

Options for Managing Volatility

- Income
- Diversification
- Risk-adjusted Returns

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February 2010

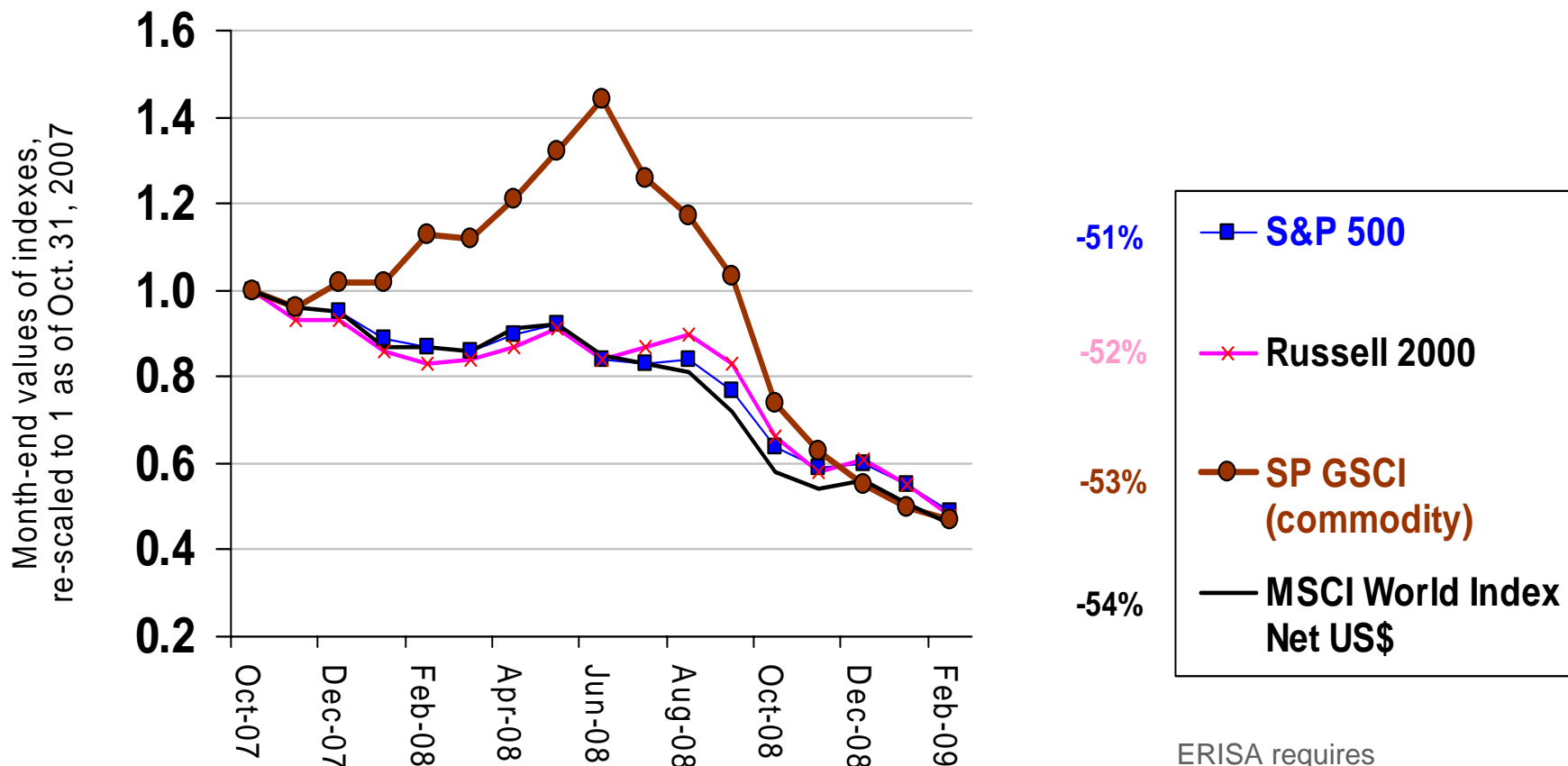
Options involve risk and are not suitable for all investors.

Prior to buying or selling an option, a person must receive a copy of Characteristics and Risks of Standardized Options (the “ODD”). The ODD and supporting documentation for any claims, comparisons, recommendations, statistics or other technical data in these materials are available by calling 1-888-OPTIONS, or contacting CBOE at www.cboe.com/Contact. No statement within this material should be construed as a recommendation to buy or sell a security or to provide investment advice.

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16 Challenging Months

Little diversification as stock and commodity indexes fell by more than 50%



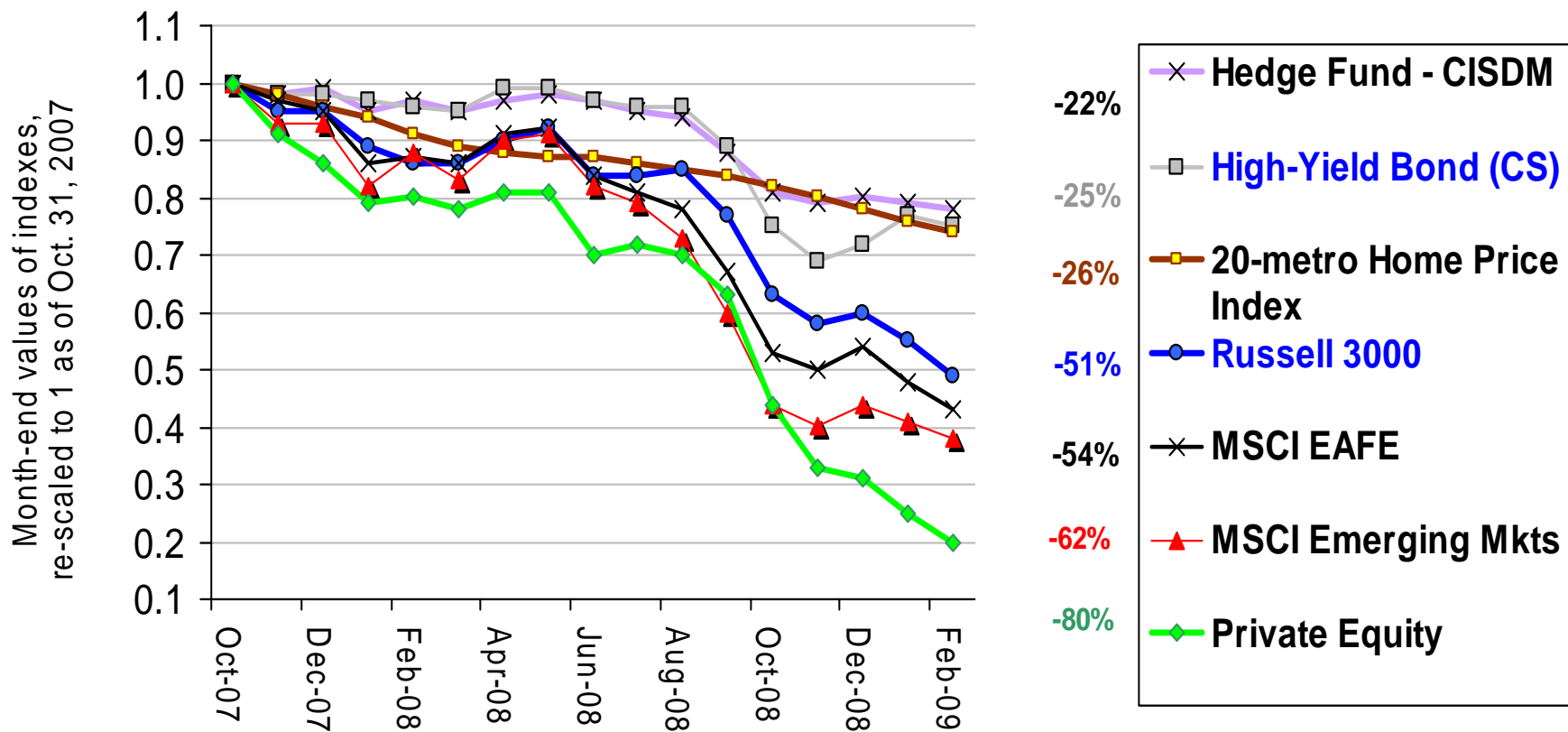
(Oct. 31, 2007 - Feb. 28, 2009)

Sources: CBOE and Bloomberg Total return indexes

ERISA requires pension fiduciaries to diversify so as to minimize the risk of large losses

16 Challenging Months

Little diversification as stock and commodity indexes fell by more than 50%



(Oct. 31, 2007 - Feb. 28, 2009)

Sources: CBOE and Bloomberg Total return indexes are used for stocks. S&P Case-Shiller Home Price Index and S&P Private Equity Index are used.

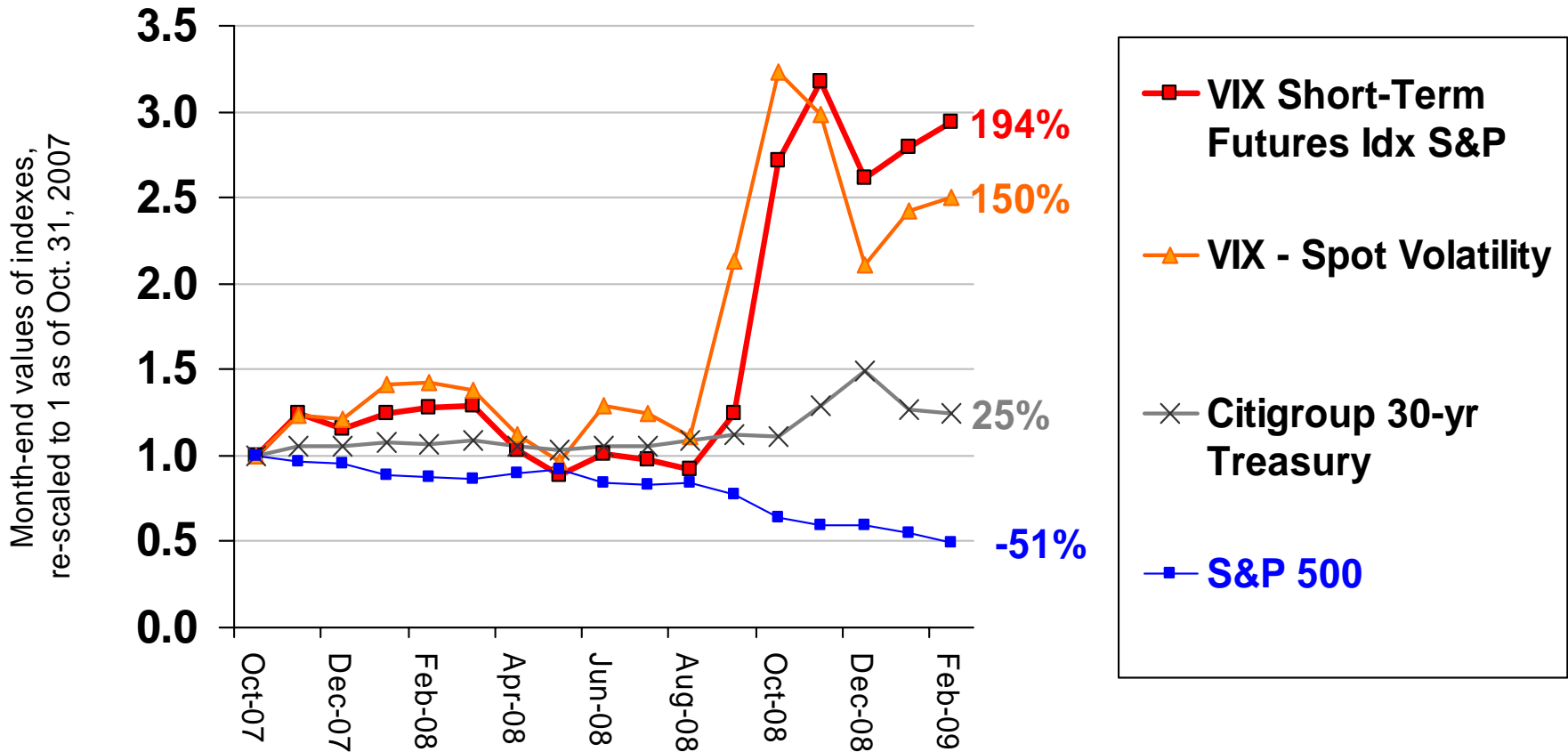
Harry Markowitz and Modern Portfolio Theory (MPT) --

“[in 2008] the S&P 500 fell approximately 38.5%; the higher-beta emerging-markets asset class fell much farther. Corporate bonds fell in value, but much less than equities, and government bonds went up. ... Generally, asset classes moved roughly in proportion to their historical betas. ... MPT never promised high return with low risk. ... [u]nless our portfolios are comprised entirely of short-term government bonds, we’ll be dealing with a level of risk for which MPT prescribes following an old and true adage: ‘Don’t put all your eggs in one basket.’”

