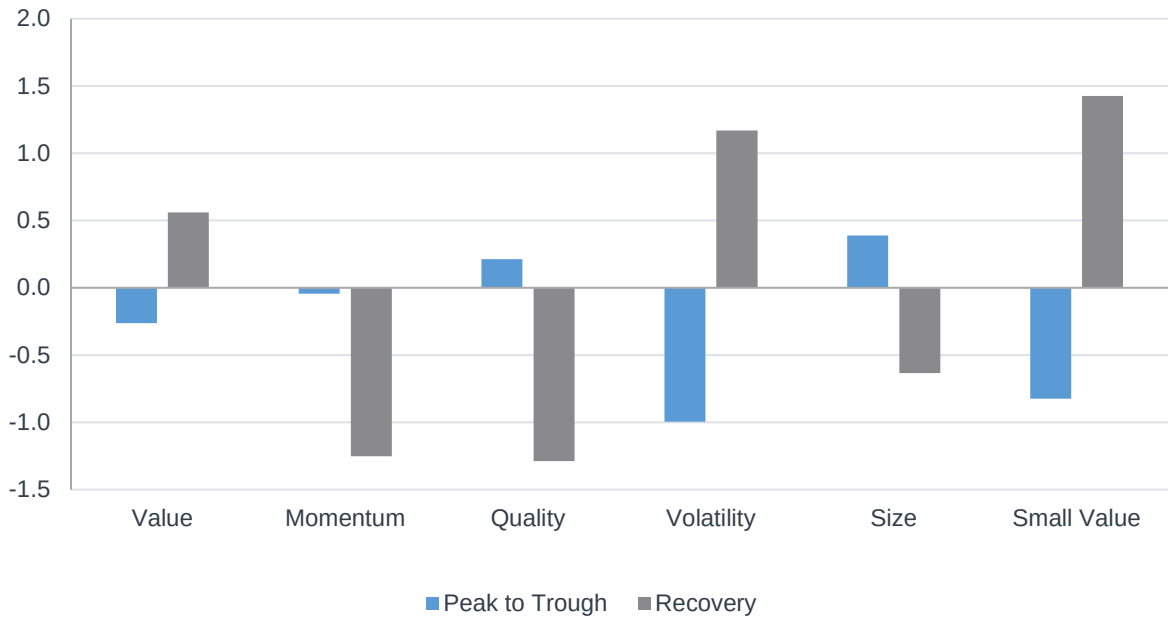
In this section, we examine past crises to compare the stylized facts, hypotheses and data in the previous sections, in an effort to inform our decision-making today. We consider four crises: the Asian Financial Crisis of 1997, the Tech Bubble of 2000, the Global Financial Crisis of 2007-08, and the Fukushima Disaster of 2011. The last we have included, although it's impact globally was much smaller than the other three, because it is similar in nature to the current crisis, causing dramatic and unexpected but temporary real economic damage.

For each of these, we present the performance of quant factors during the crisis and the recovery post-crisis. To standardize the presentation of the data we use Information Ratios as our metric of analysis, though results are similar for other choices.

Crisis 1: Asian Financial Crisis Summer 1997 – 1999

Setting: The crisis started in Thailand with the collapse of the Thai Bhat as the country was forced to devalue its currency after untethered debt issuance and poor fiscal oversight. Currency contagion spread across Asia weighing on both macro and micro economic elements. Equity markets were down greatly.

