



# Fundamentals of Options

## Part I: Options Strategies & Pricing

**CBOE**<sup>®</sup>  
CHICAGO BOARD OPTIONS EXCHANGE

**James Bittman**  
Senior Instructor  
The Options Institute at CBOE

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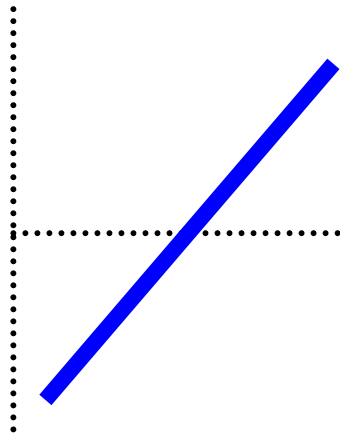
Why Options? Why Bother?

Objectives that Options Strategies Can Target

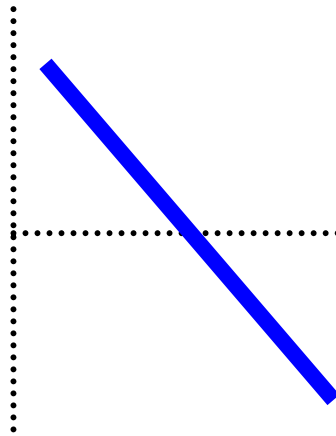
Two passive index strategies

Four Strategies for Active Managers

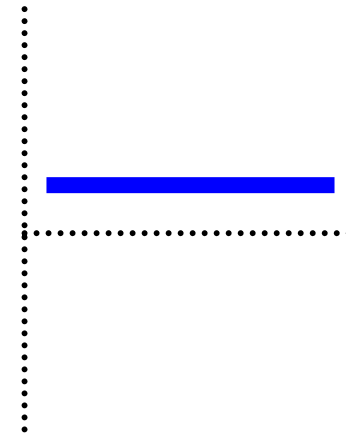
Without options,  
there are three strategy choices.



**Long Stock**

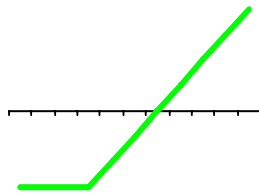


**Short Stock**

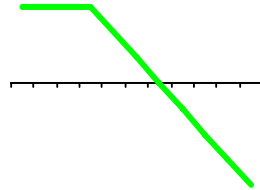


**T-Bill**

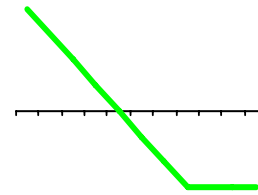
# Options Give You Options!



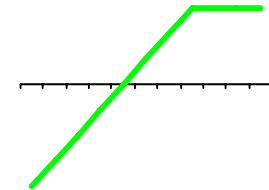
Long Call



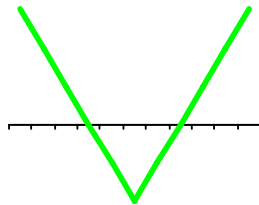
Short Call



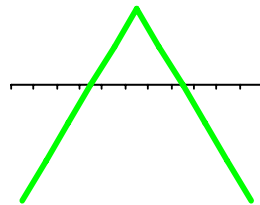
Long Put



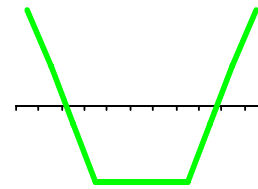
Short Put



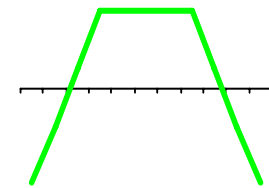
Long Straddle



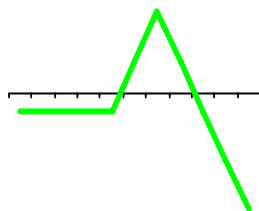
Short Straddle



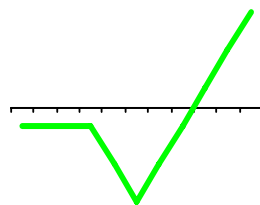
Long Strangle



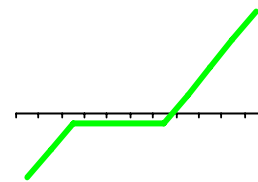
Short Strangle



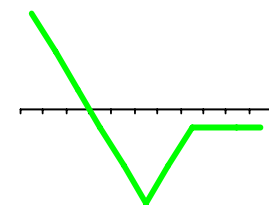
Ratio Call Spread



Call Volatility Spread



Split-strike Synthetic



Put Volatility Spread

**Options offer many strategy choices.**

- Generate income
- Limit risk
- Reduce variability of returns
- Lower the cost of protection
- Increase exposure to equities without increasing risk
- Buy equities during the next six months at lower prices

# Prices for Strategy Discussions



January 12, 2010

S&P 500<sup>®</sup> @ 1,135

<u>Strike Price</u>	<u>June Calls</u>	<u>June Puts</u>
1,100	78	45
1,125	62	55
1,150	50	68
1,175	40	80

155 days to June expiration



# Fundamentals of Options

## Part I:

### Options Strategy and Pricing



Passive Strategies

Writing covered calls on an index portfolio

Writing cash-secured index puts

Buy (own) stock (portfolio)