The Investment Professional magazine (Spring 2009)

16 Challenging Months

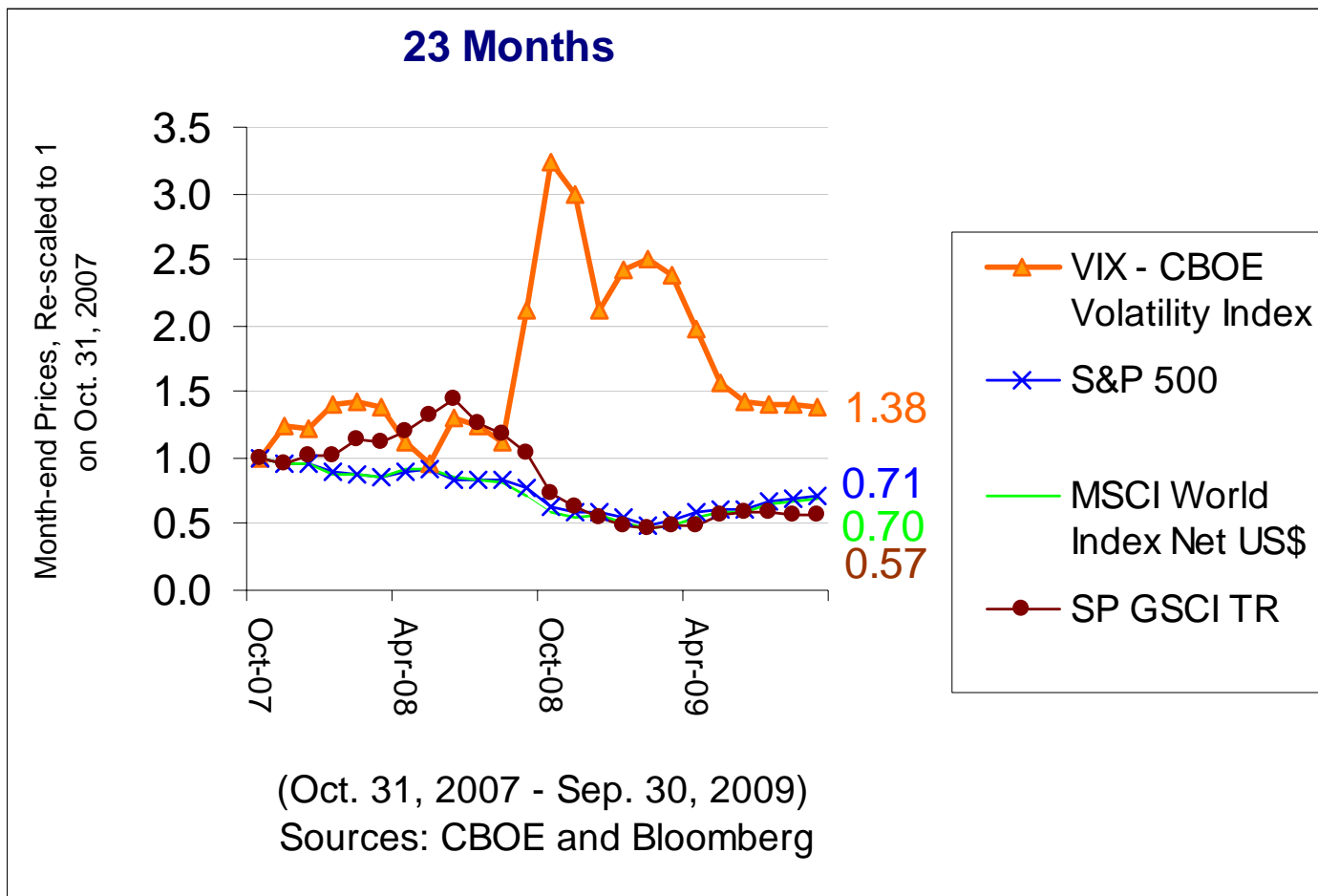
Can volatility diversify and lessen portfolio volatility?



(Oct. 31, 2007 - Feb. 28, 2009)

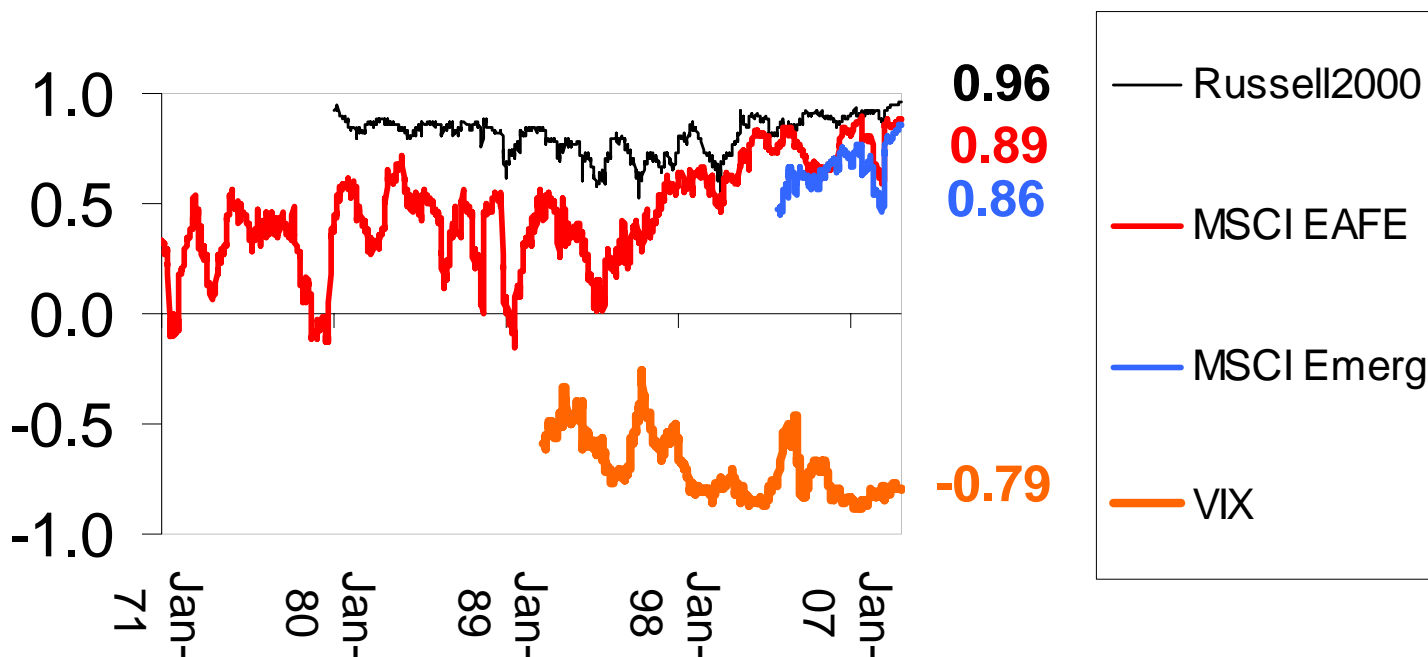
Sources: CBOE and Bloomberg

Diversification over a 23-month Time Period



Higher Correlations for Stock Indexes

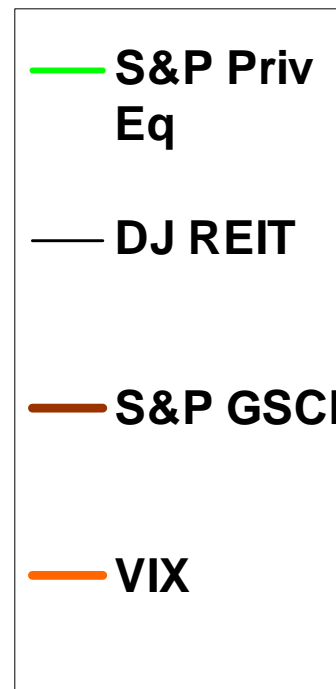
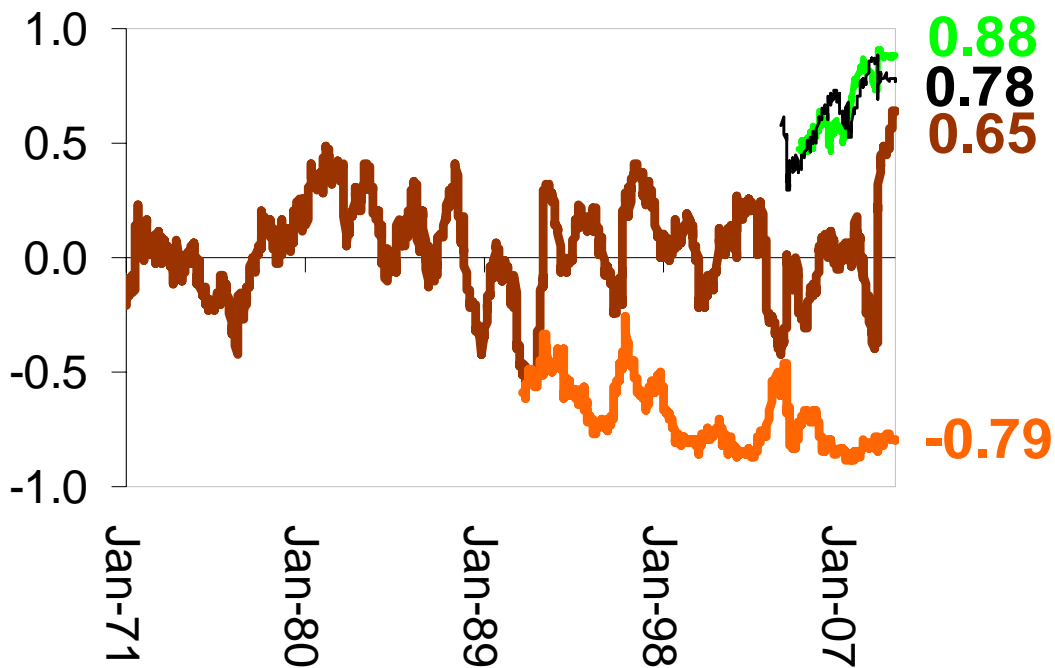
Rolling One-Year Correlations of Weekly Returns of Indexes to the S&P 500



Sources: Bloomberg and CBOE.
(Jan. 1, 1971 - Sept. 11, 2009)

