WILEY Trading

OPTION TRADING

Pricing and Volatility Strategies and Techniques

Euan Sinclair

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To my parents

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Preface

Traders tend to be a pragmatic group. They are largely interested in results. Actually some become so focused on results that it becomes a hindrance. This tendency can be a handicap, as the way to achieve good results is to focus on good processes and let the results take care of themselves. Good traders learn this.

But good traders are still intellectually parsimonious. They want to know what works, but seldom more than the minimum they need. When I'm feeling uncharitable I regard this as characteristic of the uncurious, dull people I have had the misfortune to work with, and indeed some were like this. More realistically, however, this is less a reflection on the traders themselves, most of who were intelligent people with a wide range of interests, and more a reflection on the nature of trading.

Trading is complex, changeable, and potentially emotionally draining. Once a trader has learned a sensible, statistically valid, profitable method, he is better off concentrating on exploiting it rather than continuing to experiment.

So a perfectly valid question when told something is "Why do I need to know this?" As a general answer, in the case where everything else is equal, the trader with more knowledge will make more money. He will also be more easily able to adapt to new markets and opportunities.

It is possible to trade options successfully without knowing about the Black-Scholes-Merton model, or any other pricing model. But for the traders who do this, everything is a special situation. They have to individually learn every nuance with no organizing principle. It would be like trying to learn chemistry without knowing about the periodic table. Black-Scholes-Merton provides a simplifying framework. Traders who know this can then learn other things more easily, because they use less energy remembering the otherwise unconnected facts.

Throughout this book I will tell you things that are truly useful and not merely "interesting." Trading is interesting only if it is profitable.

However I have no interest in, or intention of, making this an easy read for the "average person." The reason for this is that the "average person"

will not succeed as a trader, so I would be making things more difficult for myself by oversimplifying. The text would be longer and more boring. Trading is hard and options are complicated. Much of this book will require work and thought. It is not meant to be a light read; it is meant to be a thorough treatment.

I want this book to be the only book an intelligent, diligent person would need in order to go from knowing nothing about options to being able to trade professionally at a legitimate trading operation (a bank, a hedge fund, or a market making firm).

PROFESSIONAL TRADING

It is commonly believed that 90 percent of those attempting to trade will lose money. This is a difficult number to verify. First, the people in possession of the data needed to prove this are members of brokerages and clearing firms, and they have no interest in publicizing the fact that the vast majority of their customers fail. Second, we cannot learn much by interviewing traders as there is the problem of survivorship bias (the only people who will identify themselves as traders are those who have not gone bankrupt), and all people tend to exaggerate their successes and minimize their losses.

But even if this figure is somewhat exaggerated, its implications are startling. Most people will fail at trading. The normal excuses for this large-scale failure rate given in trading books or seminars (when it is even acknowledged) take one of two forms.

- Traders do not know the correct techniques, where "correct" corresponds to whatever the particular expert is trying to sell.
- Traders do not have the psychological discipline needed to stick with their plan. This is laughable. I know of no other field of endeavor where failure to perform a skill is routinely blamed on psychology. Would you seriously listen to a basketball coach who told you that the *main* reason you were not in the NBA was your lack of discipline and desire? While great players are also psychologically strong, no amount of desire and resolve would turn me into a professional level player. Being undisciplined might be a personal failing, but it is by no means the most important one. This is also true in trading. Psychological coaching can help a winner, but it will not make a winner.

Hundreds of books discuss these subjects, but the survival rate of traders gets no better. Yet the proprietary trading desks of banks continue

to be profitable (even in the carnage of 2008) and hedge funds proliferate. Why can professionals consistently do what the amateurs cannot? Why are the same groups successful year after year? In many fields the answer to this question is obvious: it is because they are better. For example, a professional basketball player is doing what I do, but he does it much better. Trading is different. Professionals do not generally have more knowledge, more skill, or more psychological mastery. They make money because they are playing a totally different game.

