Mark Sebastian with L. Celeste Taylor
Trading Options for Edge

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A Professional Guide to Volatility Trading

2nd Edition

DE GRUYTER

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To my incredible wife who is such an incredible mother, business owner, and soul mate. To my boys, Mark II and Valentino.

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The traders I get to be with every day at OptionPit.com

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Foreword

After 25 years of studying financial markets, I can't stress enough how unprecedented the 25 months between March 2020 and April 2022 were.

In a little more than two years, we experienced a series of mini-epic events (on top of a global pandemic) that included:
– A 2008-style financial crash (March 2020)
– A sudden, monster bull market fueled by the Fed's $5 trillion quantitative easing (April 2020 to November 2021), paralleling our 2009–2018 Fed-driven rally
– A quick Dot-com style collapse of growth stocks (November 2021 to April 2022)
– Red-hot 1979-level inflation (late 2020 to April 2022)
– An energy crisis that mirrored the OPEC-fueled tensions of 1973

It is as if we shoved 40 years of financial turmoil into this two-year stretch.

And we're still in the early innings of a significant realignment in the global markets in a debt-soaked, post-COVID world.

As of this writing, there remains greater uncertainty ahead as the Federal Reserve prepares to unwind a $9 trillion balance sheet built up over more than a decade.

Most people would read the facts above, slam this book shut, pack their bags, and flee from the city. But informed, prepared *traders* can't wait for what lies ahead.

If you're still with us, I remind you that uncertainty, volatility, and the coming realignment in the markets could provide a once-in-a-lifetime opportunity to profit in options trading.

At a time when more market participants than ever are trading options, now is the time to turn increased liquidity and volatility into your opportunity.

Trading Options for Edge will show you how.

Whether you're an experienced trader or someone just learning about the value of leverage and options trading, education remains your primary tool to outperform the markets and overperform your expectations.

I've been fortunate in my career to work with many brilliant traders, academics, investors, and market enthusiasts. Over 25 years, I've traveled the world meeting with investors and traders who enthusiastically share their so-called "edge" – or what they believe will allow them to outperform the markets.

Out of thousands of conversations and interactions, I would highlight two people who have taught me – on a personal level – the critical tools required for successful *daily* options trading.

The first was Elie Canetti, a graduate school professor and advisor to the International Monetary Fund (IMF). The man has so much brainpower that they gave him the title: *Advisor, Western Hemisphere Department*. They gave him *half of the world* to analyze.

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In my coursework, Canetti was essential to my fundamental understanding of options theory and helped me understand the advancements in behavioral economics and finance.

But that experience was in *coursework*.

There is a massive difference between learning financial theory and trading "application."

Think of it as the difference between knowing that fish exist (theory) and learning how to fish with confidence (application).

With trading application, I'm talking about the ability to develop trading ideas, build conviction and confidence, establish a risk management strategy, and click that "Buy" or "Sell" button.

My advancement in the application is where Mark Sebastian, my second influencer, enters the conversation.

Mark's background speaks for itself.

He's a former market maker at the American Stock Exchange (AMEX) and Chicago Board Options Exchange (CBOE). In addition, he's a successful co-founder and manager of a volatility arbitrage hedge fund, Karman Line Capital, and the founder of trading and mentoring consultancy Option Pit.

Mark and I each spent a decade navigating the world of Chicago commodity, futures and derivatives trading, hedge fund consulting, and options education without having crossed paths.

Years later, dozens of mutual colleagues have praised his trading skills and acumen in the Chicago and New York trading communities.

I finally met Mark in 2021 in collaboration with a new project called *Money Morning LIVE!*

We launched a live, daily trading network that produces about seven hours of content designed to help traders manage risk, identity trades, and profit. Over the last 12 months, our collaboration has helped countless traders improve their skills, boost their confidence, and identify winning trades. The praise for Mark that I see in our comments section and in letters to our team is proof of his commitment to helping anyone – from any background – find independence and success in trading.

Even after years of trading, I too have learned an exceptional amount from Mark.

Most of my former colleagues in financial media have a deep understanding of long-term investing, macroeconomics, and general headlines. Mark, however, can take small amounts of information, navigate an options chain, and identify a high-probability, high-profit potential trade in seconds.

In addition, he can provide instant risk management recommendations. Defining your risk and reward is essential to *every single* trade, and this application is a cornerstone of Mark's strategies.

That application is critical to me. I dislike losing more than I like to win.

So, with every trade, I must know exactly what my risk is and my potential upside. Mark has been instrumental in helping me narrow my risk and optimize my upside in every trade.

Each morning, we host a live 45-minute show that helps traders navigate the markets for the day ahead. During that period, I'm blessed with a five- to 10-minute segment that gives me one-on-one time with Mark to discuss volatility, momentum, and the most important trade ideas of the day.

It's the most important conversation that I have each day, as I can bounce ideas off one of the most knowledgeable traders available to retail and institutional traders.

I stress that Mark is a professional trader, and his insight will offer you a level of perspective that you cannot obtain through traditional channels.

In the pages ahead, you'll obtain a deeper understanding of how to actively than you could in a master's degree program (I can attest to this) or in an expensive immersion program that is common at many trading houses across the country.

Yes, the world of finance and trading can be intimidating at first.

But through practice, discipline, and continuing education, I assure you that you can master trading. All the tools you need lie in the pages ahead. I look forward to reading about your success in the comments section of Amazon and other outlets in the future.

Be sure to mention me and leave as many compliments as you can muster.

A toast to your trading success,

Garrett Baldwin
Founder and Chief Economist, AJB Capital Research
Executive Producer, Money Morning LIVE!
April 2022

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Preface

Why am I writing this book? That is the question that my wife, my co-workers, and my friends have asked me. The answer: There are many great books that explain what an option is, how they function, and what the profit and loss (P&L) payoffs are for options both bought and sold. There are many books that then take this a step further and walk through what each type of spread is and how to build each of the spreads. These books tend to walk through the P&L payout and may delve into the basic reasons why a trader would put one of the spreads on. Yet there are no books that I have found that adequately explain how these spreads can fit together and the optimal conditions that each of these spreads should be executed under. Essentially, there are a lot of books that can tell you what each option position is and how it makes money, but there are very few, if any, books that explain why a trade should be entered and the optimal conditions for each spread. Furthermore, I am not sure there is a book that puts these spreads together so that a trader can tell when to pick a spread. My goal is to fill that void and teach traders how each position works and, more importantly, how to put several positions together to build a portfolio.

Now that we have established why I am writing this book, let me discuss what I want you to learn by reading this book. In short, the answer is *conditional trading*. But what is conditional trading? Conditional trading is the art of understanding what the market looks like right now and how to trade that market. In essence, while most books are happy to teach you the "how to build" portions of individual trades, there are no books (that I am aware of) that teach the *why* of executing a trade, when to enter that trade, and how to piece all of these trades together.

In this book, I am going to show you why you would enter one trade over another. What are the exact conditions when you should trade a butterfly? What are the conditions that make a condor or straddle a great trade? When do you buy premium and when do you sell premium? If you want to buy or sell, what is the best trade for the market right now given the market conditions and the conditions in the stock, exchange-traded fund (ETF), or index itself?

Then I am going to take things one step further by explaining how to piece a portfolio of trades together. If you already have on a butterfly and conditions are ripe for another butterfly, what should you do? As the market changes on a portfolio of trades, how do you add to a portfolio? Can you build a portfolio that can make money most of the time and not get completely run over in the event of a major market collapse like the ones we saw in 2008, 2011, and 2020?

Once a portfolio is built, how should each of the trades and the portfolio be managed? What adjustments make sense in order to minimize losses while ensuring that good money isn't just dumped after bad? How do you make sure that the dollars being spent to manage trades are being implemented in the best way possible?

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Finally, I'll discuss the right way to manage and hedge a portfolio for both active traders and for those looking to hedge a portfolio of trades.

At the conclusion of the book, readers should have a clear idea of not only how Option Pit, my company, manages our trades, but how Karman Line Capital, my hedge fund, also manages risk on our trades.

When you have finished this book, my hope is that you will have a clear idea of not only what each trade should look like, but what a portfolio of trades should look like.

A small but needed disclaimer is that this book is meant for educational purposes only. While I may discuss in general how Option Pit and Karman Line Capital build and enter trades, due to regulatory restrictions this book will not share our performance.

I want to thank you in advance for reading this book. I hope you find the time well spent.

Mark S. Sebastian

Introduction

If this is your first options book, you picked up the wrong book. This should be read after you have read books that explain options theory, because this book is meant for experienced options traders. Have you been through a “mentoring” program and been disappointed by your preparedness? Then this is the right book for you. Have you read books by Sheldon Natenberg, Larry McMillian, etc.? Then this book is for you. Have you been trading options for a year or more and understand the Greeks . . . for the most part? Then this book is for you. If your answer was no to any of these, you may want to consider reading books that will get you to this point. Then you will be ready to pick this one up. Of course, anyone can read and learn from this book, but know that this was written for people with background knowledge, and will assume some of the basics are already understood.
Once you are ready, here is what you will read:

This book is divided into four main sections:

Part 1: Professional Lessons Every Trader Needs to Know

Chapter 1: This chapter will articulate the business side of trading. It then talks through how running a good trading business leads to good risk management. Good books (as in a *book of trades*) mean good understanding of risk. This chapter will explain why.

Chapter 2: This chapter covers the Greeks as they apply to *risk management*. An in-depth discussion of the Greeks as they pertain to market conditions will be covered. Instead of just knowing what the Greeks are, you should understand why the Greeks act the way they do. We will spend lots of time on how the Greeks move as market conditions change. Instead of simply covering what delta, gamma, and vega are, I’ll discuss what causes a Greek to change.

Chapter 3: This chapter will cover how market makers manage risk on a position-by-position basis when trading. How do market makers stop themselves from taking on too big of a position for not enough money in a stock or index? This will be your introduction to how I want you to trade.

Chapter 4: This chapter discusses how to evaluate edge trades in terms of volatility. You will learn to understand volatility as it relates to both realized and implied volatility, and you will understand the “zones” that stocks might trade in for a period of time, as well as the “zones” that volatility trades in. Finally, this chapter will discuss how these “zones” relate to one another.

Chapter 5: Here I discuss how to evaluate edge in long and short premium trades. What makes a trade a winner or loser? How do you recognize a good trade from a

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bad one given market conditions? What part do volatility, term structure, and skew play in understanding the particular trade?

Chapter 6: It is not enough to spot edge; you must also capture edge. This chapter will cover the strategies you can use to capture edge, and therefore effectively capture value. It points out some of the risks that may be associated with a trade that looks too good to be true, and it will show you how to use a series of trades to lock in edge. It also discusses issues you may have as a retail trader that large houses do not, in terms of information and how to actually make the trade to make sure you lock in value.

Part 2: Using Spreads

Chapter 7: This chapter examines call spreads, put spreads, straddles, and strangles, and talks about the conditions where they may be successful. We will discuss the Greeks as they relate to each spread, as well as the goals of each.

Chapter 8: In this chapter, we will take a detailed look at more complex spreads, including iron butterflies, butterflies, iron condors, calendar spreads, and front spreads and backspreads.

Chapter 9: Chapter 9 looks in detail at call and put spreads and how volatility, skew, and trade management enable you to gain edge.

Chapter 10: Similarly to calls and puts, butterflies and condors can help you gain an edge through volatility, skew, and management. In this chapter, I present guidelines that point to the best conditions for utilizing these spreads.

Chapter 11: I discuss trading front spreads and broken wing butterflies for edge in this chapter. This will cover how traders manage front spreads and naked options in a non-directional manner.

Chapter 12: This is when we will cover calendar spreads: when to buy them, when to sell them, and when to trade something else. This chapter will also discuss how weighted vega affects calendars, and where shorts and longs fit within a portfolio.

Part 3: Global Risk and Volatility

Chapter 13: In this chapter, I discuss market makers and their roles, how they manage risk, and how their processes compare to those of small traders. I also present steps that should be taken to "rate" a trade that should be useful for all traders.

Chapter 14: This chapter discusses book management for the retail and professional customer. I'll show you how to engage in net portfolio weighting, and how to hold rate trades against a total portfolio. As a portfolio builds into a full set of trades, how do you manage the risk? We examine weighted vega, vol vega, and beta weighting as it relates to a portfolio of trades, as well as how to rank trades.

Chapter 15: This chapter will take a dive into the Chicago Board Options Exchange (CBOE) Volatility Index, or VIX. We will discuss how the VIX moves, the role of VIX futures in volatility trading, and recommended ways to trade in different vol environments.

Chapter 16: Here we will cover VIX exchange-traded products (ETPs). VIX ETPs are valuable tools when used correctly, but incredibly risky when not managed correctly. This will discuss the most common VIX ETPs, and how and when to trade them.

Part 4: Appendix

Appendix: This appendix consists of important terms you should be well-versed in for options trading, as well as further in-depth explanations for some of the topics mentioned in the text.

When you finish reading, I hope many questions have been answered, and you are armed with knowledge to help you build a portfolio of trades, and how to manage global risk across your book of trades.

Part 1: **Professional Lessons Every Trader Needs to Know**

Chapter 1
Trading in Options

This book explains the business of trading options. It is intended for an options trader, or a trader who needs to know more about options trading in order to expand trading skills. To fully appreciate the book, you will need a basic grounding in the field, including mastery of options terminology, trading rules, nomenclature, and preferably some preliminary experience in trading options.

An options trader looks at a trade completely differently from a stock transaction. The value judgment in an options trade is limited to *whether* the trade can be made and if there is an "edge" to the trade (we say a trade "has edge"). That is, that an options trader knows something about the trade that gives them an edge, or at least perceives a specific advantage based on underlying price movement, option premium levels, and current news (especially earnings surprises or announcements about product approvals, mergers, and other significant changes). If you trade a stock, you make a value judgment about the next direction of price movement; someone on the other end of the trade disagrees with you. The result is that the stock price is an amalgamation of all trading in that stock to arrive at an optimal price. People make trades based on these perceptions and, of course, they can be right or wrong.

Throughout this book, you may find yourself thinking of options trades as "good" or "bad" in the sense of the underlying asset and its current volatility and recent price movement. You might think that the value of the options trade is related directly to the attributes of the underlying security. This is only true to the extent that you know something about the underlying security that may give you an "edge" in options trading. Throughout the book, this concept of "edge" is a recurring theme.

The options trading business is about *timing* of transactions. Whether they are smart or not is a different story and, as you will learn, the more volatility in the market, the better it is for options traders. So wise trading may involve resisting the urge to think of options as related directly with whether a stock transaction is a sensible alternative trade. The process involves being able to capitalize on trades, packaging them in combinations, or recognizing hedging opportunities to minimize risk.

The framework for trading options comes from the concept of The One-Man Insurance Company (TOMIC). Traders should approach options just as a large insurance company approaches selling insurance policies to consumers and businesses. In buying and selling options as a TOMIC, you may turn options trading into a business rather than a side activity to investing. The TOMIC approach encourages strong skills in trade selection, risk management, strategy execution, and of course adapting to market conditions as they change. Every TOMIC trader needs to understand the basics of this approach before moving into the nuances of trading options for edge.

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The One-Man Insurance Company (TOMIC)

Insurance companies make money in two ways: by making a small amount of premium on the insurance they sell, and by selling overpriced policies to offset risk. When selling a policy to a 38-year-old male with a wife, children, and a job, the insurance company uses actuarial tables to predict how much it should cost to insure a life. While on an individual basis this might cost more than the actuarial table predicts, the insurance company can still make money, because the insurance company can write thousands of policies to thousands of individuals and families that don't cost the company the full actuarial cost. Even if the insurance company loses the gamble on a decent minority of those it insures, it will make money on the whole set. Even outlier events (generally) have little to no effect on an insurance company when they write enough policies. The profits are derived from the average experience among the insured group at a particular age, as well as by investing reserves throughout a lifetime to earn investment income. While actuarial tables are used for life insurance, other forms of insurance, such as homeowners or automotive, are based on the history of claims in a particular region.

The TOMIC trader is going to take this same approach to creating option policies. For example, as a TOMIC trader, you might decide to sell option spreads at prices that you believe are too high and buy option spreads that are too cheap. This is what an insurance company does as a matter of risk evaluation to arrive at pricing. As a TOMIC trader, you set up a regular routine for trading and executing option trades that meet such criteria.

As a TOMIC trader, you develop a process for picking trades while keeping a comprehension of risk and opportunity in mind, typically trading option spreads following the guidelines described in later chapters. You set risk limits and capital allocations as a part of this process. Next, you manage the *book of trades*. This process is also described in coming chapters. Then you are able to evaluate the process for following your own trading guidelines (when to enter and exit and how much to place at risk) while constantly looking to improve the process. This requires developing a method for closing trades and taking profits (or accepting losses) systematically to keep dollars in hand.

There are other pieces to the TOMIC philosophy that you will need to master. For example, you will need to manage many forms of risk, such as the risk that an outlier event that can occur. Even this risk can be managed if your trading *book of policies* is put together with risks in mind. In the remainder of this chapter, we will discuss the important steps that are necessary to build a successful trading program:

- Build an infrastructure
- Build a trading plan
- Select trades based on articulated criteria
- Manage risks
- Learn all the essential elements of trading

Build an Infrastructure

Every trader, like every organization, must develop or have access to key infrastructure capabilities that enable the trader to perform due diligence. Those capabilities can be costly in both time invested and expense, and therefore do not get proper credit. For example, some cost centers on the surface may appear to slow down or interfere with daily work, but upon further study, they are actually centers of efficiency and cost savings. This is the infrastructure of the TOMIC. They are important pieces of every trader's infrastructure. The following infrastructure capabilities should be in place and in use continuously:
- The right clearing firm
- Proper margining
- The right execution platform and executing broker
- The proper analytic tools for volatility analysis
- Risk-management tools
- News and information services
- The right hardware
- Proper reporting tools
- A sounding board/risk manager
- A good accountant
- The manager "got hit by a bus" plan
- Redundancy for all the above

Only once you have these capabilities in place are you ready to set up a trading program (your trading business) and begin planning to trade options for edge. A solid infrastructure will save you thousands of dollars over the years. I cannot stress enough that a risk manager is not a "luxury," although many traders view it as such and choose to forgo one. A risk manager can be as simple as a "trading buddy" who may have little to do with day-to-day operations, but who is there to make sure you are not taking on unnecessary risks. For those with larger trading accounts, you will most definitely make more money trading if you have a risk manager, because he or she is viewing your positions from a distance, and will likely spot risks not seen close up "in the trenches."

Build a Trading Plan

Trading options for a career, in the TOMIC approach, requires a trading plan. The first key to a TOMIC trading plan is to take the emotion out of trading. Every trading approach should have a written plan of action. Standard Operating Procedure (SOP) is important when you want to trade like a professional. The written plan of action helps manage trading when things are going according to plan, but it is equally important that these processes are applied when things go wrong, or even just slightly off plan. A well-constructed plan prepares for the unexpected. Just as the United States Navy Sea, Air, and Land Teams (Navy SEALs) know what to do when something occurs completely by surprise, a TOMIC trader might not know what to do at the onset of a crisis, but will know how to determine the proper course of action as the situation evolves. In all cases, when you deviate from a plan, things go wrong. Improvisation is wonderful . . . in comedy, but in trading and putting money at risk, what might seem like improvisation to an outsider is actually derived from a plan. When a basketball team "plays on the fly" against a talented, well-coached team, the unorganized team loses. When the team sticks to a plan and a process for evaluating the next play, assuming the team has sufficient talent, that team will win. Even in cases where a dynamic play happens that seems to come out of nowhere, like a fast break, it is likely the result of good planning on defense and offense. Many of the best traders know that improvisation is derived from processes and contingencies. Even improv actors that seem to be moving "on the fly" have a SOP for evaluating what to do next in a scene, whether they know it or not. This is why the best comedians *study* comedy. An effective trading plan does not have deviations; it has plans on how to develop deviations when needed.

A TOMIC plan answers the following:

- What is the normal approach to trading the TOMIC if all goes according to plan?
- What is the approach to trading the TOMIC when expected issues happen?
- What is the approach to trading the TOMIC when the unexpected happens?
- How do you analyze conditions when the unexpected happens? How do you improvise?

In checking off these questions with a basic approach to trading, you will be able to stick to a process. When you stick to a process and take emotion out of your trading, you improve your odds of success. Speaking of emotion, I have seen traders who believe they could do no wrong get burned badly. I have also seen traders who constantly ignore their process because something "feels" right or wrong. Both typically end up costing the trader money. If you believe that a trade is a good or bad idea, that is one thing, but if you are trading on fear or hubris, the TOMIC approach will fail.

Select Trades Based on Articulated Criteria

Once you build a framework for trading options, you will begin the selection process. This can be tedious and taxing but is worth the investment of time. If you build the appropriate screening process, much like an insurance company screens applicants to fit them to the right risk profile, you can build a screening process for selecting trades. Your screening process of the overall market needs to include:

- Product awareness
- Conditional awareness
- Volatility analysis
- Term structure analysis
- Skew analysis

Once you have analyzed the markets, you next embark on a screening process to select options trades. This involves several steps:
- Evaluate the product to trade
- Evaluate other products
- Determine the viability of a trade
- Pick the trade to execute
- Execute the trade
- Enter the feedback loop
- Look for offsetting or complementary trades

In combining these steps, you develop a pattern of finding trades that have "edge" in them, executing them, and then taking profits. In addition, you will be able to build the trading plan using your SOPs.

Manage Risks

Risk management is nothing new. I had a risk manager in my fraternity in college whose job was to make sure our parties didn't turn into unmitigated disasters. He usually failed, but did ensure that we never got into any real trouble. Most corporations have designated risk managers or risk departments. You cannot run a company without an eye on risk. I cannot stress enough the importance of risk and the need for risk management.

Risk management, in fact, is the most important attribute of trading. It is derived in two ways:
1. *Executing good trades*: If you do not execute proper trades – those with edge – risk management is a waste of time. One school of thought in options trading states that you can just go out and sell options and you will make money. In theory, over millions of trades, this might be true. However, in the real world, where capital is not limitless, nothing could be further from the truth. The first key to managing risk is to get into trades that have edge. Trades that are executed for edge require less risk management effort. There are typically more dollars per trade, less adjusting, and fewer catastrophic losses.
2. *Managing trades and dollars*: While you can trade options for edge all day, much like an insurance company, some trades will go bad. How you deal with these trades is key. The first key is to have SOPs in place. Proper planning leads

to good risk management. However, beyond a trading plan, there are some important considerations to also keep in mind. These include:
- Asset management
- Money management
- Trade allocation management
- Trade management
- Outlier risk protection and management
- Additional addressable risk management

A plan that addresses these considerations ensures your ability to "trade the next day." The "trade the next day" rule means that no matter how bad things get, you will not run out of money to continue trading. Every trader will tell you that the key to longevity is the ability to trade the next day . . . no matter how crazy the market might be. This approach ensures that your trades are properly allocated across a larger portfolio. It requires discipline and a willingness to leave money on the table, but is truly the key to never "blowing out."

Finally, you need to work with a risk manager or, at minimum, a sounding board. At my hedge fund, Karman Line Capital, we rely on a risk manager to make sure that the fund stays within its standard operation plan. In addition, when I do choose to improvise, it is the risk manager that I use as my sounding board. Giving someone veto power, even over your own money, potentially lowers your net return, but dramatically increases your risk-adjusted net profit.

Learn All the Essential Elements of Trading

Every professional needs to undergo a learning process. When I was a floor trader I switched trading pits four times, once when I moved from the American Stock Exchange (AMEX) to the CBOE, and then three different times in six years on the CBOE. In each case, I had to learn a new set of products and rules. When I first left the floor, there weren't even weekly options to trade. Now the range includes weekly options, options on VIX (the CBOE volatility index), weekly options on VIX, you name it. In addition, multiple opportunities to trade in other markets have expanded to include much more, including commodities options on crude oil, soybeans, even hog options. All of these take time to learn.

When I was hired out of college by Group One Trading, I spent a year learning to trade. Before I traded any products, I spent months observing. In the case of Karman Line, this took years. If you are unfamiliar with a product, consider hiring someone to coach you. At a minimum, find someone you trust to show you the ropes.

Be willing to accept that sometimes conditions change, and the things that made a trade successful can also change. In the late 1990s, you could sell any straddle to a customer and win based simply on changes in *implied volatility* (*IV*) that options traders believed would occur going forward. This aspect of option pricing at times was so high that stocks could make wild moves and the options would still be overpriced. Then, in the following decade, this strategy was a net wash at best or a large loser at worst. In 2009, the best trade was the short time spread as volatility fell. Over the next nine years, the opposite was almost always true; *calendars* (buying an option expiring in one month against selling another option in a different month) had a high success rate. Since 2018, long option strategies, and short time spreads have become effective again. During February and March of 2020, almost all options purchased were too cheap. As the COVID volatility spike began to fade, so did the "edge" in long options. Conditions change and you need to be aware of what is happening around you. At some point a trade might stop working for a time, or permanently. You will develop a sense of when a trade has stopped working, and when it might never work again. This can happen. If you don't believe me, take a look at the trading patterns of iPath Series B S&P 500 VIX Short-Term Futures ETN (Ticker: VXX) during 2018 and 2019. The entire volatility class of products has had a dramatic shift on trading edge over that period of time.

The best traders are constantly learning and improving. By constantly educating yourself on what is going on in the market, what other pros are trading, and studying new products coming on the market, you will be more likely to find yourself on the cutting edge of new trades and products that can make your trading much more profitable. This can help you spot flaws and potential improvements to an existing strategy. Professionals need to have a feedback loop, either through their environment, or via one they have created themselves. The purpose of this book is to address and re-address risk management for successful trading, and to discuss the development of a professional approach to managing your book of options trades.

Chapter 2
Risk Management

In this book, we are going to discuss the ins and outs of risk management. When we talk about managing risks, we are talking about understanding and quantifying the risks of the positions you take, evaluating them to make sure they are within your policy guidelines, and preplanning actions for situations that go against your plan. Risk management is one of the most important keys to trading, but before you start a process of risk management, you need to understand the pieces that make up risk management. The key is to understand what the facets of *Greek management* are that allow a trader to manage a position. This means that a trader has to understand the Greeks at a definitive level. We will begin by discussing the options pricing model, and then take time to examine the specifics of each Greek.

The Option Pricing Model

The pricing model for options has five main inputs. While options have been around for 45 years now, the main pieces of the pricing model have never changed. It does not matter whether the firm is Citadel, the leader in advanced option trades, or the average retail trader glued to the screen of a rudimentary brokerage platform. These five factors determine how a trader approaches options:

- Price of the underlying
- Strike price
- Time to expiration
- Cost of carry; for most options trading the cost of carrying is a consideration for levels of dividends (on long positions) or, if margin is used for long positions, the obligation to pay interest
- Volatility

It is key that you understand what you assume when trading options and use the Greeks to manage your risk – especially for the retail trader, where often the Greeks are set to change with the price of options. While the average market maker can quickly recognize changes in pricing, the standard retail trader cannot. This is because market makers' lives revolve around volatility and staring at screens. A market maker makes money by trading small changes in volatility up and down and against one another. The retail trader has neither the will nor volition to stare at a screen. Additionally, market makers tend to have better analytics, making their task easier. That is not an excuse, just a firm understanding of how volatility behaves with changes in the five Greeks. This is why a trade wins or loses. In the pages that follow,

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I'm going to spend some time closely examining the Greeks. You can also find brief descriptions of each Greek in the Appendix.

The Options Greeks

– *Delta* represents the position's sensitivity to changes in an underlying's change in price. A positive (long) delta position profits when the underlying rallies. A negative (short) delta position profits from a fall in the underlying. Delta, just like in math terms, is simply the slope of the value of the position as it relates to movement in the underlying.
– *Gamma* indicates how the position's delta changes as the underlying moves in one direction or the other. It is defined as the rate of change of delta with respect to the rate of change in the underlying, or mathematically, the change in slope of the delta. Positive gamma will see delta increase if the underlying rallies, and fall if the underlying drops. Negative gamma positions will see delta increase as the underlying drops, and see delta fall as the underlying rallies.
– *Vega (sometimes called kappa in academic journals)* is a measure of how the position makes or loses money as implied volatility (IV) changes. If IV changes 1 percentage point, how does the position respond? Does it increase or decrease in value? A long vega position will profit from an increase in IV, and a short vega position will lose money if IV increases. Similarly, a long vega position will lose if there is a decrease in IV and a short vega position will profit from an increase in IV. Vega, mathematically, is the slope of the price of the underlying as it relates to IV.
– *Theta* represents how a position makes or loses money as time passes (how the value of the option position "decays"). With the passing of each day, how much is the trader making or losing by carrying the current position? Long theta means that as time passes the trader is theoretically making money (option value decay is working in the positions favor). Short theta means that there is a daily cost to carrying the current position that can theoretically cost the trader money (option value decay is working against the position).

But is that it? The answer is no. The key to risk is to understand how these Greeks and the associated risks change as volatility changes. Volatility changes the outputs of risk control, and to really be in control of risk, you have to get how these inputs really work . . . not just what they mean.

Delta

Delta is the change in price of an option as the underlying price changes. Thus, if an ATM option (*at the money*, usually the most actively traded) has a delta of 0.50, it will gain 50 cents for every dollar the underlying asset rallies. It will lose 50 cents for every dollar the underlying asset falls. Delta, in most platforms, is a dynamic measure, and can move, not just at the end of the day, but as the day moves along (the change is determined by gamma, discussed in the next section).

We will look at delta in a vacuum. Consider Option XYZ, which is trading at $2.50 (in options trader lingo, "trading 2.50") with the underlying XYZ currently trading at $35 per share. If the delta for the option is 0.5, as above, then if XYZ drops to $34, according to the pricing model's output of delta, the Option XYZ will be worth $2.00. So, Option XYZ would be valued at a lower level per contract if the underlying XYZ fell, with changes reflected point-for-point when ATM.

Continuing with a delta of 0.5, if Option XYZ is trading at $2.50 and underlying XYZ is trading at $35 and then rallies to $36, Option XYZ will be worth $3.00 per contract. If delta was 0.60, the options would gain $0.60 and would be worth $3.10 on a $1 rally in the underlying; if the delta was 0.70, it would be worth $3.20, and so on. This is true regardless of the size of the contract.

A negative delta will act the opposite way. If the option has a negative delta, it will make money when the underlying falls and lose money when the underlying rallies. In the example above, the option would fall to $2.00 on a −0.50 delta option, and $1.90 on a −0.60 delta option, etc.

Delta does not care about the underlying price. (A 1-point rally in the S&P 500 (SPX), trading about 4200 at the time of writing this edition, will increase the value of a 0.60 delta option by $0.60, so will a 1-point rally in General Electric (GE), which was trading about $14.00 when this edition was written). It relies on the multiplier, or how much of the physical underlying each contract expires into. Most stock options have a 100 share per contract multiplier. When an option price changes by $1, the value of the contract changes by 100 * $1 or $100.

Note that there are a few options that have smaller and larger multipliers, especially in futures options. In the S&P 500 E-mini options, the multiplier is 50, not 100. So with a delta of 0.50, these options would gain $0.50 per option, but the contract's value would increase by 50 * 0.50, or $25 per contract. The now-defunct big S&P options had a multiplier of 250, so an option with a delta of 0.50 would gain $125 per contract on a $1.00 move in the underlying (250 * 0.50). The calculation for dollars gained or lost per contract is:

$$\text{multiplier} * \text{delta}$$

I also use delta as a loose approximation of the percentage chance that an option ends up in the money (ITM). Understanding the likelihood of a position moving in the money is valuable when setting up a directional trade.

Do I want a trade that looks for a small move or a large move in the underlying? If I want a large move, I'll play for a home run using a low percentage option (low delta). If I expect a smaller move but have some certainty, I move toward a higher delta option to play the percentage. Thus a 0.60 delta option has a 55–65% chance of ending up in the money (this is a close enough for estimation when doing math in your head, but nothing that should ever be used to directly manage risk).

The concept of delta may seem pretty simple, but is that all there is to it? Not by a long shot; delta is a malleable risk measure that can change. Other factors that affect delta are discussed below. As conditions change in the market, delta changes with the five factors that make up the pricing model.

Change in Underlying Price

Some of the factors that move delta are easy to understand, and are interrelated with other Greeks. Change in underlying price is the most notable. If I buy a call option that is 0.50 delta at the $50 strike and the underlying XYZ is trading at $50 per share, then the next week XYZ moves from $50 to $75 per share, there is *no* way that delta stays at 0.50, even in the craziest of market situations. An option that is already 25 points in the money has different odds of remaining in the money, compared to an option that is not yet in the money, even in a large cap stock or index. Think of this like a basketball game. If teams are tied early on and one team takes a 10 point lead, the odds of the team winning with a 10 point lead must increase even if the game is early on. As the underlying price rallies on a positive delta option, the option's delta *must* rise. As the underlying falls, delta must change, in this case lower (as we will see, gamma measures this risk).

When delta is negative, the opposite holds true. When the underlying rallies, the option will become less negative delta. A quick way to view how delta will change is to look at a montage. Take the example in VIX options shown in Figure 2.1 (images throughout this text are courtesy of LiveVol).

Currently VIX March futures are trading at 23. This screen shows the current deltas for strike prices of 20 to 30. The 20-strike option is the furthest in the money, and that is reflected in the high delta. But as you get to 30 for the strike, the chances of this option finishing in the money are slim, and therefore the delta is low. If, in the future, the VIX was to run to 25, in theory the VIX 23-strike option at $2.80 would have a similar delta to the current 21-strike at $3.50, and the 25-strike at $2.20 should be similar to 23-strike at $2.80, and so on. There are other pieces that affect delta, but one way to see how delta moves is to see the deltas at different strikes.

Delta	IV	Vol	Bid	The	Ask	SIM	Pos	PnL	Last	Strike
70.41	83.96	85.4	3.90	4.04	4.10				3.79	VIX Mar16 20
64.38	87.08	89.1	3.40	3.56	3.60				3.50	VIX Mar16 21
59.43	91.77	93.1	3.10	3.24	3.30				3.10	VIX Mar16 22
53.94	95.33	95.4	2.75	2.83	2.90				2.80	VIX Mar16 23
49.56	98.18	98.1	2.50	2.55	2.60				2.50	VIX Mar16 24
45.79	100.1	101.	2.25	2.33	2.35				2.20	VIX Mar16 25
42.04	102.8	103.	2.05	2.11	2.10				2.00	VIX Mar16 26
38.68	105.4	105.	1.85	1.90	1.95				1.90	VIX Mar16 27
35.68	107.2	108.	1.65	1.74	1.75				1.70	VIX Mar16 28
32.83	109.8	109.	1.50	1.57	1.65				1.55	VIX Mar16 29
30.55	111.2	111.	1.40	1.45	1.50				1.33	VIX Mar16 30

Figure 2.1: VIX screen for March futures trading at 23. On the far left is the delta of the option; the far right is the strike price. "The" is the "theoretical" price of the option according to the IVs I was running at the time.

Change in Strike Price

As the strike changes, so changes the delta of the option. The further from being in the money an option is, the further it will be from a delta of 1. Looking at VIX options, refer to the montage in Figure 2.1. With the futures trading at 23, the 23-strike in VIX is about a 0.50 delta (0.54 delta to be exact). The 20-strike is a 0.70 delta, and the 30-strike call is a 0.30 delta option.

This interaction should be intuitive. Strike prices represent whether the option is in the money (ITM), out of the money (OTM), or at the money (ATM). Of all the facets that affect delta, this one is by far the easiest.

Time to Expiration

As more time passes, the cumulative probability of seeing any particular rare event increases. Think about it this way: In 2016, it was unlikely that the average person would stop using Facebook. However, by 2030, it is entirely possible that no one will use Facebook as a social media outlet. Think I am talking crazy? Remember Myspace had 350 million users at one time.

Let's say Apple (AAPL) is trading at $150 per share. Could it be trading at $200 in six months? Probably not. What about a year after this is published? Maybe? What about two years after this is published? Entirely possible. The point is, especially with stocks, the longer you allow for something to occur, the more likely it is that the event will occur. Thus, the AAPL 200-strike call will have a low delta when there is little time to expiration, but in LEAPS (Long-term Equity AnticiPation Securities) it could have a decently high delta.

Volatility

Volatility is the X factor across all Greeks. I am going to spend a lot of time talking about volatility in this book. Higher volatility indicates a higher likelihood of large swings in the underlying, while lower volatility indicates only smaller moves are likely. One way to think about the volatility of the option is that it changes *time*. As volatility rises, it makes certain scenarios more and more likely to occur, because it points toward large swings in the underlying. As volatility falls, it points toward different scenarios being less likely to happen.

As volatility rises, it predicts greater movement to follow. Volatility is viewed as annualized, so it is considering an annual move. For example, a $1,000 stock with an IV of 20% expects the underlying to move higher or lower by 200 points in the next year, with one standard deviation of confidence. If that $1,000 stock sees its IV increase to 25%, the market now expects a move of 250 points per year, regardless of direction.

The calculation for figuring the standard deviation that the market is currently pricing is:

Underlying price * Implied volatility of the ATM strike * SQRT(trading days to expiration/trading days in a year).

Since volatility is a function of standard deviation, a stock with a volatility of 16% should move about 1% a day (as the square root of 252, the number of trading days in a year, is actually 15.87, which would really be 1%).

Thus, if XYZ is trading at $20 with IV of 16%, the options market is expecting the underlying to move about 0.20 a day:

$$20 * 0.16 * \mathrm{SQRT}(1/252) = 0.20$$

There are approximately 252 trading days per year, so in this example the market would look for about 3.20 of movement if the underlying went *straight up* over the period of a year (252 trading days).

Therefore, a 25-strike call with 30 days to expire is unlikely to end up in the money even if the underlying rallies its volatility number every day.

$$20 * 0.16 * \mathrm{SQRT}(252/252) = 3.20$$

Looking at actual volatility over that period of time, taking movement both up and down into consideration, the market is pricing in an XYZ move of 0.92. (Remember: “30 days to expire” means about 21 days of trading.)

$$20 * 0.16 * \mathrm{SQRT}(21/252) = 0.92$$

The 25-strike calls are not expected to end up in the money. They will end up with a ballpark delta of less than 10 and a value of less than $0.20 per contract given the current time to expiration.

If volatility expectations for stock XYZ increase to 32%, double that of the previous example, all of a sudden the market is looking for 1.84 points of movement over a month. If the stock catches some momentum, the underlying could blow through the upside 25-strike call.

Whereas the 25-strike call in the previous example had a delta of less than 10 and a value less than $0.20, the option now has new life. The option will have a delta near 20, and a value near $0.50 per contract. If the IV jumps to 48%, that same option is going to have a delta over 25, and it will start to approach a $1.00 valuation give or take (0.5 * 2x IV).

The view of volatility is much like turning the clock back. A two-year scenario makes outcomes seem more likely to happen, and higher volatility makes scenarios more likely to happen. If I move IV from 16% to 32%, it's like moving days to expiration from 30 (21 days to expiration) to 120 days (84 days to expiration). To compare:

$$\text{Long expiration: } 20 * 0.16 * \mathrm{SQRT}(84/252) = 1.84$$
$$\text{Higher IV: } 20 * 0.32 * \mathrm{SQRT}(21/252) = 1.84$$

The above are similar even though the days to expiration are different; this is the power volatility has on standard deviation, which determines delta. Nothing will affect the outcome of an option like volatility. To understand this Greek is to understand the effect of volatility.

Gamma

In my experience, *gamma* is the Greek that traders have the hardest time understanding. It's also the Greek most likely to blow the trader up. I can speak from experience; there is no trader that has not been beaten badly by gamma. I have had occasions where an explosion in gamma has made or lost thousands of dollars.

Gamma represents how delta changes with a $1 change in the underlying, regardless of the price of the underlying. Thus, if you trade SPX at about 4200, gamma measures change in delta for a $1 move, and the same is true if you are trading SPY, which is about $420. Both are indexes of the S&P 500, and yet they have quite different gammas because of the underlying. More importantly, the sign and movement of gamma has *nothing* to do with the delta value. A negative delta can be accompanied by a positive gamma, and a positive delta can have a negative gamma.

Let's quickly examine gamma. Long positions have positive gamma:
XYZ is trading at $30, and a long 30-strike put has a negative delta of −0.5 and a positive gamma of 0.1. If the underlying rallies $1 to $31, the delta will change from −0.5 to −0.4.

XYZ is trading $30, and a long 30-strike call has a positive delta of 0.5 and a positive gamma of 0.1. If the underlying rallies $1 to $31, the delta will change from 0.5 to 0.6.

Looking at the opposite, short positions have negative gamma:
XYZ is trading at $30, and a short 30-strike put has a positive delta of 0.5 and a negative gamma of −0.1. If the underlying rallies $1 to $31, the delta will change from 0.5 to 0.4.

XYZ is trading at $30, and a short 30-strike call has a negative delta of −0.5 and a negative gamma of −0.1. If the underlying rallies $1 to $31, the delta will change from −0.5 to −0.6.

This is all well and good. Where gamma becomes dangerous is on a gap move. Look at the examples above and imagine the move was a gap. A *gap* means that the underlying suddenly opens sharply higher (or lower) on the charts, without trading in the area between its previous close and current open. Let's take an example from above to examine a possible scenario. Imagine you have a position that is short gamma in XYZ, trading at $125, and the position is flat delta but short gamma to the tune of 0.45 * 10, or $4.50 on a stock with the standard $100 multiplier. The trader is short 10 contracts with a gamma of −0.45. XYZ opens up one day at $100.

The calculation is: (½ gamma * change in price squared + delta * change in price) * (contracts * multiplier)

Thus $\frac{1}{2}(-0.45)^{*}25^{2*}(10^{*}100) = -140,625$

On 10 contracts, the trade lost over $140,625; this is the power of gamma.

I could switch the signs, and all of the above would still work. The process of working through delta and gamma will make the process easier to understand. Of the Greeks, gamma is by far the least intuitive.

