Applied Options Course

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Start Here

Warning: examples provided are just that – examples!

- They are not investment advice
- They are not recommendations
- Do your own homework!

Knowledge level – beginner to advanced

- Some pre-req. videos have been added – they are from the John Hull textbook "Options, Futures, and Other Derivatives"
- CFA L1 Derivatives – options sections
    - Not much from L2 which is more technical – I will introduce it when needed
    - Adds to the reading at L3 on Options Strategies
- If I see a need for an introductory section, I will add it

Broker – I use Interactive Brokers

- Get one that offers both equities and options
- You will need a margin account

Spreadsheet – paper trade for a while

- Live trading – step in slowly
- Don't get greedy – don't go crazy

Not everything you touch will turn to gold – you will get lumps of coal

- You will have losing trades, you will have bad investment theses
    - You will have losses
- Take your hits and move on

Don't swing for the fences or you will strike out a lot

- Get on base, runs will take care of themselves

Manage risk, return will take care of itself

- Options are leveraged securities
- They can be low risk all the way to very high risk
    - A lot of risk management can be front-end loaded

Cover basic Strategies first

- Options are like legos – they can be combined into more complex structures
- I need to make sure you know what each piece does first

Discussion Section – there is a discussion section under every video

- I may or may not be active in the discussions
- There should be no expectation that I will answer all your questions – but post them anyways – others can step in
    - If I see questions cluster on a topic, or on a point – I can add an extra video

Introduction

Options: contract between 2 parties
- buyer gets a right
- seller gets an obligation (requires margin)

– has an expiration date, a strike price, and an underlying security

∴ value of option (time value component) falls as the expiration date approaches

Calls: right to buy Y at X by T

Puts: right to sell Y at X by T

- Buy or sell

∴ 4 basic positions
- long call – bullish
- long put – bearish
- short call – not bullish, neutral or slightly bearish
- short put – not bearish, neutral or slightly bullish

3 big drivers of option value:

1/ price of underlying in relation to the strike price and movements in price of the underlying

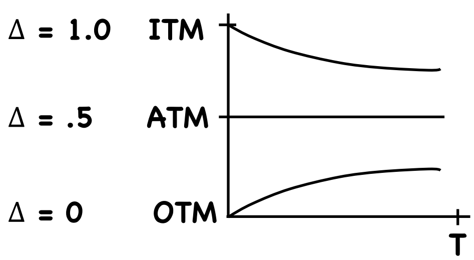
2/ time to expiration → longer = higher price

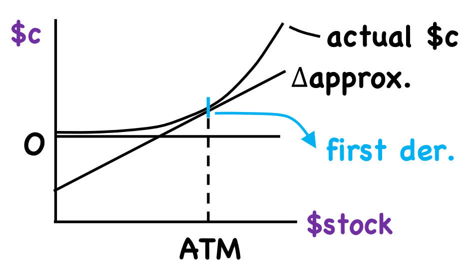
3/ volatility → higher = higher price

Greeks/

Delta: Δoption value for a Δunderlying price

e.g. Δ = .3 → underlying ↑ 10 ¢, option price ↑ 3 ¢





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Greeks/

Delta: positive for calls — negative for puts

$0 \leq \Delta c \leq 1$ — $-1 \leq \Delta p \leq 0$

Add delta → buy calls / sell puts

Reduce delta → buy puts / sell calls

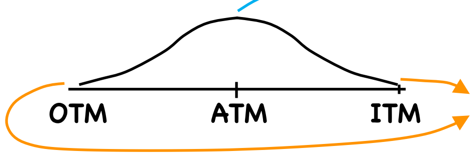
→ Stock: $\Delta = 1$ — At strike X, exp. T → $\underbrace{\text{buy call, sell put}}_{\Delta \sim 1.0}$