Figure 3: Factor Information Ratios from July 1997 – December 1999

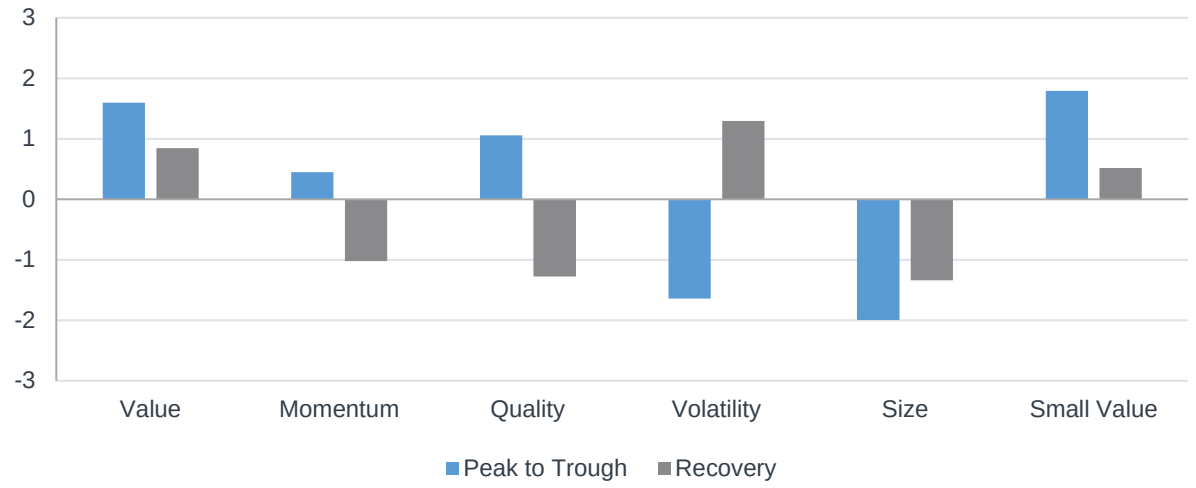


During the drawdown period of the crisis, large, low-risk stocks outperformed. Quality held up, Momentum was flat, and Value stocks fell. The performance of Small Value was poor. In the recovery Small Value soared, while this reversal was costly for Momentum, Quality and Low-Volatility stocks.

Crisis 2: Tech Bubble, March 2000-2003

Setting: After nearly a decade of dramatic economic expansion and the dawn of the internet era, stock valuations were stretched, especially in tech stocks. When the bubble finally popped the market sell-off was large and prolonged.

Figure 4: Factor Information Ratios from 2000 – 2003

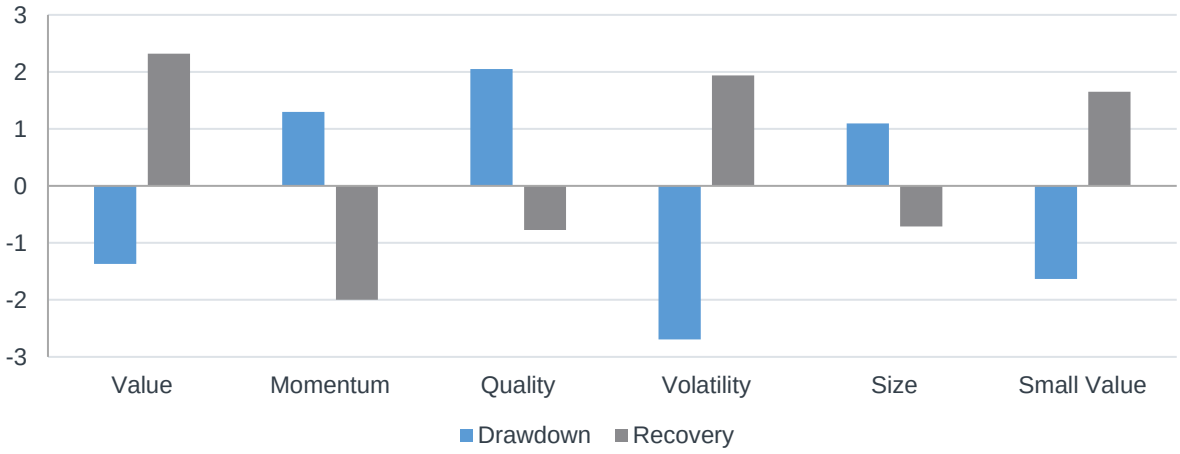


Value stocks outperformed dramatically during the drawdown and continued to outperform during the recovery. They entered the crisis already in a large drawdown relative to the growthy tech stocks that had led markets for several years before the sell-off. Quality stocks had similarly been discounted and outperformed in the initial drawdown then lagged in the recovery. Notably, larger stocks underperformed throughout this period as larger tech stocks fell and smaller, cheaper companies advanced. Lower-volatility stocks outperformed as expected initially, then this trend reversed as appetites for risk eventually returned.

Crisis 3: Global Financial Crisis Oct. 2007- Dec. 2009

Setting: A real estate and credit crisis nearly consumed the entire financial sector absent unprecedented government intervention to eventually stem the decline. The real economic damage was global and widespread.

