

THE INSTITUTE FOR FINANCIAL MARKETS

Using CME Group Stock Index Futures to Control Systemic Risk

 Interactive Brokers Webinar June 12, 2008

Presented by Kevin Baldwin

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Risk Disclosure

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.



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About the IFM

The Institute for Financial Markets, founded in 1989, is a section 501(c)(3) nonprofit industry-sponsored educational foundation.

The IFM is dedicated to providing quality and unbiased information, research data and instruction. The Institute offers independent-study and exam preparatory materials in print and computer-based formats; instructor-led seminars and customized, in-house training; research data; desktop reference tools; and consultancy on industry standards and best practices.

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Kevin Baldwin

Kevin Baldwin began his career in the futures and options industry in 1990 within a large FCM's institutional training department. 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, London, Mumbai, 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 innovative Introducing Broker in New York City as managing director and has 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 Strategies and Tactics course aimed at speculators, a Managing Exposure to Financial Instruments course aimed a corporate hedgers, a Credit Derivatives OTC & Exchange-Traded, a Algorithmic Trading course, 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.

Evaluating The Cost of Trading

One S & P 500 contract nominal value:

Quote:	1439.00
multiplier	<u>x 250.00</u>
	\$359,750

Cost: 2 ticks (0.1=\$25) + Commission=[2x25]+10=\$60

Buying \$359,750 worth of well diversified stock at an average price of say \$40/share would cost:

$$\frac{\$359,750}{40} = 8,994 \text{ shares}$$

Evaluating The Cost of Trading

Futures are cheap vs. cash

Buying 8,994 shares, pay 0.02/share =	\$179.88
Pay \$0.01 commission/share	<u>= \$89.94</u>
Net Cost of using Cash market: Σ =	\$269.82
Net Cost of using Futures market:	\$60

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Evaluating The Cost of Trading

Cash vs. Futures

<p><u>Cash</u></p> <ul style="list-style-type: none"> • Out of pocket expense (Opportunity cost) 	<p><u>Futures</u></p> <ul style="list-style-type: none"> • Use of margins to cover risk of Clearing House • Daily mark-to-market • Futures have cash flows
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Futures Margins are not like Stock Margins

- **Futures margin**
 - Small “good faith deposit” or “performance bond”
 - No interest charges
 - Required of buyer and seller
 - Both are subject to calls for additional deposits
 - Requirements determined by exchange
 - Hedgers receive favorable treatment

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February 14, 2008

Futures Contract Description		Page 1/2	
Exchange (CME)	Chicago Mercantile Exchange	Related Functions	
Name	S&P500 EMINI FUT Jun08	1) CT	Contract Table
Ticker	ESMB <INDEX>	2) FIG	Futures History Graph
		3) EXS	Expiration Schedule
		4) GIP	Intraday Price Graph
		5) OCM	Option Custom Monitor
Contract Size 50 x index		Margin Limits	
Value of 1.0 pt	\$ 50	Speculator Hedger	
Tick Size	.25	Initial	4500 3600
Tick Value	\$ 12.5	Secondary	3600 3600
Current Price	1,358.50 index points		
Contract Value	\$ 67,925 @ 13:09:09		
Cycle Mar Jun Sep Dec			
Trading Hours		The CME E-Mini S&P 500 futures and options may be traded until the regularly schedule start of trading 9:30am EST (Serial options @ 4:15pm EST) at the NYSE on the day scheduled for determining the final settlement price for futures, normally the third Friday of the month.	
Chicago	Local		
15:30-15:15	15:30-15:15		
Cash Settled		Life High	1,600.25
Valuation Date	Fri Jun 20, 2008	Life Low	1,260.00
Last Trade	Fri Jun 20, 2008	Generics Available	
First Trade	Mon Jun 18, 2007	Today's Daily Limit	ES1 <INDEX>
		Up Down	ES2 <INDEX>
		1,506.25 1,226.25	
(\$4,500 – \$3,600) = \$900/\$50 = 18.00 handles			

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Margin Example

	No Variation Margin Call	Yes, variation Margin Call
Long ESM8 from:	1358.50	1358.50
market settles	- 18.00	-18.25
	1340.50	1340.25

After a variation margin call is issued, you must resupply your account with cash back to the "initial margin" level.

