

Hedging 3

You're currently working on the equity options market making desk at CDZ Bank. Your role is to show markets¹ to institutional managers who wish to buy or sell blocks of options for individual equities. When trades are made, you are then responsible for hedging your position and remaining relatively "delta neutral". That is, your book's risk with respect to price changes in the underlying stock should be largely neutralized.

This morning, you received a call from a hedge fund that wants to purchase 200 1-month at-themoney calls for Syndicated Aluminum Corp (SAC).

Your firm's proprietary volatility forecasting model suggests that the annualized volatility of the underlying for the next month (20 days) will be approximately 15%.

Using the Black-Scholes pricing formula, and the following inputs, you have calculated what you believe is the fair value for the option:

<u>Inputs</u> Trading Days to Maturity: 20 (252 trading days per year) Risk Free Interest Rate: 0% Strike Price: \$50.00 SAC Stock Price: \$50.00 Volatility: 15%

Black Scholes Price: \$0.84

In order to have a profit margin, you have priced the option using an Implied Volatility of 25% which results in a price of \$1.41².

The hedge fund has decided to go ahead with the trade at \$1.41 and the trade will be executed once the markets open.

Your risk management group has given you explicit instructions to never have an open-delta position larger than 3000. Your role is to manage the delta of the position over the 5-minute trading case and attempt to capture as much profit as possible from the sale of the option.

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¹ The term "show a market" refers to quoting a bid and an ask to a prospective client.

² This margin is artificially inflated for case-illustration purposes.

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Hedging Simulation #3 – H3

All students will begin the H3 trading simulation with a short position of 200 SAC \$50 1-month call options that they sold at a price of \$1.41. The option is not tradable. Traders can however buy/sell the underlying equity (SAC) at their discretion. The equity market is infinitely liquid, in other words, individual traders' actions will have absolutely no effect on the price changes or liquidity in the market. The underlying follows a random-walk with an annualized volatility of 15%. There is a 2 cent per share trading commission charged on each transaction.

Discussion Questions and Follow Up:

- (1) To hedge your short position of 200 call options, will you need to be long or short shares of the underlying?
- (2) Build a Black-Scholes calculator in Excel that allows you to calculate the delta of an option given specific inputs.
- (3) Using your calculator, what is the correct number of underlying shares that you will need to trade (long or short) at the beginning of the case?