

The Second Leg Down: Strategies for Profiting After a Market Sell-Off | Hari Krishnan

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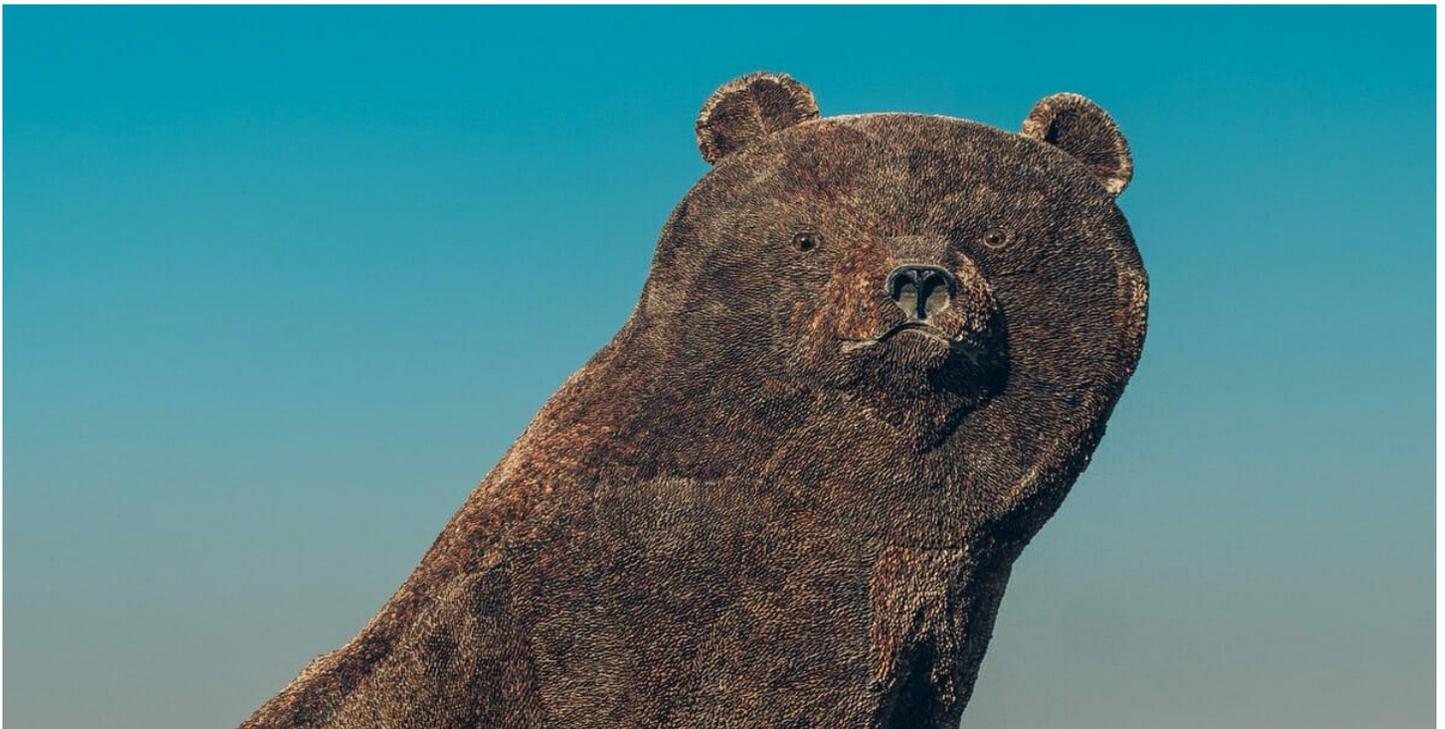
If you have a three year period where something doesn't work, it ages you a decade. You face an immense pressure to change your models, you have bosses and clients who lose faith, and I cannot explain the amount of discipline you need. — Cliff Asness

INTRODUCTION

Hari Krishnan is a portfolio manager at Doherty Advisors in New York, responsible for the VXR (VIX replication strategy) and hedging solutions business. He was formerly a fund manager at Cross Border Capital in London, with an emphasis on volatility and systematic currency strategies. Hari was an executive director at Morgan Stanley from 2001 to 2007, specializing in asset allocation across hedge funds, private equity and traditional asset classes. He was also an options trading strategist for a market making firm at the CBOE and a senior economist at the Chicago Board of Trade. He holds a PhD in applied math from Brown University, was a research scientist at the Columbia University Earth Institute and is the author of a book on regime-based hedging, published by Wiley in 2017.

