

Managing Portfolio Risk with Option Overlays

Presented by: Kevin Baldwin

November 29, 2007 @ FIA Expo

www.theIFM.org

About the IFM

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Kevin Baldwin

Kevin Baldwin began his career in the futures and options industry in 1990 with the largest non-bank FCM. He taught their six week futures and options course in Chicago for six years. In addition to the six week Chicago program, he provided shorter term derivatives seminars for client institutions in Buenos Aires, Rio de Janeiro, Tokyo, Seoul, and Moscow on behalf of the British government's Know How fund. Mr. Baldwin was also an instructor for the Illinois Institute of Technology's Master's Program in Financial Markets.

In 1996, Kevin Baldwin joined an innovating Introducing Broker in New York City as managing director and had held various securities and futures registrations including Series 3, 4, 7, 24, 30 and 63. In addition to his professional responsibilities, Kevin became an adjunct faculty member for New York University's School of Continuing Education where he taught both Intermediate Securities Analysis and Futures and Options courses. In 2000, Kevin returned to Chicago and developed a portfolio of websites aimed at different segments of the futures and options community. In the summer of 2006, Mr. Baldwin became the director of education for the Institute for Financial Markets in Washington DC. Since joining the IFM, he has worked to broaden the IFM's course curriculum offerings to include a Trading Strategies & Tactics course aimed at speculators, Financial Risk Blueprints for Hedgers, Credit Derivatives OTC & Exchange Traded, Algorithmic Trading: Is it within your grasp?, as well as our well known Series 3 preparation course.

Mr. Baldwin earned a bachelor of science degree from San Jose State University in California, and an MBA from the University of Chicago, Graduate School of Business.

The risk of loss in trading commodities can be substantial. You should therefore carefully consider whether such trading is suitable for you in light of your financial condition.

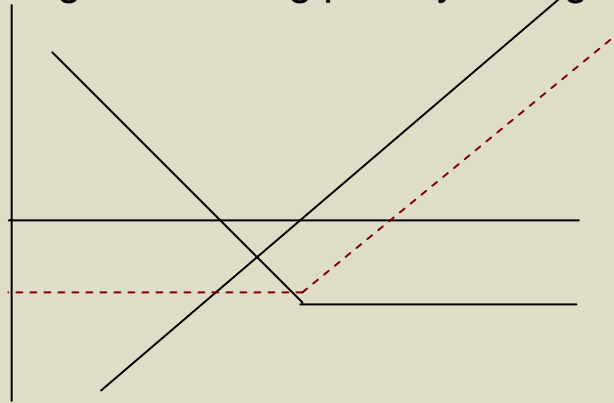
The high degree of leverage that is often obtainable in commodity trading can work against you as well as for you. The use of leverage can lead to large losses as well as gains.

The information contained herein is derived from sources believed to be reliable. The audience should practice their own due diligence.

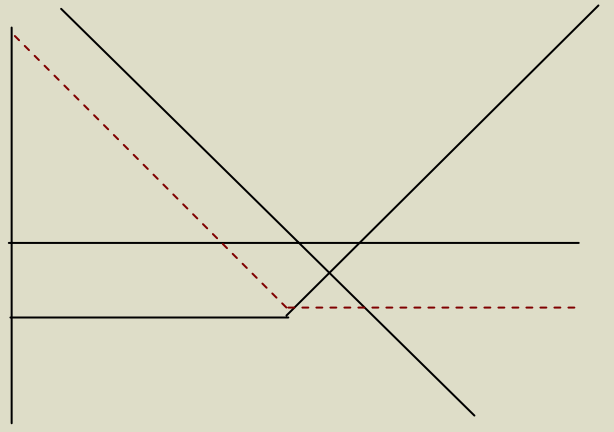
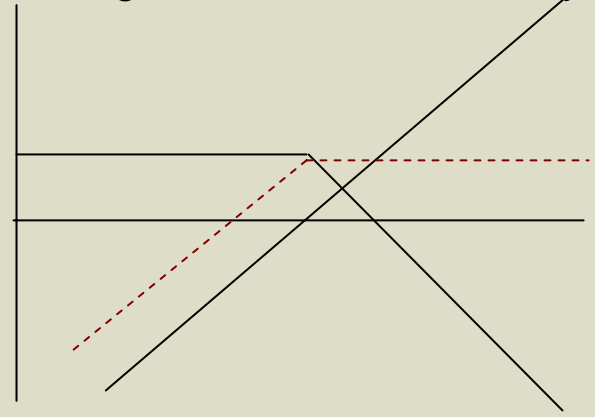