Figure 5: Factor Information Ratios from Oct. 2007- Dec. 2009

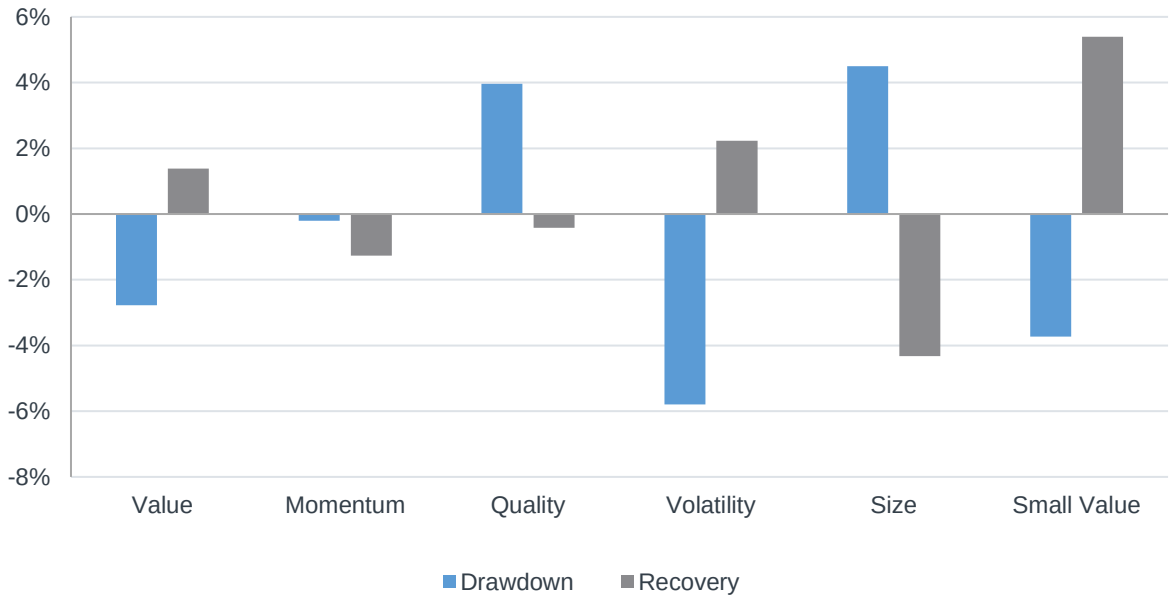


Quality and Low-Volatility stocks were favored in the decline, while smaller Value stocks underperformed. When markets bottomed, Momentum was crushed as smaller, cheaper, riskier stocks outperformed. In the US this Momentum loss wiped out at least a decade of positive performance. The returns to Value were strong post-crisis, especially in riskier stocks.

Crisis 4: Fukushima Disaster, March 2011-May 2011

Setting: Different from the other crises, Fukushima, like our current crisis, was not driven by missteps within the financial system, but rather factors exogenous to the economy. The earthquake and tsunami reversed a strong rally in the Japanese equity market which had gained 20% in the preceding five months, as equities fell quickly with a nearly 20% decline. The reversal was swift as damage could be more clearly assessed. Note we have kept the window relatively short despite ongoing energy issues and knock-on effects that continued for years in order to isolate the effect of the earthquake from the Euro debt crisis which followed soon after. Given this short window, we present factor returns instead of our preferred information ratio statistic (which is less stable in a short timespan). Information ratio's for factors are included at the end of the paper.

Figure 6: Factor Returns



Smaller, riskier, cheaper stocks underperformed, while larger Quality stocks were favored. As fears subsided, smaller value outperformed.

Lessons for The Current Crisis

What features do these crises have in common? There are some obvious ones—risky assets underperform during a crisis—but for other factors, what does the "crisis scorecard" look like? What we have examined is just a subset of crises we could study, but here is one stylized version:

Figure 7: Drawdown Performance

Crisis	Value	Momentum	Quality	Volatility	Size	Small Value
AFC	Poor	Ok	Ok	Poor	Good	Very Poor
Tech Bubble	Very Good	Good	Good	Very Poor	Very Poor	Good
GFC	Poor	Good	Very Good	Very Poor	Good	Very Poor
Fukushima	Poor	Ok	Very Good	Very Poor	Very Good	Very Poor

Figure 8: Recovery Performance

Crisis	Value	Momentum	Quality	Volatility	Size	Small Value
AFC	Good	Very Poor	Very Poor	Good	Poor	Very Good
Tech Bubble	Good	Poor	Poor	Good	Poor	Very Good
GFC	Good	Poor	Poor	Good	Poor	Very Good
Fukushima	Good	Poor	Ok	Good	Very Poor	Very Good

In general, larger Quality stocks do well, and smaller Value stocks do poorly during the drawdown period. This pattern reverses in the recovery period, and Momentum stocks do poorly in this period as well. Aside from risky stocks, smaller, cheaper stocks are the most reliable holding during recovery.

With so much unknown today, it is unwise to speculate as to how extensive this current economic shock may be. But it may be worth noting some similarities with prior crises. We highlight two below.