→ Delta neutral — $\Delta = 0$

Gamma: Δdelta for a Δunderlying price

- always positive ∴ long options → pos. gamma
  short options → neg. gamma

delta changes fastest ATM and even faster the closer to expiration

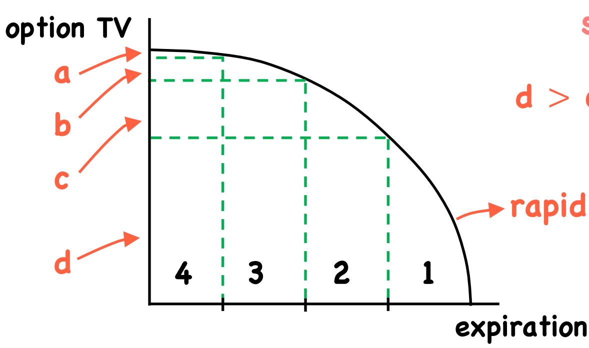


deltas change very slowly here

Greeks/

Theta: Δoption's TV for a Δtime

- always negative — i.e. long options → neg. theta
  short options → pos. theta



d > c > b > a

rapid time decay

General time rule:

long options

Buy more time than required → buy 4 mos., not 1

short options

Sell short periods of time → sell 1 month, not 4

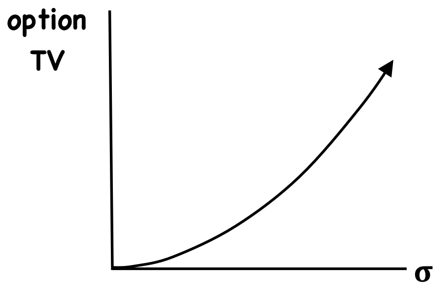
Greeks/

Vega: Δoption's TV for a Δvolatility (of underlying)

- always positive

i.e. long options → pos. vega

short options → neg. vega



$c_V = p_V$ at x

(this does not mean that $c_\sigma = p_\sigma$)