Traders obsess about their gamma exposure. This is because, as I stated in the first paragraph of the section, true exposure to movement is really derived. With the risk associated with gaps, traders have to control how gamma exposes them to movement in the underlying overnight. Additionally, gamma can become a problem for traders if the underlying moves up and down wildly. If an underlying moves up or down wildly throughout the day, the gamma of the position can push delta to change drastically throughout the day as well. I have seen scenarios where a $60 stock opened down $10 only to end up higher on the day by more than $10. The intraday movement could cause a trader that is short gamma to have to sell a large amount of the underlying on the bottom to reduce delta exposure, only to have to buy the underlying all the way back up and even up on the day as the underlying moves. In the example above, I showed how a loss of $140,625 can come from a big gap down. In order to protect yourself from the delta exposure created by negative gamma, traders typically sell the underlying to reduce risk. Now imagine the additional losses if the underlying rallies. Not only is the trader locking in $140,625 dollars of loss on the bottom, but would lose another $140,625 or more if the stock ends up flat on the day and the trader did not buy stock on the way up. Even heading the delta dynamically on the way up the trader would lose ½ of $140,625.

My point is that gamma is the risk factor professionals watch more than any other Greek, and for good reason. It is the only Greek that can allow a position to get away from a trader in a way that the P&L loss is unrecoverable. In monitoring gamma, the trader is able to monitor the risk of movement, and how the trader is exposed to realized volatility (movement in the underlying).

Let's add a new dimension by walking through how the five factors of the pricing model affect gamma.

Price of the Underlying

Recall that the SPXand SPY can each have a gamma of 1. However, a 1-point move in SPX is totally different from a 1-point move in SPY. A 1-point move in SPX trading at 4300 represents a 0.05% move in the underlying. Not exactly groundbreaking; a business reporter would announce the S&P 500 as unchanged. The same movement in the SPY, however, would be a much more significant move (though still not huge). A 1-point move in the SPX is barely a nudge in price because the index is 10 times as large as SPY. So a 1-point move in the SPY would be 10 times more of a move in the underlying (0.5%). Thus, the SPY is going to have 10x the gamma of the same position in SPX. The higher the price of the underlying, the lower the gamma. The higher the price of the underlying, the higher the pure point movement *should* be . . . at least in indexes.

This same concept applies to equity options. A stock like Amazon (AMZN), which is about $3,300 as of June 2021, may move 1% a day, and a stock like Facebook (FB), which is trading at $330, would move the same 1% with a lower dollar level. If they had the same IVs, the gamma of AMZN would be 1/10 of the stock trading at FB's level.

Strike Price

Gamma is odd in how it moves. It is at its highest point "at the money." The further the move away from ATM, the smaller gamma becomes, as a general rule. This is pretty simple until you add in the other five factors, most notably volatility and movement in the underlying. When the underlying moves and volatility also moves, the gamma of a strike price can change in ways that the trader, if unaware of gamma's power, will be blown away. Options that are sold with low gamma can quickly evolve to a high gamma, because gamma can move a position's delta extremely quickly on a gap. Remember this in all trades; it will save your butt.

Time to Expiration

Recall that the longer time to expiration, the more delta will remain the same. If gamma is the change in delta on a $1 move, then the impact of a $1 move matters. When an option has a few days to expire, a $1 move can be *huge*. When an option has a long time to expire, a $1 move might not matter as much. Let's take a quick look:

An underlying XYZ is trading at $24 with options expiring in two days. If the underlying rallies $2, the chances of a 25-strike option ending up in the money increase significantly. The calls may go from a somewhat lower delta, say 35, to a somewhat higher delta, like 65. Thus, the change in delta associated with that $2 move might be 30 delta points. This means gamma was about 15.

Look at the same scenario with the 35-strike option. With two days to expire, does a change in the underlying price from $24 to $26 actually affect the delta of the 35-strike call? Not really. The 35-strike call might go from 0.02 delta to 0.04 delta, resulting in a gamma of 1.

Looking at an option with six months to expire, that same move from $24 to $26 will result in a much smaller change. It might result in the option premium moving from $0.47 to $0.53. Thus, the $2 move caused a change in delta of 0.06, and a gamma of 3.00 – only 1/5 the gamma of the options with two days to expire. The point is that increasing gamma may point to higher rewards or greater losses. In some cases, gamma may look like a positive, but in reality, the number just represents swings in the strike chain that may be well out of the money.

It may, as in the preceding example, be dramatically affected by the expiration date. So, in interpreting gamma, look at it with a view at the other Greeks to make sure your interpretation is correct.

Clearly the greater the time to expire, the less gamma that is produced. To see this in a simpler way, pull up a montage of options and examine how different the deltas are at different strike prices in options that are close to expiration versus options not close to expiration. The montage of VXX in Figure 2.2 shows options with five days to expire and their deltas.

Does it appear that the 35 strike calls will be affected by any $2 move in the underlying? And VXX moves . . . *a lot*! Based on the above, if VXX were to move $2, the 35 delta call *might* pick up 0.5 points, but almost no gamma.

Now look at a similar set of strikes on options in VXX with six months to expire. What that might look like is shown in Figure 2.3.

The 33-strike option had a delta of 37, and the 35-strike was 33.5. Change in delta of the 35-strike will be at least 3.5/2 or 1.75 gamma, or about three times that of the options with a week to expire. Essentially gamma near the money was *super*

OI	Volume	Delt	IV	Vo	Bid	Th	Ask	SIM	Pos	PnL	Last	Strike
1544	9240	31.9	73.2	68.	0.44	0.4	0.48				0.54	VXX(W) Feb05 25
6232	2002	24.8	77.2	70.	0.35	0.3	0.38				0.42	VXX(W) Feb05 25.5
210C	2870	19.2	79.6	72.	0.27	0.2	0.29				0.32	VXX(W) Feb05 26
962	4138	14.8	82.5	75.	0.21	0.1	0.23				0.25	VXX(W) Feb05 26.5
1486	995	11.3	85.6	77.	0.16	0.1	0.19				0.19	VXX(W) Feb05 27
635	418	8.79	88.5	79.	0.13	0.0	0.15				0.14	VXX(W) Feb05 27.5
1627	1040	7.00	91.7	82.	0.11	0.0	0.12				0.13	VXX(W) Feb05 28
1132	495	5.38	93.7	84.	0.08	0.0	0.10				0.11	VXX(W) Feb05 28.5
2528	1913	4.27	98.1	87.	0.07	0.0	0.09				0.09	VXX(W) Feb05 29
993	427	3.26	97.2	88.	0.04	0.0	0.07				0.08	VXX(W) Feb05 29.5
2102	737	2.51	103.	90.	0.05	0.0	0.06				0.06	VXX(W) Feb05 30
117	467	2.19	103.	94.	0.02	0.0	0.06				0.06	VXX(W) Feb05 30.5
3811	281	1.73	108.	95.	0.03	0.0	0.05				0.04	VXX(W) Feb05 31
241	342	1.65	114.	10(	0.03	0.0	0.05				0.04	VXX(W) Feb05 31.5
1847	3727	1.24	117.	101	0.02	0.0	0.05				0.04	VXX(W) Feb05 32
99	125	1.19	119.	10!	0.02	0.0	0.04				0.03	VXX(W) Feb05 32.5
189C	837	1.15	124.	11(	0.02	0.0	0.04				0.03	VXX(W) Feb05 33
98	20	0.80	117.	10!		0.0	0.03				0.02	VXX(W) Feb05 33.5
1442	10	0.62	121.	10!		0.0	0.03				0.02	VXX(W) Feb05 34
464	55	0.44	126.	10!			0.03				0.02	VXX(W) Feb05 34.5
1732	209	0.43	124.	11:			0.02				0.02	VXX(W) Feb05 35

Figure 2.2: Note deltas of VXX options with five days to expiration and VXX trading around 23.5.

high relative to the strikes around it. This is because if the underlying moves 1 point, delta would change dramatically as the option approaches expiration.

Volatility

Volatility can act much like time. Running up IV can be like rolling the clock back. At the same time, low IV options have higher gamma than high IV options. If it sounds confusing, then now you understand why this is going to be the longest chapter of this book. Let's start with the simple, low IV stocks versus high IV stocks. Stock XYZ is a low IV stock; its options (regardless of time to expiration) have deltas across strikes, as shown in Table 2.1. Based on delta levels, XYZ is assumed to be trading at or close to $55 at this point.

Delt	IV	Vo	Bid	Th	Ask	SIM	Pos	PnL	Last	Strike
55.3	82.8	83.	4.25	4.3	4.40				4.48	VXX Jun17 25
52.5	84.1	84.	3.95	4.0	4.15				4.30	VXX Jun17 26
49.9	84.8	85.	3.70	3.8	3.85				3.93	VXX Jun17 27
47.4	86.0	86.	3.45	3.5	3.65				3.72	VXX Jun17 28
45.0	86.9	86.	3.25	3.3	3.40				3.40	VXX Jun17 29
42.9	87.8	87.	3.05	3.1	3.20				3.20	VXX Jun17 30
40.7	88.6	88.	2.89	2.9	2.99					VXX Jun17 31
38.8	89.2	89.	2.71	2.7	2.81				3.08	VXX Jun17 32
37.0	89.9	90.	2.55	2.6	2.65					VXX Jun17 33
35.2	90.5	90.	2.33	2.4	2.56					VXX Jun17 34
33.5	92.6	91.	2.24	2.3	2.53				2.36	VXX Jun17 35

Figure 2.3: A montage of VXX call options with six months to expire.

Table 2.1: Sample delta and gamma in a hypothetical stock with an IV of 25.

Strike Price	IV	Delta	Gamma
50	25	65	3
55	25	50	3
60	25	35	3

In the example in Table 2.1, as the underlying moves from $55 to $60, the delta will go from 50 to 35, with a gamma of 3. Now let's pump up the IV a touch in Table 2.2.

Table 2.2: IV at sample delta and gamma in a hypothetical stock with an IV of 35.

Strike Price	IV	Delta	Gamma
50	35	60	2
55	35	50	2
60	35	40	2

An increase in IV makes all occurrences more likely, thus you'll notice in Table 2.2 that deltas have changed. The IV pump pushed the deltas of the 50- and 60-strike options closer to 50. This in turn causes the gamma of each strike to decrease. This is the way things work for ATM options and for options that have a long time to expire. But how does volatility affect OTM options?

Believe it or not, it was a student who taught me the best way to think about OTM options. The student pulled out a string to represent a stream of options that looked like a normal curve. The normal curve represented delta; he then pulled the string just a bit. What I noticed was that near the peak (which is ATM) the slope decreased (change in slope of a delta curve is gamma). However, at the ends, where the student was actually pulling the strings, the slope increased. See the example of how gamma changes on an OTM call with an increase in volatility.

Take a look at the risk graph in Figure 2.4. Notice the change in gamma with a 30% increase in volatility on an option with a delta of about 0.08 (we bought 20 contracts to make the move clear).

Figure 2.4: The OTM option gamma actually increases in this example.

When an option is *way out of the money*, below a −0.15 delta, and up to a 0.15 delta, the options gamma will increase. Let's look at some OTM options with an increase in IV in Tables 2.3 and 2.4.

Table 2.3: Delta and gamma of hypothetical OTM options with IV of 25.

Strike Price	IV	Delta	Gamma
80	25	10	0.4
85	25	8	0.4
90	25	6	0.4

The options in Table 2.3 represent options that are well out of the money. I am going to increase IV and then make up some deltas.

Table 2.4: Delta and gamma of hypothetical OTM options with IV of 35.

Strike Price	IV	Delta	Gamma
80	35	14	0.8
85	35	11	0.8
90	35	8	0.8

While it might seem insignificant, the gamma of the options above actually doubled from 0.4 to 0.8. This is the danger of shorting OTM options – the gamma can explode (I will go into detail about this later). Imagine that the above IV moves with an increase in the underlying. Imagine you are short the 85-strike calls and the underlying moves *with* a drop in volatility. Not only does the short delta change *but* the gamma increases. Now you know how someone can turn a small position into a loser of incredible proportions.

Vega

The *vega* of an option tracks how the option's price moves with changes in implied volatility (IV). Think of it as the delta of implied volatility. If an option is worth \$3.00 and has a vega of 1.00, and IV increases one point, the value of the option will be \$4.00. This seems pretty simple – but it's not. The nice thing about vega is that relative to gamma it is pretty simple . . . *relative to gamma*. In many ways, vega's characteristics are exactly like the characteristics of delta; the big difference is that the Greek affected is the vega number (IV), not the delta number (underlying price).

Price of the Underlying

In simple terms, the higher the price of the underlying, the more vega it will have. SPX and SPY have essentially the same underlying – the S&P 500 – but one represents the full value times 100 (SPX). The other represents 1/10 of that value (SPY). As a result, SPX options have much more vega than SPY options. This is a result of each SPX option being assigned to an underlying with much more value. An option on SPX can be worth $100 or more. An increase in IV of 1 point might be equal to an option price increase of $5. That's vega of 5. In SPY, an increase in IV in the same amount might only be worth $0.50. This means that SPX has vega of 5 and SPY has vega of 0.50. Compare XSP (mini SPX options) and SPX vegas on similar strikes and expirations in Figure 2.5.

Figure 2.5: Comparison of vegas of XSP and SPX.

Note in the above, if the decimal were moved, the vega number would be exactly the same. This is clear evidence that it's all about the price of the underlying when it comes to vega numbers.

Strike Price

The closer the strike price is to the money, the more vega it will have. The ATM options always have a high vega relative to the strikes that are out of the money. The further the strike moves from the underlying, the lower the vega. That doesn't mean that managing vega is easy. Like gamma, vega can explode on a given strike price. The explosion of vega on a short strike, with the explosion of gamma, is what we in the business call a *blowout – the complete inability for a trade to go forward because* *the clearing firm is forcing the trader to liquidate*. The first rule of trading is that the trader must be able to trade the next day. If a trader blows out, he or she is likely in liquidation-only mode and will be out of a job or out of money. Either way, it's an awful feeling and one that should be avoided at all costs.

Time to Expiration

One thing about volatility is that it does not move fluidly across the spectrum of expirations, sometimes called *term structure*. Except for in very rare circumstances, options with a longer time to expire are worth more; thus, they have more vega.

In the SPX options in Figure 2.6, the value of the ATM strike increases from about $101 up to $162 from August to October when the options expire. That extra time premium represents extra exposure to vega. If you have not made the connection by now, time premium equates to raw vega exposure.

It doesn't get any simpler from there. Just because an option has more vega does not mean it makes more money when IV explodes. That also doesn't mean they move in the same manner as options with less time to expire. I am going to spend some time discussing this concept in detail later. However, to start let's make one thing clear: An option with one month to expire and an option with six months to expire will have very different vegas, but the option with one month to expire will react to volatility in a completely different way.

If I own an asset that has movement (realized volatility) at 25% and that movement increases to 30% near term, options will gain value, but the interpretation of a longer-term option will change too. A longer-term option will gain a much larger amount. This is because the market thinks that the underlying is going to keep moving the way it is moving now. Think about it this way: An option on an underlying for which vol increases from 25% to 30% will see its long-term options change in value, because the market assumes that movement has more increases still to come.

A jump in movement to 30%, even in the short term, must have a ramification on long-term movement. If a stock starts flailing around, the long-term plays will pick up a lot of value, all else being equal. From a market-driven perspective, if people are scared, they do not just hedge their position for the next 30 days. Demand for positions in the underlying increases out three, six, and twelve months or more. Looking all the way out to the longest LEAP option, demand for shares is expected to increase. Banks and trading firms, those providing liquidity to hedgers, need to hedge trades they made with a lot of "edge" in them that now maybe don't look so hot; this is the source of demand. Banks and trading firms need to follow rule number one (always be able to trade the next day), just like the individual trader. This creates demand in areas that are not being bought by the public, typically the back months.

cDELTA	cMIDIV	cBID	cASK	STRIKE
		CALL OI: 135,423		CALL VOLUME: 11,843
0.51	14.49	100.50	101.80	SPX(AM) Aug20 4,210.00
0.49	14.26	94.20	95.30	SPX(AM) Aug20 4,220.00
		CALL OI: 14,898		CALL VOLUME: 588
0.51	14.43	101.20	102.50	SPXW Aug20 4,210.00
0.49	14.27	95.50	96.10	SPXW Aug20 4,220.00
		CALL OI: 28,581		CALL VOLUME: 1,613
0.51	14.96	111.80	113.20	SPXW(W) Aug31 4,210.00
0.50	14.85	108.60	110.10	SPXW(W) Aug31 4,215.00
		CALL OI: 411,518		CALL VOLUME: 30,942
		FUTURE: ESU1		FUT. PRICE: 0.00
0.51	15.34	125.90	127.30	SPX(AM) Sep17 4,210.00
0.50	15.24	122.80	124.10	SPX(AM) Sep17 4,215.00
		CALL OI: 12,631		CALL VOLUME: 743
		FUTURE: ESU1		FUT. PRICE: 0.00
0.51	15.34	126.50	127.70	SPXW Sep17 4,210.00
0.50	15.15	120.20	121.40	SPXW Sep17 4,220.00
		CALL OI: 64,544		CALL VOLUME: 152
0.51	15.58	136.70	138.30	SPXW(Q) Sep30 4,210.00
0.50	15.50	133.50	135.10	SPXW(Q) Sep30 4,215.00
		CALL OI: 65,499		CALL VOLUME: 6,268
0.51	16.04	149.60	151.30	SPX(AM) Oct15 4,210.00
0.50	15.88	143.30	145.00	SPX(AM) Oct15 4,220.00
		CALL OI: 3,505		CALL VOLUME: 354
0.51	16.00	149.80	151.80	SPXW Oct15 4,210.00
0.50	15.84	143.50	145.50	SPXW Oct15 4,220.00
		CALL OI: 6,456		CALL VOLUME: 103
0.51	16.19	160.20	162.40	SPXW(W) Oct29 4,210.00
0.50	16.03	153.90	156.10	SPXW(W) Oct29 4,220.00

Figure 2.6: Call options in the SPX across multiple expirations.

Volatility

Strike prices that are ATM have the most vega. The further from ATM the strike price is, the less vega there will be. As IV increases, strike price characteristics become more alike. Thus, an increase in volatility makes all options more like ATM, which have the most vega. As volatility increases for OTM strikes, they become more like ATM. Hence, volatility affects strike prices by making OTM options increase in vega until they become like ATM options. As volatility increases, vega advances.

ATM options are quite simple: volatility can go wherever it wants, and if it doesn't go infinitely high, ATM vega will be stable.

Theta

Unlike delta, gamma, and to a lesser extent vega, there is no other Greek to tie theta to in terms of movement. Vega tends to move around based on time value, more or less. Theta is tied to gamma in terms of intensity, but not in terms of movement.

Theta is the rate at which an option loses value as time passes. Like all insurance products, as time passes an option loses a piece of value. If you buy an option in XYZ with a strike of $30 and cost of $3.00 ($300 total), and the underlying is trading at $29 per share, if the underlying still trades at $29 at the time of expiration, that option must be worth zero. The process of that option's value getting to zero, in the days that passed, is what theta measures.

Price of the Underlying

Much like vega, when an underlying is high, options will have a high theta. Going back to our XSP and SPX example, the same thing that produces a higher vega in options produces a higher theta. In Figures 2.7 and 2.8 you can see that an option in SPX relative to XSP is going to be worth about 10 times that of an XSP option.

cBID	cASK	STRIKE
63.70	65.00	SPXW Jul16 4,210.00

Figure 2.7: ATM July options in SPX.

cBID	cASK	STRIKE
6.39	6.54	XSP Jul16 421.00

Figure 2.8: ATM July options in XSP.

Over the next 45 days, the SPX option has 10 times the dollar value to lose. Having 10 times the value means that over the next 45 days instead of losing $6.50, the option has to lose $65. Thus, ceteris paribus, the higher the price, the higher the theta.

Strike Price

ATM options have the highest premium. These have the highest theta number. In addition, ATM options have the standard theta curve, as shown in Figure 2.9, that we are all used to seeing:

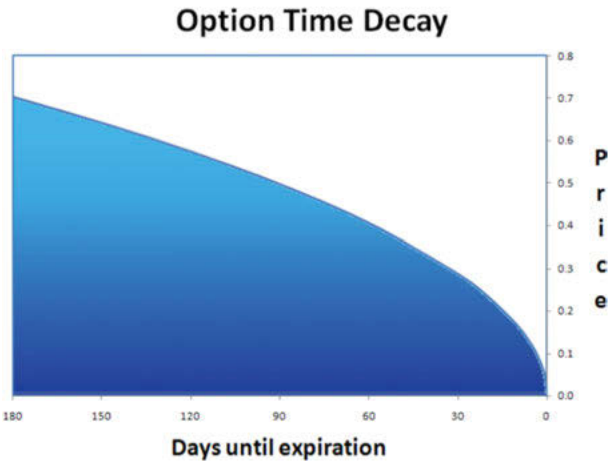

Figure 2.9: The standard theta curve of ATM options.

As time to expiration approaches, ATM options see their theta increase exponentially, with the 30 days having huge theta, and the final seven days having massive theta, getting even higher.

OTM options are not the same. The decay curve for OTM options is much more linear than that of ATM options. As strike becomes more and more OTM, the theta decay becomes more linear. Decay is more linear the further out of the money an option is.

Unit options are options worth very little, and far out of the money. For a standard stock, I would expect that a unit option will be worth less than $0.15 or so. These are options that have no value other than pure catastrophe insurance, and they take *forever* to decay. There are two main reasons that these options retain value:

1. Margining: Market makers have their margin assessed in two ways. The more margin market makers have, the more capital is tied up. So, if market makers are trying to be as capital efficient as possible, they will always stay away from selling options that tie up margin by a large amount.

The SEC mandates that for every option, be it worth $0.05 or $5,000, the market maker is charged at least $0.25 per contract. An option worth $0.05 ties up an inordinate amount of margin for the market maker. If I am short 100 $0.05 options, I can make 500.00 (.05 * 100 * 100) on the 100 options I am short. At the minimum, even if

I am long, I am going to be charged $25 of margin due to Securities and Exchange Commission (SEC) rules. That may not be the best engagement of capital.

The more treacherous effect on margin is *risk haircut*. Clearing firms run an algorithm on a portfolio assessing risk if the underlying moves 10%, 20%, and up to 40%. A trader who has several of these short option positions can see the cost of owning a position via "teeny options" go much higher, as $0.05 options are seen as a serious risk (back in the day "teeny options" were described as options worth 1/16 of a dollar or less; now usually they are referred to as options worth less than $0.10). Additionally, they run risk on increases in volatility of up to 400%. The charge of margin on these options can be astronomically high. If a trader is short 100 $0.05 options, and IV increases 400%, suddenly the "worthless" out of the money options that were sold at $0.05 are no longer worthless. Seeing this, the clearing firm must raise the margin requirements by a large amount. Clearing firms, understanding the risk potential, do not wait for vega to explode; they margin some of this risk into the options from day one. This makes being short these options potentially as expensive as the premium collected. Putting up large amounts of capital to make $500 is not what traders typically try to accomplish. Being short cheap options is not an efficient use of capital. This is going to slow the rate of decay in ways that the option pricing model cannot measure.

2. The actual risk to reward is the other issue with units. If you are a bottomless pit of money, you expect the value of shorting an option worth $0.05 to be high; they often end up worthless. However, most traders are not bottomless pits of money. The ability to make $500 on a $100 lot that is 99% likely to win, does not counteract the risk of loss of, say, $25,000 even once, even if it has a positive expectation. Major firms don't care about these types of losses, but the average retail trader does.

When I was interviewing candidates at Group One Trading, we asked college kids if they would risk $500,000 on a coin flip if they could win $1 million if they were right. If they said yes, they were unlikely to get a job. We simply did not have that kind of risk appetite, and neither do most market making firms, except those with the deepest pockets. The "risk appetite" effect on small options keeps them bid higher for longer. This slows the decay in these options beyond what the pricing model expects. Based on values in Pfizer (PFE) options in Figure 2.10, the 38-strike puts lost more value from week 3 to week 2 than they did from week 2 to week 1. This is the "unit effect," the idea that once an option hits a specific value its rate of decay breaks from the pricing model and slows to a crawl. Once an option hits its unit effect level, the cost of being short tends to become a bad trade for the average trader.

CALL VOLUME: 13,303		PUT VOLUME:
PFE Jun18 37.50	0.01	0.03
PFE Jun18 38.00	0.02	0.04
PFE Jun18 38.50	0.03	0.05
PFE Jun18 39.00	0.09	0.12
PFE Jun18 39.50	0.31	0.33
PFE Jun18 40.00	0.70	0.73
PFE Jun18 40.50	1.16	1.21
PFE Jun18 41.00	1.66	1.70
CALL VOLUME: 6,267		PUT VOLUME:
PFE(W) Jun25 37.50	0.06	0.07
PFE(W) Jun25 38.00	0.10	0.11
PFE(W) Jun25 38.50	0.17	0.19
PFE(W) Jun25 39.00	0.31	0.33
PFE(W) Jun25 39.50	0.53	0.56
PFE(W) Jun25 40.00	0.86	0.88
PFE(W) Jun25 40.50	1.24	1.29
PFE(W) Jun25 41.00	1.68	1.75
CALL VOLUME: 1,220		PUT VOLUME:
PFE(W) Jul02 37.50	0.13	0.14
PFE(W) Jul02 38.00	0.20	0.21
PFE(W) Jul02 38.50	0.29	0.31
PFE(W) Jul02 39.00	0.45	0.47
PFE(W) Jul02 39.50	0.68	0.70
PFE(W) Jul02 40.00	0.97	1.00
PFE(W) Jul02 40.50	1.34	1.37
PFE(W) Jul02 41.00	0.57	2.70

Figure 2.10: Call options in PFE.

Time to Expiration

In general, the further the time to expiration, the greater the need for insurance. The insurance decay slows down, especially for options that are near the money. The longer to expiration, the slower the decay. If you look at delta decay instead of strike decay, the story changes.

I just got done explaining that at the strike level, the further away from ATM, the more linear the decay. However, if I follow option delta decay, how a portfolio that is constantly holding a 0.20 delta option (regardless of what option that is) decays, the story changes. The decay of the 0.20 delta option is in fact exponential. Thus the 0.20 delta option at two years will decay more slowly than the 0.20 delta option at one year, which will decay much more slowly than the 0.20 delta option at six months, and so on.

This means that while you might be used to options decaying a certain way, at 10% out of the money or 20% out of the money, if we follow the decay of options with 0.10 delta at two years to expiration, and then follow the decay on trading opportunities rolling down to delta, there may be an opportunity to take advantage of theta. Option decay from a delta perspective follows a similar path to ATM options, being short a 0.20 delta option on a constant basis will produce a curve very similar to that of an ATM option.

To sum things up, theta burn following deltas is exponential, but following percentages out of the money is more linear.

Chapter 3
Market Makers, Risk, and the Individual Trader

When I first started trading, I'll admit, as much trading training as I had, I still felt unprepared. It wasn't until I went to work for Scott Kaplan at Quiet Light Trading that I "got" risk. He used to say to me, "Great trade . . . where is the edge?" He meant this from a "capturing dollars" perspective and a "risk management" perspective. Working for Scott taught me not just how to make good trades, but how to capture those dollars!

How Market Makers Make Money

Let's start with a simple concept, a New York Stock Exchange (NYSE) specialist (a market maker). If I were a NYSE specialist, I might have stock XYZ worth $100. As a specialist, I might make the market at a $99.50 bid price and $100.50 ask price, with 100 shares "up" (meaning I am willing to buy or sell 100 shares). If someone moves to buy 100 shares of XYZ, I would take the other side of their buy order and sell them 100 shares at $100.50 (my ask price). Right there I captured $0.50 in theoretical profit above fair value ("edge," which we will discuss more in Chapter 5), or $50.00. However, I have not actually captured the value; I only have it in theory. In order to gain the value of the edge I need to lock it in via another buy. The only thing I have done has been to sell 100 shares of XYZ at $100.50, which protects the edge for the time being, but does not capture the value. The next step is to capture that value, locking in the edge by "taking off" the trade. (We'll cover locking in edge in detail in Chapter 6.)

Coming out of my sale, I would like to move my market so that I can potentially capture the "edge" I sold. My market coming out of that sale might be 100 shares at $101. If someone sells me 100 shares at $100, I have now captured my $0.50 edge and locked in my profit. However, if instead someone buys 100 shares from me at $101, what was the end result of my first trade? Was the edge captured? No. My bid is now likely $100.50, and my offer is $101.50. If I buy 100 shares for $100.50, despite having two sales of the stock, I only captured edge in the underlying of $50.00. My first trade was now done at fair value, and my trade with edge was the $101 sale.

Basically, for the NYSE specialist, if the trade isn't closed (bought *and* sold), the value isn't captured. You may now understand why tightening bid–ask spreads (and therefore tightening edge margins) caused the demise of many market makers, and even drove one arrogant man to start a Ponzi scheme (Bernard "Bernie" Madoff). Apparently, Madoff had lost the ability to make a living as a market maker, so he began to be an example of the worst way to use other people's money.

https://doi.org/10.1515/9783110697865-004

Option market making is different. Option market makers must make markets not on just one quote, but on hundreds – or in the case of some ETFs and stocks like Apple (AAPL), thousands – of quotes. How does an option market maker capture edge? Is he or she trying to recreate what a NYSE specialist does on every strike, constantly buying or selling an option, then immediately attempting to take the trade off? In some ways yes, but the process of taking off trades is executed in a quite different way. While NYSE market makers make markets on price, option market makers make markets around volatility and "volatility smile." Ignoring smile for a bit, let's talk about trading around pure volatility. (For a refresher on volatility, see the Appendix.)

A standard market maker does not make markets around the options price itself. At the NYSE, a specialist makes the market around fair value, which is uncertain, but is set around where the price of the underlying is trading. For the option market maker, the underlying price is known. The unknown piece is the proper volatility. Thus, the piece of the quote the option market maker is constantly moving around and making markets around is the implied volatility (IV) of the option, not the actual price of the option itself. Here is an example:

For an at the money (ATM) option, the market maker might set the ATM IV at 30, based on how the stock moves historically and on the previous days' trading. For simplicity's sake, in this example the trader might make the market 2 IV points wide (in reality, the spread tends to be less than 0.5% wide). So, he would set the bid at 29% volatility and the offer at 31% volatility. Then, let's assume this would set the market on an ATM option in XYZ worth $1.00, based on a 30% volatility (the middle of the market maker's volatility spread) at $0.90 at $1.10, for 10 up. If someone buys 10 options for $1.10, that is buying a 31% volatility. In the option market maker's pricing model, the value of $1.10 is based on a combination of the strike price, time to expiration, price of the underlying, cost of carry, and the forward volatility that just traded. The market maker would then pump IV of the stock up to make the market bid at 30% volatility and ask at 32% volatility, moving the option market being quoted to $1.00 and $1.20, 10 up (willing to buy 10 for $1.00 and sell 10 at $1.20).

For an example of IV movement, look at a chart like the VIX intraday, which is a measure of S&P 500 (SPX) option prices. As the VIX moves, market makers adjust their markets according to the supply and demand of SPX options. Similarly, when option market makers look at "vol charts, "they are looking at a "stock chart" of the volatility of a stock's options. These vol charts, just like the VIX, just track what option market makers are making markets around.

The daily movements of the VIX chart in Figure 3.1 represent the closing prices of how option market makers moved their markets as orders came in to buy or sell.

Here is the problem that option market makers have that stock market makers don't: They are making markets on a large volume of options. It's not just one option in XYZ; it's many options in XYZ. Thus, the chart above and all volatility that option

Figure 3.1: Daily movements of a VIX chart.

market makers trade on is made of multiple strikes. Option market makers are making markets on hundreds of quotes at a time per stock, not just a single quote. While this causes multiple layers of complexity, it also allows the option market maker to lock in edge in new ways.

If a market maker is making a 30 vol market in options on XYZ, and a broker buys an ATM option at vol 31, the option market maker may not have to wait for an opposing order on that strike. The edge is already captured. Suppose instead of buying, a broker sells an ATM strike at a 31 vol. The market maker might be able to buy the strike that is just out of the money for a 29 or 30 vol level right now. If the option market maker can "spread" the order, by buying a similar option with similar risk conditions against the trade he or she just made to the broker in a short time frame, and net 1 extra vol point (buying 30% volatility and selling 31% volatility on strikes right next to each other), they may not lock in a pure dollar amount, but they may have locked some level of profit. This is how an option market maker captures edge most of the time. The market maker buys an option and then sells a similar option at a higher IV relative to the option just purchased. In other words, the market maker buys low and sells high; it is just expressed in terms of implied volatility instead of absolute price.

Alternatively, the trader may sell an option, then buy a similar option relatively cheaply in comparison. In most cases, the act of *spreading* is the method market makers use to lock in edge in trades made.

Skew

It gets more complicated from there. Not every option has the same implied volatility.

Imagine a graph that shows the implied volatility for each option in a single expiration term. The X axis shows the options' strike price, while the Y axis shows a dot at the IV for that strike. You can then connect all of those dots to create a curve interpolating the IVs for all of the options in that term, such as in Figure 3.2.

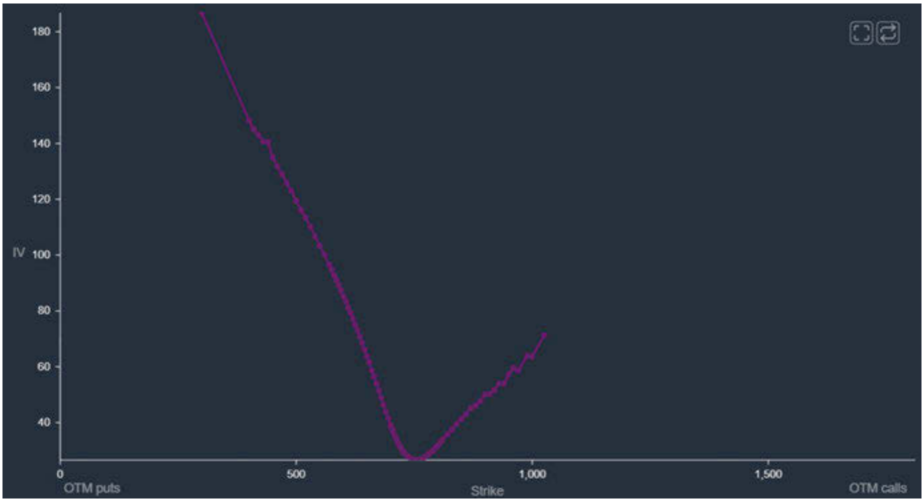

Figure 3.2: A skew chart of Tesla (TSLA) options for the September 10 weekly term.

Observe the steepness of the two sides of the graph, relative to the at the money (ATM) value. This is called skew. Skew measures the implied volatility of out of the money (OTM) puts and OTM calls, relative to the IV of ATM options. (See the Appendix for further elaboration.)

Skew is driven by supply-and-demand principles. At a given time, demand for long OTM put options might increase, pushing the relative cost of OTM puts higher, thereby steepening skew. Alternatively, demand for calls could run hot and skew could flatten. Skew connects the various implied volatility values together (as in the Appendix). Based on how trading occurs, the relationship between the dots can change. Another way to look at skew would be to think about an options curve not as a metal bar, but as a chain or a rope. If I move links in the chain with my hand, the whole chain will be pushed around, but not uniformly; the same goes for a rope.

Applying this analogy to an options curve, puts get more expensive relative to ATM options or calls get cheaper based on *moneyness*, specifically distance between current price and long-term strike. The ATM options are the center of the wheel; the spokes (calls and puts) move in a related but independent way. While OTM options can get steeper relative to ATM, vol must move if there is demand for an option along the curve. Skew is a moving target. However, understanding that IV is mean-reverting, the relationship of OTM options and ATM options is also mean-reverting, and a moving target. One of the values of being an option market maker is making markets on skew. As skew gets out of line, it allows the option market maker to buy and sell it to traders. Market makers are making markets on skew percentage at the same time they are making markets on volatility, and not just based on flat volatility. They manage the whole curve of options: OTM puts and calls, and ATM options.

Think about this complexity: Market makers are trying to manage the level of ATM IV as orders come in, *and* the level of OTM IV on puts and calls at the same time. Yet managing ATM vol and skew allows for more capturing of edge. If IV is bid, and skew is cheap, the market maker can buy OTM options and sell ATM options. If IV is moving around and skew is normal, market makers can spread against other options. If IV is low and skew is high, option market makers can try to buy ATM and sell OTM. There is value for market makers all over the board if they are active and vigilant about what is going on in their trades. Using skew and vol together, the trader can capture edge when selling a 10, 100, or even 1,000 lot option, as long as the sizing is right. It gets even crazier from there though. For more on puts, calls, skew, and term structure, see the Appendix.

Term Structure

Each option expiration series has its own ATM implied volatility (IV). Each option contract within that month will have its own skew. Adding to the complexity is the time to expiration. Every expiration has its own IV value. Like skew and vol, this is a moving target that will change with supply and demand. And like skew and volatility, the spread between months is generally mean reverting. Things such as earnings, a buyout, or a product announcement can throw these out of line, but even within those events some normalizing takes place.

If market makers see an order in an option for a certain expiration, they can hedge it with an option that has the same expiration or even one that expires on another date. They can hedge it off on another strike in the same contract month, but there may be another way to hedge it by buying or selling in a different expiration month. The trading of one month against another is one of the most common ways that market makers lay off risk. If market makers sell one month and buy another at the right *vol spread,* they are happy. This is because like skew, the months move together but are also not tied. A buy of one month against another will hedge a large portion of the market maker's risk, but not all of it.

In total, the above amount to one big concept: Market makers want to get rid of risk quickly. The use of strike, skew, and term allows them to create positions that have edge up and down. While not necessarily "locking in" profit, the positions can capture trading edge.

Market Maker Size

The next key to market success is the size of the trade. Market makers have a certain amount of risk they are willing to take on at any given time. As the ability of a trade to make money increases, like any entity looking for risk-adjusted returns, the ability of market makers to take the other side depends on how much they can make. This is entirely dependent on edge. Recall that edge is a moving target, but even within that moving target, edge has opportunities to make the market maker money.

If a trader comes in to buy an option, the market maker might start by selling the customer 10 contracts. As the customer begins to buy more options, the market maker may recognize that trading is moving a strike or month out of whack. The more things move out of whack the more the market maker should be willing to sell.

Beyond simple edge is size. Say a market maker's initial market is "29 vol at 31 vol, up by 10." So, the market maker will buy 10 or sell 10 contracts on the currently quoted vols. The next market might be "30 at 32 vol, 10 by 20" (willingness to buy 10 contracts and willingness to sell 20 contracts). The market maker is willing to sell 20 because the price is higher than the first sale, thus it has potentially more edge in the trade. The trader will sell more at a higher price. The goal of the market maker is to slowly increase the size until the current "fair value" is found, based on supply and demand. If the trader can spread out the risk, even better, given the situation. Imagine demand develops on a certain strike or month. The trader sells 10 in month X and then buys the curve (skew) or another term against it. The trader can sell more the next time the trade comes in. Let's follow the thought process of such a trader:

1. Sell 10 XYZ options. Hedge on the curve by buying a similar contract along the curve 10 times, perhaps a similar strike, but one that is not in as high demand.
2. Sell 20 XYZ options at higher price. Hedge in the curve in similar fashion.
3. Sell 50 XYZ options. Hedge in another month by buying 50 contracts in a different month.
4. Sell 200 XYZ options. Hedge around in other months and the curve as demand for the particular strike hits peak demand.

In the above example, there was demand for one particular option strike. The trader sold more and more of it as the price got higher and higher. Each time the trader sold options, he or she used the curve and/or other months to hedge off risk. This allowed the trader to sell options on one strike at higher and higher prices, selling more and more of the option in demand. Once it seems that the buyer of the particular option strike appears to be finishing, the trader may be willing to be net short options as the trading options push IV to near term extremes. In doing so, the market maker capitalizes on extremely high IV levels caused by demand for the options strike.

In short, trading different months and strikes against one another allows the market maker to capitalize on demand for one option, or one option contract per month. The professional trader should take advantage of this.

The key to sizing is that the trader needs to always "be able to trade." This means that no matter how much "edge" there is in a trade, no matter how good the trade might seem, the trader always leaves a few "rounds in the barrel" in order to keep trading. You never know when another customer is going to "piggyback" another customer's trade. Early on in my career, I remember thinking that one customer was done with a trade, finally having found the top, so I let the whole lot fly, only to have another customer walk into the pit and pay more.

Worse yet, if the customer you thought was the top was a smart customer and "out ahead" of the trade, there could be swaths of orders to follow that trade. The next thing the trader knows, the position is already short thousands of contracts, and there are four brokers in the crowd trying to buy. The traders who are able to sit on their hands and not blow their entire inventory on order number one would be able to sell more options at higher prices than those sold early. Those that sold early, in fact, may find themselves chasing options on the way up, hoping to sell them higher.

If market makers live by the "always trade the next day" rule, they will never have this happen. Does this mean "leaving money on the table" in some trades? Maybe. But over the long haul, which trader will make more money? Without a doubt, the trader who holds back. The "never be unable to trade" rule should carry on application beyond the market maker into retail trading.

Market Maker Global Risk

Market makers manage positions on a stock-by-stock, ETF-by-ETF, and index-by-index basis. But they also manage the "book of trades." One position might get out of whack, but the market maker will likely not go out of business on a large market sell off. This is because the trader manages global risk. On top of monitoring the Greeks of a single position, market makers manage their "book Greeks." Market makers make sure they are not carrying too many specific Greeks across the portfolio. The portfolio should not get too short or long gamma, too short or long vega, too short or long delta at any given time. The market maker manages the "portfolio Greeks," adding up the amount of delta, gamma, vega, and theta. If one of the portfolio Greeks is too large, the market maker does something about it. A trader may apply the same principles.

