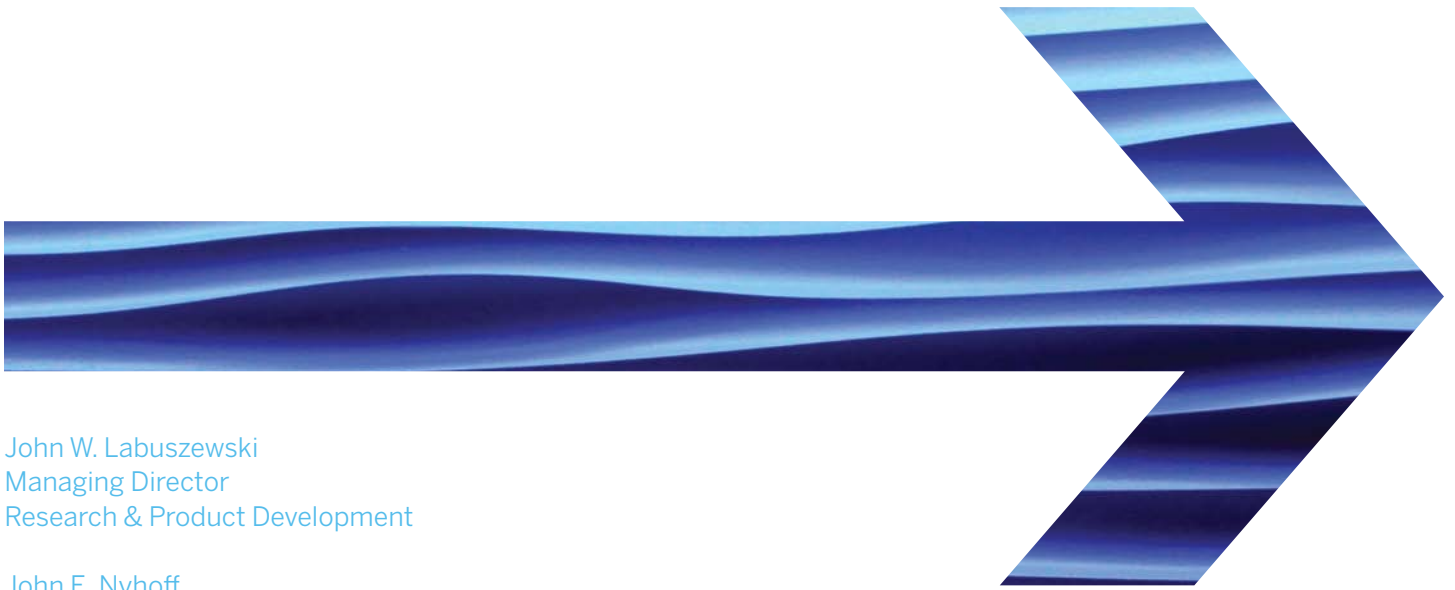


# Risk Management for Equity Asset Managers



John W. Labuszewski  
Managing Director  
Research & Product Development

John E. Nyhoff  
Director  
Research & Product Development

Richard Co  
Director  
Equity Products

# Introduction

While domestic equity markets have been very volatile over the past decade, the market has not generally produced sizable positive returns. This creates serious challenges for equity asset managers seeking to generate attractive returns while relegating volatility to acceptable levels.

CME Group provides risk-management tools that serve to assist equity portfolio managers in this challenging environment. This document is intended to serve as a primer regarding how CME Group stock index products are utilized to balance risks and seize opportunities as they arise.

## Standard & Poor's 500



We review several popular stock index futures applications, including; (1) beta adjustment; (2) cash "equitization"; (3) long/short strategies; (4) tactical rotation; (5) conditional rebalancing; and (6) portable alpha strategies.

# Measuring Risk

There is an old saying — “You can’t manage what you can’t measure.” In the equity market, one generally measures risk by reference to the beta ( $\beta$ ) of one’s portfolio. But in order to understand  $\beta$  and how it may be used, we must review the foundation of modern financial theory — the Capital Asset Pricing Model (CAPM).

CAPM represents a way of understanding how equity values fluctuate or react to various economic forces driving the market. The model suggests that the total risk associated with any particular stock may be categorized into systematic risks and unsystematic risks.

$$\text{Total Risk} = \text{Systematic Risks} + \text{Unsystematic Risks}$$

Systematic risk is a reference to “market risks” reflected in general economic conditions and which affect all stocks to some degree. E.g., all stocks are affected to a degree by Federal Reserve monetary policies, general economic strength or weakness, tax policies, etc.

Unsystematic risk or “firm-specific risks” represent factors that uniquely impact upon a specific stock. E.g., a company may have created a unique new product or its management may have introduced new policies or direction that will affect the company to the exclusion of others.

The extent to which systematic and unsystematic risks impact upon the price behavior of a corporation may be studied through statistical regression analysis. Accordingly, one may regress the returns of the subject stock ( $R_{\text{stock}}$ ) against the price movements of the market in general ( $R_{\text{market}}$ ).

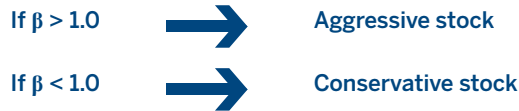
$$R_{\text{market}} = a + \beta (R_{\text{market}}) + \epsilon$$

$R_{\text{market}}$  is generally defined as the returns associated with a macro stock index such as the Standard and Poor’s 500 (S&P 500). The alpha ( $\alpha$ ) or intercept of the regression analysis represents the average return on the stock unrelated to market returns. Finally, we have an error term ( $\epsilon$ ). But the most important products of the regression analysis includes the slope term or beta ( $\beta$ ) and R-squared ( $R^2$ ).

$\beta$  identifies the expected relative movement between an individual stock and the market. This figure is normally positive to the extent that all stocks tend to rise and fall together.  $\beta$  gravitates towards 1.0 or the  $\beta$  associated with the market in the aggregate but might be either greater than, or less than, 1.0.

E.g., if  $\beta = 1.1$ , the stock may be expected to rally by 11% when the market rallies by 10%; or, to decline by 11% if the market declines by 10%. Stocks whose betas exceed 1.0 are more sensitive than the market and are considered “aggressive” stocks.

E.g., if  $\beta = 0.9$ , the stock is expected to rally by 9% in response to a 10% market rally; or, to decline by 9% if the market declines by 10%. Stocks whose betas are less than 1.0 are “conservative” stocks because they are less sensitive than the market in general.



$R^2$  identifies the reliability with which stock returns are explained by market returns.  $R^2$  will vary between 0 and 1.0.

E.g., if  $R^2 = 1.0$ , then 100% of stock returns are explained by reference to market returns. This implies perfect correlation such that one might execute a perfect hedge using a derivative instrument that tracks the market.

