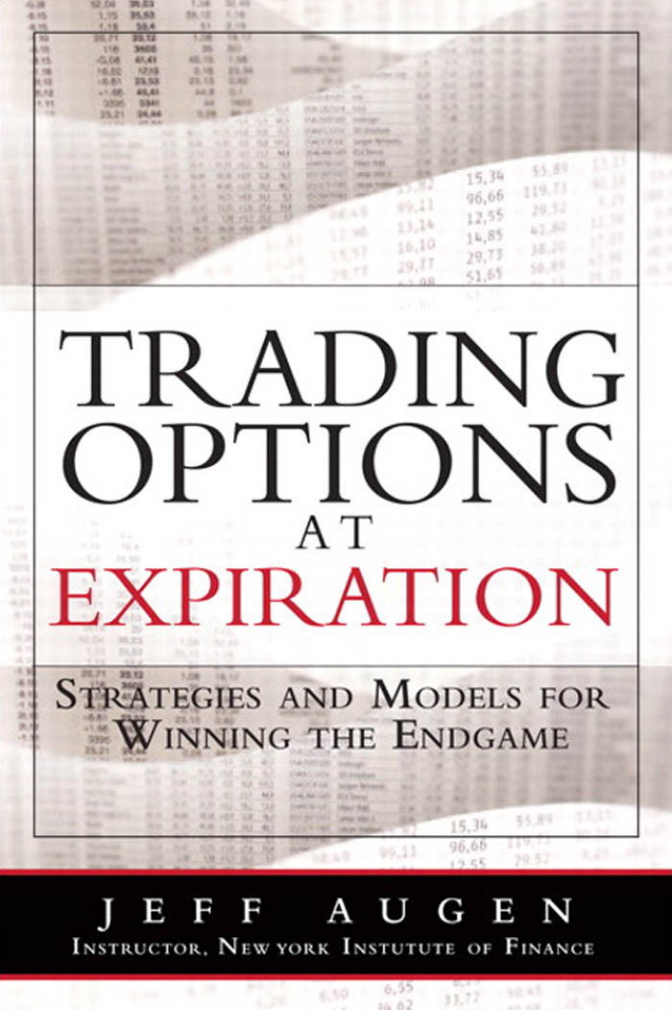
TRADING
OPTIONS
AT
EXPIRATION
STRATEGIES AND MODELS FOR
WINNING THE ENDGAME
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Introduction and Explanatory Notes

Timing

This book was written during one of the most turbulent times in stock market history—the second half of 2008. During this time frame, trillions of dollars were lost by both bulls and bears as the world's financial markets "melted down." Investors who have never experienced a crashing market often believe that it is easy to generate profits in this environment with short positions. Unfortunately, nothing is ever that simple. The 2008 collapse included single-day bear market rallies as large as 11%—large enough to destroy nearly any short position. The answer lies in reducing market exposure and trading only when it makes sense.

Far too many investors have taken the opposite approach by remaining in the market with a portfolio of investments whether they were winning or losing. This approach has its own familiar vocabulary built around terms such as *value investing* and *diversification*. It hasn't worked well for most investors. At the time of this writing, U.S. equity markets had just plunged to

their 1997 levels, erasing 11 years of gains. Subtracting an additional 30% for inflation and dollar devaluation paints an even darker, but more realistic picture. As a group, long-term stock investors collectively lost an enormous amount of money—trillions of dollars.

Commodity traders faced similar problems. Oil prices climbed steeply from $27 in January 2004 to $134 in July 2008 before falling back to $50 in November. Long-term bulls actually suffered two significant setbacks during this time frame because the price fluctuated from an interim high of $70 in August 2006 to a low of $45 just five months later. Figure I.1 traces the price from January 2004 through the November 2008 decline.

As always, timing is everything. But the more important lesson is that blindly hanging on with a bullish or bearish view is a flawed strategy. Every investment has a window of opportunity; unless that window can be identified, leaving the money invested is somewhat like gambling. That said, the window can be relatively long—sometimes spanning months or years.

