JANUARY 2012

AN ANALYSIS OF INDEX OPTION WRITING FOR LIQUID ENHANCED RISK-ADJUSTED RETURNS

ASSET CONSULTING GROUP

EXECUTIVE SUMMARY OF KEY HIGHLIGHTS

We compared the performance of four options-based benchmark indices (BXM, BXY, PUT and CLL) to the performance of more traditional indices over more than 23 years. Highlights of our findings include the following:

- **Total Growth**. Total growth for indexes since mid-1986 was 1153% (10.4% annualized) for PUT Index, 830% (9.1% annualized) for BXM Index, 807% (9.0% annualized) for S&P 500® Index, and 368% (6.2% annualized) for CLL Index (Exhibits 2 and 6).
- **Lower Volatility**. The PUT, BXM, and CLL indices all had volatility that was about 30 percent lower than the volatility of the S&P 500 Index (Exhibit 4).
- **Left-tail Risk**. The biggest monthly losses over the past 23.5 years for two of the indices were negative 8.0% for the CLL Index versus negative 16.8% for the S&P 500 Index (Exhibit 8e).
- **Risk-adjusted Returns**. One measure of risk-adjusted returns, the Sortino Ratio, was 0.90 for the PUT Index, 0.75 for BXY, 0.71 for BXM, 0.50 for S&P 500, and 0.31 for CLL Index (Exhibits 10 and 11).
- **Monthly Premium Income**. The average for the gross monthly premiums collected by the BXM Index was 1.8 percent, and the index options usually were richly priced (Exhibits 12 and 13).
- **Efficiency**. Overlaying options on appreciated stock can provide the opportunity of reducing risk without generating realized gains.
- **Liquidity**. The utilization of S&P 500 stocks and S&P 500 index options provides liquidity for those investors that prefer flexible access to their capital (Exhibit 14).

The option-based indices could appeal to investors who are concerned about low interest rates, increased volatility, illiquid investments, or sluggish stock market returns.

FOUR INDICES THAT SELL OPTIONS FOR INCOME

In this paper we analyze four benchmark indices that measure the performance of a portfolio that sells one-month, cash-settled S&P 500 Index options on the third Friday of every month (visit www.cboe.com/benchmarks for more details).

Index	Ticker	Hold stocks or cash	S&P 500 1-month Options Sold	S&P 500 3-month Options Bought	Price History Begins
CBOE S&P 500 BuyWrite Index	**BXM**SM	Hold S&P 500 stocks +	At-the-money "covered" call options	None	June 30, 1986
CBOE S&P 500 2% OTM BuyWrite Index	**BXY**SM	Hold S&P 500 stocks +	2% out-of-the-money "covered" call options	None	June 1, 1988
CBOE S&P 500 PutWrite Index	**PUT**SM	Hold U.S. Treasury bills +	At-the-money "cash-secured" put options	None	June 30, 1986
CBOE S&P 500 95-110 Collar Index	**CLL**SM	Hold S&P 500 stocks +	Out-of-the-money call options at 110% of the S&P 500 value	Out-of-the-money put options at 95% of the S&P 500 value	June 30, 1986

Exhibit 1: Profit-and-Loss Diagram for SPX Stocks, BuyWrite, Put-Write and Collar

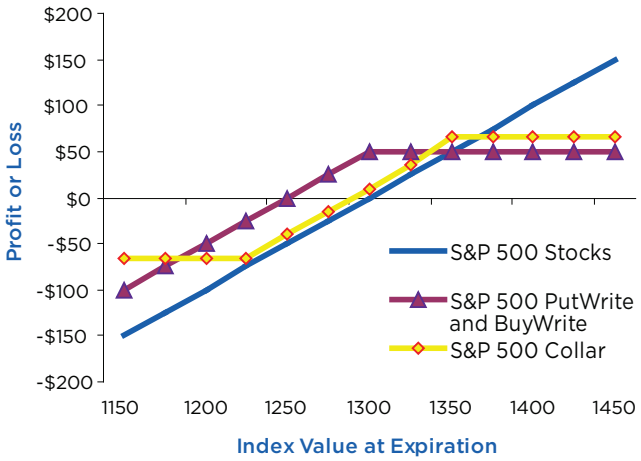


Exhibit 1: The buy-write and cash-secured put-write strategies generally add value in moderate and declining markets, while limiting participation in bullish markets. The collar strategy truncates both profits and losses to a defined range.