Sell calls on a share-for-share basis

Example: S&P 500 Index @ 1,135

Own S&P Portfolio            \$10,000,000

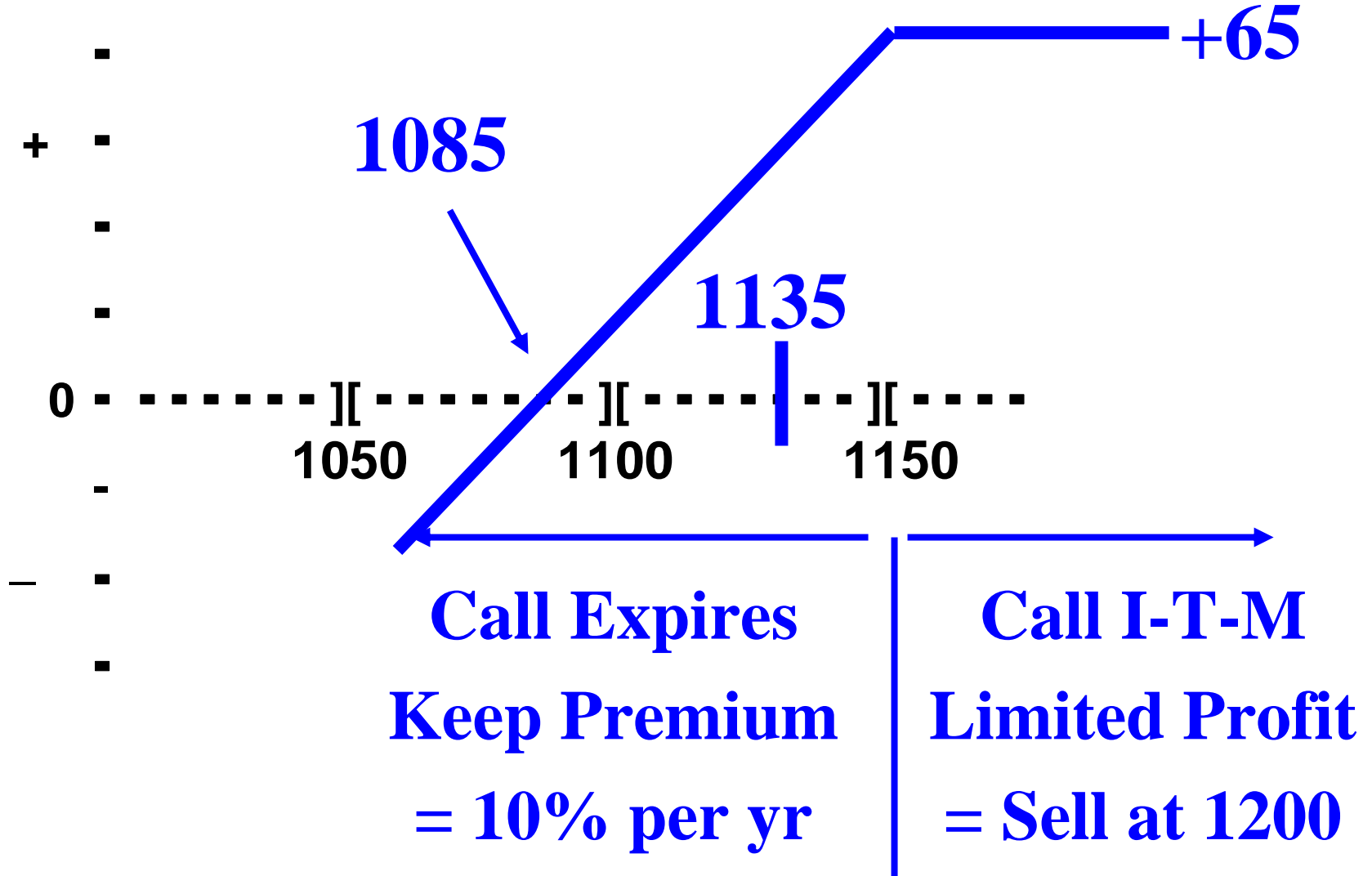
Sell 88\* 1150-strike SPX<sup>®</sup> Calls @ 50

Benefit: increase income in sideways and falling markets

Risk: underperform in rising markets

\*  $\$10,000,000$  portfolio  $\div$   $\$113,500$  per put  $\approx$  88 puts

# Writing Covered Calls



Hold Cash (or liquid investments)

Sell Puts on a dollar-for-dollar basis

Example: Own T-Bills \$10,000,000

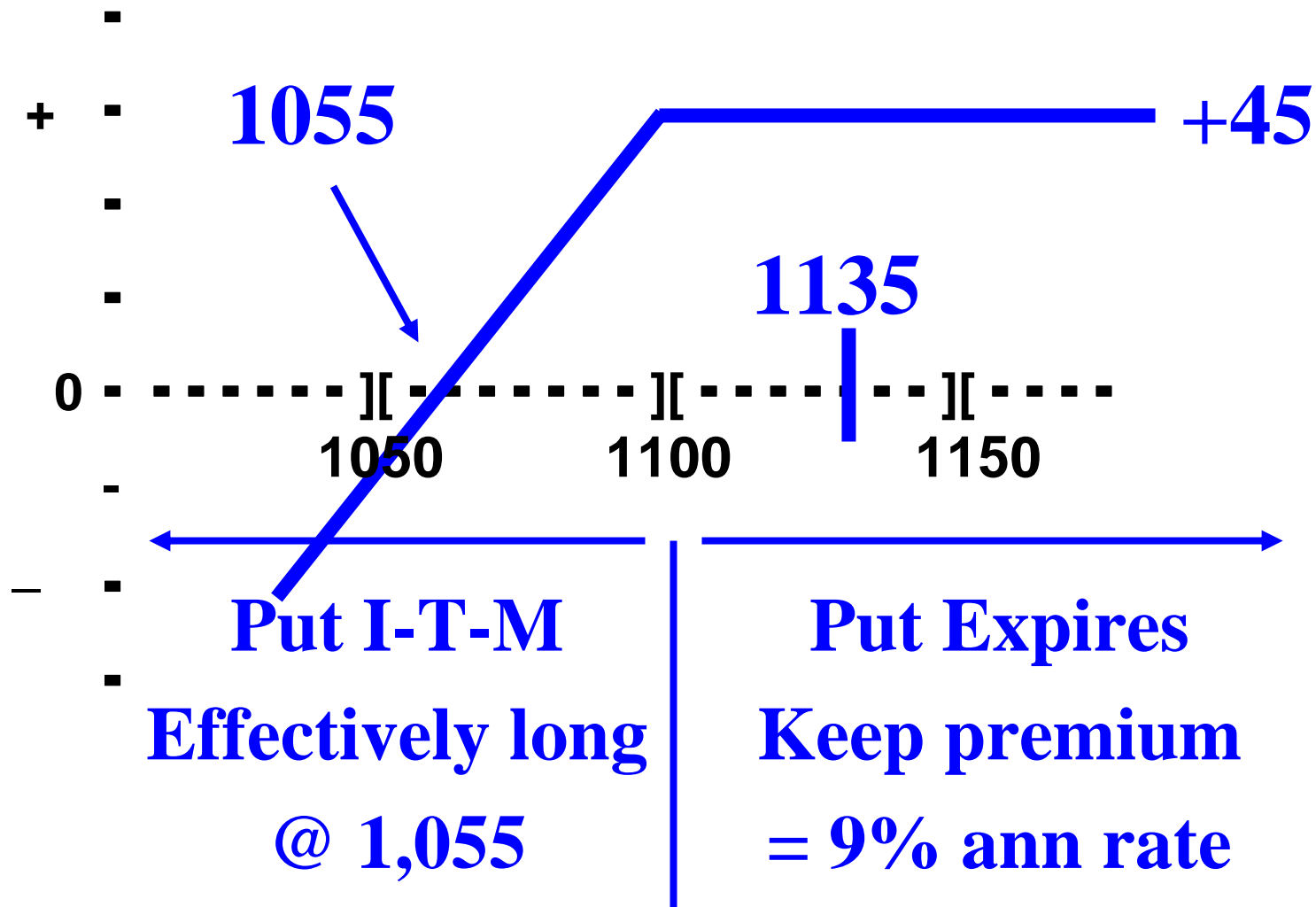
Sell 91\* SPX 1100-strike Puts @ 45

Benefit: increase income in sideways and falling markets

Risk: underperform in rising markets

\* Portfolio value divided by the strike price (times the multiplier)  
 $\$10,000,000 \text{ portfolio value} \div \$110,000 \text{ per put} = 91 \text{ puts}$

# Writing Cash-Secured Puts



Benchmark for strategy --

- **buy** portfolio of S&P 500 stocks
- **write** (sell) cash-settled S&P 500 call options every 3<sup>rd</sup> Friday for income

Announced in 2002 – study by Duke U.