Option trading in turbulent times can also be difficult. Implied volatilities rise sharply, making simple long put or call positions unreasonably expensive, and the risks associated with naked short positions is simply too large for any conservative investor. Structured positions such as calendar spreads, ratios, vertical spreads, and the like, are difficult to trade because stocks frequently cross several strike prices in a single month—sometimes in both directions.

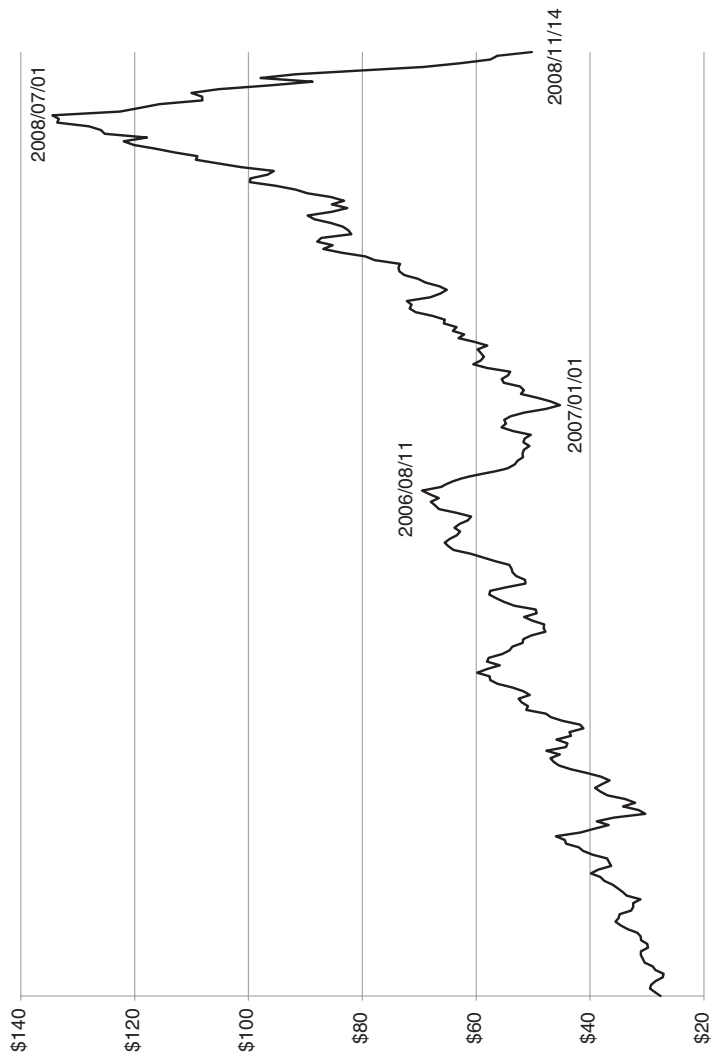

FIGURE I.1 *Weekly U.S. spot price for crude oil 2004/01/02 to 2008/11/14. Price is displayed on the y-axis, key dates are noted on the chart. Source: U.S. Department of Energy, Energy Information Agency, www.eia.doe.gov.*

These pitfalls can all be avoided by entering the market at very specific times and structuring trades that capitalize on well-characterized pricing anomalies. For option traders, the days preceding expiration represent the very best opportunity. During this time frame, traditional approaches to calculating the value of an option contract fail, and prices become distorted. One of the most significant forces, implied volatility collapse, can generate price distortions as large as 30% on expiration Thursday and 100% on Friday for at-the-money options. At the same time, strike price effects resemble the gravitational pull of planets, with stocks as their satellites. Heavily traded optionable stocks tend to hover around strike prices as large institutional investors unwind complex positions ahead of expiration. Option traders who structure day trades that take advantage of these forces can generate more profit in one day than most experienced investors realize in an entire month—sometimes an entire year.

Unlike other trading strategies that are linked—sometimes in subtle ways—to a specific set of market conditions, expiration trading focuses only on the underlying mathematics. It does not rely on any financial predictions, company results, or market direction. In this context, an expiration trader manages ticker symbols and strike prices because the name or business of the underlying stock is irrelevant. But nothing worth doing is ever easy. Trading subtle price distortions in the options market is a complex affair that requires an unusual blend of pricing knowledge and day trading

skill. Expiration trading is a mathematical game distinctly different from stock picking. It will most likely appeal to day traders and other investors seeking to moderate risk by reducing market exposure. That said, this book should never be placed in the "get rich quick" section of the bookstore because success requires hard work, focused attention, and practice.