Many people completely fail to see this. They are encouraged in this view by the proliferation of financial news media. There are several full-time business television channels, daily newspapers, business radio stations, and various Web services that offer to bring people the "inside" view of the markets. They do not. If anything, they give their consumers a false sense of the depth of their knowledge. Particularly misleading are the occasions when a floor trader is interviewed and asked for his views on a particular market. The answer will invariably *sound* useful, containing an analysis of the market's technical and fundamental factors. But successful traders do not care about these things and asking a floor trader for his opinion on them is like asking Tiger Woods for tennis lessons. He is a great sportsman and he hits a ball with an implement, but his tennis views and opinions are no more likely to be valid than those of most other people.

Knowledge is still crucial, but for derivatives traders it is not technical analysis or fundamental analysis that is important. They need a sound knowledge of market structure and arbitrage relationships. The way they consistently make money is through arbitrage and its weaker relatives: quasi-arbitrage, statistical arbitrage, and structural arbitrage.

We will be talking a lot about winning and losing. These can be emotionally loaded terms. No one likes to be called a loser, and, particularly if you are under the age of 40, you have probably become accustomed to having your self-esteem boosted to the point where you think that even if you lose money you still are not a loser. This is the wrong way to think. That is exactly what you are and if you want that unpleasant fact to change, you first need to accept it.

Being a loser does not make you a bad person. On the contrary, many of the things winners do would make them bad people in any normal setting. Winners (while not setting out to be deliberately unpleasant) are fiercely competitive, obsessive and often morose and cranky while trading. We do not trade to make friends; we trade to make money.

There is a common misconception of the successful trader as existing in a state of preternatural calm. Of course this would be nice, but one cannot sustain this state while at the same time maintaining the necessary level of obsession. Edges are so small, that you must be a complete control freak. You need to obsess over every detail.

All of this may sound very negative. It could be construed that way. On the other hand, I'm going to give you a path that has a far greater chance of success. In contrast to the 90 percent failure rate cited earlier, over 50 percent of the people I have ever known in this industry are still in it, meaning that they are competent professionals. Those who succeed are not distinguished by special intelligence. They have learned to put themselves in market niches that give them an edge. This is the most important trading decision they have made. If you also do this and are not stupid, lazy, or dishonest, you can also succeed.

Trading success is measured in money, but people who are purely motivated by money might want to reconsider trading as a career choice. We've already pointed out the colossal failure rate. But even traders who "succeed" may not make great fortunes. Many traders manage to stay in the game without accumulating great wealth. Most of these people could probably have achieved about the same income in another job. Further, a more conventional career choice would follow a standard path of professional development. A lawyer with 20 years of experience might be a partner in a law firm or a judge. A trader does not have these opportunities. If he wants to keep trading he will be in the same job as he was when he started.

So why trade? The reason to become a trader is the same reason someone should choose any career: Because that is what they do and who they are. Eventually this consideration overwhelms all others. As G. H. Hardy said in, "A Mathematician's Apology," "I do what I do because it is the one and only thing that I can do at all well. . . . If a man has any genuine talent he should be ready to make almost any sacrifice in order to cultivate it to the full."

THE ROLE OF MATHEMATICS

A (very annoying) colleague once asked for something to read about option trading that "was not mathematical." This really is not possible. All of the concepts behind the structure, pricing, and trading of options are inherently mathematical. This is true of all trading.

Nonetheless there is a large group of traders who vociferously state their distrust of mathematics. The most charitable thing I can say about these people is that they really are not thinking about what they are saying. Do they really doubt that a trader who makes a million dollars a year is better than one who loses a million dollars? After all, this is a question that can be decided only by using the appropriate mathematics. This case is simple. Is A greater than B? But just because a situation is less clear-cut does

not necessarily make the application of mathematics irrelevant. In fact, I hope to show that more complex situations need the most mathematical analysis.

I do not claim that everything is about mathematics. Intangibles matter. Leadership, inspiration, grit, and heart are all important. But they matter only if they lead to something tangible. And results are always tangible. Causes may not be.