Data history back to June 30, 1986

“Innovative Index of the Year” in 2004

More than \$25 billion in buywrite funds

[www.cboe.com/BXM](http://www.cboe.com/BXM)



Benchmark for strategy --

- **write** (sell) cash-settled S&P 500 put options every 3<sup>rd</sup> Friday for income
- invest in Treasury Bills as collateral - finance the maximum loss from final settlement of the SPX puts

Announced in 2007

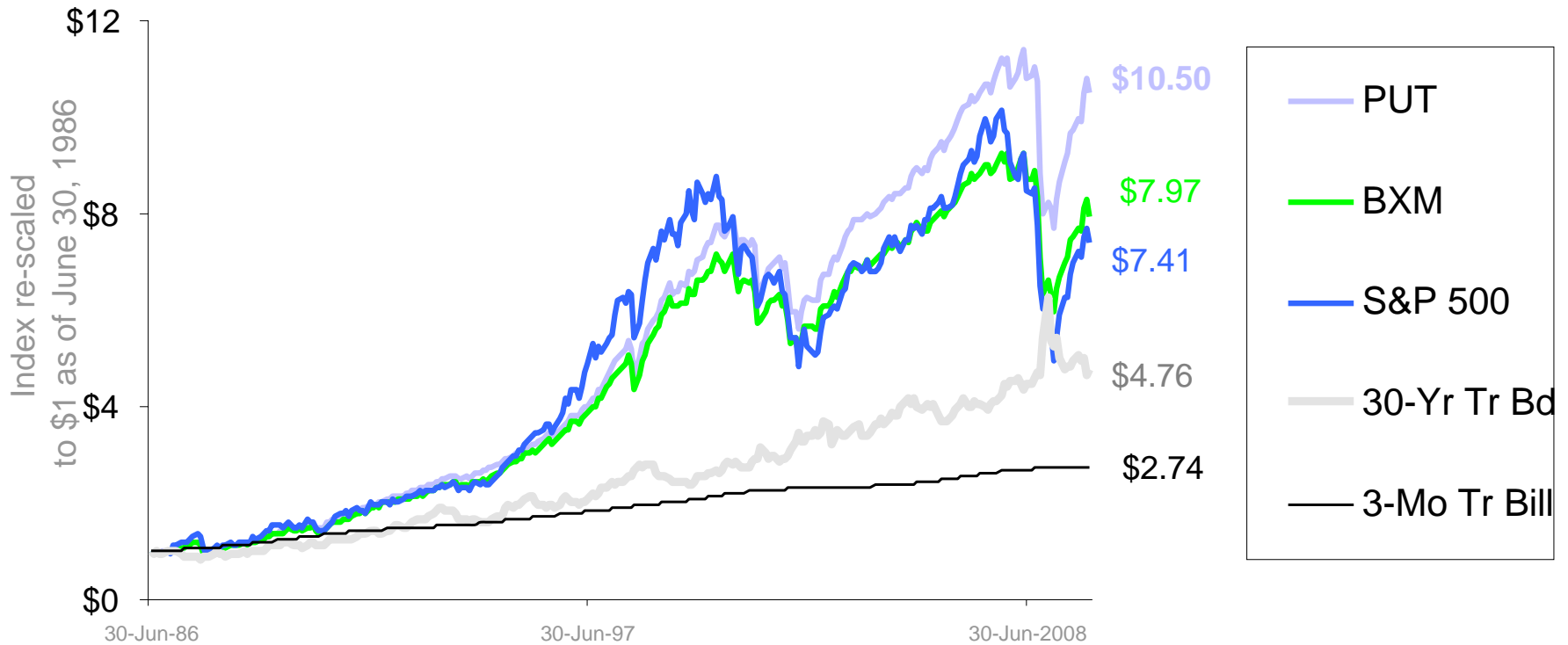
Data history back to June 30, 1986

“Innovative Index of the Year” in 2007

[www.putwrite.com](http://www.putwrite.com)