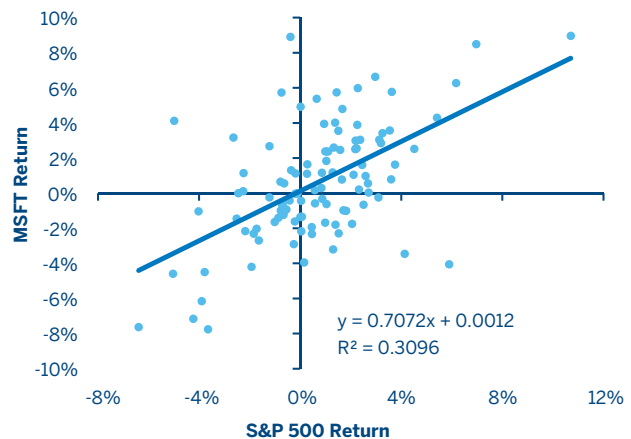
E.g., if  $R^2 = 0$ , this suggests a complete lack of correlation and an inability to hedge using a derivative that tracks the market.



An “average” stock might have an  $R^2 \approx 0.30$ , which implies that perhaps 30% of its movements are explained by systematic factors and “hedgeable.” Thus, the remaining 70% of unsystematic risks are not hedgeable with broad-based stock index futures.<sup>1</sup>

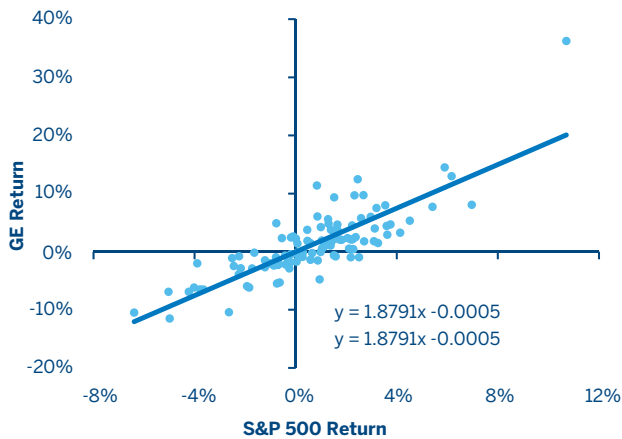
E.g., regressing weekly returns of Microsoft (MSFT) v. the S&P 500 over the two-year period from March 6, 2009, through February 25, 2011, we arrive at a  $\beta = 0.7072$  and an  $R^2 = 0.3096$ . This suggests that MSFT is a conservative company but with insufficient correlation to the S&P 500 to effectively to use equity index futures for hedging purposes.

**Return MSFT v. S&P (3/6/09-2/25/11)**

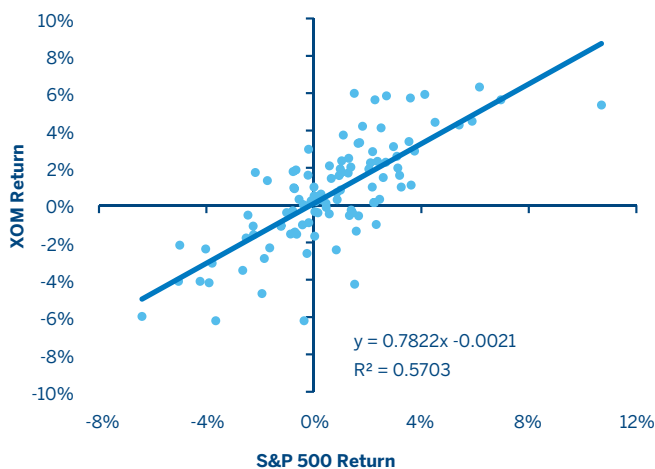


E.g., General Electric (GE) may be regarded as an aggressive stock noting its  $\beta = 1.8791$ . Further note that GE exhibited reasonably high correlation with an  $R^2 = 0.6765$  v. the S&P 500. Still, this correlation may be insufficient to qualify for hedge accounting treatment.

<sup>1</sup> It is important to establish a high degree of correlation between the hedged investment and the hedging instrument in order to qualify for so-called “hedge accounting” treatment. Statement of Financial Accounting Standards No. 133, “Accounting for Derivative Financial Instruments and Hedging Activities” (FAS 133) generally addresses accounting and reporting standards for derivative instruments in the United States. The statement allows one to match or simultaneously recognize losses (gains) in a hedged investment with offsetting gains (losses) in a derivatives contract under certain conditions. In particular, it is necessary to demonstrate that the hedge is likely to be “highly effective” for addressing the specifically identified risk exposure. One method for making such demonstration is through statistical analysis. The “80/125” rule suggests that the actual gains and losses of the derivative(s) should fall within 80% to 125% of the gains/losses for the hedged item. This may be interpreted to require an  $R^2 \geq 0.80$  or better to qualify for hedge accounting treatment. As such, the typical stock with an  $R^2$  relative to the index of perhaps 0.40 likely cannot qualify for hedge accounting.

**GE v. S&P 500 Weekly Returns (3/6/09-2/25/11)**

E.g., Exxon Mobil represents the most heavily weighted stock included in the S&P 500 as of this writing, given its large capitalization. XOM exhibited a  $\beta = 0.7822$  and may be considered a conservative investment. Its  $R^2 = 0.5703$  is reasonably high but not sufficiently high to qualify for hedge accounting treatment as a general rule.

**XOM v. S&P 500 Weekly Returns (3/6/09-2/25/11)**

Traders frequently distinguish between historical or raw or fundamental betas versus so-called adjusted betas. The historical or "raw"  $\beta$  is calculated based on historical data as depicted above. Adjusted  $\beta$  represents an estimate of the future  $\beta$  associated with a security per the hypothesis that  $\beta$  will gravitate toward 1.0 over time. Adjusted  $\beta$  may be calculated as follows.<sup>2</sup>

$$\text{Adjusted } \beta = (0.67 \times \text{Raw } \beta) + (0.33 \times 1)$$

Thus, Microsoft's raw  $\beta$  of 0.7072 may be adjusted as 0.8038.

$$\text{Adjusted MSFT } \beta = (0.67 \times 0.7072) + (0.33 \times 1) = 0.8038$$

Similarly, General Electric's raw  $\beta$  of 1.8791 may be adjusted as 1.5890.

$$\text{Adjusted GE } \beta = (0.67 \times 1.8791) + (0.33 \times 1) = 1.5890$$

Sometimes the formula is further refined based on the particular economic sector from which the stock originates. As such, the value "1" on the right-hand side of the equation may be replaced with the beta associated with the market sector, e.g., financials, technology, consumer durables, etc., from which the stock originates.