Exhibit 2: Growth of One Dollar (June 30, 1986—December 31, 2011)

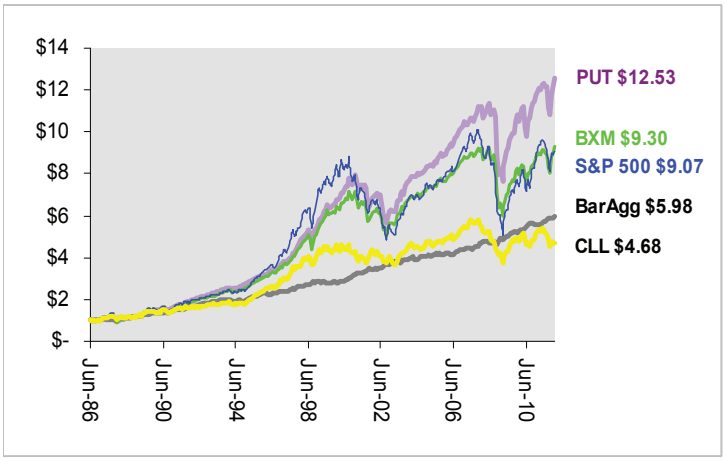


Exhibit 2: The growth in the value of a dollar invested on June 30, 1986. The BXY Index is not included in Exhibit 2 because its data history begins in June 1988. Source: Bloomberg.

COMPARING ANNUALIZED RETURNS AND STANDARD DEVIATIONS

Exhibit 3: Annualized Returns (June 30, 1988 - December 31, 2011)

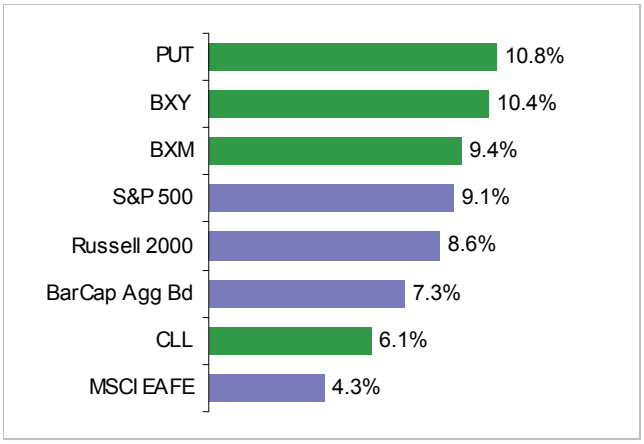


Exhibit 3: Compound annual returns for all asset classes from June 30, 1988 to December 31, 2011. The PUT, BXY and BXM indices had higher returns than various equity and fixed income benchmarks.

Exhibit 4: Standard Deviation (June 30, 1988 - December 31, 2011)

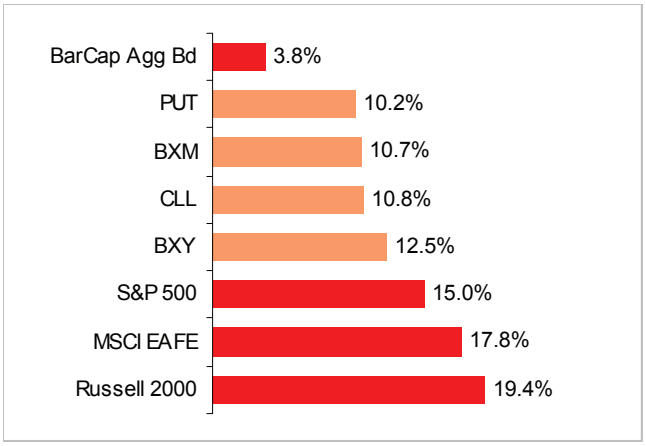


Exhibit 4: Standard deviation for all asset classes from June 30, 1988 to December 31, 2011. The PUT, BXM, and CLL indices all had much less volatility than the 3 stock indices.

Exhibit 5 : Return and Volatility (June 30, 1988 - December 31, 2011)

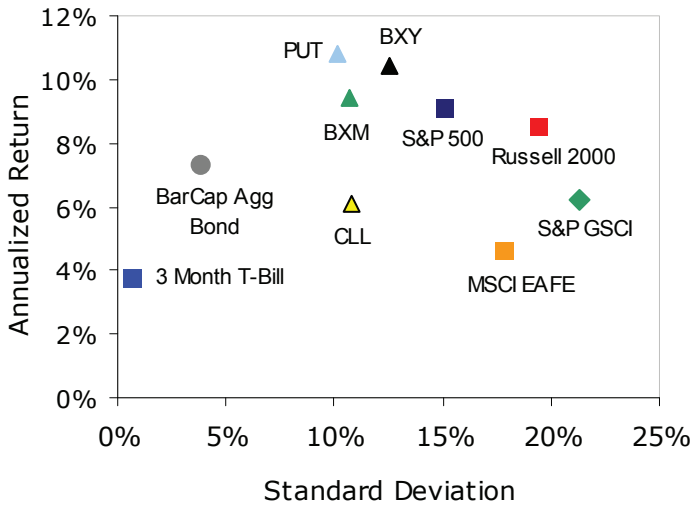


Exhibit 5: Compound annual returns and standard deviation for all asset classes from June 30, 1988 to December 31, 2011. Three of the CBOE indices outperformed the S&P 500 while also incurring less risk.