18.25 points x \$50/point x 1 lot = \$912.50

You need to either: 1.) Send \$912.50 to your FCM in cash
2.) Have ESM8 rise to 1340.50

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Total Risk = Variance + Residual

$$= \sigma^2 + \varepsilon_i$$

Investors are not compensated for 'Firm Specific' risk (unsystematic risk); however, this risk can be effectively eliminated through diversification.

Individual Stock	Portfolio of Stocks
$\beta_i \approx 1/3$	$\beta_i = 1.0$ (in the limit)
$\varepsilon_i \approx 2/3$	

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Naïve Diversification

Diversification of firm specific risk occurs rather quickly with a relatively small number of stocks –provided they are not all from the same industry.

Naïve Diversification

- Select stocks randomly
- Invest in equal weights
- Works well, but doesn't guarantee an efficient portfolio



Total Risk = Systematic_{risk} + Unsystematic_{risk}

Systematic Risk: 'Market' risks which represent those general economic factors which impact upon the price of all stocks.

Unsystematic Risk: Or, 'firm specific' risks are those factors which impact uniquely upon the price of a specific stock.



Beta Analysis

Uses regression analysis to determine the 'linear' relationship between the returns on any individual stock with the returns on the market as a whole (often defined by the reference to a stock index).

$$\text{Return}_{\text{IBM}} = \underbrace{\alpha_i}_{\text{Vertical intercept}} + \underbrace{\beta_i}_{\text{Slope}} (\text{Return}_{\text{market}}) + \underbrace{\varepsilon_i}_{\text{Noise}}$$



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Hedge Ratio Construction

Hedge 2,500,000 Euro-FX

$$\begin{aligned}
 \text{HR} &= \frac{\text{Quantity to be hedged}}{\text{Nominal Contract Size}} \\
 &= \frac{\text{€2,500,000}}{\text{€125,000/lot}} \\
 &= 20 \text{ contracts}
 \end{aligned}$$

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Hedge Ratio Construction

- Cross-hedging-not compatible w/FASB 133
 - Hedging with a futures contract on a different commodity or instrument
- Hedging with Stock Indexes
 - Use the cash index value to calculate the number of futures contracts needed to obviate systematic risk
- Beta Hedging
 - Adjust the number of index futures needed to hedge a portfolio by referencing the portfolio beta

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Which Index?

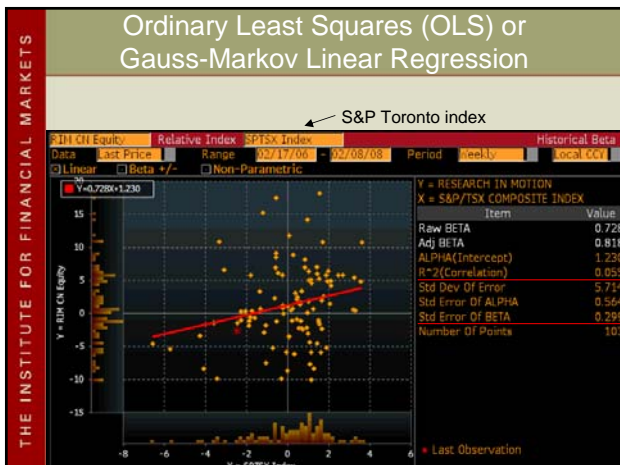
Beta Analysis

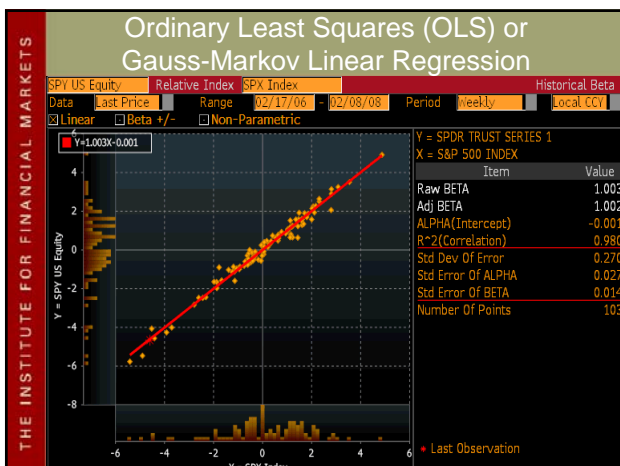
Uses regression analysis to determine the degree of “linear” relationship between the returns on any individual stock with the returns on the market as a whole –usually defined as a stock index.