A skilled mathematical trader will use math and statistics to simplify the world. A good mathematical model takes a very complex situation and makes it possible to identify a cause and an effect. All traders do this. "If nonfarm payroll comes in under expectations, the market will rally," is an example of a trader using a model in this way. He has not expressed it in an equation, but it is the same process. Someone can choose to simplify the world in a different way to you. This is not a problem. It is a good thing. You can always learn from divergent viewpoints.

A good model has to be based on the appropriate selection of inputs. To predict the score of a baseball game, for example, we might consider the number and type of hits each team averages, how often players take walks and how many runs the pitching staffs give up. Our predictive model will then be some function of these variables. But if we were to also include the population of each team's home city, then our prediction would clearly rest on an unstable foundation. Fundamental knowledge is necessary to avoid this situation.

So I need to assume a certain amount of mathematical literacy, and it is not immediately obvious where to draw this line. I've basically decided to assume that someone who wants to be a serious option trader should have picked up the mathematics of a good high school education. This includes algebra, logarithms, and exponentiation and basic calculus. The Black-Scholes-Merton (BSM) formalism requires more complex mathematics to do properly. We avoid this by doing it improperly. I think we can get the essential points across this way. An option trader need not be able to give a rigorous derivation of this equation (those who first did so were rewarded with Nobel prizes), but should be able to follow an informal discussion of it.

I make an exception for statistics. Here I assume that you know far less, and discuss probability distributions, descriptive statistics, inference, and sampling. There are two reasons for this. First, I've found that many people come into finance with a strong background in mathematics or the physical sciences. To these people calculus is simple, but their grounding in statistics is generally weak. Second, many successful traders have had only a basic understanding of the mathematics behind BSM and certainly have no idea of the differences between calculus and stochastic calculus.

This is not generally a great problem. But misunderstanding statistics and probability can, and does, lead to disastrous decisions.

THE STRUCTURE OF THIS BOOK

This book is roughly divided into three parts. First we will introduce options, both historically and conceptually. Next we use the no-arbitrage principle to introduce option pricing. We examine both static arbitrage relationships and the dynamic hedging approach. The last, and largest, part of the book is about how to actually trade options.

In Chapter 1 we discuss the history of options and other financial derivatives. I think these stories are interesting, but even if they were not interesting, they would be important. Sadly, option traders will often find themselves in situations where they need to defend their profession. This can happen in social situations, which is annoying, but it is also a topic of political debate. Traders cannot reasonably expect much public sympathy, but they need to be able to conduct a coherent defense of the morality, necessity and desirability of the existence of their business. Understanding the history of derivatives and particularly the way that they have been blamed for many past financial catastrophes can only help do this.

Chapter 2 introduces options and option markets. While this is undoubtedly boring material, it is probably the most important chapter in the book. Unless the reader has a solid grasp of basic definitions and nomenclature, he will not be able to go any further.

Chapter 3 is the first chapter in the pricing section of the book. We introduce the concept of no arbitrage and use it to derive relationships between call and puts and options of different strikes and maturities. Again, many of the proofs here are tedious, but the results must become second nature and good traders will become familiar enough with the principle of no arbitrage to be able to apply it to the analysis of unfamiliar structured products.

In Chapter 4 we work through the two most important option pricing models: the binomial tree and the Black-Scholes-Merton (BSM) model. These are not the most important models because they are the most useful. Neither one is actually used in practice much anymore. However, they provide the conceptual basis for most other models, and traders need to become familiar with their assumptions and how we compensate for these in practice.

Chapter 5 examines the solution to the BSM model and introduces the famous greeks, the sensitivities of the option price to various parameters and variables. Although the equations we give are tied to the BSM

formalism, the nature of the greeks is not. The behavior of the greeks is more fundamental than this. Options really do have these dependencies irrespective of the particular pricing model we use. This is important: we want to become familiar with *options*, not with option pricing models.