Exhibit 6: Various Time Periods

(Returns and Volatility for Periods Ending December 31, 2011)

	BXM	BXY	PUT	CLL	S&P 500	Bond
One-Year Annualized Return	5.7%	7.2%	6.2%	-8.8%	2.5%	7.8%
Three-Year Annualized Return	12.1%	15.9%	15.0%	3.7%	14.3%	6.8%
Five-Year Annualized Return	1.4%	2.6%	4.1%	-3.0%	-0.2%	6.5%
Ten-Year Annualized Return	4.2%	5.3%	6.2%	0.8%	3.0%	5.8%
Twenty-Year Annualized Return	8.3%	9.2%	9.7%	5.3%	7.8%	6.5%
Annualized Return Since 30-Jun-86	9.14%	N/A	10.4%	6.2%	9.03%	7.3%
One-Year Standard Deviation	14.3%	15.8%	13.9%	10.8%	16.0%	2.4%
Three-Year Standard Deviation	13.7%	15.7%	13.9%	12.8%	19.0%	2.8%
Five-Year Standard Deviation	14.9%	16.7%	15.2%	12.0%	18.9%	3.6%
Ten-Year Standard Deviation	12.3%	14.0%	12.2%	10.4%	15.9%	3.7%
Twenty-Year Standard Deviation	11.0%	12.7%	10.6%	10.8%	15.0%	3.7%
Standard Deviation Since 30-Jun-86	11.4%	N/A	10.6%	11.1%	15.9%	4.0%

Exhibit 6: The BXM, BXY, and PUT generally had higher returns and lower volatility than the S&P 500 over longer time periods. Relative performance varies dependent on the time frame. The BXM Index was introduced in 2002, and now has a backtested daily price history dating back to June 30, 1986.

Exhibit 7: Calendar Year Performance

Yearly Index % Changes

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
BXM	-10.9%	-7.6%	19.4%	8.3%	4.2%	13.3%	6.6%	-28.7%	25.9%	5.9%	5.7%
BXY	-11.4%	-12.3%	24.9%	9.7%	4.4%	17.1%	6.1%	-31.2%	32.1%	9.8%	7.2%
PUT	-10.6%	-8.6%	21.8%	9.5%	6.7%	15.2%	9.5%	-26.8%	31.5%	9.0%	6.2%
CLL	3.8%	-11.1%	17.9%	4.9%	2.0%	11.7%	0.9%	-23.6%	17.6%	4.1%	-8.8%
S&P 500	-11.9%	-22.1%	28.7%	10.9%	4.9%	15.8%	5.5%	-37.0%	26.5%	15.1%	2.1%

Exhibit 7: Generally, the CBOE indices have outperformed during years when the S&P 500 was below 10% or negative. The shading indicates calendar years when the respective indices outperformed the S&P 500.

Sources for all Exhibits on this page: Bloomberg, Ibbotson.

HISTOGRAMS WITH FREQUENCY OF MONTHLY RETURNS (June 30, 1988 - December 31, 2011)

- The return histograms illustrate the range of 282 monthly returns of the various indices.
- An investor in the S&P 500 has experienced a range of returns much wider than those of the CBOE strategies.
- The CBOE strategies result in fewer negative experiences while the majority of the months are in the –2.0% to +4.0% ranges.

Exhibit 8a: BXM and S&P 500

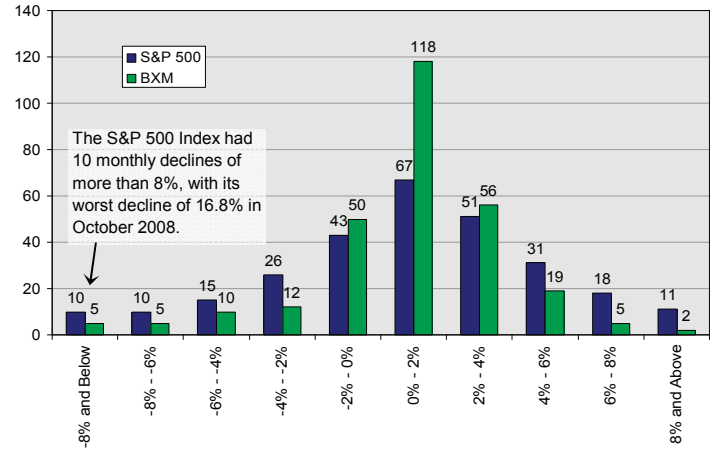


Exhibit 8a: The frequency of the BXM monthly returns is significantly greater in the –2.0% to +4.0% range highlighting the impact of the options. The distributions are tighter for the BXM reflecting cushion during declines and upside reduction.

