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The Second Leg Down

*Strategies for Profiting after
a Market Sell-Off*

HARI P. KRISHNAN

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Preface

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. This book 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 structures. 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.

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Jerry Haworth deserves a great deal of credit for introducing me to the subtleties of long-dated options and his imprint can be found in Chapter 5.

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Introduction

Finance is full of colourful stories and the most exciting ones tend to involve someone on the verge of collapse. We feel a mix of thrill and *schadenfreude* when we read about the traders who blew up or the elite hedge funds that had to liquidate after failing to meet their margin calls. In a moment of panic, investors can do the strangest things and this can make for great theatre. Arrogance and overconfidence are punished by the markets, which seem to have a life force of their own. Many shrewd investors have completely lost their way in a moment of crisis. 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.

THE AIRPLANE TICKET TRADE

The legend of the airplane ticket trade is an extreme example of bad judgment under pressure, yet it is sometimes presented as rational decision-making. The story goes as follows. A trader has been losing money and is unlikely to collect much of a bonus this year. So the trader decides to dial up risk in an attempt to make it all back in one go. This backfires horribly, leading to further losses. The trader expects risk to be cut at any moment now, so he does two things. He makes a very large short-term trade that will either make or lose a large amount and he simultaneously buys a ticket to South America. It's a tactical play, with little edge but lots of risk. The trader then goes to the airport and repeatedly checks his price feed in the lounge. If the trade goes in his favour, he closes the position then goes back to the office. If it goes belly up, he buys a bottle of vodka from the duty free then takes the flight. The trader's behaviour might seem reasonable at 30,000 feet. In the best scenario, he gets a large bonus; in the worst, he takes a long tropical holiday. There doesn't seem to be much downside and one could argue that from the trader's standpoint, he is long an option. But would you want to be that trader at the moment of crisis? If the position is going slightly against you, are you willing to hang on for dear life, with no conviction that you are making the right trade? If it is your own money, do you want to risk everything on a roll of the dice? If you are a fund manager, how can you rationalise what you have done to clients if it all goes wrong?

THE BULL 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 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 rationalise 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 parameterisation. 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 favour 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. We will examine the effect of margin constraints on short volatility strategies in Chapter 4.

THE RENEGADES

There is a small but dedicated group of defensive, bear market managers in the investment universe. The financial media trots them out every so often, typically after a market sell-off. However, in rising markets these managers are largely invisible or the subject of criticism. Profiting from panics, bankruptcies and liquidations requires patience and does not necessarily win you many friends. When equities are ramping up, bear-biased managers spend more time banging their heads against the wall than raising assets. The cost of insurance is steadily declining, yet there are no takers. The inveterate bears write long and engaging manifestos in an attempt to identify cracks in the financial system. In rising markets, the potential end users of these products generally can't or don't want to buy them. Some institutions take a crude "line item" approach, where they rank their funds according to recent performance and periodically redeem from underperforming managers. This approach seems oblivious to the idea of marginal risk, i.e. how much you can improve the risk-adjusted performance of an existing portfolio by adding a new asset or strategy. In reality, if you can find a strategy that performs strongly during crises yet doesn't lose too much over a market cycle, it can have a dramatic impact on portfolio performance over the long term.

Uncontaminated bear strategies have a hard time competing in a world where allocators believe that emerging markets, high yield bonds and carry trades are "diversifying" investments. While it is true that these asset classes can reduce realised volatility during normal market conditions, they typically amplify losses when conditions become extreme. Some strategies, such as the FX carry trade, seem innocuous during bull markets. They grind their way upward with low volatility. However, it is categorically *not* true that a strategy with relatively low volatility in a bull market will dampen risk during a crisis. If the strategy collects premium while taking extreme event risk, the opposite is in fact true. A manager who combines carry strategies with a modest number of equity index puts will often appear to be over-hedged most of the time and severely under-hedged when the protection is most needed.