By this point we will know what options are, and how they are priced. Next we can learn how to trade them. Chapter 6 looks at the various strategies that can be constructed from simple calls and puts. Many books do this, but most do so from the perspective of a customer who is trying to construct a directional bet with certain risk characteristics. As professional traders, we generally will not be doing this. We will usually be interested in the volatility aspects of a given position. Nonetheless we still need to know what the standard positions and strategies are.

Option pricing models are not magic. They are incredibly helpful trading tools, but they still need inputs in order to generate option prices. The most important of these is volatility. Chapter 7 shows how to measure and forecast volatility. Chapter 8 is somewhat complementary. Here we consider the nature and behavior of implied volatility: the volatility that the option market is using at any point. The interplay between implied volatility and realized volatility is central to the theory and practice of option trading.

While trading does involve instinctual actions it also has a number of aspects that can be quantified. There are a number of indisputable mathematical truths that need to form the basis of any sensible trading operation. In Chapter 9 we introduce the concept of expected value, the general idea of hedging and the idea of trade sizing: looking at a trade as a part of a continuing business plan rather than a single unrepeated bet.

Chapter 10 discusses the basic ideas and strategies of market making. Not all option traders will be market makers, but all traders can benefit from understanding their behavior. At the very least this will improve a trader's ability to execute trades.

In Chapter 11 we examine volatility trading, in particular, how to hedge and what to expect when we do. Volatility trading is a viable stand-alone strategy, but it also needs to be understood by any trader using options. Option traders inevitably take positions in volatility even if this is not their principal focus.

Expiry trading gets a separate chapter: Chapter 12. Nothing about expiration is really fundamentally different from any other time, but everything that happens is far more extreme. It provides opportunities for good trading, but also risks that are much larger than at other times. Risk management is the most important thing for an option trader to do. Everything a trader does, and everything in this book, is about risk management. All trades must be evaluated by both their return and their risk. But there is another level of risk management to consider as well. At this level, we think

far less about the probability of an event, and much more about the consequences of its occurrence. This is just one of the many inconsistencies that a trader must become comfortable with. We spend a lot of time estimating probabilities of events before we do a trade. But we also need to make sure that in no state of the world, no matter how unlikely, can the trade cause us to go broke. This type of analysis is covered in Chapter 13.

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CHAPTER 1

History

In our view, however, derivatives are financial weapons of mass destruction, carrying dangers that, while now latent, are potentially lethal.

—Warren Buffett, letter to shareholders, 2002

Derivatives have often been characterized as dangerous tools of financial speculation, invented by mathematicians who are out of touch with reality, then sold by unscrupulous salesmen to gullible customers who do not understand the risks they are taking. They have been blamed for most periods of modern financial turmoil, including the 1987 crash, the bankruptcy of Barings Bank, the meltdown of Long Term Capital Management, and the current "subprime crisis." Like many populist misconceptions, there are germs of truth in this straw man, but the full truth is far more nuanced, complex, interesting, and profitable to those who understand.

Derivatives are as old as recorded history. The first reference we have to derivatives is in Genesis 29. Jacob entered an agreement that obligated him to work for seven years in exchange for the hand of Rachel. However, after Jacob had fulfilled his part of the contract, Rachel's father, Laban, defaulted on his obligations and made Jacob instead marry his elder daughter, Leah. So Jacob entered another agreement in which he again worked for seven years in order to marry Rachel.

- This was a *forward agreement* where Jacob paid (in labor) in return for something (Rachel) to be delivered at a certain time in the future (seven years).

- Laban *defaulted*, by not carrying out his obligations under the contract, making this not only the first derivative we know of but also the first default.
- Jacob may not have been a great trader. He entered a contract at a high price, was cheated, and then did the same thing again.

