

## Mudd Finance



Maderas Golf Course, San Diego County, 9th hole. Your teacher brilliantly birdied this hole. He triple-bogied the one in the background. You should play golf to understand options because you learn how things can go from really good to really bad really quickly

# Put and Call Options

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## Mudd Finance

### Call Options ... definition of contract

Gives the owner the right to *buy* the stock from the option writer at the *strike price* on or before\* the *expiration date*.

The party who sells this contract and the right that goes with it is *writing* the call.

If the party writing the call also owns the stock, he is said to be writing a *covered call*, otherwise she is writing a *naked call*.

\* on the expiration date for European options.

## Put Options ... definition of contract

Gives the owner the right to *sell* the stock to the option writer at the *strike price* on or before\* the *expiration date*.

\* on the expiration date for European options.

Put and call options are financial assets called *derivatives*, because their value depends upon the value of the underlying asset which, by contract, they are attached - in this case, the value of the underlying stock against which the option is written.

## Reading the Options Chain

IBM's stock price  
At 12:55PM ET: **84.47** ↑

**International Business Machines Corp. (IBM)**

Options      Other months

View By Expiration: [Oct 06](#) | [Nov 06](#) | [Jan 07](#) | [Apr 07](#) | [Jan 08](#) | [Jan 09](#)

Options Expiring **Fri, Oct 20, 2006**

Calls		Strike Price		Puts									
Symbol	Last	Change	Bid	Ask	Volume	Open Int	Symbol	Last	Change	Bid	Ask	Volume	O
<a href="#">IBZFH.X</a>	41.90	0.00	44.40	44.60	50	731	<a href="#">40.00</a>	<a href="#">IBZVH.X</a>	0.00	0.00	N/A	0.05	0
<a href="#">IBZJI.X</a>	37.90	0.00	39.40	39.70	10	953	<a href="#">45.00</a>	<a href="#">IBZVI.X</a>	0.05	0.00	N/A	N/A	0
<a href="#">IBZJJ.X</a>	33.60	0.00	34.40	34.60	75	509	<a href="#">50.00</a>	<a href="#">IBZVJ.X</a>	0.05	0.00	N/A	0.05	6
<a href="#">IBMJK.X</a>	28.10	0.00	29.40	29.60	120	403	<a href="#">55.00</a>	<a href="#">IBMVK.X</a>	0.10	0.00	N/A	0.05	40
<a href="#">IBMJL.X</a>	21.80	0.00	24.40	24.60	51	373	<a href="#">60.00</a>	<a href="#">IBMVL.X</a>	0.05	0.00	N/A	N/A	300
<a href="#">IBMJM.X</a>	18.90	0.00	19.40	19.60	75	691	<a href="#">65.00</a>	<a href="#">IBMVM.X</a>	0.05	0.00	N/A	0.05	20
<a href="#">IBMJN.X</a>	14.63	↑ 0.03	14.50	14.80	10	2,679	<a href="#">70.00</a>	<a href="#">IBMVN.X</a>	0.05	0.00	N/A	N/A	41
<a href="#">IBMJO.X</a>	9.60	↑ 0.30	9.50	9.70	97	4,677	<a href="#">75.00</a>	<a href="#">IBMVO.X</a>	0.05	0.00	0.05	N/A	53
<a href="#">IBMJP.X</a>	4.80	↑ 0.20	4.70	4.90	896	31,611	<a href="#">80.00</a>	<a href="#">IBMVP.X</a>	0.29	↑ 0.04	0.20	0.30	1,511
<a href="#">IBMJQ.X</a>	1.10	↑ 0.10	1.10	1.20	3,199	49,646	<a href="#">85.00</a>	<a href="#">IBMVQ.X</a>	1.55	↓ 0.11	1.55	1.60	2,559
<a href="#">IBMJR.X</a>	0.10	0.00	0.10	0.15	492	21,640	<a href="#">90.00</a>	<a href="#">IBMVR.X</a>	5.71	↓ 0.16	5.50	5.70	421
<a href="#">IBMJS.X</a>	0.05	0.00	N/A	N/A	10	1,674	<a href="#">95.00</a>	<a href="#">IBMVS.X</a>	13.80	0.00	10.40	10.70	76
<a href="#">IBMJT.X</a>	0.03	0.00	N/A	N/A	30	936	<a href="#">00.00</a>	<a href="#">IBMVT.X</a>	24.40	0.00	15.40	15.70	31
<a href="#">IBMJA.X</a>	0.05	0.00	N/A	N/A	0	191	<a href="#">05.00</a>	<a href="#">IBMVA.X</a>	23.30	0.00	20.40	20.70	21