<sup>2</sup> Note that the popular Bloomberg quotation system routinely displays an adjusted  $\beta$ . The raw beta is calculated on the basis of the past two years of weekly returns while adjusted  $\beta$  is determined by the formula displayed in the text.

# Power of Diversification

Only a fraction of the risk associated with any particular stock is traced to systematic risks, while a larger proportion of the attendant risks may be unsystematic in nature. As such, stock index futures generally represent poor hedging vehicles for individual stocks.

However, the CAPM underscores the power of diversification. By creating a portfolio of stocks, instead of limiting one's investment to a single stock, one may effectively excise, or diversify away, most unsystematic risks from the portfolio. The academic literature suggests that one may create an "efficiently diversified" portfolio by randomly combining as few as eight individual equities.

The resulting portfolio, taken as a whole, may reflect market movements with little observable impact from those firm-specific risks. That may be understood by considering that those unsystematic factors that uniquely impact upon specific corporations are expected to be independent one from each other.

E.g., consider the hypothetical stock portfolio depicted below. This portfolio was created using several of the most heavily weighted stocks included in the S&P 500. The portfolio has an aggregate market value of \$100,432,360 as of February 25, 2011.

The portfolio's raw  $\beta = 0.9033$  is based on a regression of weekly returns for a two-year period between March 6, 2009, and February 25, 2011. Its value-weighted adjusted  $\beta = 0.96$  suggests that the portfolio is slightly conservative and will tend to underperform the market.<sup>3</sup> Finally, note that its  $R^2 = 0.9759$ , suggesting that 97.59% of its movements are explained by systematic market factors.

<sup>3</sup> The betas associated with each individual stock as depicted in the table were gleaned from the Bloomberg quotation system and represent adjusted betas as discussed in the text. The value-weighted adjusted portfolio  $\beta = 0.96$  represents these adjusted betas weighted by the capitalization of each stock in the hypothetical portfolio. Note that the raw  $\beta = 0.9033$  obtained from the regression analysis diverges from the adjusted  $\beta = 0.96$ . Most of this discrepancy may be reconciled by applying the adjustment formula, resulting in an adjusted  $\beta = 0.9732 [= (0.67 \times \text{raw } \beta) + (0.33 \times 1) = (0.67 \times 0.9033) + 0.33]$ . Still, there remains a discrepancy between this figure of 0.9732 and the adjusted beta of 0.96 calculated as the cap-weighted aggregate beta. This discrepancy might be explained by the fact that the effective weightings of each stock in the portfolio vary as a function of fluctuating prices. The moral of the story might be that betas are not only dynamic but, to the extent that one might strive to identify an expected future beta, they can vary as a function of one's assumptions.

### Hypothetical Stock Portfolio (2/25/11)

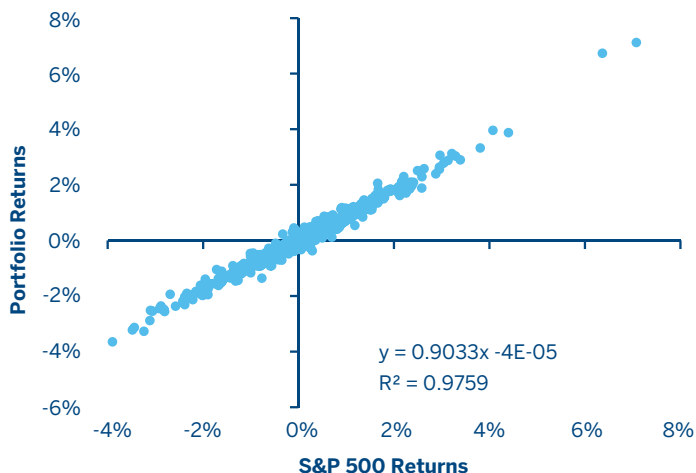
Ticker	Shares	Price	Value	Beta
XOM	98,000	\$85.34	\$8,363,320	0.86
AAPL	18,000	\$348.16	\$6,266,880	1.11
GE	203,000	\$20.82	\$4,226,460	1.59
CVX	40,000	\$102.10	\$4,084,000	0.97
IBM	24,000	\$162.28	\$3,894,720	0.79
MSFT	145,000	\$26.55	\$3,849,750	0.80
JPM	75,000	\$46.68	\$3,501,000	1.70
PG	55,000	\$62.84	\$3,456,200	0.62
JNJ	55,000	\$59.64	\$3,280,200	0.62
T	115,000	\$28.13	\$3,234,950	0.66
WFC	100,000	\$32.40	\$3,240,000	1.92
PFE	159,000	\$18.86	\$2,998,740	0.81
KO	46,000	\$64.31	\$2,958,260	0.61
BRK/B	34,000	\$84.87	\$2,885,580	0.92
BAC	194,000	\$14.20	\$2,754,800	2.42
C	556,000	\$4.70	\$2,613,200	2.00
SLB	26,000	\$92.85	\$2,414,100	1.27
ORCL	73,000	\$32.95	\$2,405,350	0.86
INTC	107,000	\$21.86	\$2,339,020	1.00
COP	29,000	\$77.28	\$2,241,120	1.00
PM	32,000	\$62.25	\$1,992,000	1.09
CSCO	107,000	\$18.64	\$1,994,480	0.60
WMT	38,000	\$51.75	\$1,966,500	0.55
VZ	54,000	\$35.97	\$1,942,380	0.81
MRK	61,000	\$32.19	\$1,963,590	0.58
HPQ	45,000	\$42.65	\$1,919,250	1.00
QCOM	31,000	\$59.02	\$1,829,620	0.90
GS	10,000	\$165.12	\$1,651,200	1.25
DIS	37,000	\$42.95	\$1,589,150	1.15
OXY	16,000	\$103.10	\$1,649,600	1.13
MCD	21,000	\$74.44	\$1,563,240	0.57
UTX	18,000	\$83.37	\$1,500,660	0.99
ABT	30,000	\$47.64	\$1,429,200	0.52
UPS	19,000	\$73.46	\$1,395,740	1.08
CMCSA	54,000	\$25.26	\$1,364,040	0.94
MMM	14,000	\$90.25	\$1,263,500	1.00
CAT	12,000	\$102.00	\$1,224,000	1.50
HD	32,000	\$37.08	\$1,186,560	1.04
<b>Portfolio</b>			<b>\$100,432,360</b>	<b>0.96</b>

# Replicating Core or Beta Performance

We generally look to a particular stock index to serve as the standard measure, or “benchmark” or bogey, against which the performance of equity asset managers may be measured. The S&P 500 stands out as the most popularly referenced benchmark of U.S. equity market performance. This is evidenced by the estimated \$6 trillion in equity investment that is benchmarked, bogeyed or otherwise tied to, the performance of the S&P 500.