The way the trader adjusts positions is by reviewing his or her portfolio. The options that have the least edge in the position are the ones that are taken off. If the market maker is short a lot of options in a portfolio, they will review the positions held. The ones that are not “bid” are the ones that the market maker will move to cover. By buying to close options that don’t have a lot of edge, the portfolio has less “systemic risk.” In a market maker’s mind, it’s one thing to lose because he or she got beat on one position or another. It’s another thing for the trader to lose because the portfolio was short a bunch of worthless garbage with no real money in it and got torched by a selloff in the S&P 500. This is the other piece of being able to trade the next day. Traders must control “book” risk to ensure that a systemic event – a flash crash, a bank run, you name it – does not put the market maker out of business.

When market makers have traded for several days because option trading is so “chunky” in that a contract will be extremely popular, they must manage many positions. As time passes option prices and values change. Options that did have value become near worthless, which changes options for ones that have quantifiable risks to those that are “units.” One final piece of book risk is “unit risk.” Market makers, more than anyone, are vulnerable to crazy moves in stocks. Thus, option traders are constantly trying to get out of options worth $0.05. Options that are worth $0.05 will pay the market maker over time, but in the near-term can cost the trader the house. In trading on their portfolios, market makers may be willing to be net short options (short more options than they are long), but they will never be net short options that are near worthless. The margin risk is simply not worth it, and the risk of “blowing out” will never allow the long-term trader to be short these contracts.

In the coming chapters, we will apply this approach to trading options in a retail portfolio. Hopefully by now, you are already starting to see some of the value of the above.

Chapter 4
Volatility

The most important part of trading options is to understand volatility. More often than not volatility, or “vol,” is presented as a theoretical concept. If Option XYZ does X, then what happens to Y? However, what you need to understand is that volatility is the most important part of recognizing a good trade. If you are able to fully understand the concept of movement (realized vol) and perceived movement (implied vol) you will be able to better distinguish a good trade from bad. In this chapter, I will discuss the vol zones in which the underlying and options trade. Additionally, I’ll talk about how each zone has its own characteristics, the levels it trades within, and its general effects on the trader. If you need to brush up on volatility, see the Appendix.

Realized Volatility

The first key to understanding edge is to understand the movement in the underlying. Volatility is mean-reverting, not just in how it trades in the long term, but how it trades in the near term. Thus, while long term vol has its mean, current volatility also has levels it will trade within in the near term. The near term can be one week, one month, or one year. In order to simplify the process of understanding where volatility is in the near term, I have broken up the levels of current volatility into four main zones. Each zone represents a general level of realized volatility (RV) for the overall market for any individual stock. *Zone 1* represents low realized volatility, *zone 2* represents low volatility, *zone 3* is long-term mean volatility (remember that long term means tend to be higher than a normal VIX level, because while the VIX can go super high, it has never settled below 8) to elevated volatility, and *zone 4* is high volatility. Each zone has its own characteristics and tendencies. Traders must understand each zone, and the signs that the market is moving from one zone to another.

Zone 1 Ultra-low Volatility

One thing traders may easily fail to recognize is how often volatility is ultra-low. The VIX has a range that encompasses a few occurrences below 10, many occurrences in the 11s and 12s, to a few in the 60s, 70s, and even 80s. While the long-term mean of the VIX might be 18 to 20, there are more occurrences of VIX in the 12s than there are in any other whole number. When the VIX is at 12, while it is “ultra-low,” it is also common, and not something that should scare a trader. Ultra-low volatility happens for long periods of time, and at a much greater rate than 25%

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of the time. Traders need to be used to these numbers. So, what are the characteristics and ranges of low volatility?

Low volatility is the bottom quartile of realized volatility in a stock; it will have serious dips that can approach a crawling pace of movement. In the S&P 500, this range is going to be realized volatility in the 13% or lower range. It may have small spurts where movement gets near 15%–16% but they will be points (“dots”), not trends. Figure 4.1 is a shot of movement in the S&P 500 (SPX) in a four-month time span. You can clearly see that realized vol is in a tight, low range.

Figure 4.1: Characteristics of low realized vol.

Low vol can be frustrating in that it doesn’t mean that every day is low movement. A market can have many days of little volatility intermixed with a dot of high volatility in the form of a single-day move of 1%–2%. That said, day-to-day analysis can be boring. When realized vol is low, those who have a plan that involves mass selling of options will probably win. This is because while realized volatility is low, implied volatility, assuming mean reversion, will be higher. For instance, a VIX of 12 usually occurs when realized volatility is from 8% to 10%, *not* when movement is 12%. Those traders will have days where they get beaten badly, but they will also get many wins.

These times can be profitable, yet extremely dangerous because they can cause traders to think they are smarter than they actually are. This is because when realized volatility is ultra-low, option prices tend to be at their most overpriced. If realized volatility is 8% and implied volatility is 12%, that is a *huge* premium in relative terms, and that creates a huge edge in points. Even at its peaks in this range (the times when there are “pops” in movement) options sold at the bottom will be worth just slightly under where the market movement gravitated. Movement increasing from 8% to 12% or 13% has a huge buffer in options built in before the move happens.

Another issue for the trader in this zone is momentum. Volatility assumes that movement is “regardless of direction.” Yet in low vol times, the market tends to have a direction: higher. For those that are not “dynamically hedging” this can make producing income more difficult. Even well-executed high-premium condor or strangle trading strategies will get beaten badly if the underlying instrument trends in one direction for days at a slow pace. This is because while the volatility sold was at a premium, the pure direction is likely to threaten the short call spread of the condor. The dollar collected selling a condor is going to quickly see the call spread expand to $2 or $3 if you don't monitor and manage the condor's delta. For an overview of spreads and condors, see Chapters 7 and 8.

We will discuss IV in zone 1 and then techniques for trading zone 1 shortly. However, we first need to understand when zone 1 is ending.

When Does Zone 1 End?

Zone 1 is the most common zone, so how does one recognize its end? The key is seeing the switch in movement. As "dots" in movement become more common, this zone is ending. If you see an outlier dot once, it's not a big deal. If you see them twice in a 20-day period, it's still not a big deal. It can even happen for a week and not be the end. When the market sees movement for more than a week *or* the market sees a three-standard-deviation move, followed by continued movement in the underlying above the top of zone 1, this *can* be a sign that things are changing. This is especially true if the movement was not driven by a one-off event. However, just be aware that, especially with zone 1, there will be many false signals. If it reverts back for a week or so, that can mean things are retracing back to normal levels. If the market is leaving zone 1, the profit you would make by assuming the market will revert back to the zone 1 mean versus the profit you are missing out on, is often not worth it. If you think the market is leaving zone 1, trading zone 1 like it is zone 2 will be worth it, despite some amount of profit forgone. A zone 1 trade gone wrong can be costly and take many months to recover from if you do not actively manage risk. Zone 1 can create high profits for many months, but you may give it all away in one month if you are slow to manage risk. If I am managing a trade to make $0.50 per option 100 times, I am trying to make $5,000. If I let a spread expand to $3.00 before closing, I need to work for six months just to get back to even. This demonstrates why zone 1 must be aggressively managed.

Zone 2

Zone 2 is the second most common zone. It is what many consider a normal range of realized volatility. This zone is the second quartile in the index or stock's range. In the SPX, this is movement in the 12%–17% range. This movement is associated with uncertainty of current market conditions, and awareness of the current conditions that could cause the market to make a large move and volatility to increase. When what is unknown becomes known, that can result in zone 2 volatility. One common example is earnings season. During earnings season, there are no stock buybacks, and earnings can be particularly good or bad. Even in a long-term low vol cycle, during earnings season the market tends to enter zone 2. A common market impetus from 2008 to the present day has been Fed policy; every time changes in Fed policy threaten to occur, the market enters zone 2. See Figure 4.2 for a look at the characteristics of zone 2.

Figure 4.2: Characteristics of zone 2.

Zone 2 can be confusing because it can look so much like zones 1 and 3. When trading in zone 2, short premium trades can be highly effective, as zone 2 tends to see volatility revert lower, not higher. A sale in zone 2 when the zone reverts back to zone 1 tends to make a lot of money. However, as the market enters zones away from zone 1, time becomes a factor. Additionally, you should understand that simple trades become trickier in zone 2 because of the potential for volatility to move higher. While most of the time zone 2 will revert back to zone 1, it is not a sure thing. The times it doesn't, and vol moves to zone 3 and 4 (which we will discuss) are when traders can get caught and lose a lot of money if they do not manage risk properly, or are too slow to recognize that volatility is not reverting back to zone 1.

Characteristics of Zone 2

Zone 2 can seem to present a real opportunity to the option seller if vol drops back to zone 1. However, if it stays in zone 2, this can create a problem for the trader used to trading in zone 1 when the market goes on to transition to zone 3 or 4. In zone 2, it is key to understand that the strangle or condor may seem expensive, but may actually be cheap given the movement to follow.

One advantage of zone 2 is that momentum becomes less of an issue over weeks of trading as opposed to a move that might occur in the first day or two. However, in zone 2 momentum can cause real pops in volatility, and the market can have small moments that seem to be panic. Generally speaking, when vol is in zone 2 it is the price received on the trade that matters, and directional price movement in the underlying becomes less of an issue. Yes, the market is moving around much more in zone 2, but the market is not moving in one direction.

Zone 2 is quite possibly the best zone for the option seller. However, if you do not prepare for zone 3 or 4, you may set yourself up for an ending worse than *The Sopranos*. Zone 2 is interesting, since it can move to zone 3 or jump to zone 4.

Zone 3

Zone 3 is in many ways like zone 2 in that it represents transition. While zone 3 occurs less often than zone 1 or 2, it is not uncommon. It can happen for a few weeks at a time due to non-US-based risks. Events that cause zone 3 are potentially systemic, but not quite there yet. See December 2014 and January 2015 in Figure 4.3. Note the divergence between the HV10 and HV20 lines, the widest on the chart; this was followed by fast convergence by the end, typical of rapid changes expected to occur during transitions.

Figure 4.3: Characteristics of zone 3.

Zone 3 is a time where vol is high, well above the long-term mean of volatility. It's the point where things can fall off the rails, but . . . often vol stops just before that happens. It can represent levels where things *could* have gone wrong but didn't. That said, zone 3 represents the market's recognition that there is real fear in the market. This is a time where the market might be really moving 1%–1.5% per day, and smaller moves are not the norm. I think the best word to describe this zone is *transition*. It's a level that the market tends to hang around in when it's transitioning from low to high vol or high to low vol. Zone 3 is also the level the market will move toward when there is a threat of a serious issue.

Zone 3 represents truly high vol somewhere above 22% in something like the SPX (as measured by VIX), but below market panic. Zone 3 can be seen most notably in January of 2016 when the VIX held in the 20s for a long time without a true panic sell-off.

Figure 4.4: HV in the SPX that might occur in zone 3.

Figure 4.4 shows how realized vol can climb continuously. That climbing movement should produce a high VIX. One of the advantages of zone 3 is the huge premiums that can be received relative to where options prices have been in the past. In addition, the tendency of this zone is to head back to zone 2 and even zone 1 relatively quickly. Money can be made trading from the short premium side (selling options), assuming you do a good job of portfolio management (a subject we will delve into). Movement will be higher, but this is often where fear can top out. When that happens, options sales can be juicy, as fear in the market is maxed out. IV maintains a huge premium over movement, but when movement dies, IV can completely collapse. Take a quick look at how IV tanked coming out of “Brexit” in Figure 4.5.

In Figure 4.5, VIX fell from more than 20 to less than 15 in about a week. That’s a massive move.

Figure 4.5: Movement in the VIX as it moves from zone 3 to zone 2.

If you have been a premium seller and you're getting beaten, this can be the level where you are tempted to roll out and increase size because premiums are so juicy. Generally speaking, selling premium wins, unless the market is entering a true volatility event.

However, it is also the time where the market truly spears traders. The market can move from zone 3 to zone 1 multiple times in a short period – as quickly as a week – and you can win nicely on those trades. If you short premium in this zone just once and it moves to zone 4, the trade may blow up. The description of this zone as *a transition* applies; when it does represent a transition, vol can completely explode, costing you serious dollars in the process.

Zone 4

This is the panic zone. Zone 4 is the rare air that we seldom see. When we see zone 4, the market is in complete disarray. It can represent a 30% vol if the market has been trading in the low 10s, or more likely into the 40s or 50s if the market is coming from zone 3. In 2020, we even saw the S&P 500's 10-day historical volatility hit 120. This is when the market's worst fears are realized. Lehman Brothers is going bankrupt, or the US is getting downgraded along with Europe having a crisis – most recently the

COVID pandemic that spiked fear in markets worldwide. You typically don't know zone 4 is happening until you wake up in the morning and futures are down *big*. It typically represents being in zone 3, and seeing an opening gap in the S&P 500 eclipsing 2%. It can lead to a flash crash in today's algorithmic trading. We most recently saw zone 4 (as of the writing of this book) in the first half of 2020, for example (see Figure 4.6).

Figure 4.6: Note the zone 4 spike.

The issue with zone 4 is that volatility can go up and up and up. In 2008, the market entered zone 4 in August and did not leave zone 4 until April of the following year. The truth is that while it can seem profitable to sell premium in zone 4, it more often than not loses. This is because vol can keep going for a *long* time. In August 2015 selling premium worked out, and it did in 2011 as well; it did *not* in 2008, to the point that it would have more than swallowed the returns made selling in 2011 and 2015 combined. Selling premium in early March 2020 wouldn't have worked out, but if you had waited for volatility to wane, it would have. During the initial stages of the COVID pandemic, we saw volatility stay in zone 4 for quite a long time, however, trying to sell strangles or condors at the peak would have been a poor strategy due to the market rally that followed. As we state often, the key to vol is to buy high and sell higher.

So, when is it safe to sell vol in zone 4? Look for a price/IV divergence. This is when the market hits a new low *after* a vol spike but implied volatility (which we will discuss next) does not spike to a new high, such as pictured in Figure 4.7.

Until then, zone 4 is the cash zone, meaning that one should take cash as a position rather than trying to be a hero and attempting to make a fortune. Although, for the more seasoned trader it can be a surgical strike zone; there are opportunities to be long vol premium and short vol premium, but only in brief stints.

The properly managed portfolio will do well if zone 4 occurs, but for the average retail trader, zone 4 typically leads to a major haircut on profits.

Figure 4.7: The SPX and SPX 30-day implied volatility (bottom) showing price/IV divergence.

Implied Volatility

Implied volatility and realized volatility are very similar. We are going to touch on IV over and over again. For now, we are going to discuss the small differences between the zones when it comes to IV and HV.

The two concepts are sisters. Sometimes realized vol leads implied volatility; other times implied volatility leads realized volatility. Recall that implied volatility is the market's interpretation of what is expected to happen between the day of the trade and the options expiration. It has the same zones as realized volatility, but they can happen at different times, and represent different market events. More so than realized vol, implied vol is more the market's interpretation of the threats of zone 3 and zone 4 than it is the actual occurrences of those zones. Basically, the fear of underlying movement entering zone 4 can cause zone 3 or 4 to occur in implied volatility terms, without zone 3 or 4 type of movement actually happening. You may notice the market tends to overprice in times of low realized vol with high implied volatility and under-price high realized volatility during times of low implied volatility.

Here I'll quickly discuss the zones associated with implied volatility. Zones 1–4 represent the same zones; it's just the causes that change.

Zone 1

Similar to realized vol, zone 1 with implied volatility represents ultra-low volatility, and it can stay in this zone for a long time. The main difference is how implied volatility moves in and out of zone 1. Typically, zone 1 will be led by implied volatility both in and out. With the S&P 500, zone 1 is below 14 in the VIX. When the market has been moving around, before realized vol measures recognize movement is stopping, implied volatility typically starts to fall. When the market starts to move around, implied volatility will start to move out of zone 1 before the underlying. IV is often described as a leading indicator. However, IV, especially in indexes, has also been described as a lagging indicator. The fact is that it is *both*: IV can lead, as it often does in zone 1, or it can lag, as it tends to do once it enters the other zones.

With zone 1, the extremes in implied volatility will be less than the extremes in realized vol. When RV gets to 5%, IV might get to 10% or 11%. On the other end, there may be periods when realized vol gets higher quickly, but implied volatility stays somewhat near where it was before the move.

Zone 2

Zone 2 is normal and exhibits standard levels of volatility; it represents a VIX in the 14–18 range. If you look at the occurrences of implied volatility, the VIX will land between 12 and 16 more often than in any other range (see Figure 4.8).

Figure 4.8: Zone 2 as seen in the VIX.

This is the meat of the market, and unlike RV, where zone 1 is possibly the most common zone, in implied volatility, zone 2 is going to be the most common area in which the options market hangs. Implied volatility in zone 2 tends to be above RV and, when movement increases, zone 2 is where implied volatility is most likely to be slow to react. Within zone 2 the market typically acts normally. The S&P 500 will be generally rallying; there may be blips of volatility, but the market is moving higher. Zone 2 will have the bull market highs in volatility. When there is a Fed meeting, the high end of zone 2 is likely to be reached. Zone 2 is where the market moves ahead of non-farm payroll reports. Within individual equities, there may be some earnings reports, especially in lower vol stocks. To learn zone 2, follow the VIX during the bulk of 2012 and 2014.

What makes zone 2 different is that unlike realized volatility, which can hang in zone 1 for a long time, even when realized volatility is in zone 1, implied can hang at the low end of zone 2 rather than dipping into zone 1. It takes an extremely long period of time to pull IV into zone 1. Thus, even if realized volatility is 8%, 9%, or 10%, implied volatility might stay above 14%. When IV is in this bottom range of zone 2 it can stay there for a longer period of time even if RV starts to move. And once IV moves into zone 2, it tends to stay in zone 2 for too long rather than quickly move back into zone 1.

Traders should plan to do the bulk of their trading within this IV zone 2, and then expect to see RV in zone 1 *and* zone 2. However, be aware that zone 2 in both realized and implied vol invites a recency bias, the belief that things will go back from whence they came. Traders that trade zone 2 think IV is going to be in this zone forever, but it won't.

Zone 3

Zone 3 represents elevated volatility in the VIX, generally at a reading of 18–23, but can be as high as 28 or 30. Zone 3 is when the market goes through a short period of fear, but has not yet hit the panic zone. Zone 3 occurs less often than zone 1 and zone 2, but it can happen quickly. Typically, unlike zone 1 and 2, it happens simultaneously with market movement. When the market starts having multiple 1% daily moves, it is getting into zone 3, and IV will quickly catch up to RV. IV can spike into zone 3 with movement of the underlying (realized volatility) meeting it; one notable example is the fiscal cliff in 2012. In 2012, IV got to 28% in the VIX, while movement never came close. Zone 3 can be scary but it presents some high IV that can give you a chance to sell market premium if you are positioned properly. On the other hand, when IVs get to zone 3 they can expand . . . for a long time.

While individual equities can reach zones 3 and 4 in bullish situations (such as a short squeeze), Zone 3 IV in indices is somewhat rare in a bull market; however, it can also happen in short spurts. It happened in 2012 ahead of the fiscal cliff, and it happened during 2014 several times. In a bear market, zone 3 becomes much more common. The SPX will spend months in zone 3 with blips of zone 4. The good news is that you can see zone 4 coming in a zone 3 situation in a bear market. Looking at both bull and bear, zone 3 is when markets tend to transition to serious volatility.

In zone 3, be prepared to sell premium, but be prepared to hedge and to leave money on the table. Traders willing to trade small and opportunistically will be able to make many small trades for short periods of time that make more than what you might make in zones 1 and 2. Quickly touching on sizing, this zone invites smaller size and more traders for shorter periods of time.

Zone 4

Just like zone 4 in realized volatility, this is the market in total panic, and represents true fear in the market. The VIX is typically above 30, although zone 4 could be lower than that level. Like zone 3, the market is moving. However, unlike zone 3, zone 4 is almost always reactionary. IV pops into zone 4 because the market popped into zone 4. As rare as it happens, zone 4 is the level you need to be prepared for. Your approach to trades should flip; when it comes to vol, sell low and buy lower and vice versa. This is especially true with IV.

The main difference between RV and IV in zone 4 is that IV tends to be a little slower to calm down. Yet, zone 4 has a lot of pump fakes; in 2011 the market went to zone 4 in August for a few weeks, calmed down, and then showed its face again in October. In zone 4, you should be short and sweet and on the attack. The slow play is not in effect and standard "income" trades should be dropped because they will likely get caught. This means that if you have a "system" to sell iron condors, butterflies, or other short premium trades, you also need to see what is in front of you and *not* blindly trade your system. The standard trades most traders rely on are *not* what you should be trading in zone 4. You need to be ready to trade for an hour or a day, *not* all day for three weeks through systematic short premium trades.

Zone 4 is, in short, almost exactly the same as zone 4 in the RV section because the two are so similar, but without the duration. You should be willing to execute short trades in zone 4 and close them when the market threatens zone 3. More importantly, you should be willing to flip your approach to trading and buy premium or set up hedges in zone 4. We will spend a chapter discussing hedging and how to trade in zone 4 in later chapters.

Volatility in 2020

Of course, we would be remiss to talk about volatility – specifically, zone 4 volatility – without discussing the events of 2020 during the COVID pandemic.

The beginning of 2020 saw both realized volatility and implied volatility churning comfortably in zone 1. In late January, the beginning of COVID fears, and an increase in COVID cases in the United States caused the VIX to gap higher to hit 19, and IV remained in the low end of zone 2 for the next several weeks, as pictured in

Figure 4.9. Meanwhile, the S&P 500's realized volatility only briefly climbed into zone 2, and was quicker to retreat back to zone 1 (this is an excellent example of IV being a "leading indicator" for zone 1, as well as an illustration of how IV tends to park itself in zone 2 as RV stays in zone 1).

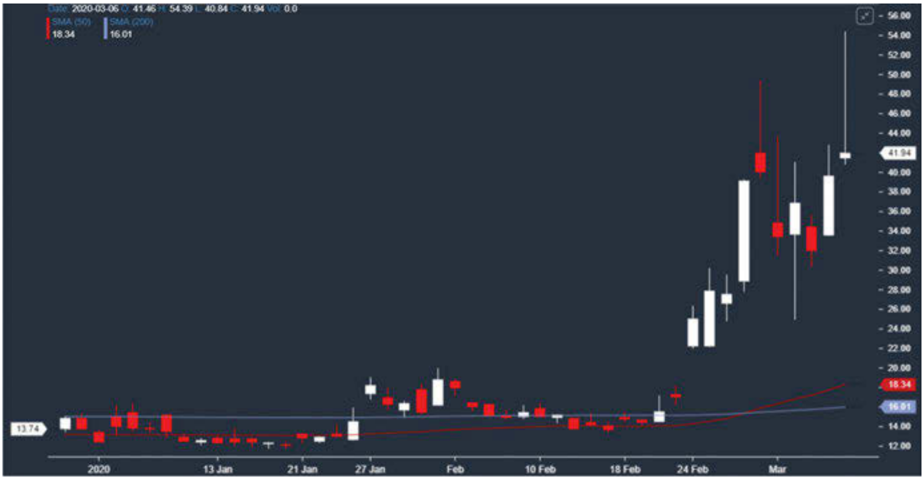

Figure 4.9: A daily chart of the VIX from January 2020 to early March 2020.

But of course, late February is when the fun really began. COVID fears shocked markets worldwide, and the S&P 500 began its tailspin. On February 24 the S&P 500 fell over 3% in a single trading session, and both realized and implied volatility began to really move, as seen in Figures 4.9 and 4.10. While the VIX led the initial volatility pop out of zone 1, it transitioned to a lagging indicator as realized volatility spiked into zones 3 and 4. Recall that implied volatility moving into zone 4 tends to be reactionary – this is what we are seeing here.

Both RV (blue and white lines) and IV (red line) hit zone 3 in short order. As we discussed, zone 3 for realized volatility tends to be a "transition" phase, and where we often see the market move when there is a threat of a serious issue. In this case, we are seeing zone 3 represent a very brief transition between low volatility and true market panic.

Within days, both realized and implied volatility had reached zone 4 – and were ready to explode to new highs. This is an excellent, if extreme, example of why traders must be so cautious when trading in zone 3. Trading zone 3 with the expectation that volatility will fall to zone 2 would have ended in disaster, as volatility continued to blast higher.

Note that while movement in the S&P 500 topped out near 120, the VIX never reached the same peak – rather, it topped out at 80, and actually began to decline before realized vol did, and as the S&P 500 was still dropping. During the volatility spike,

Figure 4.10: S&P 500 performance compared to the 10- and 20-day HV and 30-day IV in 2020.

selling premium would have been inadvisable until late March or early April, which is when we saw the VIX trending lower even as the S&P 500 continued to fall.

Both IV and RV stayed in zone 4 for quite some time – we didn't see either of these measures drop back into zone 3 until the last days of April. While the pre-spike zone 3 represented a transition to higher volatility, once volatility was trending lower, zone 3 played its "transition" role again – but this time it was a more extended transition from high volatility to low volatility. Furthermore, while IV

Figure 4.11: Implied volatility (red line) compared to 10-day and 20-day historical volatility (white and blue lines).

topped out sooner than RV and began to decline first, IV stayed in zone 3 for an overall longer period of time, which can be seen in Figure 4.11.

This is a great illustration of how IV tends to stay elevated for longer – note that even as movement fell back into zone 2 in late May, IV remained in zone 3 in the months following, and didn't hit zone 2 until August, when realized vol was already back to zone 1. Additionally, like we mentioned in our discussion of realized volatility in zone 2, it is not uncommon to see "pops" of volatility occur, and those "pops" into zone 3 are plentiful throughout the rest of 2020.

Chapter 5
What Is Edge?

Edge is the value created in an option's sale or purchase when you can exploit fair value to produce consistent profits. There are those who teach that edge is the embedded "extra premium" that naturally exists in selling options. This is the foundational thesis of my first book, *The Option Trader's Hedge Fund: A Business Framework for Trading Equity and Index Options*. In that book, I introduced the concept of TOMIC (The One Man Insurance Company) (which we briefly covered in Chapter 1). This is an approach to trading options based on market volatility and discipline, a technique similar to that used for risk assessment by insurance companies. In this chapter, we begin to break that concept apart by discussing the relative value of an option, and how to determine if an option should be bought or sold. Thus, edge is not just the "insurance" value of an option; edge is the value created when you can buy an option cheaply relative to normal levels or sell an option at a higher than normal rate. For instance, if you have a value of $1.00 on an option and the market maker acquires edge from a bid–ask spread, the trader that is initiating the order wants to buy it for *any* number less than $1.00. You may find a time period where implied volatility (IV) is so depressed that the $1.00 option is offered at a buy of $0.95, or a sale of $1.05, for example. The question many traders have when evaluating option pricing is how to tell a good trade from a bad trade. Now we will delve into the relative value of an option, how traders develop the true value of an option, and how to determine what should be bought and what should be sold.

Edge

What is edge, really? Edge, in short, is exploiting option pricing to take advantage of overly cheap or expensive contracts. To capture edge, traders sell premium when IV is high, and buy premium when IV is low. How do they recognize this? It starts with knowing the volatility of the product under consideration. S&P 500 (SPX) traders that stand in the pit all day generally *know* the volatility. One of my true mentors of trading, as I mentioned in Chapter 3, was "the Gator," Scott Kaplan. In the products he traded, he knew volatility levels so well that he could walk away from the pit or the trading screen for a week, and if I named the volatility levels and the current level of the S&P he could walk into the pit and start trading. Thus, when he was in the pit, watching trading all day, he could spot the good trades from the bad in an instant.

I am not expecting all the readers of this book to understand volatility at the level of a professional trader; however, you can prepare to trade like a professional. Additionally, unlike floor traders who only get to take the trades sent to them, off-floor traders can initiate a trade. This gives you the ability to skip the "average trades" and only go after the trades that exhibit edge. The key is volatility charts. Yes, every trader

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should have a list of stocks they follow closely. But because of the availability of good vol charts and with a solid understanding of volatility zones, you should be able to figure out where IVs of a trade are within a few minutes. The steps are simple:

1. Review the historical volatility (HV) of the underlying at the 10-, 20-, and 60-day levels.
2. Review the IV of the product.
3. Establish the product's trading zones for HV and IV based on steps 1 and 2. In what zone is the product's HV and IV currently trading?
4. Know the current zone of the whole market.
5. Determine if there is a trade with edge.

Let's walk through this trading process.

Like the market as a whole, each stock has its own levels of realized volatility and implied volatility it tends to stay within. The product will reach levels that are at the extremes, but it does not stay there for long, and it will have normal levels in which it meanders – between zone 1 and zone 4. Let's take a look at a chart of movement in Apple (AAPL) from January 2021 to July 2021 at the 10-, 20-, and 60-day HV levels.

10-Day HV

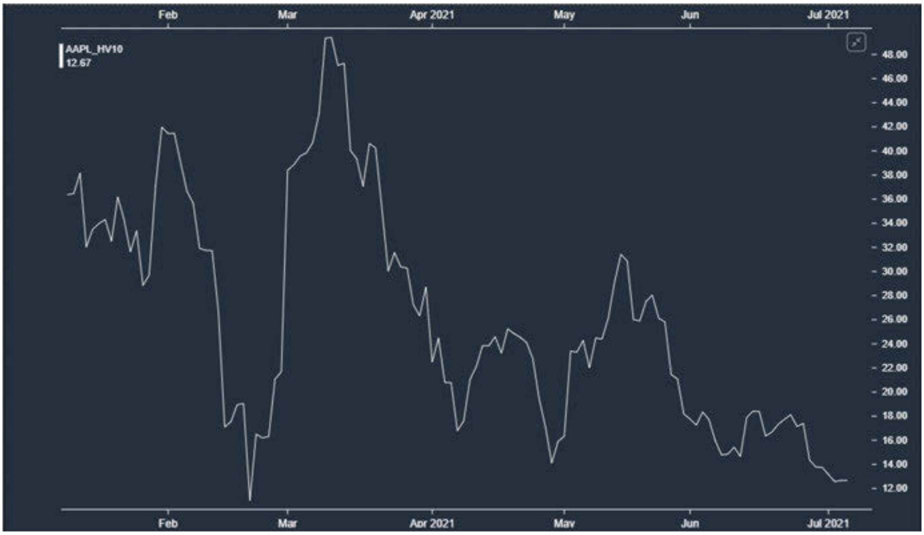

Figure 5.1: 10-day HV of AAPL over the period of six months.

As one can see in Figure 5.1, 10-day HV (10HV) has its ranges; at its absolute extremes, it can get near 50, as it did in March 2021. Looking at HV10, I would put zone 1 at about 17% HV or lower. I would put anything above 35 in zone 4. Zones 2 and 3 are a little more difficult. You might eyeball zone 3 above 26 and zone 2 between 17 and 26 (zone 2 should normally be the widest zone).

20-Day HV

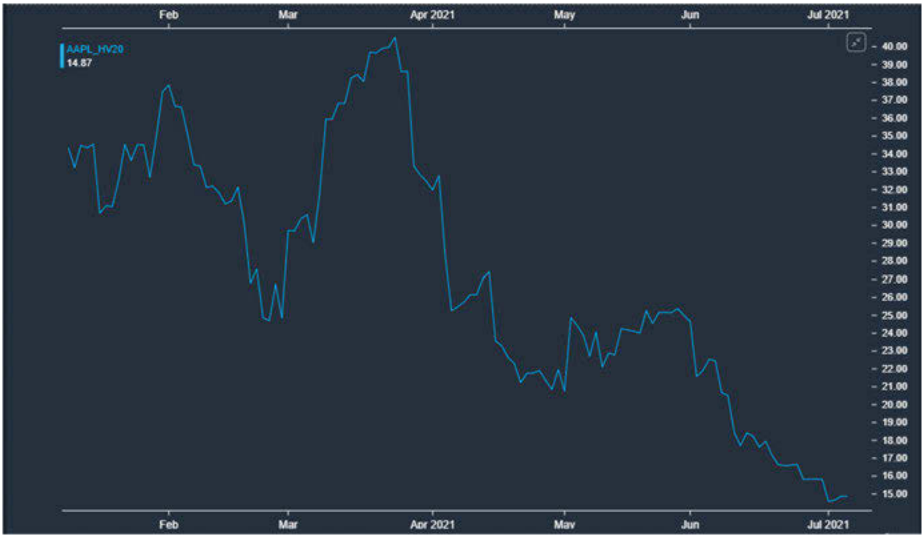

Figure 5.2: AAPL 20-day HV for the same period.

In the 20-day HV graph in Figure 5.2, the same principles hold true, although the zones will represent different levels in 20-day HV. This is less representative of near-term realized vol, and more so shows me how much the underlying moves on a more smoothed-out basis. You can see the levels of 20-day HV are: zone 1 below 18, zone 2 from 18 to 25, zone 3 from 25 to 32, and zone 4 at 32 or higher.

60-Day HV

60-day HV zones will still have some similarities to the zones of the market, and to the previous zones of the underlying. However, it should slow down the trends. In this case, Figure 5.3 shows how AAPL HV was trending lower after peaking in mid-March. Longer term HV is a great tool to help traders to recognize whether a pop in 10-day or 20-day HV is just a blip, or actually the start of a true volatility swell. Small blips in the 10-day and 20-day HV over the 60-day HV are just that: small spikes on volatility. But when we see two shorter-term HVs break above the 60-day and continue trending higher, and the 60-day HV begins to follow, that can be a sign of a volatility swell, which is the type of event that leads to market corrections.

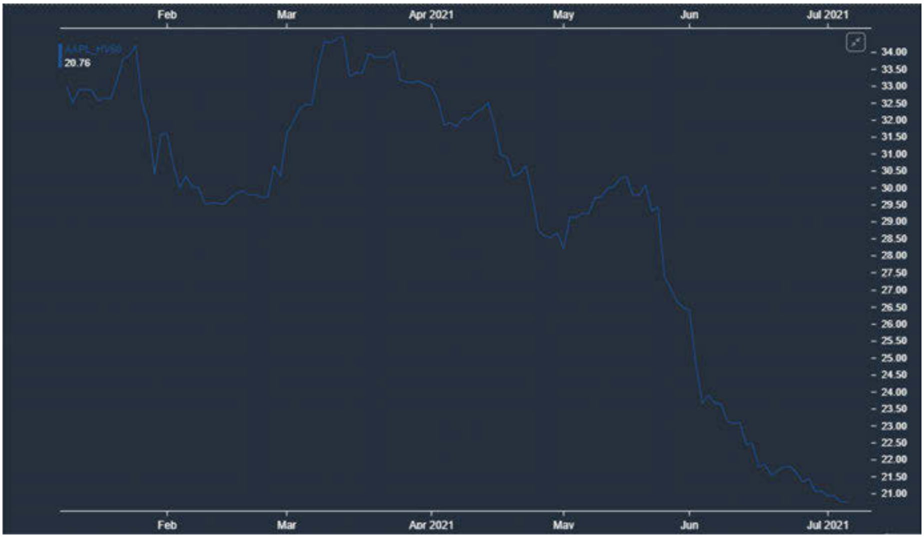

Figure 5.3: 60-day HV for AAPL for the same period.

Review the IV of the Product

Unlike HV, which should have many iterations that traders look at, IV has fewer durations to study, but with more dimensions. “Durations” are the days to expiration of the contract from which IV can be derived, typically one month, two months, or three months. Dimensions are all of the different variants of IV in a contract month, different strikes along different contract months, or how puts and calls trade in the different durations relative to at-the-money (ATM) IV, or how far out-of-the-money (OTM) options trade relative to nearer-the-money OTM options. Additionally, dimensions represent the relationships of one expiration duration to another. IVs are in many ways four dimensional – ATM, above the money, below the money, far out of the money – and each of these dimensions can be looked at across different expiration months.

Traders reading this book, for the most part, really only need to pay attention to one duration, maybe two. The first step is to figure out high and low 30-day IV (IV30), which is the most important duration. From 30-day IV, every other piece of implied volatility is derived. It’s the duration that is most active, it’s the place that every trader looks to evaluate premium, and it is the duration that is most fairly priced. In viewing IV30 and getting an accurate representation of where implied volatility with a duration of 30 days to expiration is, you can formulate any trade and have a reasonable chance at creating edge.

Of course, you will also need to know what skew and term structure look like (and thus, in many ways, you will be looking at many durations), but IV30 is so important that you could skip skew and term structure and still create trades with edge. (By the way, *don't skip skew and term structure*. Just because you can, doesn't mean you should; there is far more edge to be found by examining all three.)

IV30

We are going to use LiveVol for AAPL data in our 30-day IV examples; however, many other brokerage platforms also offer IV data. In addition, for those that want to use an extremely discounted broker, the Chicago Board Options Exchange (CBOE) puts out a host of indexes based on VIX that give an accurate view of 30-day IV. For instance, while we are going to use LiveVol's IV30 for AAPL, CBOE publishes VXAPL, which is the VIX of AAPL options with 30 days to expire. Let's take a look at a five-year chart of IV30 for AAPL, as shown in Figure 5.4.

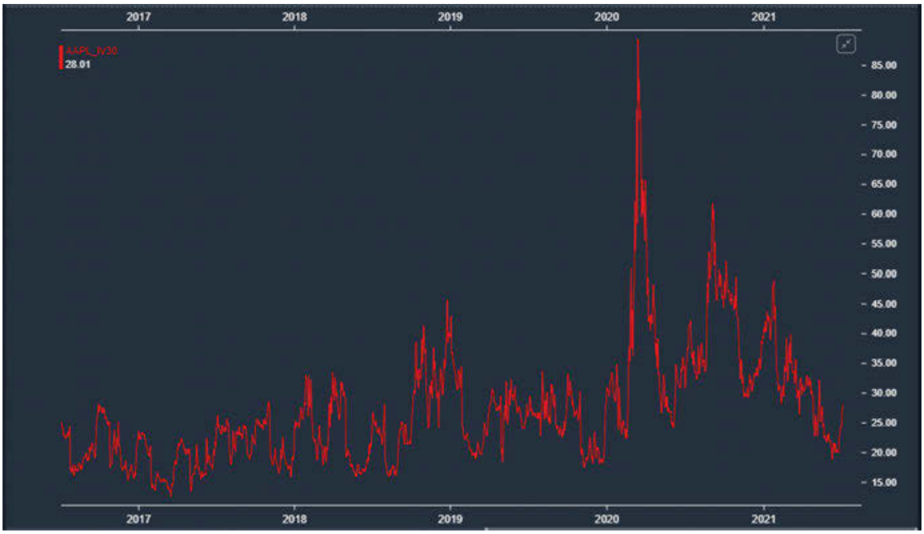

Figure 5.4: Five years of 30-day IV for AAPL.

While you can see that there are highs and lows, 30-day IV seems to have a level it centers around, even more than HV10, 20, and 60. In this case, I would put it between 23 and 26 based on the IV levels to which AAPL tends to gravitate. Outside of that, you can see stress levels and extremes. (It is also important to note that 2020 was an exceptionally high IV year, which illustrates where extremes can go, and how IV eventually returns to its norms.) Reviewing the extremes, and knowing when earnings are coming, you can set up many trades. From here, you can set up a trade somewhat easily without looking at any other pieces of vol. However, you would be trading on only a partial story.

Term Structure

In reviewing the above, you might think, "I want to buy options." Of course, you can make many trades, but without looking at term structure – how the contract months are priced relative to one another – you can't develop the best method of determining what to buy and (if you are so inclined) what to sell.

Let's take a quick look at AAPL's term structure from LiveVol. Figure 5.5 below represents the aggregate vol (normalized implied volatility) in each contract for AAPL. In short, if you were to run an aggregate vol in the month of October, the vol would be 21.35%. If you were to run the same aggregate in November the IV for AAPL options in that month would be 25.33%.

Sep23(W)	Sep30(W)	Oct07(W)	Oct14(W)	Oct21	Oct28(W)	Nov18	Dec16	Jan20'17	Feb17'17	Mar17'17
22.97	21.96	21.17	20.87	21.35	25.59	25.33	23.88	23.21	24.68	24.22
-2.63	-1.48	-1.05	-0.73	-0.63	-0.77	0.00	0.09	0.13	-0.20	-0.13

Figure 5.5: The aggregate vol in each contract for AAPL, and the daily change in IV on the day these numbers were collected.

Looking at the above, you can see that if you were looking to buy options in the near term, the October 7 or October 14 contract might make sense because relative to the rest of the contracts, they are low-priced. Additionally, aggregate IVs for the front three October contracts were lower than the months in front *and* the months behind those contracts. If you want to own a longer-term contract, you might look at January 2017, since IV is cheaper in January than it is in December and November. Alternatively, if you are looking to sell options without explosive gamma against a long, you could sell the September 30 contract for a nearer-term trade. Longer term against a January trade, you could sell November or December *because* they are more expensive. The point is that while you might want to collect premium, without looking at the term structure you can't pick the best spots to trade.

Skew

Skew is the relative price of OTM puts and OTM calls, when compared to ATM implied volatility. (See the Appendix for an introduction to skew.) Typically, in equities, OTM calls will have lower IV than ATM options and OTM puts will have higher IV. However, the IVs of OTM puts and calls relative to ATM options move constantly. Thus, skew itself can become expensive or cheap. There are times where puts, regardless of strike, are expensive, and at other times calls can be as well. Calls and puts tend to move freely from each other as the option flow (customer orders) tend to be unrelated to each other. By having an idea of how expensive puts and calls should be, and where skew normally trades, you can create trades that exhibit edge. This is *especially* true in the indexes where there is less put selling on a relative basis.

