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# **LECTURE 8**

### ADVANCED OPTION STRATEGIES

#### **SPREADS**

A spread is a combination of two or more CALL options (or PUT Options) on the same stock with different exercise prices or times of expirations.

Money Spread:Purchases/sell of options of different X pricesTime Spread:Purchases/sell of options of different Expiration Times

	<b>St</b> <= <b>X1</b>	X1 <st<x2< th=""><th>St&gt;X2</th></st<x2<>	St>X2
Payoff of CALL X1	0	St - X1	St - X1
Payoff of CALL X2	-0	-0	-(St – X2)
Total	0	Sr - X1	X2 – X1

**EXAMPLES:** 

						Vertical S	oread (Money Sprea	ads)		
						Horizonta	l Sread (Calendat Sp	oread)		
DCRB OPTION DATA MAY	14									
							1	ntrinsic		
		CALLS			PUTS			Value		
Exercise Price	May	June	July	May	June	July				
120	8.75	15.40	12.90	2.75	9.25	13.65		5.94		
125	5.75	13.50	18.60	4.60	11.50	16.60		0.94		
130	3.60	11.35	16.40	7.35	14.25	19.65		-		
Risk Free Rates	0.0447	0.0446	0.0453	0.0447	0.0446	0.0453				
Current Stock Price	125.94									

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<b>MONEY SPREADS (Ve</b>	rtical Spreads)										
1. BULL SPREADS - US	ING CALLS (Call	Bull Spread	l)			2. BEAR SPREADS	- USING P	UTS (Bear Pu	t Spread)		
Stock Price at X:	140.00					Stock Price at X:	110.00				
Strategy	Expected I	Moderate ris	se in the p	rice of the	stock	Strategy	Expected	Decline in th	e price of the s	stock	
Date	June					Date	June				
Туре	CALLS					Туре	PUTS				
Shares	100					Shares	100				
Action	Purchase	Sell	Spread			Action	Purchase	Sell	Spread		
Exercise Price	125.00	130.00				Exercise Price	130.00	125.00			
Premiums	(13.50)	11.35	(2.15)			Premiums	(14.25)	11.50	(2.75)		
	Spread	\$amount	HPR%	Stock			Spread	\$ amount	% Ch	Stock	ļ
Payoff	5.00	\$ 500.00				Payoff	5.00	\$ 500.00			
Profir/(Loss)	2.85	\$ 285.00	133%	140.00		Profir/(Loss)	2.25	\$ 225.00	82%		
Max Loss	(2.15)	\$ (215.00)	-100%	125.00	<	Max Loss	(2.75)	\$ (275.00)	-100%	130.00	>
Max Gain	2.85	\$ 285.00	133%	130.00	>	Max Gain	2.25	\$ 225.00	82%	125.00	<
Break Even Stock		\$ -	0%	\$ 127.15	=	BreakEven		\$ -	0%	\$ 127.25	
3. BEAR SPREADS - US	ING CALLS (Bea	a <mark>r Call Sprea</mark>	d)			4. BULL SPREADS	- USING PI	JTS (Bull Put	Spread)		
Stock Price at X:	140.00					Stock Price at X:	125.00				
Stratogy	Evpo	ctod Doclin	o in tho nr	ico of tho (	tock	Stratogy	Ev	nocted Incre	aco in tho price	of the st	ock
Strategy	Expe	nost the ent	ion not to	he eversio	ad	Strategy	Expected increase in the price of the stock			JUK	
Data	EX	pect the opt	ion not to	be exercis	ea	Data	luno	Expect the o	ρτιού ποι το βε	exercised	1
Date	Julie					Date	Julie				
Sharee	LALLS 100					Sharee	100				
Action	Burchaso	Soll	Sprood			Action	Burchaso	Soll	Sproad		
Exercise Drice	120.00	125.00	Spieau			Exercice Brice	125.00	120.00	Spreau		
Bromiums	(11.25)	125.00	2 15	Cradit		Bromiums	(11 50)	14.25	2 75	Cradit	
Fremunis	(11.55)	15.50	2.15	creat		Fielinulis	(11.50)	14.23	2.75	creuit	
	Spread	\$amount	<mark>% Ch</mark>	Stock			Spread	<mark>\$ amount</mark>	% Ch	Stock	
Payoff - Purchase	\$ 10.00					Payoff - Purchase	\$ 0.00				
Payoff - Sell	-\$ 15.00					Payoff - Sell	-\$ 5.00				
Net Payoff	-\$ 5.00	\$ (500.00)				Net Payoff	-\$ 5.00				
Profir/(Loss)	(2.85)	\$ (285.00)		140.00		Profir/(Loss)	2.75	\$ 275.00		125.00	
Max Loss	(2.85)	N/A		-	<	Max Loss	(2.25)	N/A			<u> </u>
Max Gain	2.15	N/A		-	>	Max Gain	2.75	N/A			<u> </u>
				6407.47						<i></i>	
Break Even Stock		l		\$ 127.15		Break Even Stock				\$ 127.25	