Exhibit 8b: PUT and S&P 500

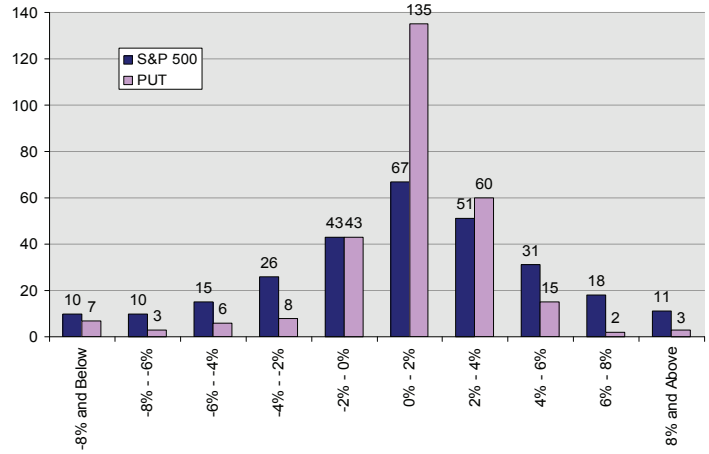


Exhibit 8b: The frequency of returns of the PUT are very similar to the BXM.

Exhibit 8c: BXY and S&P 500

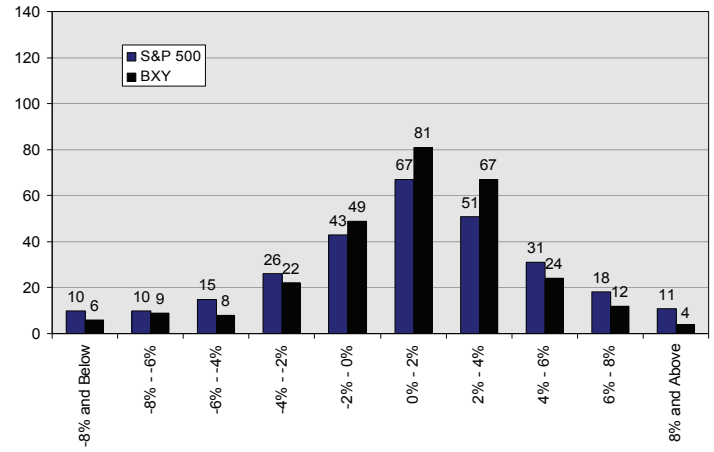


Exhibit 8c: The BXY chart shows greater frequency of higher returns than the BXM. The BXY had 91 months of returns in the +2.0% to +6.0% range versus 75 for the BXM.

Exhibit 8d: CLL and S&P 500

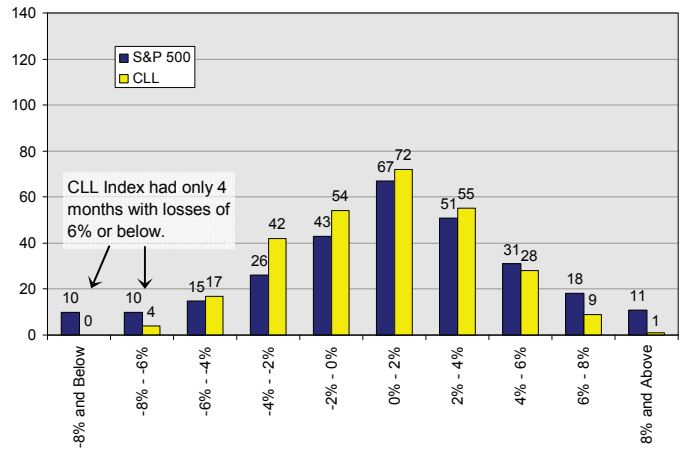


Exhibit 8d: With its use of SPX puts, the CLL Index was able to mitigate some left tail risk. In October 2008 the S&P 500 declined 16.8% and CLL was down 3.8%. In October 1987 (not covered by above chart) the S&P 500 fell 21.5% and CLL declined by 8.6%.