Rho: Δoption's TV for a Δinterest rates

calls , rho > 0

puts , rho < 0

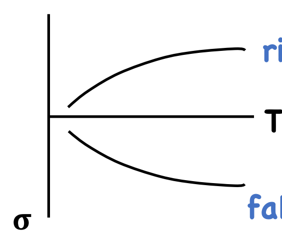
as r ↑, c ↑ p ↓

when r = 0, c = p at x

Implied Volatility: BSM assumes IV is constant for all strikes

- typically not the case

IV w.r.t. time to expiration → term structure of volatility



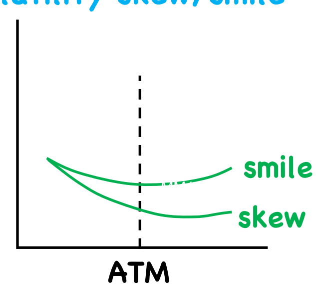
rising IV over time

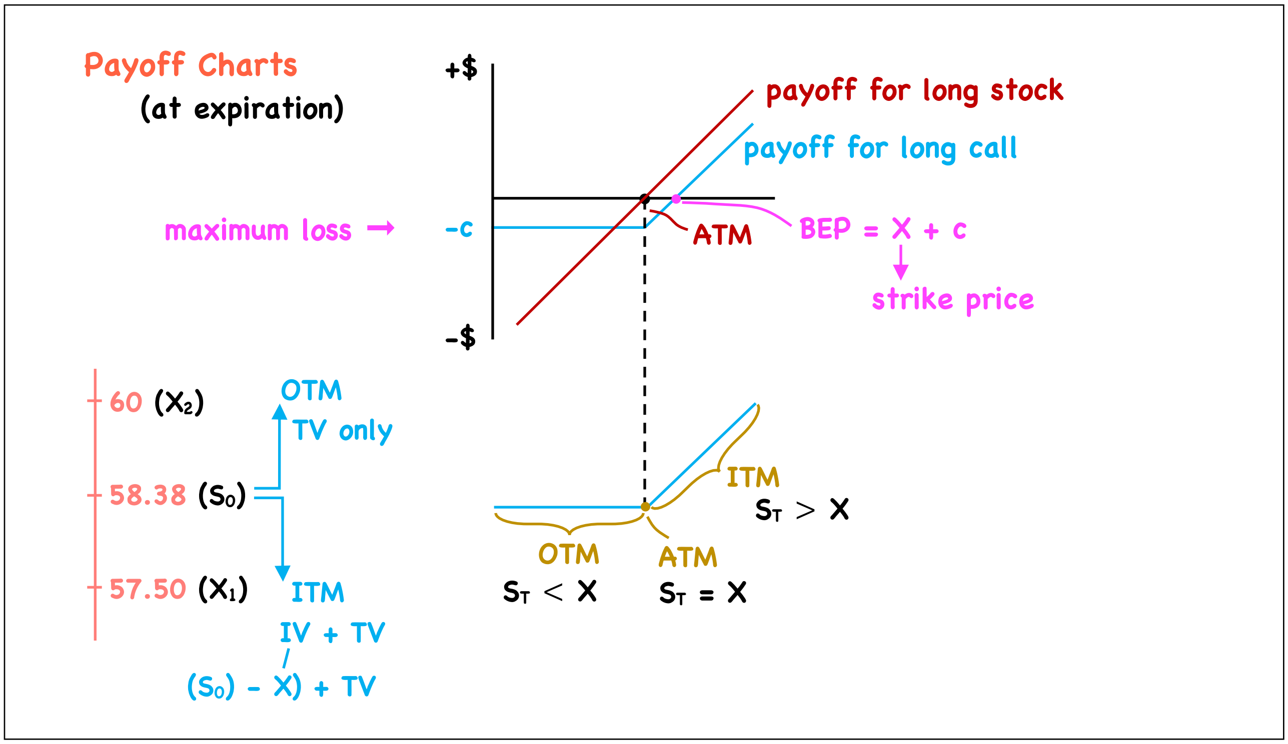
- contango

falling IV over time

- backwardation

IV w.r.t. X → volatility skew/smile

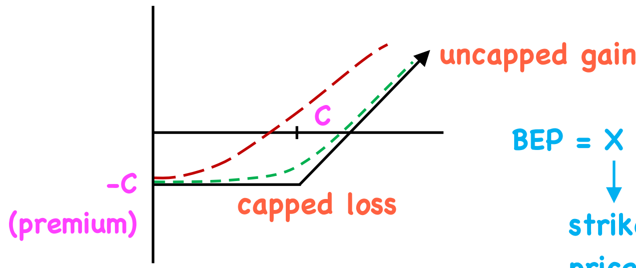



Payoff Charts
(at expiration)
+$
payoff for long stock
payoff for long call
maximum loss →
-c
ATM
BEP = X + c
strike price
-$
60 (X₂)
OTM
TV only
58.38 (S₀)
57.50 (X₁)
ITM
IV + TV
(S₀) - X) + TV
ITM
Sᴛ > X
OTM
Sᴛ < X
ATM
Sᴛ = X

Basic Strategies
Long Call

Long Call:

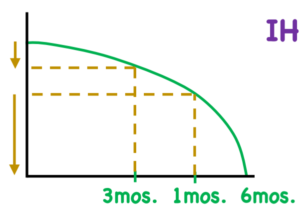
— longer dated
— shorter dated



BEP = X + c
X → strike price
c → call premium
at expiration

• Bullish
• Capped Loss, Uncapped gain

- positive delta, positive vega, negative theta
positive delta → use ATM
- highest gamma
negative theta → buy more time than required → risk mgmt.



IH = 1 mos., buy 3-mos. call
sell in 1-mos.

= 3 mos., buy 6-mos. call
sell in 3 mos.