The first unambiguously historical reference to options is in "The Politics" by Aristotle. He tells the story of the philosopher Thales of Miletus who lived from 624 to 527 B.C. It seems that Thales eventually grew tired of hearing variants of the question, "If you are so smart why aren't you rich?" and resolved to show that learning could indeed lead to riches. According to Aristotle:

> *He, deducing from his knowledge of stars that there would be a good crop of olives, while it was still winter raised a little capital and used it to pay deposits on all the oil-presses in Miletus and Chios, thus securing an option on their hire. This cost him only a small sum as there were no other bidders. Then the time of the harvest came and as there was a sudden and simultaneous demand for oil-presses, he hired them out at any price he liked to ask.*

Thales actually bought a call option. The deposits bought him the right, but not the obligation, to hire the presses. If the harvest had been poor, Thales would have chosen not to exercise his right to rent the presses and lost only the initial deposit, the option premium. Fortunately, the harvest was good and Thales exercised the option. Aristotle concludes,

> *He made a lot of money and so demonstrated that it is easy for philosophers to be rich, if they want to.*

I do not doubt that the trade was profitable, but at the risk of contradicting a philosophical giant, I need to emphasize that making money is never easy. However, Thales clearly shows that being smart is helpful when trading options.

We can also find other examples of option contracts in the ancient world. Both the Phoenicians and the Romans had terms in their maritime cargo contracts that would today be considered options. It seems likely that options were commonplace in the shipping industry, so we should not be too surprised when their use spread geographically, particularly to another nation with a seafaring history.

The United Kingdom is now one of the world's great financial centers, but the medieval English church was not particularly pro-business. It specifically forbade charging interest for loans. To get around this, a loan

would be structured synthetically using the principles behind the put-call parity theorem that we shall encounter later. It could therefore be argued that options are thus more fundamental than mortgages.

The first modern financial scandal involving derivatives took place in another prominent marine trading nation: Holland in 1636. This is an interesting case. Trade in tulips was conducted through a futures market. Dealers and growers would agree on prices before the crop was harvested. As prices rose throughout the 1630s, many German burgomasters began to purchase futures contracts as pure speculation. In February 1637, prices crashed.

Sometimes the reason for this crash is given as the defeat of the Germans by the Swedes in the Battle of Wittstock of October 1636. According to this theory, demand for tulips collapsed as the German nobles had more important things to attend to. However, this is probably a case where we are trying to find a single cause for an event that does not have one. The Battle of Wittstock took part well into the Thirty Years War (1618–1648). In this war, somewhere between 10 and 20 percent of the German population was killed. One could well guess that the German nobles were already concerned about this. Why one battle would cause a crash in the tulip market is not obvious.

Whatever the reason for the crash, the Dutch local politicians were now faced with paying above-market prices for their bulbs and they responded in the typical way for their profession: they changed the rules. After initially trying to renege on their commitments, they turned them into options. Now they would not have to buy the tulips unless the crop prices were higher. As compensation to the short futures holders, they arranged a small premium payment to be made. After this, these options became traded speculative vehicles. One of the most important things for derivative traders to remember is that the contracts exist only as legal contracts. They are hence subject to changes through the legal system. Traders who have forgotten this have apparently been getting hurt since at least 1636, and probably far earlier than that.

The other famous bubble of the period that featured options was the South Sea bubble of 1720. In return for a loan of £7 million to finance a war against France, the House of Lords granted the South Sea Company a monopoly in trade with South America. The company underwrote the English national debt, which stood at £30 million, on a promise of 6 percent interest from the government. Shares rose immediately. Common stock in this company was held by only 499 people, with many members of parliament amongst them. To cash in on the speculative frenzy, the company issued "subscription shares," which were actually compound call options. These fueled the fire, but in September of 1720 the market crashed as the management realized that the share price was wildly inflated. As news of

insider selling spread, the price tumbled 85 percent. Many people were ruined. Isaac Newton was rumored to have lost 20,000 pounds (this is equivalent to over one million pounds in today's money). As a result of this crash, trading in options was made illegal in the United Kingdom and remained so until 1825.