Exhibit 8e: Frequency of Returns

	S&P 500	BXM	PUT	BXY	CLL
Positive Returns (#)	178	200	215	188	165
Negative Returns (#)	104	82	67	94	117
Total (#)	282	282	282	282	282
Positive Returns (%)	63%	71%	76%	67%	59%
Negative Returns (%)	37%	29%	24%	33%	41%
Total (%)	100%	100%	100%	100%	100%
Highest Month	11.4%	10.0%	9.0%	11.4%	8.3%
Lowest Month	-16.8%	-15.1%	-17.7%	-15.7%	-8.0%

Exhibit 8e: This table summarizes the histogram results and illustrates the downside protection provided by the CBOE strategies.

Sources for all Exhibits on this page: Ibbotson, ACG.

RETURNS RELATIVE TO THE S&P 500 - "OVER - UNDER" CHARTS (June 30, 1988 - December 31, 2011 Quarterly)

- The "Over/Under" charts provide a quick visual representation of the quarterly performance of the CBOE strategies as compared to the results of the S&P 500 index.
- Each dot represents the quarterly return of the relevant CBOE strategy. To the extent the dot is above the blue line, the return is greater than that of the S&P 500 Index. The dots below the blue line represent periods in which the relevant CBOE strategy underperformed the S&P 500 Index.
- Periods in which the S&P 500 generated a positive return are on the right side of the diagram while periods in which the S&P 500 generated a negative return are on the left side of the diagram.

Exhibit 9a: BXM

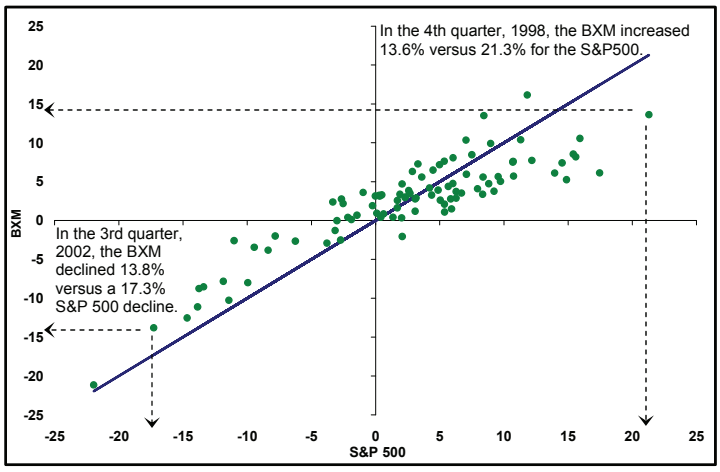


Exhibit 9a: The BXM pattern provides compelling evidence of the strategy's ability to cushion declining periods (dots above the blue line when the S&P 500 returns were negative). The cost to the cushion is illustrated in the modest upside participation (portion of the dots below the blue line when the S&P 500 returns were positive).

Exhibit 9b: PUT

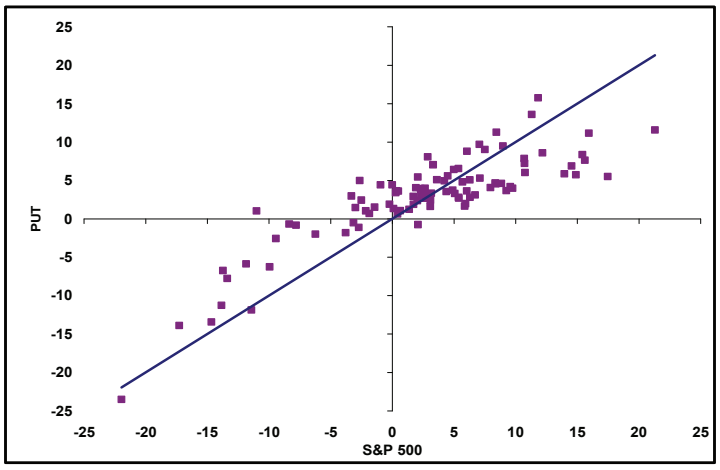


Exhibit 9b: The PUT pattern is very similar to the BXM reflecting the ability to cushion declines with modest upside participation.

Exhibit 9c: BXY

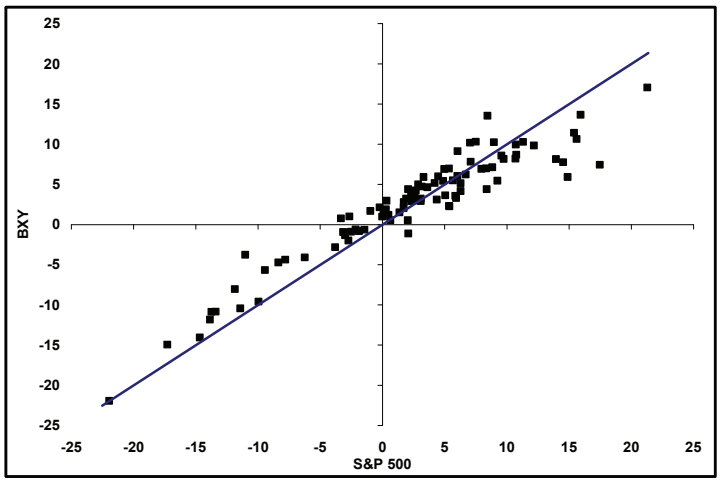


Exhibit 9c: The BXY strategy demonstrates a relatively tight correlation to the returns of the S&P 500 regardless of return direction (positive or negative). Some cushion during declining periods were realized as well as greater upside participation versus the BXM.