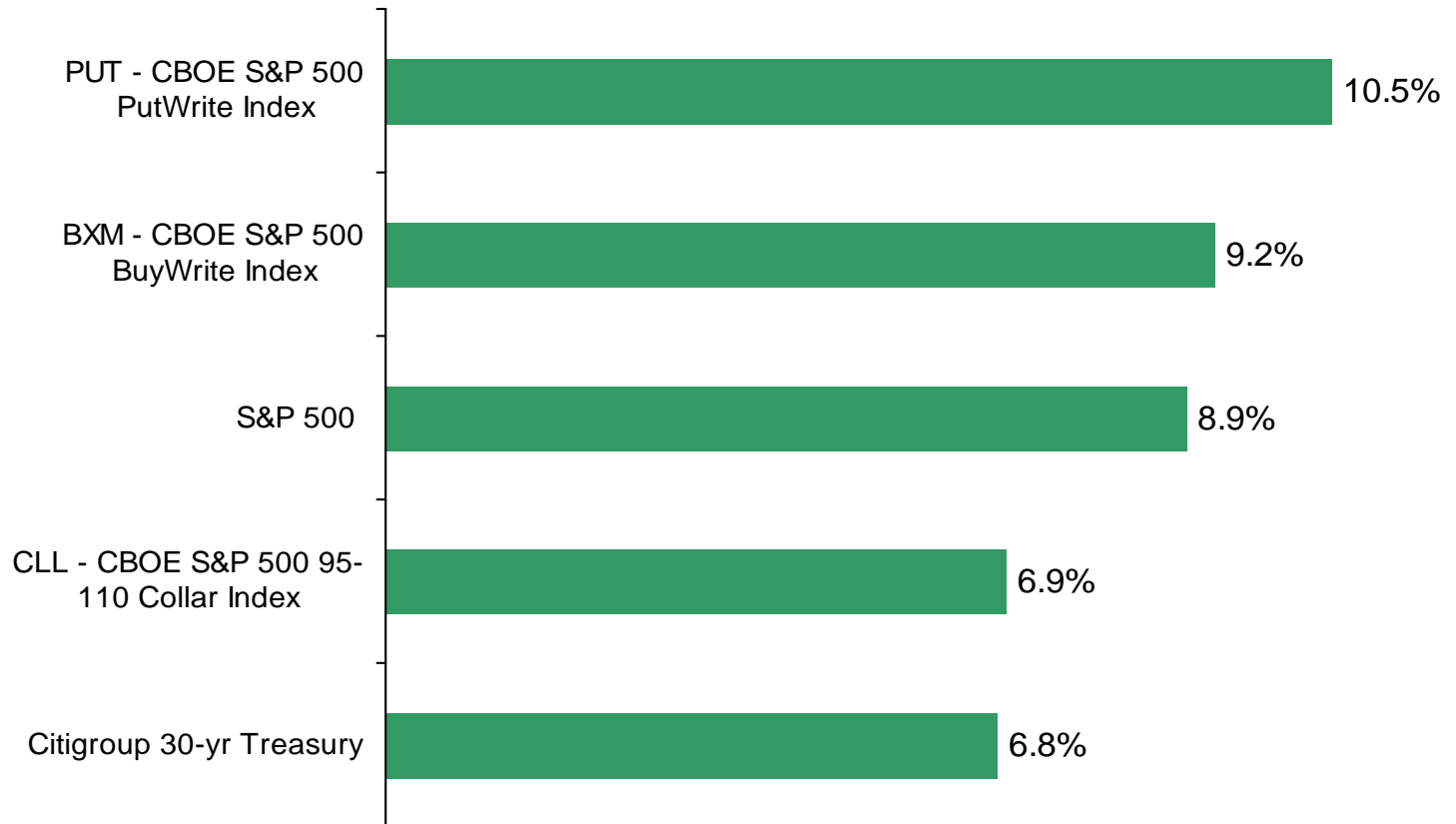
# CBOE Indexes Since Mid-1986



(June 30, 1986 - Jan. 29, 2010)  
 Sources: CBOE, Bloomberg  
 and Citigroup Fixed Income Indexes

# Annualized Returns

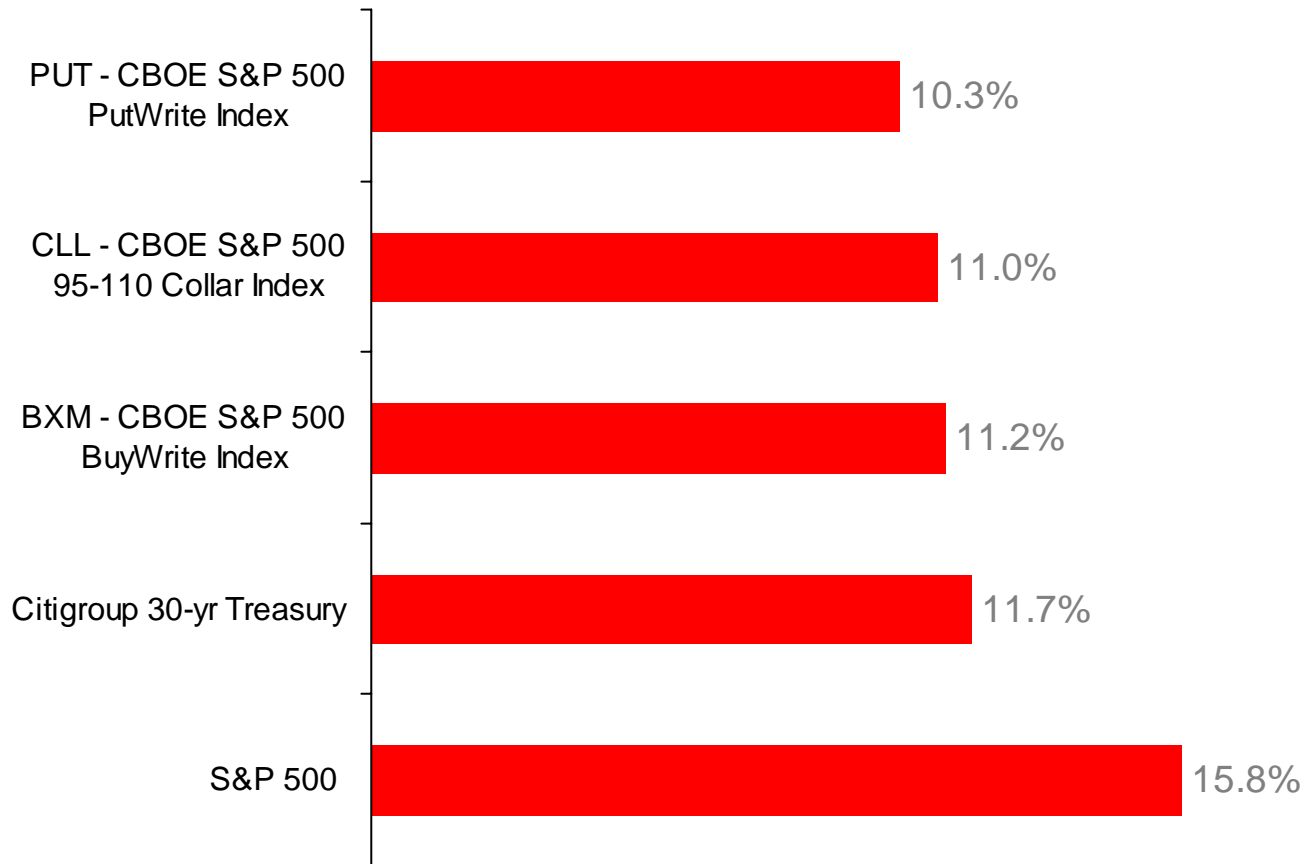
(July 1986 – January 2010) Total Return Indexes



Sources: Bloomberg, CBOE and Citigroup Fixed Income Indexes  
See the last side for risk disclosures  
[www.cboe.com/benchmarks](http://www.cboe.com/benchmarks)

# Standard Deviation

of Monthly Returns of Total Return Indexes (Annualized)  
(July 1986 – Jan. 2010)



Sources: Bloomberg, CBOE and Citigroup Fixed Income Indexes.  
Past performance is not a guarantee of future returns.

# Studies

## on Options-based Benchmark Indexes

**Ennis Knupp & Associates.** Evaluating the Performance Characteristics of the CBOE S&P 500 PutWrite Index (Dec. 2008)

**Fund Evaluation Group.** Study of BXD and VXD Indexes (2007)

**Callan Associates.** An Historical Evaluation of the CBOE S&P 500 BuyWrite Index (BXM). (Oct. 2006).

**Goldman Sachs.** "Finding Alpha via Covered Index Writing," Financial Analysts Journal. (September/October 2006).

**Ibbotson Associates.** Feldman, Barry, and Dhruv Roy, "Passive Options-Based Investment Strategies: The Case of the CBOE S&P 500 BuyWrite Index." The Journal of Investing. (Summer 2005).