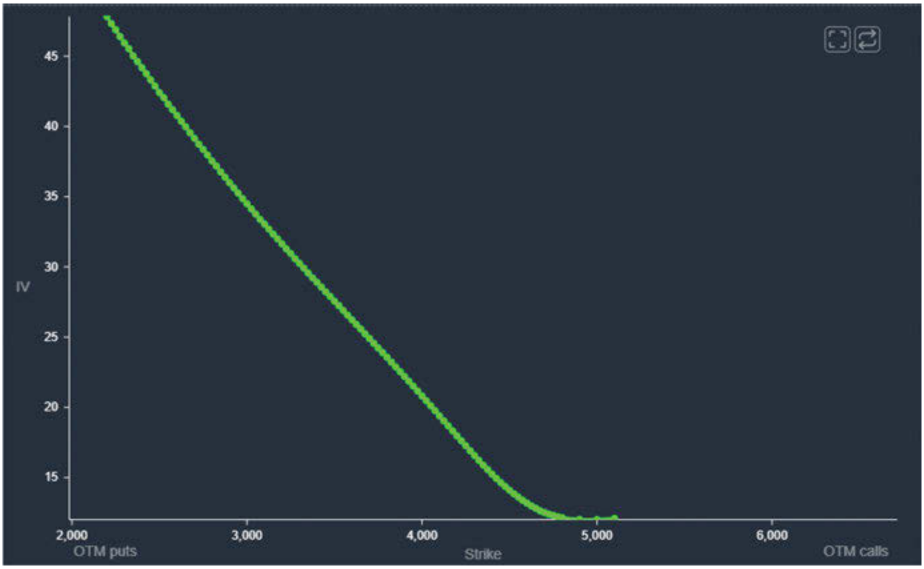

Figure 5.6: A steep skew curve.

When skew is steep, as in Figure 5.6, trades may be extremely favorable, and when skew is flat, trades may also be favorable. However, trades that work in one condition tend not to work in the other. When skew is normalized and you don't see an overall advantage to being long or short one side of the curve (skew as a whole is not "out of whack"), skew can help in strike selection because it will help the trader see which strikes may be mispriced even if the curve is mostly normal. Individual strikes can be out of whack even if the curve as a whole is not.

If you aren't trading skew, you can still use it to your advantage, especially in equities, as one strike can get overbought or oversold. By looking at the curve, you may be able to pinpoint opportunity between strikes. Strikes as close as one price increment might offer an advantage over another. You can figure this out by looking at the curve within a one-month range. This is *especially* true in equities where one customer can push things around. If customers want to own a call or put, they can move volatility by insisting on buying that strike; the other strikes around that option will not move nearly as quickly and may produce an opportunity. This is, as we explained in Chapter 3, because the nature of market makers is to not want a position. Because they are trying to adjust for customer order flow, if a large customer continuously buys or sells a strike or contract month, that customer's order flow will move volatility. On the floor, we used to call this action "pushing vol around." This can happen even in some of the most liquid equities. Figure 5.7 presents a snapshot of AAPL skew.

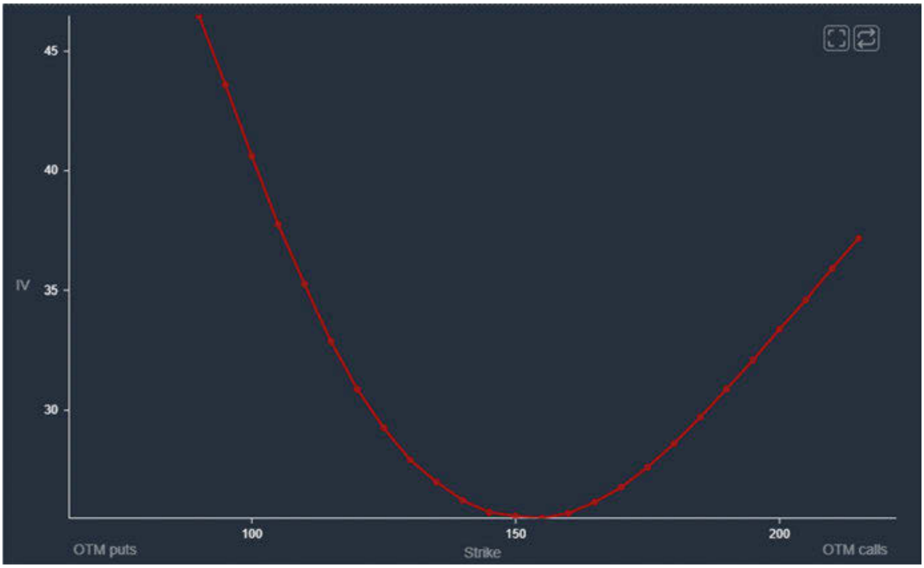

Figure 5.7: AAPL skew with AAPL trading near $145.

Within equities, skew can get out of whack, but it is subtle at times. It almost always develops if customers are buying or selling certain strikes. In equities, skew can be totally different, and something as simple as avoiding a bad sale or making a good buy can make a huge difference in the result of a trade.

Know the *Zone* of the Market

As we discussed in the previous chapter, the market as a whole has zones – and this applies to any product. Whether you are looking at cornmeal, gold, or oil options, you still need to know what the root vol (the overall volatility for that particular market) looks like in the product. This is because there is always a dog and always a tail when it comes to volatility. If you want to dig down a rabbit hole, you could say, "This market affects the next market, and the next market affects another," and so on. However, I can tell you, while professionals are aware of what is going on around them, until something bleeds into what they are trading, they only look at the main "dog" of the product. For the average trader, this makes sense as well. Until volatility "bleeds" into the market they are trading, it makes little sense to get overly concerned about intermarket volatility. This doesn't mean you should ignore macro events; it means not allowing IV decisions to be affected until the volatility actually starts to move.

When trading equities, there is really only one "dog": the S&P 500. You might argue for some small companies it's the Russell 2000 (RUT), or the Nasdaq 100 (NDX) in the case of some technology stocks. However, in the end, all stocks are driven by movement in the S&P 500. If you know the current zone of the VIX, you know the zone of the SPX. For equities, if you know the zone of the SPX, you know the zone of the market. Volatility in most every ETF and stock is correlated to the S&P 500's vol, save a few commodity ETFs, and possibly the most defensive stocks. In the most extreme times, even uncorrelated ETFs and defensive stocks will have volatilities that start to correlate with the VIX. Take a look at Figure 5.8, where the vols of a few unrelated ETFs move with vol of SPY.

In Figure 5.8, you can see that while the volatilities don't move in lock step with SPY, you should easily be able to see that if the above indexes are not tied, they are clearly connected with the individual ETFs being higher than SPY, but moving with the index nonetheless. The point is that the zone of an ETF or stock as a relative level is determined by the overall market. In short, you cannot determine the zone of IV of an equity or ETF without first knowing the IV of SPY.

Looking at individual equities, going back to our charts of AAPL HV, Figure 5.9 shows that when the market was in zone 3, as it was in January of 2016, AAPL hit its zone 4. The same holds true for June of 2016.

The same holds true for every other HV chart.

Select the Trade

Now that you have established the zone of the market, and have a strong understanding of the direction of HV – is it going up, down, or sideways? – you can make a decision on stock movement. Now that you have looked at IV level and the IV of

Figure 5.8: IVs of several sector ETFs of the S&P 500 from top to bottom: XLF, XLU, XLK, XLP, and SPY.

Figure 5.9: HV10 of AAPL relative to HV10 of the S&P 500, October 2015–August 2016.

the overall market, you can determine what option trade fits the current expected realized vol. You can figure out whether trade conditions exist because of the equity market as a whole, or because there is an edge with the specific trade. It is important to *never* get lost in a stock or ETF. The market drives everything in crisis. It's the rest of the time that edge can be found. Skills in evaluating realized vol, implied vol facets, and the overall market will enhance your trading skills. Without that skill, traders are unlikely to succeed. In the next chapter, we will begin to put the rubber to the road in showing you how to evaluate when to enter many trades that can be profitable . . . given the right circumstances.

Chapter 6
Locking in Edge

We just spent the last chapter explaining how to spot edge. However, given the movement of the market, edge in a trade can account for nothing. A trade is not a winner until the value is locked in. In this chapter, we will talk edge and locking in trades.

When I started trading, Scott Kaplan, my trading mentor, asked me, "Where is the edge?" What he meant was: Is there a way to lock and/or protect that value? Because markets are always changing, if the value of a trade isn't locked in, the trade might not hold value. If the trade doesn't hold value, it doesn't have edge. Thus, the only way to trade with edge is to buy something against a sale, or to sell something against a buy. Let me give you an example from a market maker's perspective.

When I was a floor trader, I made markets in ETF trading as the iShares MSCI Emerging Markets Index (EEM). At one point near the close, a broker came in looking to buy a near-term strangle (a call and a put at two different strike-prices, but with the same underlying and expiration) and, as I recall, the strangle had about 60 days to expire. (For more information on strangles and other spreads mentioned in this chapter, see Chapter 7.)

What made the strangle so interesting was that I had it worth about $0.10 less than what the broker was willing to pay. The set-up was great, and on its surface the strangle looked like a winner. However, it was late in the day, and you never know what customers will pay because they have a reason to think the stock is about to move. A strangle with $0.10 edge in it looks great until the next day, when the underlying moves dramatically, and the edge is lost (something that happens if the trade is left alone, and edge is not locked in). Therefore, on its own, I would have only done this trade in a small size. However, if I could "lock in the value," I would want as much of this trade as possible.

Here is how I "locked it in": Another broker, at the exact same time, was trying to sell a call tied to the stock that had about a 90-day duration, at the same time the original broker was trying to buy the strangle. That meant I had an option to sell to help me lock in my edge on the strangle. The option sale (from the customer to me) was just a touch better than fair value. I had about a penny or two of edge in the trade. On its own, I would have never bought the calls, but with the strangle available, that trade went from a marginal value to crucial to me making money. I called Broker B, asked if he still had his calls to sell, and bought 1,000 contracts. Once I had secured a purchase of the calls, I sold the other broker 750 of the strangles. Using one broker's trade against another, I managed to lock in value in the trade.

I was long in what amounted to a cheap longer-term straddle: calls plus short stock sold at delta neutral, creating a synthetic straddle. I was able to make this trade delta neutral because it combined long calls with long synthetic puts, along with long calls and long stock, against a short near-term strangle. With the whole thing at

https://doi.org/10.1515/9783110697865-007

delta neutral, the trade amounted to a long calendar spread for $0.07 ($0.05 in each option from the strangle and $0.02 in the calls). Even market makers do not expect that kind of value in a calendar spread, which, priced on its own, might typically have about $0.03 in it.

You may wonder how I determined the right number of contracts I needed to offset the trade, and how I knew that the two would "lock in" value. The answer lies in dynamic vega management. In Chapter 14, we will dig into dynamic vega and how to quantify offsetting spreads. I used these techniques to piece together the trade. For now, think of the edge I captured as more than twice what I would normally get from two different brokers. Additionally, knowing that this wasn't one customer with an agenda, but two customers with offsetting agendas, made me more confident in the trade. Normally, if I saw a calendar spread with $0.07 of edge, I might try to do 200 contracts. However, because I pieced this together, I could do more, knowing that it wasn't a trader who was "too smart" (a trader who knows something I don't).

The Retail Trader

The retail trader does not have the advantage of having the ability to trade directly with brokers to generate offsetting trades like the one above. However, the power to initiate trades means that the retail trader can create their own edge. The key is finding edge via a *spread trade*.

As a retail trader, you must accept that one leg of the trade will be executed at a fair value price. However, if the other leg of the trade is too cheap or overpriced, you should not mind executing one leg at fair value to capture edge in the other, because *any* edge to a retail trader is a win. The key is to follow the right steps:

1. Establish the option you *want* to trade (the leg with edge).
2. Establish the offsetting contract that is the cheapest to lock in the edge.
3. Execute the hard-to-fill side of the trade.
4. Execute the easy-to-fill side of the trade.
5. Manage the position.
6. Exit or hold to expiration.

Now let's look at each of these steps in depth.

Establish the Option You *Want* to Trade

This is an option that is typically over- or underpriced. Its pricing is often driven by a large block order, or a group of large block orders. Institutions hedging or speculating typically have enough information in their decision tree that moving implied volatilities (IVs) by a point is not going to affect their decision, but it can create an opportunity to capture edge for the retail trader. Paying $0.05 over fair value is the cost of business when an institution wants exposure to the underlying equal to 5 million shares of stock.

However, one thing many retail traders do not know is that when a large trade pushes markets out of whack, market makers keep things that way until someone notices, and then the market maker trades the minimum they can to move things back in line and avoid giving up edge. The average retail or *prop trader* (a proprietary trader who trades their own assets) is going to trade fewer than 100 contracts at a time. This is too small to move things for most market makers. Prop traders set up their trades to take advantage of being small, and are prepared to trade inexpensive options.

Establish the Offsetting Contract

Before executing the trade that has edge, make sure that it actually *has* edge. How is this done? By quickly finding an option to buy or sell against the contract with edge, you reduce the risk of the edge trade dramatically. This can be a calendar spread if term structure is off; this can be a credit, debit, or butterfly spread if there is a long strike out of whack. In determining the option to buy, one must spend the time to evaluate the curve (skew) and term structure. If going with term structure, make sure that overall IV matches with the trade. In determining a spread within the same contract month, the vol curve is key. We will dig into setting up these spreads on an individual basis in an upcoming chapter. The key is to be aware that in order for a trade to actually be a good trade, there *must* be something to buy or sell that is favorably mispriced, and, on the other side of the trade, that a similar thing must be bought or sold at a fair price at worst (or in a perfect world, at a favorable price in its own right, which would allow you to make money on both sides of the trade).

The Hard and Soft Side of a Trade

Just because you've found a contract that is out of whack doesn't mean it will be easy to buy or sell. When a strike or contract month is thrown out of whack, it won't necessarily be easy to trade. That all depends on the order flow (customer orders). If a strike was thrown out of whack by one large trade, what is done might be done, and the effects likely will be ignored by order flow; an offer could sit there and never trade. Market makers are not stupid and will not simply execute the trade that you want at the current mid-price. They will only fill it if they think they will be able to trade something against it. This is especially true if the trade was put up as a cross (when a broker finds both sides of a trade and meets prices in the middle) or facilitated by a firm (facilitating a trade means the brokerage firm takes down the whole trade, and the customer pays a high commission).

Let's take a look at how a big trade in Macy's (M) can be traded in the market (Figure 6.1).

SYMBOL	OPTION	QTY	PRICE	EXCHANGE
M	M Aug20 21.00 C	20,000	0.31	AMEX
M	M Aug20 20.00 C	5,000	0.43	AMEX

Figure 6.1: Big Trade in Macy's.

A firm clearly was out to buy the August upside calls, as 25,000 of them were bought (the equivalent of 2,500,000 shares); this trade moved vol. If you wanted to trade based on the order flow above, you could repeat the same trade. In setting up a trade, you might sit back and choose not to chase the bid on the August 21 strike calls, and instead seek out favorable pricing on the August 22 strike calls or August 19 strike calls, depending on the direction of the underlying.

Another scenario occurs if there is a term or strike on the asset that is being actively "swept" by the market (chased by customer order flow). In this case, multiple traders (or one large trader) are aggressively attacking a strike or term. In the example below, RR Donnelley trades met this description. The December 18 strike calls were aggressively purchased with the trader paying up to $0.30 on a market that started out at $0.15–$0.20 and, as a result, these calls traded as low as $0.15 and up to $0.30, as seen in Figure 6.2. The point is that someone, or *more than one trader*, wanted to own the December 18 strike calls. There is no rush for you to trade these, as it will not be difficult to fill a sale in this case if you are looking to sell the 18 strike calls at $0.25.

Today's largest trades

Time	Root	Option	Qty	Price	Exchange	Condition	Market	IV	Underlying
11:55	RRD	Dec16 18 C	576	0.25	ISE	IntermarketSweep	0.15 x 0.25	29.00	16.19
10:10	RRD	Dec16 18 C	434	0.15	CBOE	Regular	0.15 x 0.20	23.00	16.20
10:10	RRD	Dec16 18 C	307	0.15	BATS	IntermarketSweep	0.15 x 0.20	24.00	16.20
2:29	RRD	Dec16 18 C	300	0.30	BATS	IntermarketSweep	0.20 x 0.35	30.00	16.22
12:15	RRD	Dec16 18 C	162	0.30	CBOE	PriceVariation	0.25 x 0.30	30.00	16.21
11:55	RRD	Dec16 18 C	143	0.25	PHLX	IntermarketSweep	0.15 x 0.25	29.00	16.19
11:55	RRD	Dec16 18 C	129	0.25	CBOE	IntermarketSweep	0.20 x 0.25	29.00	16.19
11:55	RRD	Dec16 18 C	120	0.25	MIAX	Regular	0.15 x 0.25	29.00	16.16
11:55	RRD	Dec16 18 C	113	0.25	MIAX	Regular	0.15 x 0.25	29.00	16.16
3:39	RRD	Oct21 17 C	100	0.25	ARCA	AutoExecution	0.20 x 0.25	27.00	16.39
12:14	RRD	Dec16 18 C	100	0.30	BOX	AutoExecution	0.30 x 0.35	29.00	16.23
12:10	RRD	Dec16 18 C	100	0.30	AMEX	AutoExecution	0.25 x 0.30	30.00	16.28
2:19	RRD	Dec16 18 C	99	0.30	BATS	IntermarketSweep	0.20 x 0.30	30.00	16.24
12:14	RRD	Dec16 18 C	90	0.30	BATS	IntermarketSweep	0.30 x 0.35	29.00	16.24
11:55	RRD	Dec16 18 C	87	0.25	NASDAQ	AutoExecution	0.15 x 0.25	29.00	16.19

Figure 6.2: Shows large orders in RRD that traded on a specific day.

The key is to understand what is harder to fill and what is easier to fill. When edge is created by one block trader, expect that there will *not* be a lot of follow-up. Traders in this case should work to execute the side of the trade that has edge to it first. Thus, in this case, the "hard side" of the trade was executing the option with edge. After the option with edge is filled, *then* you should execute the hedge, or the "easy side." The worst case in this scenario is usually a trade executed for fair value (if you can't fill the hedge).

Alternatively, when there are a lot of sweepers, and it is not hard to sell a strike or contract month, traders should assume that getting filled on the side of the trade with edge will be easy. The hedge on the other hand, with market makers knowing there are many contracts to be laid off, will not be as easy to fill. In this case, execute the hedge, then let the trade with edge come to you. Again, going with this route, the worst the trader will end up with is fair value, and more likely they will still end up with edge, as an order will come along eventually. When a spread with edge is being set up where the hard side of the trade is the hedge, it is much more likely to end up having edge than the other way around. Use speed to get a hedge in this scenario, then be patient in letting a trade come to you. More often than not, these spreads will produce profits.

Execute, Manage, Exit

Once a trade is found, execute the hard side to fill, and *then* the easy side to execute the trade with edge. Stick to the plan of the trade. If the trade does not have value, does not have edge, don't execute the trade. Assuming the trade is done properly, it should be managed professionally. While we are going to spend lots of time discussing how to manage trades, I want this to be a clear point, and we are going to hit on this many times: edge *matters*. If you put on a trade that you believe has edge, and that is proven to be incorrect, you should kill the trade by closing it quickly. If a trade is executed with edge and the assumptions you made the trade on change, kill the trade. Alternatively, if the trade works spectacularly and makes quick money – more than you were expecting – kill the trade. The point is, if the trade does not behave as expected, win or lose, get out. Finally, if the trade hits an *adjustment point* (which we will discuss in later chapters), make the adjustment. If the trade gets away from you, kill the trade. If the trade wins, kill the trade and take the money. Adjusting and managing are critical pieces of success, but they are determined by the edge in the trade. If the edge changes, take the money or take the licks. Always be aware of how your position is changing and anticipate how you can lose or make money. We are about to dig into each trade and then put a portfolio together in coming chapters.

Part 2: **Using Spreads**

Chapter 7
A Review of Basic Spreads

Throughout this book, I discuss how to evaluate different trades in the market given specific market conditions. While thus far this book has assumed the reader has knowledge of most spreads, it is worth the time to describe each type in more detail, including the Greeks of each. In this chapter, I'll briefly discuss the basic types of spreads, what makes each spread make money, and the goals of each trade at onset.

The Vertical Call Spread

The construction of a vertical call spread is pretty simple. They come in two possible configurations; they can be done either for a debit or a credit. We will walk through each type here, and discuss the advantages and disadvantages of each.

The call debit spread (also often referred to as a "bull call spread" or "long call spread") involves buying a call close to the price of the underlying, and simultaneously selling another call in the same expiration at a higher strike price. The long call leg is most commonly set at the money or slightly out of the money, although it can be executed in the money as well. Since the option sold is less expensive than the option purchased, this results in a net "debit" to the trader's account.

When executing the call debit spread, the trader is looking for movement, and is more interested in actual movement (realized volatility) than the market thinking movement might increase in the future (implied volatility). Thus, it is more of a "gamma-centric" trade than a "vega-centric" trade. In the example below, the SPX was trading at 4378; the trader opened an August 4375–4600 call spread at a cost of $56.76. Figure 7.1 shows a P&L chart.

The advantage of the trade is that cost is limited, while profit potential is big. Note that as these spreads go further out in time, the trader gives up some of the "low cost" benefit, as the spread becomes more expensive in exchange for more time. With a call debit spread, the trader is expecting the underlying will rally, and their maximum profit is the difference between strikes minus the premium spent, while their maximum loss is limited to the premium spent. The goal of the trade is for the underlying to do something – in this case, move higher.

Often called a bear call spread or a short call spread, a call credit spread is just the opposite. To open a credit spread, the trader sells an out-of-the-money call, and buys a further out-of-the-money call. (Like the debit spread, this can also be done at and in the money.) In the case of the trade above, a trader does the opposite of the debit spread, so they would sell the 4375-strike call, and purchase the 4600 strike calls. The P&L for this trade is pictured in Figure 7.2.

https://doi.org/10.1515/9783110697865-008

Figure 7.1: The payout of a long call spread near expiration.

In the case of a call credit spread, since the option sold is more expensive than the option purchased, the trader ends up with a net credit to their account – which is their maximum profit. Their maximum loss is limited to the difference between strike prices less the premium received. In the example above, the trader believes that the underlying will not rally above 4375. If it does, the trader loses; but if it remains below 4375 at expiration, the trader keeps the value of the spread – in this case, $39.50. The goal of this spread is for the underlying not to rally, or rally only moderately to stay below the strike price sold.

Both of these spreads can be great, but they must be formed based on an opinion: will the underlying move, or will it not move?

The Put Spread

A put spread long or short (debit or credit) has the same goals as a call spread, but in the opposite direction. The debit spread holder expects the underlying will drop, while the credit spread holder wants to see the underlying rally, or at least remain above the short strike.

Figure 7.2: The payout of a short call spread near expiration.

A put credit spread (also called a “short put spread” or a “bull put spread”) involves the sale of OTM puts, and the purchase of further OTM puts, giving the trader a net credit on the spread. This premium is the maximum profit, which is realized when the underlying rises above the higher strike of the option sold, while the maximum risk is equal to the difference between strikes minus the premium received.

A put debit spread (also known as a “long put spread” or a “bear put spread”) involves the purchase of OTM puts paired with a sale of further OTM puts. This results in a net debit to the trader’s account, as the option purchased is more expensive than the option sold. A bear put spread hopes to see a decline in the underlying, as the maximum profit is realized when the price of the underlying is at or below the strike price of the option sold. Bear put spreads tend to be short delta and long vega; however, like the call debit spread, it seeks movement more than it wants a pop in implied volatility. This is especially true because volatility tends to move much harder on sell-offs. Recall that most stocks have an “investment skew,” meaning downside puts are more expensive than near-the-money puts in terms of volatility priced in, though not in terms of absolute price.

Notice in Figure 7.3, puts get progressively more expensive in volatility terms the further OTM they get. Let’s price out a put credit spread versus a put debit spread to see how pricing makes owning a debit spread more favorable.

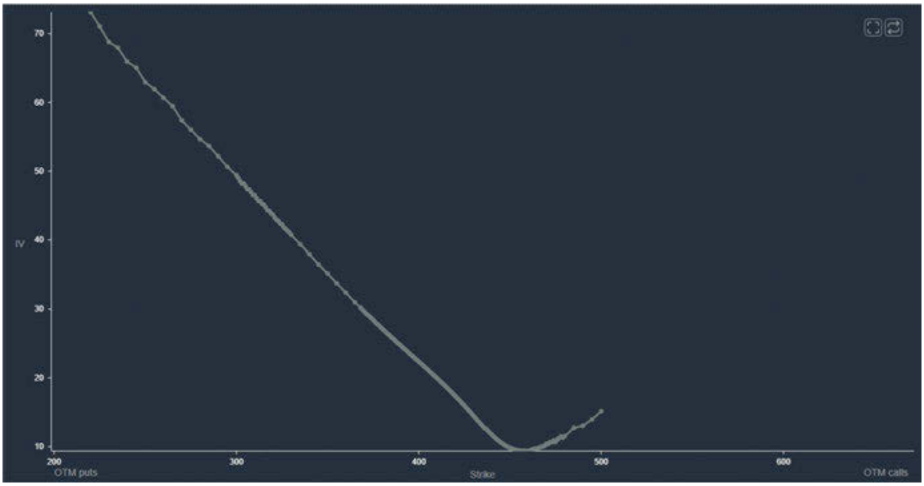

Figure 7.3: A chart of options skew in the SPY.

In this case, we are going to look at an August put spread with five weeks to expiration. In Figure 7.4, the August 4200 puts cost about $32, meanwhile the August 4100 strike puts are further out of the money, and still cost more than $20. I can buy or sell a put spread for about $10.50 per spread (buying the 4200 strike for $32, and selling the 4100 strike for $21.50, or vice versa).

The pricing of puts versus calls also changes the risk-reward of a long and short put spread. Generally, you will find that puts are more expensive when compared to calls that are similarly out of the money. This pricing also changes the risk–reward profile of a long and short put spread.

In this case, if I open a put debit spread (pictured in Figure 7.5), I am risking $10.50 to make about $89.50 on the spread (the $100 difference in strike prices minus the $10.50 cost of opening the trade).

Notice that if the trader is right, this spread pays out big. However, if the trader is wrong, the $10.50 he or she spent goes "poof" and decays away. In owning the put debit spread the trader is looking for something to happen, just like in owning a call spread.

Looking at the put credit spread (Figure 7.6), if I sell it, I am risking $89.50 to make $10.50.

The trader is risking a lot to make only a little; however, because markets tend to grind higher, there are a lot of traders who like to sell put credit spreads. Traders like to bet that the market won't go down. In this case, the trader is looking for something not to happen, like a call credit spread.

In credit versus debit spreads, it's easy to bet that nothing will happen, but the market will charge you for it if you're wrong – usually to the tune of more than four to one. It's priced that way because generally, four out of ten times, nothing happens.

STRIKE	pBID	pASK	pMIDIV	pDELTA
SPX(AM) Aug20 4,060.00	18.40	18.80	21.01	0.12
SPX(AM) Aug20 4,070.00	19.20	19.50	20.76	0.13
SPX(AM) Aug20 4,075.00	19.50	19.90	20.63	0.13
SPX(AM) Aug20 4,080.00	19.90	20.20	20.51	0.14
SPX(AM) Aug20 4,090.00	20.70	21.00	20.29	0.14
SPX(AM) Aug20 4,100.00	21.50	21.90	20.04	0.15
SPX(AM) Aug20 4,110.00	22.40	22.70	19.79	0.15
SPX(AM) Aug20 4,120.00	23.30	23.60	19.56	0.16
SPX(AM) Aug20 4,125.00	23.70	24.10	19.41	0.16
SPX(AM) Aug20 4,130.00	24.20	24.50	19.29	0.17
SPX(AM) Aug20 4,140.00	25.20	25.50	19.03	0.17
SPX(AM) Aug20 4,150.00	26.20	26.50	18.79	0.18
SPX(AM) Aug20 4,160.00	27.20	27.60	18.52	0.19
SPX(AM) Aug20 4,170.00	28.40	28.70	18.27	0.20
SPX(AM) Aug20 4,175.00	28.90	29.30	18.13	0.20
SPX(AM) Aug20 4,180.00	29.50	29.90	18.01	0.21
SPX(AM) Aug20 4,190.00	30.70	31.10	17.74	0.21
SPX(AM) Aug20 4,200.00	32.00	32.30	17.47	0.22
SPX(AM) Aug20 4,210.00	33.30	33.60	17.20	0.23
SPX(AM) Aug20 4,220.00	34.70	35.00	16.93	0.24
SPX(AM) Aug20 4,225.00	35.40	35.70	16.78	0.25
SPX(AM) Aug20 4,230.00	36.10	36.50	16.65	0.25
SPX(AM) Aug20 4,240.00	37.60	38.00	16.36	0.27
SPX(AM) Aug20 4,250.00	39.20	39.50	16.08	0.28
SPX(AM) Aug20 4,260.00	40.80	41.20	15.80	0.29

Figure 7.4: A selection of downside puts in the SPX showing option price.

Credit and debit spreads are often the first spreads traders execute, but they are far more complex when you sit down to think about it. Take the time to understand what makes these work or not work, and you will be much better off.

To wrap up credit and debit spreads:

– A debit spread has a preference in direction of the underlying, thus it has a delta. The spread wants something to happen, thus it is long gamma. If nothing happens, the spread will lose money as time passes, thus it is short theta. The spread is buying premium; thus it wants the belief that movement will increase, making it long vega.
– A credit spread has a preference in the direction of the underlying, thus it has a delta. The spread does not want anything to happen, thus it is short gamma. If nothing happens, the spread will make money as time passes, thus it is long theta. The spread is selling premium; thus it wants the belief that movement will decrease, making it short vega.

Figure 7.5: A long put spread in the SPX.

The Straddle

A straddle is the buying or selling of both a call and a put on the same strike and with the same expiration. The straddle is based on whether something will or will not happen. If you go long on a straddle, you are betting that the underlying is going to move. If you sell a straddle, you are betting that the underlying won't move.

You could describe a straddle as the perfect combo of a vega trade and a gamma trade. You want the market to think the underlying is going to start moving or stop (vega exposure) and you want the underlying to either stop or start moving (gamma exposure). Let's walk through how long and short straddles make money.

Long Straddle

The long straddle is the purchase of a call and a put on the same strike. Looking at the P&L graph in Figure 7.7, you hope the underlying will rally. But the P&L of the position shows a 10% increase in volatility.

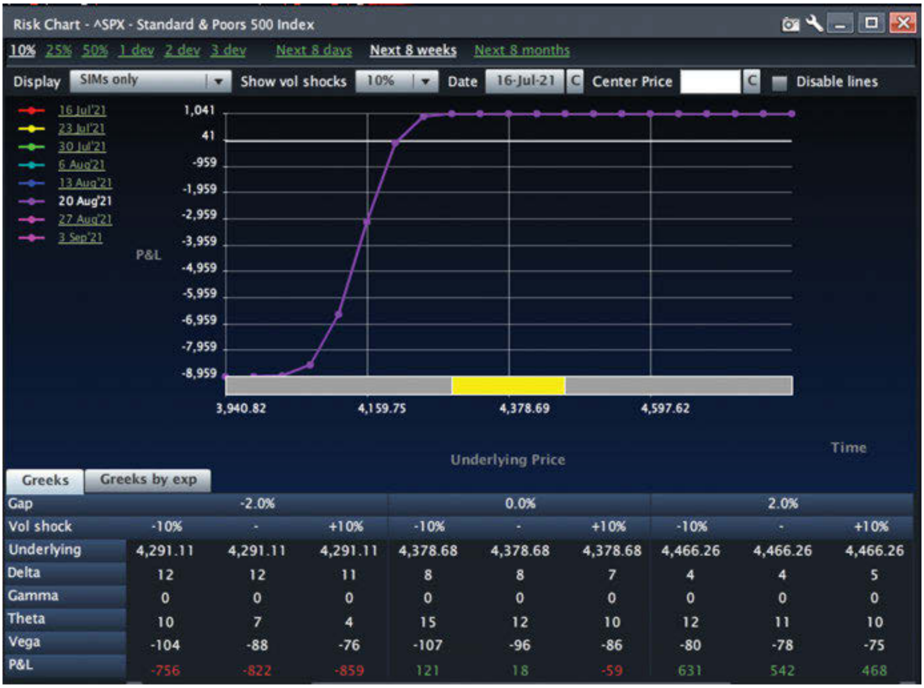

Figure 7.6: A short put spread in SPX.

If the SPX sits, and vol goes up, you do well. If the underlying moves 2%, you do well. If the underlying moves and implied volatility increases, you hit it out of the park. If the underlying moves, even if the IV drops, you win. Gamma is a powerful force in straddles, but vega will augment the trade almost as much as the movement. In the end, you need something to happen though, either a change in perception or a change in underlying price. Wrapping up a long straddle, the basic structure is:

- The spread does not have a preference in direction of the underlying, thus it is flat delta. The spread needs something to happen, thus it is long gamma. If nothing happens, the spread will lose money as time passes, thus it is short theta. The spread is buying premium; thus it wants belief that movement will increase, making it long vega.

Short Straddle

The short straddle is the opposite of the long straddle, so you are selling both a call and a put at the same strike, with the same expiration. It wants the underlying to not move, and it wants perception of movement to decline. Thus, the trade is both short movement, and short perception of movement. This produces a spread that is

Figure 7.7: A long straddle in the SPX.

short gamma and short vega. The P&L of the short straddle in Figure 7.8 shows the preferences quite clearly.

The short straddle loses money if the underlying moves 10%, but it loses far less if IV drops, meaning that if the underlying moves and perception of movement drops, you will be okay over time, but will lose immediately. As a straddle seller, more so than any other type of trader, you look for something *not* to happen. You want the underlying to stick either in the immediate or over time. There is an advantage for you as a straddle seller (if you have the stomach for it): if the underlying gyrates (up-and-down or down-and-up) you can do extremely well. Based on the risk associated with the straddle, I almost never sell straddles naked. Generally, I trade iron butterflies instead (I will discuss iron butterflies later in this chapter). Wrapping up a short straddle, the basic structure is:

– The spread at onset does not have a preference in direction of the underlying, thus it is flat delta. The spread wants nothing to happen, thus it is short gamma. If nothing happens, the spread will make money as time passes, thus it is long theta. The spread is selling premium; thus it wants belief that movement will decrease, making it short vega.

Figure 7.8: A short straddle in SPX.

The Strangle

A strangle, long or short, is a straddle with split strikes. The strangle takes in less premium; in return, you get a wider “landing pad” for the underlying to move about. Like a straddle, a strangle is vega- and gamma-centric. The strangle wants both perception of movement and movement to change.

Strangles are essentially straddles with more wiggle room, whether bought or sold. Personally, I do not like buying or selling these. I think the risk–reward does not work for the independent trader. I feel similarly about straddles, but will trade them from time to time, because they are a stronger play on a hard belief.

Long Strangle

The long strangle consists of buying a slightly OTM call and slightly OTM put, and looks for both movement and perception of movement to increase. Profit potential is achieved when the price of the underlying rises above the strike of the call option, or falls below the strike of the put option. In the example in Figure 7.9, you buy the August 4315 strike put and 4515 strike call at the same time.

Gap	-2.0%			0.0%			2.0%		
Vol shock	-10%	-	+10%	-10%	-	+10%	-10%	-	+10%
Underlying	4,328.06	4,328.06	4,328.06	4,416.39	4,416.39	4,416.39	4,504.71	4,504.71	4,504.71
Delta	-46	-46	-45	-13	-13	-13	36	35	33
Gamma	0	0	0	0	0	0	1	1	1
Theta	-159	-180	-202	-151	-184	-216	-145	-176	-207
Vega	368	378	392	404	448	485	489	518	544
P&L	1,867	2,426	2,997	-802	-249	348	76	606	1,178

Figure 7.9: A long strangle in the SPX.

You look for movement, or an increase in belief that there will be movement. You want something to happen – in this case, you want either the IV of the options to increase, or for the price of the underlying to move below 4315 or above 4515. Wrapping up a long strangle the basic structure is:

– The spread does not have a preference in direction of the underlying, thus it is flat delta. The spread needs something to happen, thus it is long gamma. If nothing happens, the spread will lose money as time passes, thus it is short theta. The spread is buying premium; thus it wants belief that movement will increase, making it long vega.

Short Strangle

The short strangle is similar to the short straddle, in that you're selling both a call and put, but the put and call sold are at different strikes. Looking at a short strangle in Figure 7.10, you are trading off a lot of risk for your belief that the underlying

Figure 7.10: A short strangle in SPX.

isn't going to move. If the underlying moves, you will lose, or if the perception is that the underlying is going to move, you will lose. You are set up with a wider landing pad than a straddle, but in return you receive fewer dollars. However, the inverse to that is that because you're receiving fewer dollars (theta) relative to the straddle, the points where you lose money are much farther apart.

For the short strangle to succeed, you need the underlying to *not* do something; in this case, move outside of the strikes you sold. Based on the P&L, you need the underlying to sit, and the perception of movement to sit, with the hopes that both options sold expire worthless, so you can pocket both premiums. However, the theoretical risk is unlimited with this strategy, and a large move in the underlying could expose you to significant losses.

Wrapping up a short strangle, the basic structure is:

– The spread at onset does not have a preference in direction of the underlying, thus it is flat delta. The spread wants nothing to happen, thus it is short gamma. If nothing happens, the spread will make money as time passes, thus it is long theta. The spread is selling premium; thus it wants belief that movement will decrease, making it short vega.

Chapter 8
A Closer Look at Advanced Spreads

Throughout this book, I discuss how to evaluate different trades in the market given specific market conditions. While thus far this book has assumed the reader has knowledge of most spreads, it is worth the time to describe each type in more detail, including the Greeks of each. In this chapter, I'll briefly discuss the basic types of spreads, what makes each spread make money, and the goals of each trade at onset.

The Iron Butterfly

An iron butterfly is simply a straddle that is hedged. You sell or buy a straddle, generally at the money (ATM) (although butterflies can, and often are, also used as directional plays), while simultaneously opening the opposite spread in the form of a strangle. Thus, if you sell a straddle, you buy a wider strangle. If you buy the straddle, you sell the strangle against it. This lowers the premium collected or paid, and lowers the risk if you sell the straddle, but decreases potential gains if you buy. I am a huge proponent of these spreads, as they can be used strategically. The added benefit of these spreads is that they require less margin than straddles – especially short straddles.

The Short Iron Butterfly

A short iron butterfly, as stated above, is a short straddle paired with a long strangle. You could also view this as a call credit spread and a put credit spread. You look for the same results as a straddle seller (both low movement and low perception of movement), but with less cost. The long positions have the effect of reducing the associated Greeks of a short straddle.

Let's suppose we want to set up a short iron butterfly; here is the standard way to pick strikes when setting up the trade. Start by selling an ATM straddle. Next, calculate the standard deviation of the straddle. This can be done by taking the strike, multiplying it by the implied volatility of the short straddle, and then multiplying it by the square root of days until expiration of the spread divided by days in a calendar year. Let's look at an example starting with Figure 8.1.

In this example, the trader would likely sell the 4415 strike straddle with an IV of 11.33. In this case, the August options have 15 days to expiration. Thus, the trader would calculate the standard deviation:

$$\text{Strike} * \text{IV} * \text{SQRT(days to expiration/days per year)}$$

$$4415 * .1133 * \text{SQRT}(15/265) \text{ or } 101 \text{ points}$$

https://doi.org/10.1515/9783110697865-009

cDELTA	cMIDIV	cBID	cASK	STRIKE	pBID	pASK	pMIDIV	pDEL...
0.69	14.02	89.60	90.20	SPX(AM) Aug20 4,350.00	26.70	27.10	14.01	0.31
0.68	13.80	85.50	86.20	SPX(AM) Aug20 4,355.00	27.60	28.00	13.78	0.32
0.67	13.60	81.50	82.10	SPX(AM) Aug20 4,360.00	28.60	29.00	13.58	0.33
0.65	13.38	77.50	78.10	SPX(AM) Aug20 4,365.00	29.60	30.00	13.36	0.35
0.64	13.17	73.60	74.20	SPX(AM) Aug20 4,370.00	30.70	31.10	13.16	0.36
0.63	12.95	69.70	70.30	SPX(AM) Aug20 4,375.00	31.80	32.20	12.94	0.37
0.61	12.75	65.90	66.50	SPX(AM) Aug20 4,380.00	33.00	33.40	12.73	0.39
0.60	12.55	62.20	62.80	SPX(AM) Aug20 4,385.00	34.30	34.70	12.53	0.40
0.58	12.33	58.50	59.10	SPX(AM) Aug20 4,390.00	35.60	36.00	12.32	0.42
0.57	12.12	54.90	55.50	SPX(AM) Aug20 4,395.00	37.00	37.40	12.12	0.43
0.55	11.92	51.40	52.00	SPX(AM) Aug20 4,400.00	38.50	38.90	11.91	0.45
0.53	11.71	48.00	48.60	SPX(AM) Aug20 4,405.00	40.00	40.50	11.70	0.47
0.52	11.51	44.70	45.20	SPX(AM) Aug20 4,410.00	41.70	42.20	11.52	0.48
0.50	11.33	41.50	42.00	SPX(AM) Aug20 4,415.00	43.50	44.00	11.31	0.50
0.48	11.14	38.40	38.90	SPX(AM) Aug20 4,420.00	45.40	45.90	11.12	0.52
0.46	10.94	35.40	35.90	SPX(AM) Aug20 4,425.00	47.40	47.90	10.95	0.54
0.44	10.78	32.60	33.00	SPX(AM) Aug20 4,430.00	49.50	50.10	10.76	0.56
0.42	10.59	29.80	30.30	SPX(AM) Aug20 4,435.00	51.70	52.30	10.59	0.58
0.40	10.43	27.20	27.60	SPX(AM) Aug20 4,440.00	54.10	54.70	10.43	0.60
0.38	10.25	24.70	25.10	SPX(AM) Aug20 4,445.00	56.60	57.30	10.24	0.63
0.35	10.11	22.40	22.80	SPX(AM) Aug20 4,450.00	59.30	59.90	10.09	0.65
0.33	9.95	20.20	20.60	SPX(AM) Aug20 4,455.00	62.10	62.70	9.95	0.67
0.31	9.83	18.20	18.60	SPX(AM) Aug20 4,460.00	65.00	65.70	9.80	0.69
0.29	9.69	16.30	16.70	SPX(AM) Aug20 4,465.00	68.10	68.80	9.67	0.71
0.27	9.57	14.60	14.90	SPX(AM) Aug20 4,470.00	71.30	72.10	9.56	0.73

Figure 8.1: Options in the SPX.