Exhibit 9d: CLL

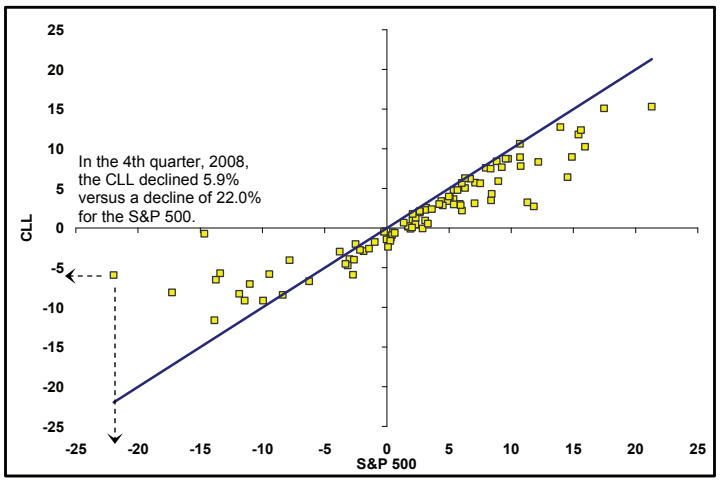


Exhibit 9d: The CLL cushion during declines is clear and compelling while the upside participation is somewhat moderated based on the underlying option exposures.

Sources for all Exhibits on this page: Bloomberg, ACG.

RELATED METRICS FOR RETURNS AND RISK

Exhibit 10: Metrics for Returns, Risk, and Risk-adjusted Returns
(June 30, 1988 – December 31, 2011)

	BXM	BXY	PUT	CLL	S&P 500	MSCI EAFE
Return	9.41%	10.43%	10.79%	6.10%	9.11%	4.31%
Standard Deviation	10.68%	12.49%	10.18%	10.80%	15.03%	17.76%
Beta vs. Market	0.63	0.78	0.56	0.66	1.00	0.86
Skewness	-1.30	-0.90	-2.00	-0.11	-0.55	-0.38
Kurtosis	4.54	2.56	9.04	-0.29	1.08	0.93
Sharpe Ratio	0.52	0.52	0.68	0.21	0.35	0.02
Semi Standard Deviation	0.09	0.10	0.08	0.08	0.11	0.13
Sortino Ratio (MAR = Cash Eq.)	0.71	0.75	0.90	0.31	0.50	0.03
Jensen's Alpha vs. S&P	0.02	0.02	0.04	-0.01	0.00	-0.03
Correlation to S&P	0.88	0.94	0.82	0.91	1.00	0.73

Exhibit 10: The BXM, BXY, and PUT indices had risk-adjusted performance that was superior to that of the S&P 500 per metrics such as the Sortino Ratio, Sharpe Ratio and Jensen's Alpha. Please note that all of the above indices had negative skewness, and the measures of risk-adjusted returns are imperfect when measuring non-normal distributions.

Exhibit 11: Risk-Adjusted Returns (June 30, 1988 - December 31, 2011)

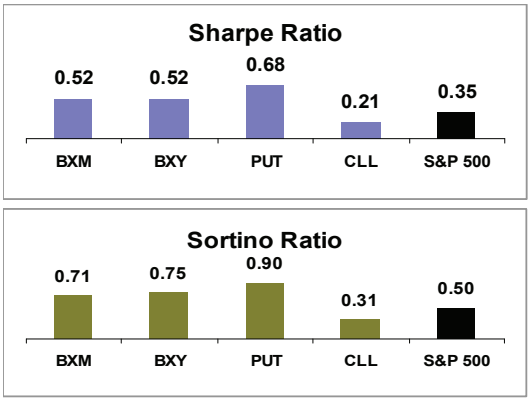


Exhibit 11: The BXM, BXY and PUT indices had risk-adjusted performance that was superior to that of the S&P 500 per metrics such as the Sortino Ratio and Sharpe ratio. Please note that all the above indices had negative skewness, and the measures of risk-adjusted returns are imperfect when measuring non-normal distributions.