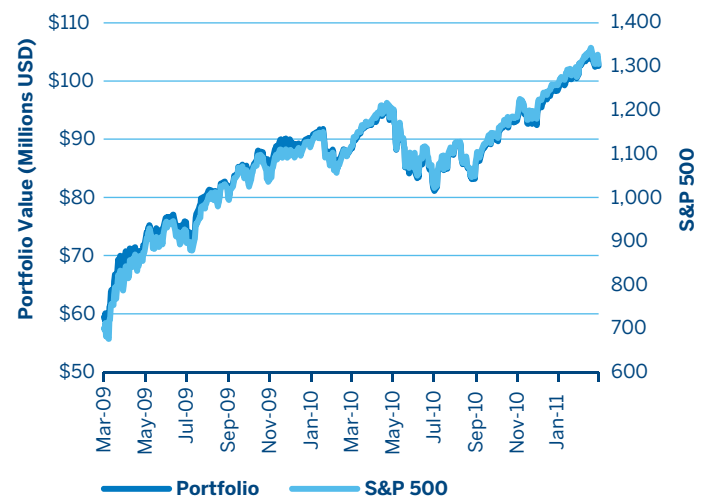
Asset managers frequently conform their “core” equity holdings to reflect the performance of the benchmark index, e.g., S&P 500. Subsequently, they may alter the characteristics of the portfolio to seek enhanced return above the core “beta” returns reflected in the index. Those enhanced returns may be referred to as “alpha” returns. Strategies in pursuit of this goal are often referred to as “enhanced indexing” strategies.

## XOM v. S&P 500 Weekly Returns (3/6/09–2/25/11)



Because stock index futures may be based directly upon the benchmark utilized by an equity asset manager, they may be used to replicate the performance of the benchmark or to manage the systematic risks associated with a well-diversified stock portfolio.

## Portfolio Value v. S&P 500



In order to serve as an effective risk-management vehicle, a stock index futures or derivatives contract must offer “efficient” or “true” beta. Efficient beta is implicit when the derivatives contract exhibits two important attributes, including (1) low tracking error; and (2) low transaction costs. This point is a recurring theme in our discussion.



# Beta Adjustment Strategies

Equity asset managers often seek alpha by adjusting portfolio beta to reflect future market expectations. Thus, an asset manager may diminish portfolio beta in anticipation of a bear market or increase portfolio beta in anticipation of a bull market.

The former strategy conforms to the textbook definition of a “hedge,” i.e., a strategy applying derivatives to reduce risk in anticipation of adverse market conditions. While the latter strategy may not qualify as a textbook hedge — accepting additional risk, as measured by beta, in pursuit of alpha — it is nonetheless equally legitimate.

Fund investment policies may permit portfolio managers to adjust portfolio beta within a specific range centered around the beta implicitly associated with the benchmark. E.g., one may maintain a  $\beta = 1.0$  but may be allowed to adjust beta within a range bounded by 0.80 and 1.20 in pursuit of alpha.

Practitioners may identify the appropriate “hedge ratio” (HR), or the number of stock index futures required to effectively achieve a target risk exposure as measured by beta as follows.

$$HR = (\beta_{\text{target}} - \beta_{\text{current}}) \times \left( \frac{\text{Value}_{\text{Portfolio}}}{\text{Value}_{\text{Futures}}} \right)$$

Where  $\beta_{\text{target}}$  is the target beta of the portfolio;  $\beta_{\text{current}}$  is the current beta of the portfolio;  $\text{Value}_{\text{portfolio}}$  is the monetary value of the equity portfolio; and,  $\text{Value}_{\text{futures}}$  is the nominal monetary value of the stock index futures contract used to execute the hedge transaction.

E.g., assume that the manager of our hypothetical \$100,432,360 portfolio believes that the market is overvalued and likely to decline in the near term. Thus, the investor may take steps to protect the portfolio by reducing its beta from the current 0.96 to 0.80. March 2011 E-mini S&P 500 futures were quoted at 1,318.75 on February 25, 2011, implying a futures contract value of \$65,937.50 ( $= \$50 \times 1,318.75$ ). Applying our HR formula, this suggests that one might sell 244 E-mini S&P 500 futures to effectively reduce portfolio beta from 0.96 to 0.80.

$$HR = (0.80 - 0.96) \times \left( \frac{\$100,432,360}{\$65,937.50} \right) = -244$$

E.g., assume that the equity manager believes that the market is likely to advance and wants to extend the portfolio beta to 1.20. This requires the purchase of 396 futures.

$$HR = (1.20 - 0.96) \times \left( \frac{\$100,432,360}{\$65,937.50} \right) = 366$$

Stock index futures may be used to adjust the effective portfolio beta without disturbing the portfolio’s core holdings. Of course, this process is most effective when one is assured that futures offer efficient beta with low tracking error and low transaction costs.

**Sell 244 futures**



**Reduces  $\beta$  from 0.96 to 0.80**

**Buy 366 futures**



**Increases  $\beta$  from 0.96 to 1.20**

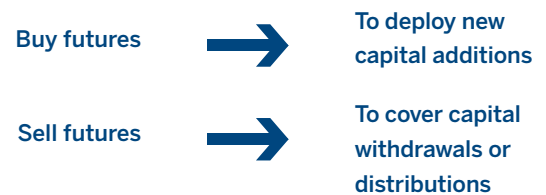
# Cash Equitization

Passive index investment strategies have become very popular over the past 20 years. This is evidenced by the size of the assets under management (AUM) held by passive index mutual funds as well as the success of various exchange-traded funds (ETFs), including SPDRs ("SPY") and others designed to replicate the performance of the S&P 500.

Mutual funds typically offer investors the opportunity to add or withdraw funds on a daily basis. As such, equity managers are often called upon to deploy additions or fund withdrawals on short notice. They could attempt to buy or sell stocks in proportions represented by the benchmark. But execution skids or slippage may cause fund performance to suffer relative to the benchmark.

Or, they can utilize stock index futures as a temporary proxy for the addition or withdrawal of funds, i.e., buy futures effectively to deploy additions of capital or sell futures to cover withdrawals. This "cash equitization" strategy provides the equity asset manager with time to manage order entry in the stock market while maintaining pace with the benchmark.

Some asset managers may utilize futures as a long-term proxy for investment in the actual stocks comprising the index to the extent that the leverage associated with futures frees up capital for redemptions or distributions.



Consistent with our recurring theme, the successful execution of cash equitization strategies is dependent upon the degree to which futures deliver efficient beta with low tracking error and low transaction costs.

