



## Stock Index Futures Spread Trading

S&P 500  
vs.  
DJIA

S&P MidCap 400  
vs.  
S&P SmallCap 600

Second Quarter 2008

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# Stock Index Futures Spread Trading

## Introduction

### About CME Group and Stock Index Futures

CME Group, formed by the 2007 merger of the Chicago Mercantile Exchange (CME) and the Chicago Board of Trade (CBOT), is the world's largest and most diverse derivatives exchange. It is also the world's premier marketplace for trading stock index futures.

The first successful stock index futures contract, the S&P 500 contract, began trading at CME in 1982. Since then, our product line has grown to include a comprehensive range of benchmark indexes on U.S. and international stocks. In 2007, CME Group's equity index product line had an average daily volume (ADV) of over 2.4 million contracts, with an average notional value in excess of \$200 billion traded every day. The notional value of open interest in CME Group's equity index product line was in excess of \$400 billion on December 31, 2007.

CME Group offers trading on stock index futures virtually 24 hours per day, with the E-mini products available electronically only. The markets are liquid around the clock, even during non-U.S. hours, and especially in the European morning hours leading in to the U.S. daytime open for the stock market.

### About This Guide

This spread trading guide introduces and studies the spread between two sets of indexes: The S&P 500 and the DJIA, and S&P MidCap 400 and S&P SmallCap 600. If you are interested in trading the spread between either or both of these pairs we hope this guide will help you get started.

## Spreading the S&P 500 Versus the DJIA

The Standard & Poor's 500 (S&P 500) Index and the Dow Jones Industrial Average (DJIA) are the two most widely known stock indexes. The S&P 500 is the leading large-cap benchmark for the U.S. stock market and is the main barometer for institutional and professional investors. The DJIA is a popular measure of the U.S. stock market, especially among the media and general population. In addition:

- The S&P 500 index contains 500 stocks, while the DJIA has 30 stocks. All 30 of the stocks in the DJIA are also in the S&P 500.
- The S&P 500 is a capitalization-weighted, float-adjusted index. The DJIA is a price-weighted index.
- ADV for the CME Group E-mini S&P 500 index futures was 1,641,692 contracts in 2007. For Q1 2008, ADV increased to 2,487,430 contracts.
- ADV for the CME Group E-mini Dow index futures was 158,494 contracts in 2007. For Q1 2008, ADV increased to 209,689 contracts.

The S&P 500 and DJIA is one of the most popular spreads because the two indexes are closely related – but not 100 percent correlated. Given that the DJIA has only 30 stocks, it is also feasible to monitor the main stocks that may have an impact on the spread relationship.

### Terminology and Rational for Spreads

The S&P 500 and DJIA are not only calculated using different methodologies; they are also at very different price levels. For example, on April 18, 2008, the E-mini S&P 500 futures settled at 1388.00 while the E-mini Dow futures settled at 12810. They also have different futures “multipliers”, resulting in different dollar notional values. While there is no single “official” or “correct” way to price a spread, we will use a convention based on the ratio of dollar notional value for both pricing a spread and also helping to determine the optimal ratio of contracts to buy and sell (depending on a trader’s risk profile).

Using the closing values of April 18, 2008, the E-mini S&P 500 futures had a notional value of \$69,400 ( $1388.00 \times \$50$ ) and the E-mini Dow futures had a notional value of \$64,050 ( $12810 \times \$5$ ).

### Pricing the Spread as a Ratio<sup>1</sup>

With many traditional spreads, the “spread price” or “spread value” would simply be equal to A minus B. For example, consider a spread involving two stocks, such as ExxonMobil (XOM) vs. Chevron (CVX). On April 18, 2008, XOM closed at 94.00 and CVX closed at 93.18 – so the “spread price” was simply \$0.82. Another example would be the spread between Chicago Wheat futures vs. Kansas City Wheat futures. On April 18, 2008, their closing prices were \$8.85 and \$9.33 respectively, so KC was trading at a premium of \$0.48 to Chicago. Trying to use this convention for the E-mini S&P 500 futures vs. E-mini Dow futures spread would be impractical and risky.