Synthetic ATM options

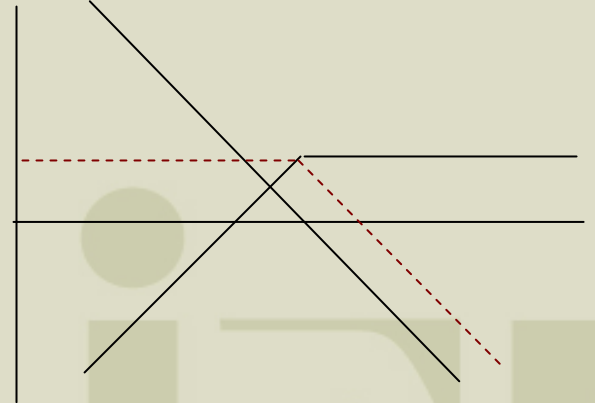
Long Cash+Long put=Syn.Long Call



Long Cash + Short Call = Syn.Short Put



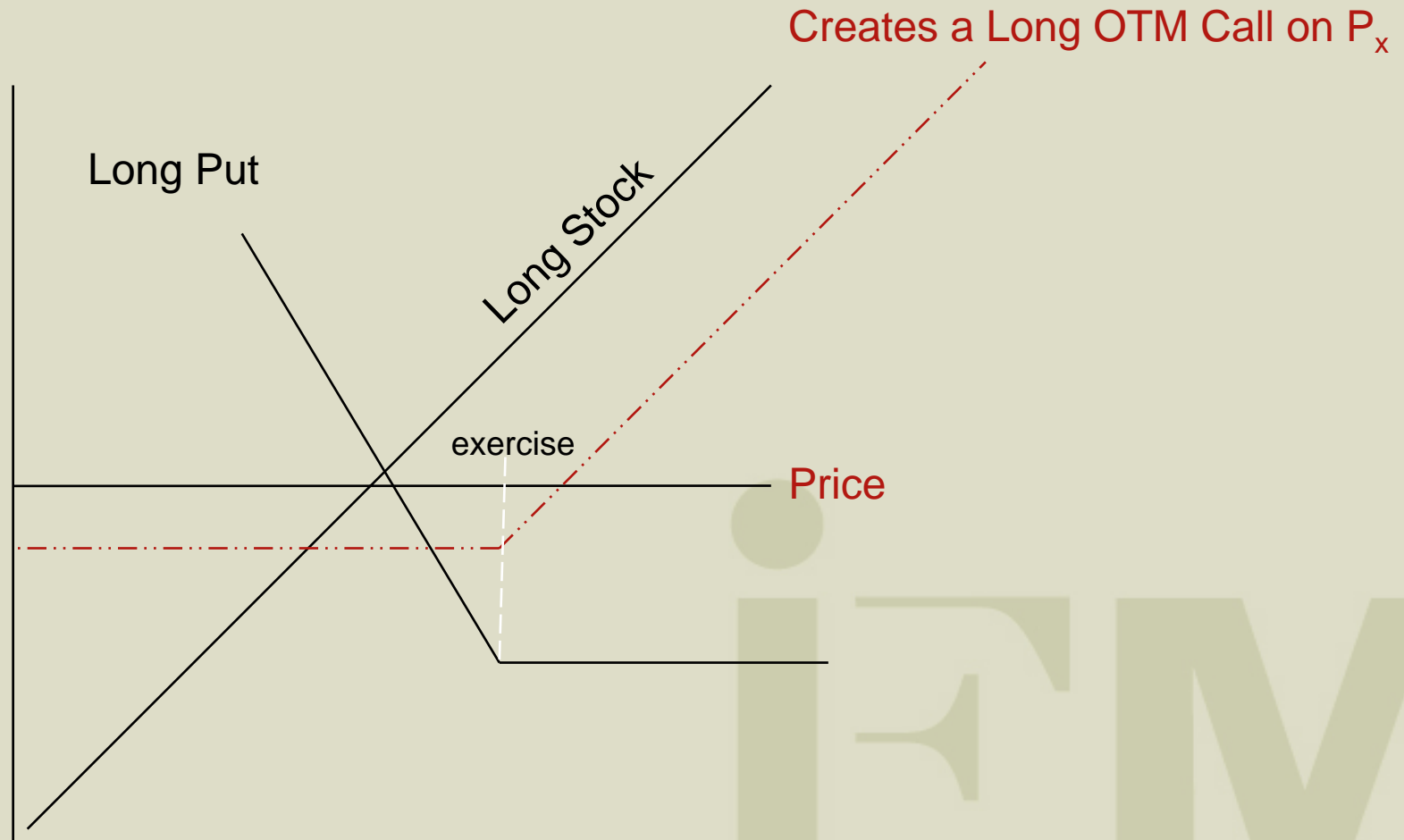
Short Cash + Long Call = Syn.Long Put



Short Cash+Short Put = Syn.Short Call

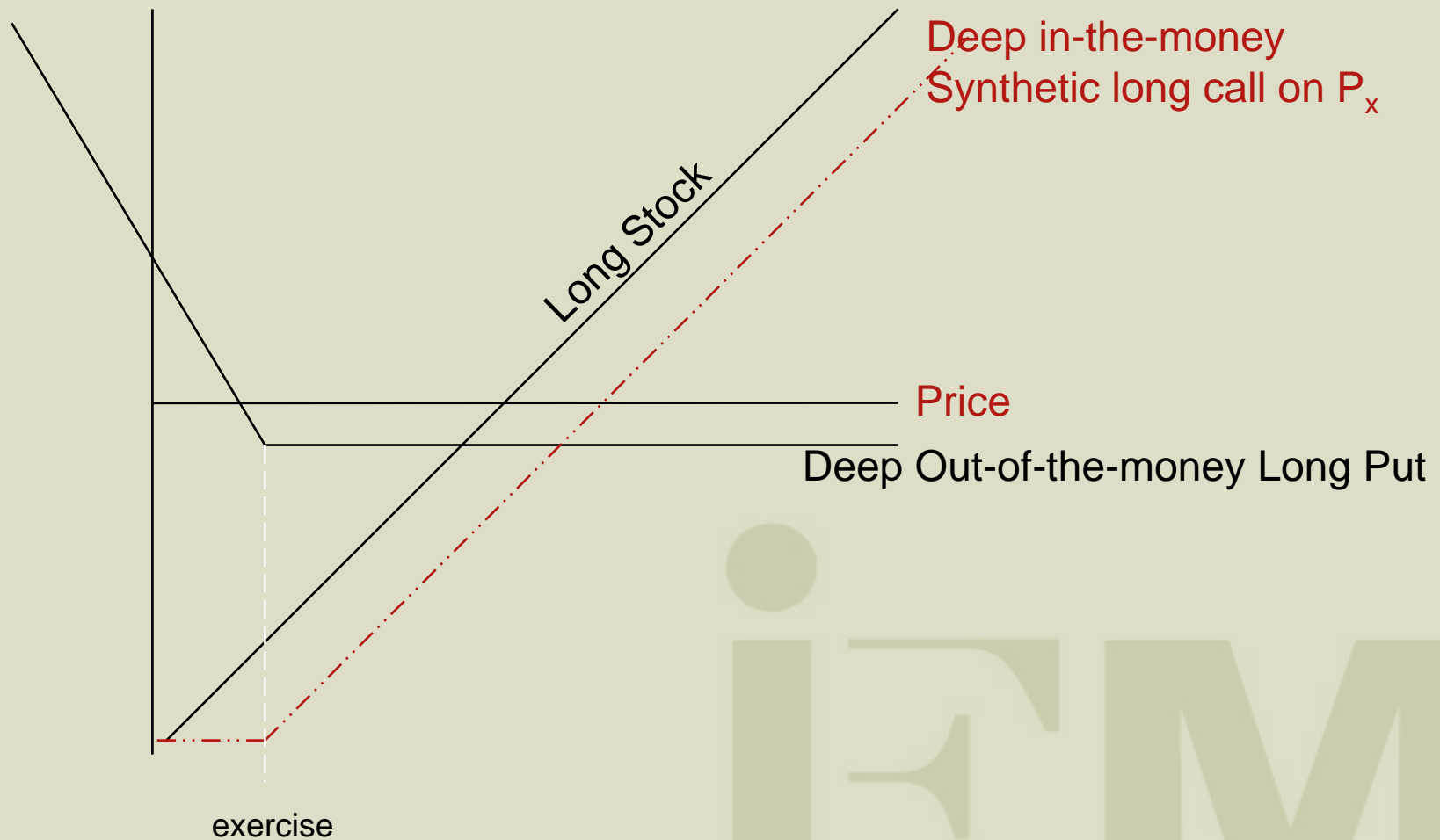
Synthetic OTM Long Call

Long ITM Put, Creates OTM Call



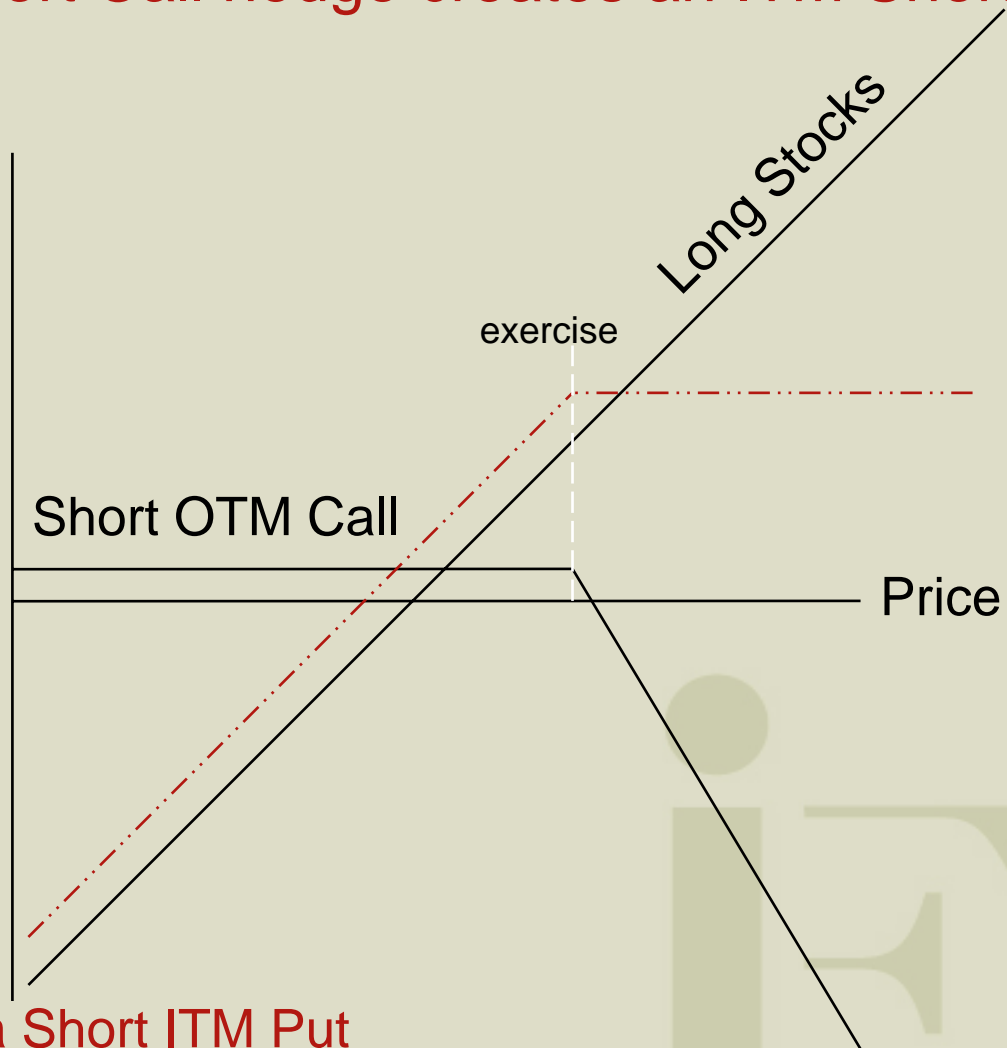
Synthetic ITM Long Call

OTM Long Put with Long Stock Creates ITM Long Call



Synthetic ITM Short Put

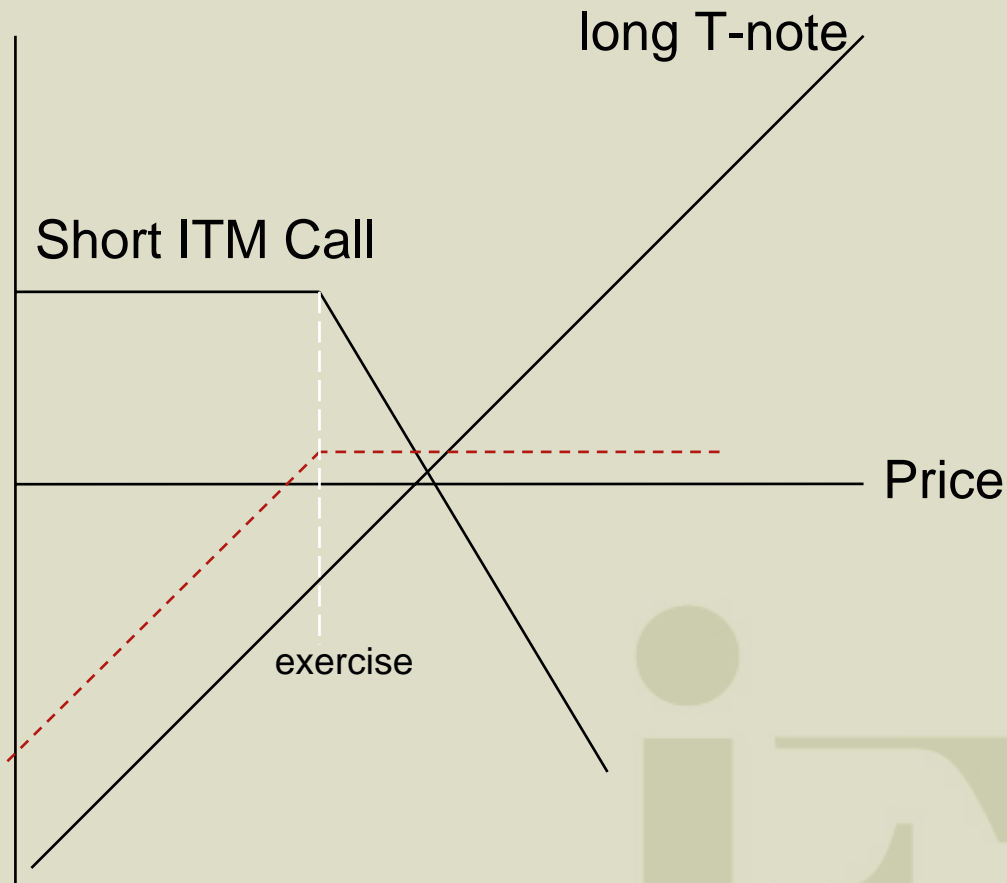
OTM Short Call hedge creates an ITM Short Put



Creates a Short ITM Put

Synthetic OTM Short Put

ITM Short Call hedge creates an OTM Short Put



Synthetic Short OTM Put on P_x

Fence or Collar

OPTION PORTFOLIO SCENARIO ANALYSIS										Page 1/ 1
Summary		Graph		Position		SPU6				
Underlying	Position	Price	Mkt. Val	Cost	Hist. Volatility					
SPU6 Index	10	1287.90	3219750.00	1287.90	10.74					
Exp. 9/15/ 6	Rate 4.66%	Exer. Amer	Cont. Sz. 250.00							
Option	Position	Price	Cost	Imp. Volat.	Delta	Gamma	Vega	7-Day		
1)SPU6 9 C1300	-10	44.10	44.10	12.8132%	.4738	.00311	3.8554	.778		
2)SPU6 9 P1275	10	44.40	44.40	13.2359%	-.4308	.00298	3.8151	.796		
Total Mkt. Val.		3,220,500.00		Total Delta		238.437		Total Gamma		-.329

The fence strategy involves buying a put to protect the downside while financing it with the sale of the call. In affect, you're giving up some *upside* potential in order to gain a *floor* return below. A popular variation of this strategy is the 'zero cost' collar; whereby the two option premium's just offset –hence it's 'zero cost'.

Actually, this strategy has the effect of turning a stock portfolio into a bull vertical call spread. I.e. long stock + long put=synthetic long call. Further you're short a higher struck call. The result is a long synthetic 1275 call and a short 1300 call. Note too that the impact of gamma, theta and vega are largely neutralized.

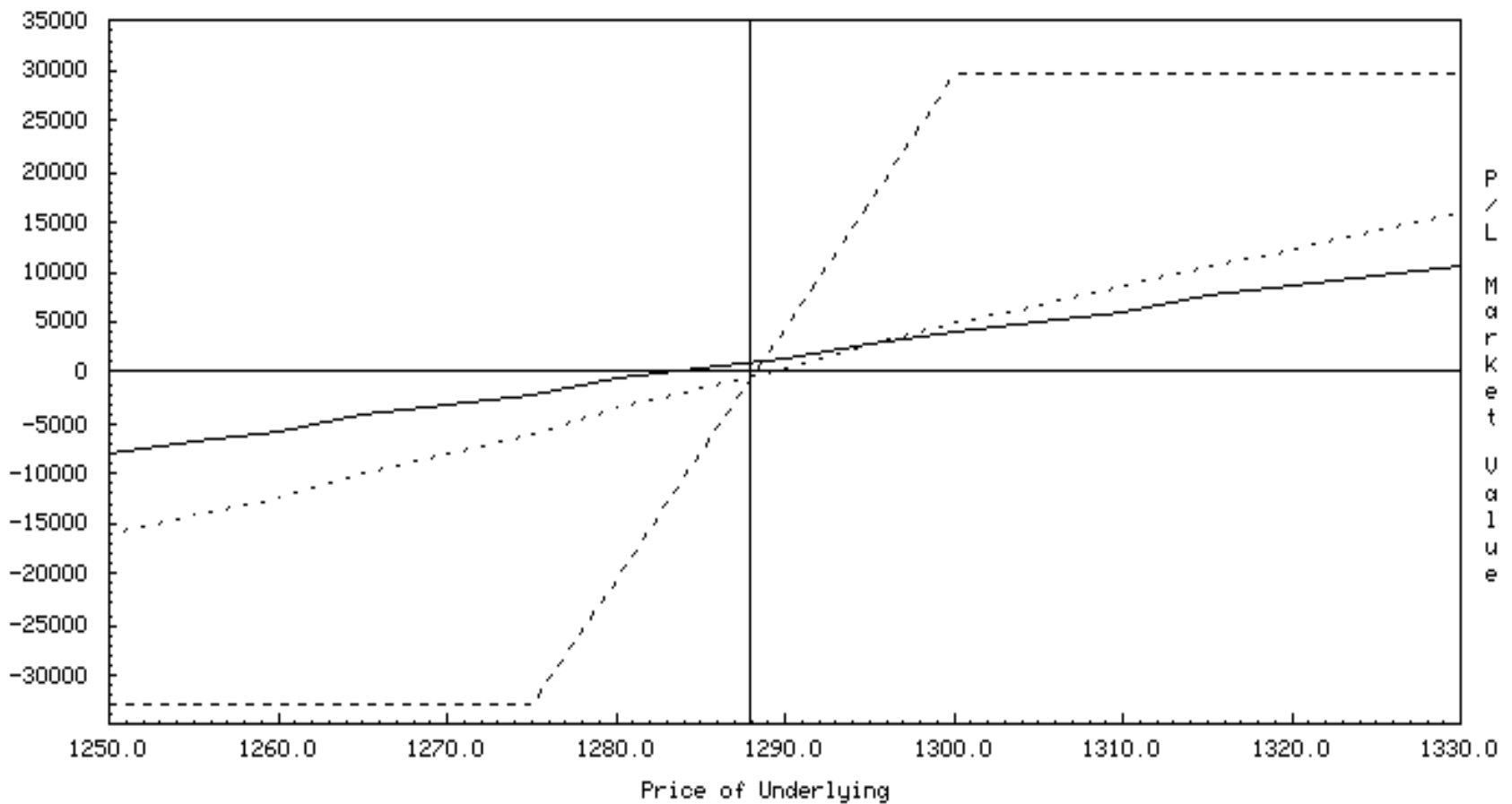
Fence Payoff Graph

OPTION PORTFOLIO SCENARIO ANALYSIS Page 1 / 2

Summary	Graph	Position	SPU6
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X-Axis: **1** Curr. Underlying: **1287.90**
 1-Underlying Price **1250.000** to **1330.000**
 2-Volatility Change **-5.0** to **+5.0**

Evaluation  **2/13/06**
 Dates:  **8/ 1/06**
 **9/15/06**



Fence or Collar

Long Cash + Short ATM Call = Synthetic short ATM Put

Synthetic Short ATM Put + Long OTM Put = Synthetic Vertical Bull Put Spread



Reverse Fence

OPTION PORTFOLIO SCENARIO ANALYSIS Page 1/ 1

Summary		Graph		Position		SPU6				
Underlying	Position	Price	Mkt. Val	Cost	Hist. Volatility					
SPU6 Index	10	1287.90	3219750.00	1287.90	10.74					
Exp. 9/15/ 6	Rate 4.66%	Exer. Amer	Cont. Sz. 250.00							
Option	Position	Price	Cost	Imp. Volat.	Delta	Gamma	Vega	7-Day		
1)SPU6 9 C1300	-10	44.10	44.10	12.8132%	.4738	.00311	3.8554	.778		
2)SPU6 9 P1325	10	68.10	68.10	12.2823%	-.5892	.00318	3.7479	.708		
Total Mkt. Val.		3,279,750.00		Total Delta		-157.662		Total Gamma	.189	

The reverse fence transforms the long stock portfolio into a synthetic bear call spread. Long stock + long 1325 put = synthetic long 1325 call. Combine a short 1300 call with a syn. long 1325 call and you've got a bear vertical call spread. In this case the put strike is higher than the call strike.