Long Call: e.g./ Dec. 15 close → GM = 58.61

60 calls		Days	¢/day
Dec. 17	0.27	2	13.5
Jan. 21	2.21	36	6.14
Feb. 18	3.40	64	5.31
Mar. 18	4.13	92	4.49
Jun. 17	6.03	183	3.30
Jan. 2023	8.98	400	2.25

	Terminal	March			projected op. price	June		
		Gain	ROI	Annualized	P.O.P	Gain	ROI	Annualized
0% →	60	-413	-100.0%	-396.7%	5.12	-91	-22.0%	-87.4%
	61	-313	-75.8%	-300.7%	5.69	-34	-8.2%	-32.7%
	62	-213	-51.6%	-204.6%	6.27	24	5.8%	23.1%
5% →	63	-113	-27.4%	-108.6%	7.05	102	24.7%	98.0%
	64	-13	-3.1%	-12.5%	7.69	166	40.2%	159.5%
	65	87	21.1%	83.6%	8.36	233	56.4%	223.8%
	66	187	45.3%	179.6%	9.05	302	73.1%	290.1%
	67	287	69.5%	275.7%	9.77	374	90.6%	359.3%
	68	387	93.7%	371.8%	10.51	448	108.5%	430.4%
	69	487	117.9%	467.8%	11.28	525	127.1%	504.3%
16.7% →	70	587	142.1%	563.9%	11.60	557	134.9%	535.1%

Long Call: Variations

- Buy short-dated ITM calls → IV + TV

ATM
OTM

- deeper ITM → lower TV
→ higher delta

e.g. Dec. 16 @ 11:30am, GM at 59.72

Buy 100 shares = $5,972

36d	Jan.	50	10.15	→ TV = 43¢	
	Feb.	50	10.75	→	1.03
	Mar.	50	11.15		1.43

one contract = $1,015

BEP = 60.15

J = .019
F = .016
M = .016

GM at 63 on exp. date

$$\left(13/10.15\right) - 1 = 28.08\%$$ option

$$\left(63/59.72\right) - 1 = 5.5\%$$ stock

- downside risk higher than ATM calls
- ROI will be lower (higher denominator)
- Initial capital higher

Long Call: Momentum strategy

- 52-week high list
  - eliminate all stocks with ADV $<$ 500k
  - eliminate all stocks with no options or illiquid options
  - ignore biotech, takeover targets
- buy ATM call on stocks that are left
  - 3-mos., sell in 1 month
  - 6-mos., sell in 2-3 months
- works best when markets are making new highs

Last Revised: 11/21/2022

Long Call:

SPY - as of Dec. 17/21

484 +4.86%

461.56 -3.04%

447.50

F. (62d)

23.37 - 13.56 = 9.81

3.97

13.66 4.28

3.30

M. (90d)

26.53 - 13.56 = 12.97

3.16

16.85 3.19

6.02

May/ 32.29 - 13.56 = 18.73

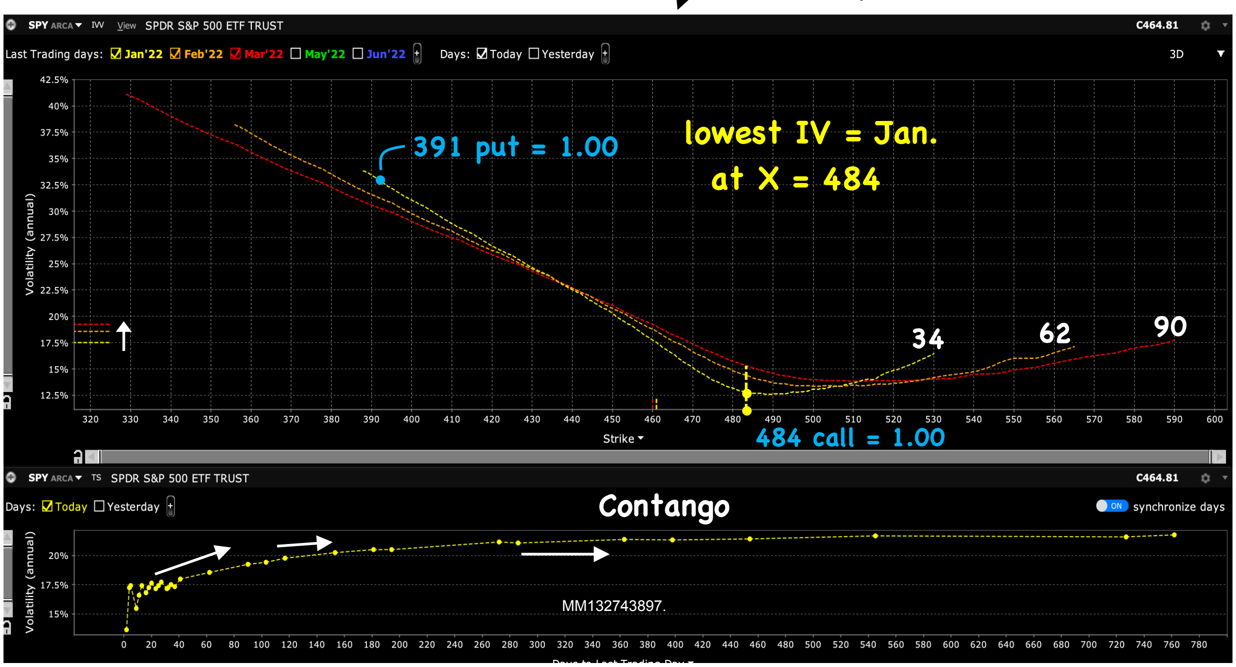
2.88 x 2

23.00 3.08 x 2

11.03

Long Call:

Volatility skew



Term Structure of Volatility

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Long Call:

Long Call:

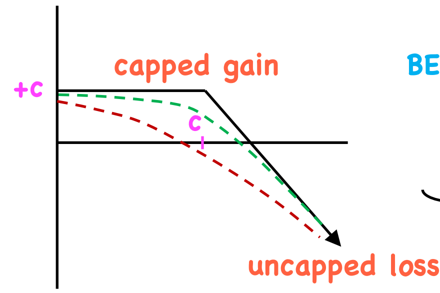
Long Call:

→ BVPS 15.80

Short Call

- Short Call:

— longer dated
— shorter dated



BEP = X + c

X → strike price; c → call premium

at expiration

- Not Bullish, Neutral, Slightly Bearish, Risk Management, Income
- $\underbrace{\text{negative delta}}_{\text{strike depends on stance/strategy}}$, $\underbrace{\text{negative vega}}_{\text{sell high IV options}}$, $\underbrace{\text{positive theta}}_{\text{sell short periods of time}}$
- Naked Short → very high risk → uncapped losses (Very Bearish)
- Long underlying → covered call — risk mgmt. / Income

- Short Call: Strategy: As a replacement for a covered put
  - short stock
  - sell a put → can cover the short position if exercised

→ put-call parity: $\underbrace{S_0 + p = c}_{-S_0 - p = -c} + PV(x)$

short TLT - borrow cost
- monthly cash outflow

152
142
136

① Sell OTM @ 155 or ↑ front-month

Jan. 155 → 1.04 [2.2%/32d] 25.5%/a

② Sell longer-dated ITM options

March 140: 11.05 (90% IV) ✓

May: 11.80

- Short Call: Strategy: As a replacement for a covered put

$$c = Se^{-\gamma T} \cdot N(d_1) - Xe^{-rT} \cdot N(d_2)$$

carry benefits = div. yield (continuously compounded)

∴ call price will be adjusted downwards for the dividend

TLL yield = 1.4% ~1.39 cc

$$149.95 \cdot N(d_1) \quad \text{vs.} \quad \underbrace{149.95e^{-(.0139 \times (88/365))}}_{149.45} \cdot N(d_1)$$

Div. = .1850 x 3 mos. = .555 vs. 50¢ lower

→ Mar. 140 Call TLT at exp.