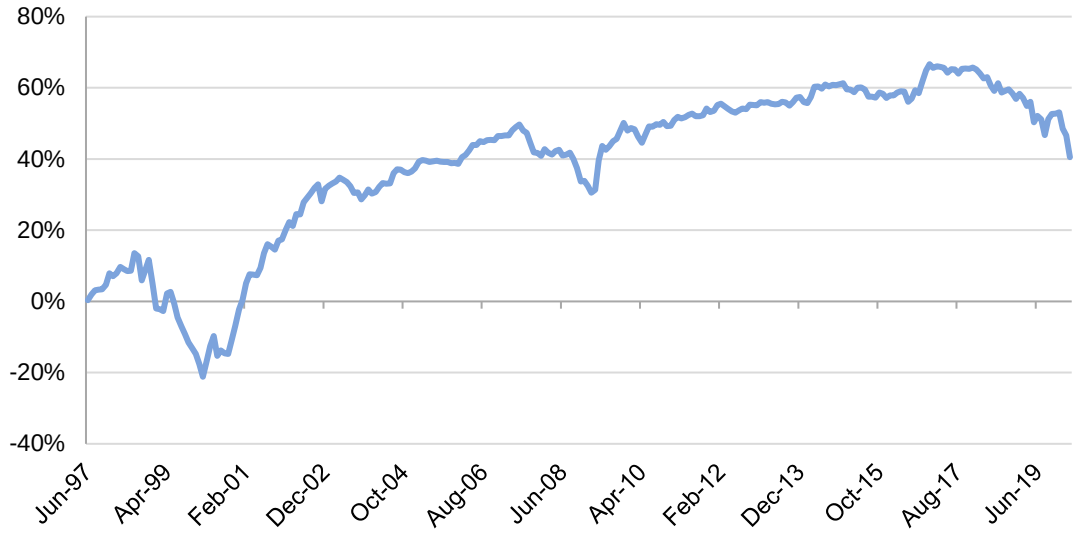
First, this crisis was an exogenous shock that has produced massive uncertainty in a short amount of time. This is similar in some ways to the Fukushima event. This type of shock may precipitate broader economic problems but may also be more short-lived in terms of market impact. Whereas in the other crises there were large economic imbalances that had built up for years, our present crisis is the product of an unexpected and very recent shock. Market and factor behavior may therefore correct more quickly than in some prior crises we've examined.

Second, the starting conditions matter. In the Tech Bubble crisis, Value stocks, especially small ones, outperformed during the long drawdown and continued to outperform during the recovery. Value had lagged leading up to the crisis, which set it up for outperformance when conditions changed. At least in the case of Value, this starting point is similar to the conditions entering today's crisis. Small Value stocks have underperformed for several years. More broadly, the intersection of Value with other factors (e.g. Quality) has also done poorly. Overall it has not been a great environment for multi-factor portfolios for some time. Starting conditions mattered for these prior crises and will likely matter here as well.

Taken together, along with the other data presented in this short note, this is at the very least a cautionary note against abandoning factors in the midst of crisis. If anything, it may represent a catalyst for reversing some of the headwinds factor portfolios have recently faced, especially in smaller value stocks. If the crisis deepens and extends for a longer period, it may be like the Tech Bubble crisis when investors discovered that price is the ultimate margin of safety and smaller value stocks may even outperform in the drawdown. And if the current crisis proves fleeting, as we all hope, the magnitude of the reversals in factor performance may be large.

To illustrate this point, in **Figure 9** below we have plotted the performance of an allocation to the Small Value factor globally since 1997. There are three dramatic drawdowns: leading into the Tech Bubble meltdown in 1997 through early 2000 (-34%), during the Global Financial Crisis from 2007 through early 2009 (-20%), and leading into the current crisis (-25%). Note that these align with our study periods though blending across the globe hides the impact of more localized crises. In both of the former cases, the recovery to Small Value stocks was strong and sustained.

Figure 9: Return to Small Value, ACWI Universe



Thus far in the first month of the current crisis, smaller, cheaper stocks have underperformed substantially. But this crisis has extended conditions similar to the prior two crises visible in the graphic, which both ended with dramatic outperformance by this factor.

Overall, we remain rooted in our conviction that factor exposures will be rewarded over the long run. The same human behavioral biases that give rise to long-term factor outperformance accentuates them in times of crises. For the patient and prepared investor, this volatility can create great opportunities. Studying prior crises and considering starting conditions, today we feel more convinced that some of these factor exposures are likely to be well rewarded as our current crisis plays out.

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Fukushima Disaster Information Ratios:

	Value	Momentum	Quality	Size	Volatility	Small Value
Drawdown	-0.61	0.73	1.55	-0.52	-0.94	-0.25
Recovery	2.09	-1.05	-1.70	0.03	1.48	1.06