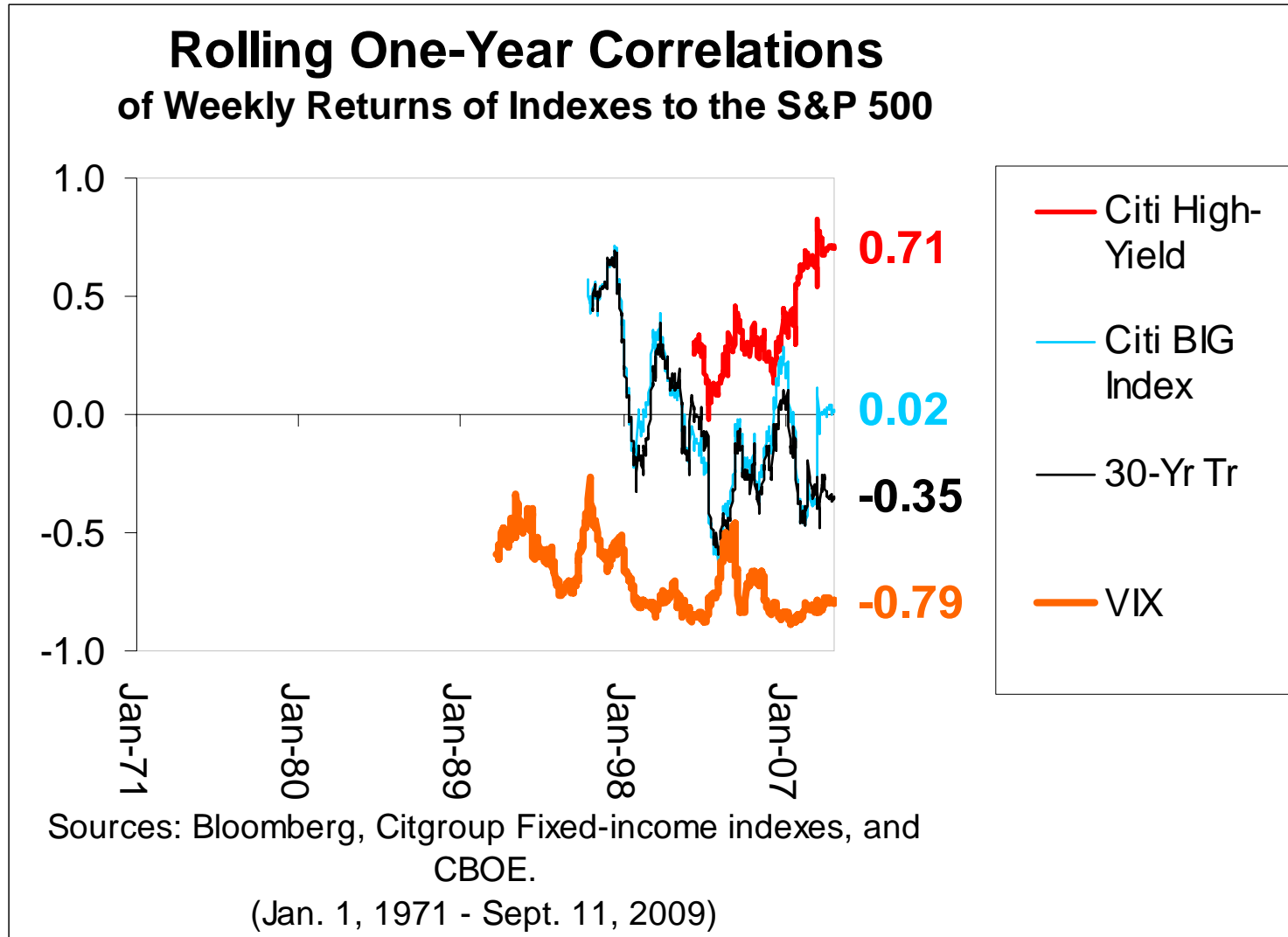
Higher Correlations for Alternatives Indexes

Rolling One-Year Correlations of Weekly Returns of Indexes to the S&P 500



Sources: Bloomberg and CBOE.
(Jan. 1, 1971 - Sept. 11, 2009)

Correlations and Fixed Income Indexes



Exchange Listed Equity Options

- Calls – Right to buy security at certain price for certain period
- Puts – Right to sell security at certain price for certain period
- Usually represents 100 shares
- Limited life – usually expires after third Friday
- Option Info – *200 XYZ Jan 50 calls for 1.55*
 - *Number of contracts*
 - *Underlying Security*
 - *Expiration Date*
 - *Strike price*
 - *Call / Put*
 - *Premium*

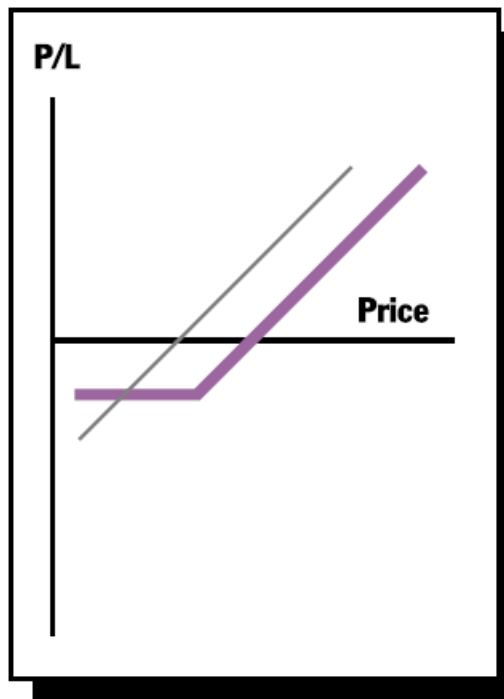
Simple Options Profit-and-Loss Diagrams

Long Call



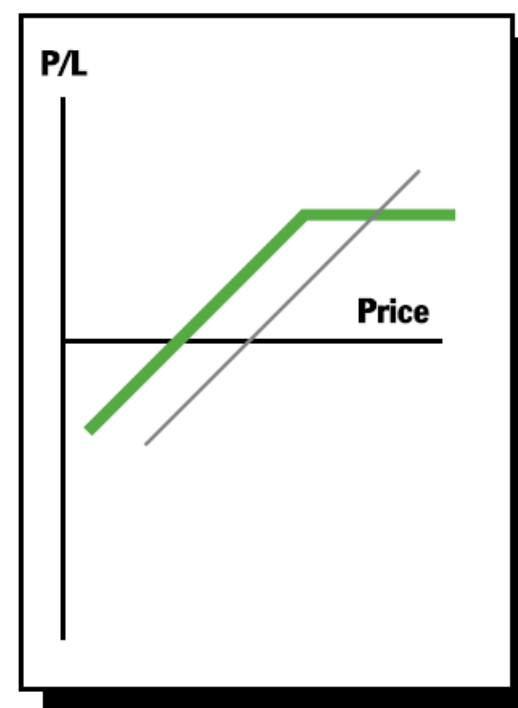
Long call gives the holder the right to buy the underlying security at a specified price for a certain, fixed period of time.

Protective Put*



Protective put investor purchases a put (right to sell) while holding underlying security.

Buy-write*



Buy-write investor buys a security and writes (sells) a covered call for income

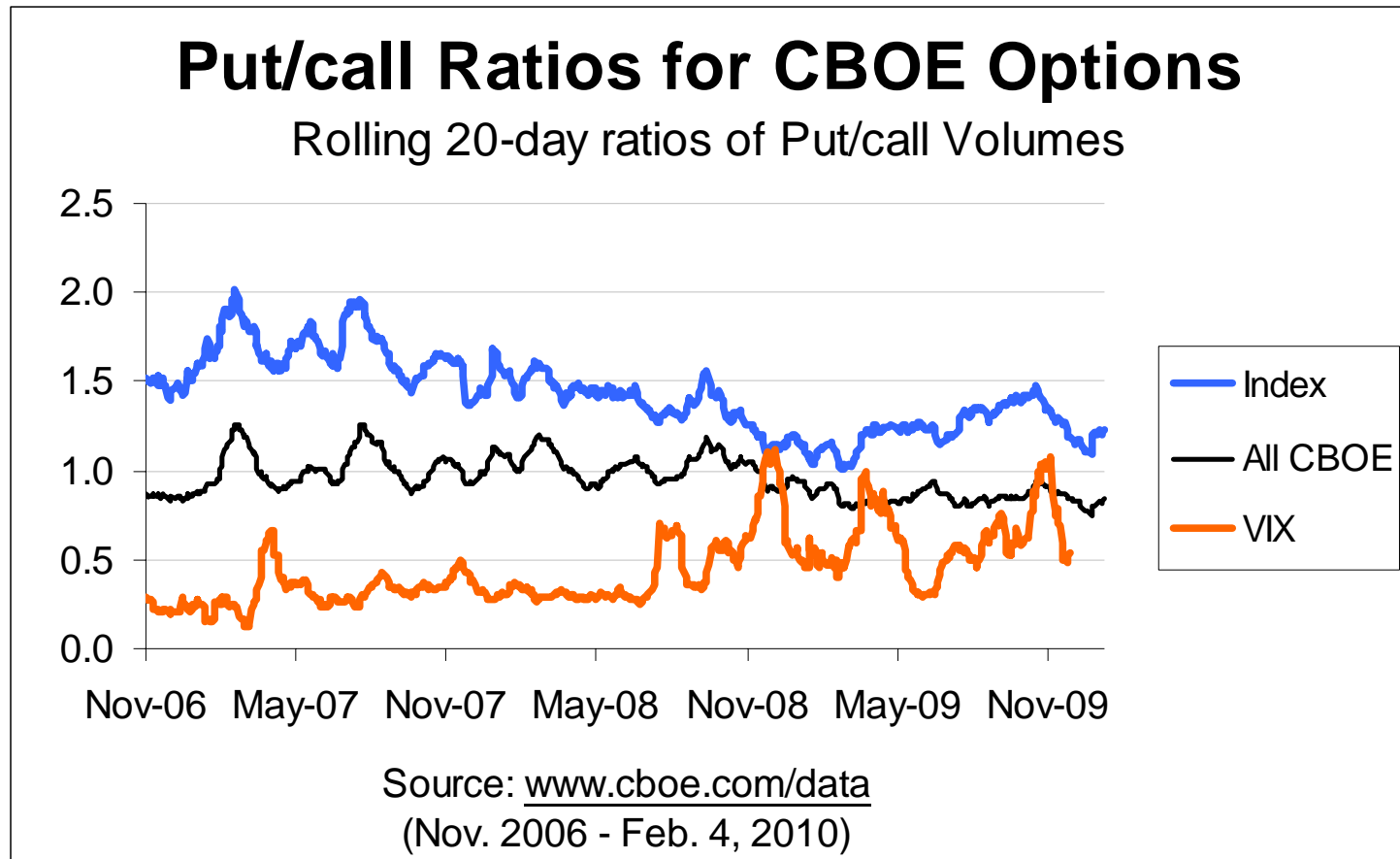
* The colored line reflects a position with both options and stock

Some Key CBOE Options in Jan. 2010

<u>Options</u> <u>Symbol</u>	<u>CBOE Options Product</u>	<u>Put Avg. Daily</u> <u>Volume</u>	<u>Call Avg. Daily</u> <u>Volume</u>	<u>Pu/Call Ratio for</u> <u>January Volume</u>
Index Options				
SPX	S&P 500 Index	451,605	275,686	1.64
VIX	CBOE Volatility Index (options)	65,773	170,977	0.38
RUT	Russell 2000 Index	30,430	22,132	1.37
OEX	S&P 100 Index (American-Style Exercise)	24,559	17,856	1.38
NDX	Nasdaq 100 Index	19,249	14,495	1.33
DJX	Dow Jones Industrial Average	8,068	6,601	1.22
Equity Options				
C	Citigroup, Inc.	35,751	118,929	0.30
BAC	Bank of America Corporation	46,485	89,928	0.52
AAQ	Apple, Inc.	33,265	57,264	0.58
INQ	Intel Corporation	20,099	41,139	0.49
JPM	JPMorgan Chase & Co.	23,630	32,876	0.72
MQF	Microsoft Corporation	12,389	38,824	0.32
GE	General Electric Company	18,948	32,234	0.59
F	Ford Motor Company	18,458	25,113	0.74
GS	The Goldman Sachs Group, Inc.	17,281	24,463	0.71
YUX	YRC Worldwide, Inc.	22,167	15,228	1.46
AA	ALCOA, Inc.	11,560	19,770	0.58
WFC	Wells Fargo & Company	15,692	15,310	1.02
ZQN	Amazon.Com, Inc.	11,891	15,398	0.77
GOQ	Google, Inc.	10,682	16,340	0.65
RUL	Research in Motion Limited	9,779	16,349	0.60