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OTHER MONEY SPREA	DS											
BUTTERFLY SPREADS -	USING CALLS						BUTTERFLY SPRE	ADS - USIN				
Stock Price at X:	125.00						Stock Price at X:	125.00				
Strategy	No Volatil	ity					Strategy	No Volati	lity			
Date	June						Date	June				
Туре	CALL						Туре	PUTS				
Shares	100						Shares	100	)			
Action	Purchase	Sell	Sell	Purchase	Spread		Action	Purchase	Sell	Sell	Purchase	Spread
Exercise Price	120.00	125.00	125.00	130.00			Exercise Price	120.00	125.00	125.00	130.00	
Premiums	(15.40)	13.50	13.50	(11.35)	0.25		Premiums	(9.25)	11.50	11.50	(14.25)	(0.50)
	,			, ,				. ,			. ,	. ,
	Spread	\$amount	% Ch	Stock				Spread	\$ amount	% Ch	Stock	
Payoff - Purchase	\$ 5.00						Payoff - Purchase	\$ 0.00				
Payoff - Sell	\$ 0.00						Payoff - Sell	\$ 0.00				
Payoff - Sell	\$ 0.00						Payoff - Sell	\$0.00				
Payoff - Purchase	\$ 0.00						Payoff - Purchase	\$ 5.00	)			
Net Payoff	\$ 5.00						Net Payoff	\$ 5.00	)			
Profir/(Loss)	5.25	\$ 525.00		140.00			Profir/(Loss)	4.50	\$ 450.00		125.00	
Max Loss	N/A	N/A		120.00	<		Max Loss	(0.50)	\$ (50.00)		120.00	<
Max Gain	5.25	\$ 525.00		125.00	=		Max Gain	4.50	\$ 450.00		125.00	=
BreakEven - Lower				N/A	=		BreakEven - Low	er			120.50	=
BreakEven - Upper	ĺ			N/A	=		BreakEven - Upp	er			129.50	=
				,				-				
BOX SPREADS OR LON	G BOX											
Stock Price at X:	110.00											
Strategy	No Volatil	itv										
Date	June	-,										
Type	CALL/PUT											
Shares	100											
	100											
	Call Bull Sr	pread			Put Bear S	pread			Net			
Action	Purchase	Sell	Spread		Purchase	Sell	Spread		Spread			
Exercise Price	125.00	130.00	opicaa		130.00	125.00	-					
Premiums	(13.50)	11 35	(2.15)		(14.25)	11 50	(2.75)		(4.90)			
	(13.30)	11.55	(2.13)		(17.23)	11.50	(2.73)		(			
	Spread	Samount	HPR%		Spread	\$ amount	% Ch		Spread	Samount	% Ch	
Pavoff	5.00	\$ 500.00			5.00	\$ 500.00		-	10.00	\$ 1.000.00		
Profir/(Loss)	2.85	\$ 285.00	133%		2.25	\$ 225.00	82%		5.10	\$ 510.00	185%	
, (0)	2.55	, _35.00	10070	,		,0.00			0.10	, 510.00	10070	

### OTHER NOTABLE OPTION LIKE SECURITIES

- Callable Bonds (Value of straight Vs Callable bonds)
- Convertible Securities (Value of stock vs Bonds)
- Warrants (attached Debt facilities option to get equity stake)
- Leveraged Equity and Risky Debt (Assets instead of Equity stake for Debt holders)
- Exotic Options

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- <u>Asian Option</u> depending on Average (instead of final)
- <u>Barrier Options</u> "down and out" if the price drops passed the barrier causes the option to cancel even if the stock comes back within the expiration day
- Lookback Options Based on minimum and maximum price
- <u>Currency Translated Options</u> fix the exchange rate when converted in US dollars.