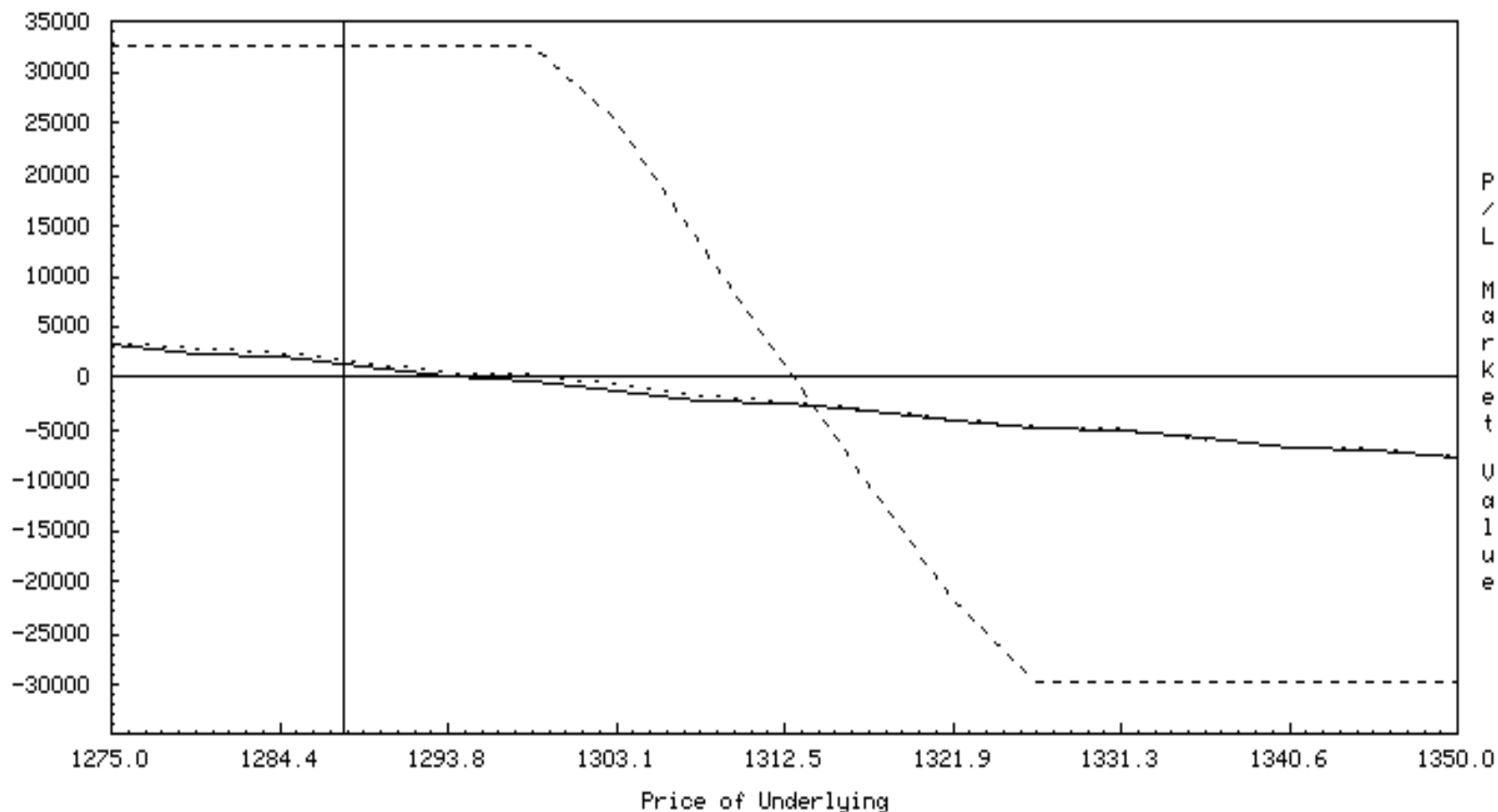
Position delta

Cash	+1.0000
Short call	-0.4738
Long put	<u>-0.5892</u>
Net	-0.0630 or - \$15.75/pt. (mildly bearish)

Reverse Fence Payoff Graph

OPTION PORTFOLIO SCENARIO ANALYSIS Page 1 / 2

Summary	Graph	Position	SPU6
X-Axis: 1			Evaluation <input type="text" value="2/13/06"/>
Curr. Underlying: 1287.90			Dates: <input type="text" value="2/23/06"/>
1-Underlying Price 1275 to 1350			<input type="text" value="9/15/06"/>
2-Volatility Change -5.0 to +5.0			



Reverse Fence

Long Cash + Short ATM = Syn.Short ATM
Call Call Put

Syn.Short + Long ITM = Syn.Vertical
ATM Put Call Bear Put Spd.



'Traditional' Delta hedging

- Neutralize exposure to price movement by selling calls or buying puts in a ratio determined by delta.



The Neutral Ratio

$$\text{Neutral Ratio} = [1/\text{delta}] \times \text{HR}$$

HR=Hedge Ratio



SPY US \$ ↓ **126.53** -.11 T 2sEquity **DES**

DELAY 11:50 Vol 20,170,000 Op 126.57 T Hi 128.46 O Lo 125.65 O Prev 126.64

SPY US

DESCRIPTION

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SPDR TRUST SERIES 1

Objective - Index Fund-Large Cap

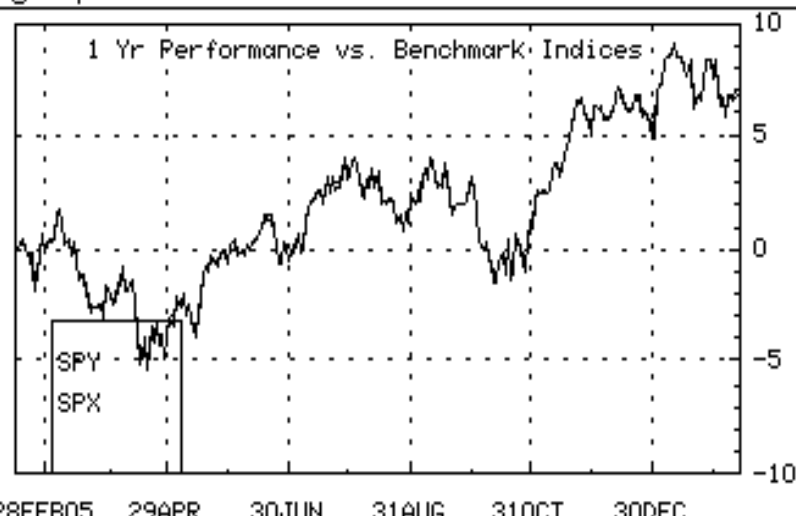
SPDR Trust Series 1 issues exchange-traded funds called Standard & Poor's Depository Receipts or "SPDRs". The SPDR Trust holds all of the common stocks of the Standard & Poors 500 Composite Stock Price Index and intends to provide investment results that, before expenses, correspond to the price and yield of the S&P 500 Index. Initial Index ratio upon inception was 1/10 of SPX.

Bloomberg Classification Data

Asset Class	Equity	Style	Index Fund
Market Cap Focus	Large-cap	Geographic Focus	U.S.

Current Data

Underlying Index	12)	SPX
1)GP Price	\$	126.53
52Wk Hi	1/11	\$ 129.440
52Wk Lo	4/20	\$ 113.550
NAV	2/13	\$ 126.82
INAV		\$ 126.52
%Premium	n.a.	
Shares Out(x000)	2/13/06	404107.0
Market cap(mil)	\$	51441.66



Long 127,000 'SPY' @ 126.53 = \$16,069,310

$$\text{HR} = \frac{\text{Portfolio Value}}{[\$250^* \times \text{SPX quote}]} \times \text{Port. Beta}$$

$$= \frac{\$16,069,310 \times 1.0000}{[\$250 \times 1288.40]}$$

$$= 49.9 \text{ contracts} \cong 50 \text{ contracts}$$

emini S&P500 multiplier is \$50, big S&P contract is \$250,
mini Nasdaq=\$20, etc.

Hypothetical Delta's

If SPU6₁₃₀₀ call delta = 0.4738 . . .

Neutral Ratio = $[1/0.4738] \times 50$ cts.
= 105.53 options

If delta were 0.6000. . . NR = 83.3 options

If delta were 0.4000. . . NR = 125 options

NR=Neutral Ratio



Managing the Position

	<u>Short Calls</u>	<u>Long Puts</u>
Mkt Rallies:	Liquidate	Buy
Mkt Falls:	Sell	Liquidate



Overwrite the calls

OPTION PORTFOLIO SCENARIO ANALYSIS										
Summary		Graph			Position					
Underlying	Position	Price	Mkt. Val	Cost	Hist. Volatility					
SPU6 Index	50	1288.40	16105000.00	1288.40	10.74					
Exp. 9/15/ 6	Rate 4.65%	Exer. Amer	Cont. Sz. 250.00							
Option	Position	Price	Cost	Imp. Volat.	Delta	Gamma	Vega	7-Day		
1)SPU6 9 C1300	-106	44.10	44.10	12.8128%	.4739	.00311	3.8556	.778		
Total Mkt. Val.		14,936,350.00		Total Delta		-57.164		Total Gamma		-82.367

Long stocks + 1 short call = Synthetic short 1300 Put

Synthetic short 1300 Put + Short 1300 Call = short 1300 straddle.