PREFACE FROM HARI

There have been times when I have looked into the abyss as a portfolio manager, yet found a way to avoid disastrous losses. My trading accounts have weathered the 2008 crisis, the 2010 Flash Crash, the European Crisis of 2011 and the volatility spike from nowhere in August 2015, with varying degrees of success. Things have not always gone as well as I had hoped, yet I have always come away with a collection of new tactics for survival. For a fund manager, it is about survival after all. Aside from the money, your reward for decent performance is another year of money management. You don't want to take the path of boxers, who only decide to retire after a series of devastating knockouts. It is nice not to have to go out on your shield. *The Second Leg Down* has been inspired by the various crises I have faced as a money manager and the techniques I have learned and devised for managing through them. As every crisis is somewhat different, finding the most efficient hedge is a never-ending quest. I do hope that readers will find something that they can use to avert catastrophic losses. The style of this book is casual and conversational, yet it



attempts to be as accurate and realistic as possible. I have been asked who the ideal reader of this book might be. The best answer I can give is me, 20 years ago. This is a more pedestrian effort than Rilke's Letters to a Young Poet. Still, if I had followed the roadmap laid out in the pages that follow, I would have avoided numerous mistakes over the course of my career. More pragmatically, the book is targeted at a wide range of potential readers. Pension fund managers might find value in the discussion of duration hedging, bespoke trend following and roll down as a source of return for bond portfolios. The introductory options sections are designed to give a buy-side perspective on a topic that is usually discussed in terms of arbitrage, precise replication and stochastic calculus. I try to address why someone might want to use particular options structure. I also highlight specific structures that portfolio managers actually use and what might predicate a certain trade. It is common for portfolio managers to hide their best ideas. In some cases, they might even publish strategies that didn't quite work, for implementation reasons. This leads to a situation where people who don't have any money management experience write extensive books about investing, while those who have the most to contribute are relatively silent. How is it possible to provide some valuable content without giving too much away? In this book, I have tried to veer from the norm. By focusing on hedging, rather than alpha generation, I have been able to go into some detail about specific strategies, without pretending to offer a cook book for making money. These have actually been battle-tested in the markets, for institutional clients.

THE VOLATILITY CYCLE

In reality, most institutional losses and disasters are not caused by trading reminiscent of the Wild West. Rather, they are caused by somewhat predictable behaviour through the market cycle. In bull markets, portfolio managers tend to increase exposure in an effort to chase the market and outperform competitors and benchmarks. Ten basis point differentials in performance seem important. By the "market", we mean risky assets such as stocks and corporate bonds. Investors eagerly buy into every dip in the market, dampening volatility. As the value of collateral increases and volatility declines, banks lend more and the market eventually becomes overextended. This applies to equities, corporate bonds and other risky assets. When risky assets appear to be vectoring toward

We argue that an option does not have to wind up in the money to be profitable. All that is needed is a repricing of risk. — Hari Krishnan



infinity, we would argue that it is a good time to hedge. Risk embedded in the system has increased, yet the market is practically giving away insurance. The painful memories of the last crash have been erased, making investors particularly vulnerable to a random shock. Investors who chase returns after a large sustained move tend to have relatively low pain thresholds. They worry that they have missed the move, but are equally likely to bail out at the first sign of trouble. So long as the rally persists, the cost of insurance (i.e. options) tends to be low. The latecomers to the market do not want to erode their return by hedging and the longstanding bulls are complacent. You could sensibly argue that if the market continues to rally, hedging costs should be more than offset by profits in the rest of the portfolio. Yet there is a natural human reluctance to “waste” money on insurance when everything seems fine. As the animal spirits take over, investors attempt to rationalize their behaviour in a variety of ways.

- “This time it’s different.” There is a central bank put on the market, as monetary conditions will be eased whenever there is a risk event. Regulators can prevent extreme intra-day moves by disqualifying trades that occur very far away from recent prices.
- Calm periods are persistent: they tend to last for a long time. Not very much happens from day to day, suggesting that there is plenty of time to prepare for the next correction.
- Over the long term, hedging is largely unnecessary. For example, some institutions don’t hedge their currency risk. Over the long term, they assume that currency moves will wash out. Buying insurance on risky assets such as equities is a losing strategy over the long term. According to academic theory, hedging must have a negative risk premium, as it reduces the non-diversifiable risks in your portfolio. Insurance companies are generally profitable because they sell individual policies that are statistically overpriced. So long as the policies are relatively uncorrelated, insurers are able to collect more than they pay out over the long term.