Sources: CBOE and www.cboe.com/data

Put/call Ratios



FLEX[®] Options

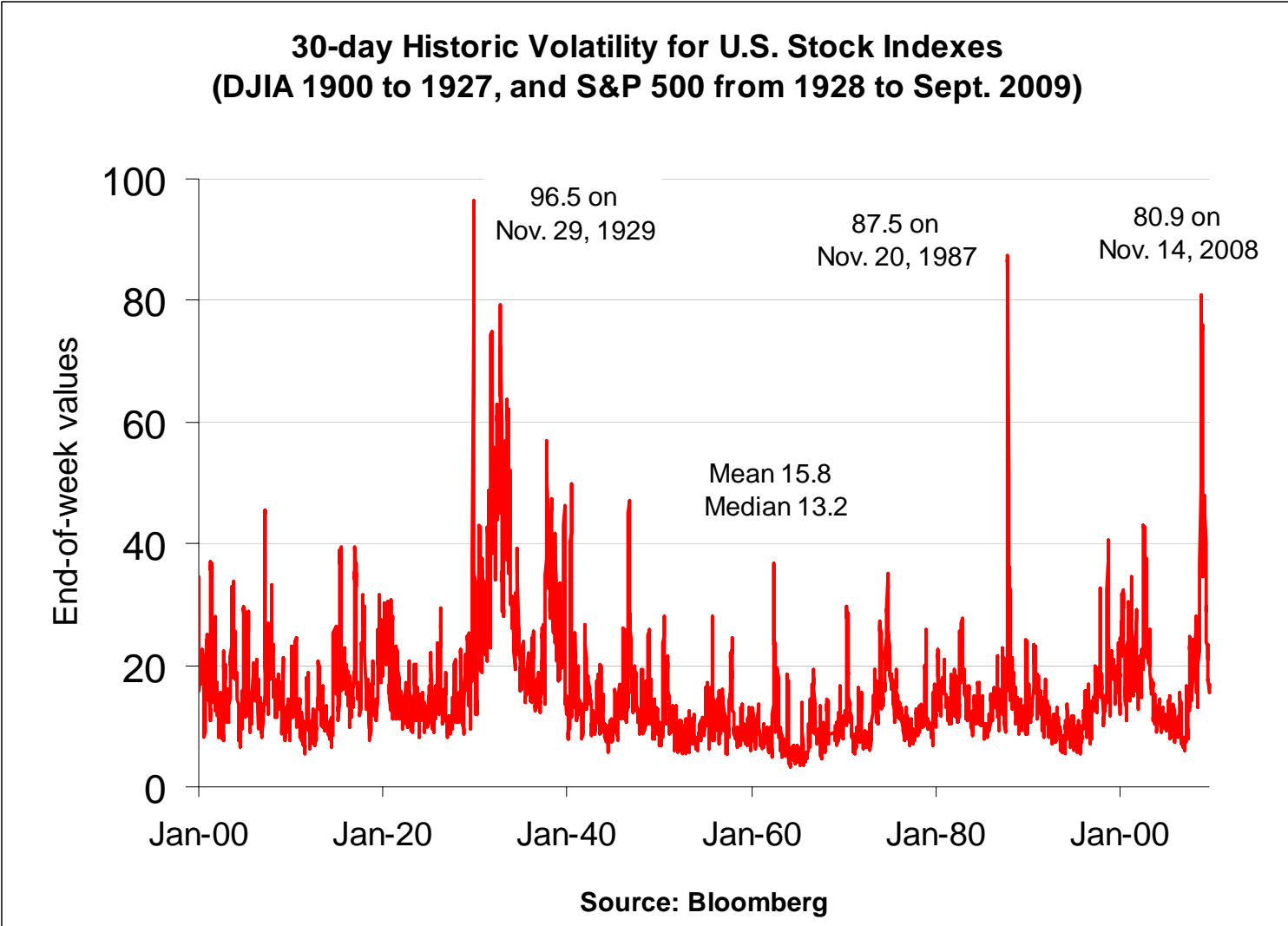
- Ability to customize key contract terms, like exercise prices, exercise styles and expiration dates
- Virtual elimination of counter-party risk - guaranteed by The Options Clearing Corporation, a "AAA" rated clearinghouse
- Price discovery in competitive, transparent, auction markets
- A secondary market for an opportunity to offset or alter positions before expiration
- Independent daily valuation by OCC of prices
- Availability of daily price and open interest reports
- The opportunity to trade large size with expanded or eliminated position limits
- Operational efficiencies of exchange-listed options
- Expiration date up to 15 years from trade date

SEC recently approved CBOE's recent rule filing to --

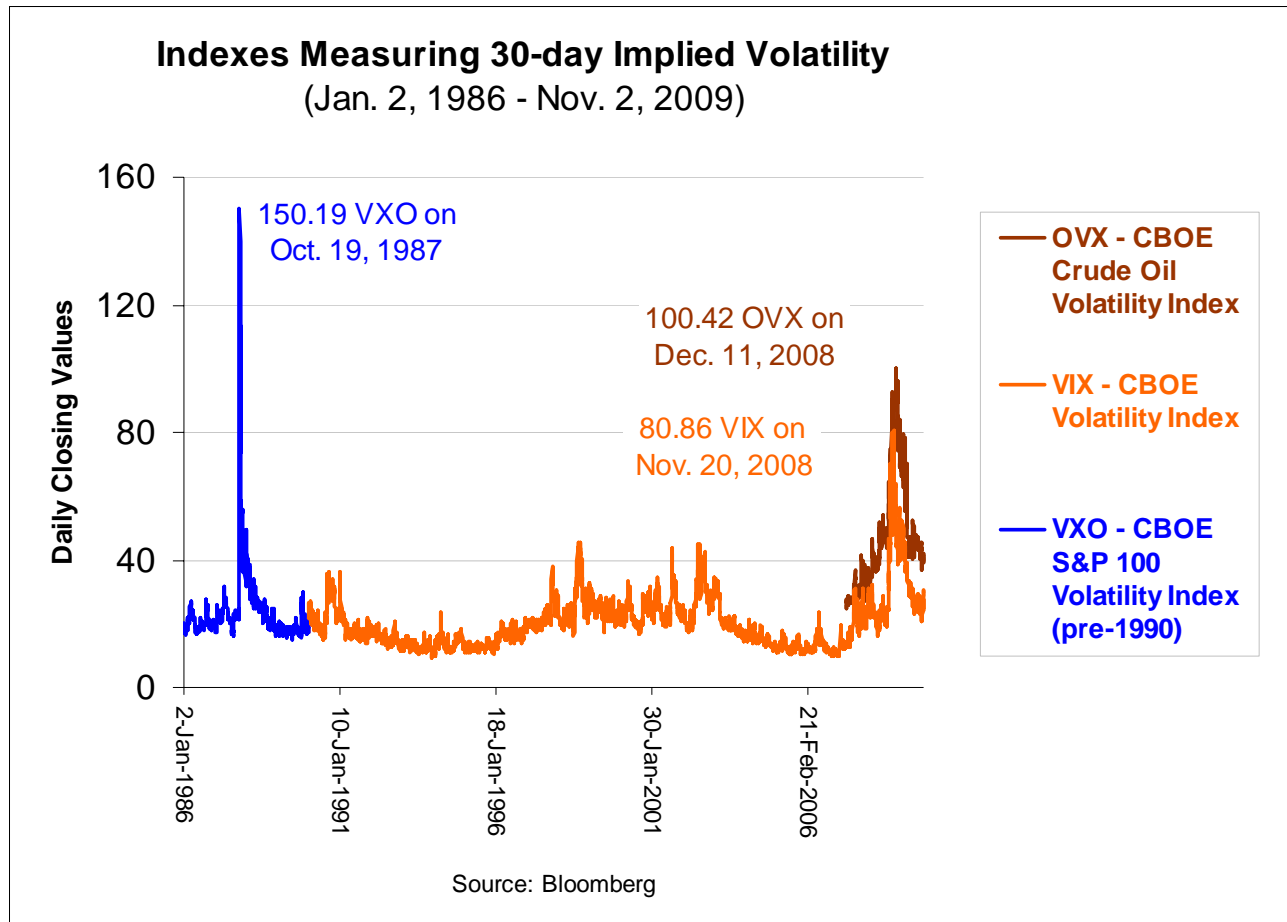
- a. Eliminate minimum size requirements, and
- b. Lift the PM-settlement restriction on Index FLEX expiring within the old blackout dates period on a pilot basis.

www.cboe.com/FLEX

Historic Volatility Since 1900



Implied Volatility Indexes Since 1986



“Implied Volatility” is a measure of the option market’s expectations for the future volatility of the underlying security. It is determined by using option prices currently existing in the market at the time (rather than using historical data on the price changes of the underlying stock or index). It is the annualized volatility implied by the market price of the option based on an option pricing model. If a 30-day option and a one-year option both have implied volatilities of 25, that means that the options prices imply that options investors believe that there is about a 68% chance that the price of the underlying will be approximately --

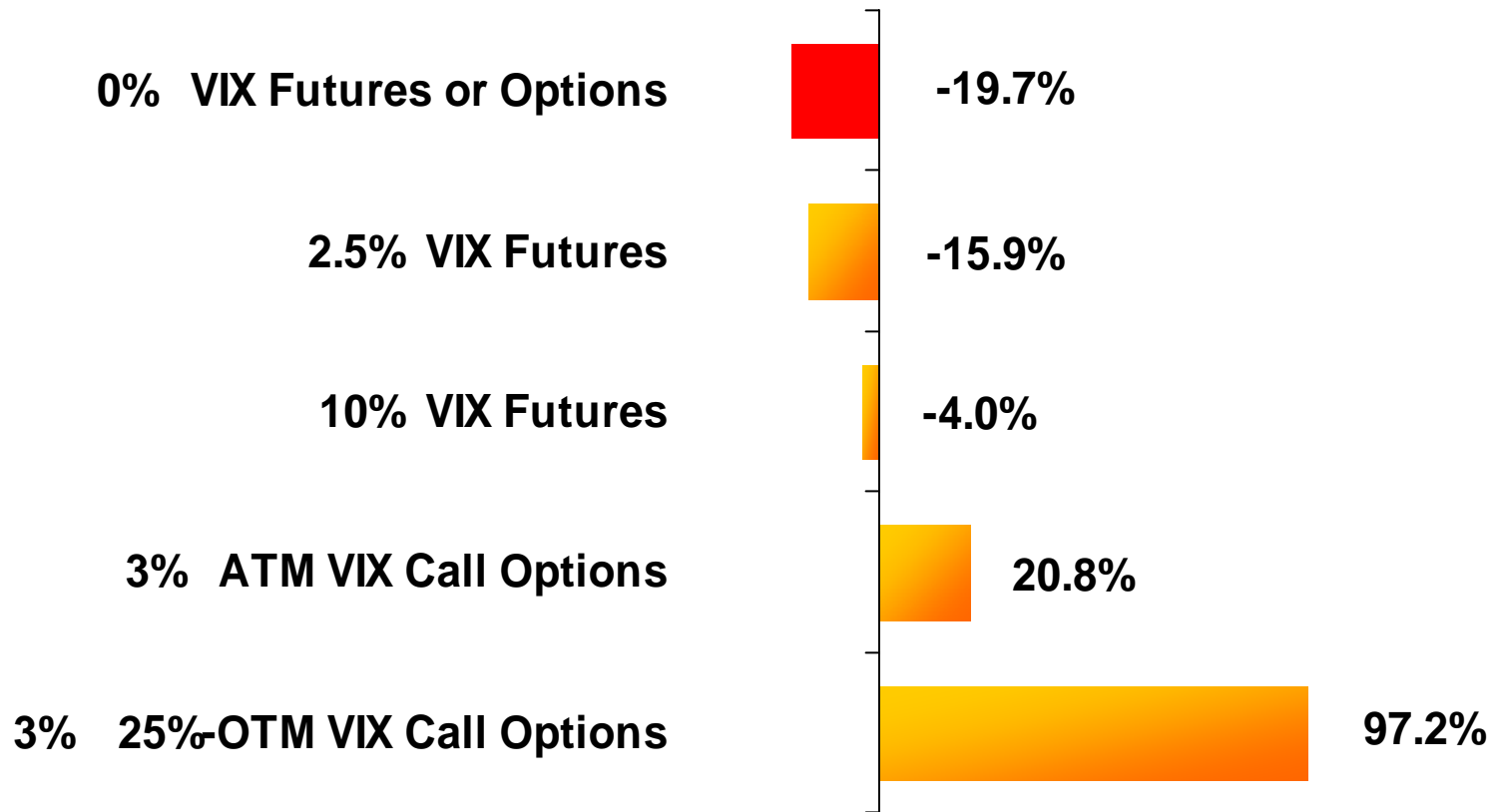
(a) within 25% (or one standard deviation) of its current price one year from now, and

(b) within 7.3% (or one standard deviation) of its current price one month from now. (The annualized number of 25% is divided by (the square root of 12)).

Impact of Adding Long VIX Futures or Options

to a Traditional Portfolio During the 5-Month Period Aug. 2008 – Dec. 2008

From: "VIX Futures and Options: A Case Study of Portfolio Diversification During the 2008 Financial Crisis." The Journal of Alternative Investments (Fall 2009)



CBOE Performance Benchmark Indexes

<u>Index</u>	<u>Ticker</u>	<u>Introduced</u>	<u>Data beginning</u>	<u>Website</u>
CBOE S&P 500 BuyWrite	BXM SM	2002	June 30, 1986	www.cboe.com/BXM
CBOE S&P 500 2%OTM BuyWrite	BXY SM	2006	June 1, 1988	www.cboe.com/BXY
CBOE Russell 2000 BuyWrite	BXR SM	2006	Dec. 29, 2000	www.cboe.com/BXR
CBOE DJIA BuyWrite	BXD SM	2005	Oct. 16, 1997	www.cboe.com/BXD
CBOE NASDAQ-100 BuyWrite	BXN SM	2005	Dec. 30, 1994	www.cboe.com/BXN
CBOE S&P 500 95-110 Collar	CLL SM	2008	June 30, 1986	www.cboe.com/CLL
CBOE S&P 500 PutWrite	PUT SM	2007	June 30, 1986	www.cboe.com/PUT

Bloomberg provides historical data for all seven indexes.