Source: <http://finance.yahoo.com> options quotation for **October 11, 2006**      Volume & Open Interest

## Jargon

call: in the money (**ITM**) if strike price < stock price  
 out of the money (**OTM**) if strike price > stock price

put: in the money if strike price > stock price  
 out of the money if strike price < stock price

In-the-money call premium = OP - (Stock price - Strike price)  
 For the 80 call:  $0.33 = 4.80 - (84.47 - 80.00)$

In-the-money put premium = OP - (Strike price - Stock price)  
 For the 90 put:  $0.18 = 5.71 - (90.00 - 84.47)$

Out-of-the money premium = Option price (it has no intrinsic convertible value)

## Questions??

What will the October 85 Call be worth (currently \$1.10) on October 20 if IBM is trading at:

84.50?

85.50?

87.50?

What will the October 85 put be worth on October 20 (currently \$1.55) if IBM is trading at

86.00?

84.50?

82.00?

## Buying and Selling Options Online

Suppose I want to buy the October 85 call marked below in the diagram cut from my Ameritrade account. To buy this option if I submit a market order it will be bought at ASK (1.10). But look at the spread between BID and ASK. I really should submit a limit order, though, at ASK or below, although if it is not at ASK it may not get executed. One option is to submit a limit order between BID and ASK. Another option is to target an even lower price, put in a day order and hope that the stock and the option dip down and the order executes.

October 21 Calls

Symbol	Bid	Ask	Type	Last	Change	Vol	Op Int	Strike
+IBMJN	14.20	14.50	S	14.63	0.23	10	2,679	70.00
+IBMJO	9.30	9.50	S	9.50	0.10	260	4,677	75.00
+IBMJP	4.50	4.70	S	4.60	0.10	1,154	31,611	80.00
+IBMJQ	0.95	1.10	S	1.05	0.05	5,175	49,646	85.00
+IBMJR	0.10	0.15	S	0.15	0.05	926	21,640	90.00
+IBMJS	--	0.05	S	0.05	0.00	0	1,674	95.00

On the next screen, I decide to buy 5 contracts (500 shares) with a limit order.

Note the Buy / Sell / Open / Close / Exercise buttons and make sure I explain them

Buy to Open to buy a call or put. Sell to Close to sell the call or put that you already own. Sell to Open to write a call or put. Buy to Close to offset (cancel) a call or put that you have written. Exercise to exercise an in-the-money option *at any time*.

The screenshot shows the Ameritrade Options Order Entry interface. At the top, there is a search bar and navigation tabs for Trade, Portfolio, Streamer Suite, Research, and Account. The main heading is "Home > Trade : Options". Below this, there are tabs for "Order Entry", "Single Order", "Buy/Write", "Spread", "Straddle", and "Strangle". The "Single Order" tab is selected. The form includes the following fields and controls:

- Underlying Symbol:** A dropdown menu showing "IBMJQ".
- Order Type:** Radio buttons for "Buy", "Sell", and "Exercise". "Buy" is selected.
- Order Entry:** Radio buttons for "to open" and "to close". "to open" is selected.
- # of Contracts:** A text input field containing the number "5".
- of Symbol:** A dropdown menu showing "+ IBMJQ".
- Price:** A text input field containing "1.10".
- Order Type:** A dropdown menu showing "Limit".

