

UNIVERSITY OF ROCHESTER

William E. Simon Graduate School of Business Administration

Finance 411
Investments

Professor G. William Schwert
Spring 1997

TRADING CASE ST2: May 5, 1997

Part of your grade for this course will depend on trading sessions using the Financial Trading System (FTS). For the purpose of these trading sessions, you should divide your study group into two separate subgroups - append an A or B to your group name for this purpose (e.g., "WildcatA" or "WildcatB"). Each subgroup will be considered a single "trader." Maintain the same subgroups throughout the course. The system will assign each trader a certain amount of "grade cash" based on their trading performance, but the amount assigned is never less than zero. At the end of the course, the grade cash for the two subgroups will be averaged to determine the grade for the study group. This provides diversification (risk reduction) in case one trader makes a big mistake in one of the cases.

The trading session for this case will be conducted after class on Monday May 5 from 4-5 PM.

FTS has an online help feature you may want to look at (it's not essential). You get to it by going through the sequence: SIMON_STUDENT, SYS, PUBLIC, . . ., FTS. Once you're in the FTS folder, click on the file FTS with the book icon. Similarly, clicking on Fast! gives a description of all the available trading cases.

Note: don't assume information for trading sessions will be the same as that given in the case descriptions. The information (interest rates, etc.) will be displayed by the system at the beginning of the session.

OVERVIEW

ST2 is a trading case designed to introduce you to the problem of hedging the position profits associated with an active market maker's inventory of stock. This inventory of stock will change over time because of active market making in the stock.

Your objective is to hedge the profits generated from market making activities in the underlying stock at positive bid/ask spreads. However, the spread profit is exposed to price risk because the number of buyers and sellers at a point in time is random and therefore the trading book is rarely balanced. This imbalance means that although you are earning a return from a posted spread, you cannot avoid taking some residual changing position in the stock. The changing residual is the source of price risk that you are exposed to in this trading exercise.

To manage the price risk you can trade in the option markets. In one put/call market, you can only take market but in the other put/call market you can make market and take market.

As an aid to this exercise, you are provided with a set of real-time analytical support tools. Using these tools, you can monitor the delta and gamma of your position at each point in time.

TRADER SUPPORT WINDOWS

Your standard trading support windows allow you to monitor the history of prices in each market: IMB stock prices, the Treasury strip market (zero-coupon bond) with six months to maturity, two European call options on IMB, and two European put options on IMB.

In ST2, you can access additional support windows by first clicking on the menu item Support in your Trading Screen. Once you have initialized this support system you will automatically see the market value, delta and gamma of your position in real time. By clicking on any Option label in this Option Support Window will popup and update an option calculator support window.

Each time you want to update the calculator be sure to click on the option label in the Option Support window first.

FTS markets are open for approximately three months of calendar time at the end of which your position is marked at the realized prices. FTS time is condensed so that one week is equal to 30 seconds.

MARKET ENVIRONMENT

THE STOCK MARKET

The stock market trades the stock of a large computer manufacturer called IMB. Although this stock has suffered from major price corrections over recent history analysts expect that these corrections are finished. The following statistical process describes expected future price behavior:

Volatility of return (σ):	30% per annum
Spot Price:	347
Drift (μ):	5% per annum
Unit of Time:	1 week (30 seconds FTS time))

This process is expected to remain stationary over the next three months. In addition, due to the recent weakness in the stock price, analysts expect no dividend payments over the next three months.

Trading in this stock is permitted at the displayed prices that are updated weekly.

Your inventory of stock is marked to the market price of IMB at the end of the trading period (approximately three months of calendar time).

THE TREASURY STRIP MARKET

The Treasury strip market is a risk-free zero-coupon bond that pays \$900 at the end of three months, regardless of which path the stock market takes.

THE EUROPEAN OPTIONS MARKETS

The third to sixth securities are European options (call/put/call/put securities 3, 4, 5, and 6 respectively) defined on one IMB stock. The strike or exercise price for these options are 320, 320, 360, 360 respectively. That is there is a put and call option for each strike price and for example, security 4 is the put with strike price equal to 320.

The time to maturity for each option is three months and the terminal payoff for each option depends on the realized value for IMB at the time of their expiration. For example, for the options with a strike price equal to 320, the following terminal values apply:

TERMINAL VALUE:

At the end of their life options are automatically exercised if they are "in the money."

Call Option = Max[Marked value - \$320, 0]

Put Option = Max [\$320 - Marked value, 0]

TRADER ENDOWMENTS

As a trader your task is to manage the exposure of your position to price risk. Your underlying stock position can change every week, reflecting the market making activities of your firm in the IMB stock. This stock position cannot be traded. However, you can manage your exposure by trading in the options market.

TRADING RESTRICTIONS

Trading is restricted to the options and the strip markets only.

Option trading is permitted in all option markets. In the strike 320 options you are a market taker only, and in the strike 360 options you can both make market and take market.

An option contract is for one stock. You can trade up to 99 contracts in a single trade (i.e., click of the mouse). You can build a position through multiple trades (i.e., repeated clicks of the mouse). Prices are quoted in whole dollars.

Shortselling in the treasury strip market is permitted. This allows you to borrow (lend) at the risk-free rate by shortselling (buying) treasury strips. Holding market cash pays zero interest

and borrowing is not permitted in the cash market. If you want to buy options but have insufficient cash you must first shortsell the required amount of treasury strips and then purchase the desired amount of options.

The spot risk-free rate of interest for a Treasury strip with 3 months to maturity is currently 3.25% per annum. This rate is not expected to change over the next 3 months.

OPTIONS SUPPORT SYSTEM

Your trading screen in the FTS markets will indicate the remaining life, as a proportion of a calendar year for each option.

If you combine this information with the annualized risk-free rate and volatility information (provided in this case) then you can apply the options calculator to compute the Black-Scholes option price.

The Black-Scholes option price can be used as a guide to your market making strategies.

TRADING OBJECTIVE

Your trading objective is to earn as much grade cash as possible.

EARNING GRADE CASH

Securities are exchanged using market cash in a trading period lasting three months and which is referred to as one trading trial.

Multiple independent trials will be conducted. This means that for each trial you will restart with an initial endowment that is either Type A or Type B, and an independent path for the stock prices is generated (starting from a spot price around 347).

If at the end of any trial you have a closing balance of \$45,000, market cash you will earn \$6 of grade cash. If you have a closing balance of market cash that is lower than \$45,000, you will earn \$0 grade cash. Any amount of market cash that is greater than \$45,000 and less than or equal to \$200,000 earns grade cash as follows:

$$\text{Grade Cash} = \$6 + [(\text{Ending Balance of market cash} - \$45,000)/155,000] \times \$4$$

Above \$200,000, market cash earns the maximum \$10 grade cash for one trial.

Trading is conducted over a number of independent trials and a record of your cumulative grade cash is maintained.