PREMIUMS AND IMPLIED VOLATILITY

Exhibit 12: BXM Index - Monthly Gross Premiums
(June 1988 – December 2011)

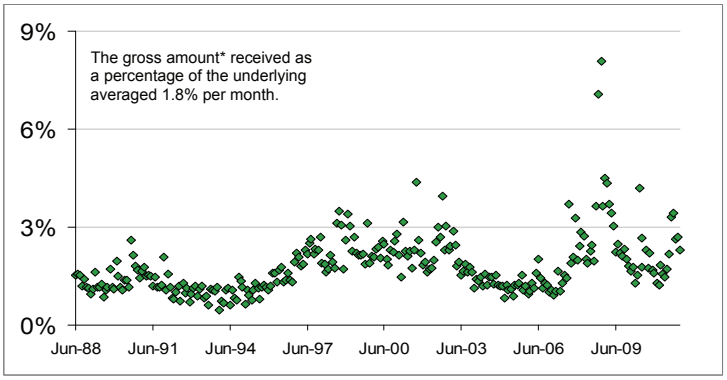


Exhibit 12: The BXM call premiums sold averaged about 1.8% per month. Consequently, on average, the BXM usually should outperform the S&P 500 in any expiration month that returned less than 1.8%. *Please note that these are gross amounts, and the net return usually will be less with the BXM strategy.

Exhibit 13: S&P 500 Implied Volatility vs. Subsequent Realized Volatility (January 1990 – December 2011)

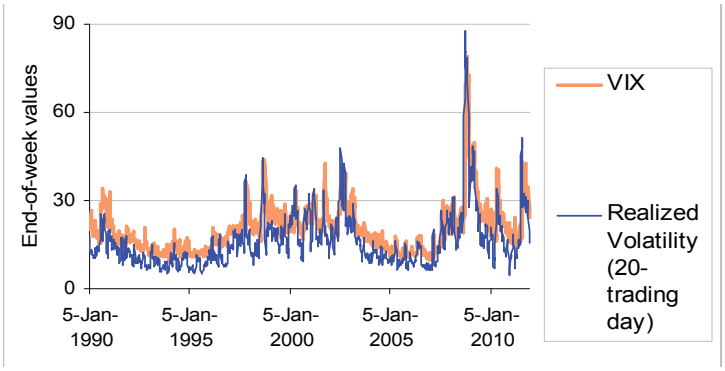


Exhibit 13: In this Exhibit the average value for implied volatility (as represented by VIX) was 20.27 and the average value for realized volatility was 16.38. A number of studies have shown that the implied volatility inherent in index options prices generally has exceeded subsequent realized volatility over multi-year periods (see www.cboe.com/benchmarks). Richly priced index options could provide advantages to the option seller.

CAPACITY

Exhibit 14: Average Daily Volume for S&P 500 (SPX) Options

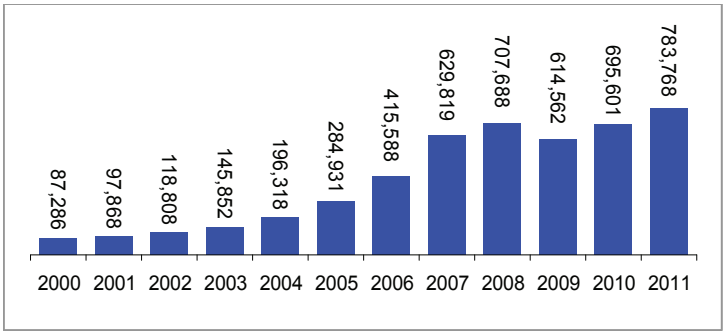


Exhibit 14: S&P 500 Index Option volume has increased significantly over the last ten years supporting liquidity. Current daily volume based on conservative estimates implies a very liquid $40 billion of notional value is traded daily.

TAXES

The CBOE indices will typically generate a greater frequency of realized gains and losses than a long only strategy. The net tax impact is dependent on the performance of the S&P 500 and the options in any given year. Index options may qualify for Section 1256 treatment resulting in 60% long term/40% short term tax treatment regardless of the holding period. Complex straddle rules may apply when losses are incurred. Overlaying options on appreciated stock can be a tax efficient way for investors to potentially replicate the CBOE indices. The taxpayer should consult their tax advisor prior to investing. For publications that discuss tax issues, please visit www.cboe.com/tax.

Sources for all Exhibits on this page: Bloomberg, CBOE.