A trader could also try taking the difference between the notional values but this would result in a “spread price” that would vary significantly and could be awkward to view. For example, using the notional values for April 18, 2008, the spread price would be \$5,350. During the period from April 2002 through April 2008, the range of the spread price was \$1,002 to \$9,848.

However, using a ratio (E-mini S&P 500 notional value / E-mini Dow notional value) of the respective notional dollar values of the futures contracts results in a more stable looking “spread price” for traders to analyze and view. For example, using the notional values for April 18, 2008, the spread price would be 1.0835. During the period from April 2002 through April 2008, the range of the spread price was 1.0245 to 1.1826.

### Trading the Spread as a Ratio

Additionally, traders must also decide on the “quantity ratio” when actually trading the spread. How many contracts of the respective index futures do you buy and sell? For traders who prefer to trade the smallest quantities, trading the spread on a 1:1 basis is the obvious choice. However, for traders who are trading larger quantities, and for those who are “position traders” (holding spreads for at least one day or potentially much longer), trading a ratio of quantities is the preferred method. CME Clearing offers reduced margins via Spread Credits for traders who use a ratio of 5:6 (five contracts of E-mini S&P 500 futures vs. six contracts of E-mini Dow futures).

Trading a ratio of quantities is important for traders who are holding positions long enough to witness significant market moves. For example, if both the S&P 500 and DJIA increased by 10 percent, a trader using a 1:1 quantity ratio would see the notional value of the spread move by about \$500, even though the underlying markets moved by the exact same percentage amount.

We will discuss these topics further throughout this guide.

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<sup>1</sup> Obviously there are as many ways to look at spreads as there are traders. Some traders may prefer a convention using the ratio, while others prefer the simple difference in notional values. <sup>1</sup>

## Index Methodology, Calculations and Weightings

### Index Methodology

#### STANDARD AND POOR'S 500 INDEX (S&P 500)

The S&P 500 index is a capitalization weighted, float adjusted index.

**A capitalization-weighted index** measures the market capitalization of all the stocks in the index, rather than just the stock prices. The market capitalization of a stock refers to the value of the stock price multiplied by the number of shares outstanding.

**“Float-adjusted”** refers to shares. When calculating a capitalization-weighted, float-adjusted index, only those shares available to investors are counted. This will be less than a company's total outstanding shares. Shares held by government agencies, closely held groups, and others are not counted.

#### DOW JONES INDUSTRIAL AVERAGE (DJIA)

The DJIA is a price weighted index.

**A price-weighted index** is calculated using only the component's stock prices, summed up and divided by the DJIA Divisor. The number of outstanding shares of each stock is not used. Therefore, the weight of a stock in the DJIA is simply determined by the stock's price. The stock with the highest price will have the highest weighting in the DJIA. Additionally, on any given day, a \$1.00 move in any two stocks would have the same impact on the DJIA – so a \$1.00 move in IBM has the same impact as a \$1.00 move in Intel, even though their respective weightings on December 31, 2007 were 6.62 percent and 1.63 percent.

Although the S&P 500 and DJIA are different in terms of methodology and the number of stocks in the indexes, they have shown very high levels of correlation – over 95 percent during the vast majority of trading days (see Index Correlation section). Both indexes are dominated by large capitalization, blue chip stocks.

### Index Calculations

#### Index Calculations - March 31, 2008

S&P 500	$\frac{\text{Sum of Float Adjusted Market Capitalization}}{\text{Divisor}}$	
S&P 500	$\frac{11,510,418,587,426}{8,702,191,481}$	= 1322.70

DJIA	$\frac{\text{Sum of DJIA Prices}}{\text{Divisor}}$	
DJIA	$\frac{1,506.30}{0.1228340160}$	= 12262.89

### Changes in Index Composition – Dow Jones Industrial Average

Given that the DJIA is a price weighted index and has only 30 stocks, any changes in its composition could have a potentially significant impact on a spread relationship – ie. it will likely impact the S&P 500 vs. DJIA spread.