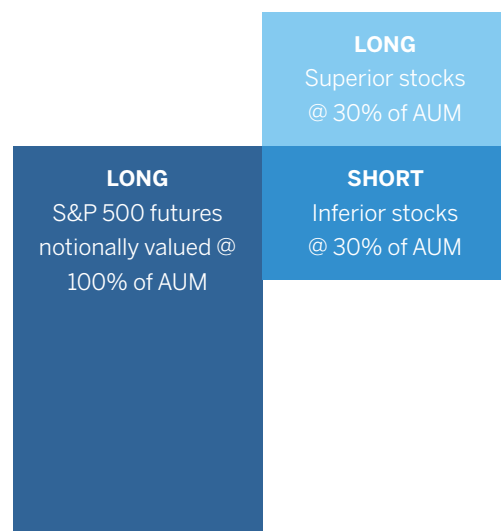
# Long-Short Strategies

There are many strategies deployed in the equity markets involving a combination of long and short positions designed to create alpha returns.

One of the most common long/short strategies is known simply as “130/30.”<sup>4</sup> The equity manager begins by distinguishing stocks that are expected to generate superior returns vs. those that are expected to generate inferior average returns. Thus, the asset manager could distinguish superior from inferior stocks by rank ordering all the constituents of the S&P 500 from best to worst based on some selection criteria. The manager buys the superior stocks with 130% of the fund’s AUM, funding the excess 30% long position by shorting/selling inferior stocks valued at 30% of AUM.<sup>5</sup>

To the extent that the fund’s goal is often stated as outperforming the S&P 500, core fund holdings may mimic the holdings of the S&P 500, i.e., one may deploy 100% of AUM in stocks or derivatives that mimic the benchmark index. Frequently, stock index futures are deployed to generate those core or beta returns.

## 130/30 Strategy with Futures



A core beta investment created with stock index futures provides fund managers with flexible cash management capabilities including the ability to deploy additions or fund withdrawals quickly and efficiently. But, again, this strategy is only effective provided that futures offer efficient beta.

Buy-and-hold futures



**Replicate core  
or beta portfolio  
performance with cash  
management flexibility**

<sup>4</sup> 130/30 strategies probably evolved from a popular technique known as “pairs trading.” This requires one to identify pairs of corporations, typically engaged in the same or similar industry sectors. E.g., one may pair two high-tech computer companies, two energy companies, two auto companies, etc. One further identifies the stronger and weaker of the two companies in each pair, based upon fundamental or technical analysis, buying the stronger and selling the weaker. By executing this strategy across multiple pairs of stocks, one may hope to generate attractive returns.

<sup>5</sup> There is nothing particularly magical about the 130/30 proportion. Sometimes the strategy is pursued on a 140/40 ratio, sometimes on a 120/20 ratio, or with the use of other proportions.

# Sector Rotation Strategies

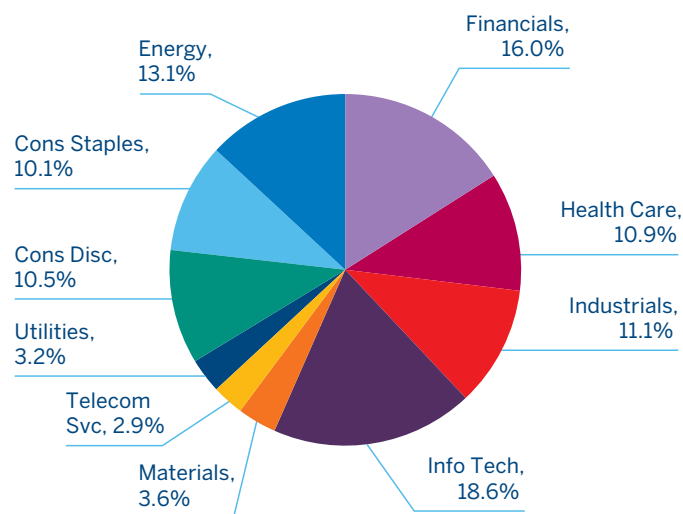
Equity asset managers will generally allocate their funds across stock market industry sectors and individual stocks. In many cases, they may conform the composition of the portfolio to match that of the benchmark or bogey. This strategy assures that the performance of the portfolio generally will parallel performance of the benchmark.

E.g., the S&P's 500 is the most popularly referenced benchmark for U.S. equity asset managers. It is comprised of securities drawn from 10 well-defined industry sectors as indicated below.

However, asset managers may subsequently re-allocate or rotate, portions of the portfolio amongst these various sectors in search of enhanced value.

E.g., noting that the financial sector of the economy has performed poorly relative to other sectors, including industrials, in recent years, an asset manager might adopt a "contrarian" viewpoint to the effect that financials may bounce back in coming months. Thus, he may re-allocate investment away from industrial stocks in favor of financial stocks.

**S&P 500 Sector Breakdown (2/28/11)**

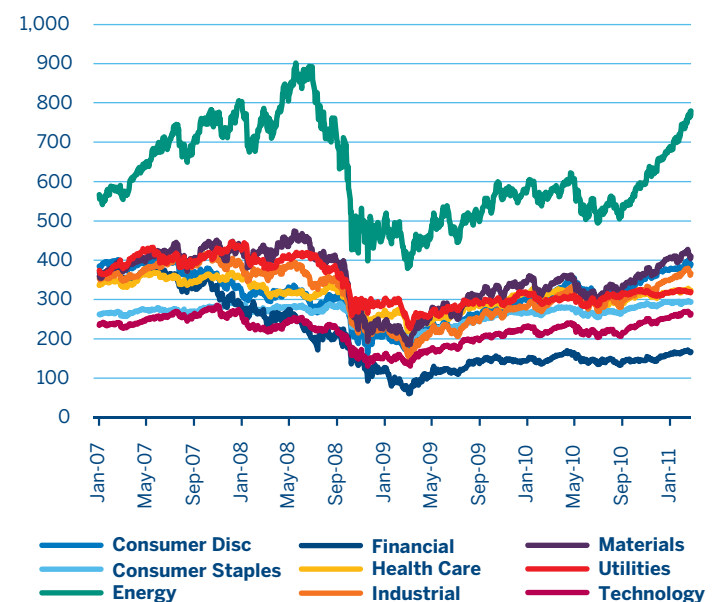


This may be accomplished simply by liquidating industrial stocks in favor of buying financial stocks. Or, one might utilize CME Group E-mini S&P 500 Select Sector stock index futures similarly to restructure the portfolio.<sup>6</sup> Specifically, one may transact a spread by selling E-mini Industrial Select Sector futures and buying E-mini Financial Select Sector futures.

In either case, the asset manager effectively may "underweight" industrials and "overweight" financials relative to the benchmark. But the futures spread strategy offers the advantage of leaving undisturbed the underlying equity investments weighted according to the benchmark. Thus, this may be referred to as an "overlay" strategy.

