

Video lecture

<https://youtu.be/lxqr9KXaU-s>

What?

A call option gives the buyer the option (not the obligation) to purchase an underlying financial security at a specific (**strike**) price before an expiration (**maturity**) date. Anybody can purchase call options. Call options trade very similar to stocks through brokerage companies during normal market trading hours. The money that is paid to purchase call options is not an investment. Call options expire on their maturity dates. Call option value may go to zero. Call option buyer's potential loss will be no more than what they paid for the call option. Call options trade in contracts and each contract is usually for 100 shares of the underlying financial security.

Example

A call option with a strike price of \$200 and maturity date of January 18th on AAPL is trading at \$1 per share. We can buy one contract for: $\$1 \times 100$ shares = \$100 for one contract. We have the right to buy 100 shares of AAPL at \$200 per share until January 18th. Note that the \$100 that we pay to buy this option is sunk cost. It is not a down payment. It is not a deposit. There is no way to get this money back. We can try to sell this option back in the market. However, the new sale price has nothing to do with the \$100 we paid. Thus, \$100 is an instant loss that we take up front, as soon as we buy the call option. If AAPL price increases to \$215 then we will earn \$15 per share ($\$215 - \$200 = \$15$ per share). Since we have the right to buy 100 shares, we will earn \$1,500 ($\15×100 shares = \$1,500). If AAPL price decreases to \$185 then we will not lose any money. Remember that the call option gives us the right but not the obligation. Thus, we will choose not to exercise our right to buy AAPL at \$200 when the market price is below our strike price (i.e. \$185).

Pricing

Call option price is determined by two factors: 1) **exercise value** (a.k.a. intrinsic value) and 2) **premium**.

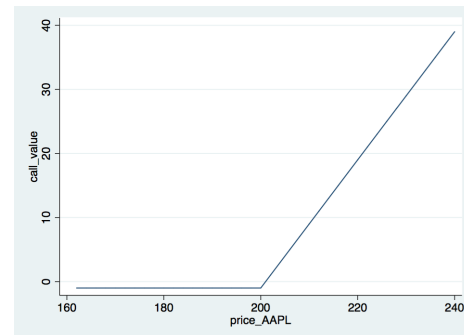
Exercise value is the value that the call option

buyer will attain if s/he chose to exercise the option. So, based on our example above the \$15 per share ($\$215 - \$200 = \15 per share) is the exercise value. Exercise value is precise and easily calculated. **Premium** is the value that is dependent on traders' perception of the specific call option. Think of a memorabilia (ex. baseball) that is signed by a celebrity. The actual baseball may be worth a few dollars but the autograph by the celebrity adds significant value. However, how much value the autograph adds is hard to determine. The best way is to try to sell it. Then, we would know the true value of the autographed memorabilia. Option premium is similar to the autograph's value. Traders perception of the specific call option's value is hard to determine. However, the market traded prices will show true value.

Possible outcome

We will now evaluate possible outcomes of buying the call option in our previous example. Note that, since it is hard to determine the premium, our exercise is based on exercise value.

```
set obs 40
gen price_AAPL = 160 + (_n*2)
gen call_price = -1
gen strike = 200
gen call_value = max(price_AAPL-strike,0) + call_price
twoway (line call_value price)
```



The horizontal axis is the possible AAPL share price in the market. The vertical axis is the call option outcome based on possible AAPL share prices. Note that the call option outcome can be negative \$100. This is the sunk cost of buying the call option. In fact, we need AAPL to increase to \$201 in order to earn this \$100 sunk cost back. Note that, when we buy call options, our loss will never be more than our sunk cost. Our potential profit however is dependent on how high the AAPL share price can increase until our call option maturity date.