If you are not careful, you can convince yourself that selling insurance is an unbeatable strategy. Short volatility strategies tend to perform magnificently in back-tests, without much parameterization. All you need to do is persistently sell downside protection on equity indices, risky currencies and corporate bonds, or so it would seem. When volatility is low, these options appear



to be slightly but consistently overpriced.

It is tempting to conclude that you can make small but very steady returns in this environment. As volatility rises, your profits become less reliable from day to day. However, this might be more than compensated for by an increase in the premium you collect when volatility is high. Most active management strategies are short volatility in one way or another. Whether you buy equities, take long positions in risky bonds or engage in spread trades, you will tend to perform better in flat to rising markets than highly volatile ones. The vast majority of hedge fund strategies are structurally short volatility. The incentive structures for many hedge funds and proprietary trading desks favor collecting pennies in front of the bulldozer. However, this does not imply that selling volatility universally has a positive expected return. Once you put a back test into action, you are vulnerable to large jumps that may not have appeared in the sample past. As soon as you introduce leverage, you are vulnerable to risk and margin constraints that can force you out of a trade at the worst possible time. Markets don't usually collapse because investors want to sell, but because they have to. Liquidation is forced, in the presence of margin calls.



A vaguely philosophical statement might be in order. It is hard to deduce why anything happens in financial markets. The newspaper articles about last week's move tend to be rationalizations, rather than accurate explanations. It's quite amusing to look at last month's, or last year's, research reports, where the recent move was extrapolated in an exaggerated way. The S&P 500 has dropped from 2000 to 1800 and the prophets of doom have come out in force, predicting a move to 1500 and below. In this book, we try to veer away from the financial entertainment industry (media headlines and so forth) and focus on ways that practitioners think about markets. Nevertheless, it is possible to speculate about the mechanisms behind market action. Credit and leverage play a larger role than is commonly recognized and it may be that trends are caused by

predictable changes in gearing over time. Let's say you are a speculator who buys and sells commodity futures. You use a lot of leverage in an attempt to goose your returns. If the market is going your way, your credit situation automatically improves, because you can apply your profits to the margin account. This allows you to scale up your position. So, if you had bought cotton futures, you can buy some more without damaging your margin situation. Conversely, if a long position shifts from a winner to a loser, at some point you have to sell. There is some threshold at which you will be wiped out and a nearer threshold which can turn you into a nervous wreck. If the volume in a given asset class is dominated by leveraged speculators, trends are likely to emerge. The speculators have to manage their margin by



following the policy of “cutting their losses and letting their profits run”. This is tantamount to following trends. It is not always that the specs want to be trend followers. Rather, their style of trading demands it. So, trends and ultimately bubbles form when the amount of leverage applied in a given direction increases.

There is of course, a larger issue. If we could solve it completely, the rest of this book would be largely unnecessary. Is it possible to predict the timing of market crises? Our view is that it is possible to identify conditions in the market that increase the odds of a crisis. Those are the limits of prediction. However, getting the timing right is nearly impossible. In the sciences, you can conduct experiments under controlled conditions. In the markets, you can't. A scientific idea can be zany, far from the main-stream, yet will be accepted if confirmed by experiment. In the markets, you need to get the aggregate of investors to agree with you in a reasonable amount of time. In 2008, it is probable that the portfolio managers who first predicted mortgage-backed securities crisis made less money than other managers who jumped on the bandwagon at the last minute. The early buyers of default insurance were forced to pay a premium for many months before they were vindicated. The best one can do is identify situations that court disaster and hedging structures that have a large bang for the buck, i.e. that offer large payouts with low time decay. At its core, the volatility cycle is intimately tied to the credit cycle. As banks lend more, investors become more vulnerable to a market shock. They have debts to pay off. So long as the random shock does not occur, volatility will tend to decline. Yet the system is becoming increasingly fragile. We argue that when investors scramble for the exits, seemingly “safe” assets can go down as much as risky ones. This was the case when quantitative equity funds were forced to unwind in August 2007. At the height of the 2008 crisis, investors generally sold whatever they had, including stocks that were usually considered to be defensive.