$$\text{Return}_{\text{RIM}} = \alpha_i + \beta_i(\text{Return}_{\text{SPTSX}}) + \varepsilon_i$$

S&P Toronto Index

Vertical intercept Slope Noise





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Implementing a "Futures hedge"

QQQQ = "Nasdaq 100 Trust Series 1"

QQQQ HR = $\frac{\text{Value}(\text{stock})}{(\$100 \times \text{NDX } P_x)} \times \text{Beta}_{\text{QQQQ}}$

Today's date: 1/3/8 S-T rate: 4.25%

- Long 400,000 QQQQ 50.625 = \$ 20,250,000
[Alpha: 0.00% Beta: 1.00 DvYld: 0.40%]
- Short 99 Jun. '8 Futures @ 2,102.25 -
[Spot: 2051.76 Carry: -5.27%]

HR = $\frac{\$ \text{ quantity to be hedged}}{\text{contract size}} \times \beta_i$

= $\frac{\$20,250,000}{(\$100 \times 2051.76)} \times 1.0 = 98.7 \text{ contracts}$

Equal & Opposite

The futures hedge should create a position that is "equal and opposite" to the existing cash market exposure.

\$20,250,000 Long cash stocks	△	Short 99 NDM8 from 2102.25
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Number of contracts x price x quantity = nominal value
 $99 \times 2102.25 \times \$100 = 20,812,275$ (562,275 more than cash)

1 lot = $2102.25 \times \$100 = \$210,225/\text{contract}$

Equivalence

- If cash & futures positions are equal and opposite, then the delta on the futures should approximate the cash delta.
- The futures delta is how much money you make/lose if the market changes by 1.00. That's 99 cts x \$100 = \$9,900

Portfolio Summary

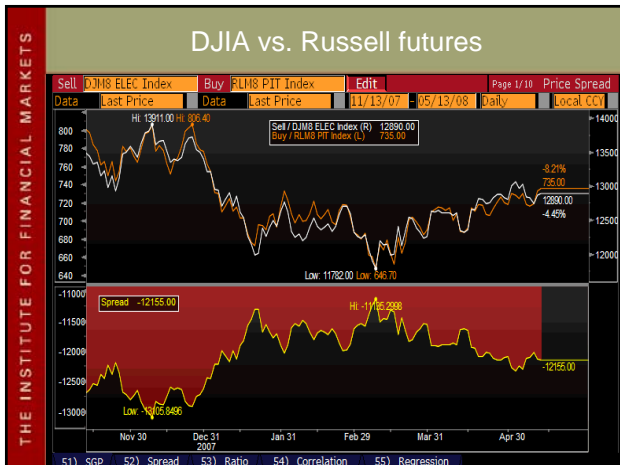
Portfolio Summary
 Today's date: 1/3/8 S-T rate: 4.25%

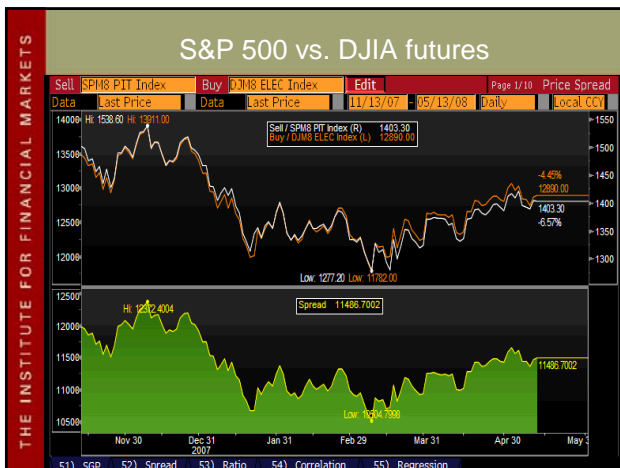
Port value:\$ 20,250,000	Hedge val:\$ 20,250,000
Div yield: 0.395%	Dividends:\$ 80,000 /yr