**Duke University.** Whaley, Robert. "Risk and Return of the CBOE BuyWrite Monthly Index" The Journal of Derivatives (Winter 2002).

**University of Massachusetts.** Schneeweis, Thomas, and Richard Spurgin. "The Benefits of Index Option-Based Strategies for Institutional Portfolios" The Journal of Alternative Investments, (Spring 2001).

[www.cboe.com/benchmarks](http://www.cboe.com/benchmarks)



# Fundamentals of Options

## Part I: Options Strategy and Pricing



Strategies for Active Managers

Buy with limited risk

- Sell put spread (cash secured)

Target buy prices significantly below current market level

- Ratio put spread (cash secured)

Increase market exposure, limit risk and conserve cash

- Ratio call spread overlay
- Long split strike synthetic

**Market View:** You are willing to buy near current levels if risk is limited

**Objective:** Commit funds with limited risk and bring in cash income

**Strategy:** Sell put spread

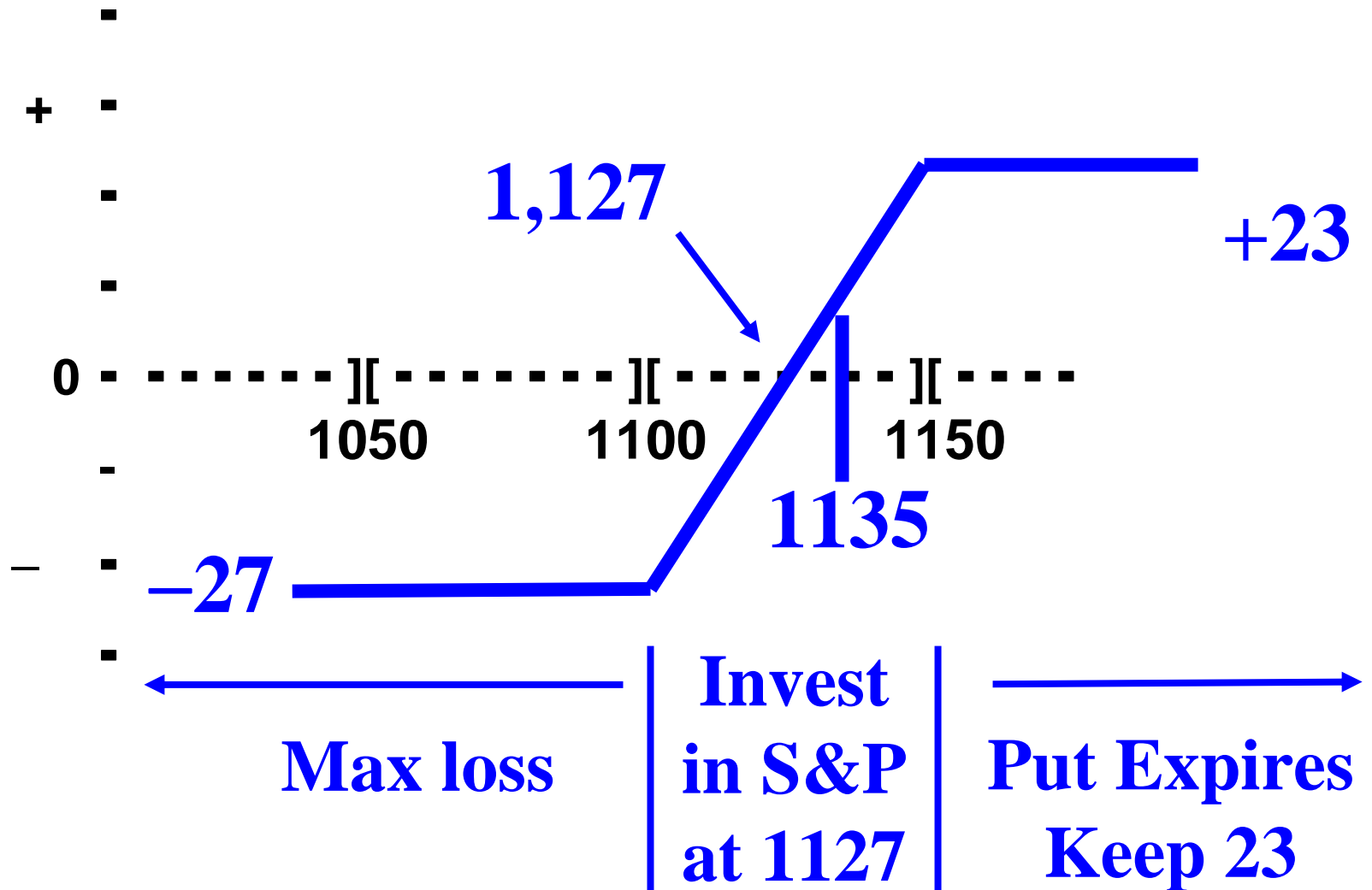
Sell SPX June 1150 Puts @ 68

Buy SPX June 1100 Puts @ 45

Net Credit 23

**SPX currently at 1,135**

# Sell Put Spread



## Market

- > 1,150: Puts expire; keep premium of 23 index points
- 1,100-1,150: Buy S&P at level of 1,127 ( $\approx 1\%$  below current level)
- < 1100: Max loss of 27 index points ( $\approx 2\%$ ; can buy at lower level)

Market View: The market will decline 10%

Objective: Bring in cash income and buy the market down 10%.

Strategy: Cash-secured ratio put spread

Buy 1 SPX 1150 Put @ (68)