When it comes to crisis prediction, we observe that the banking failures are responsible for most financial crises. If you think of the financial system as a network with agents at various nodes, the banking nodes are perhaps the most important. Once they are removed, the network collapses. Banks are the great multiplier in the economy. With a small quantity of deposits, they can lend a large amount of money. All of that lending goes into financial assets and the real economy,

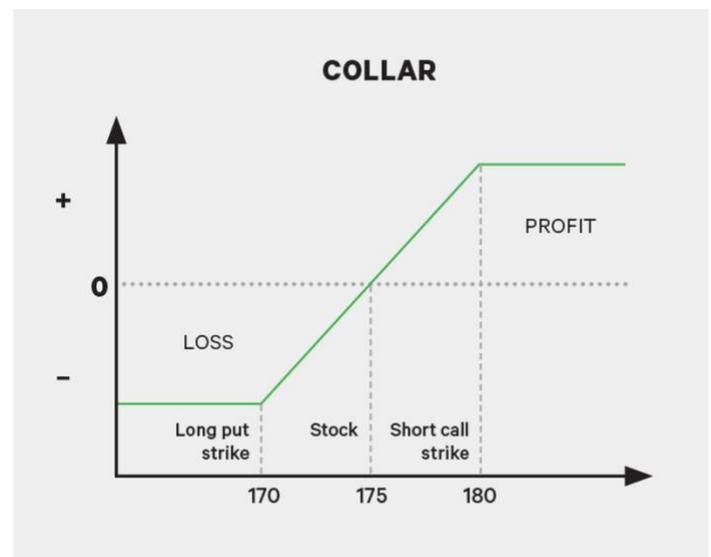


stimulating growth. The peak of the market cycle is generally characterized by a perverse relationship between volatility and leverage. Volatility tends to be low, as investors are complacent about the near future. The value of collateral (equities, real estate, etc.) has risen, so investors are able to apply more leverage to their overall portfolios. This implies that the risk in the system, the potential for a future collapse, is rising, while observed volatility is declining. Margin requirements at exchanges and prime brokers are low, enabling larger position sizes. Equity indices outperform equity hedge funds, leading some managers to chase the market and cut their hedge. In order to keep lending, however, banks need access to a revolving credit line from investors and ultimately, from Central Banks. If a bank is overleveraged, the market may react by demanding a higher yield on loans. At some point, the bank has to repair its balance sheet by slashing some of its assets. Every loan that is not renewed has a knock-on effect, as corporations are unable to lend. When you take out a loan, you don't let the money just sit there, accruing negative interest. You put it to use, buying a house or investing in financial assets. Borrowing increases consumption, stimulating growth and increasing the value of risky assets. The amount of credit in the system is more important than the amount of money and deposits, as it is put to use in the economy. We develop this narrative more fully and in a non-rigorous way describe how bubbles form and burst over the market cycle. We take a multi-disciplinary approach, analyzing the fundamentals and price dynamics that lead to market crises.

Some investors try to anticipate what could go wrong, what could cause a risk event. While many crises seem obvious in retrospect, the triggers take a long time to surface, are thought to be unimportant at the time or come as a complete surprise to investors. Many things could go wrong at a given time and one could argue that the most obvious ones are already priced into the market. Trying to understand "why" risk assets dropped on a given day is a game best left to market commentators. — Hari Krishnan

THE GOOD, THE BAD, AND THE UGLY

How do we characterize the prevailing regime in a reasonably precise way? When can we say that global markets are calm and when can we say they are in a state of abject fear? Our approach is to use volatility indices, such as the VIX, as a guide. When the VIX is low, our analysis favors value-buying of volatility. As it rises, we transition to relative-value hedges in various markets. At the extreme, we recommend options combinations that provide significant payouts without too much exposure to volatility. We also explore the merits of trend following as a portfolio protection strategy during a crisis. Of course, this requires a definition of what is meant by low and high volatility. Toggling back and forth between different types of hedges as conditions change allows us to overcome the question of when to take profits in a hedging strategy. So long as the client wants a hedge in place, there is always something we can do. As conditions worsen, we simply rotate out of strategies whose cost is very sensitive to volatility, into other types of hedges. We emphasize that, for options that do not have a long time to maturity, stop losses are not an alternative to strategy rotation. Option prices can move radically from one day to the next, as volatility and price change for the underlying asset. They can quite easily crash through any internal profit-taking level you might have set or any price you may have flagged to the market.