In order to place an intermarket spread, it is necessary to derive the so-called "spread ratio." The spread ratio is an indication of the ratio or number of stock index futures that must be held in the two markets to equalize the monetary value of the positions held on both legs of the spread.

**S&P Select Sector Indexes**



<sup>6</sup> E-mini S&P Select Sector Stock Index futures were introduced on March 13, 2011. There are nine (9) different contracts based on indexes carved out of the S&P 500 and representing the consumer discretionary, consumer staples, energy, financial, health care, industrial, materials, technology and utilities sectors of the economy. The info-tech and telecom sectors cited in the chart above are combined into the technology select sector index. They are cash-settled to a value of \$100 x Index with the exception of the Financials contract, which is valued at \$250 x Index.

The following formula may be used for this purpose where  $Value_1$  and  $Value_2$  represent the monetary value of the two stock index futures contracts that are the subject of the spread.<sup>7</sup>

$$\text{Spread Ratio} = Value_1 \div Value_2$$

E.g., on February 25, 2011, the S&P Financial Select Sector index was quoted at 168.10. Thus, the E-mini S&P Select Sector Financial futures contract was valued at \$42,025 ( $= \$250 \times 168.10$ ). The E-mini S&P Select Sector Industrial futures contract was valued at \$36,910 ( $= \$100 \times 369.10$ ). The spread ratio is calculated at 1.139 suggesting that one might balance 10 Financial index futures with 11 Industrial index futures.

$$\begin{aligned} \text{Spread Ratio} &= \text{Value}_{\text{Financials}} \div \text{Value}_{\text{Industrials}} \\ &= \$42,025 \div \$36,910 \\ &= 1.139 \\ &= 10 \text{ Financial: } 11 \text{ Industrial} \end{aligned}$$

Assume that the equity manager of the \$100,432,360 portfolio wanted to “overweight” financials by 5% and similarly “underweight” industrials by 5%. This would imply the purchase of 119 Financial Sector futures [ $= (5\% \times \$100,432,360) \div \$42,025$ ] coupled with the sale of 136 Industrial Sector futures ( $= 1.139 \times 119$ ).

**Buy 119 Financial  
Sector futures & sell  
136 Industrial  
Sector futures**



**Effectively over-weights financials by 5% & underweights industrials by 5%**

Thus, our asset manager may quickly and effectively rotate investment from one economic sector to another while leaving core holdings undisturbed. Similarly, one may use stock index futures to rotate investment from one national stock market to another. E.g., one might sell E-mini S&P 500 futures and buy E-mini S&P CNX Nifty futures to effectively rotate investment away from U.S. and into Indian equity markets.

#### Financial: Industrial Spread Ratio



In either case, spread ratios provide an indication of the appropriate way to construct an intermarket spread. Because they are dynamic, one must be aware of the current spread ratio when placing a trade. Spread ratios are also useful as a general indication of spread performance in terms of both volatility and direction.

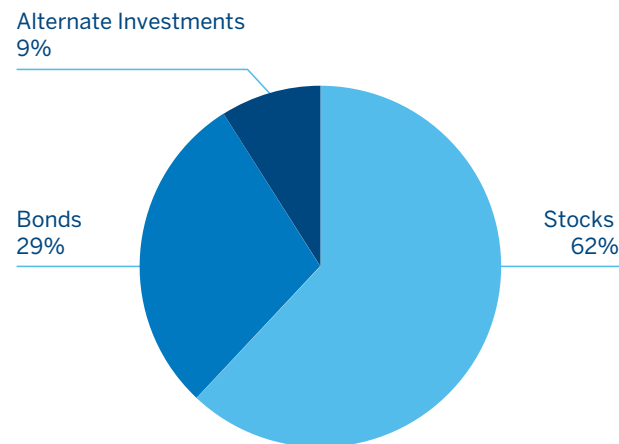
<sup>7</sup> We reference spot index values and not the quoted futures price for purposes of identifying the monetary value of a stock index futures contract. This convention serves to eliminate carry considerations from the calculation.

# Conditional Rebalancing

Traditional pension fund management strategies require investors to allocate funds among different asset classes such as stocks, bonds and “alternate” investments (e.g., real estate, commodities, etc). A typical mix may be approximately 60% in stocks, 30% in bonds and 10% in alternative investments. The mix may be determined based on investor return objectives, risk tolerance, investment horizon and other factors.

After establishing the allocation, investors often retain the services of active fund managers to manage portions of a portfolio, e.g., stocks, bonds, etc. Thus, investors may seek to retain managers in hopes of generating excess return (or “alpha”) beyond the beta return in any specific asset classes, as measured by benchmark indexes, e.g., S&P 500 in equity market or Barclays Capital U.S. Aggregate Index in the bond markets.

## Typical Exposure of S&P 500 Defined Benefit Pension Fund



Source: Credit Suisse Asset Mgt, “Alpha Management Revolution or Evolution, A Portable Alpha Primer”.

But the portfolio's mix will necessarily fluctuate as a function of market movements. E.g., if equities advance (decline) sharply, the portfolio may become over (under) weighted with stock; and, under (over) weighted with bonds. As such, the portfolio manager may be compelled to rebalance the portfolio by reallocating funds from one asset class to another.

Sometimes asset managers use options on E-mini S&P 500 futures to provide for a “conditional rebalancing” of the portfolio. Specifically, one might sell call options and put options in the form of an option strangle, i.e., sell out-of-the-money calls and sell out-of-the-money puts.

If stocks rally beyond the strike price of the call options, they may be exercised, resulting in short futures positions. Those short futures contracts will serve effectively to offset expansion of the equity portion of the portfolio if the market continues to advance or as a hedge if the market should reverse downward.

If stocks decline beyond the put option strike price, they may likewise be exercised, resulting in a long futures position. That long futures position serves as a proxy for the further purchase of equities.

**Sell out-of-the-money  
calls and puts  
(sell a strangle)**



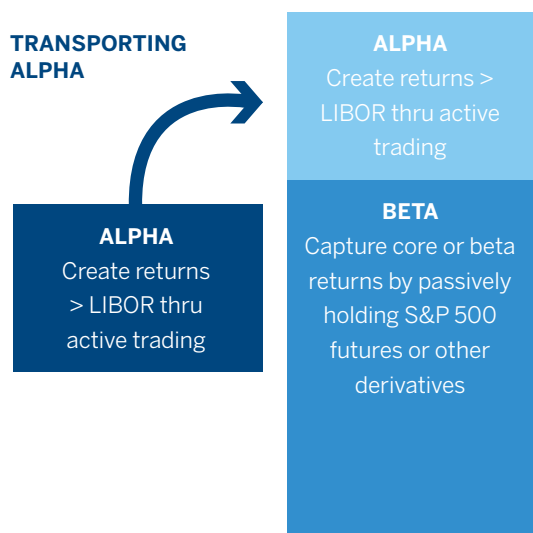
**Rebalances position,  
creating long futures  
positions in a bear  
market and short  
futures in a bull  
market**

# Portable Alpha

“Portable alpha” investment strategies have become quite popular during the past decade. This technique distinguishes total portfolio returns by reference to an alpha and a beta component. The beta component of those returns is tied to a general market benchmark, e.g., the S&P 500. Additional returns are generated by devoting a portion of one’s assets to another more ambitious trading strategy intended to generate a superior return over the base or benchmark “beta” return.