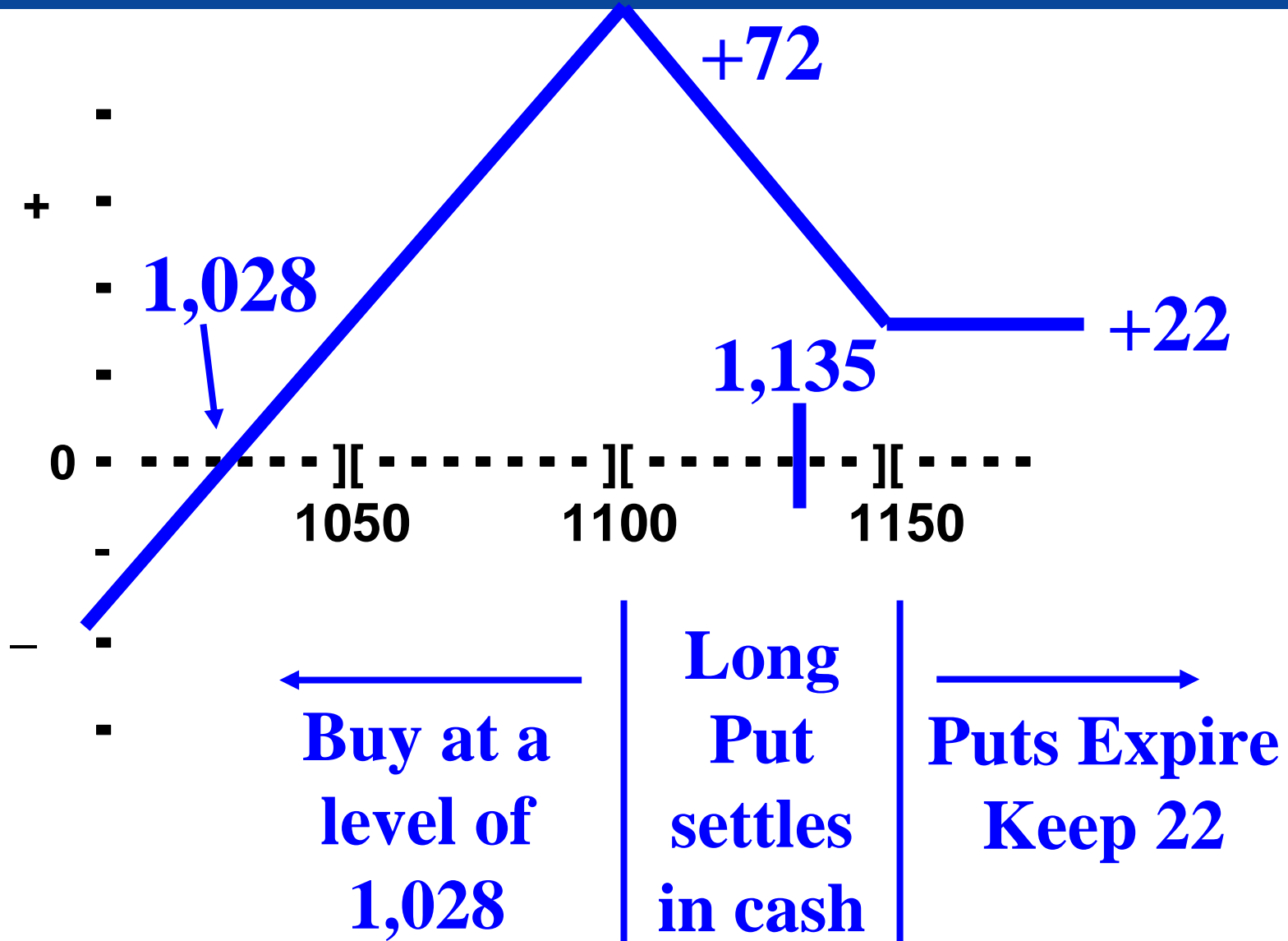
Sell 2 SPX 1100 Puts @ 45 ea

T-Bills \$103K

Net Credit 23

SPX currently at 1,135

# Cash-Secured Ratio Put Spread



## Market

> 1150: Puts expire; keep premium of 22 index points (5%)

1100-1150: Long put settles in cash for additional income

< 1100: Buy the S&P 500 at 1,028

# Increase Exposure Without Risk **CBOE**<sup>®</sup>

Market View: The market will rise modestly

Objective: Add upside exposure without increasing downside risk.

Strategy: Ratio Call Spread Overlay

Own SPY (or S&P stocks)

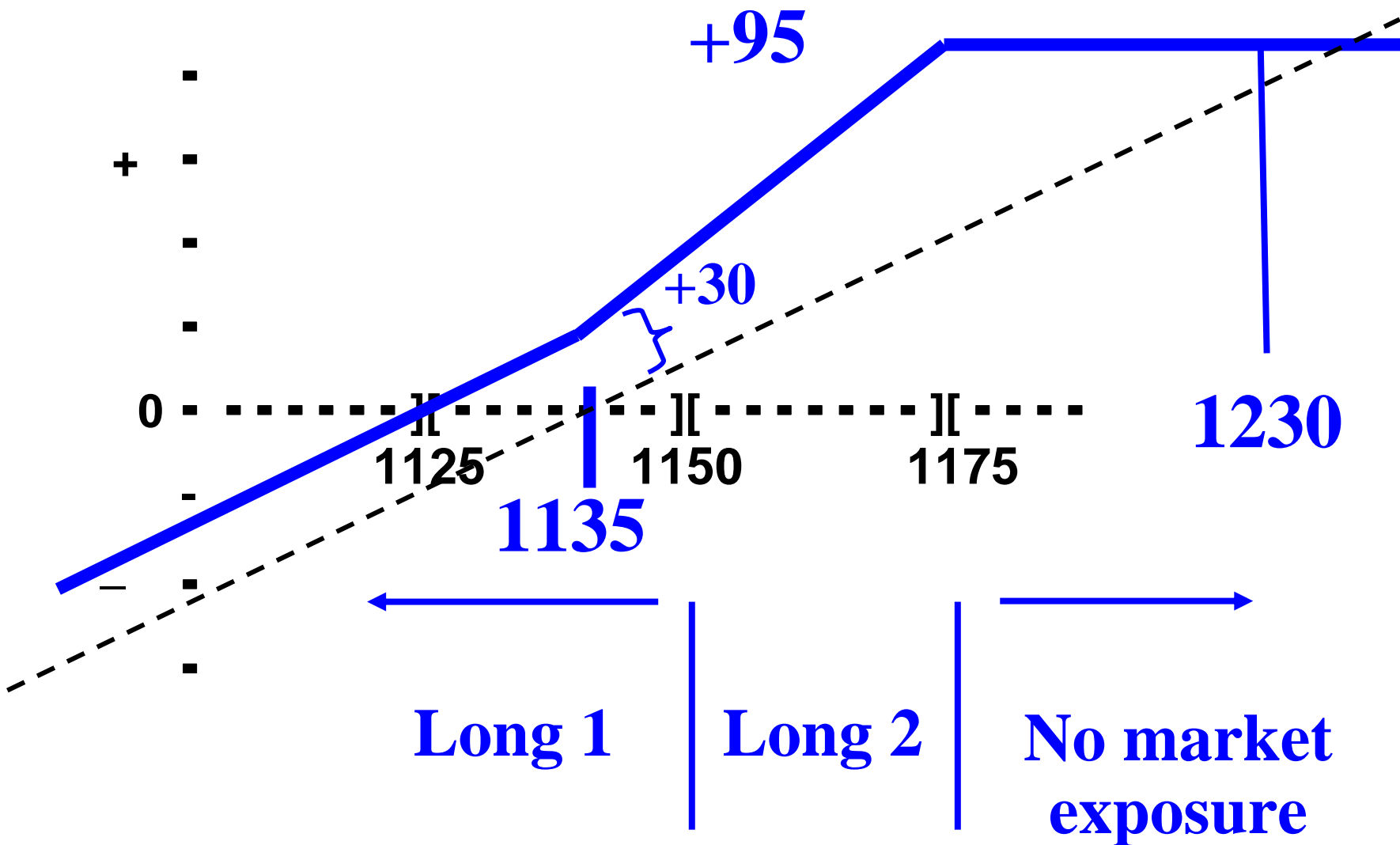
Buy 1 SPX June 1150 Call @ (50)

Sell 2 SPX June 1175 Calls @ 40 ea

Net Credit 30

**SPX currently at 1,135**

# Ratio Call Spread Overlay



## Market

< 1,150: Long 1 (30 points, or 6%,  
better than SPX)

1,150-1,175: Long 2

> 1,175: No market exposure  
maximum profit = +950

Market View: Think market will decline, but worried about missing a rally

Objective: Target buying 3% lower and participate in the upside.