QUESTIONS

The Second-Leg Down — Q: What is your book about and what does “The Second Leg” refer to?

The Investor Mindset — Q: How fragile is the investor mindset and what are the behavioral forces and impulses that drive investor performance during a crisis?

Common Investor Mistakes — Q: What are some common mistakes that investors make?

Protecting Against Systemic Event — Q: What do you mean when you say that one can protect a portfolio against a systemic event “that isn’t too bad?” Q: How do you protect a portfolio of risky assets before, during, and after a sell-off?

Risk Repricing — Q: How can managers profit from the repricing of risk by investors? *** When something that was previously thought of as being implausible (or better yet, impossible) suddenly enters the realm of plausibility, investors reprice the risk of that thing happening. If you were able to make money only by holding an option to maturity, the repricing of such risk may not concern you. But because these options trade in secondary markets, the repricing of such risks can cause their related options to reprice so dramatically that you can make more from selling an out-of-the-money option than from exercising an option that is firmly in-the-money.

Risk Arbitrage — You have said that your goal is to identify areas where insurance is relatively inexpensive, while recalling the idea that your hedges need to make money in a severe risk event. Q: How does a risk manager go about doing this? Q: How difficult is it to identify where risk is being mispriced?

Credit & Positioning — Q: Why are credit and positioning the biggest drivers and how do you go about defining each one?

Market Positioning — Q: How has the dealer function transformed over the last decade and what has been the impact?

Role of Credit — Q: How has central bank policy over the last ten years in particular influenced risk taking and set the conditions for this recent downturn? Q: How do you incorporate what the Fed and other central banks are doing today into your risk strategy going forward?

Exogenous vs. Endogenous — Q: Why is it dangerous to link exogenous events with price action in certain markets? Q: How does a market that is at first responding to an exogenous shock suddenly become driven by endogenous factors?

Endogenous ABM Modeling — Q: What sort of modeling is done for assessing endogenous risk and how new is this type of modeling? Q: What are the core considerations for agent-based

value-buying options across strikes and maturities	→	selling put ratio spreads on risky assets	→	buying long- dated options	→	weekly options	→	trend following in futures
CHEAP VOLATILITY		CHEAP SKEW		CHEAP TERM STRUCTURE		EVERYTHING EXPENSIVE		EYE OF THE STORM

modeling? (i.e. who are the agents, what do they hold, how do they behave based on XYZ assumptions, how will an agent's actions feed through the network, etc.?)

Defining Volatility: Low vs. High Vol — Q: How does one define volatility? Q: What is meant by "low volatility" and "high volatility?"

Historical vs. Implied Volatility — Q: What is the difference between historical vs. implied volatility? Q: How does the relationship between historical and implied vol inform the pricing of options? Q: How is implied volatility calculated? Q: How pure of a measure of expected future volatility is implied vol and how much is it influenced by the normal forces of supply and demand? (i.e. if dealers have been aggressively selling volatility, could this force them to bid up the price of vol well above historical simply because they are backed in a corner?)

Exchange Traded Products — Several prominent money managers, including Carl Icahn, have argued that corporate bond ETFs are a recipe for disaster. Q: What is the relationship between an ETF and the underlying basket of assets that the fund references?