147 → $4.05/42 = 39.99\%$

144 → $7.05/42 = 69.6\%$

140 → $11.05/42 = 109.12\%$

- Short Call: when combined with an underlying

• Covered Call (dedicated video)
- OTM - income
- ATM } Risk Mgmt.
- ITM } Risk Mgmt. → tax deferral

Naked short calls: very risky - uncapped losses, capped gains

• sell on rallies in a downtrend

tight stop based on underlying price

sell call on a rally back to resistance (75)

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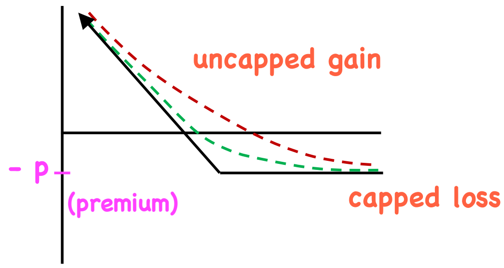
Long Put

Long Put:

— longer dated

— shorter dated



BEP = X - p

X ↓ strike   p ↓ put premium

at expiration

- Bearish
- Capped Loss, Uncapped gain

- $\underbrace{\text{negative delta}}_{\text{risk mgmt.}}$, $\underbrace{\text{positive vega}}_{\text{long volatility}}$, negative theta

negative theta ↓ buy more time than required (typically)

risk mgmt. (a.k.a. portfolio insurance)

long volatility ↓ buy when IV is low

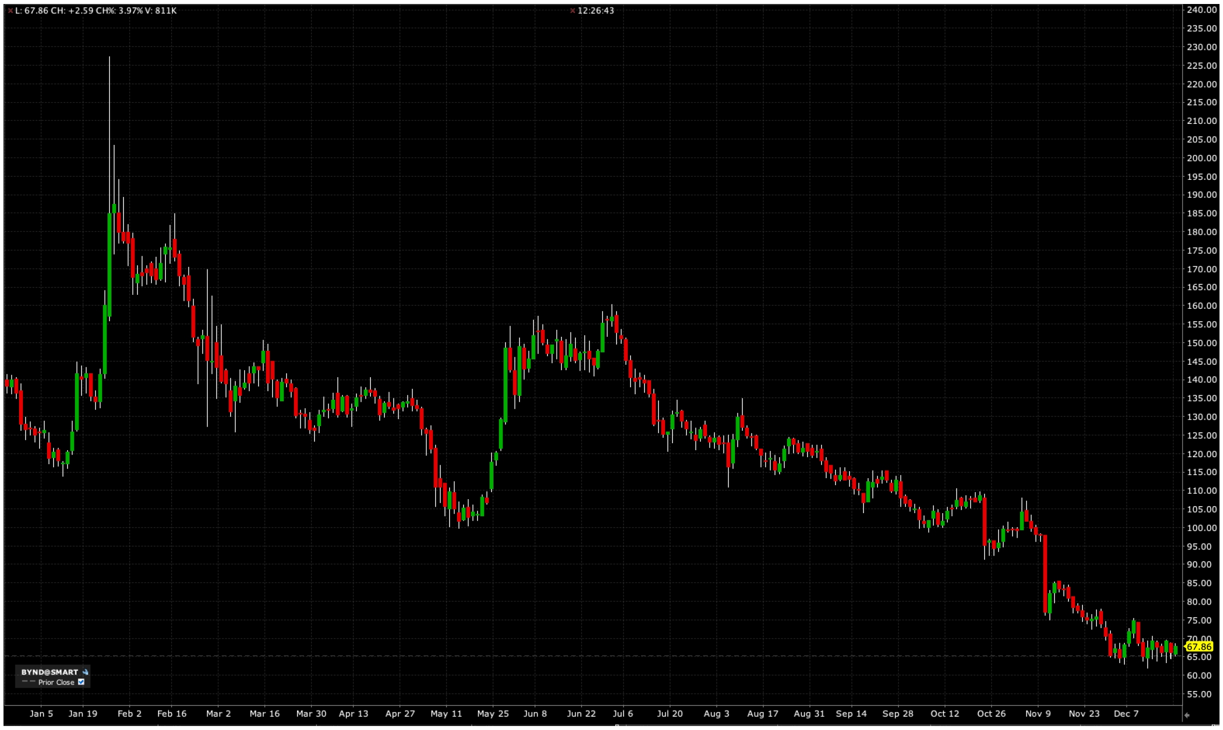
- Strategies
  - Insurance
  - Alternative to shorting or selling calls
  - Range Trading