*Note: The addition/deletion of stocks is accompanied by a change in the DJIA Divisor, so any such changes will not impact that days DJIA price level. However, these changes will impact how the DJIA behaves going forward, which includes intraday spread relationships.*

Changes do not occur frequently – from January 2000 through March 2008, a total of 5 stocks have been added to the DJIA, and 5 others have been deleted.

### Changes to the DJIA on April 8, 2004

*Added:* American International Group Inc. (AIG), Pfizer Incorporated (PFE) and Verizon Communications Inc (VZ)

*Deleted:* AT+T Corporation (T), Eastman Kodak Co. (EK) and International Paper Co (IP)

*Name Change on November 21, 2005:* SBC and AT+T merge, changing SBC's name to AT+T Inc (T) which again appears in the DJIA.

### Changes to the DJIA on February 19, 2008

*Added:* Bank of America Corp (BAC) and Chevron Corp (CVX)

*Deleted:* Altria Group Inc (MO) and Honeywell International Inc (HON)

This most recent change did have a significant impact on the energy sector weighting in the DJIA, nearly doubling its weighting to above 11 percent, as CVX was added and joined ExxonMobil (XOM). Adding BAC to the DJIA did not have a huge impact on the financial sector, as there were already 4 other financial stocks in the DJIA, and BAC itself had a weighting of less than 3.00 percent of the DJIA.

## Spread Calculations, Sensitivities, Risks and Margins

### Calculating the Spread Ratio

**Note:** Examples in this guide use only the E-mini S&P 500 and DJIA contracts. Buying the spread means buying the E-mini S&P 500 index and selling the E-mini Dow index, and selling the spread means selling the E-mini S&P 500 index and buying the E-mini Dow index.

For example, if a trader expects the S&P 500 to outperform the DJIA (either up or down regardless of time frame), the trader would want to “buy the spread” – **buy the E-mini S&P 500** index and **sell the E-mini Dow** index. If the spread ratio was at 1.1020, the trader who bought the spread would be looking to sell it for a ratio above 1.1020.

When trading the spread between the E-mini S&P 500 index and the E-mini Dow index futures, the different index levels and their respective multipliers need to be taken into account. Ideally, a spread ratio which closely balances the notional values of the contracts should be used, so that the net effect of market movements is captured more precisely. This can be called a “dollar neutral” spread when it is initiated.

Required ratios to have “dollar neutral” at spread initiation –

	A	B	C	D	E
Year End	S&P 500	\$notional	DJIA	\$notional	Ratio
		= A x \$50		= C x \$5	= B / D
2002	879.82	\$43,991	8341.63	\$41,708	1.05473
2003	1111.92	\$55,596	10453.92	\$52,270	1.06364
2004	1213.75	\$60,688	10783.01	\$53,915	1.12561
2005	1248.29	\$62,415	10717.50	\$53,588	1.16472
2006	1418.30	\$70,915	12463.15	\$62,316	1.13799
2007	1468.36	\$73,418	13264.82	\$66,324	1.10696
2008 Q1	1322.70	\$66,135	12262.89	\$61,314	1.07862

For example, the 2007 year end prices of 1468.36 and 13,264.82, initiating a spread as dollar neutral would require buying one E-mini S&P 500 index futures contract and selling one 10696 E-mini Dow index futures contracts. This can be rounded to being a 1 to 1.1 ratio.

Although some traders may wish to trade equal quantities between the E-mini S&P 500 and E-mini Dow futures, others may want to trade using a ratio of these contracts. While there is no single “correct” ratio, consider the following three ratio alternatives:

- 1) **1 x 1 ratio** = Buy one contract E-mini S&P 500 – Sell one contract E-mini Dow
- 2) **5 x 6 ratio** = Buy five contracts E-mini S&P 500 – Sell six contracts E-mini Dow
- 3) **10 x 11 ratio** = Buy 10 contracts E-mini S&P 500 – Sell 11 contracts E-mini Dow

### Sector Distribution

Another way to examine the similarities / differences between the S&P 500 index and the DJIA is by comparing the percentage weights of each index in the main index sector categories. The table below illustrates which of the specific sectors have significantly different weightings in the S&P 500 and DJIA.