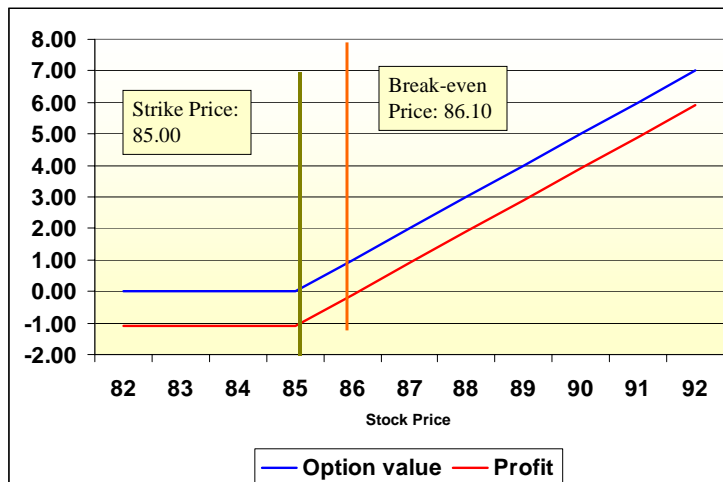
Red arrows from the text box on the left point to the "Buy" radio button, the "to open" radio button, the "# of Contracts" field, the "Price" field, and the "Limit" dropdown. A separate box on the right with the text "Enter these" has arrows pointing to the "IBMJQ" dropdown, the "to open" radio button, the "# of Contracts" field, and the "Price" field.

## Pointers about option trades

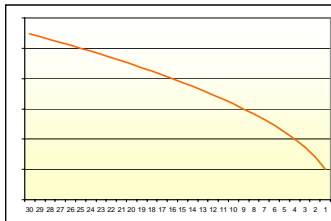
- There is often a large spread between bid and ask, and this really cuts into option trading profits.
  - conversion to electronic trading from open outcry is helping
- Never, ever, use a market order for an option trade.
  - or you may be real surprised at the price you pay.
- Before trading an option, always check **open interest** and **volume** for liquidity.
- Once an option goes into the money or becomes profitable, it can be difficult to decide when to sell it.
  - take profits now or hope that it goes higher and pray that it doesn't fall back out of the money.

Note: This graph is somewhat misleading. It shows the profit and value of the position *on the expiration date only if the option is held to expiration*. It shows nothing about the possible value of an option between now and the expiration date.

### The 85 call option (\$1.10)



## The Premium/Price



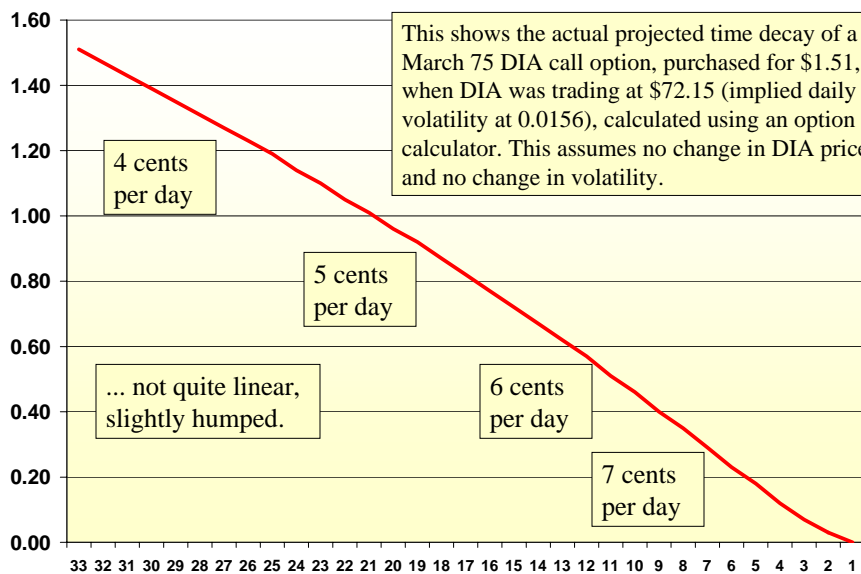
The premium for an option converges to zero as the option approaches expiration.