Options need not be considered in isolation. Financial engineering is the construction of hybrid derivative products with features of multiple asset classes. This is also not new practice. Early examples were confederate war bonds. The antebellum South had one of the lowest tax burdens of contemporary societies. The hastily assembled Confederacy did not have the infrastructure in place to collect taxes for war financing. In 1863 the Confederacy issued bonds that allowed them to borrow money in pounds. There was also an embedded option that allowed the bondholder to receive payment in cotton. The cotton option gave the bondholder more certainty of payment, as cotton was the south's largest crop. The catch was that the cotton would be delivered in the Confederacy. This bond was probably more important as a political tool rather than a source of financing. These bonds financed only about 1 percent of the military expenditures, but they were seen as a way of conferring legitimacy upon the breakaway states by being listed in London and having William Gladstone, the Chancellor of the Exchequer and future British Prime Minister, among the holders. Of course, the Union won the war and the Confederacy ceased to exist—and defaulted on all of its obligations.

In the United States options began trading in the eighteenth century. By the nineteenth century an active over-the-counter business in equity options had developed. This market had a well-defined structure. Wealthy individuals would sell blocks of puts and calls to brokers who would in turn sell them to smaller speculators. This arrangement helped to mitigate against credit risk, as the smaller traders were only allowed to purchase options and had to pay in full for the options up front. These options were commonly referred to as "privileges," because the purchaser had the privilege of exercising the option and calling (or putting) the stock but was under no obligations.

While the market was active, it was not considered socially acceptable. In 1874 the Illinois state legislature made option trading illegal. Other states followed, often because of the idea that speculation was harmful to "real" businesses and was nothing more than a form of gambling. Option trading was generally considered no more legitimate than trading in bucket shops or even participating in outright financial frauds.

Due to the counterparty risk, this market was mainly one of issuance. The options would trade in a secondary market, but this was far more illiquid. Over the next hundred years, this market developed in size but remained over-the-counter.

During this time, traders gradually developed many of the rules of thumb that we still use today. The equivalence of puts and calls was well understood, as were the ideas behind hedging with the underlying and other options. There were also several option pricing models being used by the more advanced traders. In fact it is likely that traders were using the essential features of the Black-Scholes-Merton model in this period.

The first exchange to list standardized contracts was the Chicago Board Options Exchange (CBOE). These started trading on April 26th, 1973. The publication in the same year of the famous Black-Scholes pricing model (now more correctly referred to as the Black-Scholes-Merton model) also boosted the market as more and more people thought they could now successfully price and hedge options. Initially options were listed on 16 stocks. Today options on thousands of stocks, indices, currencies and futures trade on at least 50 exchanges in over 30 countries.

In addition to this enormous expansion of the universe of underlyings, the total activity has increased exponentially. Figure 1.1 shows the total volume in U.S. stock options annually since 1973.

It is currently popular to advocate a dangerous form of financial Luddism in which derivatives are banned, but we can see that even during the turmoil of 2008, volume continued to rise. The main reason for this large and consistent growth is that derivatives are useful and their users like them. They can indeed be used for foolish speculation, but they can equally be used for prudent risk reduction and profitable trading. Even if the dominant use of options was for speculation, this would seem to be a weak argument against them. Practically anything can be used for speculation. There have been speculative bubbles in baseball cards, stamps, classic

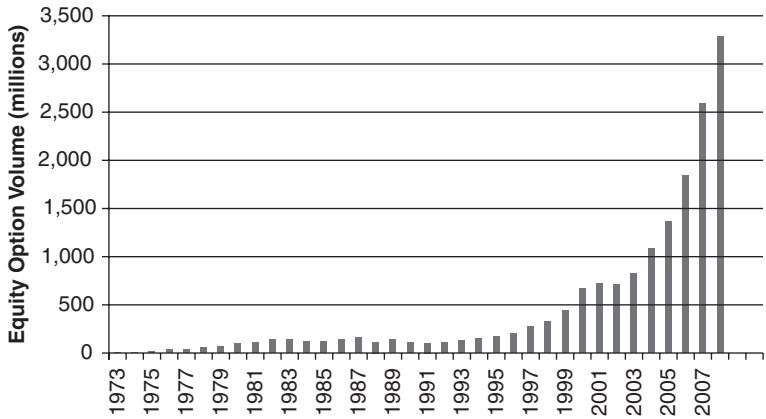

FIGURE 1.1 The Total Annual Volume in U.S. Stock Options

cars, wine, and coins. The subprime crisis was initiated by people buying property they could not afford. Options may well have been a tool in the speculative bubble, but they were not the root cause.