For example, in the S&P 500, the energy sector has a weighting of 13.25 percent. The DJIA has two energy stocks, ExxonMobil and Chevron, with a combined weighting of 11.28 percent.

<b>Sectors</b>		
<b>March 31, 2008</b>	<b>S&amp;P 500</b>	<b>DJIA</b>
Consumer Discretionary	8.65%	11.14%
Consumer Staples	11.07%	9.96%
Energy	13.25%	11.28%
Financials	16.80%	12.56%
Health care	11.73%	8.22%
Industrials	12.18%	22.42%
Information Technology	15.70%	13.97%
Basic Materials	3.57%	5.50%
Telecom	3.44%	4.96%
Utilities	3.61%	0.00%
	<b>100.00%</b>	<b>100.00%</b>

The different sector weights will obviously have a significant impact on the spread, as measured by the ratio (see “Calculating the Spread Ratio”). For example, consider the time period between March 26,

2007, and August 3, 2007, when the spread ratio fell from 1.1529 to 1.0871 – that is, the S&P 500 index underperformed the DJIA index. During this period, the financial sector fell 11 percent (higher weight in S&P 500), the energy sector increased by 9 percent (higher weight in S&P 500) and the industrial sector increased by 5.7 percent (higher weight in DJIA).

## Historical Dollar Weighted Ratio

$(\text{S\&P 500 price} \times \$50) / (\text{DJIA price} \times \$5)$

The data below and the charts on the following page illustrate the various levels of the dollar weighted notional ratio, from April 2002 up to April 2008. The ratio is simply the notional value ratio of the E-mini S&P 500 / E-mini Dow contracts. The ratio during this period ranges from 1.0245 to 1.1826. While this may seem to be a wide range, it takes place over a period of over six years. Traders involved in trading the S&P 500-DJIA spread are likely to be much more short term in nature, measuring holding time minutes, hours and possibly days, rather than months or years.

Additionally, given that the correlation of percentage price changes between the S&P 500 and DJIA is relatively very high, the spread ratio, especially in shorter time frames, is quite stable.

Viewing the table below and the following charts, the dollar weighted ratio had a substantial increase from January 2002 to January 2006, from below 1.10 to above 1.18 as the S&P 500 outperformed the DJIA, led by significant increases in the financial and energy sectors – both of which have higher weightings in the S&P 500. During the period from January 2006 through March 2008, the financial sector experienced a significant downturn which had a negative impact on the S&P 500 vs. the DJIA. The dollar-weighted ratio declined from above 1.18 to below 1.07 during that time.

## Sector Performance

### January 2002 ~ January 2006

S&P 500 Outperforms; \$Weighted Ratio Increases from 1.10 to above 1.18

	<u>Price Appreciation</u>	<u>Total Return</u>
DJIA	6.95%	16.78%
S&P 500	8.73%	16.61%
S&P Financial Sector	20.42%	30.97%
S&P Energy Sector	88.43%	101.50%
S&P Industrial Sector	13.43%	20.30%