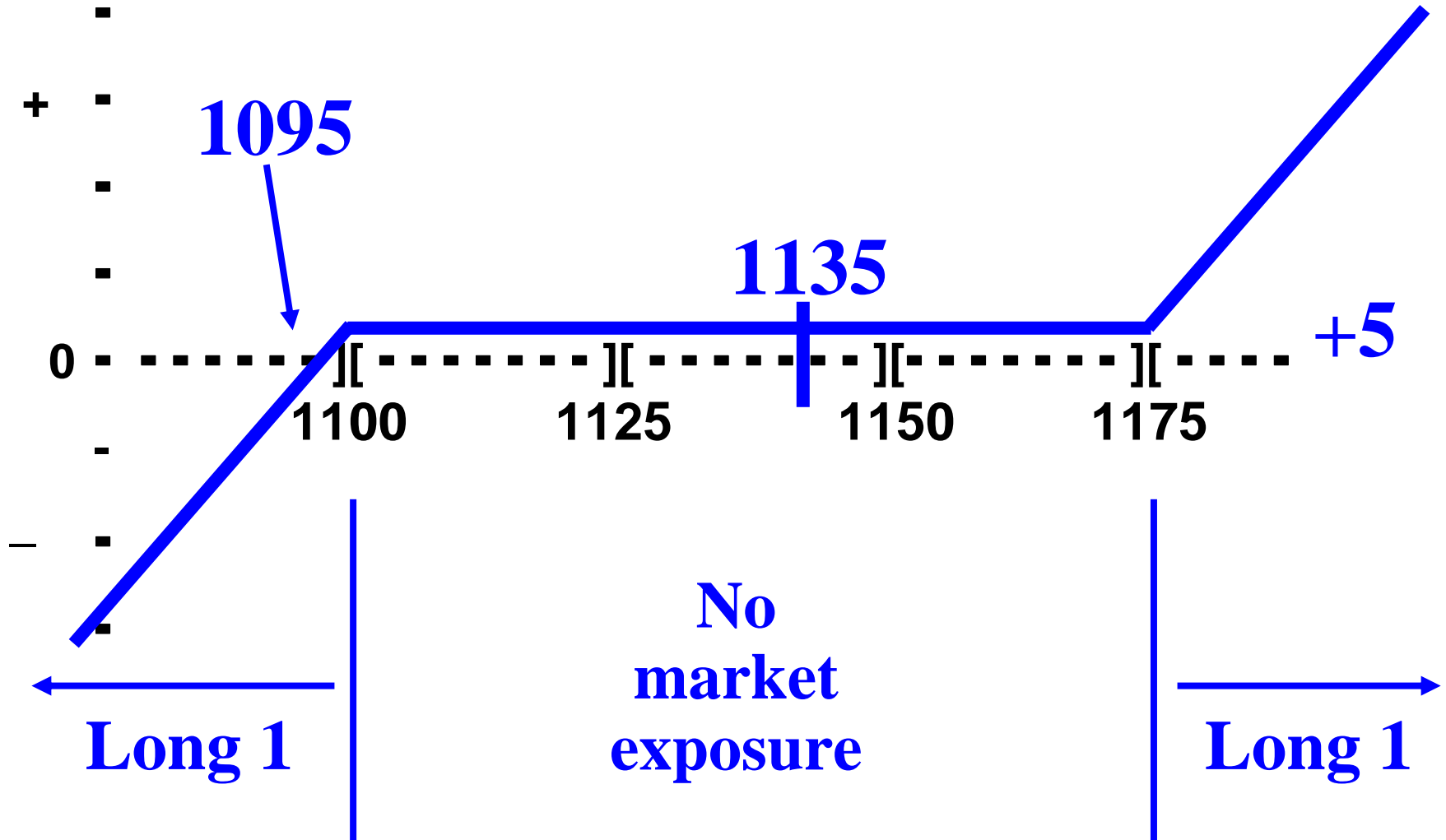
Strategy: Split-strike Synthetic (Long)

Buy 1 SPX 1175 Call @ (40)

Sell 1 SPX 1100 Put @ 45

T-Bills \$109,500 Credit 5

# Split-Strike Synthetic



## Market

< 1,100: Put assigned – long the S&P 500 at 1,095

1,100-1,175: No market exposure

> 1,175: Exercise call - long the S&P 500 at 1,170

- Options can be used to target investment objectives
- Options give investors more strategies with unique tradeoffs.
- 2-step thinking is required
- Using options requires more decisions
  - Expiration date
  - Strike price



# Fundamentals of Options

## Part I: Options Strategy and Pricing



Option Price Behavior

2/19/09	<u>Today</u>	<u>In 1 Week</u>
XSP	110	→ 114
Days to Exp.	28	→ 2
Mar 110 Call	3.55	→ <b>5.51 +55%</b>
Mar 114 Call	1.90	→ <b>3.27 +72%</b>

# 3 Option Pricing Concepts

Delta: Option prices change less than stock prices.

Time Decay: Option prices decrease as expiration approaches.

Volatility: the risk factor in option prices.

Warning 1: **Time decay is complicated.**

Warning 2: **Volatility changes.**

# In 2 Weeks?

2/19/09	<u>Today</u>	<u>In 2 Weeks</u>
XSP	110	→ 114
Days to Exp.	28	→ <b>14</b> vs. <b>55%</b>
Mar 110 Call	3.55	→ <b>5.02 +42%</b>
Mar 114 Call	1.90	→ <b>2.58 +35%</b> vs. <b>72%</b>

# VIX on 2/19/09 – Volatility 23%

XSP	110	→	114	114
Days to Exp.	28	→	21	14
Volatility	23%		23%	23%
Mar 110 Call	3.55	→	<b>5.51</b>	<b>5.02</b>
Mar 114 Call	1.90	→	<b>3.27</b>	<b>2.58</b>

**What if volatility drops to 18%?**

XSP	110	→	114	114	
Days to Exp.	28	→	21	14	
Volatility	23%				
110 Call	23%	3.55	→	<b>5.51</b>	<b>5.02</b>
Volatility	18%			<b>4.99</b>	<b>4.63</b>
114 Call	23%	1.90	→	<b>3.27</b>	<b>2.58</b>
Volatility	18%			<b>2.54</b>	<b>2.07</b>

Changing volatility can have a significant impact on option prices!