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#### **OPTION VALUATION (Chapter 16)**

#### **INTRINSIC & TIME VALUES**

Consider a CALL option that is out of the money at the moment – which is stock below the exercise price – This does not mean that the value is Valueless.

There is always a chance that the stock will increase sufficiently by expiration date (or Zero value at Expiration day)

S - X = Intrinsic value

The difference between the Actual Call price and the value of the Intrinsic Value call  $\underline{\text{Time Value}}$  of the option – It is the <u>Volatility Value</u> If not exercised the payoff cannot be less than Zero – As the price of the stock increases, the probability to be exercised is higher as it approaches the "adjusted" intrinsic value.

#### S - PV(x)



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#### DETERMINING OF OPTION VALUE

Six factors that affect the value of Call option:

If the Value Increases		The Value of the Call Option
1. Stock Price	S	Increase
2. Exercise Price	Х	Decrease
3. Volatility op the stock price	σ	Increase
4. The time to expiration	Т	Increase
5. The interest rate	rf	Increase
56. Dividend Value of the stock	D	Decrease

#### VOLATILITY IMPACT

Value \$10 and \$50 = average \$30 Value \$20 and \$40 = average \$30

Both have the same average, but the volatility on the first one is much higher. Suppose the exercise price is \$30.... Option Payoff? With 1 in 5 probability 0.2.

High Volatility Scenario

0					
Stock Price	10	20	30	40	50
Option Payoff	0	0	0	10	20

Low Volatility Scenario

Stock Price	20	25	30	35	40
Option Payoff	0	0	0	5	10

High Volatility Average = (0+0+0+10+20)/5 = 6Low Volatility Average = (0+0+0+5+10)/5 = 3

So it doesn't matter if its below \$30 (Zero value) – upside only volatility.

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### BINOMIAL OPTION PRICING MODEL

Binomial Option Pricing Model (BOPM) was invented by Cox-Rubinstein in 1979. It was originally invented as a tool to explain the Black-Scholes Model to Cox's students. However, it soon became apparent that the binomial model is a more accurate pricing model for American Style Options. The binomial model is thus named as it returns 2 possibilities at any given time. Therefore, instead of assuming that an option trader will hold an option contract all the way to expiration like in the Black-Scholes Model, it calculates the value of that trader exercising that option contract with every possible future up and down moves on its underlying asset, reflecting its effects on the present value of that option, thus giving a more accurate theoretical price of an American Style option.

The binomial model produces a binomial distribution of all the possible paths that a stock price could take during the life of the option. A binomial distribution, or simply known as a "Binomial Tree", assumes that a stock can only increase or decrease in price all the way until the option expires and then maps it out in a "tree". Here is a simplified version of a binomial distribution just for illustration purpose :



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It then fills in the theoretical value of that stock's options at each time step from the very bottom of the binomial tree all the way to the top where the final, present, theoretical value of a stock option is arrived. Any adjustments to stock prices at an ex-dividend date or option prices as a result of early exercise of American options are worked into the calculations at each specific time step .

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#### **Advantage Of The Binomial Option Pricing Model**

It can more accurately price American Style Options than the Black-Scholes Model as it takes into consideration the possibilities of early exercise and other factors like dividends.

#### **Disadvantage Of The Binomial Option Pricing Model**

As it is much more complex than the Black-Scholes Model; it is slow and not useful for calculating thousands of option prices quickly.

Example:

#### **BINOMIAL OPTION PRICING**

Probability of direction of the stock up or down 50/50

Parameters	Current Stock Price	Probability (p)	Stock x p	Cal Pa Exe	l Option ayoff if ercised	Re	Net after payment of Loan	after Relationship between nent of Payoff and Profit an (leverage)		lue of e Call ption
Current Price= Up probability (u) = Down probability (d) = Range =	\$ 100.00	1.2 0.9	\$ 120.00 \$ 90.00 \$ 30.00	\$ \$	10.00 -	\$ \$	30.00 -	3.0x	\$	6.06
Exercise Call Option = Exercise time =	\$ 110.00 1 year									
Borrowing Parameters Interest Rate = Borrowed Amount (P) per share= Interest Amount per share = Total	10% \$ 81.82 \$ 8.18 \$ 90.00									
Sources of Investment Loan Cash (Equity) Total Sources	\$ 81.82 \$ 18.18 \$ 100.00									
Fully Hedged Portfolio										
Stock Price Obligations for 3 Calls Payoff	90 0 90	120 -30 90	-							