### January 2006 ~ March 2008

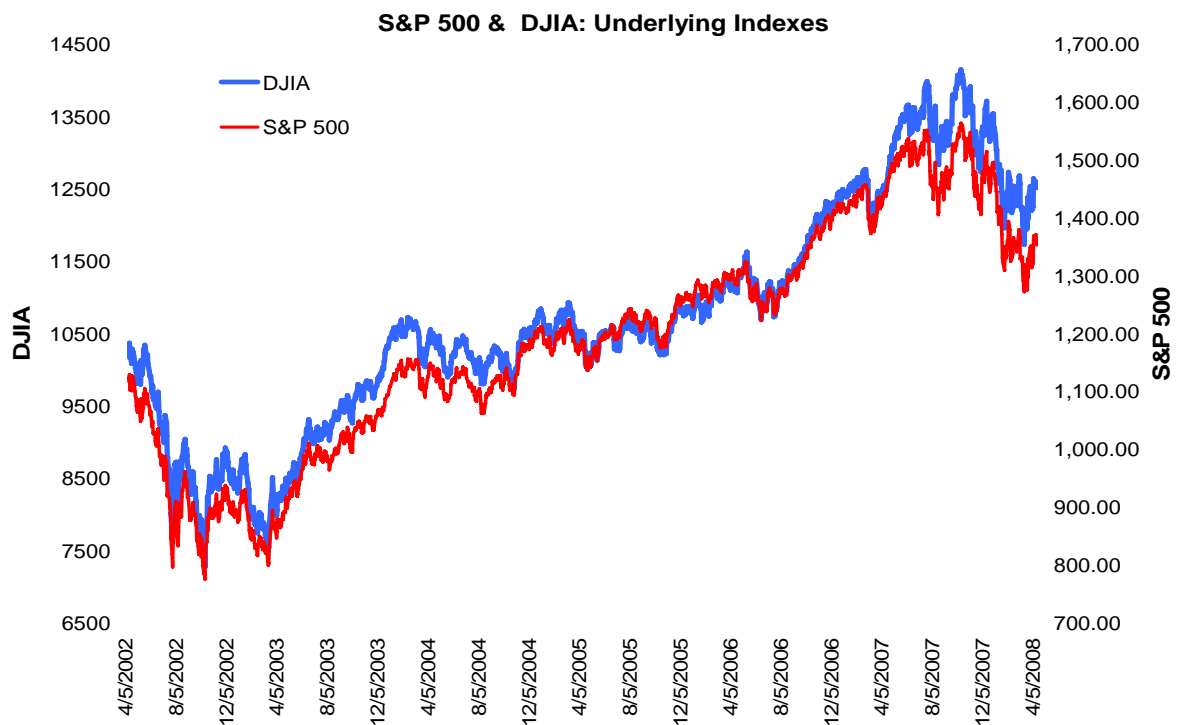
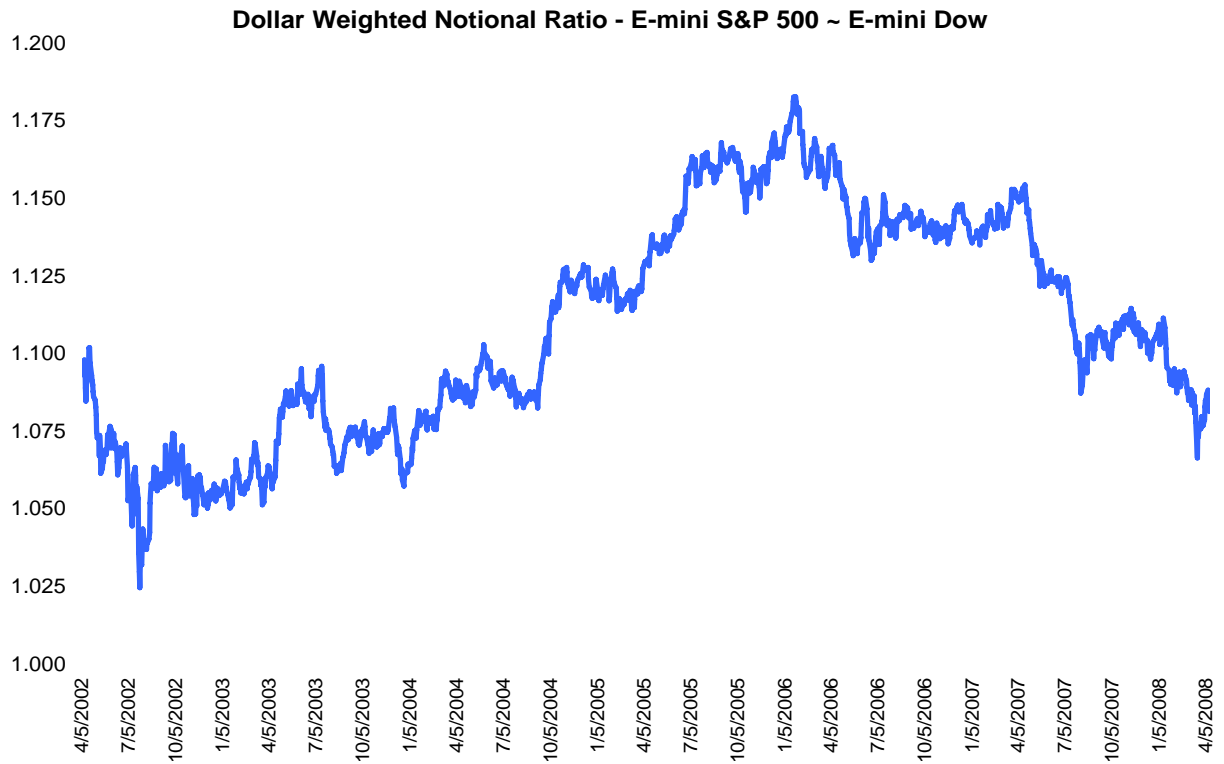
DJIA Outperforms; \$Weighted Ratio Decreases from 1.18 to below 1.07