$1/0.4739 \times 50 = 105.507$ contracts, or 106



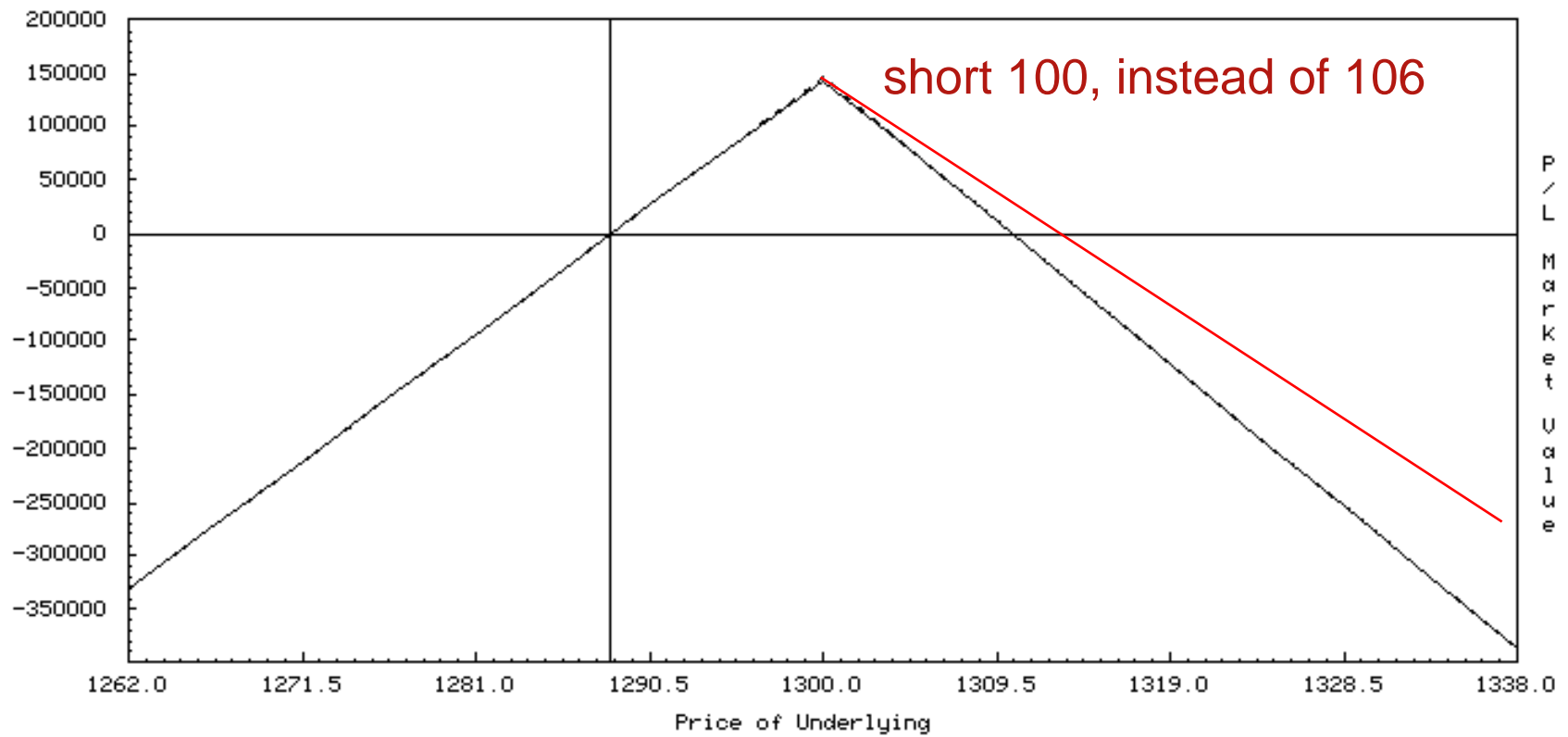
Long Stock + 106 short SPU6₁₃₀₀ calls

OPTION PORTFOLIO SCENARIO ANALYSIS Page 1 / 2

Summary	Graph	Position
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X-Axis: **1** Curr. Underlying: **1288.40**
1-Underlying Price **1262** to **1338**
2-Volatility Change **-5.0** to **+5.0**

Evaluation **2/13/06**
Dates: **7/ 1/06**
 9/15/06



Synthetic long straddle

Long Cash + Long Put = Syn.Long Call

Syn.Long Call + Long Put = Syn. Long Straddle



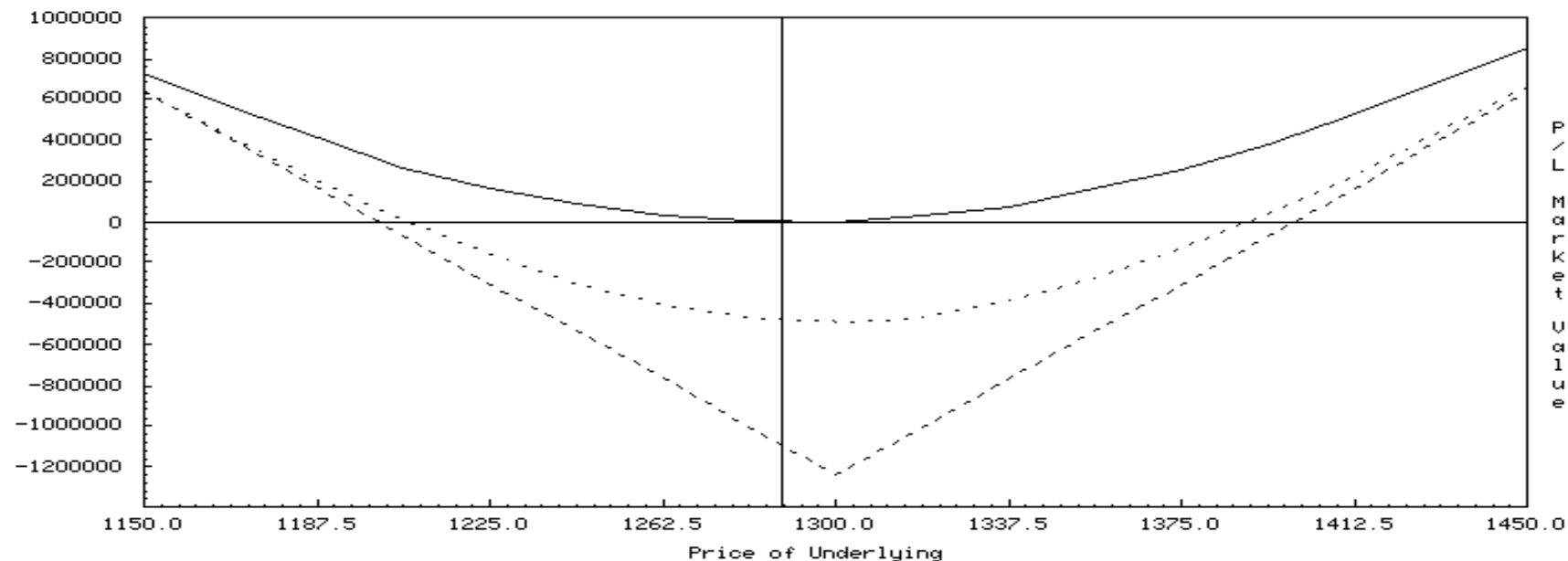
Long Stock + Overbuy Puts, long 100 puts

OPTION PORTFOLIO SCENARIO ANALYSIS Page 1/ 1

Summary		Graph		Position					
Underlying	Position	Price	Mkt. Val	Cost	Hist. Volatility				
SPUG Index	50	1288.40	16105000.00	1288.40	10.74				
Exp. 9/15/ 6	Rate 4.65%	Exer. Amer	Cont. Sz. 250.00						
Option	Position	Price	Cost	Imp. Volat.	Delta	Gamma	Vega	7-Day	
1)SPUG 9 P1300	100	55.40	55.40	12.7910%	-.5079	.00313	3.8556	.771	
Total Mkt. Val.		17,490,000.00		Total Delta		-196.348		Total Gamma 78.201	

OPTION PORTFOLIO SCENARIO ANALYSIS Page 1/ 2

Summary		Graph		Position					
X-Axis: 1	Curr. Underlying: 1288.40	Evaluation	<input type="checkbox"/>			2/13/06			
1-Underlying Price	1150 to 1450	Dates:	<input type="checkbox"/>			7/ 1/06			
2-Volatility Change	-5.0 to +5.0		<input type="checkbox"/>			9/15/06			



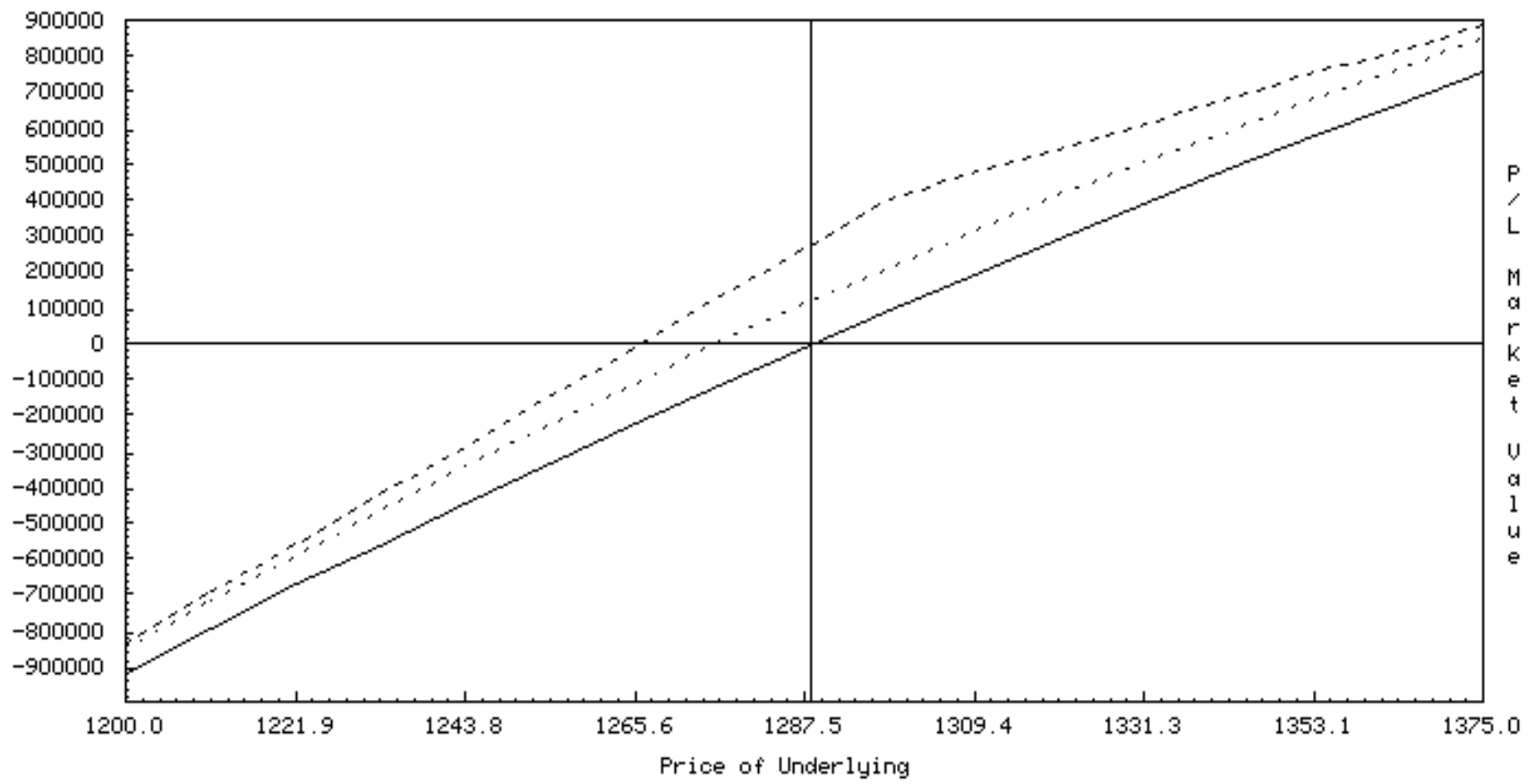
Long Stock + Under write Calls, short 25 SPU6 1300 calls

OPTION PORTFOLIO SCENARIO ANALYSIS Page 1 / 2

Summary	Graph	Position
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X-Axis: **1** Curr. Underlying: **1288.40**
 1-Underlying Price **1200** to **1375**
 2-Volatility Change **-5.0** to **+5.0**

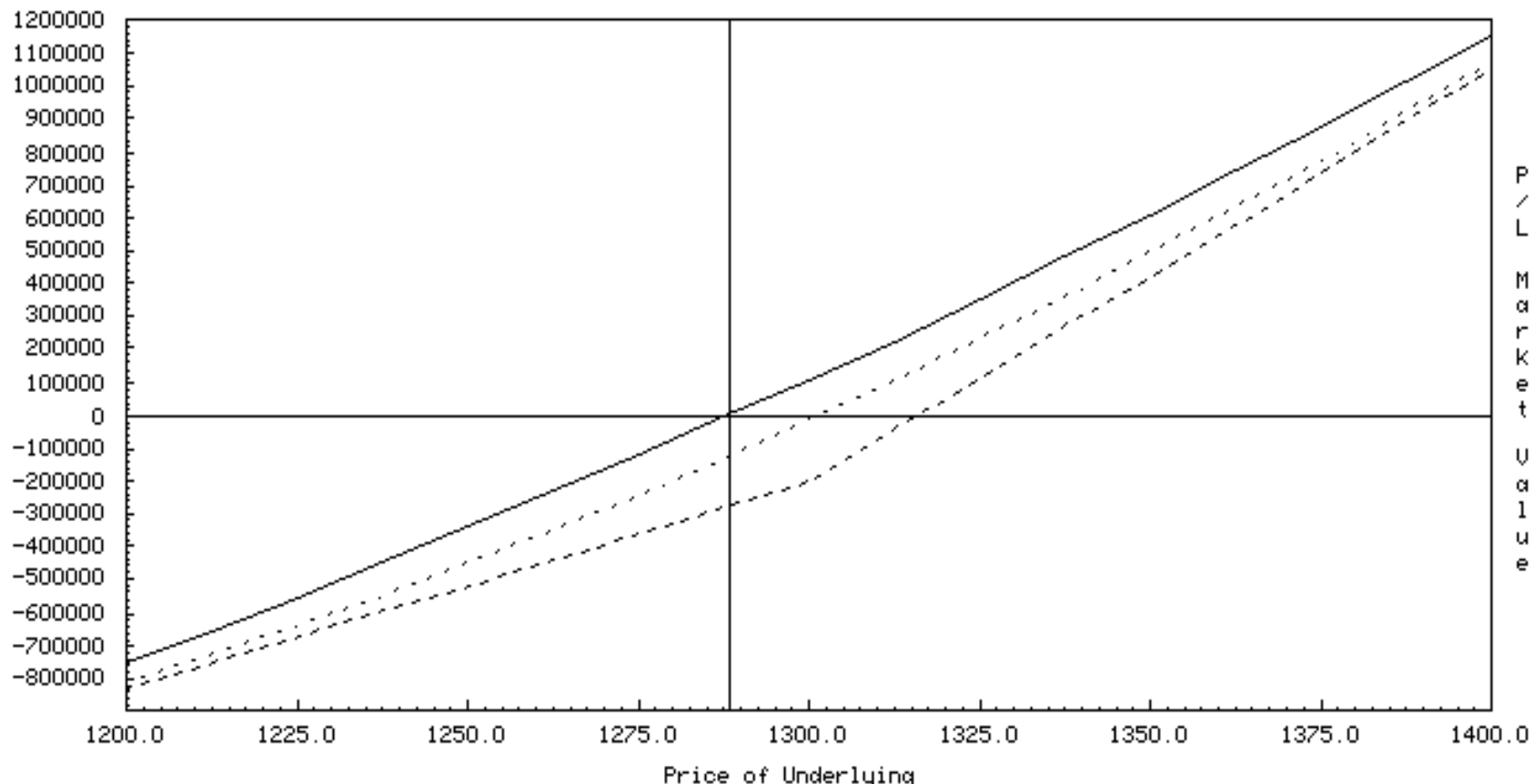
Evaluation **2/13/06**
 Dates: **7/ 1/06**
 9/15/06