Now, moving 101 points in either direction will not land on a strike, so, in this case, the trader should lean in, not out, and make the "wings" 100 points wide instead of 105 points wide (the "wings" are the outside long strikes of the strangle).

Thus, the trader would set up a short iron butterfly as the 4315–4415–4515. The 4415 strike straddle is sold, and the strangle, consisting of the 4315 strike put and 4515 strike call, is purchased. However, one needs to make sure that calls are not too cheap. If skew is steep, the calls might be inexpensive, so the trader may be buying what amounts to worthless calls as a hedge. Generally speaking, the wings should be worth at least 1–2% of the value of the underlying, or generally at least $0.25 for equities or $4.00 for a major equity index. In the case above, you can see how upside calls are priced in Figure 8.2.

The 4515 calls were worth about $4.70, an acceptable level for the hedged calls. Thus, the butterfly would look like Figure 8.3.

What you will notice is that the spread is a touch odd looking. While the strikes are all set up equally, the iron butterfly appears to have a preference that the underlying should fall. This is because the delta for OTM puts is greater than the delta of OTM calls; this is caused by skew in SPX options. At the trade onset, we generally

cDELTA	cMIDIV	cBID	cASK	STRIKE
0.50	11.28	41.40	41.90	SPX(AM) Aug20 4,415.00
0.48	11.12	38.30	38.80	SPX(AM) Aug20 4,420.00
0.46	10.91	35.30	35.80	SPX(AM) Aug20 4,425.00
0.44	10.74	32.40	32.90	SPX(AM) Aug20 4,430.00
0.42	10.58	29.70	30.20	SPX(AM) Aug20 4,435.00
0.40	10.42	27.10	27.50	SPX(AM) Aug20 4,440.00
0.38	10.25	24.60	25.10	SPX(AM) Aug20 4,445.00
0.35	10.06	22.30	22.80	SPX(AM) Aug20 4,450.00
0.33	9.94	20.20	20.60	SPX(AM) Aug20 4,455.00
0.31	9.82	18.10	18.50	SPX(AM) Aug20 4,460.00
0.29	9.69	16.20	16.60	SPX(AM) Aug20 4,465.00
0.27	9.56	14.50	14.80	SPX(AM) Aug20 4,470.00
0.25	9.44	12.90	13.20	SPX(AM) Aug20 4,475.00
0.23	9.34	11.40	11.80	SPX(AM) Aug20 4,480.00
0.21	9.25	10.10	10.40	SPX(AM) Aug20 4,485.00
0.19	9.14	8.90	9.20	SPX(AM) Aug20 4,490.00
0.17	9.06	7.80	8.10	SPX(AM) Aug20 4,495.00
0.16	8.98	6.80	7.10	SPX(AM) Aug20 4,500.00
0.14	8.92	6.00	6.20	SPX(AM) Aug20 4,505.00
0.13	8.88	5.20	5.40	SPX(AM) Aug20 4,510.00
0.12	8.82	4.60	4.80	SPX(AM) Aug20 4,515.00
0.10	8.78	4.00	4.20	SPX(AM) Aug20 4,520.00
0.09	8.78	3.50	3.60	SPX(AM) Aug20 4,525.00

Figure 8.2: Upside call pricing in the SPX.

believe that some of the delta should be managed, so I suggest buying additional calls to hedge. I like buying about half the delta, using a call inside of the "tent" (strikes between the short and long). This is because of the phenomenon where puts have a higher delta at the onset, giving this trade an overall short delta. To remove some of that delta exposure, in this case I would purchase a call to reduce the delta of the trade. It is important to note that when hedging these trades, you should not purchase the hedging option outside of the initial trade spread.

In this case, you could buy an extra 4515 strike calls to smooth out delta exposure, as shown in Figure 8.4.

While the spread still has delta, the gamma from the long calls reduces the true P&L effect of delta quickly.

With this spread on, the trader is clearly looking for one thing: the underlying to sit still. If it moves, the trader will lose. Additionally, the trader is looking for

Figure 8.3: A 100-point ATM iron butterfly in SPX.

the belief that the underlying might not move for a while. If the trader is right, and the underlying sits as time passes, much like a short straddle, the trade is profitable.

A question that invariably affects combination strategy: do you close profitable legs, or wait until expiration? In closing one leg, the risk of the remaining side may be increased substantially. It's necessary to determine (preferably in advance) whether to hold the position through expiration in hopes of overall profit with managed risk, or close early. In the second choice, rather than closing, rolling to a later expiration often presents the best combination of risk management and profit.

Wrapping up short iron butterfly, the basic structure is:

– The spread does not have a preference in the direction of the underlying, thus it is flat delta once hedged. The spread wants nothing to happen, thus it is short gamma. If nothing happens the spread will make money as time passes, thus it is long theta. The spread is selling premium; thus it wants belief that movement will decrease, making it short vega.

Figure 8.4: A 100-point SPX iron butterfly with delta management.

The Long Iron Butterfly

A long iron butterfly is similar to a short iron butterfly . . . but on its head! The trader buys a long straddle, and uses the same standard deviation formula above to pick which strikes to sell in the short strangle. You could also consider trading this as a call debit spread paired with a put debit spread. The long iron butterfly spread has the opposite characteristics of the short iron butterfly as well. See the example of the spread in Figure 8.5.

Unlike with the short iron butterfly, I do not suggest hedging off the delta of the spread. This is due to the vega exposure of the spread. Since you are actually looking for movement, you need to take into account how vega will affect the value of the spread if there is movement. If the underlying rallies, almost certainly (except under extraordinary circumstances) IV will fall. If the underlying falls, the IV will almost certainly increase. This will change the payoff of the graph above by a wide margin, making delta the equalizer of P&L. This spread is delta neutral because you want movement to occur in either direction. You also want movement to occur quickly, because the spread is purchased, and thus every day that the underlying doesn't move, the trade loses money due to time decay (theta). If the perception of

Figure 8.5: A long iron butterfly in SPX.

movement increases, options will likely cost more, and therefore the spread will make money. Wrapping up the long iron butterfly, the basic structure is:

– The spread does not have a preference in direction of the underlying, thus it is flat delta. The spread needs something to happen, thus it is long gamma. If nothing happens the spread will lose money as time passes, thus it is short theta. The spread buys premium, thus it wants belief that movement will increase, making it long vega.

Standard Butterfly

A standard butterfly is almost the exact same spread as an iron butterfly. The only difference is that it is made up of a long call spread and a short call spread, or a short and long put spread. In either construction, the short options will be at the same strike. In essence, you are purchasing one option in, at, or near the money, selling two options out of the money, and purchasing one more even further out of the money. The long call butterfly is shown in Figure 8.6, and the long put butterfly is shown in Figure 8.7.

Figure 8.6: The long call butterfly.

Notice that the long call (Figure 8.6) and long put (Figure 8.7) butterflies look almost exactly the same and share the same Greeks as the iron butterfly. This is because, at their core, they are essentially the same.

While there are some slight differences in terms of having a call or put in the money, the spreads are synthetically (linked by put–call parity) the same spread. An ATM long call or put butterfly is going to look exactly the same as a short iron butterfly. The difference between an iron spread and a standard spread is pretty simple to calculate. Take the credit from the options sold in the iron spread, subtract it from the difference between the short and long strikes, and you will have the value of the call or put spread. For example, going back to our SPX iron butterfly that is 100 points wide, and collected $58.50 premium, the debit on a call or put butterfly should be 100–58.50, or $41.50 per spread.

I generally do not suggest standard ATM put butterflies, but I do like them better for directional spreads. This is primarily due to bid/ask spread width of ATM, ITM, and OTM options. As a brief example, take a look at the spread between OTM calls (bid at $4.60, asked at $4.80) and ITM puts (bid at $105.70, asked at $106.50) at the 4515 strike.

Figure 8.7: Long put butterfly in SPX.

cDELTA	cMIDIV	cBID	cASK	STRIKE	pBID	pASK	pMIDIV	pDEL...
0.12	8.82	4.60	4.80	SPX(AM) Aug20 4,515.00	105.70	106.50	8.82	0.88

The OTM calls are about $0.20 wide, while the ITM puts are about $0.80 wide. OTM and ATM options almost always have tighter bid/ask spread than ITM options. Because of this, iron butterflies are generally more desirable for ATM spreads. Generally, OTM puts are best for downside directional butterflies, and OTM calls for creating upside directional butterflies. Note that it's also worth the time to price out the other synthetic forms, just in case there is a mispricing somewhere. This is especially true for individual equities, where mispricing is more common.

The Iron Condor

An iron condor is simply a strangle that is hedged. A trader sells or buys a strangle. Then, the trader buys or sells the opposite strangle even wider than the initial strangle, and against the initial trade. So, for example, if the trader sells a strangle, he or she will buy a wider strangle. If the trader buys the strangle, he or she will sell a wider strangle against it. This will lower the premium collected or paid for the strangle; in return, it will lower risk for the strangle seller and decrease the gain for the strangle buyer.

The Short Iron Condor

A short iron condor, as stated above, is a short strangle versus a wider long strangle. There are synthetic variants called simply condors where one has all puts or all calls, but those are not as common, and they are hard to find (so we are not going to discuss them). The short iron condor trader is essentially looking for the same result as a strangle seller, just with less risk. The longs have the effect of reducing the associated Greeks of a short strangle.

Let's suppose we want to set up a short iron condor, the standard way to pick strikes consists of:

Start by figuring out what strangle to sell. For an iron condor, I typically look for wings well out of the money. I look about 60 days out, and at the 10 delta mark. Next, I find options wider out that will provide the cheapest hedge, in terms of what provides the best bang for the buck. Here are two theoretical scenarios:

Let's say I can sell the 10 delta call and put together and collect $2.50. That's the short strangle part of the condor. Against that trade I can:

1. Buy a strangle 10 points wider for $1.50

or

2. Buy a strangle 20 points wider for $1.00

In scenario 1, I collect $1.00 ($2.50 – $1.50), or $100 per contract, creating a margin of $900 (the spread between short and long strikes, minus the credit collected) per spread. I'm risking $900 to make $100. Assuming a best case scenario, where I collected every last dollar possible (which will not happen), the risk–return payout is 100/900, or 11.11%.

In scenario 2, I collect $1.50 ($2.50 – $1.00), or $150 per contract. This is more dollars than in scenario 1, but what about the risk–return? The payout is now $150 against the potential loss of $1850 per spread. This is a payout of 150/1850, or 8.1%.

So while scenario 2 makes more raw dollars, in a risk-to-reward analysis, scenario 1 is preferable.

Moving on to time to expiration, in Jim Bittman's book, *Trading Options as a Professional: Techniques for Market Makers and Experienced Traders* (2008), he discusses how selling an option that is 10% out of the money produces more decay in raw dollars 60 days out than selling an option that is 10% out of the money with 30 days to expiration. The way most iron condors are traded is with about 55–70 days to expiration, since that range tends to produce optimal decay, when coupled with the 10 delta option sale on the condor. Figure 8.8 shows a chart of an iron condor set up to these specifications:

Figure 8.8: Iron condor.

We end up short the 3960 puts against the 3950 puts, about 10% OTM on the puts. The calls were sold at 4620 versus 4630, only about 5% OTM.

While not 10% OTM on both strikes, it is at a level where, by the time the spread is 30–40 days to expiration, the decay has come out of these spreads. Interestingly, while the spread pulls more dollars out of the calls, more of the money will be made by the puts dying than the call spread. This is because of the proximity of calls relative to puts.

Risk in iron condors exists in the calls. While traders tend to obsess over downside risk in iron condors, upside risk loses more money than downside. The risk chart (Figure 8.9) makes this pretty clear.

Looking at risk, one can clearly see that upside options are closer and steeper. This is one reason we push traders to shoot for half the credit received on the sale and to move on; the market tends to move higher, creating problems in an upside condor.

I almost never trade these spreads because, as an active trader, I believe better value can be found in other spreads. Those who do want to trade these need to learn that these spreads are less of a "sit and wait" trade than they may seem. They are much more of a play on volatility dropping for a few days, and collecting the vega. When I do execute these trades, I almost never look for more than 50% of the credit; typically, I look for about 30%–40%, most of which is derived from a drop in volatility. The theta that occurs is additive. If you are in an iron condor for more than 15–20 days, you are setting yourself up to lose.

With this spread on, the trader is clearly looking for one thing: the underlying to sit. If it moves, the trader will lose. Additionally, the trader is looking for the belief that the underlying might sit still for a while. If the trader is right, and the underlying sits still as time passes, then the trade is profitable (much like a short straddle). If the underlying moves, the trader loses.

Wrapping up, for a short iron condor, the basic structure is:

– The spread does not have a preference in the direction of the underlying, thus it is flat delta, although it tends to have a small short delta. The spread wants nothing to happen, thus it is short gamma. If nothing happens, the spread will make money as time passes, thus it is long theta. The spread is selling premium; thus it wants movement to decrease, making it short vega.

Gap	-2.0%			0.0%			2.0%		
Vol shock	-10%	-	+10%	-10%	-	+10%	-10%	-	+10%
Underlying	4,332.04	4,332.04	4,332.04	4,420.45	4,420.45	4,420.45	4,508.85	4,508.85	4,508.85
Delta	0	-1	-2	-8	-8	-9	-18	-17	-16
Gamma	0	0	0	0	0	0	0	0	0
Theta	21	23	25	31	33	33	32	31	30
Vega	-169	-187	-197	-267	-263	-252	-282	-250	-222
P&L	599	391	181	301	0	-283	-816	-1,117	-1,380

Figure 8.9: Iron condor risk chart in the SPX.

The Calendar Spread

A calendar spread, also called a horizontal spread or time spread, is buying a contract in one month against the selling of another contract in a different month. Typically, both options will be at the same strike, although they do not have to be. (For the purposes of this description, we'll assume the two options are at the same strike.) Calendars represent a dichotomy. On one hand, they want something to happen, but on the other hand, they do not. A long calendar spread (where the longer-term option is bought, and the shorter-term option is sold) expects the underlying to sit. The trader wants implied volatility to increase while the underlying does not move at all. A short calendar spread (where the longer-term option is sold, and the shorter-term option is bought) wants the opposite. In many ways, calendars are like hedged straddles; they are different from the way a butterfly is hedged, but they are still hedged straddles nonetheless. We will discuss how to make money on these spreads later on, but for now we will walk through the building of the trade, and how they compare to straddles.

The Long Calendar

A long calendar spread, which is the purchase of a longer-term contract and the sale of a nearer-term contract, results in a net debit. The calendar spread can span over weeks, months, or even years. Traders believe the longer-dated contract is cheap relative to the nearer-term short contract. When this spread is put together, the similarity to a short straddle is striking (see Figure 8.10).

Figure 8.10: A calendar in the SPX.

The major difference between the two is the exposure to perception of movement. The trader wants the trade to do nothing in the short term, but longer-term expects movement to increase. This is what creates the long calendar's payout. The longer the length between contract months, the more the perception of movement will matter to its success.

The value of the calendar relative to the straddle beyond the "perception of movement" exposure is the limited risk. The most a calendar spread can lose is the cost of the spread. Wrapping up a long calendar spread, the basic structure is:

– The spread does not have a preference in direction of the underlying, thus it is flat delta. The spread wants the underlying to sit, thus it is short gamma. If nothing happens, the spread will make money as time passes, thus it is long theta. The spread is buying premium; thus it wants movement to increase, making it long vega.

The Short Calendar

If a long calendar is similar to a short straddle, then a short calendar is going to look an awful lot like a long straddle. The short calendar spread involves the sale of a long-term option against the purchase of a near-term option for a net credit. It produces a spread that wants the underlying to move now, and the perception of movement to fall. The trader believes that near-term options are too cheap, and long-term options are too expensive. When put together, it looks a lot like a long straddle (see Figure 8.11):

Figure 8.11: A short ATM calendar in SPX.

If the underlying moves, the trader makes money, just like a long straddle. The big difference is what the short contract represents. If perception of movement drops, the spread will make money, the spread will make money, so it is short vega (exposure to the perception that movement will change). If the underlying moves and the perception of movement drops, the trader will do extremely well. Short calendars are great on rallies, and less great on sell-offs. I like the spreads; however, the downside of the short calendar is that despite the limited risk, they are generally margined worse than long straddles. Many firms view the short strike as naked, even though it is hedged by the near-term option.

The one issue with these spreads is if the trader is wrong on perception of movement. If the back month begins to see an increase in movement perception, the P&L of the short calendar can change quickly, creating problems for the trader. A big increase in the value of your long-term options can cause losses to be greater than the initial P&L predicts, and can actually be so large that the longer-term options can possibly see its value increase.

Wrapping up a short calendar spread the structure is:

– The spread does not have a preference in direction of the underlying, thus it is flat delta. The spread wants the underlying to move, thus it is long gamma. If nothing happens the spread will lose money as time passes, thus it is short theta. The spread is selling premium; thus it wants belief that movement will decrease, making it short vega.

Front and Back Spreads

Front and back spreads involve the trading of one option near the money against the trading of several options out of the money. Depending on the spreads, they want either a long movement (back spread) or almost no movement (front spread). These are considered professional trades, as they tend to be margin intensive. We will go more into detail on these spreads in later chapters, but I want to spend a few moments describing these trades now.

Back Spreads

A back spread is the sale of a high delta option to finance the purchase of at least two lower delta options (all calls or all puts). The spread uses the higher delta option to finance the lower delta options in hopes of rapid movement from the underlying. These spreads generally do have a directional bias, but can be set up to not lose if the underlying moves in the opposite direction, so long as they are set up for a net credit, or for zero cost. These spreads, more than any other spread, require a change in perception of movement *with* a change in movement. If the underlying moves in the direction of the spread, the trader will likely not make money, but if the underlying both moves and the perception of movement changes, the trade will do exceptionally well. These are usually set for periods where IV is perceived to be cheap. A classic example would be for the spread to be executed for even money. Let's look at an example in SPX, in this case short 10 SPX 4450s versus long 20 SPX 4485 calls, as shown in Figure 8.12.

Notice that as time passes, the spread loses exposure to movement, and the spread becomes less effective. Back spreads need movement, and they prefer it quickly, preferably with an increase in perception of movement. They can be set up as either bullish or bearish. To do them at zero cost in equities and indexes, generally

Gap	-2.0%			0.0%			2.0%		
Vol shock	-10%	-	+10%	-10%	-	+10%	-10%	-	+10%
Underlying	4,332.67	4,332.67	4,332.67	4,421.10	4,421.10	4,421.10	4,509.52	4,509.52	4,509.52
Delta	-3	-3	-2	4	8	11	47	47	47
Gamma	0	0	0	0	0	0	1	1	0
Theta	11	8	3	-35	-47	-60	-98	-107	-115
Vega	-34	-15	9	177	210	237	434	426	421
P&L	12	-24	-43	-147	0	174	1,897	2,263	2,623

Figure 8.12: A long back spread in SPX.

a call back spread will have strikes closer together than put back spreads (this is due to skew). Wrapping up a back spread, the basic structure is:

– The spread does not have a preference in direction of the underlying, thus it is flat delta, but, in the end, expects the underlying to move in the direction of the long strike. The spread needs something to happen, thus it is long gamma. If nothing happens, the spread will lose money as time passes, thus it is short theta. The spread is buying premium; thus it wants belief that movement will increase, making it long vega.

Front Spreads

A front spread is a flip of the back spread, with the trader buying a near the money option, and selling at least two out of the money options. These are often called the “pro” trade because it is so popular among professional traders. The spread is almost always set up for a net credit. The goal of the trade is for the underlying to slowly creep toward the two short strikes, but not get there quickly. As time passes, the OTM options lose Greeks, and the near the money options gain delta and gamma. What is odd about a front spread is that the trader does want movement, just extremely slow movement. If the underlying moves slowly toward the short strike, the trader will do extremely well. If the underlying moves too hard, the trader loses. As mentioned, these are generally done for a credit, so if the underlying moves in the opposite direction of the spread, they will make money for the trader. Essentially, the value of a front spread is that the trader can be right or wrong and still win, as long as they aren't *too* right. A call front spread is shown in Figure 8.13.

Figure 8.13: A front spread in SPX.

With the underlying trading 4420, the trader is long 10 of the 4450 calls and short 20 of the 4475s for a net credit. If the underlying creeps higher, the trader does extremely well. If the underlying drops, the trader keeps the credit. The issue the trader will have is if the underlying rallies quickly, above 4475 – then the P&L will start to look ugly. Bear front spreads tend to be wider because of skew, and bullish spreads will have to be tight if done for a credit. Wrapping up a front spread, the basic structure is:

– The spread at onset does not have a preference in direction of the underlying, thus it is flat delta, but, in the end, wants the underlying to slowly move in the direction of the short strikes. The spread needs movement to be slow, thus it is short gamma. If nothing happens, the spread will make money as time passes, thus it is long theta. The spread is selling premium; thus it wants belief that movement will drop, making it short vega.

Chapter 9
Adding Edge to Spreads

The last chapters reviewed many option spreads. In this chapter, the discussion centers on how spreads can have edge to them, *not* the structure of the trade. Many books present the latter, but few give you the former. In this chapter, the basic spread is presented as a trade with edge.

Credit/Debit Spreads

A *credit* vertical spread involves a purchase of one option and a sale of another with the same expiration, but different strike prices, where the sold option is worth more than the bought option. This produces a net credit. A *debit* spread on the other hand is a spread combining a more expensive long option with a less expensive short option, setting up a net debit.

The assumed set of positions in this description is to set up a spread out of the money (OTM). In other words, with calls, the positions would be close to the money combined with a higher OTM strike, and with puts, the spread would combine close to the money positions with lower OTM strikes. As an issue of risk, the "moneyness" (the difference between the underlying and strike price) of the strikes are crucial, and risk is well managed with OTM short positions. However, by definition, a vertical spread could also include deep in the money (ITM) options, adding to exercise risk in exchange for higher short premium received (meaning a lower debit or a higher credit). The offset to these desirable adjustments in premium levels is inevitably not justified by higher risks. And so, in the discussion that follows, the assumption is that we're talking about close-to-the-money spreads.

To begin on the comparison, the spreads represented in Figures 9.1 and 9.2 are essentially the same. Why? Because rather than making a distinction between credit and debit spreads, it is more realistic to define vertical positions as either call spreads or put spreads.

When placed next to each other, these two spreads are the same in terms of risk. Professional traders do not look at these spreads as credit and debit spreads; instead they typically view each of the spreads as a call spread or a put spread. A *call spread* is a trade that is set up above the at the money (ATM) strike. You may sell a call credit spread, or buy a call debit spread out of the money; in either case, you have opened a call spread. You may buy a *put spread* out of the money (a long below the ATM price), creating a long put spread, or execute the opposite to set up a short put spread.

The difference between a short spread and a long spread is the opinion you are expressing about likely direction. If you put on a spread, you need to decide if the underlying is going to move in the desired direction (toward the long strike), or *not*

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Figure 9.1: SPX 4475-4400 credit spread.

move in that direction, away from the strike. If you sell a spread, you expect that movement to *not* happen.

Figure 9.1 is the chart for a sale of an SPX 4475 put versus a buy of a 4400 put (a short put spread). If you sell the 4475–4400 put spread at 27.60, you assume that the SPX will close above 4475 and, at a minimum, not fall below 4475–27.60 or 4447.40. The easy way to think about selling a put or call spread is that you want the underlying *not* to move in the direction of the spread. When you are rooting against movement, you assume that volatility will drop. Thus, a sale of a call or put spread assumes the underlying will *not move*.

If both options are in the money – meaning the moneyness is moved higher in a call spread or lower in a put spread – you increase the risk on the short side, so this must rely on rapid *time decay* (the ratio of the change in an option's price to the decrease in time to expiration). For this reason, the time remaining to expiration should be very fast – for example, 10 days or less. However, this makes it more difficult for the long side to become profitable, because of the same time decay issues. This problem illustrates why the most likely positions to generate profits should center on the current price, with one side slightly above and the other slightly below. This simply is the most realistic scenario to generate profits.

This is a mindset you may adopt with risk awareness at the core of how you pick strikes. Position and proximity define whether you expect movement to happen (thus

Figure 9.2: SPX 4475-4400 debit spread.

setting up long vol), or not to happen (thus setting up short vol). With this thinking, if you are *long*, you want the underlying to move in that direction for a call spread or put spread. A long call equals upward bias, and a long put equals downward bias.

Take the opposite of my put spread from above. If I could sell the spread at 27.60, that means I could buy the spread close to that price as well (with adjustments between bid and ask prices). Whereas the short put spread expected the underlying to stay above 4447.40, in this case the expectation is for the underlying to drop. Thus, you anticipate a move lower to 4447.40 by expiration.

Figure 9.3 shows a purchase of the 4425 put versus a sale of the 4375 put. You expect the underlying to move, since you need movement, as you are long volatility.

How do you create a call or put spread with edge? The answers:

1. Volatility
2. Skew
3. Management

Volatility

When going long or short, the first thing you need is to determine in what direction volatility is going. If IV is super low or rallying, or the price is rallying, think about

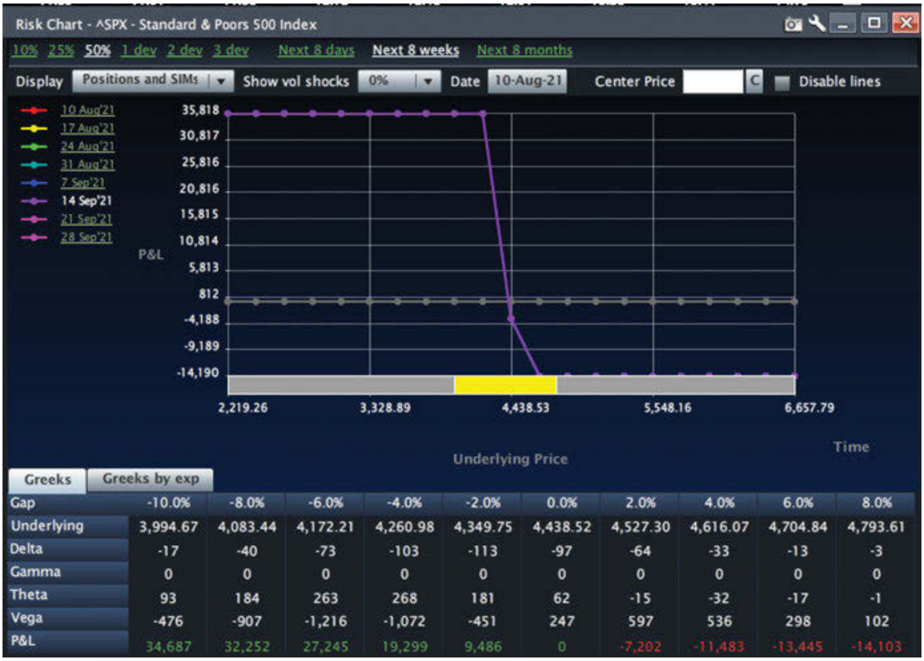

Figure 9.3: A put spread in the SPX.

taking advantage of the change in movement, or the change in volatility. This is done by *buying* a spread as opposed to selling it. The anticipation is that the increase in vol or movement will result in a quick profit (this is shown for AAPL in Figure 9.4).

In this example, both price and IV were increasing. If you think the underlying is going to go up, set up a long call or call spread, and if you think the underlying is going to drop, do the opposite.

Next, look at Figure 9.5, the chart of Molson Coors (TAP).

Figure 9.5 shows that IV has plummeted and HV (movement over the last 20 days of trading), while having rallied, started to flatten and dip lower. This might be a setup for a short spread. If movement dies, whether you are playing the underlying drop or rally, consider a sale, as it appears the above movement (as seen in a rise in HV20) is going to drop.

In playing volatility, you set up a trade you believe more likely to succeed in confirming your opinion on the stock's direction. Avoid the trap of selling spreads when the underlying is moving, or buying spreads in a stock not moving. If you convert the opinion into a "will move" or "won't move" decision, you create edge in the trade.

Figure 9.4: AAPL stock price (top) IV (red) and 20-day historical volatility (blue).

Figure 9.5: TAP stock price, IV (red) and HV (blue) showing divergence.

Skew

The next part of evaluating volatility is an examination of skew. Skew describes how calls and puts are related, and represents the IV curve of the entire option chain when it gets out of whack due to sudden changes in volatility. Look at the skew curve for October Alcoa (AA) options in Figure 9.6, where the *Y* axis is IV and the *X* axis is strike price.

Figure 9.6: The skew curve of AA.

There is a slight kink in the AA curvature at 37. The 37 strike puts are too expensive relative to the 36 and the 38 strikes. If you are inclined to sell a put spread, the 37s are the strike to sell in October. Against a sale of the 37 puts, you can buy any contract below 36. In this case, if you sell the 37 strike (which is too expensive) you are buying cheap, relatively. As long as you sell the 37 puts, any purchase will create edge in the trade. This is because you capture the overpriced vol from the 37s by buying against them. Now look at the option montage in Figure 9.7.

Oct 37–35 put spread collects about $0.41 of cash per spread. The 38–35 put spread collects about $0.69, that is $0.28 more, and the 36–35 spread collects $0.12, or $0.29 less than the 37–35. The difference between the three strikes is $0.285 per

Strike	Last	PnL	Pos	SIM	Bid	Theo	Ask	Vol
AA(W) Oct01 30	0.25				0.20	0.26	0.31	61.91
AA(W) Oct01 35	0.85				0.90	0.96	1.01	57.93
AA(W) Oct01 36					1.13	1.19	1.24	56.99
AA(W) Oct01 37					1.42	1.47	1.52	56.37
AA(W) Oct01 38	1.66				1.70	1.82	1.94	56.16
AA(W) Oct01 39	1.82				2.12	2.18	2.24	55.21
AA(W) Oct01 40	2.20				2.57	2.62	2.66	54.75
AA(W) Oct01 41					3.05	3.10	3.15	54.30
AA(W) Oct01 42	3.45				3.60	3.68	3.75	54.53

Figure 9.7: A montage of October puts in AA.

strike – (0.29 + 0.28)/2 – if the curve was smooth, but in this case $0.01 has moved to the 37 strike. Thus, that is the strike to sell.

In the above example, if vol were reversed and you thought the underlying was going to move, you would want to do the opposite. With the underlying around 41, you should buy the 41 to the 38 strike and sell the 37 strike to create maximum curvature with real premium; you want to sell the 37s against any long put purchase because the 37s are too expensive.

Alternatively, you could buy any strike other than the 37s (because they are too expensive) and sell a strike below. Avoid buying strikes where volatility is expensive, and avoid selling strikes where volatility is cheap. This means avoid buying options that are out of whack above the curve, and avoid selling options that are out of whack below the curve. Utilizing the skew curve is crucial in picking strikes almost all the time. In some other spreads, other factors are involved relative to credit and debit spreads; the best way to create edge is with skew, followed by volatility.

Management

With call and put spreads, the key to management is to get paid the right amount for the trade and then get out. Understanding how the Greeks change as time passes becomes key. Early on in the trade with a credit and debit spread, assuming it's not executed the week of expiration, the two strikes are similar. As time passes, long and short strikes act less alike. This is seen in how the payout moves with time in the near-the-money call spread shown in Figure 9.8. Notice how the P&L curve becomes steeper as time passes.

As the curve becomes steeper, what is really happening is that the near-the-money option retains gamma and delta, while the out-of-the-money option is losing

Gap	-10.0%	-8.0%	-6.0%	-4.0%	-2.0%	0.0%	2.0%	4.0%	6.0%	8.0%
Underlying	45.87	46.89	47.91	48.93	49.95	50.97	51.99	53.01	54.03	55.05
Delta	55	86	128	178	236	297	358	412	457	488
Gamma	26	36	45	54	59	61	57	49	37	23
Theta	-5	-7	-9	-11	-11	-11	-9	-6	-2	4
Vega	15	22	29	35	40	42	40	34	25	12
P&L	-824	-753	-645	-489	-276	0	342	750	1,216	1,728

Figure 9.8: Payout for near-the-money call spread over time.

those Greeks. The effect and lesson of this is that the underlying needs to rally further away from the short strike in order for the spread to reach max profit. Early on, however, it will become profitable on smaller movement.

When managing a call or put spread, consider what the P&L curve looks like at the outset, and what your profit targets are (or should be) based on this curve. The number one mistake is being too greedy or setting unrealistic expectations. For long call and put spreads, here is the risk management approach we use at my trading company, Option Pit:

1. Don't look for more than 100% return on margin.
2. Typically seek 50–75% of margin.
3. If the spread makes half the profit target in the first day or two, close the trade.
   a. The trade likely was done for a greater edge than you realized, and that edge has now come out of the trade; take the money and run.
4. Set a loss target at *less* than the profit target.
   a. If you win 50% of the time, and make more than you lose on the other 50%, you will be profitable.
5. Never lose more than what you expect to make.
6. If you make an adjustment on the spread, the original margin is still where maximum loss should be set.

7. It is OK to add to a trade, not to average down.
   a. Adding to a trade is *liking* the trade more at a better price. Market makers do this all the time.
   b. Averaging down is saying, "I liked it for a dollar, I must *love* it for 0.50," whether the trade is still good or not. This equates to chasing a losing trade, which almost never works out.
8. If the conditions or the assumptions change, *get out*!

A Few Words on Adjusting

Just like how you open a spread by buying in the direction that you expect the underlying to move, you adjust spreads by doing the opposite: You adjust spreads by buying in the opposite direction as expected underlying movement. One puts on a call or put spread because they thought premium was cheap, as well as because they had a directional bias. Buying options in the opposite direction allows you to buy premium in a name in which you thought premium should be bought.

Additionally, you will want to sell spreads or options if volatility pops. If this pop occurs before you sell, make sure that assumptions did not change. If you sell, you need to have a strong opinion on direction, because if vol pops and the direction is wrong, selling turns a bad trade into a stink bomb. We do *not* sell spreads against long spreads at Option Pit.

The following list shows what we do at Option Pit for short call and put spreads:

1. Set profit target at 50% of the credit or less.
2. If the spread makes half the profit target in the first day or two, get out.
3. Set loss at the profit target.
4. If you adjust the spread, the original margin is still where the maximum loss should be set.
5. Add to the trade, but do so at different strikes; *never* average down.
6. If conditions change or the assumptions change, get out.

Generally speaking, when you sell spreads as the underlying moves against you, you will slowly buy to close the short option in order to control delta. This ensures that the net trade still has a credit.

In adjusting, we push to cut delta by one-third to one-half, typically adjusting to the delta of the original trade.

If you cannot cut delta by the desired level and maintain a credit, the trade was the wrong trade and there was a mistake made on the spread.

We will see this approach to management and adjusting for other spreads over and over again. We are believers in hammering the point home!

Chapter 10
Butterflies and Condors

Beyond basic call and put spreads, the interesting next step is trading butterflies and condors. Much of what goes into a call or put spread creates a good butterfly or iron condor. And just as with a call or put spread, creating a butterfly or condor with edge demands a firm grasp of three matters:
1. Volatility
2. Skew
3. Risk management

In piecing these together, you create a butterfly or condor with high odds of success, even with an ATM spread, because you will trade with edge. The key is to use the information in front of you to piece the right trade together, both in choosing the right spread and in identifying strikes and expiration for maximum potential.

The Butterfly

In concept, a butterfly utilizes the following conditions:
1. Short implied volatility
2. Short realized volatility
3. Centering on one strike

What other trade performs that way? A butterfly is simply a straddle that is hedged if the underlying moves. Straddles are executed by maximizing volatility or lack of volatility. Figure 10.1 is a graph of a short straddle.

The graph shows that losses mount the further away the underlying moves from the short strike.

Compare that with the graph of an iron butterfly.

Figure 10.2 shows an *iron butterfly,* which is a straddle sold ATM with a wider strangle set up as a hedge. This one is set centered at the 4440 strike with wings 65 points wide. If the underlying moves hard, your losses are limited because of the hedge.

The Greeks of the two trades are revealing. Both trades begin with:
- short gamma
- long theta
- short vega

The butterfly has the least extreme Greeks. The trade is about half as sensitive to movement, time, and volatility as a straddle. Interestingly, it does not give up nearly

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Figure 10.1: A short straddle.

as much upside as half of the short straddle. So, what makes these trades winners? For a straddle, the answer is easy: If the underlying sits or only moves around a bit, you win. A butterfly is not nearly as easy, since you can use the other pieces of the trade to create spreads with a greater chance of success than that of a straddle. What makes a good butterfly?

Trading a Butterfly

To start a trade in a butterfly, it should first have falling IV. The butterfly is short vega; this means the trade has volatility exposure. If IV falls, the butterfly will make money quickly as its vega exposure delivers. In Figure 10.3 a butterfly sees a 10% drop in IV ATM in one day.

With a drop in volatility of 10%, the butterfly made $95 on risk of $1,094, net of commissions (you can see the 10% drop category under 0% move; P&L moves from zero to $95 on a drop, almost 10% on the trade with just a move in vol). Given a day or two of decay after this event, it is likely it will be time to close the trade. When we discuss risk management, we argue that with a 10% drop in vol and *no* time

Figure 10.2: An iron butterfly with wide wings.

passing, the above trade is a close. If IV falls immediately, thus trending down, that is favorable to a butterfly.

The next key is movement. What is going on with the underlying? Is it decreasing or increasing? It's OK to execute a butterfly if IV is up, but if movement is also up, it's a terrible idea. If movement is stable or falling, investigate further. Why is implied volatility increasing? If a butterfly is a bad idea, it's because IV is rising or movement is rising, a real problem for these spreads. If movement is falling and IV is falling, as seen in Figure 10.3, it makes sense to trade a butterfly; otherwise, you would need to believe that price levels were going to fall. Figure 10.4 is a chart showing a price (top), IV movement (red), and HV movement (blue) in the S&P 500 (SPX). It might have been a perfect butterfly candidate. Over the six months shown in Figure 10.4, the underlying was unable to keep up with IV. If IV is going to hang out above movement that long, a butterfly might be appropriate.

That being said, I would not be "all over" butterfly trading in SPX in this case. The reason is that IV was rising and seemingly ready to rally. Very rarely does IV make a big move higher and then stop. We know that IV tends to correlate to itself. In other words, when IV rallies it tends to keep rallying and when IV drops it tends to keep dropping. Knowing this, what does a butterfly expect to happen? It expects IV to drop. If you execute a butterfly, be aware that if IV is rallying it probably

Figure 10.3: A short butterfly in SPX with day 1 and near expiration payouts.

Figure 10.4: SPX price (top), IV, and HV over a six-month period.

won't work. In addition, IV is meant to be a leading indicator of movement. Even though it is not particularly accurate, and almost always overpriced, this doesn't mean you should unload butterflies into rising IV, because IV close to 50% of the time leads to a nice pop in volatility.

If you trade butterflies, be on top of volatility and how it is acting at the time; it should be falling, not rallying, hopefully from a level not overly sold (low). See the chart in Figure 10.5 for Citigroup (C).

Figure 10.5: C IV and 10-day HV.

If IV falls with movement, that may be the best time to execute a butterfly. However, there is one other factor important to the success of a trade: skew. A skew chart is shown in Figure 10.6.

The speed of IV increase on puts relative to calls is clear. Puts, options below the strike, tend to be sensitive to IV movement, but can also move on their own. When running tests on butterflies, how overpriced is the downside of the curve? If puts are expensive, the iron butterfly is going to be cheap, and the standard butterfly will be too expensive. We trade straddles because the IV is expensive. We trade butterflies because the IV is too expensive, and because it is cheap to buy the downside. If downside puts are cheap, the butterfly is cheap and the trade will probably make money. To trade butterflies effectively, you cannot pay too much for downside puts. Cheap puts produce an iron butterfly that collects more profit, and a standard butterfly that is too cheap.

Sounds easy, right? The problem is that it can be difficult to spot cheap vol and skew. The key is to be on top of volatility and curvature (skew). If curvature is cheap (the skew curve is flat), even if IV is low, the trade may still be good; the opposite tends not to be true. The moral of the story is that skew (curvature) makes butterflies succeed.

Figure 10.6: The skew curve in C.

The final step is picking strikes in an environment where HV and IV are falling and skew is normal or flat. Review the curve and find the best strikes to buy and sell. Look at the curve in VIX in Figure 10.7.

Figure 10.7: The skew curve in VIX.

Some strikes are expensive and some are cheap compared to a smooth curve passing through them. In the case of VIX, you would need to buy the 19s and 17s and sell the 18s. That would create a better butterfly from a price perspective. Compare, knowing the underlying is about 17.35. Comparing the 18–19–20 butterfly to the 17–18–19 butterfly, the value difference is apparent.

Consider the 18–19–20 iron butterfly discussed in the previous paragraph. It creates a credit of about $0.90. The 17–18–19 discussed above creates a credit of $0.95. When the trade is this close to the money and this tight, there is little difference between the two trades, yet one produces a better price by $0.05, which is a lot of edge for a trade of this width. You apply vol and skew concepts to pick strikes with an extra $0.05 on a tight spread, meaning you will have a hard time losing money on the trade.

The checklist for butterflies:

1. Sinking movement
2. Sinking IV
3. Flat skew
4. Picking the right strikes

Targeting Profit in a Butterfly

Once you put the butterfly on, the goal is then to make a quick dollar. Look for 10–15% on margin; if you want to get aggressive, shoot for 20%. On the other end, if managing losses, never accept a loss greater than what you are gunning for in wins. Win the same amount as you lose, and win more often. The alternative is to win more than you lose, and then make the same as you might lose. Either works, but you want to win, not lose.

Condors

Much of what makes a butterfly a successful trade makes a condor successful as well. While a butterfly is very similar to a short straddle, a condor is much more like a short strangle. Compare the two spreads in Figures 10.8 and 10.9.