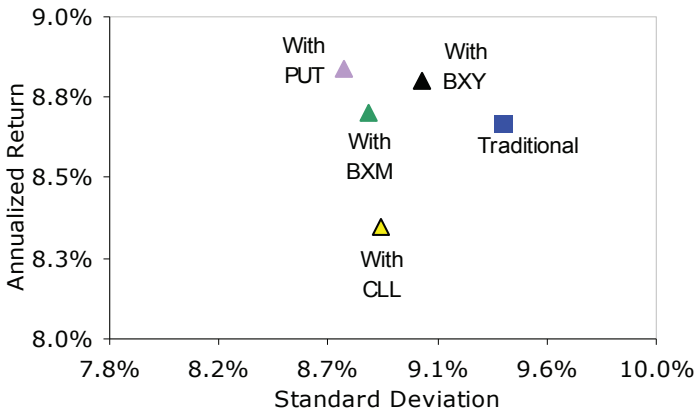
IMPACT OF ADDING OPTIONS BENCHMARKS TO A TRADITIONAL PORTFOLIO

The charts on this page provide an estimate of the impact of adding the CBOE strategies to a traditional diversified portfolio of stocks and bonds. The traditional portfolio is made up of 60% S&P 500 and 40% Barclays Aggregate.

The risk/return charts illustrate the historical return and risk characteristics of the traditional portfolio as well as combinations of the traditional portfolio and CBOE strategies over different time periods and market environments.

Legend:					
	Traditional	With BXM	With PUT	With BXY	With CLL
S&P 500	60%	50%	50%	50%	50%
Barclays Aggregate	40%	40%	40%	40%	40%
CBOE Index		10%	10%	10%	10%

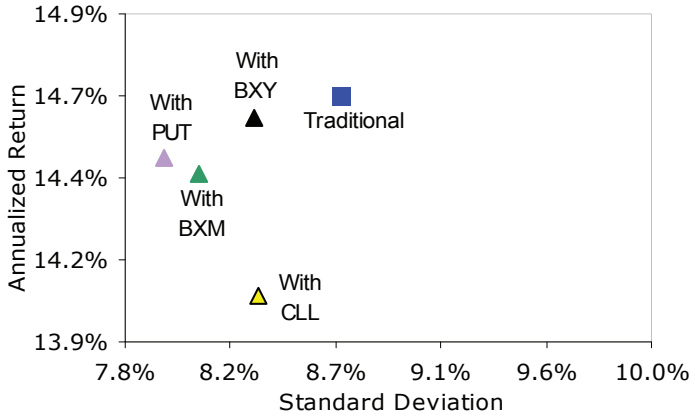
Exhibit 15a: Addition of Options Benchmarks During the Past 23.5 Years (June 30, 1988—December 31, 2011)



	Traditional	With BXM	With PUT	With BXY	With CLL
Annualized Return	8.67%	8.70%	8.84%	8.80%	8.35%
Standard Deviation	9.38%	8.84%	8.74%	9.06%	8.89%

Exhibit 15a: Returns are similar while risk is reduced in all cases where the benchmarks were added.

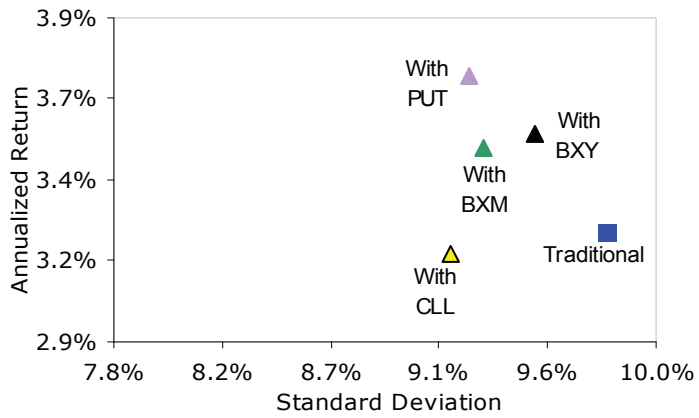
Exhibit 15b: Addition of Options Benchmarks During Bullish Period (June 30, 1988—December 31, 1999)



	Traditional	With BXM	With PUT	With BXY	With CLL
Annualized Return	14.65%	14.41%	14.46%	14.58%	14.04%
Standard Deviation	8.70%	8.11%	7.96%	8.34%	8.36%

Exhibit 15b: During bullish periods, returns were slightly muted with greater risk reduction benefits.

Exhibit 15c: Addition of Options Benchmarks During Period with Moderate Returns (December 31, 1999—December 31, 2011)



	Traditional	With BXM	With PUT	With BXY	With CLL
Annualized Return	3.24%	3.50%	3.72%	3.54%	3.17%
Standard Deviation	9.80%	9.30%	9.24%	9.51%	9.17%

Exhibit 15c: During moderate periods, the risk reduction also serves to enhance returns.

Sources for all Exhibits on this page: Ibbotson.