Long Stock + Under Bought Puts; 1/2 x Hedge Ratio

OPTION PORTFOLIO SCENARIO ANALYSIS Page 1 / 2

Summary	Graph	Position		
X-Axis: 1			Curr. Underlying: 1288.40	Evaluation <input type="checkbox"/> 2/13/06
1-Underlying Price 1200 to 1400				Dates: <input type="checkbox"/> 7/ 1/06
2-Volatility Change -5.0 to +5.0				<input type="checkbox"/> 9/15/06



Short call hedge

OPTION PORTFOLIO SCENARIO ANALYSIS Page 1/ 1

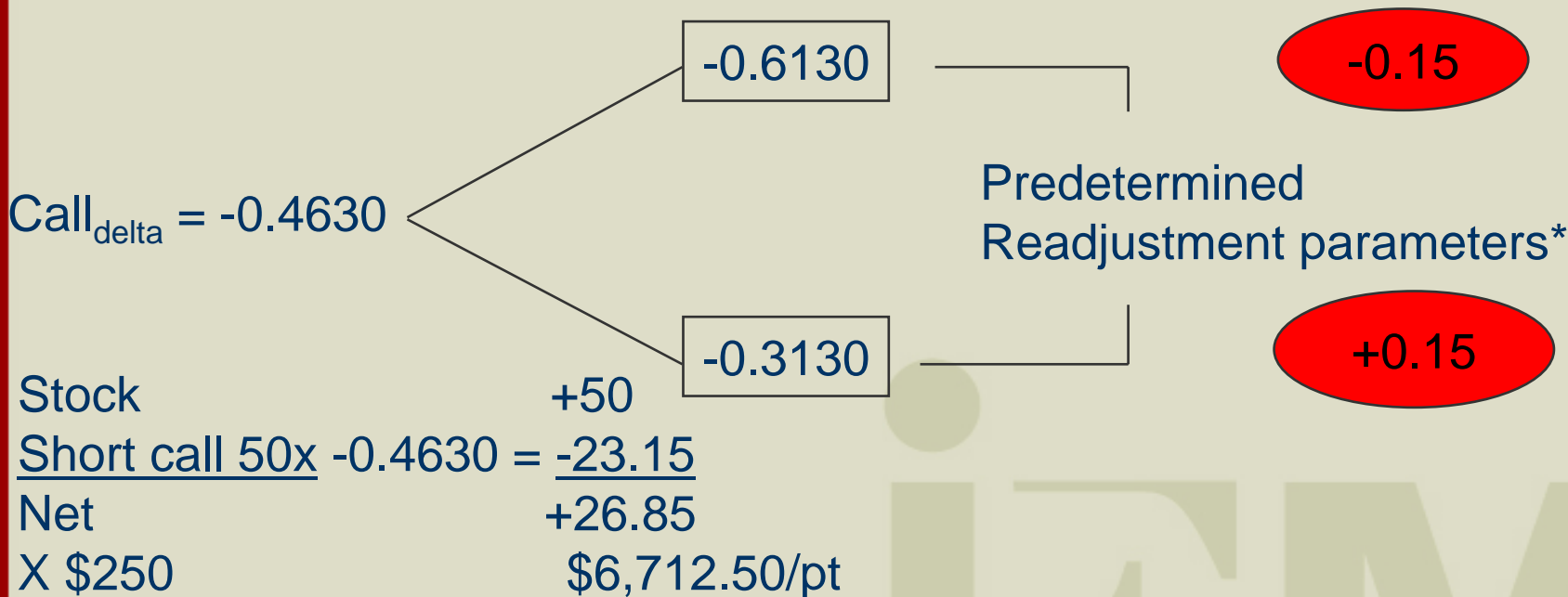
Summary		Graph		Position						
Underlying	Position	Price	Mkt. Val	Cost	Hist. Volatility					
SPU6 Index	50	1288.40	16105000.00	1288.40	10.74					
Exp. 9/15/ 6	Rate 4.66%	Exer. Amer	Cont. Sz. 250.00							
Option	Position	Price	Cost	Imp. Volat.	Delta	Gamma	Vega	7-Day		
1)SPU6 9 C1300	-50	44.10	44.10	13.3666%	.4630	.00299	3.8414	.810		
Total Mkt. Val.		15,553,750.00		Total Delta		6712.694		Total Gamma -37.338		

Feb. 10, 2006

Mkt/Vol	Stk	1250	1275	1300	1325	1350
1288.40	Call	69.52	55.85	44.10	34.22	26.08
	Delta	0.6216	0.5464	0.4630	0.3962	0.3266
	Put	32.17	42.82	55.40	69.82	86.00
	Delta	0.3511	0.4263	0.5024	0.5765	0.6460

OPTION PORTFOLIO SCENARIO ANALYSIS Page 1/ 1

Summary		Graph		Position					
Underlying	Position	Price	Mkt. Val	Cost	Hist. Volatility				
SPUG Index	50	1288.40	16105000.00	1288.40	10.74				
Exp. 9/15/ 6	Rate 4.66%	Exer. Amer	Cont. Sz. 250.00						
Option	Position	Price	Cost	Imp. Volat.	Delta	Gamma	Vega	7-Day	
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Total Mkt. Val.		15,553,750.00		Total Delta		6712.694		Total Gamma	-37.338



*Pick any parameter you like, the bigger the change you allow will reduce commissions and the spreads you pay at the expense of defeating the effectiveness of what you're trying to accomplish.

If delta is 'too high' ---> 'Roll-Up'

If delta is 'too low' ---> 'Roll-down'

If gamma is 'too high' ---> 'Roll-over'



‘Traditional’ delta hedge . . .

Variable number of calls; fixed
strike

‘Dynamic’ CCW {Covered Call Writing}

Variable Strike; fixed number calls



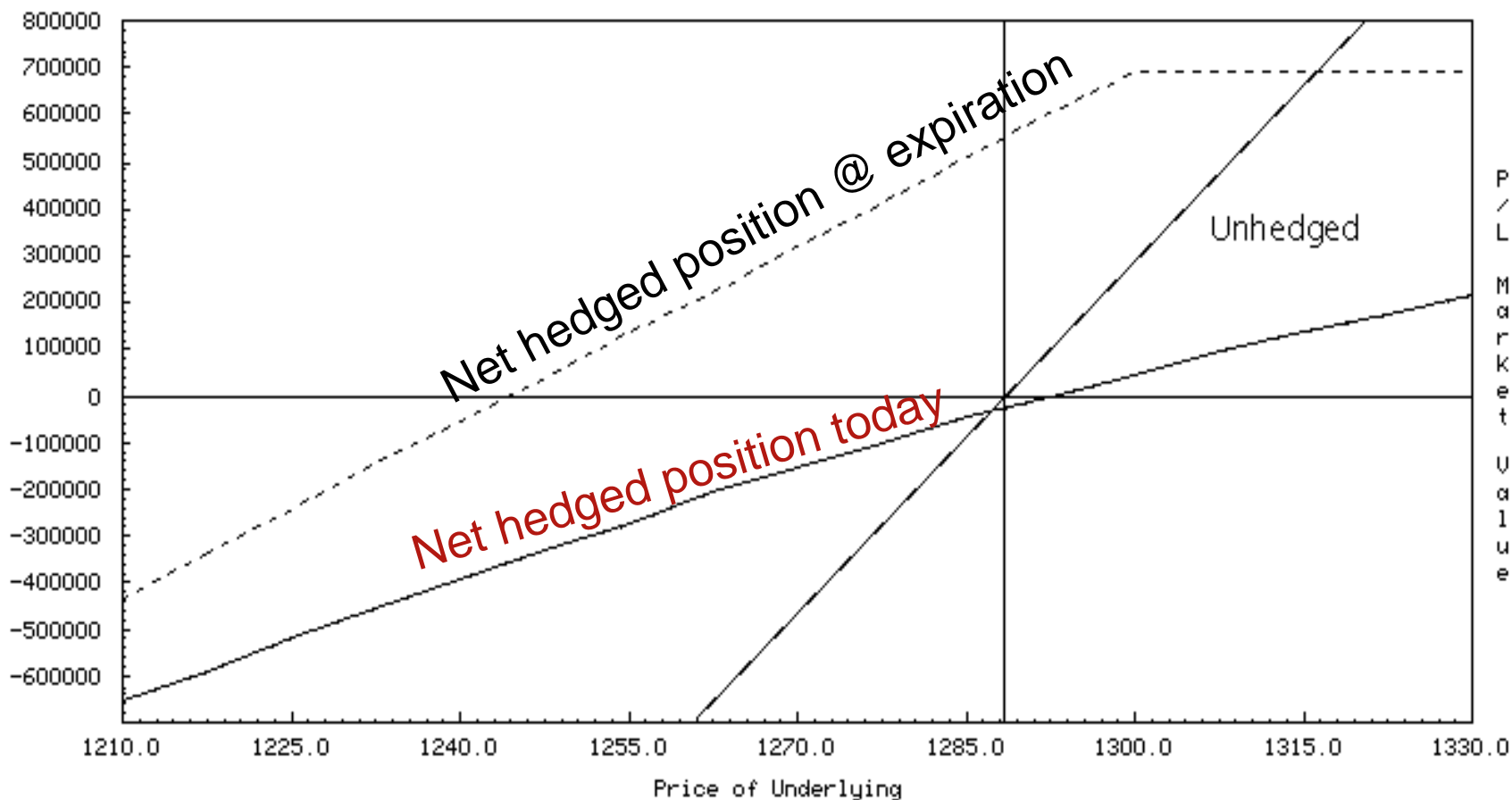
Payoff diagram as of Feb 13

OPTION PORTFOLIO SCENARIO ANALYSIS Page 1 / 2

Summary	Graph	Position
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X-Axis: **1** Curr. Underlying: **1288.40**
 1-Underlying Price **1210** to **1330.000**
 2-Volatility Change **-5.0** to **+5.0**