What is a “Buy-write”?

- **Buy** stocks, and **write** (or sell) a call option to gain premium income.
- Also known as a “covered call.”
- **Pros** – add premium income, can reduce portfolio volatility and boost risk-adjusted returns.
- **Cons** – forego some or all of the upside on stock position; underperformance in bull market.

CBOE S&P 500 BuyWrite Index (BXM)

- Benchmark for strategy --
 - **buy** portfolio of S&P 500 stocks
 - **write** (sell) cash-settled S&P 500 Index options every 3rd 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 \$20 billion in buywrite funds
- www.cboe.com/BXM



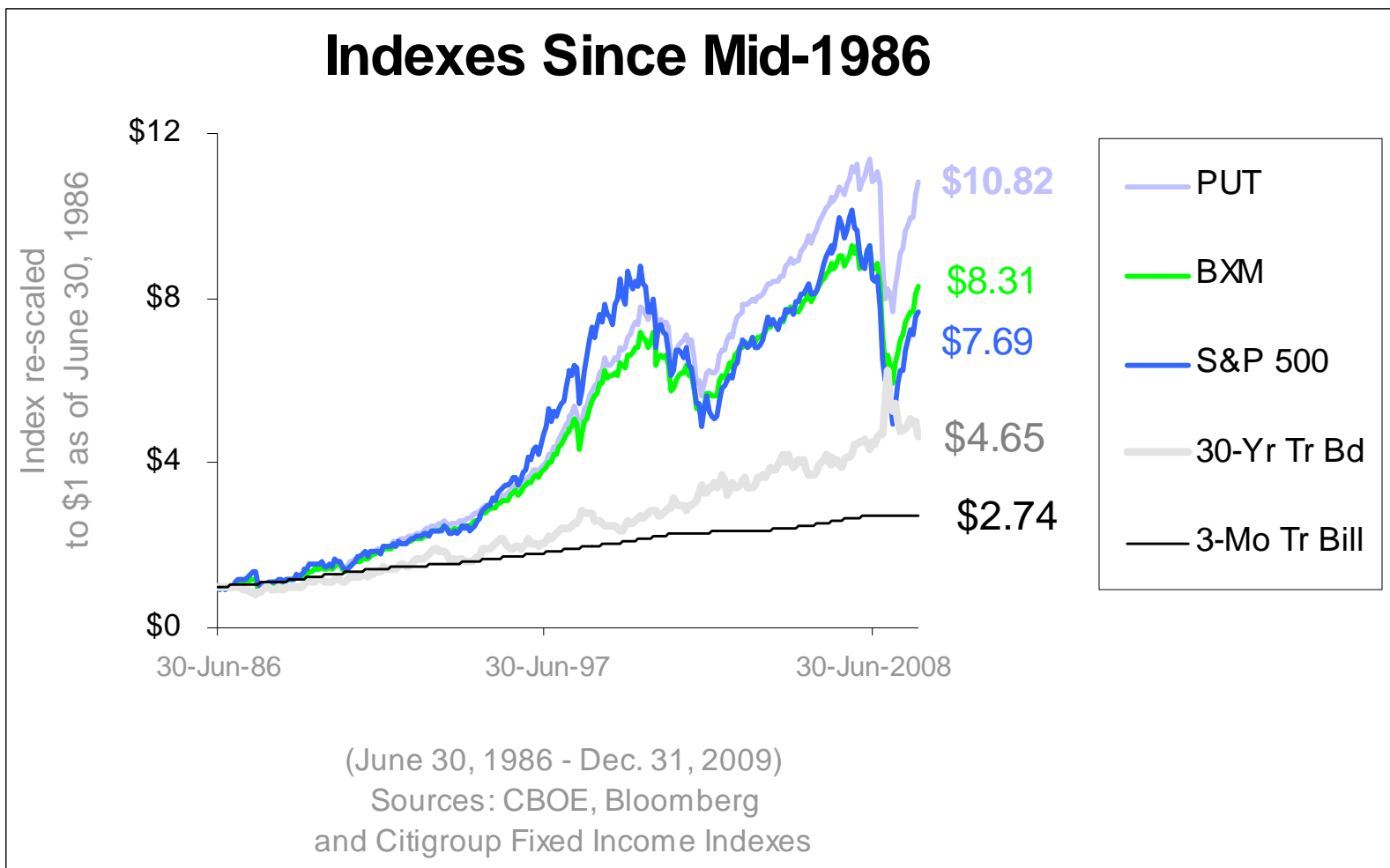
CBOE S&P 500 PutWrite Index (PUT)

- Benchmark for strategy --
 - **write** (sell) cash-settled S&P 500 put options every 3rd 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



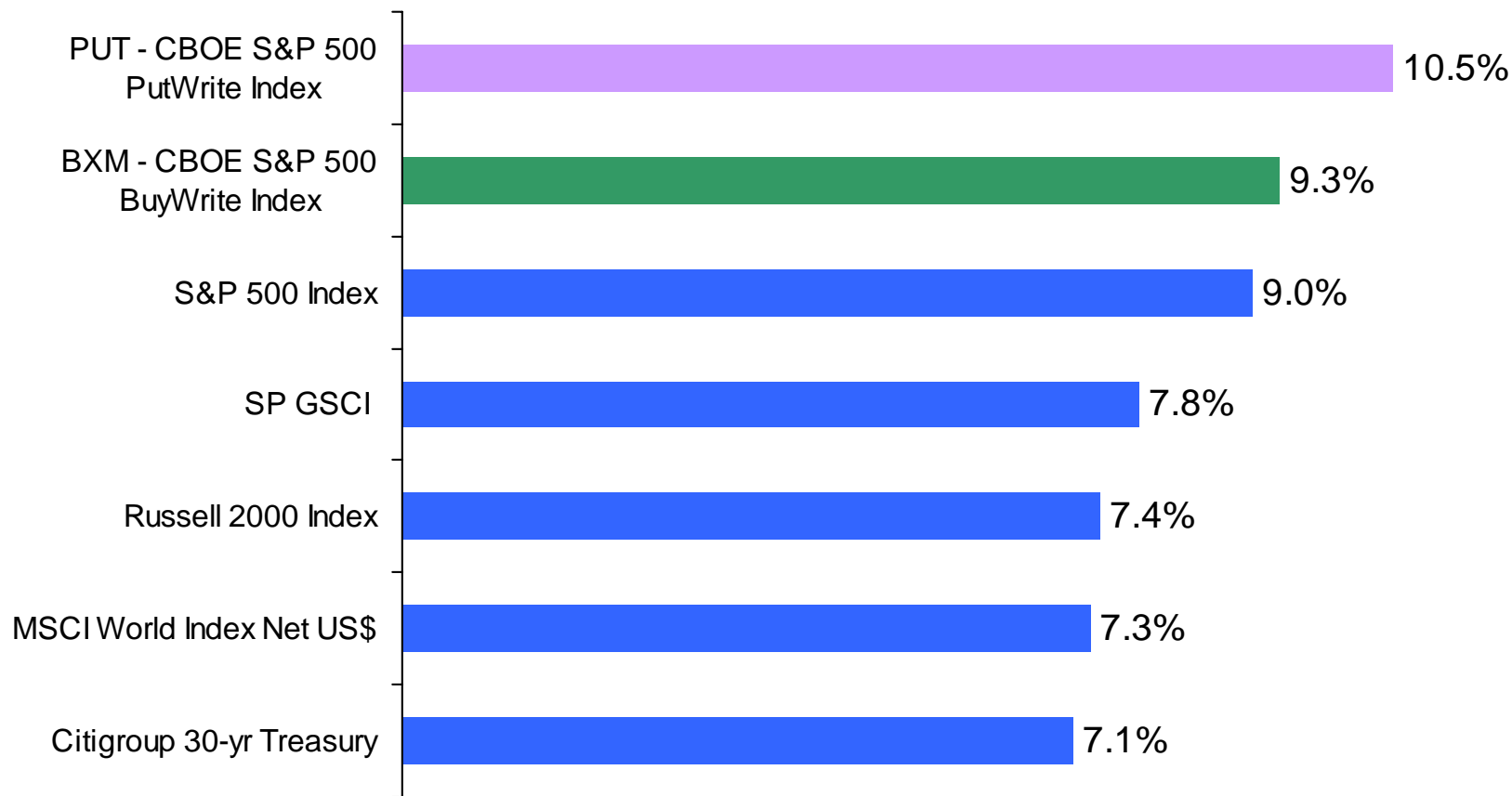
Growth of \$1

PUT Index end value is 40% higher than that of the S&P 500



Annualized Returns

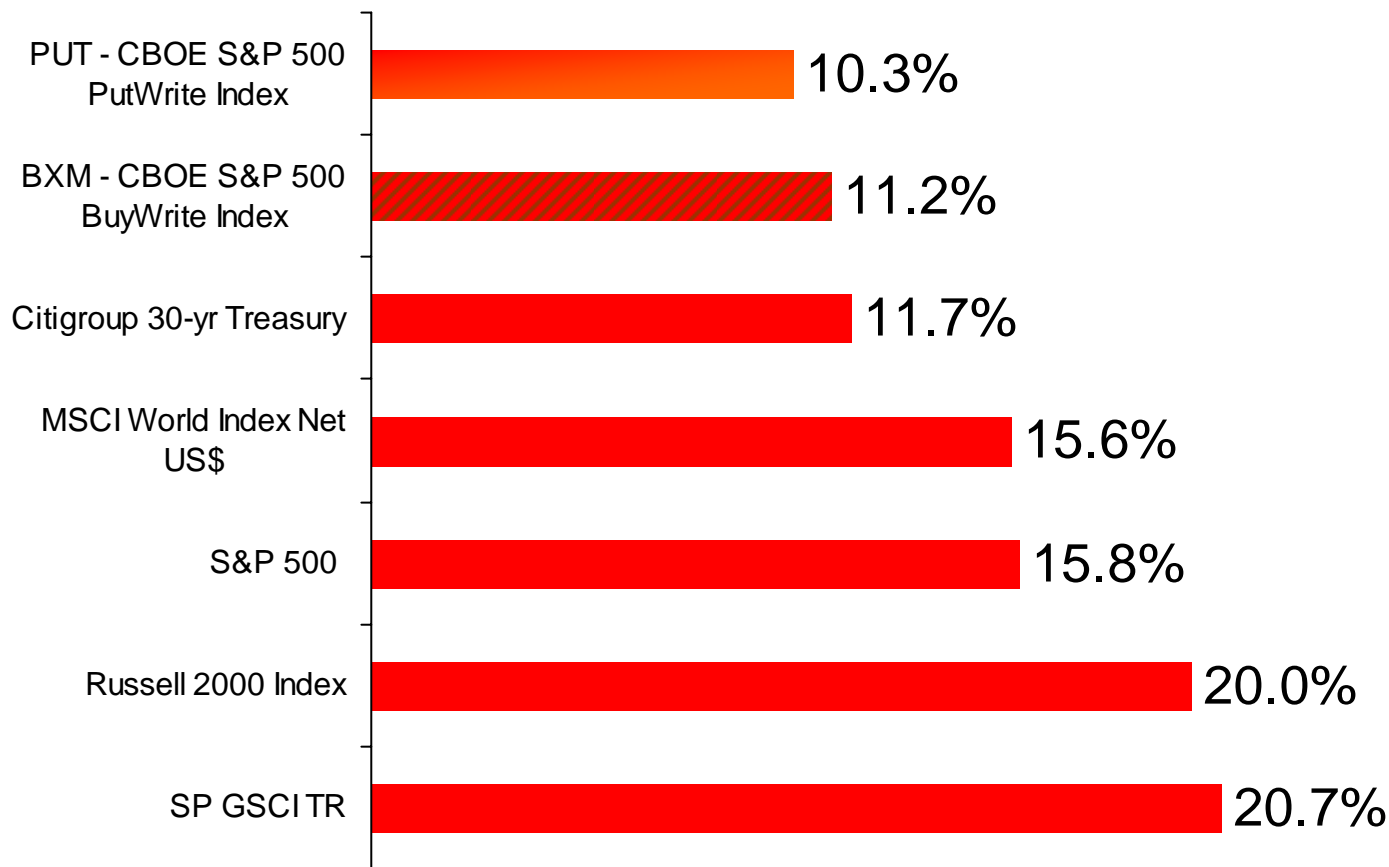
(June 30, 1986 – Dec. 31, 2009) Total Return Indexes