In rising markets, dedicated bears have to overcome time decay as well as markets that are moving in the wrong direction. The portfolio manager who takes the opposite side of the trade by selling insurance has an optical advantage. Investors seem to prefer a sequence of returns of the form $\{+1\%, +1\%, +1\%, +1\%, +1\%, -5\%\}$ to $\{-1\%, -1\%, -1\%, -1\%, -1\%, +5\%\}$, even though the compounded return of the second strategy is a bit higher. In the first scenario, you can always say to your client that you are an alpha manager who had a few issues with risk control that have now been resolved. This cynical approach may well salvage the mandate. Even the most dedicated bears are incentivised to scale down their hedges when threatened with redemptions.

The best time to buy outright volatility is when it is low, in a counter-cyclical way. You want to swim against the tide of short-sighted overconfidence. Investors are more than happy to sell volatility when they are feeling confident. However, implied volatility is low precisely because there is virtually no demand for hedging or long volatility strategies in general. Hence, long volatility managers struggle to raise assets in situations when the best risk-adjusted returns are available. Our book acknowledges the perverse nature of hedging mandates. When assets are pouring in, outright volatility tends to be overpriced. We try to identify ways to minimise drag while still offering protection after markets have started to tumble.

CLAWS OF THE BEAR

[T]o borrow the term, your sense of time does change when you are running real money. Suppose you look at a cumulative return of a strategy with a Sharpe ratio of 0.7 and see a three year period with poor performance. It does not phase you one drop. You go: "Oh, look, that happened in 1973, but it came back by 1976, and that's what a 0.7 Sharpe ratio does." But living through those periods takes – subjectively, and in wear and tear on your internal organs – many times the actual time it really lasts. 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 Asness¹

Once you put real money behind a short volatility strategy, the situation changes. Now you have some skin in the game and things aren't quite so comfortable. Your margin levels can change dramatically over time, requiring that you cut positions that look very attractive from a valuation standpoint. In Chapter 4, we show that wildly fluctuating margin requirements can force you out of a short volatility strategy at the worst possible moment. A historical series of daily NAVs is devoid of emotion and assumes that you have sufficient capital to keep playing indefinitely. It can't capture gut wrenching intraday moves or account for price action that is different from what has been observed in the past. If the worst 1 day historical loss is -10% and your strategy is down -9% at mid-day, there is no guarantee that losses will be bounded at roughly -1% thereafter. In rising markets, investors are quite happy to sweep latent risk under the carpet as risk and margin limits are never reached. Inevitably, at some point, risky assets take a significant leg down. The "stocks go up in the long term" bulls can no longer buy the dip as they approach their risk limits. Large institutions spend ages deciding whether "this is the one", whether credit and equity markets will plunge further into the abyss. Their portfolios might already be down -5% or -10% on an unlevered basis and they really can't take much more. Do they hang on, cut exposure or hedge?

It has often been remarked that "hope is not an investment strategy". Hanging on is a sign of desperation or delusion. Sometimes, an overconfident investor can become convinced that the market *has* to move a certain way and goes all in. It is almost as though the investor believes it is possible to move the market by force of mind. Solipsism doesn't seem to be a viable strategy, either. Some investors doggedly hold onto losing positions using "fair value" arguments. When combined with leverage, this approach can be toxic. The standard argument is that the expected return of a static portfolio goes up as its price drops, i.e. price and expected return move inversely. While this may be true over long horizons, there is a point at which every institutional manager has to cut risk. Most of us do not have an infinite investment horizon in which to capture a risk premium. 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.

ZUGZWANG

In chess, zugzwang refers to a situation where a player has to move, but every move worsens the player's position. When a portfolio manager's risk limits are hit or losses are thought to be unacceptable, the situation is quite the same. There are two choices: cut risk or buy insurance. Neither seems appealing. If the manager slashes positions, the potential for further losses is reduced. This can be agonising for investors who believe that, given enough time, their portfolio is bound to bounce back. Some portfolios are large and complex, implying that they cannot be liquidated in one go. Finally, suppose an investor has been making small bets for years and now has to divest a large percentage of his or her portfolio. This one action can offset a large number of good decisions and successful trades. Some funds scale in and out of positions almost continuously as risk changes. They generally have sophisticated techniques for sampling volatility and correlation over time. However, even these funds are exposed to gap risk (i.e. when a currency peg is released) or situations where their alpha-generation systems have stopped working.

