Week 14 Learning Objectives

- Understand the Futures Markets
- Understand the Options Markets
- Become familiar with the uses of these markets, their risks and their advantages

Week 14 Lecture - Futures and Options

The text covers futures and options in chapters 26, 27, and 28. Please make sure you read those chapters as I will not be repeating information here. There are several issues related to the futures and options markets that I would like to address. The development of the market, the need for the market, and the upside and downside to the market.

The development of the futures and options markets can be traced for the most part to the Nobel prizing winning work of Robert Merton, Fisher Black and Myron Scholes. The Black/Scholes model of option pricing is the baseline that establishes a framework for pricing that allows the market to determine a reasonable value of an individual option. This formula has be called the holy grail of finance and other such exaggerated terms due to the impact it has had on the industry. It opened up a derivatives market that has grown from 1973 when the Chicago Board of Options Exchange (CBOE) opened, to a $1 trillion in 1988, to $10t in 1994, to $100t in 2000, to $170t in 2003 to $600t in 2007, and almost $700t in late 2008.

The development of the B/S model began with background research started in 1965, leading to formula in 1969 and a paper on empirical tests published in 1972 and after several rejections, a paper on the formula published in 1973. It culminated in the Nobel Prize in 1997.

Jack Treynor worked on CAPM from 1961 and with Black worked at the firm Arthur D. Little in 1965 and sparked Black's interest. Black was an applied mathematics PhD.

The actual work was done on warrants over options because the over the counter market in options was imperfect. The best papers had tried to find the value of a warrant by taking

the expected value of the warrant at expiration and discounting it to the present.
Key step is to write the warrant value as a formula that depends on the stock price and other factors, not the expected value of the stock price at expiration.

Black wrote down an equation that tied risk of warrant to risk of the underlying stock but although he had a Ph.D. in applied math but didn't spend any time in differential equations. He also had an A. B. in physics but didn't recognize the relation to a standard heat equation which is really what the B/S model is based on. So its Myron Scholes to the rescue. Scholes at MIT began work with Black and made rapid progress. They recognized that volatility was key, not the expected return. "Rather Suddenly, it came to us. We were looking for a formula to relating the option value to the stock price"

Robert Merton made suggestions that improved the paper which is how he got the Nobel Prize and both Black-Scholes and Merton began separate work on papers with a mixture of rivalry and cooperation.

They sent the paper to the Journal of Political Economy and received a rejection letter. One that I am sure I would hate to have my name on! They said it was too specialized. They sent it to The Review of Economics and Statistics and got rejected again. Neither had really had it fully reviewed and it was suspected that the reason was that Fischer Black didn't have an Academic Background. Eventually, Merton Miller and Eugene Fama interested and the it was published in U of Chicago's Journal of Political Economy May 1973. Meanwhile the Journal of Finance published a paper with some empirical results of the formula May 1972.

So this formula gets out there but no one knows if it works. So they thought, "Why not try it?" They applied the formula to market and found several warrants that looked like very good buys! The jumped in and took a bath. What was obvious to the market and not so obvious to them was that the market knew that stock could be taken over and they didn't. The market price was out of line for very good reason.

Well after a couple of mis-steps the traders found the formula and started using it. Traders now use the formula extensively. In fact, they use and rely on it so much, prices trade very close to formula values, even when they shouldn't be due to external reasons.

Check out http://www.pbs.org/wgbh/nova/stockmarket for an interesting site on this story.

The risk in derivatives market is unquestionable. Hedging risk from currencies to crops can be facilitated through derivatives. Yet there are many more speculators that true hedgers. There are questions as to who should be participating and for what reasons. But recognize that the market needs a certain level of speculators in addition to true hedgers to provide liquidity. If there were few or no speculators many markets wouldn't be liquid enough to function properly.

There are restrictions about letting average investors participate until they have become familiar with the workings of the market. This may involve taking seminars or other proving that you are familiar with the risks involved. It's sort of amazing that the simple introduction of a time element makes investing more of a traders game than an investment and therefore adds so much risk. There simply isn't a buy and hold strategy like there is in stocks. Derivatives have a expiration date after which they don't exist and if the market moves against you, everything is lost.

Please don't be overly concerned about the math involved in options or memorizing the diagram of bull-bear spread. Try to get an overview of the marketplace and its usefulness.