Unhedged beta: 1.000 Hedge beta: -0.028

Port delta:\$ -30 /pt	Gamma:\$ 0 /pt
Theta:\$ 0 /day	Vega:\$ 0 /1%

Unhedged delta? \$100/point x 98.7 contracts = \$9,870/point
 \$30/\$9,870 = 0.3% of initial risk position





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- ### CME Group Equity Index Products
- DJIA (\$5/point & \$10/point)
 - S&P 500 (\$50/point & \$250/point)
 - S&P 400 (\$100/point & \$500/point Mid-cap)
 - S&P 600 (\$100/point & \$500/point Small cap)
 - Russell 2000 (\$100/point & \$500/point Small cap)
 - S&P 500/Citigroup Growth \$250/point
 - S&P 500/Citigroup Value \$250/point
 - Financial services SPCTR \$125/point
 - Technology SPCTR \$125/point
 - MSCI EAFE¹ \$50/point
 - MSCI Emerging Markets Index \$50/point
 - Nasdaq Biotech \$50/point
 - Nikkei 225 (Japan) \$5/point
 - S&P Asia 50 \$25/point
- ¹MSCI=Morgan Stanley Country Index
 EAFE = East Asia, Far East

Tech.Portfolio without a Time Series

Technology Portfolio

Today's date: 1/02/08 S-T rate: 4.25%

nominal \$ x beta = Risk Adj. Value

1. Long	150,000	MSFT	35.25 = \$ 5,287,500 x 1.04 = \$5,499,000
	[Alpha: 0.00%	Beta: 1.04	DvYld: 1.25%]
2. Long	600,000	JAVA (SUNW)	17.5 = \$ 5,250,000 x 1.63 = \$8,557,500
	[Alpha: 0.00%	Beta: 1.63	DvYld: 0.46%]
3. Long	150,000	CSCO	26.5 = \$ 4,637,500 x 1.15 = \$5,333,125
	[Alpha: 0.00%	Beta: 1.15	DvYld: 0.00%]
4. Long	6,250	GOOG	683.5 = \$ 4,271,875 x 1.05 = \$4,485,469
	[Alpha: 0.00%	Beta: 1.05	DvYld: 0.00%]
5. Long	7,100	CME	672.5 = \$ 5,381,000 x 1.10 = \$5,919,100
	[Alpha: 0.00%	Beta: 1.10	DvYld: 0.51%]
6. Short	0	Jun. '8 SPX Futures: @ 1487.00	-
	[Spot: 1447.44	Carry: -4.55%]	

Port. Value = \$24,827,875
 Risk Adjusted Value = \$29,794,194

Port(beta) = 1.200 = 29,794,194 / 24,827,875
 vs. SPX

Hedging Tech Portfolio

Today's date: 1/02/08 S-T rate: 4.25%

Portfolio Value: \$24,827,875 Portfolio Beta: 1.20
 Jun'08 futures: 1487.00 Hedge Ratio: 401 cnts

Port.HR = [Value(port) / (\$50 * SPX)] x Beta(port)

*multipliers vary by contract
 = \$24,827,875 / (\$50 x 1487.00) x 1.20 = 400.7189 cnts

HR calc. in a few moments

Hedge Ratio	Beta
300 cnts short	0.3016
350 cnts short	0.1519
401 cnts short	-0.0008
450 cnts short	-0.1476
500 cnts short	-0.2973

"Hedge" trades can make you: less long, near flat, or out-right short.
 Derivatives permit you to manipulate your exposure to your taste.