The premium of an in-the-money option can be thought of as simply the price of the option because the option has an intrinsic value of 0 at the moment.

The premium (and the price) is a function of

1. **Time to maturity** (shorter is smaller), which implies **time decay** as time elapses.
2. The degree to which the option is in the money (more is smaller) or out of the money (more is greater), which implies that it is a function of the underlying **price of the stock**.
3. The underlying stock's **volatility** (greater is larger)

## Time Decay



## Sensitivity to Stock Volatility



The VIX index, shown above, measures the relative volatility of the S&P 500 (and hence SPY). When the volatility of any underlying stock rises, premiums and option prices rise with it, sometimes even enough to overcome a movement in a stock's price in the wrong direction! Note: there are many ways to measure stock volatility. The VIX is a good proxy.

## Option strategies .. calls

- Writing a call
  - covered (you already own the stock)
    - reduces risk
    - can enhance yield
  - naked (you don't own the stock)
    - collecting fees and gambling in no price rise in stock
- Buying a call
  - gambling that the **price or volatility** will rise
  - near or out of the money: high leverage, high risk
  - deep in the money: lower leverage, lower risk

## Option strategies .. puts

- Writing a put
  - short-covered (short on stock)
    - hedging, locking (same as a call)
  - naked (no stock position)
    - gambling on no price decline
- Buying a put
  - gambling price will fall
  - excellent hedge for a long position in stock or related asset

## Option strategies .. puts

- Buying a put
  - gambling price will fall
  - *excellent hedge* for a long position in stock or related asset
- Writing a put
  - short-covered (short on stock)
    - hedging, locking (same as a call)
  - naked (no stock position)
    - gambling on no price decline
    - again, huge downside risk (if the stock rallies)

## Buying Deep-In-The-Money (DITM) Options

- Calls:
  - Premium is nearly zero
  - Call is nearly identical to buying the stock directly, but *with leverage*
  - Rollover DITMs for index ETFs is a good, albeit risky in the short term, strategy (see example next slides)
- Puts
  - A good way to short if you think the stock will decline
  - Shorting with leverage

## What is leverage?

- Leverage multiplies your percentage gain on investment relative to the percentage increase in the underlying asset value.
- $(\% \text{ gain in investment}) = (\mathbf{L}) \times (\% \text{ gain in asset value})$
- Leverage comes from either **(a)** using debt to pay for part of a financial asset purchase
  - $(\mathbf{L}) = (\text{Value of Purchase}) / (\text{Amount Borrowed} + \text{Interest})$
  - e.g. 2 to 1 for a stock purchase in a margin account when you borrow \$50,000 to buy \$100,000 in stock.
- or **(b)** because of the way a derivatives contract is structured to give you leverage, like the DITM option contract in the next example.
- Leverage works off of capital gains and of course works both directions; losses are leveraged too.

Contracts every month.

## Option chain for DIA etf

DIAMONDS Trust, Series 1 (DIA)

\$1 increments in strike prices!