Another thread of this argument against financial options is that no one really understands them. Actually this argument is normally advanced by people who think *they* understand options but no one else does. As with all areas of human knowledge, there are indeed things that we do not understand, but many traders have, through study and experience, developed robust, conservative trading methods. In fact, most professional option traders had a relatively good year in 2008, as the high volatility levels increased the spreads they could charge.

Derivatives are an exceptionally useful tool. They have made financial products such as fixed-rate mortgages with early prepayment options widely available and much cheaper than they would otherwise be. They also allow users to tailor their portfolios toward their ideal level of risk. We could not return to a "simple" financial system without also returning to a "simple" economy with a far higher cost of capital and the lower growth that this would generate.

In any case, as a practical matter, derivatives cannot be *uninvented*. It seems very likely that acquiring a solid understanding of vanilla options will remain useful and profitable.

SUMMARY

- Derivatives are not a modern invention. They have a longer history than either stocks or bonds.
- They have consistently gained in popularity, particularly since they were listed on major exchanges.
- Arguing that they are "too complex" is neither logically or financially sensible.

CHAPTER 2

Introduction to Options

No one said life would be interesting.

—My parents

Boring is good.

—"Squid," with 15 years' worth of option-trading experience

The fact that many people try to trade without understanding basic contract specifications has been illustrated several times in the ETF space recently.

Consider the case of the ultra-short ETFs. These are funds designed to return a multiple of the negative daily return of an index. They do this fairly well. However, due to the ways that returns compound, they will not deliver the negative return if we look over a longer period. Table 2.1 looks at the returns of FXI and FXP (which is intended to deliver negative two times the daily returns of FXI) in October and November of 2008.

We can see from this data that the ETF does a reasonable job of delivering the negative two times return each day. The relationship is not perfect, as FXP actually averages −1.75 times the daily return of FXI. This is mainly due to the large bid ask spread slightly distorting the closing prices. But the important point to notice is that over the full period, the FXI total return was 9.0 percent and FXP returned −49.2 percent. This is clearly nowhere close to negative two times the return of FXI. This is not due to any nefarious activity on the part of the fund manager. It is purely the effects of compounding.

TABLE 2.1 FXI and FXP

Date	FXI	FXI % Returns	FXP	FXP % Returns
10/27/2008	19.29		183.01	
10/28/2008	23.15	20.01	118.7	−35.14
10/29/2008	22.34	−3.50	115.48	−2.71
10/30/2008	25.48	14.06	87.03	−24.63
10/31/2008	24.99	−1.92	89.00	2.26
11/3/2008	25.28	1.16	86.00	−3.37
11/4/2008	27.02	6.88	75.20	−12.56
11/5/2008	24.48	−9.40	87.00	15.69
11/6/2008	22.54	−7.92	101.99	17.23
11/7/2008	25.43	12.82	76.32	−25.17
11/10/2008	26.43	3.93	69.50	−8.94
11/11/2008	24.88	−5.86	76.66	10.30
11/12/2008	23.92	−3.86	82.58	7.72
11/13/2008	27.47	14.84	60.40	−26.86
11/14/2008	24.98	−9.06	69.68	15.36
11/17/2008	24.93	−0.20	69.96	0.40
11/18/2008	24.11	−3.29	74.61	6.65
11/19/2008	22.13	−8.21	86.23	15.57
11/20/2008	21.02	−5.02	93.00	7.85

Compounding daily leveraged returns is not the same as delivering a leveraged return over any arbitrary period. This is a mathematical fact. A fabricated example might make the effect clear. Consider two ETFs, X and Y. Y is designed to deliver twice the daily return of X. They initially both trade at $100. On the first trading day, X rallies by 10 percent to $110 and Y accordingly rallies 20 percent to $120. On the second day, X drops back to $100. This is a decrease of 9.09 percent. Y drops by 18.18 percent, as it is designed to do. However this brings the price of Y to $98.18. So after two days, the first ETF is unchanged and the second has lost 1.82 percent. This effect is path dependent and is exacerbated by high volatility.