Faced with the choice of liquidating positions or hedging, institutions finally pick up the phone and contact managers who can protect capital during a crisis. Managed accounts that have not been used for months are reactivated, with a hedging overlay mandate. Assets begin to flow into bear-biased strategies. As the demand for hedging increases, its cost sky rockets. To a patient on the operating table

in a life-or-death situation, money is no object. Survival is all that matters. And so it goes for an individual or institution on financial life support, who hedges regardless of cost. The long volatility manager who gets the call is in two minds about it. On the one hand, the manager is more than happy to have a new allocation. It serves as vindication, as well as a new source of fees. On the other, hedging looks expensive now. If only the call had come a few weeks earlier, when there was a wide range of inexpensive hedges to choose from! Previously, an overlay could have been slowly and carefully constructed, with an emphasis on finding inexpensive hedges across a variety of asset classes. Now it's a case of making the best of a bad situation. You have to make sure that the patient survives (i.e. that there is a floor on further losses), while ensuring that you don't spend too much along the way. Once markets recover, your performance will be mercilessly scrutinised. Did you make enough on the way down? Did you monetise enough gains to avoid giving it all back during the recovery?

Whether you allocate to another manager or hedge yourself, the pressures are quite the same. Most of the time, you will be incentivised *not* to hedge, even when you can identify good short opportunities. Indirect hedges, such as buying calls on the VIX to hedge against long exposure to the S&P 500, will generally add to your exchange margin requirements. This reduces the degree to which you can lever the rest of your portfolio. Even if leverage is not an issue, hedging suffers from an optical standpoint. Unless you can bury your hedges in the rest of your portfolio, your supervisors and clients will see long strings of mildly negative returns punctuated by the occasional lumpy positive one. Once things get ugly, you will be asked whether you have hedged *enough*. Are you making money on every little drop in risk assets? Have you put a floor on how much can be lost in the overall portfolio?

THE SCEPTICS

Some investors, especially those with a “stocks for the long run” bias (e.g. Siegel, 1998), might argue that hedging is intrinsically wasteful. The hedging sceptics tend to intersect with the true believers in the equity risk premium. If you are prepared to wait long enough, there's no need to hedge, as equity market returns will exceed inflation. Over rolling 10-year horizons, the S&P 500 has nearly always outperformed CPI inflation on an annualised basis. It follows that, if equities deliver a positive real return over the long term, hedging *must* have a negative risk premium. After all, you are paying a premium to take a short position on the market, is that not so? Theory suggests that you earn a premium for bearing an undiversifiable risk. Conversely, an instrument that offsets market risk should have a negative expected return. Insurance companies are in business precisely because insurance is overpriced on average. Historical back-tests in the markets tend to support this idea. Insurance eats into your long-term expected return. Static options hedges tend to lose money at an alarming rate, with modestly positive spikes along the way. On paper, the appropriate strategy involves *buying into* market sell-offs, as risk premiums go up whenever the prices of risk assets go down. It would seem as though the last thing you want to do is buy options *after* volatility has gone up. If an option was expensive before, it must be egregious after a risk event. Our view is that listed options are somewhat different from insurance policies. While typical hedges are probably overpriced, as there is excess institutional demand for them, options are subject to the same cycles of greed and fear as equity markets.