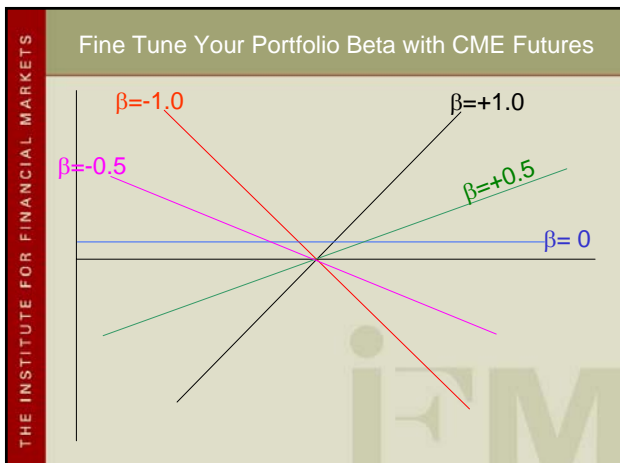
Beta Tuning

Modify the standard stock portfolio hedge ratio calculation:

Port.HR = [Value(port) / (\$50 * SPX)] x Beta(port)

Port.HR = [Beta_{target} - Beta_{current}] x Value (port.) / (mult x Index)
 = [0.30 - 1.20] x [\$24,827,875 / (50 x 1487)]
 = -0.9 [333.93]
 = 300 short futures

* Contract size multipliers vary with the product.



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Hedging Tech Portfolio

Futures Hedge

Today's date: 1/2/8 S-T rate: 4.25%

1. Long	150,000	MSFT	35.25	=\$ 5,287,500
		[Alpha: 0.00% Beta: 1.04 DvYld: 1.25%]		
2. Long	300,000	JAVA	17.5	=\$ 5,250,000
		[Alpha: 0.00% Beta: 1.63 DvYld: 0.46%]		
3. Long	175,000	CSCO	26.5	=\$ 4,637,500
		[Alpha: 0.00% Beta: 1.15 DvYld: 0.00%]		
4. Long	6,250	GOOG	683.5	=\$ 4,271,875
		[Alpha: 0.00% Beta: 1.05 DvYld: 0.00%]		
5. Long	8,000	CME	672.5	=\$ 5,381,000
		[Alpha: 0.00% Beta: 1.10 DvYld: 0.51%]		
6. Short	401	Jun. '8 Futures	@ 1,487.00	-
		[Spot: 1447.44 Carry: -5.79%]		

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Hedging Tech Portfolio

Portfolio Summary with Futures Hedge

Today's date: 1/2/8 S-T rate: 4.25%

Port value: \$ 24,827,875 Hedge val: \$ 24,827,875
 Div yield: 0.473% Dividends: \$ 117,520 /yr

Unhedged beta: 1.200 Hedge beta: -0.001

Port delta: \$ 534 /pt Gamma: \$ 0 /pt
 Theta: \$ 0 /day Vega: \$ 0 /1%

"unhedged" delta is approx. equivalent to:
 400.7189 cts x \$50/contract = \$20,036. The hedge appears to negate 1 - (534/20,036) = 97.33% of the systemic risk.

Hedging Tech Portfolio

Portfolio down about 12% on June 20, 2008=Futures LTD
 Today's date: 6/20/ 8 S-T rate: 4.25%

1	Sell	150,000	MSFT	31.625	=\$	-543,750
			[Beta: 1.04 1 div payments:\$	16,500]		
2	Sell	300,000	JAVA	14.625	=\$	-862,500
			[Beta: 1.63 1 div payments:\$	6,000]		
3	Sell	175,000	CSCO	23.5	=\$	-525,000
			[Beta: 1.15 0 div payments:\$	0]		
4	Sell	6,250	GOOG	611.75	=\$	-448,438
			[Beta: 1.05 1 div payments:\$	0]		
5	Sell	8,000	CME	598.625	=\$	-592,000
			[Beta: 1.10 1 div payments:\$	6,880]		
6.	Buy	401	Jun. ' 8 Futures	@ 1302.70	=\$	3,695,216
			[Spot: 1302.70 Carry: 5.79%]			

Unhedged P/L = \$ -2,971,688 Hedged P/L = \$ 723,529
 -11.97% +2.91%

The portfolio went down 12% when SPX dropped 10% why? beta!