Some Notes About the Data

A relatively large amount of minute-by-minute stock and option data was used in the preparation of this book. This information, in its unprocessed form, was purchased from Tick Data of Great Falls, Virginia. Many specific criteria went into the decision to choose this particular data source.

First, and most significant, was accuracy. Because slight discrepancies can cause significant errors in implied volatility calculations, it is important that the data be both accurate and complete. Assembling complete and accurate datasets is not a trivial exercise, as options trade on several different exchanges, often at low liquidity levels. It is, therefore, necessary that the data vendor precisely align timestamps for the individual trades before creating a single sequence or time series. In addition, the large number of strike price and expiration date combinations adds a level of complexity that becomes apparent when a new series is introduced or a stock splits. This situation is further complicated by the enormous number of symbols used and reused by

the options market. When creating data files of option prices, it is, therefore, crucial that old and new data or data from different equities not be mistakenly commingled despite the presence of overlapping symbols. In this regard, it is not unusual for a single stock in a given year to have more than 1,200 strike price/expiration date combinations. Multiplying by the number of stocks and years yields a very large number of permutations.

File format is another important criterion. Individual files should contain text delimited by commas, spaces, or some other readily identifiable marker so that the information can be imported into a database or spreadsheet. Filenames should follow a consistent set of conventions that make it simple to identify a particular series. For example, trade data for the Apple Computer $170 strike price call expiring on 2010/01/16 and having the symbol WAA_AN might be stored in a file designated WAA_C_20100116_170.00_AN. This file can easily be found using Excel's import feature by searching for the concatenated expiration strike (20100116_170). The search will yield just two files, one containing call data, and the other containing put data (the put file would be designated WAA_P_20100116_170.00_MN). In this way, simple file-retrieval functions found in Microsoft Office products can be used to retrieve an individual option series from tens of thousands, and the collection of files effectively becomes a database.

Tick Data files were named as described above, and the information was provided as simple comma-delimited text. The data was clean in the sense that series designations were consistent and anomalies that made no sense were removed. In this context, the term anomalies refers to trades that were made in error—an option purchased for $125 rather than $1.25. Furthermore, time series used in the book were spot checked by calculating implied volatilities across multiple strike prices contained in different files. No inconsistencies were found in any of the Tick Data information. Readers who decide to purchase their own data are encouraged to apply the same level of scrutiny before selecting a vendor.

Working with Minute-by-Minute Data

Expiration trading provides enormous opportunities that scale with the amount of time and effort an investor is willing to spend. It is certainly reasonable to study options expiration by observing the behavior of individual stocks, and to profitably trade the opportunity using principles outlined in these pages. That approach represents one end of the spectrum. The other end involves the development of custom databases and software. Although most investors are probably not inclined to build their own databases, many will discover that much of the statistical analysis mentioned in these pages can be compiled with little effort and no programming using the capabilities of Microsoft Excel. Following are a few simple examples.

The first, and probably most relevant for the present discussion, is the determination of the nearest strike for each closing price. This value can be determined for stocks having $5 spacing using Excel's rounding function, as follows:

```
Strike = (ROUND (Close /5)) *5
```

Assuming that each line of the spreadsheet contains data for a single minute, the formula can simply be pasted down a column of the sheet to create a running list of nearest strikes. Adding another column that calculates the difference between strike and closing prices takes just a few moments. The calculation would use the absolute value function:

```
Difference = ABS (Strike - Close)
```

Extending this operation with a simple conditional if/then statement enables us to determine the number of minutes where the closing price was more than $2 from the strike price. The following statement marks rows that exceed the $2 threshold with the number 1:

```
If (ABS (Strike - Close) > 2, 1,"")
```

As before, pasting the formula down the spreadsheet automatically marks all appropriate rows. Summing the results and dividing by the number of minutes (rows) gives the percentage chance of any minute closing more than $2 from a strike.