- A profit might become a loss.
- The “best option” may change.
- Another strategy might be better.

<b>Delta</b>	<b>Impact of underlying price</b>
<b>Gamma</b>	<b>Change in delta</b>
<b>Theta</b>	<b>Impact of time</b>
<b>Vega</b>	<b>Impact of volatility</b>
<b>Rho</b>	<b>Impact of interest rates</b>

Index up 1 point → Call up less than 1 point

In-the-Money Calls                      Delta > 50%

At-the-Money Calls                      Delta  $\approx$  50%

Out-of-the-Money Calls                Delta < 50%

# Concept 1 - DELTA

XSP 110

Exp.:

28 days

56 days

Strike

Call

Delta

Call

Delta

107

5.70

+.64

7.40

+.61

110

4.10

+.52

5.80

+.54

113

2.80

+.39

4.50

+.46

116

1.85

+.30

3.40

+.39

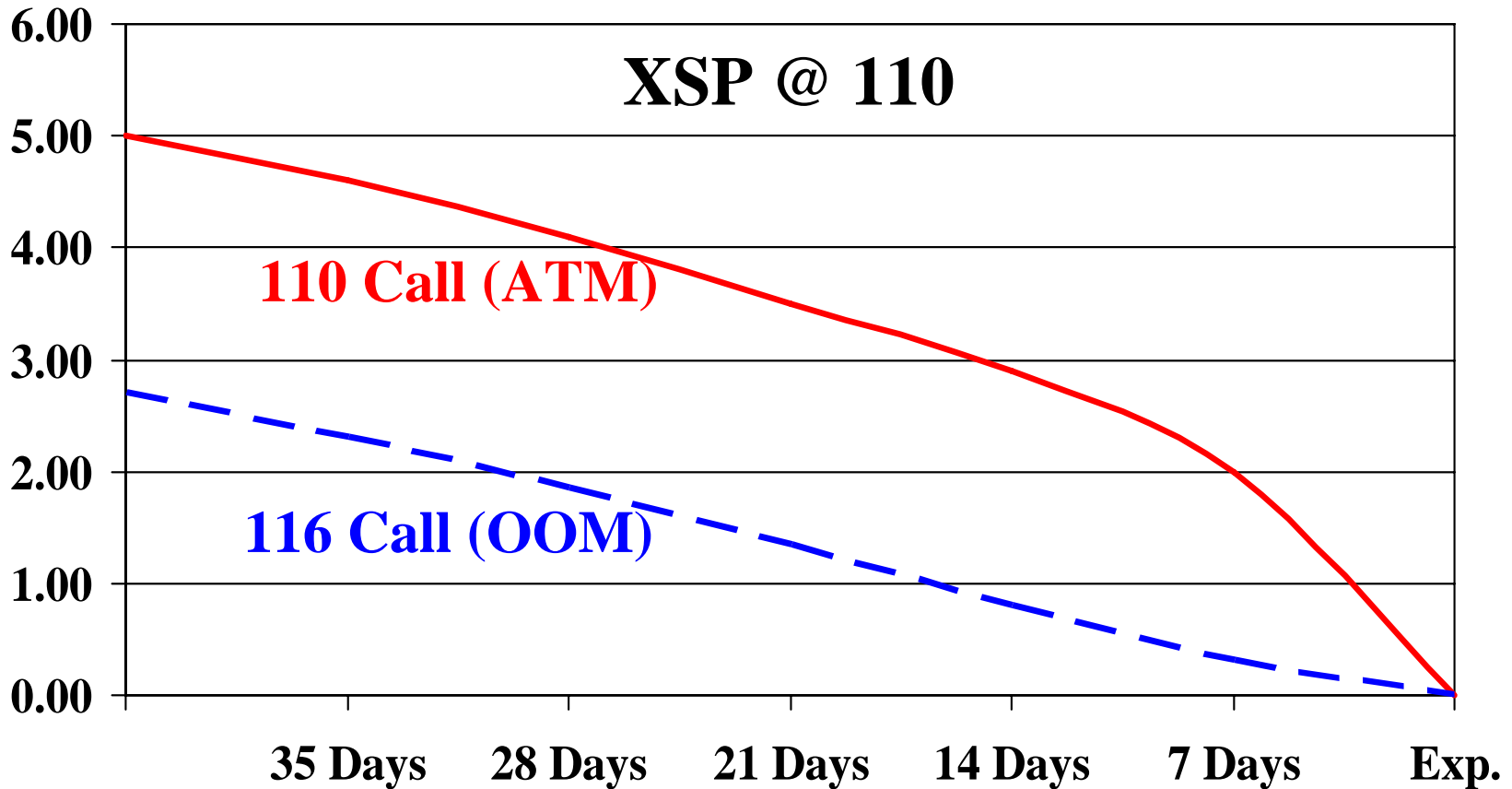
# Concept 2 – Time Decay

Options decrease in value over time. XSP at 110

Call	42	35	28	21	14	7	
<u>Strike</u>	<u>Days</u>	<u>Days</u>	<u>Days</u>	<u>Days</u>	<u>Days</u>	<u>Days</u>	<u>Exp.</u>
107	6.60	6.20	5.70	5.20	4.60	3.90	3.00
110	5.00	4.60	4.10	3.50	2.90	2.00	0.00
113	3.70	3.30	2.80	2.25	1.65	0.90	0.00
116	2.70	2.30	1.85	1.40	0.85	0.30	0.00

**A-T-M & O-O-M Decay at different rates!!**

# Time Decay – A-T-M vs. O-O-M



A-T-M options decay less initially and more as expiration approaches.

O-O-M options decay in a more linear fashion (least erosion near expiration).

# Time Decay - Theta

**XSP Index      110**

**Days to Exp.    56**

**7-Day Theta**

<u>Strike</u>	<u>Call</u>	<u>Theta</u>	<u>Put</u>	<u>Theta</u>
107	7.40	-.37	4.00	-.32
110	5.80	-.38	5.40	-.33
113	4.50	-.38	7.10	-.32
116	3.40	-.36	9.00	-.30

Option prices change less than index prices.

(delta concept)

Time decay is complicated.

Volatility changes.

Option traders need a 3-part forecast

(underlying price, time, volatility )

THANK YOU FOR ATTENDING.

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**bittman@cboe.com**