Sources: Bloomberg and CBOE

Standard Deviation

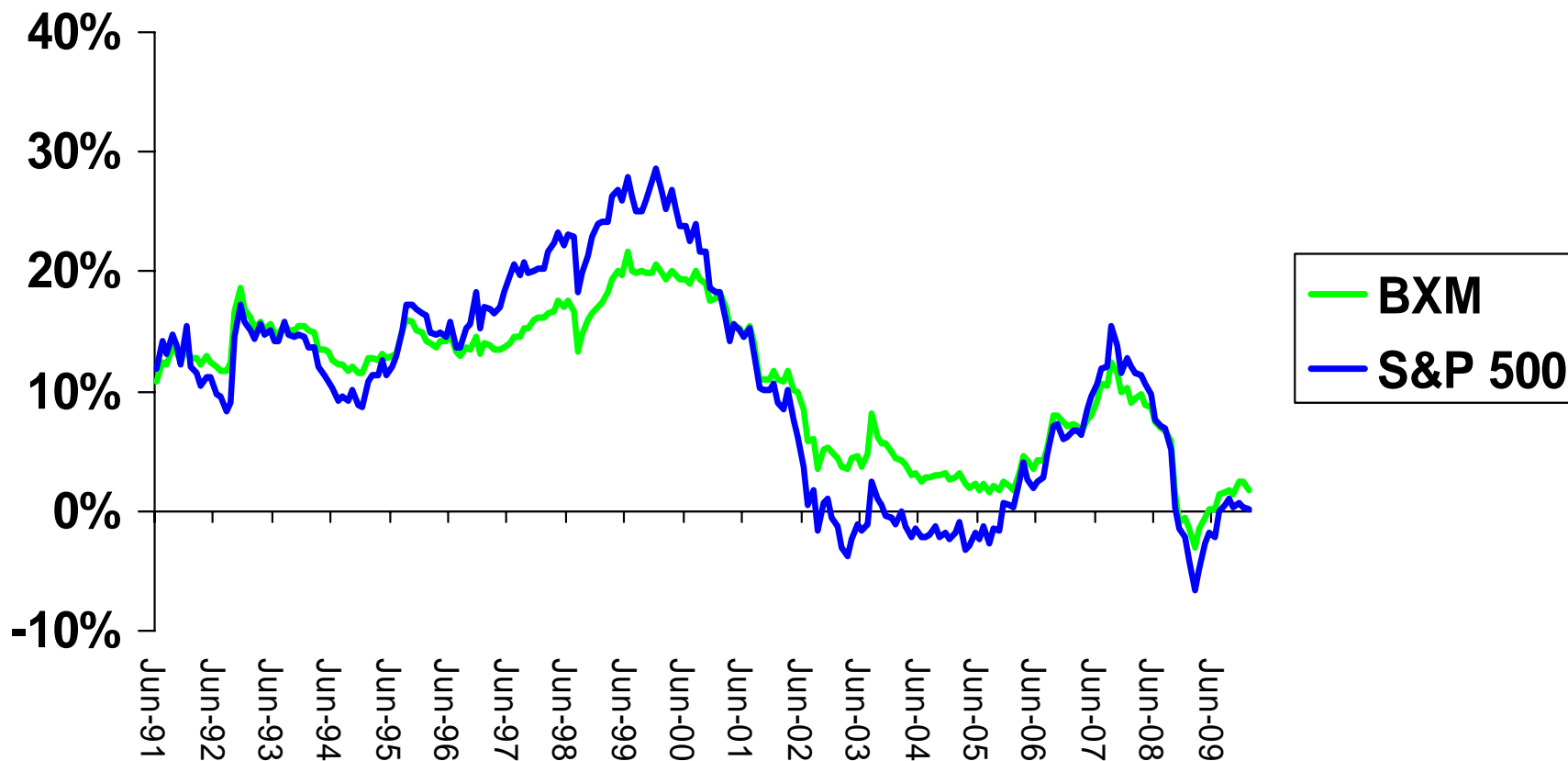
of Monthly Returns of Total Return Indexes (Annualized)
(July 1986 – Dec. 2009)



Sources: Bloomberg and CBOE.
Past performance is not a guarantee of future returns.

Rolling 5-year Annualized Returns

(June 1991 – Oct. Jan. 2010)

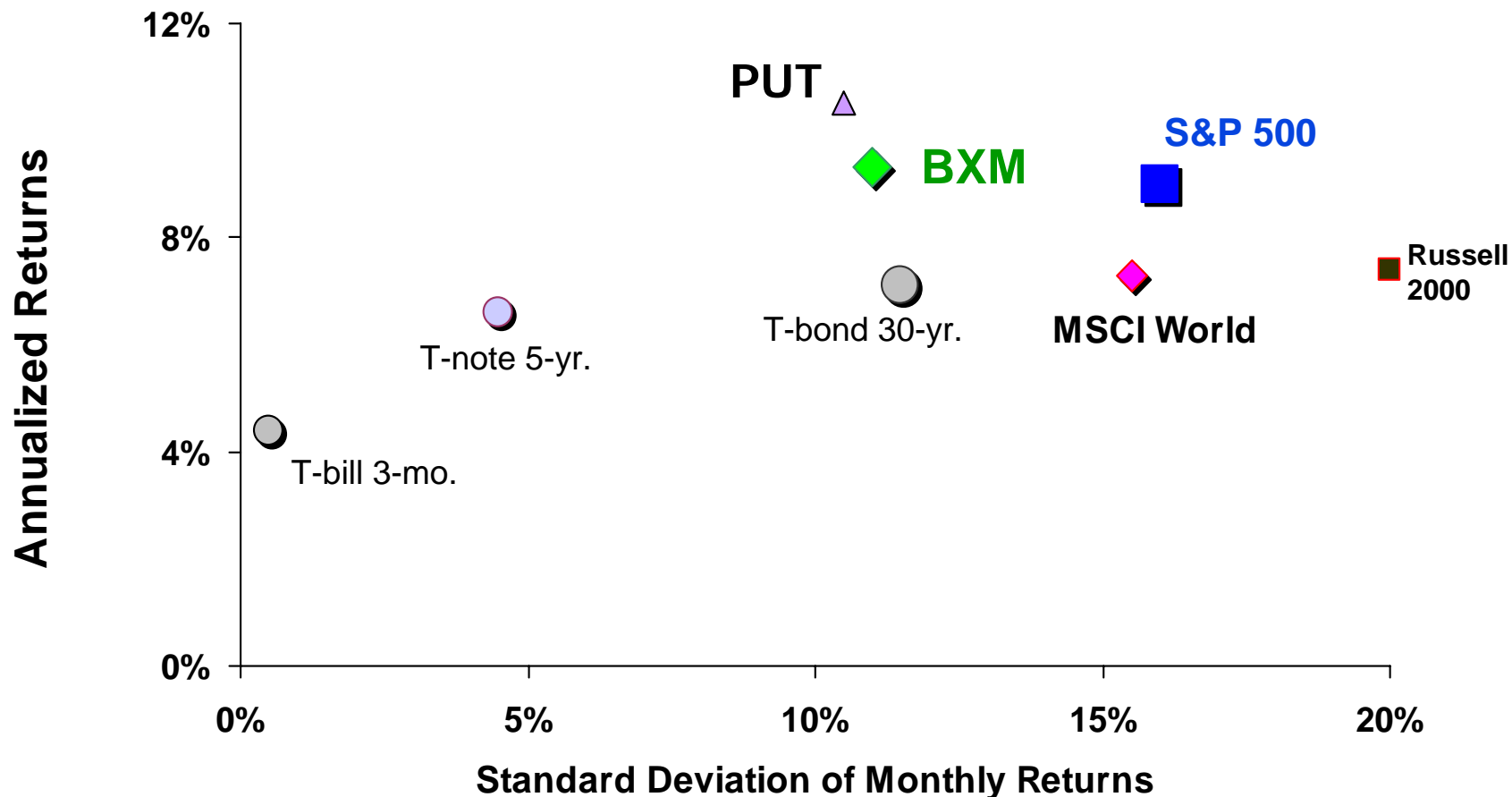


Sources: Bloomberg
and CBOE

Returns and Volatility

(June 30, 1986 – Dec. 31, 2009)

PUT – CBOE S&P 500 PutWrite Index
 BXM – CBOE S&P 500 BuyWrite Index

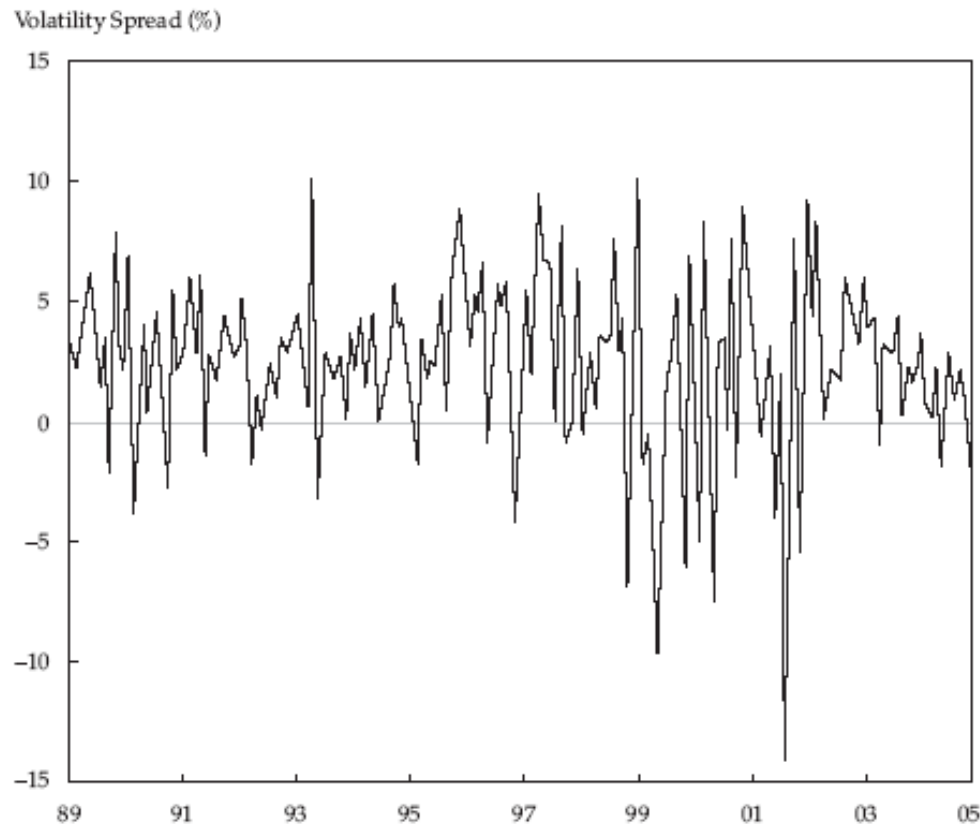


Sources: CBOE and Bloomberg. The figures above represent total return indexes; Citigroup indexes are used for the fixed income numbers. Please see risk disclosures. Past performance is not a guarantee of future returns.

Source of Returns- Sell “Rich” Options

From: "Finding Alpha via Covered Index Writing," [Financial Analysts Journal](#). (September/October 2006).