At 4:15PM ET: 118.57 ↑

### Options

View By Expiration: Oct 06 | [Nov 06](#) | [Dec 06](#) | [Jan 07](#) | [Mar 07](#) | [Jun 07](#) | [Sep 07](#) | [Dec 07](#) | [Jan 08](#) | [Jan 09](#)  
Options Expiring Fri, Oct 20, 2006

Calls						Strike	Puts							
Symbol	Last	Change	Bid	Ask	Volume	Open Int	Price	Symbol	Last	Change	Bid	Ask	Volume	Op
<a href="#">DIAJK.X</a>	3.50	↓ 0.20	3.70	3.80	613	12,289	115.00	<a href="#">DIAVK.X</a>	0.10	0.00	0.05	0.10	1,500	
<a href="#">DAWJL.X</a>	2.70	↓ 0.25	2.75	2.90	1,439	10,563	116.00	<a href="#">DAWVL.X</a>	0.15	0.00	0.10	0.15	1,211	
<a href="#">DAWJM.X</a>	1.90	↓ 0.10	1.90	2.00	732	10,883	117.00	<a href="#">DAWVM.X</a>	0.25	↓ 0.05	0.25	0.30	2,839	
<a href="#">DAWJN.X</a>	1.15	↓ 0.05	1.10	1.20	861	9,169	118.00	<a href="#">DAWVN.X</a>	0.50	↓ 0.05	0.45	0.55	4,537	
<a href="#">DAWJO.X</a>	0.50	↓ 0.15	0.50	0.55	840	6,976	119.00	<a href="#">DAWVO.X</a>	0.95	↑ 0.05	0.85	0.95	1,700	
<a href="#">DAWJP.X</a>	0.15	↓ 0.10	0.15	0.20	508	4,656	120.00	<a href="#">DAWVP.X</a>	1.60	0.00	1.50	1.65	966	
<a href="#">DAWJQ.X</a>	0.05	0.00	N/A	0.05	98	3,073	121.00	<a href="#">DAWVQ.X</a>	2.80	↑ 0.30	2.40	2.55	401	
<a href="#">DAWJR.X</a>	0.05	0.00	N/A	0.05	4	352	122.00	<a href="#">DAWVR.X</a>	3.70	↑ 0.20	3.30	3.50	60	
<a href="#">DAWJT.X</a>	0.05	0.00	N/A	0.05	1	228	124.00	<a href="#">DAWVT.X</a>	7.40	0.00	5.30	5.50	10	

Source: <http://finance.yahoo.com> for October 11, 2006.

Excellent for hedging and speculating; liquid and offering as much leverage as you want.

## Leveraging Long with a DIA DITM rolling call option

### Option Chain

Enter search criteria for underlying symbol

Symbol [Symbol lookup](#) Chain type Calls Options range In The Money Expiration May Strike [View Chain](#)

Symbol	Bid	Ask	Last	Change	Change %	B/A Size	High
<a href="#">IWM</a>	81.72	81.73	81.73	0.56	0.69	26100X28200	81.77

D Market data is *delayed*.

May 19 2007 Calls 88 Days to Expiration

Strike	Symbol	Bid	Ask	Last	High	Low	Change
57.00	<a href="#">+IWTFE</a>	25.05	25.15	24.10			-0.40
58.00	<a href="#">+IWTEF</a>	24.05	24.15	19.40			-0.50
59.00	<a href="#">+IWTEG</a>	23.05	23.20	21.10			0.20
60.00	<a href="#">+DIWEH</a>	22.10	22.20	20.50			-0.10
61.00	<a href="#">+DIWEI</a>	21.10	21.25	17.00			-0.50
62.00	<a href="#">+DIWEJ</a>	20.15	20.25	17.30			0.00
63.00	<a href="#">+DIWEK</a>	19.20	19.30	15.90			0.00
64.00	<a href="#">+DIWEL</a>	18.20	18.30	14.20			-0.20
65.00	<a href="#">+DIWEM</a>	17.25	17.35	15.90			2.40

Buy this one

The IWM ETF tracks the Russell 2000 and trades at 10%.

The call option that you buy must have adequate open interest (at least a few hundred contracts).

As can be seen, the premium on this option is about 40 cents. You are leveraged about 1.3 to 1 here (a 10% rise in the index yields a 13% rise in this contract).