A SAD TRUTH

Recently, a number of books and articles have appeared covering topics such as “tail risk protection”, “crisis alpha” or “extreme event hedging”. Many of these are thorough treatments of how institutions think about truncating the left tail of their return distribution. Bhansali (2014) is a thoughtful treatise on the nature of asset class distributions and institutional quality hedging strategies. However, they invariably ignore a sad truth. Almost no one wants to hedge much when the going is good. Institutional investors generally do not pay much attention to the independent economists and hedge fund managers

who warn that a new crisis is brewing. In bull markets, articles that focus on doomsday scenarios are viewed as nothing more than fearmongering. Indeed, it is notoriously difficult to predict where the next crisis will come from. Will it be credit derivatives, emerging markets or a change in Central Bank policy?

Several well-known hedge fund managers try to engage in crisis prediction by identifying potential cracks in the system. They typically screen for excessive leverage in some part of the economy and then direct their hedges to the places where danger seems to be lurking. This is a substantial improvement on not hedging at all, but it assumes that extreme events are predictable in place *and* time. If the manager places the doomsday bet too early, there may be a long string of losses before any material gain is realised. In the meantime, investors might redeem from the strategy. If the bet is placed too late, the risk of default may already be priced into the market, reducing potential returns. Most of us don't have the foggiest idea when the next crisis is coming and should be honest enough to admit it. Note that we *will* discuss crisis prediction in Chapter 8. It might seem contradictory that we are taking a stab at a problem as difficult as this. For the purposes of this discussion, however, it is best to assume that predicting financial crises is like predicting earthquakes. We can identify situations (geological fault lines) which are unstable, but can't with any certainty say *when* an event will occur.

Returning to the original problem, let us generalise and assume that investors only want to hedge after risk assets have taken a leg down. Hedging is not going to be cheap, as there is more demand for insurance. So what can you do to protect a portfolio against a systemic risk event, that isn't *too* bad? That is what this book is all about.

COMMON MISTAKES

In the chapters that follow, we identify strategies for protecting a portfolio of risky assets *after* a sell-off. Investors have suddenly become wary and are no longer just giving away protection at discount levels. It is not wise to just go in and buy index puts, as these are bound to be overpriced. Yet many institutions do exactly that. They react to an increase in perceived risk by identifying "plausible" downside scenarios and choosing options that target those scenarios. The risk committee might have a discussion about how bad things could get, before reaching a consensus on what constitutes a tolerable and plausible loss. We believe that this approach is flawed. While it is reasonable to average forecasted returns, taking an average of downside scenarios understates the risk of an extreme event.

If everyone is buying options to cover the risk of moderate losses, those options are likely to be overpriced. Our approach is to find other options to buy. 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*. Just as the price of hurricane insurance goes up when there is a thunderstorm, the price of extreme event insurance rises when there is a moderate sell-off in the equity market. You can always sell an option back to the market if it reprices substantially. In any case, implausible scenarios can appear plausible after a plausible scenario has occurred. This may sound thoroughly convoluted, but it is not meant to be. Our goal is to be as clear as possible. At first sight, a -30% one month collapse in the S&P 500 seems highly unlikely. Even in October 2008, the peak to trough drop was less than that. But suppose that the index drops -10% in the first week. Suddenly, that -30% drop does not seem so unlikely and investors are clamouring for insurance at levels (i.e. option strikes) far below what could be imagined. This is partly a function of perception. It is also based on the idea that in certain scenarios, markets exhibit positive feedback. A drop cannot be viewed in isolation, because that drop may force others to sell as they hit their risk limits. Sell-offs can occur in cascades.

Another common idea is to hedge extreme event risk using currency options. This is a play on the "Mrs. Watanabe trade", which will be analysed in greater depth in Chapter 2. Mr. Watanabe has a demanding job, so he delegates the family's personal investments to his wife. There is no point in depositing money at a local bank, since the bank rate is effectively 0%. The Nikkei 225 is still well below its peak in 1989 and there is no cult of equities in Japan, as there is in the US. The equity premium puzzle is irrelevant, as there is no premium to speak of. Investors are distrustful that Japanese equity indices will deliver a positive return over the long term. So why not sell the Yen to buy Australian dollars