Evaluation **2/13/06**
 Dates: **2/13/06**
 9/15/06



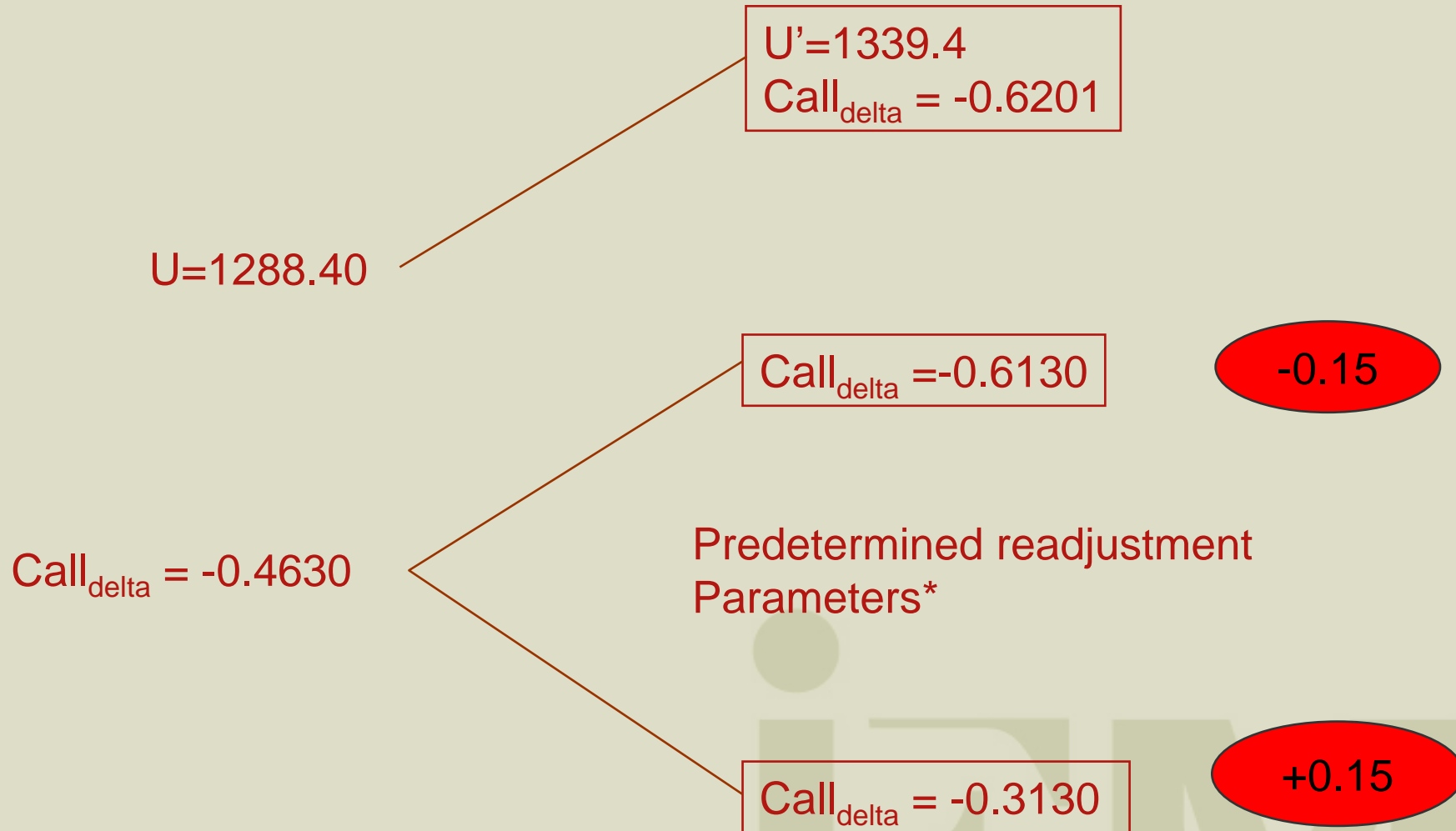
SPU6

Date: 2/13/ 6 Exp: 9/15/ 6 Days: 214
 Tics/pt: 100/ 100 Vol: 12.883% Rate: 4.66%

Mkt/Vol	Strike:	<u>1250</u>	<u>1275</u>	<u>1300</u>	<u>1325</u>	<u>1350</u>
1288.40	Call	69.53	55.86	44.10	34.21	26.08
	Delta	0.6219	0.5466	0.4630	0.3963	0.3267
	Put	32.17	42.82	55.40	69.83	86.02
	Delta	0.3512	0.4265	0.5024	0.5768	0.6464



Market up \$51



HR = 100 futures contracts

Cash has +50 delta	+50
The 50 ATM short 1300 Sept. Calls have a delta of -0.4630×50	- <u>23.15</u>
Net Portfolio delta	+26.85

The +26.85 delta represents the position delta of a synthetic ATM short put. We will arbitrarily make HR adjustments to maintain that portfolio property.



Simulation of 51 point rally to 1339.40

Date: 2/13/ 6 Exp: 9/15/ 6 Days: 214
 Tics/pt: 100/ 100 Vol: 12.883% Rate: 4.66%

Mkt/Vol	Stk	1250	1275	1300	1325	1350
-1.00%	Call	101.77	84.09	68.25	54.38	42.50
	Delta	0.7682	0.7020	0.6283	0.5500	0.4706
	Put	14.78	21.43	29.91	40.36	52.82
	Delta	0.2048	0.2711	0.3448	0.4230	0.5025
1339.40	Call	104.72	87.48	71.98	58.31	46.48
	Delta	0.7524	0.6893	0.6204	0.5479	0.4747
	Put	17.73	24.81	33.64	44.29	56.79
	Delta	0.2206	0.2837	0.3527	0.4251	0.4984
+1.00%	Call	107.78	90.93	75.73	62.24	50.46
	Delta	0.7385	0.6785	0.6138	0.5464	0.4784
	Put	20.79	28.27	37.40	48.23	60.77
	Delta	0.2345	0.2945	0.3592	0.4267	0.4947

Market Up \$51, What do you do now?

$$U = 1288.40$$

$$U' = 1339.40$$

$$\text{Call}_{\text{delta}'} = -0.6204$$

We were short 50 SPU6₁₃₀₀ Calls which transformed the portfolio into a synthetic short ATM Put; position delta +26.85 After the futures rally to 1339.4, the call delta falls to -0.6204 which results in a new position delta of +18.98 {50+(-0.6204x50)} or an OTM¹ short put. Either adjust the hedge ratio of the existing strike, or rebalance with the new ATM² strike.

$$\#1. +50 + (N_{1300} \times -0.6204) = +25$$

$N_{1300} = 40.3$; cover 10 of the 50 short 1300 calls

$$\#2. \text{The SPU6}_{1350} \text{ Calls will have a delta of } -0.4747 \text{ after the futures rally } 51 \text{ pts. } +50 + (N_{1350} \times -0.4747) = +25 ; N_{1350} = 52.66 \text{ contracts}$$

Cover the 50 short SPU6₁₃₀₀ calls replacing them with 53 SPU6₁₃₅₀ short calls.

¹OTM = out-of-the-money

²ATM = at-the-money

Simulate \$53 point break on Feb 13, 2006

$\sigma = 12.883\%$, 214 DTM

Mkt/Vol	Stk	1250	1275	1300	1325	1350
-1.00%	Call	37.14	27.69	20.17	14.36	9.98
	Delta	0.4541	0.3713	0.2952	0.2282	0.1716
	Put	51.35	66.22	83.03	101.54	121.49
	Delta	0.5189	0.6017	0.6778	0.7448	0.8015
1235.40	Call	40.80	31.22	23.43	17.25	12.46
	Delta	0.4595	0.3828	0.3115	0.2476	0.1924
	Put	55.01	69.75	86.28	104.43	123.97
	Delta	0.5136	0.5903	0.6616	0.7254	0.7807
+1.00%	Call	44.47	34.77	26.75	20.25	15.09
	Delta	0.4643	0.3929	0.3259	0.2651	0.2114
	Put	58.67	73.30	89.61	107.44	126.60
	Delta	0.5088	0.5802	0.6471	0.7080	0.7616



Market Breaks \$53

$$U = 1288.4$$

$$U' = 1235.40$$
$$\text{Call}_{\text{delta}} = -0.3115$$

$$\text{Call}_{\text{delta}} = -0.6130$$

-0.15

$$\text{Call}_{\text{delta}} = -0.4630$$

Predetermined readjustment
parameters

$$\text{Call}_{\text{delta}} = -0.3130$$

+0.15

Market Breaks \$53

$$U = 1288.40$$

$$U' = 1235.40$$

$$\text{Call}_{\text{delta}} = -0.3115$$

We were short 50 SPU6₁₃₀₀ struck calls which transformed our portfolio into an ATM synthetic short put; position delta = +26.85. After the break to 1235.40 the position delta is +50 + (50 x -0.3115) = +34.42. Rebalance to obtain the desired ATM short put property.

$$\#1. +50 + (N_{1300} \times -0.3115) = +25 \quad N_{1200} = 80.26$$

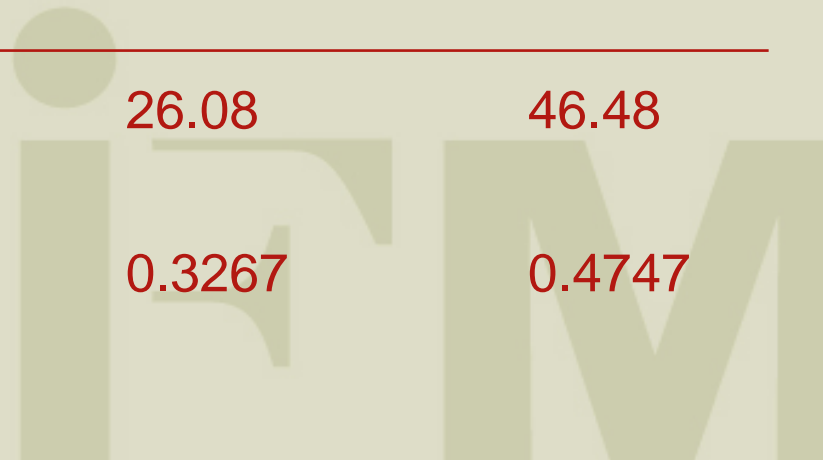
Sell an additional 30 (we're already short 50) of the SPU6₁₃₀₀ calls.

$$\#2. +50 + (N_{1250} \times -0.4595) = +25 \quad N_{1250} = 54.4$$

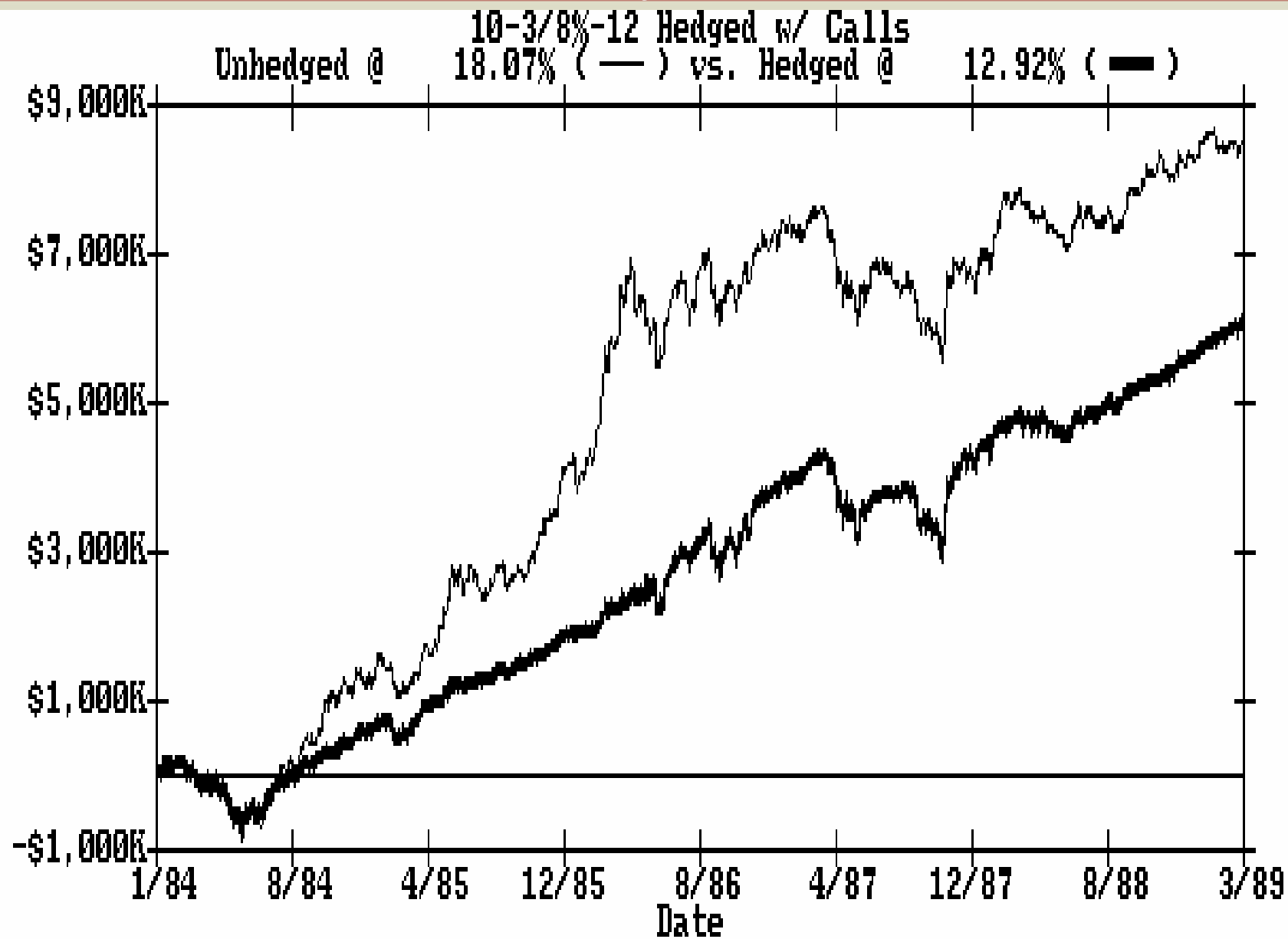
Cover the original 50 short SPU6₁₃₀₀ calls replacing them with 54 short SPU6₁₂₅₀ Calls.