Strangle

At expiration, because of the long wings (long options against the short options), there is a difference in how much money can be lost in a disaster; at their onset and within the short strike, the two spreads have similar characteristics. Much like a butterfly's P&L, the success of the trade is decided by whether HV is sinking, whether IV

Figure 10.8: SPX strangle.

is sinking, and whether you can get the best price on the spread as a whole. However, the roles of IV, HV, and skew for a condor are slightly different than for the butterfly.

IV and HV

Like a butterfly, the condor expects HV and IV to fall; it will perform best under those circumstances. The difference in execution between the condor and the butterfly has to do with range. While a butterfly expects the underlying to stop completely, a condor is much more forgiving of movement. The distance between the short strikes leaves room for the underlying to move around. This makes the spread great for choppy markets, where you can capture IV spikes *and* have room for the underlying to move on a reaction and IV to drop.

Retail condor traders often believe that because IV is overpriced naturally, that makes condors a perfect spread to trade. The problem is that low HV might also be in conjunction with sustained movement. With a condor, you look for a choppy market that might have a slightly higher movement, but the underlying is spinning its wheels and going nowhere.

Figure 10.9: A risk graph of a condor in SPX.

A market that rallies and drops with the underlying "spinning" is perfect for a condor because there will be opportunities to execute the sale on drops lower and carry the trade as it rallies. Within one cycle, the trader may be able to get out of the iron condor trade.

Several periods are perfect for condors that might not look as perfect on the basis of HV alone. To see this effect, overlay an indicator such as Bollinger Bands to visualize HV. The chart in Figure 10.10 demonstrates this point, specifically for periods where HV is declining. If you sold a condor in mid-August it might have gotten stuck or whipsawed by the market. If you were to sell in mid-September in the middle of a huge candle caused, say, by fear Deutsche Bank was going to go bust, but you believed that Deutsche Bank was going to be all right, you could have executed a condor and been in a position to collect a lot of chop and be out of a condor for a profit.

Meanwhile, look at the HV in Figure 10.11.

IV is cut and dried: If it's dropping, it's good for a condor, as well as for a butterfly. The big difference is that a condor can take a little more change in IV relative to a butterfly. Where a butterfly seeks a thumping of implied volatility, a condor is better with a "melt," meaning the underlying is doing little to nothing or chopping in a range, and the condor is therefore a trade that makes sense when there is a chance that IV still has more chop to it. Like a butterfly, condor trades expect a sinking of option premiums.

Figure 10.10: A price chart of SPX.

Figure 10.11: 1-day (white) and 20-day (blue) HV in SPX around the Deutsche Bank scare.

Skew

The big difference between a condor and a butterfly is the use of skew in analyzing the trade. While a butterfly necessarily makes money because of the skew, a condor relies less on curvature to succeed. That does not mean that you should ignore the skew curve. Skew is especially useful in condors for strike selection, which is visualized in the curve and makes a big difference by helping you decide what options to buy and sell. While a few pennies here and there can make little difference on an individual basis, making a few extra dollars on every trade over time creates a system of consistent profits.

Look at the curve in Figure 10.12.

Figure 10.12: The skew curve for September options in DE.

In this curve of Deere & Co. (DE) options, there is a kink in the downside curve. You can sell the 370s and buy the 365 puts at nearly the same volatility. This is the type of trade that makes a condor profitable over time. By selling the same volatility on the put portion of the curve, you collect more premium. In an equity index, the lower the strike, the higher the IV. If you buy and sell the same IV, you collect more premium than you would expect otherwise. More premium means a greater credit, which in turn means higher odds of success.

Set Up and Management

Like the butterfly, there are many ways to set up a condor depending on style. In managing a condor, follow the same rules as a butterfly. Never try to make too much, and never lose more than what you are trying to make. In adjusting, make trades that reduce risk, not ones that carry additional risk.

Follow these guidelines for setting up a condor:

1. Look for falling HV and a choppy market.
2. Look for falling IV.
3. Take advantage of skew to set up the trade.
4. Manage the position.
5. Exit the trade.

In the end, much like a butterfly, if you follow the steps to put on a good trade, you will win more often than not, and you will have an easier time managing risk.

Chapter 11
The Front Spread

The *front spread* shares many characteristics with butterflies and bull call spreads, except that they are set up as naked trades or with off-center strikes. I love these trades for several reasons:

- They enable put or call selling at extremes without being completely naked.
- They have a directional bias but are not extremely directional.
- They collect premium.
- They are short volatility.
- They improve with time.

There are a few things that make front spreads different from and – in my opinion – superior to butterflies and short call and put spreads. More often than not, when I look at trades, I end up with a broken wing butterfly or front spread. The trade is going to do well based on specific volatility conditions and, to a lesser extent, on skew conditions. The trade also tends to rely on moderate directional bias.

What Is a Front Spread?

When I was a floor trader, I preferred trading any option that was short gamma and long theta (a trade that expected little or no movement and collected on time decay). To the institutional and retail public, a front spread is a very specific trade that we call a "1 by 2." This means you are long "1" option (purchased for a debit). At the same time, you set up a credit in the "2" part of the 1 by 2. For example, you're long one option that is close to the money for $2; and you are short two options further away from the money, at $1.25. The net is the cost of the long minus the credits of the short, or in this case $2 – ($1.25 x 2) = $0.50 credit.

This trade gains exposure in the direction you expect the underlying to move, and you get paid to set up the trade. However, you are at risk in this trade if the underlying moves too hard or too fast. If your trade moves beyond the *range* you set, your position could lose big. The risk graph is shown in Figure 11.1.

The position expects the underlying to move higher. If the SPX is above 4540 at expiration, the position makes more than it would if the underlying is lower. It doesn't expect movement to be too quick. As more time passes, the more you hope the underlying will move higher. A move early is a loser but, with time, a run slightly higher does well. At no point in time do you want a strong move in the direction of the trade. Why? At the onset, the trade's delta is opposite of what you want as time passes; the trade is short delta and expecting the underlying to drop. As time passes, you expect the underlying to rally and delta to become positive. This is

https://doi.org/10.1515/9783110697865-012

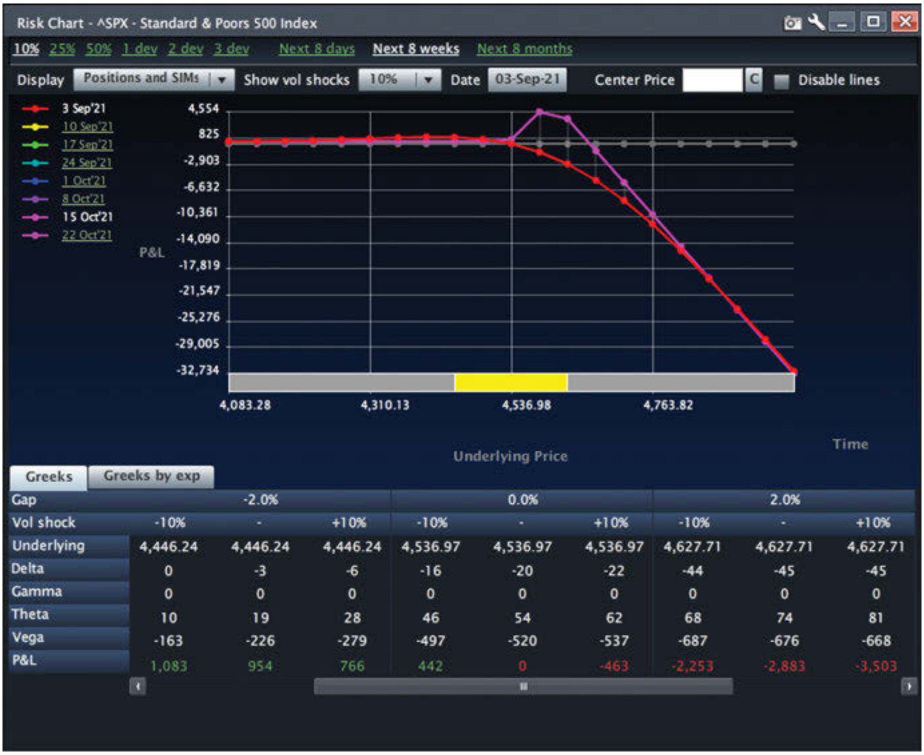


Figure 11.1: The P&L payout of the purchase of one ATM call and the sale of two further OTM calls.

caused by the two short options losing value from theta and becoming closer to worthless near expiration. This is an effective trade if managed properly.

Creating a Front Spread

The key to an effective front spread is forming an opinion on direction. The beauty of this trade is that it can be set up against the direction or with the direction. It is the classic "fade" set up or the classic "slow down" trade. Decide the trade by relying on one thing: volatility.

Let's look at an example of both.

IV

The United States Oil Fund (USO) chart shown in Figure 11.2 had IV points and exploded, but the underlying was finding a floor.

The lower graph saw a peak at the same time the top graph was in the trough. IV exploded as the underlying dropped (in July). At those points, when IV was at its

Figure 11.2: Stock price and IV of the USO ETF.

peak and the underlying was dropping, a bear one-by-two put spread would allow you to take advantage of the pop in volatility and let you "call a bottom" because the spread created room for it.

With USO trading $45.80 and IV at 44% the strikes are shown in Figure 11.3.

Strike	Bid	Ask	IV	Delta	Volume	OI
USO Sep17 39	0.82	0.87	46.42	17.04	16	230
USO Sep17 40	0.97	1.03	45.12	20.16	362	1082
USO Sep17 41	1.18	1.24	43.84	23.76	13	275
USO Sep17 42	1.41	1.47	42.73	27.71	34	207
USO Sep17 43	1.68	1.76	41.86	32.22	109	327
USO Sep17 44	2.01	2.09	40.74	37.05	27	140
USO Sep17 45	2.40	2.48	39.57	42.26	316	904
USO Sep17 46	2.83	2.93	39.25	47.71	345	558

Figure 11.3: USO strikes out of the money.

To pick a bottom, you could set up a one-by-two by buying a 43-strike put for $1.76 and selling two of the 40-strike puts at $0.97 each. With the $0.18 credit taken in (one put for $1.75 on the 43 strike, versus two puts sold at 0.97 on the 40 strike), USO could drop to $36.82 before you would be down on the trade (the $40 lower strike minus the $3 difference between strikes, minus $0.18 credit received).

What makes the trade work? The *high* IV and the extreme price. Traders are often paralyzed by the concept of selling puts on a major market move; a trade like this allows traders to take advantage of that movement. The risk is realized if the timing is wrong.

On the other side, if a stock rallies higher, a front spread can be a great way to fade a strong move up. It is dangerous to sell short calls on a stock that is off to the races, but when a stock rallies and IV does the same, that can signal that the stock price is going to slow down (look at Cameco (CCJ) price and IV in Figure 11.4).

Figure 11.4: Price of CCJ and IV of options.

As CCJ broke out in mid-August, IV exploded. As the stock topped out, so did volatility. That is a setup for an amazing front spread. With the stock trading at $21.32, the structure in October options is shown in Figure 11.5.

You could have bought the 27 calls and sold the 30 calls for almost nothing. You would be buying the 27 calls for $0.35 and selling two 30 calls at $0.17 (a net debit of $0.01). In paying $0.01 for the spread, CCJ could run to $32.99 and still make money. If you bought the 27 calls and the underlying rallied, you would have made significantly more on the 27s than you lost on the 30s. At expiration, if the 27s were worth $5.99 (with the underlying at $32.99) the 30s would be worth $2.99 each. The trade was up huge dollars, even as the underlying rallied. This is due to the combination of time decay and IV drop.

There are many other reasons to execute a front spread trade. They are excellent spreads for income trading but executing on the back of a move in volatility makes these spreads more palatable.

cDELTA	cMIDIV	cBID	cASK	STRIKE
0.76	56.16	2.89	2.97	CCJ Oct15 19.00
0.67	54.71	2.16	2.36	CCJ Oct15 20.00
0.57	54.02	1.66	1.73	CCJ Oct15 21.00
0.46	53.73	1.24	1.25	CCJ Oct15 22.00
0.38	55.34	0.91	0.98	CCJ Oct15 23.00
0.30	56.51	0.68	0.73	CCJ Oct15 24.00
0.24	57.91	0.51	0.55	CCJ Oct15 25.00
0.19	60.27	0.39	0.43	CCJ Oct15 26.00
0.15	62.13	0.31	0.35	CCJ Oct15 27.00
0.09	68.67	0.17	0.20	CCJ Oct15 30.00

Figure 11.5: Grouping of CCJ calls.

Skew

The next key to a front spread is the potential behind a change in skew. The steeper the curvature in the direction of the trade, the more likely that trade is to be successful. Why? Because with a steep skew the trade will be likely to collect a greater credit for the same width of spread. In the example of a CCJ front spread in Figure 11.5, the 30 calls had 0.01 of vega. What if you had bought the 27 calls for 62.13, and sold 69.67 volatility instead?

Taking the change in vol and multiplying by the vega will give you the extra premium in each call sold.

1 (change in vol) * 0.01 = 0.01 of extra premium in each 30-strike call sold.

That would allow the front spread to collect $0.02 more in the trade at onset, relative to what you would expect based on theoretical pricing. Two cents would help pay the commission, and gives you a few extra pennies of yield to collect. It makes the trade easier.

You may be able to widen the spread out. While, in the CCJ case, that 1 point in volatility might only increase the credit by $0.02, in SPX, as close to a week out, each strike can have vega near $0.50–$1.00 per contract, depending on time and placement.

That extra premium allows you to move the front spread an additional $5.00, and receive a similar – if not better – credit. The curvature in the trade makes a huge difference in how you set up the strikes.

While volatility is the key to a good front spread trade, if skew is in the spread's favor, it makes a front spread especially likely to succeed. Extra steep skew can be a sign that the move is likely to be nearing an end. The CBOE SKEW Index tends to have a positive correlation with the market. When skew gets super steep, it's bullish, and when flat, bearish. With a front spread looking for a turnaround, skew can be the difference between an easy winner and a hard-fought victory.

HV

The final piece of a good front spread is a slowing down of movement. Much like every other short premium trade, a profitable front spread expects movement to slow down (even more so, in many cases, than a condor or butterfly). A slowdown of momentum can be seen when HV drops while volume also drops. Let's look at Bank of America (BAC).

Volume (the bottom portion of the price graph in Figure 11.6) peaked with HV (a lagging indicator). One day of falling volume was a dip; two to three days of falling volume led to sinking HV.

Figure 11.6: The more volatile line (white) is 10-day HV; the smoother line (blue) is 20-day HV.

That sinking HV meant that the "nasty move" was over and a continuing move meant it would slow down. More often than not, this means the smart money is selling their wins to the retail side. If you can set up a front spread near peaks when HV is starting to sink, combined with great IV and skew, the front spread will work.

The Broken Wing Butterfly

What is the difference between a broken wing butterfly and a front spread? Almost nothing. The broken wing buys an extra option away from the two short strikes. This is done for two reasons.

1. Limit margin
2. Limit risk

The trade looks just like a front spread. In AAPL, you could have set up a front spread expiring in three weeks that was long ATM, short about 3% OTM, and long 10% OTM, to reduce the margin on the trade and ensure that you did not "blow out" if AAPL reversed (see Figure 11.7).

Figure 11.7: The payout on an AAPL call one-by-two.

Aside from the reduced credit and limited upside, the two trades were practically identical.

Trade Management

There are two ways to manage these trades: aggressively or passively.

Aggressive Management

A trader typically manages delta of the position daily. When I was a floor trader, I traded to keep the delta of the position no more than twice my gamma; this allowed the position to move without needing to adjust (especially since adjustments reduce the profitability of a trade). Others kept it one-to-one on a daily basis, still others were much closer managers and let delta slip to two to three times gamma of the position. In managing delta, I used the stock or future, hedging with the underlying.

This method is appropriate if you use margin to trade these positions, or trade the pure one-by-two positions because it will keep the trade from getting out of hand; no one wants a loss. Managing delta of a one-by-two ensures it doesn't explode into an account-blowing loser. I suggest going conservative and keeping delta at no more than one-to-one against a portfolio position. (In the Appendix, managing delta over the course of a few days is explored.)

Passive Management

This is more appropriate for the retail trader or those trading broken wing butterflies. In passive management, let the trade sit until the underlying gets to the long strike. Once this occurs, slowly buy to close calls or puts from the short strike to reduce delta. In adjusting this way, you will see two things happen to the position: The trade will become net long contracts, and the short gamma of the position will drop. As the gamma drops, the pain will be reduced; and if the underlying pops, your long contracts will kick in, allowing you to break even on continued momentum that, given the odds on a one-by-two, sets up long-term success when these are executed repeatedly. I love these spreads because the odds work well for the consistent trader.

Beginning of Front Spread in TSLA

Let's examine a front spread in Tesla Inc. (TSLA).

At the onset, this is a classic front spread; you buy a near-the-money call and sell two OTM calls (see Figure 11.8).

As the stock moves higher, you buy three 350-strike calls to hedge off risk. This exploits the upward movement with an increased position on the long side. Figure 11.9 shows a TSLA front spread after a few days pass, managed with more calls.

If you aggressively cover, the underlying will not be a problem. The trade can have a P&L curve much like graph number one, where a strong move puts the trader in real trouble.

At this point, cut the delta in half every time it increases to the point that it "takes over" the position. If you cut delta in half when delta starts to be the number one concern, you have a chance to make the front spread work. You can do this by buying calls or buying the underlying to handle delta. In the above example, you bought calls. This meant keeping delta in a position that it would not be so high that a move against you would put the entire position in peril. This means keeping delta at two times gamma. You can also look at the P&L of the position to manage risk. Never lose more than you are trying to make – as that becomes a risk, delta should be cut.

Figure 11.8: You are long 10 June 335-strike calls and short in 20 350-strike calls, for a small net credit.

Target Profit

Do not look at the margin unless you are on PM (portfolio margin). The margin associated with front spreads is high relative to risk. I prefer to look at these in terms of how much I am willing to lose, and set my P&L targets there. Thus, if I am willing to lose $500 on a trade, I shoot for $500–1,000 in profit. That is equivalent to selling a one by two at $0.30 and covering it for a $0.30 credit.

Front spread checklist:

1. What is the probable direction of the trade?
2. What is the IV?
3. What is the skew?
4. Where is the momentum and HV?
5. What is the target for the trade?

Using this checklist, you can develop a profitable front spread and a set of front spread trading positions.

Figure 11.9: The stock moves higher and you buy three more calls at the 350 strike.

Broken Wing Butterfly Variation

Returning to the TSLA example, a variant is the broken wing butterfly (as discussed earlier in this chapter). This is a front spread combining one long contract close to the money, with two short contracts out of the money. It is much like a front spread, but your long contract is further away from the two shorts, reducing margin. The net of the trade produces a credit but limits risk if the underlying keeps moving (see Figure 11.10).

The chart looks a lot like a front spread; however, margin is reduced because you own an OTM call. Trading a broken wing is almost exactly like trading a front spread. The difference is that as the underlying rallies and you cover, the position loses less. Consider the broken wing butterfly as an alternative to the front spread.

Figure 11.10: The payout on a TSLA broken wing butterfly at onset and expiration.

Chapter 12
Calendar Spreads

The *calendar spread* is a trade that is betting the implied volatility (IV) of an option in one month is mispriced against another month. While many traders view calendar spreads as long or short implied volatility trades, in actuality, calendars are a play on the exact opposite: A calendar spread is a play on movement. Compare the long calendar spread to a short straddle. Figure 12.1 shows a risk chart of a short straddle for the S&P 500 (SPX), whereas Figure 12.2 shows a calendar spread for the SPX under the same conditions.

Figure 12.1: A short straddle for SPX.

The primary difference between the two is that there is a limit to how much a calendar spread can lose. On the surface, calendar spreads and straddles are, in a sense, the same trade. The major difference is that owning the back-month contract in the calendar spread creates a hedge in the case of a major move, and it creates a hedge if and when IV explodes.

https://doi.org/10.1515/9783110697865-013

Figure 12.2: The calendar spread under the same conditions for SPX.

Creating a Calendar

A calendar spread provides exposure to *realized volatility*, but it also maintains sensitivity to implied volatility rallying. It is a “vol swap.” You are betting that near-term volatility is too high, and long-term volatility is too low. The calendar spread also shows belief that the overall perception of volatility is too low, while movement itself is sinking. To say these are complex vehicles is an understatement; however, you can use calendar spreads to develop a trade with a ton of edge in it, and have a hard time losing, while enjoying huge upside potential.

Here are the steps to developing a good calendar spread:

1. Evaluate overall implied volatility.
2. Evaluate term structure.
3. Evaluate event risk.
4. Evaluate realized volatility.
5. Evaluate the market trend.
6. Choose the right strikes.
7. Execute the trade.

8. Manage the trade.
9. Exit the trade.

Now we will walk through each of these steps in detail.

Evaluate Overall Implied Volatility

Calendars work best when they are executed in a low implied volatility environment. For one, like all purchases, the lower the price, the better. In addition to the upside of a lower price, since IV is mean-reverting, both within and between volatility zones, buying calendars when volatility is cheap will lead to trades with higher odds of success. The next chart in Figure 12.3 is CBOE Equity VIX on Apple (VXAPL), which shows the implied volatility of Apple (AAPL) options.

Figure 12.3: The above chart is of VXAPL, the VIX of AAPL options.

In July and August, IV of AAPL options was cheap (compared with past movement) – at levels where you should buy, because IV was low over this period. AAPL prices in August versus September for an option with 30 days to expire reveal more.

Figure 12.4 shows August 9 options pricing:

OI	Volume	Delta	IV	Bid	Ask	Strike	Bid	Ask	IV	Delta	Volume	OI
1492	62	64.27	17.31	3.20	3.30	AAPL(W) Sep09 107	1.34	1.37	17.37	35.72	114	305
3284	2115	57.22	17.25	2.60	2.65	AAPL(W) Sep09 108	1.72	1.76	17.10	42.68	76	114
918	554	49.93	17.06	2.07	2.11	AAPL(W) Sep09 109	2.19	2.22	17.02	50.02	78	69
5481	2202	42.60	16.96	1.61	1.65	AAPL(W) Sep09 110	2.72	2.77	16.91	57.37	9	85

Figure 12.4: AAPL options with 30 days to expire – from August 9 to September 9.

In the montage above, the ATM options (using the offer price) cost about 1.9% of the value of the underlying stock (2.1/109 = 0.0192). Options with 30 days remaining until October expiration are shown in Figure 12.5.

OI	Volume	Delta	IV	Bid	Ask	Strike	Bid	Ask	IV	Delta	Volume	OI
1398	914	61.57	21.52	3.70	3.85	AAPL(W) Oct14 110	1.87	1.92	21.23	38.31	2623	102
732	1996	55.92	21.22	3.10	3.25	AAPL(W) Oct14 111	2.27	2.33	21.09	44.06	1467	85
1254	1165	50.04	21.03	2.61	2.67	AAPL(W) Oct14 112	2.74	2.79	20.94	49.97	268	13
663	870	44.14	20.93	2.15	2.20	AAPL(W) Oct14 113	3.25	3.35	20.80	55.91	223	24

Figure 12.5: AAPL options with about 30 days to expire, September 14 to October 14.

The ATM options cost about 2.4% of the value of the stock (2.65/112 = 0.0237). That is no small difference in straddle price for a stock costing $100.00 per share. $0.50 in a straddle is a big change in straddle price. Now consider how this might affect much larger stock or index options, such as in the SPX or Nasdaq 100 (NDX), which have values in the thousands. Instead of a $0.50 spread difference in the bid–ask, index options can be worth $5.00–$6.50 per contract or more. That is not a small dollar amount in an option spread. Most traders in index options are only trying to make $1.00–$2.00 on the entire trade. Thus, small changes in IV can dramatically change the cost of the straddle and will mean the difference between a trade with high odds of success versus a trade likely to lose.

When IV is low, calendar spreads are cheaper, making them potent. However, overall low IV is not the only way price is determined. The second (and almost as important) piece of overall pricing is term structure.

Evaluate Term Structure

The next key to a calendar spread is the relationship between contract months; that is, comparing the IV of one week or month against another. It is not enough to have low volatility if the option being sold too cheap. When IV is low, term structure tends to steepen, just like a VIX futures curve: volatility is low in the near-term contract, but gets progressively higher with each week and month out. You can see this in Figure 12.6, which shows the VIX futures curve in contango.

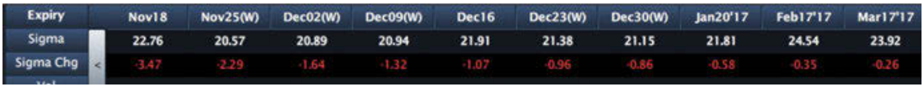
Because IV is low, the assumption that IVs will revert to a higher mean pulls the curve upwards. When IV is low, traders look for a quicker and slightly stronger reversion; however, unlike the VIX futures curve, the structure of index and equity curves is far more inefficient. Volatility doesn't move as smoothly across contracts in individual months among index options, especially when you also look at daily and weekly option terms. It is even less efficient in equity options, where one trade

Figure 12.6: VIX futures curve in contango, where futures trade progressively higher than spot VIX.

Figure 12.7: 30-day and 60-day IV in AAPL options.

can throw off the entire volatility curve in one month relative to all the other months. Figure 12.7 is a chart of AAPL options IV.

Even when IV is low, the spread between the 30-day and 60-day IV widens and tightens over time. When IVs tighten and IV is low, calendar spreads can work – and work quickly. However, with weekly and even daily options now available, it's not enough to look at simple volatility charts. You need to study aggregate volatility (which we discussed in Chapter 5). Look at the weeks in Figure 12.8 to determine which contracts can be bought or sold.



Expiry	Nov18	Nov25(W)	Dec02(W)	Dec09(W)	Dec16	Dec23(W)	Dec30(W)	Jan20'17	Feb17'17	Mar17'17
Sigma	22.76	20.57	20.89	20.94	21.91	21.38	21.15	21.81	24.54	23.92
Sigma Chg	-3.47	-2.29	-1.64	-1.32	-1.07	-0.96	-0.86	-0.58	-0.35	-0.26

Figure 12.8: The volatility of AAPL options over several expirations.

You could have bought the December 30 contract and sold the December 2 or December 9 contract for relatively even volatility. You could get a credit selling the December 16 against the December 30, but there might be a reason not to, as explained in the next paragraph.

Evaluate Event Risk

In Figure 12.8, December 16 seemed to have a much higher IV than the contracts in front of and behind it. Why? If you don't review event risk, you would overlook the fact that December 16 was the week of a major Federal Open Market Committee (FOMC) meeting. Traders believed that the FOMC might raise rates in December, but the result was not certain at the time. Because of this belief, IVs were high across the board in all major stocks and indexes for the December 16 contract. This means that IV term structure likely did not actually have an edge around that contract. Unless you were willing to hold through the Fed meeting, there was no edge in being short the December 16 contract. Given my belief in not trading events, the high IV amounts to no theoretical edge. Thus, you would be better off taking a small negative vol trade, such as selling December 2 and buying December 30, than doing a trade around the December 16 term. If you are looking for edge, event risk is not the way to trade.

Evaluate Realized Volatility

While overall IV and term structure are the primary keys to trading calendars, it is also important to recognize the importance of movement in the underlying. If the underlying is moving a lot, a calendar spread will lose. Thus, while you should look at IV, you also need to examine historical volatility (HV) movement (see Figure 12.9).

Like a straddle, a calendar wants the underlying to sit; so look for periods where movement is starting to fall. In August, you could have set up a trade that bought cheap volatility just as movement stopped – a great time to execute a trade. Alternatively, movement is mean-reverting, so the times where movement was at its lowest could line up with low volatility. Trade into sinking movement, *not* bottoming out movement. Look at movement *with* IV in SPX in Figure 12.10.

Figure 12.9: 20-day and 30-day HV in AAPL.

Figure 12.10: 20-day HV (blue) and 30-day IV (red) in SPX.

The time to execute a calendar was in late July when HV was dropping and IV was low. At the end of August, HV was bottoming and vol was low, but then HV started to move again. It is important to pay attention not to where HV is, but the direction of movement. If HV is falling and is in the toilet, that could be a great time to execute a calendar. If HV and IV are both low, that might seem like a great spread, but might not have as much edge in the trade.

Choose the Right Strikes

Don't ignore strike-to-strike volatility – how one strike's IV is priced against that of another strike. Within a month, each strike has its own volatility and that can be expensive or cheap. Examining standard term structure provides insight into where volatility is currently; in order to optimize a trade, review each strike to find the right price. Look at the December 9 contract and December 30 contract in AAPL around the ATM strikes, as shown in Figure 12.11.

Expiry	Nov18	Nov25(W)	Dec02(W)	Dec09(W)	Dec16	Dec23(W)	Dec30(W)	Jan20'17	Feb17'17	Mar17'17
Sigma	22.76	20.57	20.89	20.94	21.91	21.38	21.15	21.81	24.54	23.92
Sigma Chg	-3.47	-2.29	-1.64	-1.32	-1.07	-0.96	-0.86	-0.58	-0.35	-0.26

Strike	Last	PnL	Pos	SIM	Bid	Thec	Ask	Vol
AAPL(W) Dec09 107	2.07				1.83	1.88	1.93	21.90
AAPL(W) Dec09 108	2.25				2.23	2.28	2.34	21.50
AAPL(W) Dec09 109	2.75				2.69	2.75	2.81	21.07
AAPL(W) Dec09 110	3.23				3.20	3.30	3.40	20.83

Strike	Last	PnL	Pos	SIM	Bid	Thec	Ask	Vol
AAPL(W) Dec30 107	2.75				2.58	2.66	2.74	21.55
AAPL(W) Dec30 108	3.22				3.00	3.10	3.20	21.36
AAPL(W) Dec30 109	3.75				3.45	3.52	3.60	20.77
AAPL(W) Dec30 110	4.37				3.95	4.05	4.15	20.52

Figure 12.11: Strike prices in AAPL in options in the December 9 and December 30 contracts.

The spread between the different strikes varies from strike to strike. The 107s have a vol spread of 0.35 (21.90 vol in December 9 minus 21.55 vol in December 30), the 108s are 0.14, the 109s are 0.30, and the 110s are 0.31.

Based on the spreads, there is more potential in trading the 108 calendar with its tighter spreads than the other contracts. If you are setting up an ATM calendar, the 108s appear to be the strike to trade, as the IV spread is less than half of the surrounding strikes. While 0.14 to 0.3 might not seem like much based on the net vega of the spread (which is about $0.04 in the calendar) executing the 108 would produce an extra $0.01 in the calendar. A penny is equal to the commission on the trade.

If you are able to trade commission-free, how much more would you make in a year? And if you can't trade commission-free, you can create enough edge in a trade to negate its cost.

Execute the Trade

If you put on a calendar spread, and then the underlying moves, given the edge executed in the trade, the trade should be near break-even or only slightly down (unless the move is a crazy-hard move). Practice closing these trades almost immediately. A well-executed calendar should make money in a few days. If it doesn't, or if it starts losing money, there may not have been nearly as much edge as you initially thought, or the trade could be losing its edge. Quickly closing losing trades and then making money on winners should result in more profits than losses.

An alternative to this management tactic is to add a calendar in the direction of movement. This is a more nuanced approach to management and requires conditions the trader liked about the first calendar to still be in effect, thus the calendar would have an edge to it. If you do this, you will end up with a double calendar that will be around the current price. However, you still need to have great calendar trading conditions. In this scenario, you sell a calendar one strike beyond where the underlying is currently trading; thus, if you executed an AAPL 150-strike calendar initially, and the stock ran to 155, you would then add a calendar at the 157.5-strike or 160-strike (see Figure 12.12).

Figure 12.12: Adding subsequent calendars.

The underlying is now surrounded by calendar spreads. If the underlying sits, you will make money as time passes and if IV runs higher. If the things that make a calendar not work (such as falling volatility, or a lot of stock movement) continue to happen, you will lose more. Therefore, when the conditions for a calendar are no longer present on the initial spread, you should kill the trade.

Manage the Trade

With calendar spreads traded for edge, we believe in the simple approach to adjusting. Each trade should have edge. We look for a simple approach to calendar management.

Exit

When managing a calendar, you should be going for about 10–15% of the margin, while looking to lose less than 5%. If this is done over time, calendar trading should produce net overall profits. The absolute max loss on a calendar should be about what you are trying to make in profit. The key is the edge, though. If you trade these with edge over time, calendars will win.

Part 3: **Global Risk and Volatility**

Chapter 13
How a Market Maker Trades

How do market makers trade? There are two answers: a general approach, and a "manage the book" approach. Market makers, unlike traders, would rather be involved in trading, not in "building the book." This is a primary driver in option pricing; market makers dislike carrying positions.

Market Making

The story of market making begins with middlemen. Regardless of industry, middlemen do one thing: manage demand. Middlemen buy fish from fishermen, and then sell them at the wharf. Middlemen buy furniture, and then sell it to office managers. Middlemen are some of the biggest companies in the world; think Amazon (AMZN) and Walmart (WMT).

In the stock and options world, middlemen take on a different name: market maker. In a perfect world, the market would be able to perfectly match buyers and sellers. While this does happen every now and then, most of the time someone else needs to buy an unwanted stock or sell a wanted stock and hold the opposite position for some period of time. Here's how stock market making works:

- A market maker presents a market on stock XYZ, currently trading at $100.
- The bid (or price the market maker will buy at) is $99.95, and the offer (the price the market maker will sell at) is $100.05.
- The offer trades as the market maker sells the underlying XYZ at $100.05.
- The market after the trade now sees the bid at $100.00, and the offer at $100.05.
- The bid trades at $100. The market maker makes $100.05 – $100.00, netting $0.05 on 1,000 shares, or a total of $50.00.

Fifteen years ago, that was the model on a few hundred million shares each day. Now that there are a billion shares per day, spreads (the difference between the bid and offer) have tightened to $0.02 wide for active stocks, and $0.05 wide for less liquid stocks. The "trade by appointment" (very illiquid) stocks can still have spread widths of $0.20 or more. On a given day, a firm can make good money simply by buying stock, holding it for a few seconds, and then selling it to someone else.

Why do market makers make money? Because they are willing to hold a position for a short period of time. However, because market makers don't want to hold a position for long, markets move. This movement is the risk the market maker takes on. Trades can go in stocks when the underlying moves. For example, consider the intraday chart of the Nasdaq-100 (NDX) in Figure 13.1.

https://doi.org/10.1515/9783110697865-014

Figure 13.1: A one-minute chart of the NDX.

From 9:30 am to 10:00 am the stock went more or less straight up, yet the market maker had to take the risk of being short the NDX over that brief time, because they were selling NDX. For this reason, market makers are allowed to trade on the bid/offer spread. In the end, they do not make $50 dollars per trade or even $20; it ends up amounting to less than $1.00 per trade. With dynamic hedging (hedging as the delta moves), direction should not be important as hedging takes directional moves out of the equation (except for gaps).

While the above is similar to option market making, it is not exactly the same. A stock market maker needs to make markets in one instrument: the stock. A market maker in options needs to make markets in hundreds of strikes, all of which move with the underlying. While a market maker could try to make markets on each individual case, given the scope of the job and the correlated relationship of each contract, option market makers have to move all options when a single option trades.

Option traders, in order to manage the entire curve, need to trade volatility. Look at the vol chart of Apple (AAPL) in Figure 13.2.

Much like a stock price, option volatility moves around on a daily basis, and intraday basis. This point is made in Figure 13.3.

At any given time, regardless of the movement in the stock, the vol price is based on what traders buy and sell. Market makers trade volatility on option prices. They hedge off directional risk when they trade, and hedge delta as the underlying moves. For example, a trader might set his or her fair value volatility at 40, which would place volatility at a 39 bid and 41 offer.

When you trade an option, regardless of the strike, it is going to move volatility. Whether you buy an out-of-the-money option or an in-the-money option, downside or upside, volatility is going to move. In the example above, if you buy an option, the new vol levels may move to 40 bid and 42 offer. While this example is more

Figure 13.2: A 30-day vol chart of AAPL options.

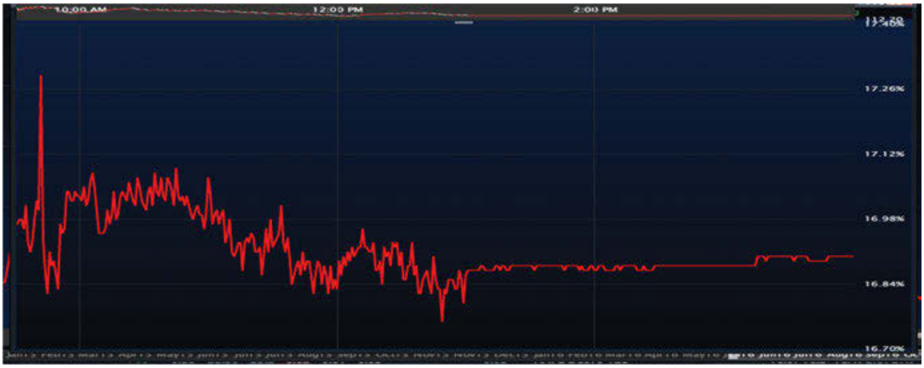


Figure 13.3: An intraday chart for AAPL options.

extreme than the actual movement we would typically see, it illustrates how markets are made by market makers.

The market makers do not want to hold too strong a position one way or the other. By moving markets based on vol, you avoid establishing too large of a position. If vols get too high, someone, likely a professional customer, will sell the overpriced volatility back to the market maker. The market maker will have very little position open, and vol pricing will be near equilibrium.

The Trader

What does this have to do with the retail or "prop" trader? The above approach applies to those *producing* trades. One of the major mistakes retail traders make is overplaying their hand. In other words, traders tend to sell or buy too much. Thus, you should approach position-building like a market maker; you don't want for the trades to come to you, but you allow your trades to determine the next trade increment. The first trade you make should not be the largest.

The most powerful weapon you have is your ability to initiate a trade, or to not initiate a trade. When trading, it is important to develop a management system to evaluate each trade. While there are several different approaches you can take, at my company Option Pit, I encourage my students to use a "numbers" system. I tell my students to rank each trade on a scale from 1 to 5 (or 1 to 10); the higher the number, the more they pay to remove risk. This way, we rank the likelihood of success on a trade. If a trade is good, it should demand less capital. The equation is direct: By ranking your trade based on risk, you identify an appropriate level of risk you are willing to take. Too many traders fail to understand this and end up losing money because they lacked a rating system.

The first key to portfolio building is to develop a rating system for this purpose. That way, you have an objective way to answer, "How good is this trade?" If it is a great trade, you might apply a rating of a 7 or 8 (if you're using a scale of 1–10). If the trade isn't that great, you might rank it a 5. If the trade is below 5, I would not even bother with it. This is something professional traders do all the time.

Market makers have an advantage in that they see orders come in, and do not generate them. The fact that orders are generated by upstairs traders (large firms and institutional investors) and the public makes the process of rating trades that much more important. As you create the trade, you are not getting the bid–ask spread. The only value the upstairs and retail traders have is the edge generated by the trade. Prop desk (which trade an institution's own money for profit) and major upstairs traders likely go through a "ranking" system in their heads as well. Since the retail public does not have the luxury of managing a multi-million-dollar trade book, they need to use a system of rating each trade from the very onset.

Here are the steps for rating a trade:

Step 1

Establish fair value of a given trade. This may be a credit received, given the risk, or it may be a value above a theoretical value. Newer traders tend to go with the former, and more experienced traders will go with the latter. For our assumptions, this example is the former. The fair value should be set for each trade – and really, for each product (which means the volatility of the underlying). Time spreads and similar trades are a little more complicated as it's the vol spread that sets the edge, but all things being equal, it's not that different from buying or selling a single option.

Step 2

What is the maximum capital to allocate to a trade? If a trade is just OK, you might be willing to place 2% of your portfolio at risk. If a trade is a home run, you might be willing to put 5% toward the trade. Even the amount you allocate toward an absolute home run trade should be less than the maximum you are willing to apply toward a trade. If we have one rule, it is "always be able to trade another day." Thus, while you theoretically should never allocate more than 10% of your portfolio to a trade, in reality no trade should meet the maximum, and should therefore be limited to only about 5% at the most.

Step 3

Slowly build a book. One of the mistakes retail traders make is the failure to let the right trade come to them. While you have to press the buy or sell button, you do not have to do it on any specific date or time. Traders who take the time to let a good trade "show up" (and by that, I mean set criteria, stick to them, and wait for the right trade) will be more successful than those traders who impatiently "wing it." The key is that as the book builds the rating system changes. While at the onset you might be willing to trade a 3 out of 5, after one trade, the next trade needs to be a 4, and then a 5 after that. The next trade, if it's not a 5, needs to be skipped. In fact, if an offer on the other side of the current position comes in near a 3, you might be willing to take the trade if you have sold recently at 5.

While you rate each trade, in the end, you look at the portfolio as a whole. We are going to look at a portfolio in the next section and how it might be built in a single day. We discuss managing the portfolio as a whole in the next two chapters.

Step 4

Unwind the book. Much like putting on a trade, take trades off in waves. If the trade makes the profit target quickly and you only have one trade on, the plan becomes easy; close the trade. If you have many trades on, it is more convoluted. This is where profit targets for every trade matter. The following is an example of how a basic portfolio might trade condors.

Using the Option Pit method to build a portfolio of trades:
Day 1: Sell a condor with a rating 3: 2% of portfolio allocated.
Day 2: Sell a condor with a rating 4: 2% of portfolio allocated.
Day 3: Sell a condor with a rating 5: 4% of portfolio allocated.
Day 4: Sell a condor with a rating 5: 2% of portfolio allocated.

Even though you saw a rating of 5 on day 4, you only sold 2%; this is because all of the condors account for 10% of the portfolio's risk. Thus, even though it was better than the day 1 trade, it went at the same level. You should not stop yourself from being able to trade because you have traded too much at one time. This is the key to the day 4 sale level.

Now looking at a larger portfolio, the tricky part is understanding that each trade adds on to the next. A trade done is additive to the entirety of the portfolio:

Day 1: Sell a condor with a rating 3: 2% of portfolio allocated.

Day 2: Sell an iron butterfly with a rating 5: 5% of portfolio allocated.