Finally, we can execute more powerful conditionals without adding much complexity using Excel's AND, OR, *and* NOT functions. Marking and counting the number of minutes containing a strike cross can be accomplished as follows:

```
If (AND (High>Strike, Low<Strike),1,"")
```

As before, summing the column yields the total number of minutes meeting the criterion—in this case, a strike price cross. The design assumes that only one strike price will be crossed in a single minute—an assumption that turns out to be true virtually 100% of the time. More complex logical structures can be designed for situations where a single record can contain multiple strike price crosses; the general case, designed for any length record, is best deployed as part of a program linked to a database. A fully functional example written in Excel VBA is listed in Appendix 1, "Excel VBA Program for Counting Strike Price Crosses."

These examples represent only a tiny fraction of the statistical queries that can be constructed in just a few minutes using minute-by-minute data imported into a spreadsheet. Surprisingly, this capability is relatively new; older versions of Excel (pre-2007) were limited to approximately 65,000 rows per worksheet—less than a single year of minute-by-minute data. Before the introduction of Office 2007, large amounts of information

could be managed only by using a database and custom software. The combination of fast multiprocessing desktop computers and large-capacity spreadsheets now makes it reasonable for nearly anyone to purchase and analyze very large datasets. Current Excel worksheets can handle more than 1 million rows and 16,000 columns.

Ambitious investors with programming experience will want to take the next step by constructing databases and writing custom software. The information used throughout this book was stored in a database constructed with Microsoft SQL Server. The complete database contains millions of records along with custom programs and SQL queries. Despite its complexity, none of the work is beyond the capabilities of a determined investor with a desktop PC and Microsoft Office software. Furthermore, single-user versions of Oracle and IBM DB2 databases are also available for free download from company websites. These "developer" versions are very powerful and can be expanded to full corporate licenses with unlimited storage capacity and advanced security features.

Additional Notes Regarding Collateral Requirements and Pattern Day Trading Rules

Many of the trades described in these pages are structured as ratios where a certain number of options are purchased at one strike price and a larger number sold

at a more distant strike. For example, a call ratio spread consisting of 10 long $95 calls and 20 short $100 calls would be referred to as a 1:2 call ratio. Many of our discussions use a larger ratio—most typically 1:3. Each of these trades has a naked short component because more options are sold than bought. The naked short component has a collateral requirement equal to 100% of the option proceeds plus 20% of the underlying security value minus the amount that the option is out-of-the-money. For $105 strike price calls costing $2.50 on a stock trading at $97, the calculation for a single contract would be as follows:

Option proceeds	100 × $2.50 =	$250
Underlying stock	20% × 100 × $97 =	1,940
Out-of-the-money adjustment	($105 – $97) × 100 =	(800)
Total		1,390

Because the adjustment for out-of-the-money options can be very large, a minimum of 100% of the option proceeds plus 10% of the underlying security value applies. Throughout the book when profits are mentioned, they are measured against the value of the original position, and collateral requirements are not included. For example, if a trade is long $5,000 of options and short $4,000, then the initial net cost of the trade is just $1,000. If the trade is ultimately closed for $1,500, the gain is considered to be $500 or 50%. Critics will rightfully point out that the return should be calculated using the collateral cost because this money must be present in the account while the trade is open. I have intentionally avoided this comparison because

collateral requirements vary between brokers for different customer accounts.[1] In addition, for customers who are able to take advantage of portfolio margining, the requirement for a particular trade depends on other positions in the account. It is generally a good idea to understand the collateral requirements for your own account, and to keep these in mind when placing short trades.

One additional requirement to keep in mind is the SEC 2520 Pattern Day Trader rule, which requires day traders to maintain account balances of at least $25,000. In this regard, the term *pattern day trader* refers to an investor who executes four or more "round-trip" day trades within five business days. The strategies outlined in this book are, therefore, not appropriate for accounts smaller than $25,000 because they involve opening and closing the same position during a single trading session.

Endnotes

1. Recent changes allow customers whose accounts exceed certain minimum thresholds to take advantage of portfolio margining rules that more precisely align collateral requirements with overall portfolio risk. Readers wanting to further explore margin and collateral requirements are encouraged to visit the Chicago Board Options Exchange website and to contact their broker.

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