DCCW Strategy: buy (cover) on rallies, sell more on declines.

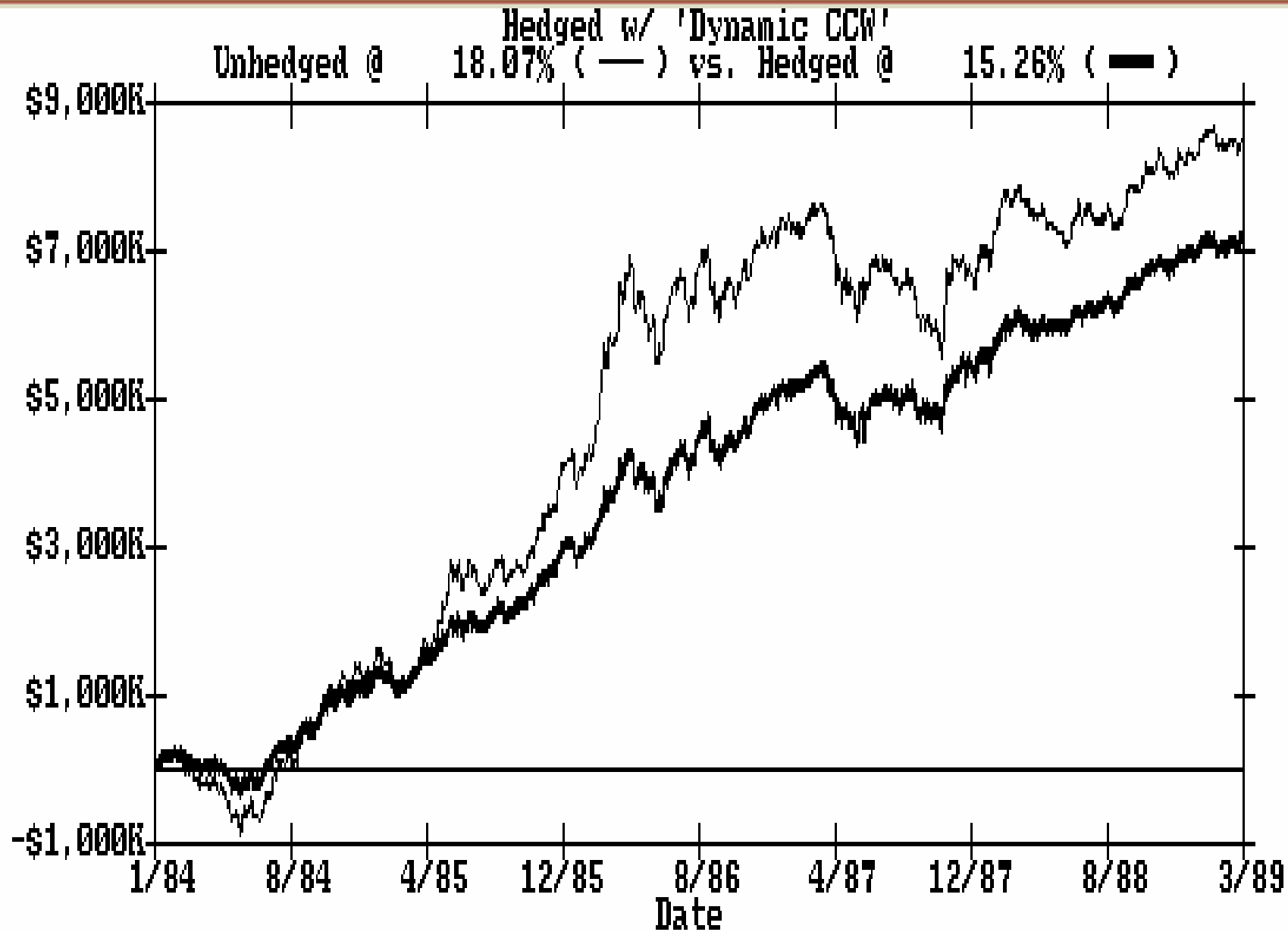
	$U'=1235.4$	$U=1288.4$	$U'=1339.4$
1250 call prem	40.8	69.53	104.72
1250 delta	0.4595	0.6219	0.7524
1300 call prem	23.43	44.10	71.98
1300 delta	0.3115	0.4704	0.6204
1350 call prem	12.46	26.08	46.48
1350 delta	0.1924	0.3267	0.4747



Unmanaged short calls implemented over 5 years



DCCW implemented over same 5 years



Managing the Long Put hedge

OPTION PORTFOLIO SCENARIO ANALYSIS										Page 1 / 1
Summary		Graph			Position					
Underlying	Position	Price	Mkt. Val	Cost	Hist. Volatility					
SPU6 Index	50	1288.40	16105000.00	1288.40	10.74					
Exp. 9/15/ 6	Rate 4.65%	Exer. Amer	Cont. Sz. 250.00							
Option	Position	Price	Cost	Imp. Volat.	Delta	Gamma	Vega	7-Day		
1)SPU6 9 P1300	50	55.40	55.40	11.9821%	-.5315	.00335	3.8242	.714		
Total Mkt. Val.		16,797,500.00		Total Delta		5855.789		Total Gamma		41.845

Long stock+Long ITM¹ put=Synthetic OTM Call, strike 1300

Whereas the short call hedge left you:
+delta, -gamma, -vega, and +theta

The long put hedge transforms your portfolio:
+delta, +gamma, +vega, and -theta

Each are bullish, yet they have very different views about:

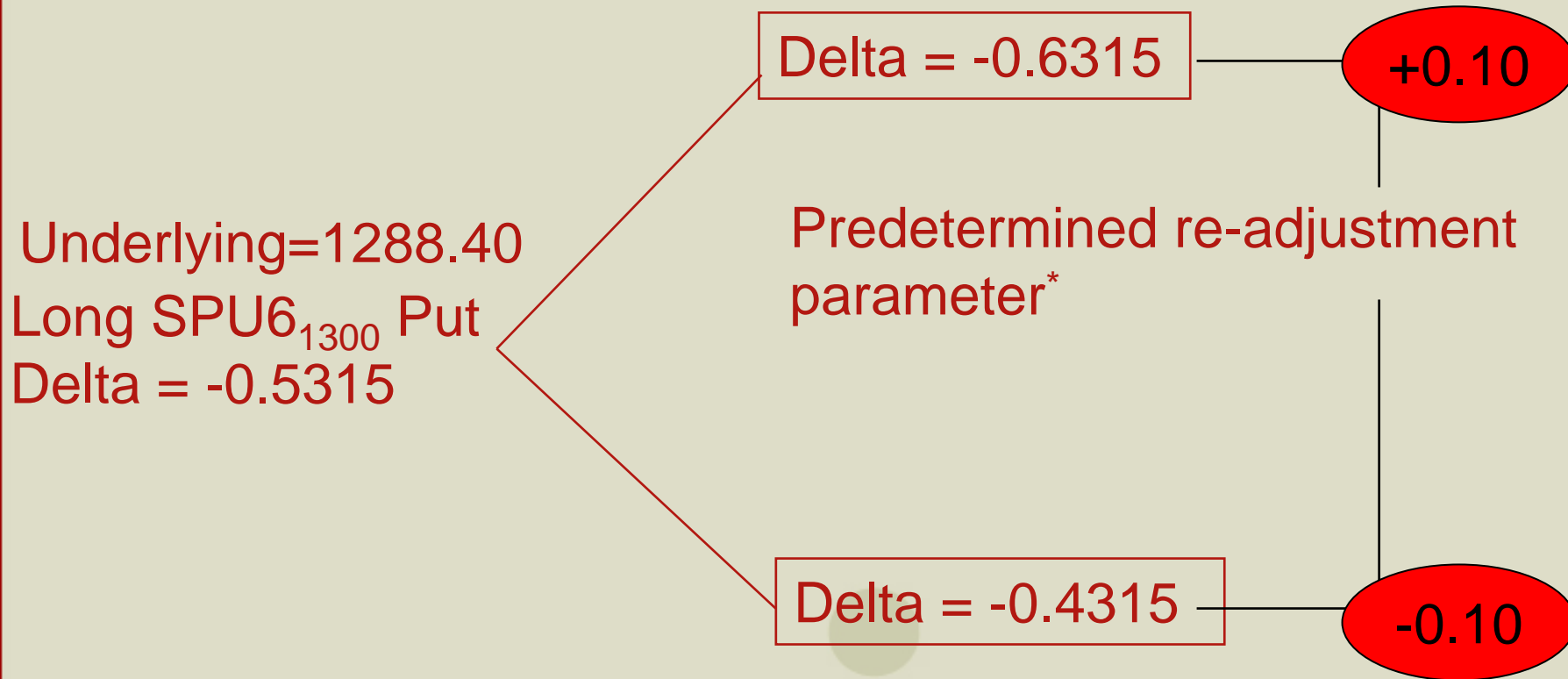
gamma: convexity of delta

vega: sharpness (relative vol. level) of expected move

theta: timing of the expected move

¹=ITM=in-the-money ²=OTM=out-of-the-money

Readjustment parameters: precision vs. whipsaw



*Pick any parameter you like, the bigger the change you allow will reduce commissions and the spreads you pay at the expense of defeating the effectiveness of what you're trying to accomplish. Too small a parameter will result in frequent whip-saw.

Date: 2/13/ 6 Exp: 9/15/ 6 Days: 214

Tics/pt: 100/ 100 Vol: 12.886% Rate: 4.66%

Mkt/Vol	Stk	1250	1300	1350
-1.00%	Call	82.64	52.96	31.35
	Delta	0.7026	0.5477	0.3880
	Put	20.94	39.92	66.97
	Delta	0.2704	0.4254	0.5850
1313.40	Call	85.96	56.82	35.14
	Delta	0.6900	0.5458	0.3983
	Put	24.26	43.78	70.76
	Delta	0.2831	0.4273	0.5747
+1.00%	Call	89.34	60.68	38.96
	Delta	0.6791	0.5444	0.4074
	Put	27.65	47.64	74.57
	Delta	0.2939	0.4287	0.5657



$$U = 1288.40$$

$$\text{delta} = -0.5315$$

$$U' = 1313.40$$

$$\text{Delta} = -0.4273$$

We were long 50 SPU6₁₃₀₀ puts which gave us an OTM synthetic long call; position delta +22.93. After the rally, the put delta has penetrated the predetermined readjustment parameter warranting an adjusting trade.

#1. $50 + (N_{1300} \times -0.4273) = +25$ $N_{1300} = 58.51$ or 59 cts.
Buy an additional 9 of the SPU6₁₃₀₀ puts.

#2. $+50 + (N_{1350} \times -0.5747) = +25$ $N_{1350} = 43.5$ or 44 cts.
Cover the original 50 long SPU6₁₃₀₀ puts replacing them with 44 long SPU6₁₃₅₀ puts

Alternate Adjustments on a Rally

Former SPU6₁₃₀₀ Put delta: $-0.5315 \times 50 \text{ cts} = -26.57$

New SPU6₁₃₀₀ Put delta: $-0.4272 \times 50 \text{ cts} = -21.36$

Portfolio Beta_{original} = 1.00

Portfolio Beta_{outcome}

Put Delta_{original} = -0.5315

=

Put Delta_{new} = -0.4272

Portfolio Beta_{Outcome} = 0.8037

As the market rallied, your protection (the puts) withered. The put's negative delta becomes smaller and smaller on the rally, leaving your net delta more and more positive. To rebalance, you could target beta.

$$\begin{aligned}
 \text{Portfolio HR} &= [1 - (\text{Target}_{\text{beta}} / \text{Actual}_{\text{beta}})] \times \frac{\text{Portfolio Value}}{\$250 \times \text{SP quote}} \times \text{Portfolio}_{\text{beta}} \\
 &= [1 - (0.8037 / 1.0)] \times \frac{\$16,105,000}{\$250 \times 1288.4} \times 1.0 \\
 &= 9.81 \text{ or } 10 \text{ short S\&P 500 futures}^*
 \end{aligned}$$

Instead of adjusting the quantity or strike of the Put options, consider adjusting the amount of the risky asset; i.e. selling some cash on the rally to maintain the synthetic short ATM Call.