Day 3: Buy a straddle with a rating 3: 2% of portfolio allocated.

Day 4: Sell an iron butterfly with a rating 5: 5% of portfolio allocated.

Day 5: Buy a straddle with a rating 3: 4% of portfolio allocated.

Even though the trades are all different, they offset to some degree. Yet this does not negate the fact that each trade does not exceed 5%. If you do too much of the same thing, you have to stop trading. Build a portfolio in which you understand what each trade means to the overall picture. I recommend building a spreadsheet to help you keep track.

Assigning a numerical rating to every trade is part of your retail trader training. It transforms how you look at the Greeks and risk, and turns it into a skill. To manage a book, you need to be able to weight and understand the Greeks. To do that, you need to use weighted Greeks, the right forms of vega, and total delta management – which we will talk about in the next chapter.

Chapter 14
Portfolio Greeks

Traders have a choice to look at each trade individually, or the portfolio as a whole. Looking at the investment portfolio as a whole is usually the more profitable choice, but requires an understanding of how the Greeks operate and how to evaluate aggregate Greeks. This chapter discusses how to interpret Greeks for the whole portfolio, and the proper calculation of vega.

Delta

All deltas are not the same. This is because delta is not weighted. You can be long 100 deltas of Apple (AAPL) and long 100 deltas of Bank of America (BAC), yet the exposure is different because of the price and volatility of each stock. This is where the concept of *beta weighting* comes into play. Beta weighting a portfolio to a base index is key. This is a practice engaged in by many trading firms, including some of the largest market making firms in the world. So how *do* you beta weight?

The first step is to pick the right index to beta weight a portfolio against. Most active traders' portfolios are best weighted to the S&P 500 (SPX). The SPX has the most active futures and most traders do not specialize in only one sector. The alternative is to beta weight to a different index, potentially the Nasdaq-100 (NDX) or Russell 2000 (RUT); the NDX is a good choice if you trade a lot of the major tech stocks, or you can choose RUT if you specialize in small cap names. If you have a smaller portfolio, you could weight to the ETF of the index instead of the index (for example, SPY, QQQ, or IWM for the SPX, NDX, or RUT, respectively). There are brokerage platforms that have beta weighting already programmed, and others that do not. However, the concept is the same.

So what is beta weighting? By beta weighting, you can estimate the exposure of a portfolio to a move in a major index like the S&P 500.

Divide the price of the underlying by the price of the beta index to get a relative ratio taking the stock's price into consideration; then multiply by the beta of the underlying to the index to get a per-share ratio that can be used to compare to other stocks.

We will walk through an example.

For a stock worth $110 dollars per share versus the S&P 500 with an index price of 4400, 100 deltas (for 100 shares) would become:

$$100 * 110/4400 = 2.5 \text{ (this is the relative ratio)}$$

https://doi.org/10.1515/9783110697865-015

Next, multiply by the beta of the underlying to the S&P 500. If the beta is 0.96:

$$2.5 * 0.96 = 2.4$$

Thus, the beta weighted delta of this stock would become 2.4.

Thus, for every 100 shares of stock, if a trader is long, it contributes 2.4 deltas to an S&P 500 weighted index.

Gamma

The effect of beta weighting on gamma is much the same as the effect beta weighting has on delta. Because gamma is how the delta changes with a one point move, when a portfolio is *beta weighted gamma*, it will also convert and can be calculated in a similar fashion.

Essentially, to convert gamma:

1. Calculate the delta beta weighted conversion ratio.
2. Multiply this number by the gamma.

While not exact, this will be better than a "back of the envelope conversion" for those using a spreadsheet to calculate a beta weighted portfolio.

Change gamma by the same adjustment made to delta. Thus, a stock priced at $110, with 100 deltas and 100 gammas, would see its gamma converted by the same effect: It has a beta multiplier of 0.24, and 100 deltas convert to 2.4. Applying this to gamma converts 100 gamma to a gamma of 2.4 as well.

Theta and Vega

Unlike delta and gamma when beta weighting, theta and vega are already weighted.

Theta

Recall that theta represents the amount a position costs or produces with a daily passage of time. Because this number is derived from premium paid or collected, it is already weighted if you sell premium at the same delta. A single contract sold at $3.00 with 32 days to expire will – if it goes out worthless – produce $300 ($3.00 * 100 shares per contract) of decay. This is a similar theta to a contract with the same delta sold at $0.30, ten times. It does not matter if the contracts were on the S&P 500 or a $30 stock; $300 of premium at a given delta sold will have a similar rate of decay (theta). An example can be seen in AAPL vs SPX options in Figures 14.1 and 14.2.

Figure 14.1: Short 1 SPX 15 delta call at a 15 delta.

The two options, with similar expirations and deltas, have the same amount of theta.

In Figures 14.1 and 14.2, the two sales collected similar premiums. While the AAPL options produced slightly less theta (a result of a slightly higher delta), the two options produced similar risk, and more importantly, overall similar theta levels.

Vega

Much like theta, vega is derived from premium collected. In its raw form, vega is already weighted. 1000 vega in AAPL is the same, in raw terms, as 1000 vega in SPX; although the former would need more contracts to create that much volatility exposure. The more premium, the more vol exposure, regardless of price. However, a couple of attributes of vega take the analysis a step further. For example, how do you analyze volatility?

Figure 14.2: Short 6 AAPL options with 32 days decay at a 17 delta.

Weighted Vega

Much like delta changes as the underlying moves, vega also changes as the underlying moves. The closer to expiration, the more the volatility of the option. This can be seen in the price action of VIX futures. While every VIX future represents 1000 vega notionally, in practice, they do not behave that way. During times of normal market action, anear-dated VIX future will have much lower implied volatility than a long-dated VIX future. This is called contango. Figure 14.3 shows a future with just a few days to expire that has much lower implied volatility than a longer-dated VIX future. March is lower than April and April is lower than May, etc.

However, that is not the whole story. Because of the near-dated nature of short-term futures, they have a higher *actual* volatility (volatility of volatility) than longer-dated futures. A move in VIX will cause near-dated futures to move more than long-dated futures. Observe how futures reacted to the French elections of 2017 (Figure 14.4). As the election got closer, VIX rallied, but the VIX futures did not move in unison; near-dated futures rallied harder over the two weeks heading into the election than long-dated futures:

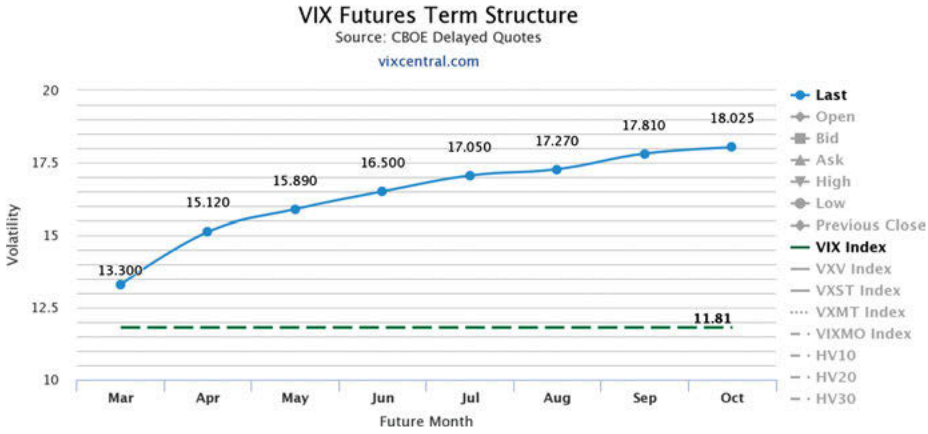


Figure 14.3: VIX futures term structure.

Figure 14.4: Futures reaction after the French election.

Futures with less time to expire moved at a much greater relative speed than long-dated futures and, in some cases, longer-dated futures didn't move at all.

Because near-dated volatility is so much more active than long-dated volatility, it becomes important to take this movement into account. Traders generally weight the volatility of their portfolio. By weighting a portfolio, you can give more emphasis to volatility in near-dated options than premium held in longer-dated options. There are several ways to calculate weighted vega.

Professional trading groups run correlation by "days to expirations." This means that a professional has run the correlation of the volatility of an option within a single stock or index that has 20 days to expiration, against how its volatility moves in options with expirations from one day to well over a year to expiration.

These correlations probably are too much work for an independent managing a small book.

For the independent trader, it makes more sense to use a simple squaring function to calculate weighted vega. To calculate weighted vega, first come up with a base number of days to expiration: a simple standard duration of the portfolio. To do this, take the square root of the standard days to expiration over the days to contract expiration. Thus:

1000 vega with 60 days to expire with a standard duration of 30 days would have a weighted vega of:

$$1000 * \text{SQRT}(30/60) = 1000 * 0.707 = \text{a weighted vega of } 707.$$

This weighted vega shows me I should expect to make about $0.70 on the dollar relative to my raw vega, in the event that volatility increases. Thus, while in theory I am long 1000 vega, if volatility moves up 1 point, I am likely only going to make $707. This is important because if I have a long volatility spread such as a calendar spread, so a short in a near-dated month and a long in a further dated month, I am not going to make money on a movement in volatility created by the overall market (such as in a market sell-off) the way I may be expecting. If I am counting on vega to produce a profit against losses in being short gamma on a calendar spread, if I only look at raw vega, I will not see the results I want.

Using weighted vega will give a portfolio manager a better idea of how the portfolio will perform in a VIX spike rather than looking at raw vega alone. Weighted vega is a huge step toward good portfolio management, but does not answer the vega question entirely. The next step is to use *vol vega*.

Vol Vega

Vol vega is a concept I learned during my time at Group One Trading. I had to ask John Kinahan (current CEO, and at the time, head of training and head trainer) what it was. He described it this way:

> "If you own 1000 vega of a biotech, it is not the same as owning 1000 vega in an industrial. Vol vega adjusts for it."

He then walked through the calculation. Vol vega multiplies how much more volatility the underlying has than the base index has. Thus, if I am long 1000 vega in SPX, and at the same time long 1000 vega in biotech Amgen (AMGN), vol vega adjusts for the differences in the stock's volatility. So if AMGN is two times as volatile as the SPX, SPX would have a vol vega of 1000, and AMGN would have a vol vega of 2000.

Vol vega is one of the most important calculations for anyone trading a wide range of stocks and indexes. It allows you to piece together what your real vol exposure is in the event that volatilities start to move, so that you are prepared for how dramatically the individual components may start to move.

Additionally – and this is the far more important case for vol vega – it is *great* for volatility pair traders (traders that sell volatility in one stock or month against another). Imagine that I am trying to set up a pairs trade between the Financial Select Sector SPDR Fund (XLF) and iShares Nasdaq Biotechnology ETF (IBB). (Yes, I know there would never really be a pairs trade here, but that is part of why I am using them for this example!) While the two are both index ETFs, they are in very different sectors. If I buy 1000 vega in XLF because I think the volatility is cheap, and I sell 1000 vega in IBB because I think the volatility is expensive, even if I am right, I might not win on volatility because IBB vol can move so much more. Using vol vega allows you to put a vol pair trade together that will make money because of volatility.

Let's look at an example. Suppose XLF has a volatility of 19, and IBB has a volatility of 27. If volatility increases by 10% in IBB, and 15% in XLF, and if I am long 1000 vega in both, do I actually come out ahead?

In IBB, my short position, I would lose:

$$1000 * (27 * 0.10), \text{ or } 2700$$

In XLF, my long position, I would make:

$$1000 * (19 * 0.15), \text{ or } 2850$$

Overall, I would come out $150 ahead – not bad for a volatility trade. But when you consider the capital required to make this trade, there were likely better trades available.

Next, let's adjust for vol vega.

27/19 is 1.42. Thus, if I traded on vol vega terms, I would go long 1400 vega in XLF for every 1000 vega in IBB. Thus, in the event of the volatility increases above, my vega trade would look like this:

$$1000 * (27 * 0.10), \text{ or } 2700$$

versus

$$1400 * (19 * 0.15), \text{ or } 3990$$

In this case, I am $1290 ahead – more than eight times the P&L above. That is how strong vol vega is in a volatility pair trade.

Managing a Book

Now that we have dug into how to actually value a book of trades, how should you manage the book? It's easy: Manage each trade individually. This makes sense in particular if you are carrying fewer than ten positions. However, when deciding to add to your book, you need to look at net Greeks to develop a portfolio. In the last chapter, we discussed ranking your trades based on the positions carried. In setting up a book to be beta weighted, vega weighted, and with some touch of vol vega, you can rank each trade against the whole portfolio.

Look at each trade on its own merits; if it is a good trade it should be considered, but once you have established positions on more than a few stocks and indexes, you need to start rating trades against the book. If the book is short gamma and short vega, you should be actively trying to find trades that are opposite the existing positions. It's easier to evaluate the value of the trade against a book if you are weighting properly.

Weighting will allow you to trade smaller or larger depending on the circumstances of the portfolio. For a portfolio after weighting, you should know which way you are leaning in buying or selling. If you have a clear idea of the net of your portfolio, you can set up a hedge based on movement.

The final attribute of portfolio management is how to manage severe global risk. You can set up a constant hedge, or you can engage in crisis alpha management. *Crisis alpha* is a label in the financial industry used to describe investment strategies designed to generate positive returns during equity market panics. Crisis alpha strategies can range from short-focused hedge funds to specialized "Black Swan" tail risk protection products. Crisis alpha is a system of going for volatility when it is needed, and ignoring it when it is not needed. We will explore volatility and volatility products that can be used to manage risk in the upcoming chapters.

Chapter 15
Trading Volatility

We have already discussed the CBOE Volatility Index, or the VIX, several times throughout this book – especially during our discussion of realized volatility and implied volatility in Chapter 4. However, the VIX is an incredibly valuable tool not only for gauging market sentiment, but also as a way to trade volatility (although the VIX itself is not directly tradeable).

The VIX

It may be helpful to remember that the CBOE Volatility Index is just that – an index. However, while the S&P 500 or other traditional stock-based indexes derive their price levels from the price of the stocks within the index, the VIX derives its current level from the price of S&P 500 options. Unlike a stock index, the VIX itself is not directly tradable – though we will discuss some of the many ways to trade VIX movement in this chapter.

In the simplest of terms, the VIX is a market volatility indicator. It is forward-looking and reflects investor consensus of expected 30-day market volatility by measuring the implied volatility (IV) of S&P 500 (SPX) options. The reasoning behind this is that investors use SPX options to hedge against a market downturn. As demand for SPX options rises, the implied volatility priced into SPX options also rises. When this happens, the VIX moves higher. As hedges come off, and demand for SPX options decreases, the implied volatility priced in moves lower, and the VIX decreases.

However, there is more to the story than that. The VIX looks at both near-term and next-term weekly options in the SPX – that is, options expiring on the Friday before and the Friday after a 30-day time horizon – and pulls implied volatility from any strike with a bid. Since the VIX is looking at 30-day market volatility, it weights the contracts from each of the two terms to come to a net 30-day calculation. Thus, if the near-term contract is 27 days to expire, and the longer-term contract is 34 days to expire, each will be weighted to give an average 30-day IV.

Additionally, the VIX is vega weighted, so at-the-money (ATM) options are weighted more than out-of-the-money (OTM) or in-the-money (ITM) options in the VIX calculation. It also weights according to where premium is concentrated, so heavily populated strikes will affect the VIX more than options with fewer open contracts. This also means the VIX is generally slightly put-skewed, as puts tend to be more in demand as hedging vehicles and are comparatively more expensive than calls.

The VIX usually has a negative correlation with the S&P 500 – meaning when the SPX moves higher, the VIX usually moves lower, and vice versa. You can see this pictured in Figure 15.1. It is important to note that often the VIX peaks before

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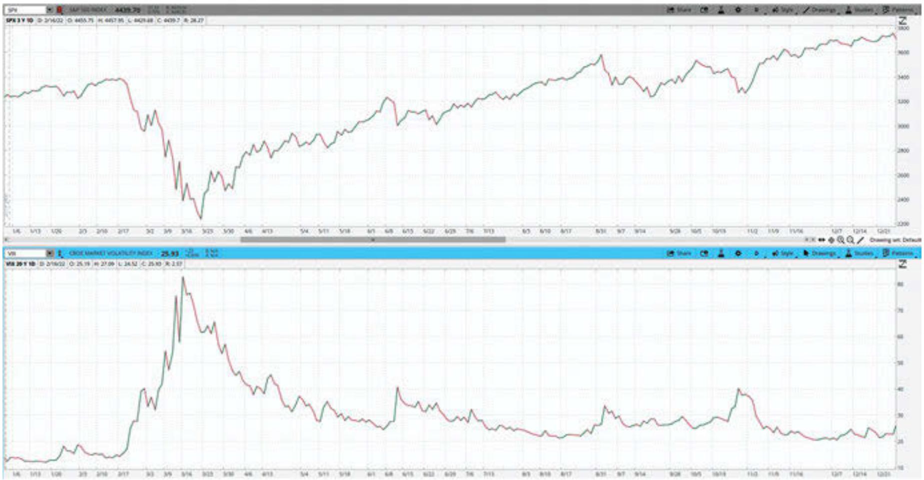


Figure 15.1: Negative correlation between the SPX (top) and VIX (bottom).

the S&P 500 hits its bottom, and the VIX bottoms before the S&P 500 peaks. When there is a break in that correlation, it often signals we are approaching a change in trend.

This makes sense when you consider that during a bull market, traders may be more confident, and feel less need to hedge against a sudden downturn. This plays into why the VIX is often referred to as the "fear index" – however, I prefer to think of it more as an "insurance index," as I discuss in the Appendix.

Though you will often see the VIX written as a whole number integer, the VIX is actually a percentage. Specifically, it is the annualized change expected in the SPX over the next 30 days, within one standard deviation. So a VIX of 25 indicates that current options prices are indicating that traders expect the SPX to move 25% over the next year.

The VIX moves in two ways. First, and the most obvious, is when implied volatility in S&P 500 options rises, the VIX also rises. When IV falls, the VIX also falls. However, movement in the S&P 500 itself can also affect the VIX. Take a look at the skew curve for S&P 500 options in Figure 15.2, with the S&P trading around 4600.

Note that the curve is steeper and has higher volatility on the lower strikes. As the S&P 500 rises, the at-the-money strikes will move further to the right, causing more volume and open interest to flow into those strikes. This results in the VIX weighting algorithm weighting these options more heavily, which will naturally cause the VIX to fall, even when the IVs of the options didn't really change. This is how we can see a market rally and a lower VIX, without volatility truly falling. Because the VIX is so closely tied to the S&P 500, it is important not to view the VIX "in a vacuum," but instead consider it within the context of the whole market.

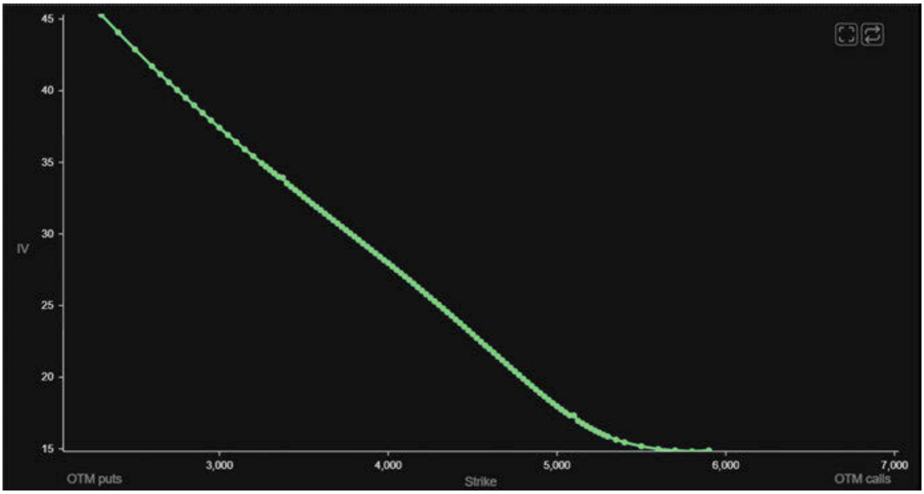


Figure 15.2: A skew curve for SPX options.

The Weekend Effect

As we covered in Chapter 2, an option's theta measures its time decay – that is, how much value an option loses as time passes. If an option has a theta of $10 per day, we expect to see it fall $50 from Monday through Friday. However, that leaves two days of theta unaccounted for. So, does that mean that on Monday, options prices will fall an extra two days' worth of theta at the market open?

No. Instead, market makers account for the weekend theta decay during the week – so they price in an average of 1.5 days of extra decay throughout the week. So rather than the option with the theta of $10 per day falling $50, it would instead fall $65 (6.5 days of decay/5 trading days * the option's theta) during the week, or $13 per day.

However, the VIX does not take this into account. Therefore, as the theta decays out of SPX options at an accelerated rate during the week, the VIX reads that the options are losing volatility. Thus, historically and statistically, the VIX is down four days of each trading week.

However, on Monday, the VIX is typically higher. This is because Monday is the one day of the week that the VIX model and the pricing of S&P options are aligned, as the market maker's accelerated decay has not yet affected options pricing.

VIX Futures

Now, remember that we are not able to trade the VIX itself. However, we can trade VIX futures (and associated exchange traded products, which we will cover in the next chapter). VIX futures allow us to trade expected volatility, by trading where we think the VIX will be on a certain date in the future (the date the future expires).

VIX futures trade at 1000 times the index, and they trade in increments of $0.05 ($50 ticks). They also trade 24 hours a day, five days per week. VIX futures trade eight months out, plus weekly futures, and they expire on the Wednesday morning 30 days ahead of the next month's standard options expiration. Because they expire on Wednesday mornings, the last trading day for VIX futures is actually Tuesday.

While VIX futures are correlated with one another, they are not tied to one another, allowing each to move independently of the months around it. This is similar to how strikes behave on the skew curve – each link in the chain can move independently. It should also be noted that while VIX futures track the VIX, they do not move precisely with the VIX. Because they represent an estimate of what the VIX Index will be at the moment they expire, this time element makes them usually trade at either a premium or a discount to the spot VIX price.

In Chapter 4, we talked about volatility being mean-reverting, and this is a key thing to keep in mind with the VIX. Since the VIX is based on implied volatility, the VIX is also mean-reverting – that is, when it is above the mean, we can expect it to eventually fall back to normal levels, and when it is below the mean, we can expect it to rise. (The long-term VIX mean is 18, but the VIX mode is 12.)

Why is this important to know for VIX futures? VIX futures assume that there will be mean reversion as the contract moves toward expiration – so when the VIX is high, the futures contract tends to trade at a discount to spot VIX, and when the VIX is low, the future trades at a premium. However, VIX futures (and VIX options) are European-style futures contracts, which means unlike American futures contracts, there is no early exercise. This prevents traders from buying call contracts and holding them until a sudden pop, or trying to trade a VIX pop by buying puts.

The premium (or deficit) to which futures are trading above or below the current VIX Index is illustrated on the VIX futures curve. Typically, we will see the futures curve in a contango pattern – that is, VIX futures are trading progressively higher, and at a premium over the current VIX itself. Figure 15.3 depicts the VIX futures curve in a contango pattern.

Note how back-month futures are more expensive than front-month futures. This indicates that the market is more afraid of longer-term market risk than immediate market risk, and there are long-term expectations that the VIX will rise. The VIX curve is in contango 80% of the time.

However, especially during periods of market uncertainty, the VIX curve will enter backwardation. This is when front-month VIX futures are trading above back-month futures, and all futures are trading below the current VIX itself, as pictured

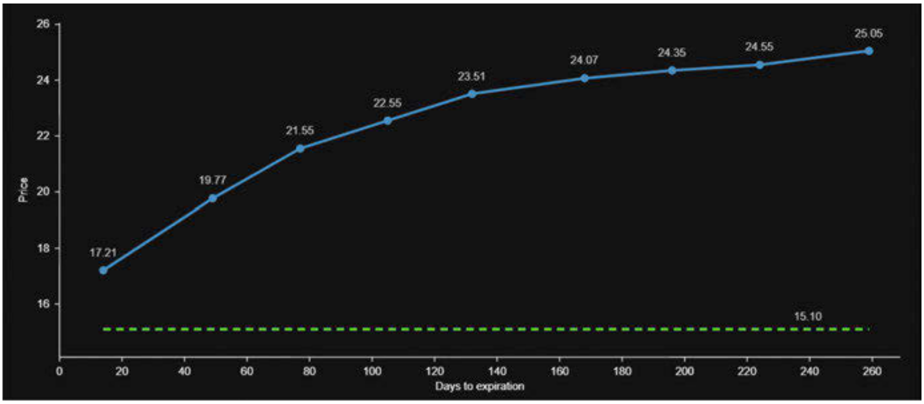


Figure 15.3: The VIX futures curve in contango.

in Figure 15.4. What this tells us is that the market believes the volatility of SPX options will fall over time, and we will see a corresponding fall in the VIX. Traders are more worried about immediate and near-term market risk than long-term market risk. Remember that the VIX futures curve is essentially a forward volatility curve for the S&P 500. Since VIX is mean-reverting, when the curve is in backwardation, it is telling us that traders expect volatility to return back to its lower levels.

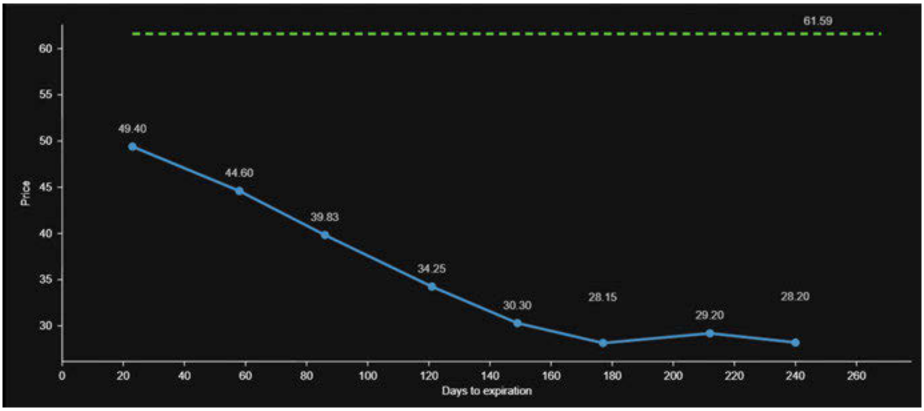


Figure 15.4: The VIX futures curve in backwardation.

Here is the most important thing to know if you are trading VIX futures: By the time VIX futures reach expiration, they must be equal to the current VIX Index. So if the VIX futures curve is in a contango (as it usually is), VIX futures will experience VIX decay, as the front-month future must shed its value until it is equal to the VIX. This is called convergence. When the VIX curve is in backwardation, this convergence can act as a tailwind to VIX futures contracts, as the futures contract must rise to equal spot VIX at the time of expiration.

When the VIX curve deviates from the historical norms, that is worth taking a closer look at, as there may be trade opportunities. But what are the historical norms?

With the VIX in zone 1 or zone 2, and the curve in contango, we would expect to see front-month futures trading $2.00 over VIX spot with 30 days to go. Next-month futures would be about $1.00–$1.50 over that, third month about $0.75 over that, and the fourth month about $0.50 over that. Of course, the VIX is not always in zone 1 or zone 2, nor in a perfect contango. What should we expect to see then? Jim Carroll of Toroso Advisers sent me data his firm collected that looked at the average VIX/futures spread each day until expiration. In Figure 15.5 you can see the average premium of the front-month future to VIX spot for the 20 days leading into expiration.

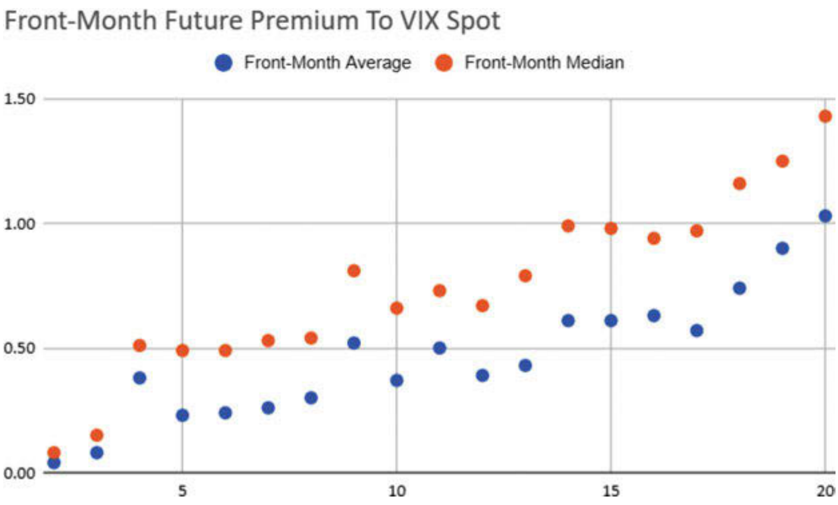


Figure 15.5: The average and median premiums of front-month VIX futures to spot VIX in the 20 days leading into expiration.

Notably, with 20 days left to expiration, the front-month future was trading at only a single point above VIX on average, though the median is closer to 1.4. During the final days before expiration, we see both the median and average values decline sharply, as they converge to nearly zero.

If we compare the difference between front-month futures and second-month futures, as in Figure 15.6, we see that the premium between the two holds more or less steady until the end of the expiration cycle, when the front-month decays more rapidly than the second month, widening the gap between the two.

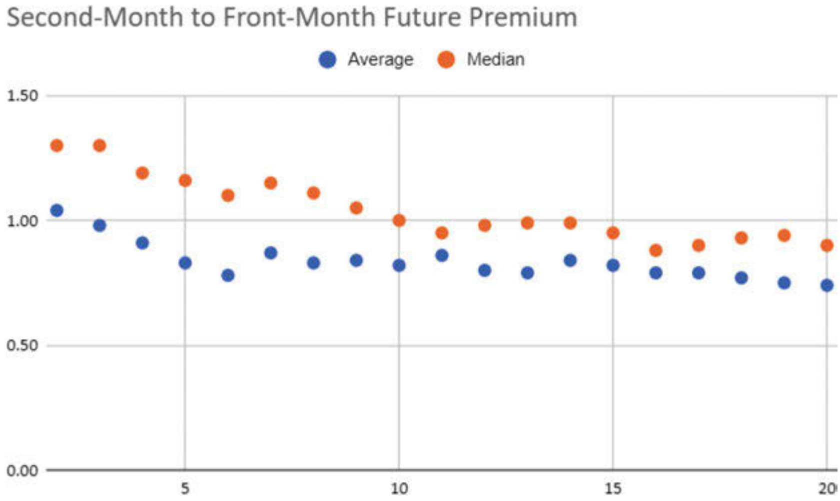


Figure 15.6: The average and median difference between front-month and second-month VIX futures through the end of the expiration cycle.

VIX Options

VIX options are not based on the VIX itself; rather, they are based on the VIX future that expires during the same month as the option term. This means that in VIX options, the at-the-money strike is not based on the VIX, but based on the futures for the same term. For example, the November option at the money strike price will be based on the current price of November futures. They trade in monthly and weekly terms, and like futures, trade independently of one another. VIX options are most commonly used as a hedge against a long portfolio – remember, because the VIX and SPX are negatively correlated, if the SPX plummets, we expect to see the VIX rise.

It is crucial to keep in mind that VIX options are based on VIX futures and not the VIX itself. This gives us the opportunity to make convergence trades – that is, since we know the VIX future and VIX spot must eventually converge, we can use this to our advantage. When the VIX futures curve is in a contango, we have the opportunity to trade short VIX. Since the VIX future must eventually fall to reach spot VIX, buying puts or put spreads is a way to simulate a short future, but we are able to cap our losses, and capture some time premium. Also, because we know that the VIX future will travel lower toward VIX cash (assuming volatility does not spike), purchasing a put at a strike price above where the VIX is currently trading will see the option gain value with the passage of time. We will look at an example of this shortly.

Trading long volatility can be used to hedge, and can be a profitable strategy when conditions are right. When the VIX curve enters backwardation, you can engage in a long futures approach to hedging (or you can go long on one of the VIX exchange traded products, which we will talk about in another chapter). However, if you are someone who wants to use a static hedge, look to VIX options. Why VIX options instead of SPX options? The value of using VIX options to hedge can be explained by a concept I call "sticky strike." Consider where the SPX is at today, versus where it was at one year ago. At the time of writing, the SPX is currently around 4700, while one year ago it was 3700. If you use SPX puts as a hedge, as the SPX rises, you will see your puts get further out of the money as time passes, requiring a larger drop from the SPX in order to act as an effective hedge. The VIX, however, is mean-reverting, and as the SPX rises, often, the VIX will not move as much. Therefore, when hedging with VIX options, your hedge will require less rebalancing, and works in an event where things explode.

One static hedge I like is looking at VIX options 45–75 days to expiration, and executing a backspread. This trade significantly reduces the cost of setting up a static hedge, and is appropriate when volatility is low. The key to making this trade is only opening it when the VVIX Index – which measures the volatility of VIX – is below 100, or preferably below 90.

Take a look at the way these backspreads can explode. You can see in Figure 15.7 on Wednesday, February 19, 2020, before the COVID pandemic hit full-force, you could have sold the April 20 strike calls for $1.10, and purchased two 25 strike calls for about $0.60, paying a total of just $0.10 for the backspread.

Snapshot for Wednesday February 19, 2020

^VIX		IV30		IV60	IV90	HV10	HV20	HV30	HV60
14.38	-0.45 -3.03%	93.56	-3.23 -3.33%	77.98	67.18	81.45	144.49	120.81	114.67
				-1.69	-1.08	-14.72	-0.56	0.31	0.19

Feb19 VIX	Mar18 VIX	Apr15 VIX	May20 VIX	Jun17 VIX	Jul22 VIX	Sep16 VIX	Oct21 VIX
0	95.05 iv	79.54 iv	66.94 iv	61.12 iv	57.22 iv	50.89 iv	49.09 iv
-141.65	-2.38	-1.40	-0.68	-0.43	-0.70	-0.48	-0.45

OI	Volume	Delta	IV	Bid	Ask	Strike	Bid	Ask	IV	Delta	Volume	OI
14121	56	66.46	75.40	2.45	2.55	VIX Apr15'20 15	1.15	1.25	72.05	33.06	436	25842
9795	1173	58.39	79.83	2.05	2.15	VIX Apr15'20 16	1.75	1.85	75.79	41.55	1243	14291
19453	5118	51.26	83.63	1.75	1.80	VIX Apr15'20 17	2.40	2.50	79.80	49.04	118	12384
52037	1083	44.96	86.62	1.45	1.55	VIX Apr15'20 18	3.10	3.30	82.90	55.61	40	36600
21228	1824	39.51	89.51	1.25	1.35	VIX Apr15'20 19	3.90	4.10	86.70	61.00	15	22659
50836	966	35.23	93.58	1.10	1.15	VIX Apr15'20 20	4.70	4.90	88.63	66.03	22	2028
5250	725	31.26	96.20	0.95	1.00	VIX Apr15'20 21	5.60	5.70	91.10	70.16	5	85
11627	3180	27.47	97.52	0.85	0.90	VIX Apr15'20 22	6.40	6.60	94.61	73.28		9
32790	1	24.58	100.02	0.75	0.80	VIX Apr15'20 23	7.30	7.50	97.06	76.20		42
27278	54	22.24	102.83	0.65	0.70	VIX Apr15'20 24	8.20	8.40	98.52	78.99		1
61522	2935	20.08	105.05	0.60	0.65	VIX Apr15'20 25	9.20	9.30	98.96	81.74	11	109
13431	35018	17.92	106.31	0.50	0.60	VIX Apr15'20 26	10.10	10.30	101.57	83.40		5
66397	1841	16.35	108.53	0.45	0.50	VIX Apr15'20 27	11.00	11.20	103.71	84.95		11
65215	2002	14.83	110.15	0.40	0.45	VIX Apr15'20 28	12.00	12.20	101.31	87.67		
17300	9005	13.35	111.24	0.35	0.45	VIX Apr15'20 29	12.90	13.10	106.01	87.97		8
70329	486	12.47	113.79	0.30	0.40	VIX Apr15'20 30	13.90	14.10	106.22	89.45	105	51

Figure 15.7: VIX options pricing on February 19, 2020.

When the pandemic truly hits, and volatility explodes, this backspread takes off. By February 28, the backspread was already beginning to take off, and by the peak of the pandemic on March 16, the backspread had expanded considerably – to $30! See the new pricing in Figure 15.8.


Snapshot for Monday March 16, 2020

^VIX			IV30		
82.69	24.86	42.99%	210.63	37.35	21.5...

IV60	IV90	HV10	HV20	HV30	HV60
166.64	138.70	340.18	298.26	262.36	204.14
33.19	29.56	10.83	14.58	12.64	11.60

Mar18 VIX	Apr15 VIX	May20 VIX	Jun17 VIX	Jul22 VIX	Aug19 VIX	Sep16 VIX	Oct21 VIX
351.79 iv	211.04 iv	159.72 iv	136.44 iv	111.90 iv	95.31 iv	86.40 iv	81.41 iv
102.39	43.69	35.87	31.08	23.63	17.18	14.51	13.64

OI	Volume	Delta	IV	Bid	Ask	Strike	Bid	Ask	IV	Delta	Volume	OI
10542	19	95.99	414.56	43.90	45.00	VIX Apr15'20 15		0.10			1936	77020
10924	150	95.73	395.65	42.40	44.10	VIX Apr15'20 16	0.05	0.10	193.85	0.41	1678	92122
19347	53	95.43	381.37	41.40	43.10	VIX Apr15'20 17	0.05	0.25	195.29	0.59	190	109396
50300	2585	95.21	362.19	40.70	42.10	VIX Apr15'20 18	0.05	0.20	193.85	0.76	1626	108256
51162	14340	94.85	352.59	39.90	41.20	VIX Apr15'20 19	0.15	0.25	202.55	1.21	16111	58381
56833	185	94.63	335.38	39.00	40.30	VIX Apr15'20 20	0.20	0.30	193.85	1.26	4006	171787
18579	52	94.36	321.77	37.70	39.30	VIX Apr15'20 21	0.25	0.55	193.85	1.58	386	21664
30783	70	93.95	313.98	37.00	38.40	VIX Apr15'20 22	0.35	0.50	195.76	2.01	96	142685
34867	5	93.59	304.03	36.40	37.50	VIX Apr15'20 23	0.45	0.75	195.94	2.44	1574	30679
36404	36	93.16	296.73	35.50	36.60	VIX Apr15'20 24	0.55	0.65	195.04	2.87	1119	18965
60635	1744	92.71	289.59	34.60	35.40	VIX Apr15'20 25	0.60	1.00	193.47	3.31	4434	57164
72060	33	92.24	282.61	33.60	34.90	VIX Apr15'20 26	0.75	1.00	193.05	3.85	10	39573
73421	96	91.76	275.77	32.60	33.70	VIX Apr15'20 27	1.00	1.25	191.88	4.39	580	72479
49535	61	91.14	272.80	31.80	33.20	VIX Apr15'20 28	1.10	1.45	193.02	5.11	599	60175
31284	68	90.62	266.07	30.80	32.40	VIX Apr15'20 29	1.30	1.70	193.20	5.82	8265	10168
86837	279	89.91	264.53	30.10	31.60	VIX Apr15'20 30	1.55	1.70	192.65	6.54	4508	37803

Figure 15.8: VIX options pricing on March 16, 2020.

Alternatively, an at-the-money or slightly out-of-the-money call spread is another way to achieve a favorable risk/reward. Because of the VIX skew, and the cost of out-of-the-money options relative to at-the-money options, call spreads tend to be more favorable than straight call purchases. These allow you to take advantage of the huge bullish skew in VIX options. As you can see in Figure 15.9, as we move up in strike, VIX volatility moves higher, which allows for the creation of relatively inexpensive call spreads.

Here is an example of a bullish VIX call spread, with the VIX trading near the 26-handle. As you can see As you can see in Figure 15.10, March 30 strike calls are priced around $2.50. Meanwhile the March 45 strike calls are priced at $1.00. By buying the 30 strike calls, and selling the 45 strike calls, we're able to set up a fairly inexpensive bullish hedge, paying about $1.50.

Now, what about when you are bearish on VIX? Certainly that will happen quite often. When I am bearish on the VIX, and the VIX futures curve is in contango, buying puts to play a convergence trade is my preferred method of trading. This takes

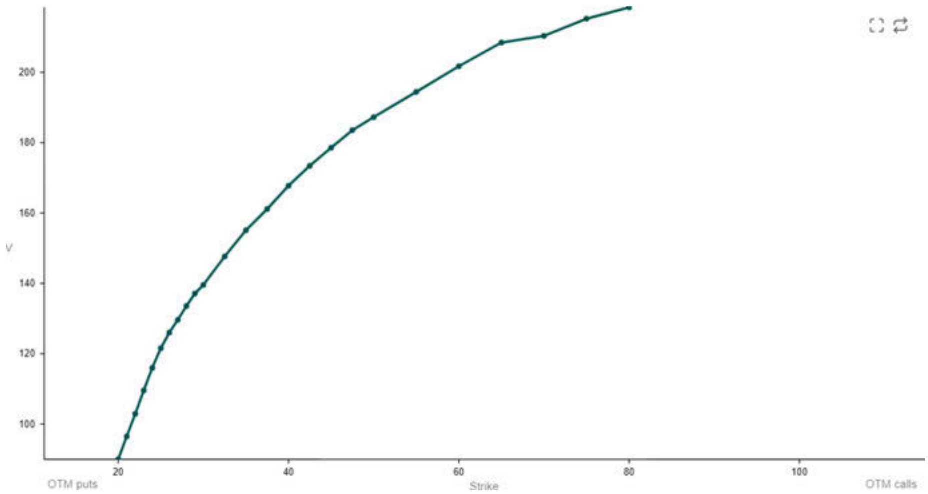


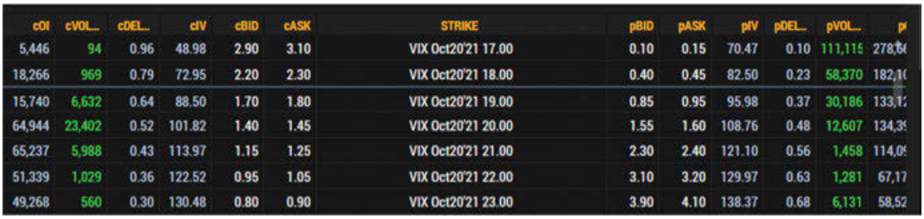
Figure 15.9: VIX skew curve.