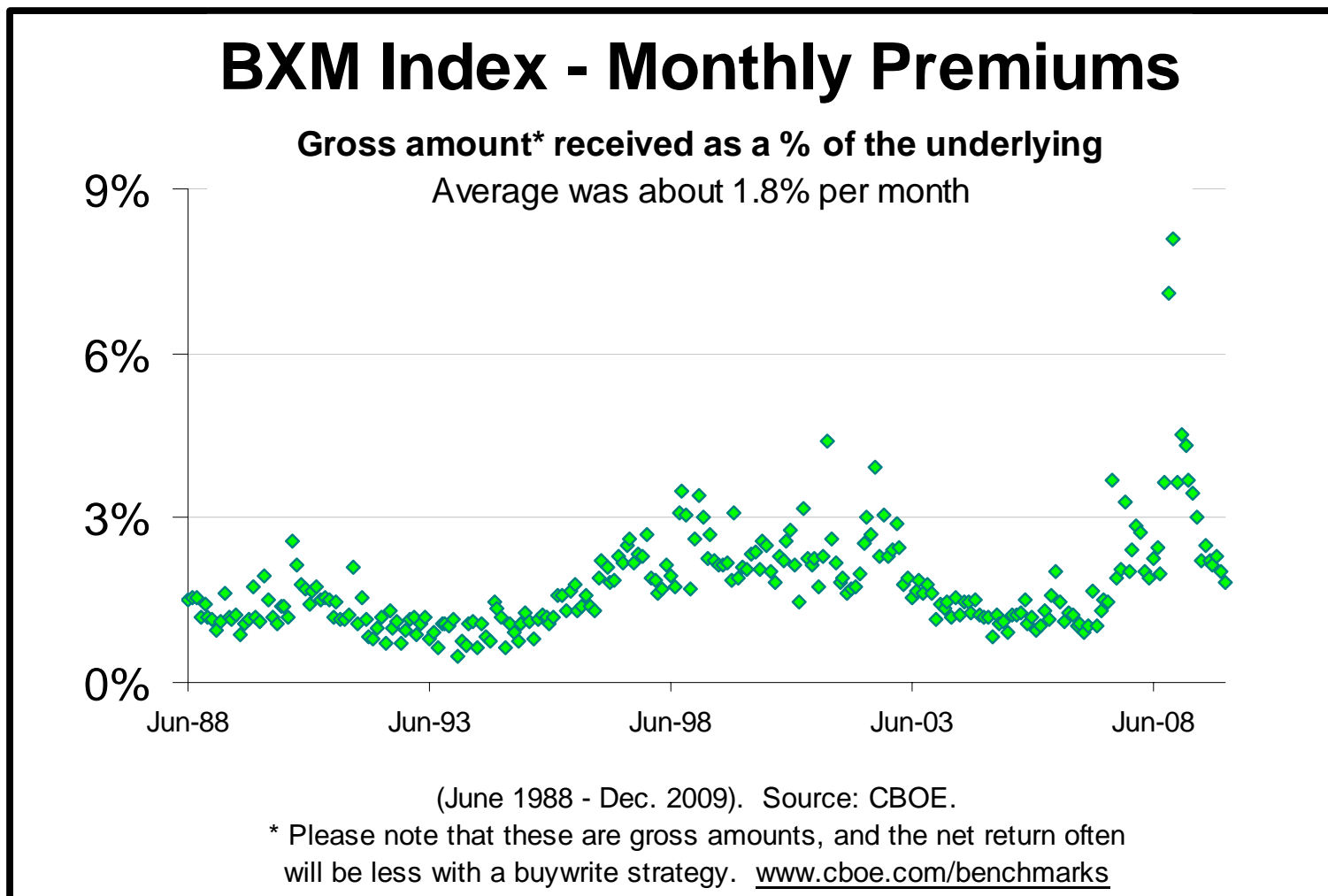
Figure 5. S&P 500 ATM One-Month Option: Implied vs. Realized Volatility Spread, 1 January 1990 to 31 October 2005



Note: The average spread was 2.4 percentage points; the median, 2.7 percentage points.

Source: Goldman Sachs.

Gross Monthly Income from Options Premiums



Studies on BuyWrites

- **Fund Evaluation Group.** Study of BXD and VXD Indexes (2007) at www.cboe.com/BXD <http://www.feg.com/documents/EvaluationofBuyWriteandVolatilityIndexes.pdf>
- **Callan Associates.** An Historical Evaluation of the CBOE S&P 500 BuyWrite Index (BXM). (Oct. 2006). at www.cboe.com/BXM http://www.cboe.com/micro/bxm/Callan_CBOE.pdf
- **Goldman Sachs.** "Finding Alpha via Covered Index Writing," Financial Analysts Journal. (September/October 2006). www.888options.com/institutional/research/pdfs/finding_alpha_via_covered_index_writing.pdf
- **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). at www.cboe.com/BXM www.cboe.com/micro/bxm/ibbotsonAug30final.pdf
- **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

Study By Ibbotson Associates

IbbotsonAssociates

2004

Highlights from Case Study on BXM Buy-Write Options Strategy

Exhibit 6 – Risk Adjusted Returns (as measured by the Stutzer index) (June 1, 1988 – March 31, 2004)

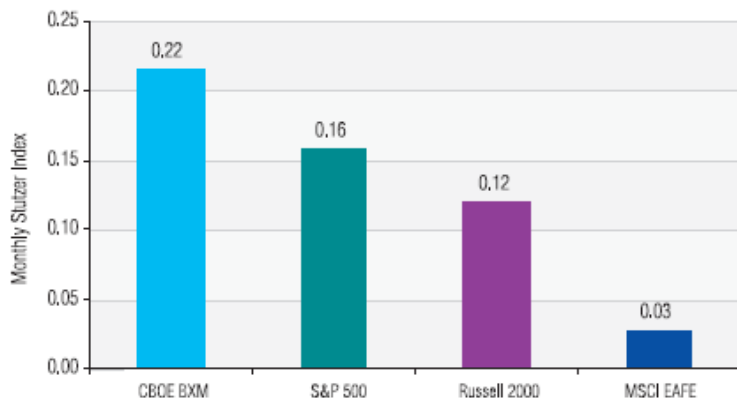


Exhibit 6: Monthly Stutzer index values for equity indexes, data from June 1988 to March 2004. The Stutzer (2000) index is a measure of risk-adjusted returns. It is a generalization of the Sharpe ratio that controls for skew and kurtosis in asset returns. The results indicate that the CBOE BXM has had considerably better risk-adjusted performance than the S&P 500. See Exhibit 7 for corresponding Sharpe ratios.

Sources of Returns

Selling index options 12 times a year can produce significant income. Over the 190-month period studied, the S&P 500 options were found to have an average implied volatility of 16.5% and a realized volatility of 14.9%. The average monthly premium was 1.69% of the underlying value.

Exhibit 8 – BXM Call Premiums as a Percentage of the Underlying Value (June 1, 1988 – March 31, 2004)

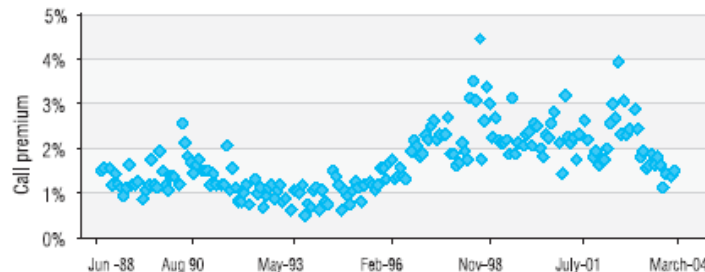


Exhibit 8: CBOE BXM call premiums earned as a percentage of underlying value, June 1988 to March 2004. The average monthly premium is 1.69%, an annualized rate of 22.31%.

A case study of a real-life BXM investment program is included. The study (both long and short versions) is available at www.cboe.com/BXM

Study by Fund Evaluation Group

Evaluation of BuyWrite and Volatility Indexes

Using the CBOE DJIA BuyWrite Index (BXD) and CBOE DJIA Volatility Index (VXD) for Asset Allocation and Diversification Purposes

Fund Evaluation Group, LLC 2007

Exhibit 6: Annualized Returns vs. Risk
(Monthly Data October 31, 1997 through November 30, 2006)

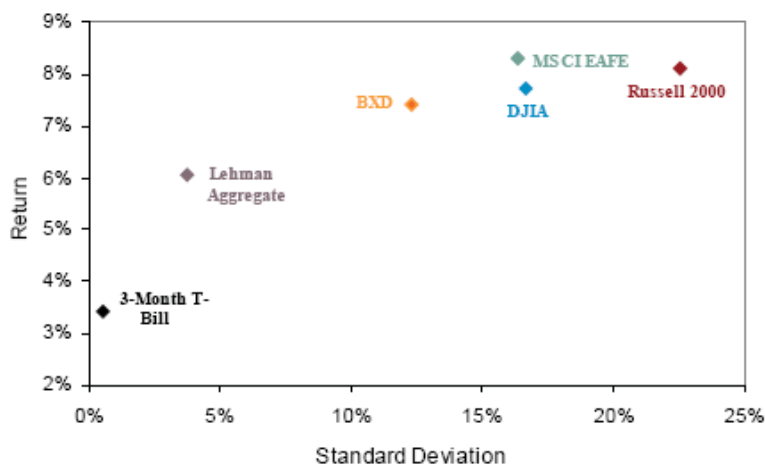
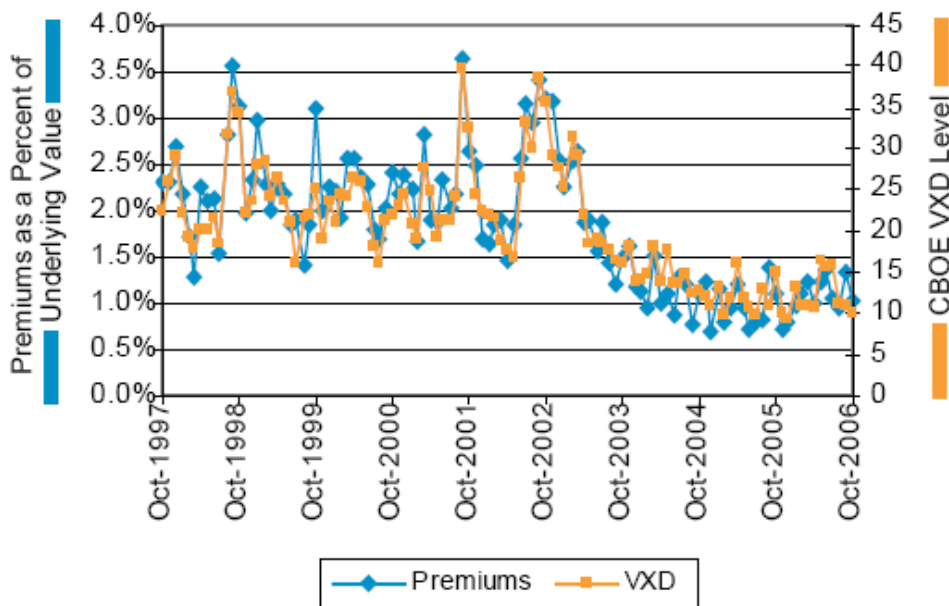


Exhibit 6: The graph above plots several indexes according to their respective risk and reward. Over the course of the study, the BXD posted annualized returns similar to equity indexes but experienced less volatility. The BXD's performance was superior to fixed income and cash, but exhibited greater volatility.