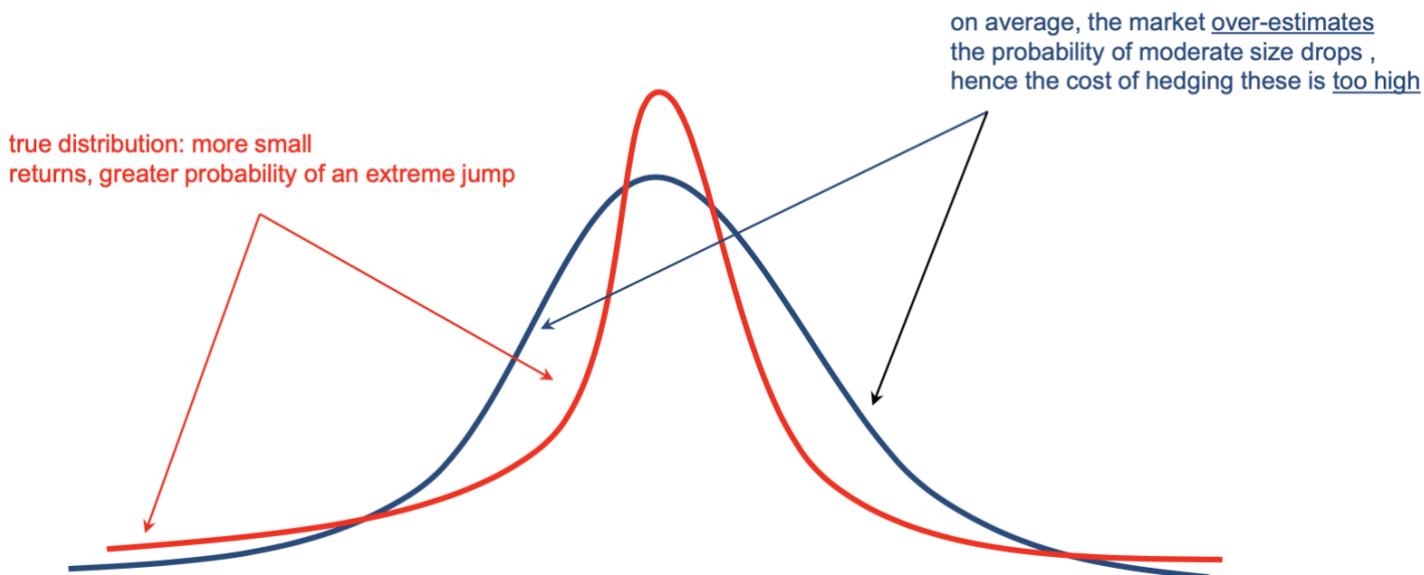
Dislocation in ETF/ETN Prices — Q: What can cause a dislocation in price between the ETF/ETN and the underlying assets? Q: What could cause forced selling and when have we seen this before? Q: How does that spread close? Q: How might a sharp drop in the price of an ETP or analogously, a sharp drop in the price of its underlying securities feed back into the other and cause a cascade effect?

Trend Following — Historical studies show strong performance for trend followers during periods of market distress (so-called "crisis alpha"). Q: What is trend following? Q: How does trend following tend to generate positive returns during market crises? Q: Can trend following strategies be deployed in conjunction with value investing (i.e. help you get in and out)? Q: Is trend following "long volatility?" *** Think of Trend Following as "buying high and selling higher."

Turning Bullish — Q: How do you know when and how to switch from being defensive to being offensive while the market remains in a full-blown panic?

Pressure Points — Q: Who are the market makers and is it possible to discern what they are doing, if they have on-balance risk, and what they have to do to hedge can you identify pressure points in the market?

Killer Apps for Hedging — Q: What are some of the more effective hedging techniques and in what types of risk environments are they ideal to deploy?



QUOTES

There is a saying for the leveraged deep value investors who hang on during crises: “it looks good at 90, looks great at 80, looks absolutely fantastic at 70 and you’re out of business at 60.” This is the classic value trap that needs to be avoided. — Hari Krishnan

There are numerous stories of portfolio managers who have patiently extracted profits from the markets for years, then had a large and unexpected loss. It might have been advisable for them to exit the position (“cutting their losses”) and try to claw back using their core strategy over time. Yet, the temptation is to put all the chips on black in an attempt to make the money back quickly. In principle, this is a wretched idea, as the profit from a long series of rational trades over time may be overwhelmed by a single irrational bet. — Hari Krishnan

If an emerging markets index drops from 100 to 90 in a day, a 75 strike put may have a larger percentage gain than a 95 strike put, even though the stock hasn’t come close to 75. The implausible scenario (a sudden –25% drop) has suddenly become plausible. As we will see, large moves sometimes beget even larger moves as the market enters a positive feedback loop. When investors start to worry about a major loss, they bid up the prices of puts that are far out of the money. This causes those silly strike options to make multiples of what was initially paid. — Hari Krishnan

Money managers typically focus on maximizing risk-adjusted portfolio returns. From a psychological standpoint, though, avoiding regret is equally important. — Hari Krishnan

Some investors try to anticipate what could go wrong, what could cause a risk event. While many crises seem obvious in retrospect, the triggers take a long time to surface, are thought to be unimportant at the time or come as a complete surprise to investors. Many things could go wrong at a given time and one could argue that the most obvious ones are already priced into the market. Trying to understand “why” risk assets dropped on a given day is a game best left to market commentators. — Hari Krishnan