Why has the market embraced portable alpha programs? Consider the traditional or typical asset allocation approach practiced by many pension fund managers as described above. While this approach is typical, it may nonetheless fail to generate returns in excess of benchmark returns. In particular, few asset managers are able to consistently outperform the market. If they did, their services would be in much demand and high management fees may detract from performance.

## Portable Alpha Strategy



Portable alpha strategies are designed specifically in the hopes of achieving (alpha) returns in excess of the applicable benchmark (or beta) returns. Thus, there are two components of a portable alpha strategy: alpha and beta.

Beta is typically created with a passive buy-and-hold strategy using derivatives such as futures or over-the-counter swaps. Stock index futures have proven to be particularly useful vehicles for achieving those beta returns in the context of a portable alpha program.

Futures are traded on leverage, freeing a sizable portion of one’s assets for application to an alpha generating strategy. Of course, per our recurring theme, futures must offer efficient beta to serve their purpose, a point discussed in more detail below.

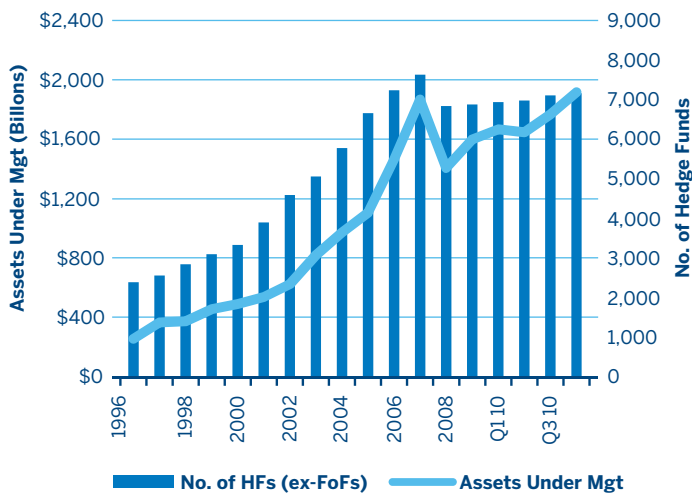
Buy-and-hold futures



Replicate core  
or beta portfolio  
performance with cash  
management flexibility

Alpha returns, in excess of prevailing short-term rates as often represented by LIBOR, are generated by applying some portion of one’s capital to an active trading strategy. Common alpha generating strategies include: (1) tactical asset allocation or “overlay” programs that attempt to shift capital from less to more attractive investments; (2) programs that attempt to generate attractive absolute returns, such as hedge funds, commodity funds and real estate investment vehicles; and (3) traditional active management strategies within a particular asset class or sector of an asset class. Much of the growth in the hedge fund industry in recent years may be attributed to the pursuit of alpha.

### Size of Hedge Fund Industry

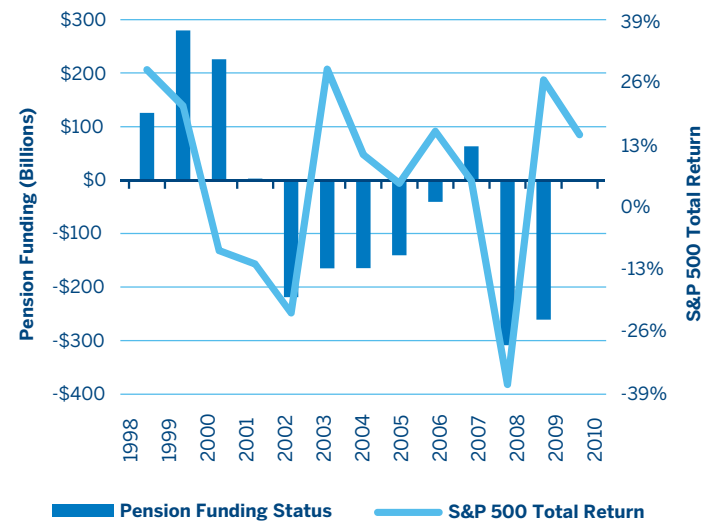


Source: Hedge Fund Research

Of course, more active alpha generating strategies tend to require more trading skill. While they may generate attractive returns, they may also entail higher management fees. And still, it is difficult to find an investment strategy that consistently delivers attractive alpha and is truly distinct from the benchmark class that forms the core beta returns. As such, the major and most obvious risk associated with portable alpha strategies is the possibility that the alpha strategy fails to outperform LIBOR.

However, it is probably safe to conclude that the “search for alpha” will continue unabated in the future. This is apparent when one considers the significant pension funding gap, or the difference between pension fund assets and the present value of their future obligations. As of the conclusion of 2009, the gap faced by the corporate pension funds of the firms that comprise the S&P 500 stood at some \$261 billion.

### Pension Funding Gap vs. S&P 500



Source: Standard & Poor's



# Delivering Efficient Beta

A recurring theme in this discussion is that stock index futures must deliver efficient beta, i.e., low tracking error and low transaction costs, in order effectively to serve the purposes as outlined above.

Low tracking error means that the futures contract accurately and consistently reflects its “fair value.” This is reflected in the end-of-day (EOD) mispricings or deviations between the futures settlement price, and fair value as reflected in the spot index value adjusted by financing costs and anticipated dividends.

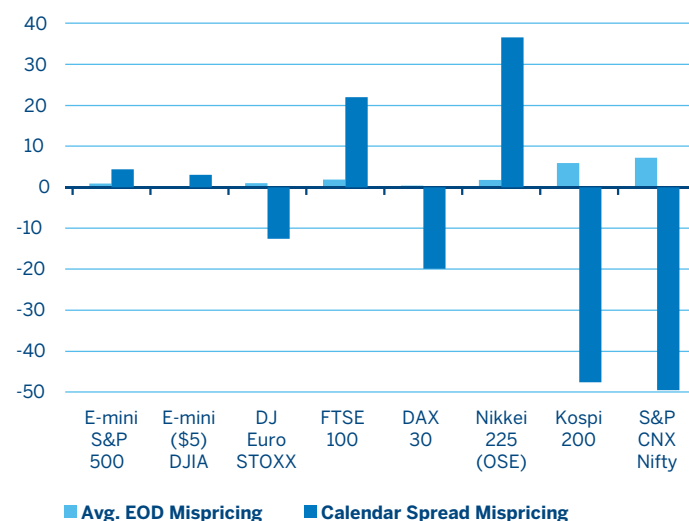
Note that CME Group utilizes an end-of-month fair value (FV) settlement procedure. This means that on the final day of each calendar month, the futures settlement prices for many CME Group domestic stock index futures are established by reference to its fair value.