- * Is this the best way to reduce the amount of the risky asset? What other methodologies might be appropriate?

Simulate a break to 1244, -44.4 points

Date:	2/13/ 6	Exp:	9/15/ 6	Days:	214
Tics/pt:	100/ 100	Vol:	12.886%	Rate:	4.66%
Mkt/Vol	Stk	1250	1300	1350	
-1.00%	Call	41.18	22.83	11.55	
	Delta	0.4837	0.3217	0.1915	
	Put	47.02	77.32	114.69	
	Delta	0.4894	0.6514	0.7815	
1244.00	Call	44.88	26.22	14.20	
	Delta	0.4867	0.3364	0.2120	
	Put	50.72	80.71	117.35	
	Delta	0.4863	0.6367	0.7610	
+1.00%	Call	48.58	29.66	17.00	
	Delta	0.4896	0.3494	0.2306	
	Put	54.42	84.15	120.14	
	Delta	0.4835	0.6237	0.7424	



Market breaks \$44.4

$$U = 1288.4$$

$$U' = 1244.00$$

$$\text{Delta}' = -0.6367$$

We were long fifty SPU6₁₃₀₀ Puts which provided a position delta of +25 (ATM long call). After the break to 1244, the delta is beyond the readjustment parameters and requires adjustment.

$$\#1. +50 + (N_{1300} \times -0.6367) = +25 \quad N_{1300 \text{ Put}} = 39.26 \text{ or } 39 \text{ cts.}$$

Sell 11 of the original 50 long puts to bring the portfolio delta to the desired exposure.

$$\#2. +50 + (N_{1250} \times -0.4863) = +25 \quad N_{1250 \text{ Put}} = 51.4 \text{ or } 51 \text{ cts.}$$

Cover the original 50 long SPU6₁₃₀₀ puts replacing them with 51 long SPU6₁₂₅₀ puts.

Depending on your taste for Gamma, Theta, and transaction costs...

1. Adjusting the number of Puts

Or . . .

2. Adjusting the amount of risky asset



Depending on your view of volatility over the hedge maturity, select from:

1. Call + MMY
2. Underlying + Long Put
3. $h \times$ Underlying + MMY

Where h represents the optimal amount (fraction) of risky asset to purchase.

MMY = money market instrument like a t-bill

Portfolio Insurance

- Simulates the long put hedge with the use of short futures.
- Avoid time value decay while replicating convexity.
- Sell and liquidate futures by reference to the Put delta.



Portfolio Insurance....An historical aside:

From Mark Rubenstein's website:

<http://in-the-money.com/artandpap/Comments%20on%20the%201987%20Stock%20Market%20Crash%20-%2011%20Years%20Later.doc>

Portfolio Insurance. Four months after the crash (1987), the presidential task force that searched for its causes clearly laid the blame primarily on portfolio insurance. Its main argument was simple: **anyone who sold on net on the 19th contributed to the decline**, and portfolio insurance accounted for about **12%** of the selling in the stock and index futures markets. Unlike other easily identifiable groups, portfolio insurers sold with almost no offsetting purchases. To make matters worse, had they followed the dictates of their computer programs and ignored the ballooning bid-ask spreads and market impact, **portfolio insurers would have sold several times more**. Not only did portfolio insurers come to the Monday's opening with an overhang of unexecuted sell orders from the accelerating decline of the previous week, but as the decline deepened on the 19th, this backlog also deepened. Whenever **the market seemed to rally and trading costs contracted, they would clobber the market with large sell orders** in their attempt to catch up with the demands of their trading strategy.

$$\begin{aligned}\text{No. of Futures} &= \text{Put Delta}_{1200 \text{ strike}} \times \text{HR} \\ &= -0.5315 \times 50 \\ &= 26.575 \text{ Short S\&P futures}\end{aligned}$$



Market falls, delta now at -0.7000 . . .

No. of futures = $-0.7 \times 50 = 35$ short futures

Add 8 more shorts to your existing 27

Market rises, delta now at -0.4000 . . .

No. of futures = $-0.4 \times 50 = 20$ short futures

Cover 7 of your 27 shorts

Sell more futures on declines, cover shorts on rallies.

Importantly, note that by using the delta on the put to dictate how many futures to use, you avoid the adverse impact of time-value-decay while still replicating the positive gamma effect of a long option hedge.

Portfolio Insurance

1244



1288.4



1313.4

-\$44.4

+\$25

As the market declines,

As the market rallies,
Put delta \longrightarrow 0.0

Put delta \longrightarrow -1.0

You need more short futures to replicate the long put hedge

You need fewer short futures to replicate the long put hedge

i.e. $\text{Put}_{\text{delta}} \times \text{HR}$

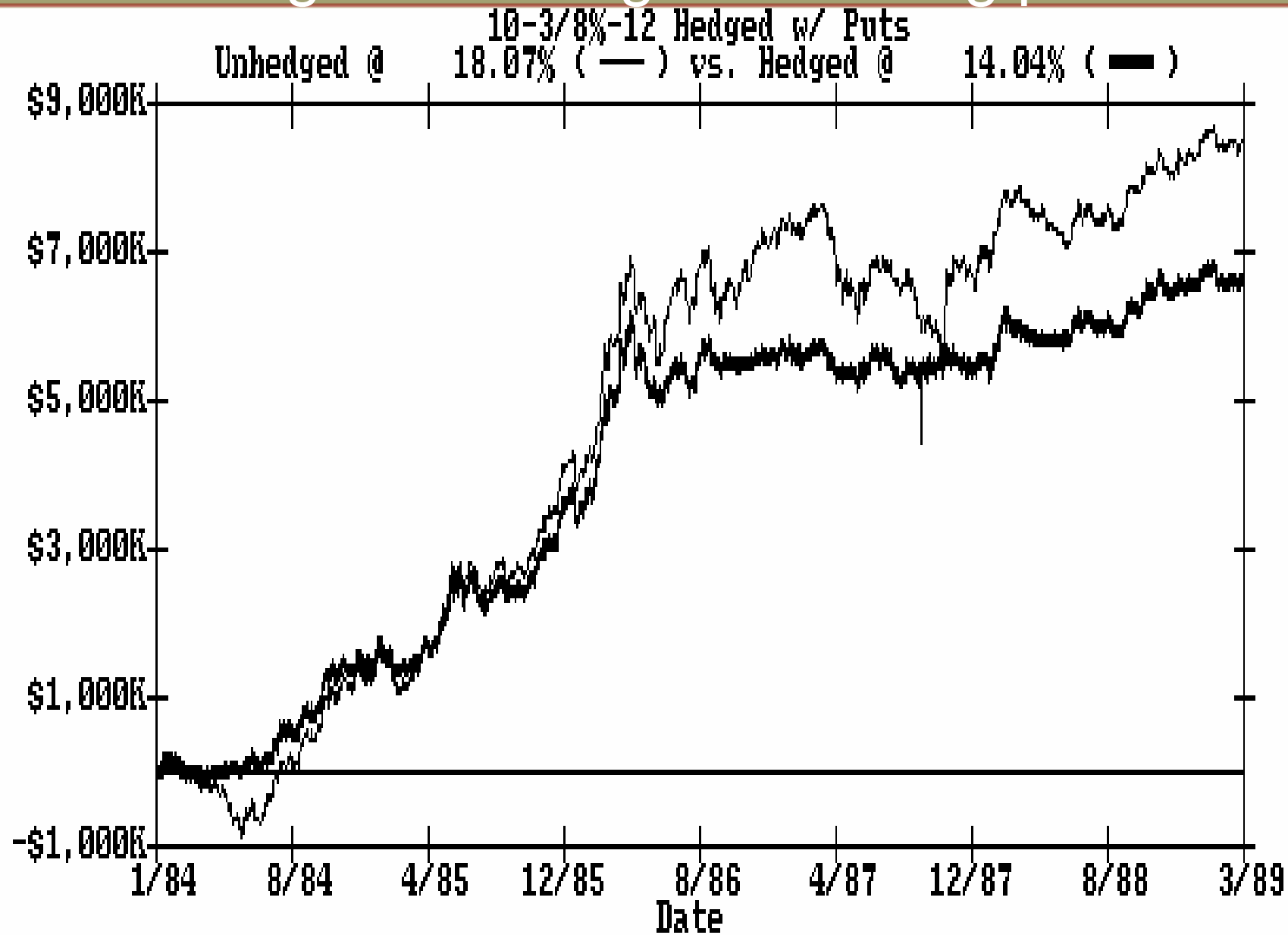
i.e. $\text{Put}_{\text{delta}} \times \text{HR}$

Sell additional futures

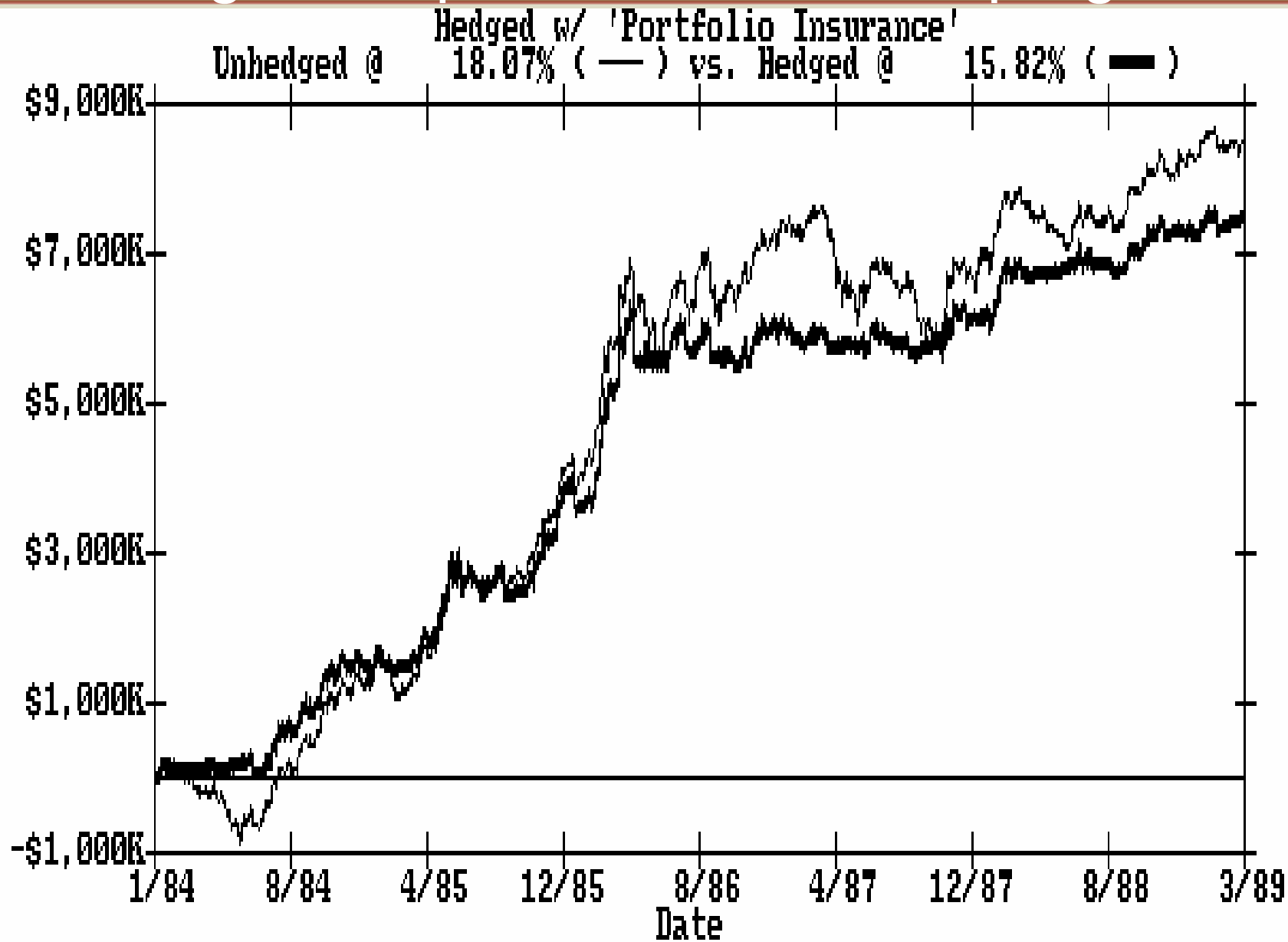
Cover shorts



Historical comparison of a bond portfolio; unhedged vs. hedged with long puts



Historical comparison of a bond portfolio; unhedged vs. portfolio insurance program



Portfolio Insurance . . .

Replicating convexity &
avoiding time value decay.

Dynamic Covered Call Writing . . .

Maximize time value decay &
manage convexity.



Thank You!

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