Exhibit 9: CBOE BXD Call Premiums and CBOE VXD Levels



Risk-adjusted Returns

Exhibit 6 from the Callan Study

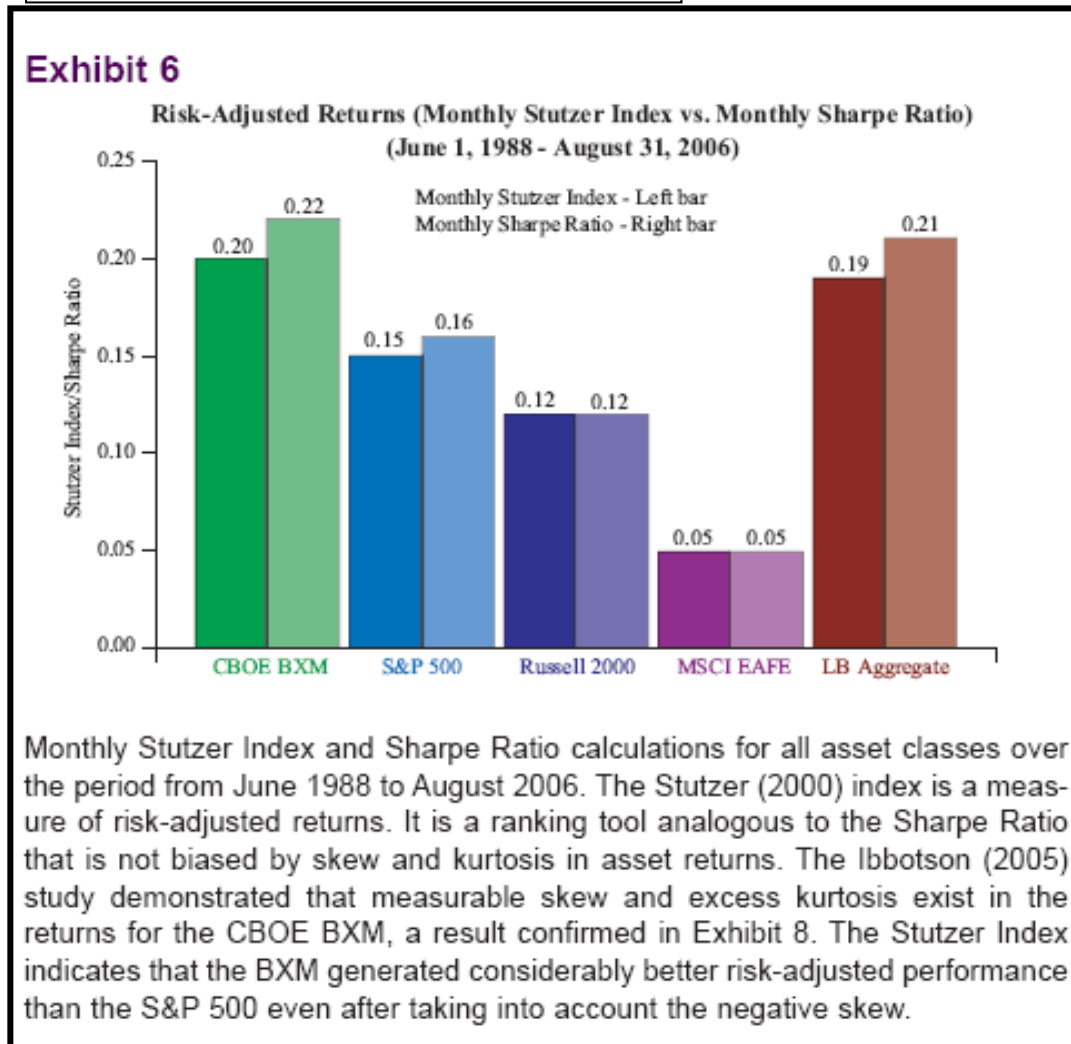
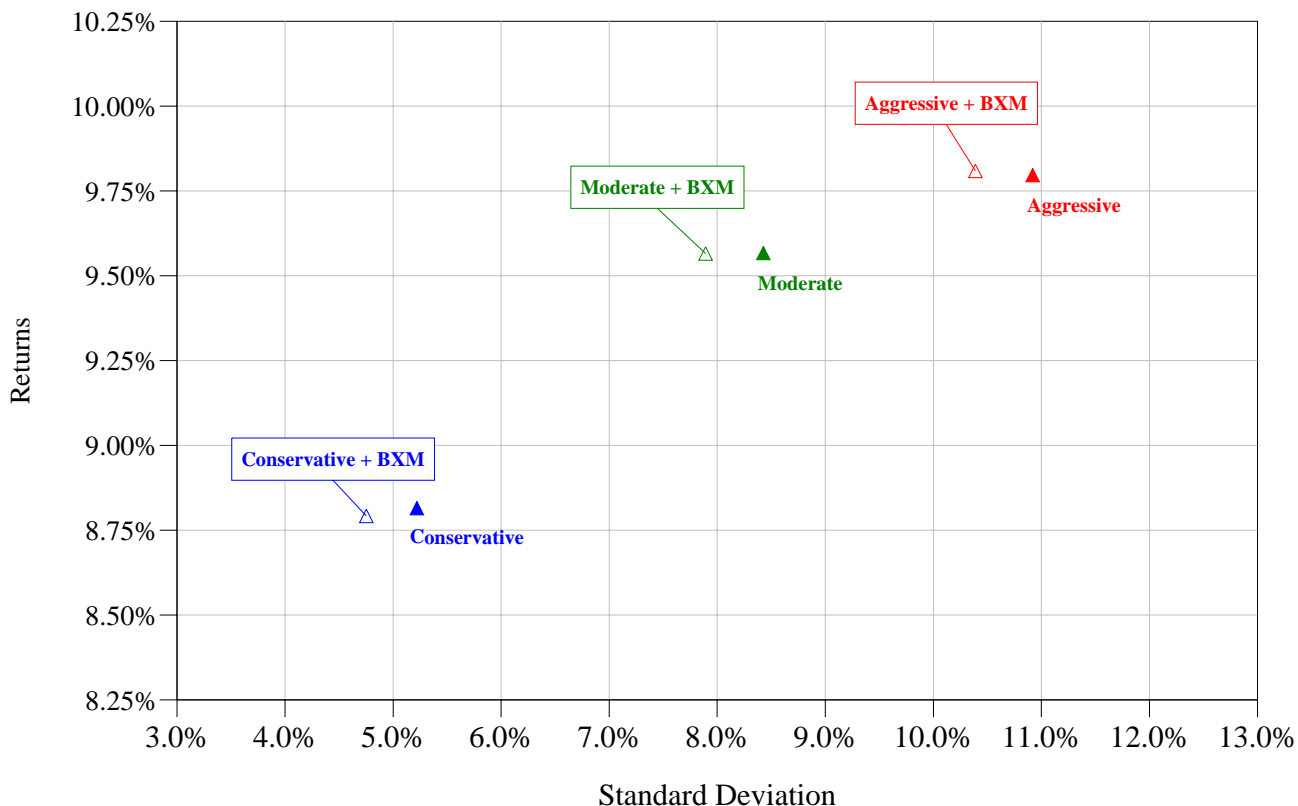


Exhibit 17 from Callan Associates' 2006 Study

Annualized Return versus Risk
(June 1, 1988 - August 31, 2006)



Measuring the impact of adding CBOE BXM to diversified portfolios. Calculated with monthly rebalancing over the period June 1, 1988 to August 31, 2006. BXM substituted for 10% of large cap equity exposure in each asset mix. In all cases, return is essentially unchanged while risk is reduced, improving the risk-adjusted return as measured by the Sharpe ratio.

Pensions & Investments

Sept. 7, 2009 excerpts

Investors turn to options to hold gains while trimming losses

After the scalding they took from the financial crisis, more institutional investors are embracing options strategies both to lock in upside gains and limit downside losses.

"It's been going on for some time, but lately there's a lot more activity because of two things," said Terrence Ransford, director of trading for Northern Trust Securities, the broker/dealer subsidiary of Northern Trust Corp., Chicago.

"Money managers are extremely anxious to mitigate some of the volatility in their portfolios," he explained. "And when the VIX (the Chicago Board Options Exchange's gauge of stock market volatility) was hitting new highs, the swings were so dramatic that many end clients — foundations, endowments, corporate pensions — all became interested in ways to manage volatility."

And these days, because there are "no returns anywhere," investors are looking to options strategies to scrape any alpha they can out of the stock market, Mr. Ransford added.

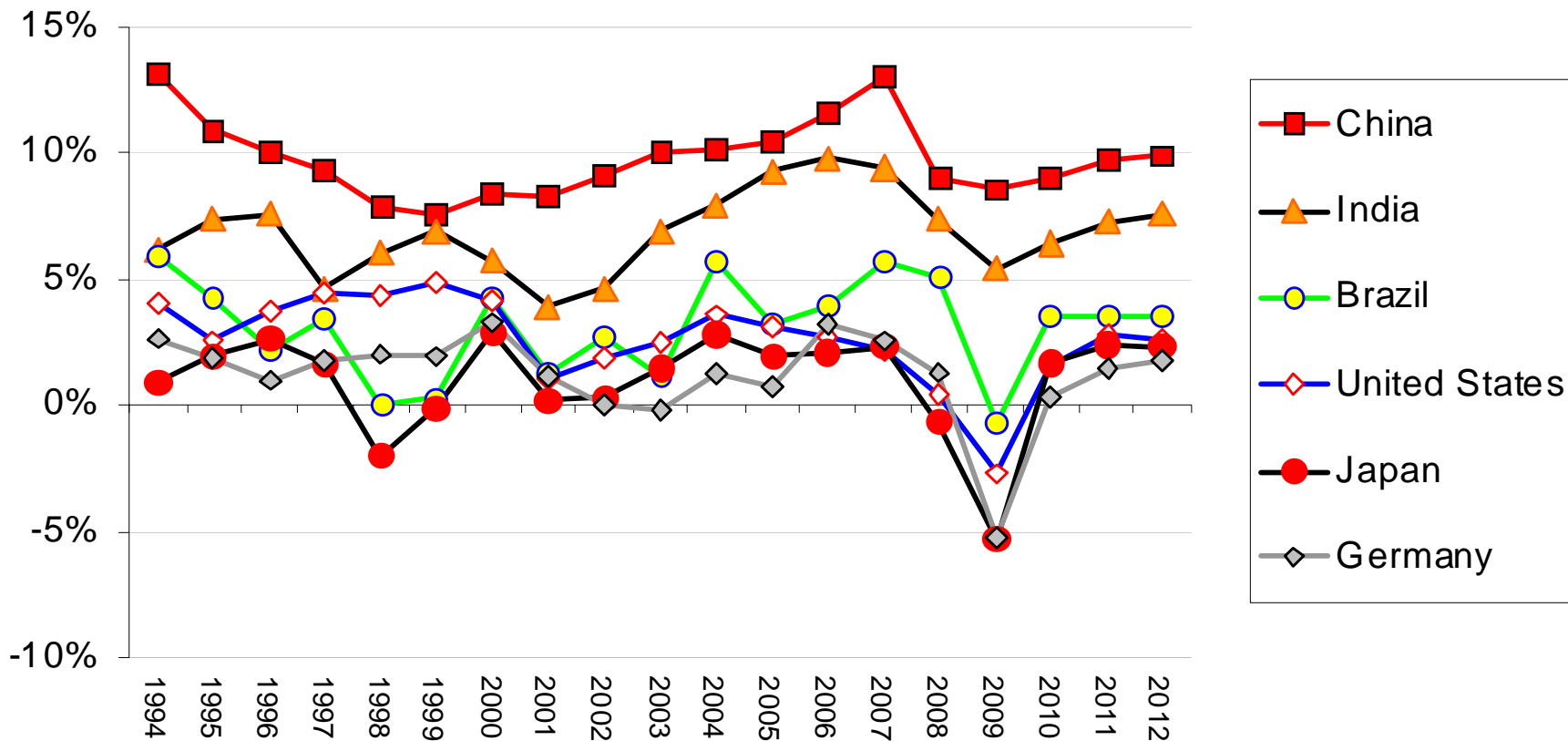
tions. According to the minutes of the Indiana Public Employees' Retirement Fund's

May board meeting, trustees approved a plan that would allow staff to write up to \$500 million in notional value of call options on domestic equity indexes as a way to manage the \$12 billion fund's overweight position in domestic equities.

And in December, the board of the \$4.6 billion San Bernardino (Calif.) County Employees' Retirement Association approved a covered call strategy for its S&P 500 index mandate, which was valued at \$230.3 million at the end of last month. The strategy is managed by State Street Global Advisors, Boston. According to meeting minutes, the reasons for implementing the strategy included: record premium income from selling the options and the association's need for liquidity.

...

GDP Growth 1994 - 2012



Source: IMF on Dec. 1, 2009, with estimated predictions for 2009 - 2012

Returns and Volatility for Select Indexes

	ATM BuyWrite	OTM BuyWrite	PutWrite	Large-cap	Small-cap	Treasury	Commodity
	BXM - CBOE S&P 500 BuyWrite Index	BXY - CBOE S&P 500 2% OTM BuyWrite	PUT - CBOE S&P 500 PutWrite Index	S&P 500	Russell 2000	Citigroup 30- yr Treasury	S&P GSCI
	<u>BXM</u>	<u>BXY</u>	<u>PUT</u>	<u>S&P 500</u>	<u>Rus2000</u>	<u>30-Yr Tr</u>	<u>S&P GSCI</u>
One-Year Annualized Return	25.9%	32.2%	31.5%	26.5%	27.2%	-25.9%	13.5%
Three-Year Annualized Return	-1.4%	-1.2%	1.8%	-5.6%	-6.1%	4.9%	-6.9%
Five-Year Annualized Return	2.5%	3.3%	5.3%	0.4%	0.5%	4.4%	-3.0%
Ten-Year Annualized Return	2.6%	2.5%	4.8%	-0.9%	3.5%	7.0%	5.1%
Annualized Return Since 30-Jun-86	9.4%		10.7%	9.1%	7.8%	6.8%	7.8%
One-Year Standard Deviation	14.1%	16.8%	12.6%	22.3%	29.4%	18.6%	24.5%
Three-Year Standard Deviation	15.9%	17.8%	15.9%	19.9%	25.2%	18.6%	31.1%
Five-Year Standard Deviation	12.6%	14.3%	12.5%	16.0%	21.4%	15.7%	28.2%
Ten-Year Standard Deviation	12.2%	14.0%	12.0%	16.1%	21.5%	13.8%	25.3%
Standard Deviation Since 30-Jun-86	11.2%		10.3%	15.8%	20.0%	11.7%	20.7%

Total return indexes, for periods ending Dec. 31, 2009

Sources: CBOE and Bloomberg

Options involve risk and are not suitable for all investors.

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