The exchange surveys broker-dealers for the applicable interest rate and anticipated present value of dividend flows and calculates the fair value of the futures contract. Thus, these CME Group stock index futures are forced to reflect fair value at the conclusion of each calendar month or accounting period. This practice has likely contributed significantly to the growth of the portable alpha fund business since 1998, when the practice was established.

A further means of measuring tracking error is by reference to the “roll,” or the difference between prices prevailing between the current and deferred futures contract month. Portable alpha managers typically use stock index futures on a passive buy-and-hold basis. Thus, they establish a long position and maintain it consistently in proportion to their AUM. But they will roll the position forward, i.e., sell the nearby, maturing contract in favor of buying a deferred contract, on a quarterly basis.

Independent research on the subject of end-of-day mispricing and mispricing inherent in the quarterly roll suggests that CME Group products are quite competitive relative to stock index futures offered elsewhere.

## Average Q4-10 Mispricing (BPs)

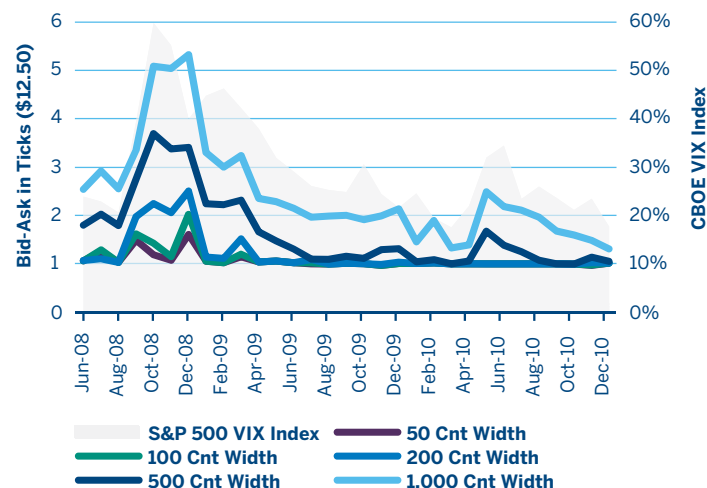


Source: GS Equity Product Strategy, Futures Focus

Transaction costs for trading stock index futures may be comprised of various components, including brokerage commissions and exchange fees. The most significant of transaction costs is trading friction, aka execution skids or slippage, i.e., the risk that the market is insufficiently liquid to execute commercial-scale transactions at fair prices. Liquidity may be measured in many ways, but two of the most common and practical methods are to monitor the width of the bid-ask spread and measuring the depth of market.

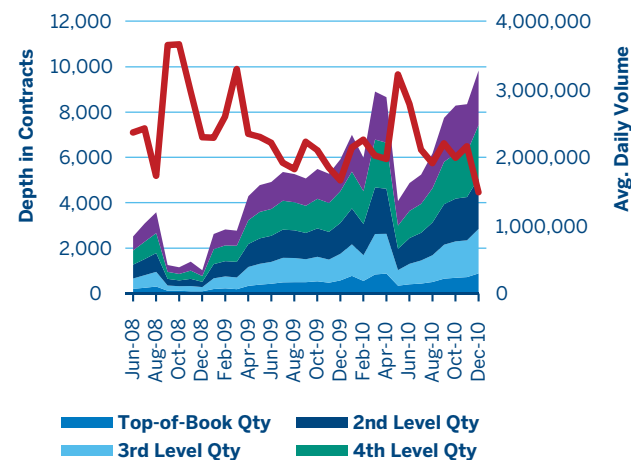
The width of the bid-ask spread simply refers to the average difference between the bid and the asking or offering price throughout any particular period. These figures may be based upon order sizes of stated quantities, e.g., a 50-lot, a 100-lot order, etc. Liquidity is correlated closely with volatility. The VIX, or S&P 500 volatility index, is a popular measure of volatility. The width of the bid-ask spread widened in late 2008 and early 2009 at the height of the so-called subprime mortgage crisis when the VIX advanced to 60%. Since then, market width has declined to levels barely over the one minimum price fluctuation (\$12.50) in E-mini S&P 500 futures.

#### E-Mini S&P 500 Market Width Lead Month on CME Globex RTH



Likewise, one may measure liquidity by reference to market depth or how many orders are resting in the central limit order book (CLOB). The CME Globex® electronic trading platform routinely disseminates information regarding market depth at the best bid-ask spread (the "top-of-book"), at the 2nd, 3rd, 4th and 5th best bid and asking prices as well. Liquidity as measured by market depth has increased significantly since the recent financial crisis.

#### E-Mini S&P 500 Market Depth Lead Month on CME Globex RTH



# Conclusion

CME Group is committed to finding effective and practical risk-management solutions for equity asset managers in a dynamic economic environment. While the recent financial crisis has sent shivers through the investment community, it is noteworthy that CME Group's exchange traded futures and options on futures performed flawlessly throughout these trying times. Our products offer deep liquidity, unmatched financial integrity and innovative solutions to risk-management issues.

## For more information, please contact:

### Phillip Hatzopoulos

phillip.hatzopoulos@cmegroup.com

+1 312 930 3018

*Director, Client Development and Sales*

*Asset Managers – Chicago*

### Elizabeth Flores

elizabeth.flores@cmegroup.com

+1 312 338 2801

*Director, Client Development and Sales*

*Asset Managers – Chicago*

### David Lerman

david.lerman@cmegroup.com

+1 312 648 3721

*Director, Client Development and Sales*

*Asset Managers – Chicago*

### Frank Mineo

frank.mineo@cmegroup.com

+1 212 897 5287

*Associate Director, Client Development and Sales*

*Asset Managers – New York*

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**CME GROUP HEADQUARTERS**

20 South Wacker Drive  
Chicago, Illinois 60606  
cmegroup.com

info@cmegroup.com  
800 331 3332  
312 930 1000

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**CME GROUP REGIONAL OFFICES**

**New York**  
212 299 2000

**Calgary**  
403 444 6876

**Tokyo**  
+81 3 5403 4828

**London**  
+44 20 7796 7100

**Houston**  
713 658 9292

**Washington D.C.**  
202 638 3838

**Singapore**  
+65 6593 5555

**São Paulo**  
+55 11 2565 5999