This should be perfectly obvious to anyone who has read the prospectus. The funds are designed to deliver leveraged, daily returns. They do this. That this relationship does not hold over longer periods is not the fund manager's fault. The fact that customers thought that this should happen is *their* fault. They did not do their homework. However, the trading chat-rooms and message boards indicated that there were plenty of people who were eager to blame others for their ignorance.

This can never happen to a professional. You simply must know all details of your instrument's specifications.

This chapter will test your ability to grind through some fairly dull material. It is, however, vital material. You can forget about exploiting the nuances of trading if you do not know the basic contract specifications.

OPTIONS

Options are a type of derivative. A derivative is a financial instrument whose value is derived from the value of another asset: the underlying. An option gives the option owner the right, but not the obligation, to buy or sell the underlying asset at a specified price any time during a designated period or on a specified date. To gain this right, the owner pays the seller a payment called the option premium.

The fact that an option holder is under no obligation to do anything is worth stressing. The owner of an option can also choose not to exercise the option and to let it expire worthless. This creates an asymmetry that is one of the great appeals of options. The owner can benefit from a favorable move in the price of the underlying, yet does not suffer due to an unfavorable move.

The seller takes the opposite side of this risk in return for the premium. He is obligated to fulfill the terms of the contract if the owner exercises it.

Because options are contracts they can be created without limit (At least this is true in theory. In reality, a market participant's position will be limited by his ability to collateralize it). An option market can never be cornered, and a seller does not have to borrow an option from another person in order to short it.

SPECIFICATIONS FOR AN OPTION CONTRACT

The specifications that define an option contract are: option type, underlying asset, strike price, expiration date, exercise style, and contract unit.

Option Type

There are two basic types of options, calls and puts. A call option gives the holder the right, but not the obligation, to buy the underlying asset at a predetermined price on or by a certain date. A put option gives the holder the right, but not the obligation, to sell the underlying asset at a predetermined price on or by a certain date.

Underlying Asset

Options are available on a number of underlying assets including stocks, indices, and various futures. The underlying asset of a stock option is a certain number of shares of the underlying stock. The underlying asset of an index option is an amount of cash equal to some multiple of the index value (this is sometimes referred to as cash settled). The underlying asset of a futures option is a future.

Strike Price

The strike, or exercise, price is the price at which the option owner can buy or sell the underlying asset.

Expiration Date

The expiration date is the last date on which the option exists.

Exercise Style

The two most common exercise styles are American and European. American options can be exercised at any time before the expiration date (or more practically at a given time on any trading day before the expiration date), while European options can be exercised only on the expiration date. Bermudan options, so named because they fall somewhere between American and European, can be exercised on a given number of days before the expiration date. There are many other options named for geographical areas (for example, Asians, Russians, Israelis, Hawaiians, and Parisians), but these refer to features other than exercise style.

Contract Unit

The contract unit is the amount of the underlying asset that the option owner can buy or sell upon exercise. In the United States, the contract unit for individual stock options is usually 100 shares of stock. For index options, it is an amount of money equal to $100 times the index. For futures options it is one futures contract.

So if a stock option is traded at a price of $3.00, the buyer would need to pay $3 $\times$ 100 for each option.

Traders need to be aware of how the contract units and strike price for equity options can be adjusted as a result of corporate actions. If a stock undergoes an integer split, the number of open contracts increases by the split factor, and the stock price and strike price will decrease. For example,