Figure 15.10: A VIX 30/45 strike call spread.

advantage of the movement in VIX future as it converges with spot VIX. When implied volatility is low enough, VIX is low enough, and VIX futures are in a wide contango, this trade works thanks to the movement in the VIX future.

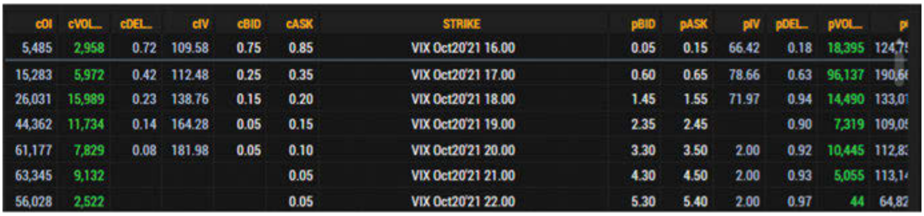
For example, on Friday, October 8, 2021, the VIX was trading at 18.77. As seen in Figure 15.11, the 20 strike puts were trading at $1.55, and the 18 strike puts were trading at $0.45. Opening a 20/18 put spread would cost $1.10. Subtracting the cost of the trade from the strike of the put purchased (20–1.10 = 18.90), you will see that we have created a trade with edge to it. This allows us to make a bearish trade that is likely to make money, even if volatility just sits.

In this case, though, volatility did not sit. Just a little over one week later, on October 18, the VIX was sitting at 16.31, and the spread had expanded significantly. You can see in Figure 15.12 that the 20 strike puts were now trading for $3.40, and the 18 strike puts were now trading for $1.50.



cOI	cVOL...	cDEL...	cIV	cBID	cASK	STRIKE	pBID	pASK	pIV	pDEL...	pVOL...	pI
5,446	94	0.96	48.98	2.90	3.10	VIX Oct20'21 17.00	0.10	0.15	70.47	0.10	111,115	278,6
18,266	969	0.79	72.95	2.20	2.30	VIX Oct20'21 18.00	0.40	0.45	82.50	0.23	58,370	182,1
15,740	6,632	0.64	88.50	1.70	1.80	VIX Oct20'21 19.00	0.85	0.95	95.98	0.37	30,186	133,1
64,944	23,402	0.52	101.82	1.40	1.45	VIX Oct20'21 20.00	1.55	1.60	108.76	0.48	12,607	134,3
65,237	5,988	0.43	113.97	1.15	1.25	VIX Oct20'21 21.00	2.30	2.40	121.10	0.56	1,458	114,0
51,339	1,029	0.36	122.52	0.95	1.05	VIX Oct20'21 22.00	3.10	3.20	129.97	0.63	1,281	67,17
49,268	560	0.30	130.48	0.80	0.90	VIX Oct20'21 23.00	3.90	4.10	138.37	0.68	6,131	58,52

Figure 15.11: The VIX options pricing pictured here allows for a trade with edge.



cOI	cVOL...	cDEL...	cIV	cBID	cASK	STRIKE	pBID	pASK	pIV	pDEL...	pVOL...	pI
5,485	2,958	0.72	109.58	0.75	0.85	VIX Oct20'21 16.00	0.05	0.15	66.42	0.18	18,395	124,7
15,283	5,972	0.42	112.48	0.25	0.35	VIX Oct20'21 17.00	0.60	0.65	78.66	0.63	96,137	190,6
26,031	15,989	0.23	138.76	0.15	0.20	VIX Oct20'21 18.00	1.45	1.55	71.97	0.94	14,490	133,0
44,362	11,734	0.14	164.28	0.05	0.15	VIX Oct20'21 19.00	2.35	2.45		0.90	7,319	109,0
61,177	7,829	0.08	181.98	0.05	0.10	VIX Oct20'21 20.00	3.30	3.50	2.00	0.92	10,445	112,8
63,345	9,132				0.05	VIX Oct20'21 21.00	4.30	4.50	2.00	0.93	5,055	113,1
56,028	2,522				0.05	VIX Oct20'21 22.00	5.30	5.40	2.00	0.97	44	64,82

Figure 15.12: VIX options pricing on October 18.

When the trade was initially put on, the October future was trading at 20, while the VIX was at 18.77, as seen in Figure 15.13.

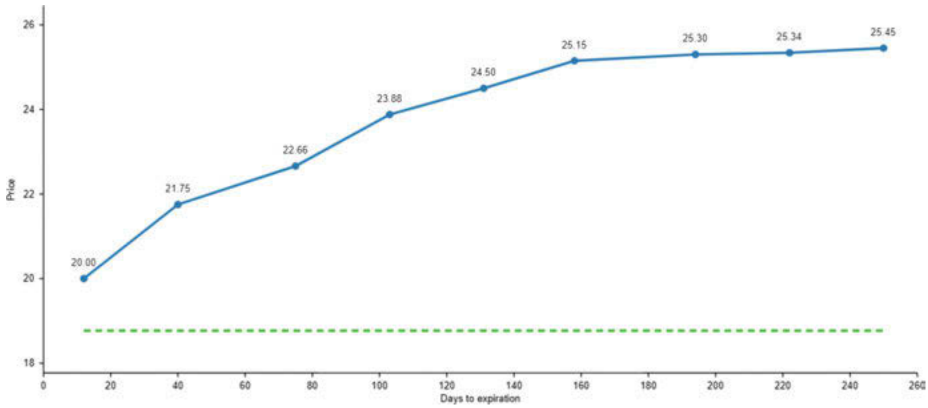


Figure 15.13: The front-month future is trading well above spot VIX.

As we neared VIX expiration, the VIX pulled the whole futures curve lower with it. In addition, the spread between VIX and the October future tightened up significantly, as you can see in Figure 15.14. This means the trade benefited not only from the movement of the VIX dropping, but also from the movement of the curve tightening.

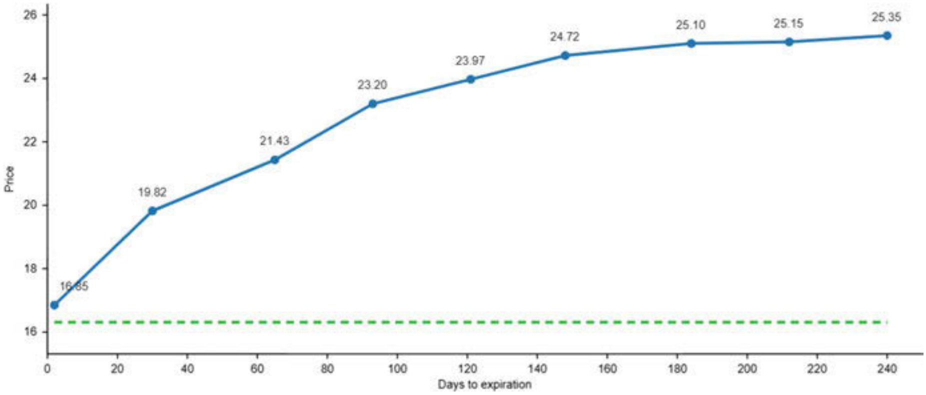


Figure 15.14: As VIX dropped and expiration neared, spread between spot VIX and the front-month future tightened.

Now, if you are still bearish on October 18, because of the spread between VIX futures and cash, look at the 16 strike puts. As you can see in Figure 15.15, they are only 0.31 out of the money, and only cost about $0.15.

cOI	cVOL...	cDEL...	cIV	cBID	cASK	STRIKE	pBID	pASK	pIV	pDEL...	pVOL...	p
5,485	2,958	0.72	109.58	0.75	0.85	VIX Oct20'21 16.00	0.05	0.15	66.42	0.18	18,395	124,7
15,283	5,972	0.42	112.48	0.25	0.35	VIX Oct20'21 17.00	0.60	0.65	78.66	0.63	96,137	190,6
26,031	15,989	0.23	138.76	0.15	0.20	VIX Oct20'21 18.00	1.45	1.55	71.97	0.94	14,490	133,0
44,362	11,734	0.14	164.28	0.05	0.15	VIX Oct20'21 19.00	2.35	2.45		0.90	7,319	109,0
61,177	7,829	0.08	181.98	0.05	0.10	VIX Oct20'21 20.00	3.30	3.50	2.00	0.92	10,445	112,8
63,345	9,132				0.05	VIX Oct20'21 21.00	4.30	4.50	2.00	0.93	5,055	113,1
56,028	2,522				0.05	VIX Oct20'21 22.00	5.30	5.40	2.00	0.97	44	64,82

Figure 15.15: The October 16 strike puts are offered at $0.15.

Why? Because the front-month VIX future is still trading near 17. Even with cash VIX at 16.30, the future is trading at a large enough premium to give us favorable pricing. And if you expect the VIX to continue to drop, this presents the opportunity to play another trade.

On the day before settlement, the 16 strike puts that were trading for about $0.15 were now trading for $0.30. And if you were willing to carry these puts into settlement, you would have found you turned your $0.15 into $0.65, with October settlement at 15.35.

These are just a few ways to play and profit with VIX options. There are plenty of other complex ways of doing it as well, but for people new to the product, these are some of the simplest ways to start trading it.

Chapter 16
Trading VIX ETPs

In the previous chapter, we talked about how when you are trading VIX options, you are not trading options on the VIX Index itself, but rather trading options based on VIX futures. There is a whole array of VIX exchange traded products (ETPs) that are also available, and all of these are based on VIX futures, too. This fact presents some interesting challenges—and opportunities—to those who are seeking to profit from trading volatility.

VIX ETPs and the Issue of Contango

Each VIX ETP is constructed for a very specific purpose . . . but their construction also has unintended consequences. As mentioned above, VIX ETPs are not based on the VIX Index itself, but rather track various VIX futures. However, given the VIX futures term structure, this means that VIX ETPs also suffer from the same issue of decay that plagues VIX futures during times of contango . . . which happens to be most of the time.

To illustrate, let's take a look at what is arguably the most well-known VIX ETP, iPath S&P 500 VIX Short-Term Futures ETN (VXX). VXX is designed to track a constant 30-day maturity VIX futures, or essentially it attempts to replicate a long VIX future with a constant duration of 30 days so that traders can position themselves long or short near-dated volatility. It does this by holding a weighted amount of the two nearest dated VIX futures contracts and, as time passes, it sells some of the front-month inventory to buy the next month, maintaining the 30-day weighting.

Now, you may recall that the VIX also tracks volatility that is 30 days out . . . so naturally, wouldn't an ETP that tracks a similar timeframe be ideal?

Here is the issue. Recall that when VIX futures are trading in a contango—which means futures are trading progressively higher above the VIX Index cash price—the front-month future must eventually equal the VIX cash index price at the date of expiration. Therefore, VIX front-month futures in a contango must, by definition, lose value into expiration.

This means that in a contango state, VXX is buying high, and selling low. To maintain its 30-day duration, VXX is buying VIX futures at a high price, riding them down to cash, only to then sell the futures at the lower price and buy a new future farther out. Clearly, this is a problem, and means that during contango, the VXX is in a constant cycle of depleting its funds.

You can see this in the VIX curve in Figure 16.1, which displays the VIX futures curve on two consecutive days. The first day is represented by the upper line; the second day is represented by the bottom line. Note that the shape of the curve

https://doi.org/10.1515/9783110697865-017

itself does not change much, but the value of the holdings has dropped considerably. Meanwhile, while VXX was long the futures represented by the blue dots, on the second day, both of the front-month futures have fallen. However, to rebalance its holdings appropriately, VXX must now sell some of the front-month future at the lower price represented by the lower line, while buying some of the higher-priced second-month future.

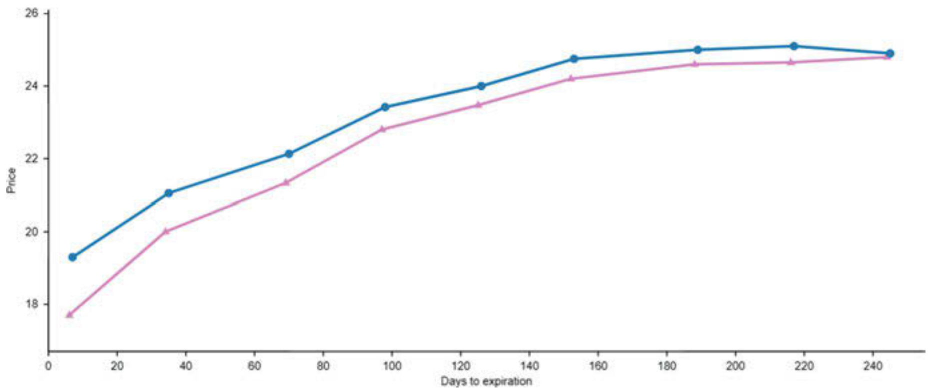


Figure 16.1: This VIX futures curve on two consecutive days shows how the price of VIX futures decays over time.

Think of VXX like King Sisyphus, who was condemned by Zeus to continuously roll a large boulder up a hill, only to see it roll back down to the bottom each time he reached the top. This is a great metaphor for how VXX operates in contango, and it should not be a surprise then that I would advise never, ever buying and holding VXX for any duration longer than a few hours—or a few days at most.

However, intraday VXX does perform as it was designed to; that is, it moves with the VIX Index. This makes it an appropriate vehicle for day-trading volatility, but you must always remember that the more time that passes, the more VXX suffers from the decay of contango. VXX is also a way to hedge against a falling market with rising volatility and, in fact, if VIX futures reach backwardation, VXX can even potentially outperform the VIX itself.

VXX moves in one of two ways: either when VIX futures move (which will cause fast movement) or as VIX futures decay (which causes slower movement). VXX decays on a daily basis, which means you can estimate a linear decay based on where VIX futures are trading relative to the VIX. This also means that going short VXX, and similar ETPs, is a very viable, and often profitable, trading strategy during a contango market (we will discuss this more later). However, if for some reason the curve does not move, you will not make money shorting VIX ETPs like VXX, even if the curve is in contango. You must have the movement of the curve sliding lower in order to profitably short this product.

Other VIX ETPs also struggle with issues of decay. For example, ProShares Ultra VIX Short Term Futures ETF (UVXY) tracks the same two front-month VIX futures as VXX, but UVXY is actually leveraged to be 1.5 times long these futures. On a daily basis, it moves at 1.5 times the rate of VXX. It also decays 1.5 times as fast (or more), which means as much as you do not want to hold VXX for an extended period of time, you really do not want to hold UVXY for any meaningful period of time. UVXY is great for taking advantage of volatility movements, but precise timing is even more important here, because contango decay is an even greater threat.

The mid-term VIX ETP iPath Series B S&P 500 VIX Mid-Term Futures ETN (VXZ) tracks VIX futures with four to seven months until expiration. Because these futures are farther out, they typically suffer from less decay than near-term ETPs like UVXY and VXX; however, VXZ still decays nonetheless. Also, because VXZ tracks futures that are farther out, it is less sensitive to any uptick in the VIX as well. This makes VXZ less desirable as a volatility play, but might make it a more appropriate hedging vehicle.

Because of the decay problem in these products, especially UVXY and VXX, these products regularly undergo reverse splits. For example, in May 2021, UVXY underwent a 10-to-1 reverse split, which took the share price from about $4 to about $40. Less than six months later, the shares were already trading back below $20. The lifetime chart of UVXY in Figure 16.2 illustrates just how quickly these products hemorrhage value.

Figure 16.2: An illustration of how dramatically decay has destroyed value in UVXY.

Inverse Volatility ETPs

With traditional vol ETPs providing exposure to VIX futures, which results in a steady shedding of value like we just covered above, Inverse Volatility ETPs provide short exposure to VIX futures. The thought process behind these inverse volatility products is that since we can count on long exposure to VIX futures like UVXY and VXX to move lower with time, short exposure should do the opposite, right? With VIX futures more often than not in contango, VIX futures are typically moving lower, so a product that provides short exposure to the assets that are steadily declining should see steady upside itself.

Unfortunately, it is not quite that simple, and a volatility melt-up in 2018 taught many traders the hard way why "easy money" is never actually easy.

Prior to the 2018 "Volmageddon" (which we will talk about in a minute), VIX ETPs were one of the most popular VIX products on the market, for both retail and institutional investors. And on the surface, why wouldn't they be? With traditional VIX futures products consistently melting down, the opposite exposure in theory should climb steadily higher. And in a low VIX, contango-dominant market, this theory worked pretty well.

The problem came when volatility popped higher suddenly in February 2018 (pictured in Figure 16.3). The VIX soared 115% in a single day, which of course sent VIX futures soaring, and it caused several inverse volatility products to shed 90% or more of their value within a single session. The issue was the Trade At Settlement (TAS) rebalancing method these inverse ETPs used. Essentially, in order to rebalance at the end of each trading day, these inverse VIX ETPs had to purchase huge amounts of front-month and second-month VIX futures. The sudden VIX surge had already pushed VIX futures higher, and the huge demand at the end of the day from inverse VIX ETPs needing to purchase futures to rebalance their books sent VIX futures even higher, forcing the inverse ETPs to buy even more futures.

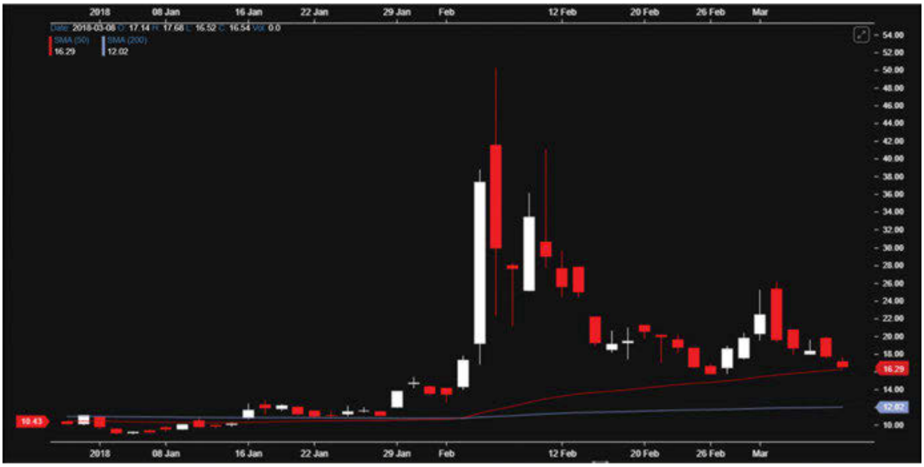


Figure 16.3: The February 2018 VIX pop presented a major problem for inverse VIX ETPs.

It was a nasty cycle that took ProShares Short VIX Short-Term Futures ETF (SVXY) down 90% nearly overnight (pictured in Figure 16.4), and VelocityShares Daily Inverse VIX Short-Term ETN (XIV) imploded so badly that it was completely taken off the market shortly after, leaving investors to swallow huge losses.

Figure 16.4: SVXY tumbled nearly 90% in a matter of days during the February 2018 volatility pop.

In the years following, the only inverse volatility product available on the market is SVXY, which provides –0.5x leveraged exposure to the S&P 500 VIX Short-Term Futures Index. However, in October 2021, the Securities and Exchange Commission (SEC) gave the green light for inverse VIX products to be revived, with modifications to their structures and settlement processes to theoretically prevent another meltdown like we saw in 2018. In March 2022, VelocityShares introduced 1x Short VIX Futures ETF Fund (SVIX), a product that provides similar exposure to that of XIV, but allegedly without the same “issues” that led to XIV’s implosion in 2018.

Trading Volatility ETPs

Because the movement of volatility ETPs is, in *some* ways, predictable, they present tempting, and often profitable, trading opportunities. However, their unique structures and decay problems make timing, locking in edge, and strict money management essential.

If you are considering trading any VIX futures-based product, the first thing you want to do is figure out which zone volatility is currently in (both realized and implied). For example, if we see that realized volatility is sitting firmly in zone 1, we can expect implied volatility (the VIX) to continue to slowly melt lower. On the other hand, if realized volatility is high, right now might not be a great time to try to go short on implied volatility! (If you need a refresher on volatility zones, please review Chapter 4.)

The ideal time to purchase puts against traditional VIX ETPs (such as VXX and UVXY) is when VIX is crossing from a higher vol zone to a lower vol zone. However, it is also important to look at the current realized volatility in the S&P 500 (SPX). Implied volatility can be a leading indicator in certain vol conditions, but it can also be a lagging indicator—especially as the market moves above zone 1. This means that if implied volatility is falling, but realized volatility is rising, it is not unlikely that we would see implied volatility rise, eating up any potential profits in long puts. Therefore, we want to see both the VIX and SPX realized volatility moving lower to create the ideal conditions for playing puts against VIX ETPs. Finally, we would also want to see the VIX futures curve in a heavy contango.

While it is not a requirement that all three of these conditions (falling VIX, falling realized volatility, and futures curve in a contango) be met, the more that are, the better conditions for the trade.

Remember that volatility ETPs are subject to the "gravitational pull" of VIX futures to cash, so in a contango we would expect to see VIX ETPs decay as VIX futures are pulled lower, but in backwardation we will actually see VIX ETPs move higher, as futures are pulled upwards.

When you are looking to trade VIX ETPs, it is critical to consider the sale of front-month futures and the purchase of second-month futures. Taking VXX as an example, on the day of VIX expiration, its holdings will be wholly composed of the VIX future currently 30 calendar days out from expiration. Each trading day, it will sell approximately 5% of its front-month holdings (assuming 20 trading days in the expiration cycle, this number may be more or less in a given month), while buying the equivalent dollar amount of second-month holdings. Assuming there is not a steep difference between front-month and second-month futures, this daily rebalancing typically does not have a large effect on VXX's day-to-day movement, but it does affect the overall rate of decay.

VIX futures move at a "delta" to VIX cash—that is, for every 1-point change in the VIX itself, VIX futures will move some percentage of that. On average, a future 30 days from expiration moves about 50% of spot VIX during contango, and this percentage goes up by approximately 10% per week as the future nears expiration. VXX moves about 60% of VIX cash, but there are huge discrepancies in this figure, especially in the day-to-day. This is why it is usually advisable to buy a bit more time than you may think you need (30 to 45 days is typical) to give VXX movement time to normalize.

It is possible to model VXX and UVXY decay, though it is by no means simple, and you must consider the price of the front-month and second-month futures, the percentage of each the product currently holds, and where futures are trading in relation to VIX cash. At Option Pit, we have a tool that allows us to estimate the rate of decay in both VXX and UVXY. However, the Achilles' heels of such models (or, really, with any market forecasting) are that they are unable to predict VIX movement. Therefore, a sudden volatility spike or drop renders even the most meticulous calculations invalid.

Except for in very rare circumstances, such as a day-trade or extremely short swing-trade, I use VIX products like UVXY and VXX to fade volatility. I begin by calculating the expected daily decay and multiply that by the number of days to expiration. However, it is critical here to remember that you cannot count on the VIX to fall every day. Inevitably there will be days that the VIX rises, and the product you are trading gains values. Therefore, when I am trying to determine my price expectation, I take the daily decay multiplied by days to expiration, and then I take about 60% of that value as a starting point to find my trade.

For example, if I am looking to buy a UVXY put with one month until expiration, and I note that the daily decay in UVXY should be about 0.20, in theory, that would make the expected price of UVXY about $6 lower than where it currently is trading. However, because we can't count on it to decay every day, I would use about 60% of that number, or $3.60, and look to set up a trade around that point.

As a final cautionary note, UVXY volatility and VXX volatility tend to move higher along with VIX volatility, which is measured by the VVIX Index. So in a scenario in which VIX is high, even though UVXY may also be exploding higher, if VVIX is extremely elevated, the speed at which the IV can come out of UVXY and VXX options can actually negate the dollar move in the underlying. If you are looking to fade volatility using one of these products, it is crucial to take note of VVIX. If VVIX is extremely high, it is wiser to use a spread or ratio spread to trade, rather than straight puts.

Part 4: **Appendix**

Appendix A
Important Terms

Over the course of this book, I have introduced the lingo and jargon of the options industry. There are two goals for this appendix: (1) for you to be able to follow along with what I am trying to teach in this book; and (2) to present what I mean when I discuss these topics and to give you an understanding of what they mean to me.

Historical Volatility (HV)

Historical volatility is a backward-looking number. It is a representation of the history of volatility. Historical volatility calculates how much an instrument has moved over a previous period of days, and it gives an overview of how much an instrument has deviated from its average value. Without getting too deep into the weeds, HV calculations usually compare where the underlying closed the previous day relative to where it closed the next day and determines how much the underlying moved. HV uses a set number of days to calculate the volatility over previous days.

However, this method of determining HV has one major flaw: It only looks at end-of-day pricing. It misses how much an underlying might move throughout the day. If the S&P 500 moves up 15 points and then down 20 points and settles on the day up 5 points, this modeling will only see 5 points of movement. Is that 5 points of movement an accurate way of portraying how much the underlying moved? The answer is no. So while HV is important, it doesn't tell the whole story.

Even so, historical volatility is what tends to drive price perceptions going forward. The assumption is that how volatility moved in the past will be a good indicator of how volatility will move in the future. In betting on how something will move, we tend to look at specific time periods, each meaning different things depending on the amount of data reviewed.

Short-Term Historical Volatility

Short-term HV studies periods existing over less than a month. This means looking at the last 10 trading days, the last 20 trading days, and the last 30 trading days. Figure A.1 shows a graph of the volatility over time.

HV10 moves much more quickly than 20-day volatility and HV20 moves more than 30 day, although the difference in movement between 20 and 30 is far less than the difference in movement between 10 and 20. Near-dated HV gives you a view of what has happened recently. It tends to miss some intraday movement. It

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Figure A.1: Short-term historical volatility.

also tends to be the best view of what might happen next. These should be looked at in three-month increments at most.

Intermediate-Term Historical Volatility

If near-dated HV gives you a view of what has been going on recently and what might happen next, *intermediate HV* is going to give you the general trend of movement based on the last two to six months. High volatility tends to lead to more volatility and low volatility tends to lead to lower volatility. Looking at intermediate volatility gives you an idea of what the general trend has been on the product over the last few months. It tends to be smoother but can still anticipate major movement.

A vol trend frees you from some of the noise of near-dated HV. When this hits historic levels, it can mean that the underlying is at a reversal point. Be wary when these numbers are hitting highs or lows, because that can mean the market is setting a trap and is primed for a reversal. In Figure A.2, SPX movement is below 7% over the previous 60 days and below 8% over the previous 90 days, which is about as low as movement in the S&P 500 will get. I find this type of information invaluable, as it helps me see that movement is lacking, at a minimum will not go much lower, and is likely to go higher. When I view movement at historic lows, I know that even if I don't want to buy options, I also do not want to be net short options.

Figure A.2: Intermediate-term historical volatility (HV of 60 and 90 days).

Long-Term Historical Volatility

Long-term HV is meant to point out where the mean reversion point is. Movement is always mean-reverting to a point. If movement has been steadily decreasing, as it was in Figure A.2, and mean reversion is in the cards, long-term HV is where you will see the movement unless the underlying is completely breaking out. This reversion level, like a stock's moving average, is dynamic and will act like a resistance point. Consider long-term HV to be a reversion level for the underlying.

180-day vol, shown in the lower graph in Figure A.3, acts as a near term stop for movement and tends to be a resistance point for forward-looking volatility

Figure A.3: Long-term historical volatility.

measures. In Figure A.3, the 180 vol is about 11%, pointing toward where near term vol is likely to find resistance if HV increases from the 6% it was trading. 360-day HV can show the true reversion level if an event occurs or movement starts to increase. Yes, the underlying IV might explode higher but, in general, when other vol measures hit HV360 that will be a level where price either goes much higher or turns around.

Realized Volatility (RV)

Realized volatility is how the underlying is moving at the moment. This term describes how an underlying moved while you are setting up a trade. It is interchangeable with short-term HV. You look at what amounts to HV of 10 to 20 days. For the most part, when I think about realized volatility, I think about 10-day HV.

Looking at Figure A.4, which is 10-day HV, I can describe how the S&P 500 (SPX) has been moving in the recent past, which is the best I can do to describe what is happening right now. While HV10 can say what has happened in the recent past, it can't say what is actually happening right now. This is the one place where something like candlesticks might actually show movement. The candlestick, the pattern seen on most modern charts, shows a great deal of information: high to low (the rectangular "real body"), trading range extension above and below, and direction (white candles moved up, black candles moved down).

Figure A.4: Realized 10-day volatility.

I can see ups and downs on this candlestick chart (Figure A.5). Combined with historical analysis, you can see what is going on with the underlying instrument. In this case, in my eyes, the answer is a trend. SPX has slow momentum higher.

Figure A.5: Candlestick chart.

Forward Volatility

Forward volatility is how much an asset might move going forward over a certain period of time. The options pricing model uses five factors: (1) underlying price, (2) strike price, (3) time to expiration, (4) cost of carry, and (4) forward volatility.

The problem is that no one knows what forward volatility will be. This is what creates option trading opportunities. In this book, you have seen how the ignorance of forward volatility is where all of the trading uncertainty exists. Understanding that forward vol is a moving target allows you to make profitable trades. If forward vol were known, there would be no trading.

Implied Volatility (IV)

Implied volatility is the market's best guess at how volatility will be going forward. While HV is backward facing, IV is forward facing. IV does rely on the past, but it also takes into account what might happen in the future. What is interesting, and a common misconception, is that IV is actually an *output* of the pricing model, not an input.

The pricing model is based on the Black–Scholes formula, used for calculating what an option's price should be *in theory*. While an older model, it is the source for many newer models. Traders use many types of pricing models, but all options models use the following five factors: (1) price of the underlying, (2) strike price of the option, (3) time to expiration of the option, (4) cost of carry, and (5) forward volatility that was originally used in the model developed in Black–Scholes.

This sounds easy, except that we only know four of the five factors. We do not know what forward volatility is going to be. Thus was born implied volatility. IV is derived using what we know: the four factors in the pricing model. Using the options price and the four factors, we run a formula to solve for forward volatility via calculus, creating implied volatility. Implied volatility is an *output* of the pricing model, not an input. Thus, as the factors of the model change or the option's price changes, IV changes. The Greeks are based on IV and can also move based on what happens with the four factors and the option's price. IV is a market-driven number. Here is an example of how that equation for IV looks:

Option Price = Stock Price*Time*Carry*Strike*X Unknown Forward Volatility (IV)

If a $30 stock has an ATM options price of 2.00 with 30 days to expire, a carrying cost of 0.05, and a strike of 30, the formula would be at onset:

$$2.00 = 30 * 30 * 0.05 * 30 * X$$

When the market moves IV to an extreme, there is a chance to set up a trade. It depends on whether you think options are fairly priced. IV as seen in VIX moves up and down much like a stock price, as shown in Figure A.6.

Figure A.6: IV movement.

The only difference between HV and IV is that IV is driven by concepts of mean reversion – the assumption that volatility returns to a mean.

Calls and Puts

An option is a contract that enables you to buy or sell an underlying or an asset at a specific price and time. An option that allows you to buy at a predetermined price is called a *call*. A call option is exercised only when the strike price is below the market price of the underlying, without exception. A put is the opposite. An option that gives the owner the right to sell at a specific price is referred to as a *put*. A put would be exercised if the strike price is above the market price of the underlying (in the money), without exception.

Skew

Skew is the relationship between puts and calls as they relate at the money (ATM). It is the formation of volatilities of options below the current price, relative to at-the-money options, relative to options that are above the strike. Out of the money (OTM) options trade relative to ATM options' skew. Options are not tied to one another, but they are connected. When ATM IV moves, calls and puts move, but not necessarily at the same rate. When IV falls, the same is true. OTM calls and OTM puts can move free of ATM options. An out-of-the-money call and an out-of-the-money put can gain value whether the ATM options values change or not, especially in indexes and ETFs if a customer has an ax to grind on a particular option, portion of the curve, or direction of the underlying. Take a look at the skew chart in Figure A.7.

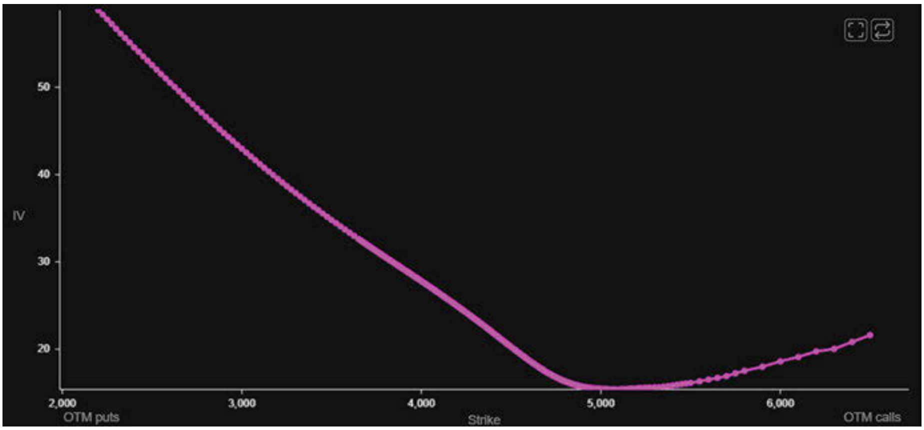

Figure A.7: Skew chart for the S&P 500.

SPX, like most indexes, has a higher IV for puts than for calls. However, this curve doesn't remain constant, but moves with changes in the underlying price and also with trade volume in options. While it is hard to see, there are spots where vol is cheap or expensive in relative terms.

Skew can get out of whack. Look at FEZ, a leveraged ETF 2X long on the Eurozone (Figure A.8). The 35 calls are cheaper than the 39 calls even though the 39 calls are OTM. What drove this? Customer call buying. A customer bought 20,000 of the 39 calls in FEZ ahead of this vol set-up.

Here is how to judge skew:

1. Look at skew across many vol scenarios – what does skew look like when volatility is cheap, expensive, and normal?
2. How did skew move as volatility changed? Skew has a pattern. When IV increases, skew tends to move in predictable ways, and if it moves away from those patterns there may be a chance to trade.
3. Was there an order that moved skew? Did a buyer or seller move the curve?

Figure A.8: Skew chart for FEZ.

Looking at the curve above in Figure A.8, we can see where skew went out of whack. In FEZ the 30 puts were more expensive than the 31 or 32 puts. There was likely an order driving up volatility in the 30 puts. This type of action needs to be evaluated so that you know what is going on, and can potentially find price ranges where you can make money.

Term Structure

While volatility is often presented as a single concept, it is not. Volatility does not move evenly across every contract. While all volatility is correlated, it is not tied at the hip. As skew is created by different demand for different strikes, *term structure* is created by demand for options in different months.

Implied volatility is created by demand; so just as demand is not going to be the same for a given strike, demand will also not be even across different months. In equities, there will be more demand for options during earnings months or when the stock has an important announcement coming. Look at AAPL term structure (Figure A.9). Earnings were predicted as coming up in the term structure below.

Expiry	Mar24(W)	Mar31(W)	Apr07(W)	Apr13(W)	Apr21	Apr28(W)	May19	Jun16
Sigma	15.90	14.78	14.62	14.51	14.39	18.55	20.07	19.29
Sigma Chg	-0.78	-0.48	-0.28	-0.28	-0.27	0.21	-0.34	-0.36
Vol								

Figure A.9: Predicting earnings with term structure.

Based on Figure A.9, earnings were unlikely to be announced before April 21. Less certain was whether earnings would be published after the April 28 contract or sometime before May expiry. The April 28 contract had a dramatic increase in IV over April 21, and May IV was higher than the April 28 contract, and June showed a lower IV than May. This can also be observed in pharmaceutical stocks that have drugs up for Food and Drug Administration (FDA) review. You can see when the market thinks an FDA decision might occur.

When I was a floor trader, I traded a stock called Sepracor. The company was developing a sleep aid called Lunesta (eszopiclone). The FDA committee approval was a moving target; thus, term structure was constantly changing. When it appeared something was imminent, IV would pop, and when that turned out to be nothing, IV would tank. However, the official FDA approval date never moved; it was always a contract that customers wanted to own. I managed the fact that traders wanted to sell me the "boring months" to buy the "action months."

Volatility between months is related, not tied. Order flow (customer demand) can drive one month in a different direction than another. This is just the way equity flow runs. Index flow is a touch different but can share similar characteristics.

Index term structure is often driven by events. Take a look at Figure A.10, the S&P 500 a few months before the time of Brexit.

Even in April, the market was pricing some type of event to happen in June or July. That turned out to be Brexit.

Figure A.10: S&P 500 pre-Brexit.

Term structure provides a ton of information:

1. In what time period is the market looking for movement?
2. When is the next serious event?
3. What movement is expected between different months?

Used to the trader's advantage, you may be able to develop a trade you think will make money.

Term structure is valuable and crucial in developing calendar spreads, for example. When a month seems mispriced, you can use term structure to develop a trade.

Volatility Index (VIX)

The VIX is the CBOE Volatility Index. The VIX represents the calculated value of volatility in SPX options (options on the S&P 500) that expire in 30 days. How does it do this? It's complicated.

The VIX Index looks at the weekly options expiring on the Friday before and after a 30-day time horizon in the SPX and pulls implied volatility from every strike with a bid (traders are at least willing to pay 0.05 for the option). The index is called the "fear gauge" or "fear index," and tends to have a negative correlation to the S&P 500. When the SPX is up, the VIX tends to be down. When the SPX is down, the VIX tends to be up.

I do not like the description of VIX as a fear gauge. I prefer to call it the "insurance gauge." The VIX measures how much it costs to insure a portfolio. When the VIX is high, it points to market turmoil. Look at a chart of VIX in Figure A.11.

When VIX was high, markets were a mess. VIX tends to move before a major event, such as major elections.

The VIX Index is the baseline for setting volatility across any product that is traded in the equity space. If VIX is low, vol in that equity should lean lower. If it doesn't, that could be a trade.

Delta

Delta is slope. It represents your exposure to directional movement in the underlying stock. If a position expects the underlying to rally (such as a call), it positively

Figure A.11: VIX chart.

correlates with the underlying. If the position expects the underlying to fall (such as a put), the position is short delta. An example:

A position is long 100 delta. If the underlying rallies 1 point, the position will make $100.00 (1*100). If the underlying falls one point, the position will lose $100.00 (–1*100).

Or take a position that is short 100 delta. If the underlying rallies 1 point, the positions will lose $100 (1*–100). If the underlying falls one point, the position will make $100 (–1*–100).

Delta is also directional exposure. If a position will make or lose money based on movement on the underlying, the position has delta.

Delta is the red line in Figure A.12. As the underlying rallied in a direction, how does the position perform?

Gamma

When you have a position as the underlying moves around, you will see delta change – this degree of change is *gamma*. Gamma is a position's exposure to movement, not in one particular direction, rather movement in *either* direction. Look at a chart of 20HV in the SPX in Figure A.13.

This movement shows where gamma comes into play. When the SPX starts to move, it measures gamma as a related factor. That occurs often.

A common problem among traders is understanding that the *sign* of gamma has nothing to do with the *sign* of delta. You can have a positive gamma and negative

Figure A.12: Delta chart.

Figure A.13: 20-day HV in SPX.

delta and vice versa. What gamma measures is what happens to delta as the underlying moves. If you are short delta and long gamma and the underlying rallies, you become less short delta. If you are short delta and long gamma and the underlying falls, you will become more short delta with exposure to the underlying.

Gamma doesn't directly affect P&L; it affects delta. Following are some examples of the math behind gamma:

– A position is long 100 delta and long 100 gamma and the underlying rallies 1 point. The position is now long 200 delta.

– A position is long 100 delta and long 100 gamma and the underlying falls 1 point. The position is now flat delta.
– A position is long 100 delta and short 100 gamma and the underlying rallies 1 point. The position is now flat delta.
– A position is long 100 delta and short 100 gamma and the underlying falls 1 point. The position is now long 200 delta.

Look at the call from above. Delta changes as the underlying rallies in Figure A.14.

Figure A.14: Delta changes.

At a 0% move, delta was 49. When SPY was up 2%, delta changed to 84. That is the way gamma helps you measure and manage trades. A quick increase in the underlying dramatically changes delta, and that change is gamma.

Theta

Theta represents the position's exposure to time. As a day passes, the theta of a position tells you whether or not you are making money. If a position has theta of positive 100 and a day passes, the position should in theory make $100.00. Look at a chart of option premiums on a long call option in Figure A.15.

Figure A.15: Multiple payouts in SPX over the life of a call option.

As time passes, ATM options move. The way to measure that cost is theta. Options are like insurance – as time passes, insurance policies lose value, and the loss of insurance value is what theta measures. Think about theta like this:

– A position is long 100 theta and a day passes. Your position should make $100.00.
– A position is short 100 theta and a day passes. Your position should lose $100.00.

Theta is what the position produces in time decay, which is not an easy thing to keep track of over multiple positions and many option trades – unless you manage positions with theta in mind.

Vega

Vega is to volatility as delta is to underlying price. When IV increases, vega reacts to the movement in implied volatility. A one point increase in implied volatility will cause the option position to gain the value of its vega. Look at a chart of the call with a change in implied volatility in Figure A.16.

Figure A.16: A call payout in SPY.

If IV rallies 10%, the position makes money. This is directly related to the vega of the position. Negative vega will behave the opposite of the above and is created by short options. Vega, like gamma, moves less as the underlying moves away from the starting price of the trade.

Thank you for reading Trading Options for Edge. *If you would like to start trading with Mark, readers are invited to contact Option Pit by calling 1-888-TRADE01 (1-888-872-3301) or by emailing support@optionpit.com to receive a free quarterly membership to one Option Pit product with mention of this book.*

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