Hedging Tech Portfolio

Portfolio Unchanged on June 20, 2008
 Today's date: 6/20/ 8 S-T rate: 4.25%

1	Sell	150,000	MSFT	35.25	=\$	0
			[Beta: 1.04 1 div payments:\$	16,500]		
2	Sell	300,000	JAVA	17.5	=\$	0
			[Beta: 1.63 1 div payments:\$	6,000]		
3	Sell	175,000	CSCO	26.5	=\$	0
			[Beta: 1.15 0 div payments:\$	0]		
4	Sell	6,250	GOOG	683.5	=\$	0
			[Beta: 1.05 1 div payments:\$	0]		
5	Sell	8,000	CME	672.625	=\$	0
			[Beta: 1.10 1 div payments:\$	6,880]		
6.	Buy	401	Jun. ' 8 Futures	@ 1447.40	=\$	793,980
			[Spot: 1447.44 Carry: 5.79%]			

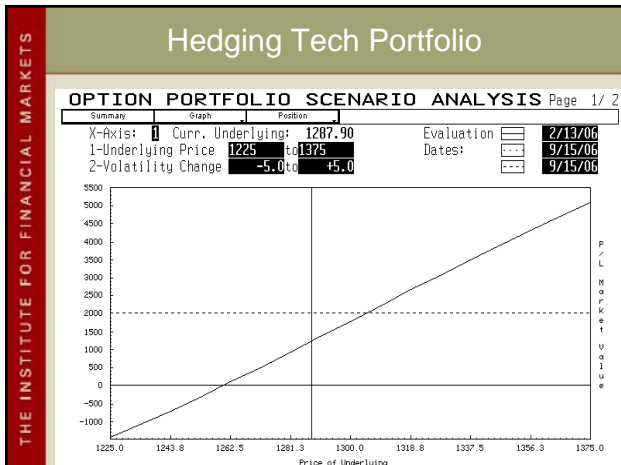
Unhedged P/L = \$ 0 Hedged P/L = \$ 793,980
 0.00% +3.20%

Hedging Tech Portfolio

Portfolio up about 12% on June 20, 2008
 Today's date: 6/20/ 8 S-T rate: 4.25%

1	Sell	150,000	MSFT	38.875	=\$	543,750
			[Beta: 1.04 1 div payments:\$	16,500]		
2	Sell	300,000	JAVA	20.375	=\$	862,500
			[Beta: 1.63 1 div payments:\$	6,000]		
3	Sell	175,000	CSCO	29.5	=\$	525,000
			[Beta: 1.15 0 div payments:\$	0]		
4	Sell	6,250	GOOG	755.25	=\$	448,438
			[Beta: 1.05 1 div payments:\$	0]		
5	Sell	8,000	CME	746.625	=\$	592,000
			[Beta: 1.10 1 div payments:\$	6,880]		
6.	Buy	401	Jun. ' 8 Futures	@ 1592.20	=\$	-2,109,260
			[Spot: 1592.20 Carry: 5.79%]			

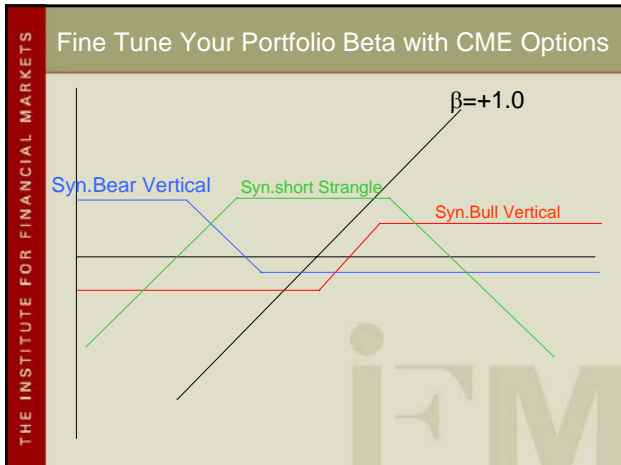
Unhedged P/L = \$ 2,971,688 Hedged P/L = \$ 862,428
 +11.97% +3.47%



Hedging Tech Portfolio

Hedge position results

	-12% @ Expiration	Unch.	+12% Pts @ Expiration
Unhedged:	-2,971,688 -11.97%	+\$0	+\$2,971,688 +11.97%
Futures Hedge:	+\$723,529 +2.91%	+\$793,980 +3.20%	+\$862,428 +3.47%



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Thank You

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