Long Put: Strategy - Alternative to shorting - fundamental thesis

- capped loss
- no borrowing costs
- no forced buy-ins

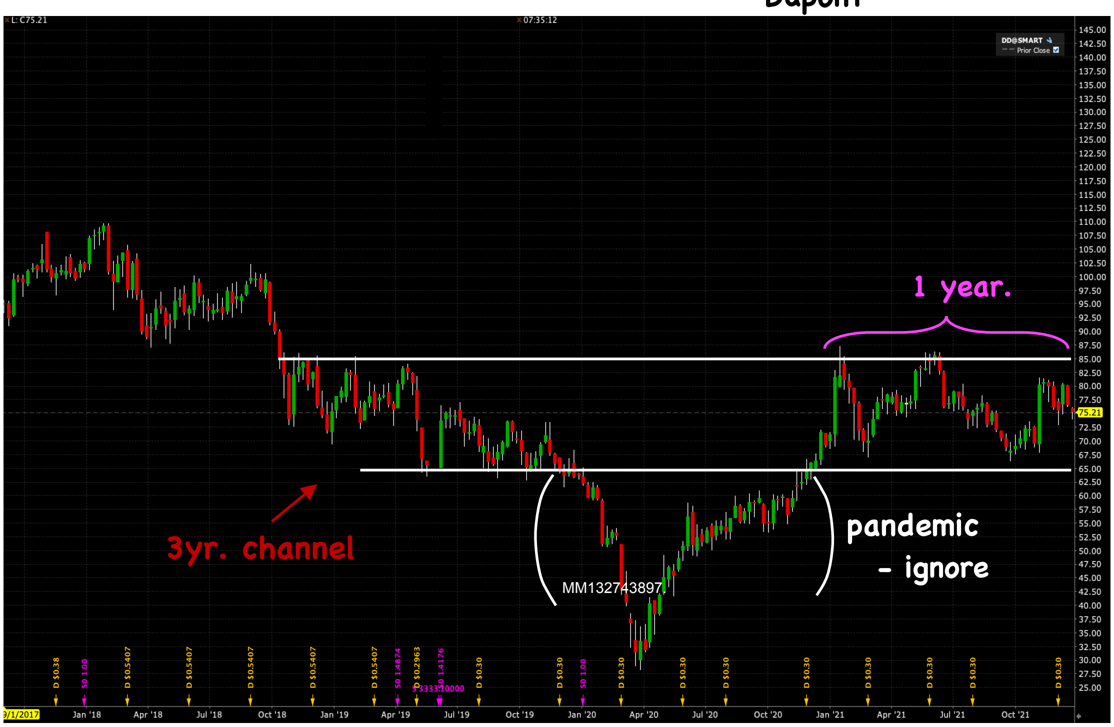
- downtrending stock
- buy at resistance

Long Put: Strategy - Alternative to shorting



Long Put: Strategy - Trading Range

Dupont



Apr.
$(\Delta|S = 85)$

85	.503
75	.219
65	.08