	<u>Price Appreciation</u>	<u>Total Return</u>
DJIA	12.87%	18.75%
S&P 500	3.33%	7.76%
S&P Financial Sector	-22.16%	-17.52%
S&P Energy Sector	28.44%	31.99%
S&P Industrial Sector	18.69%	23.20%

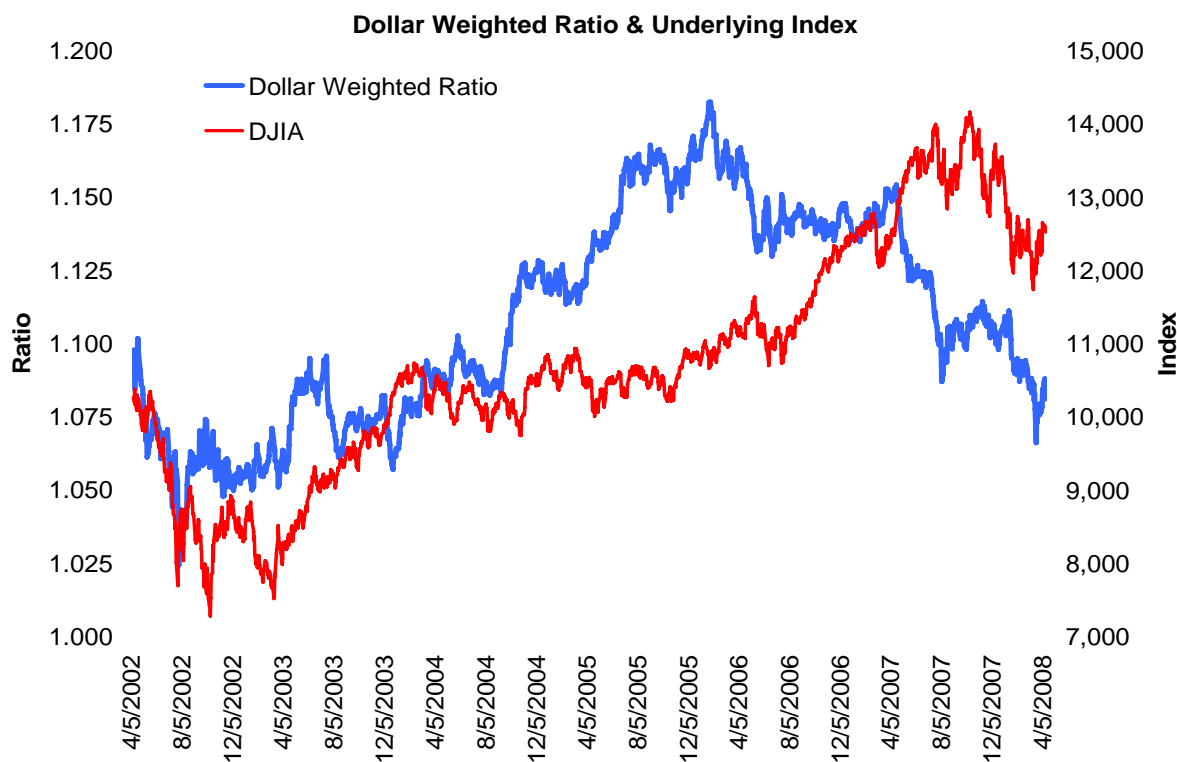
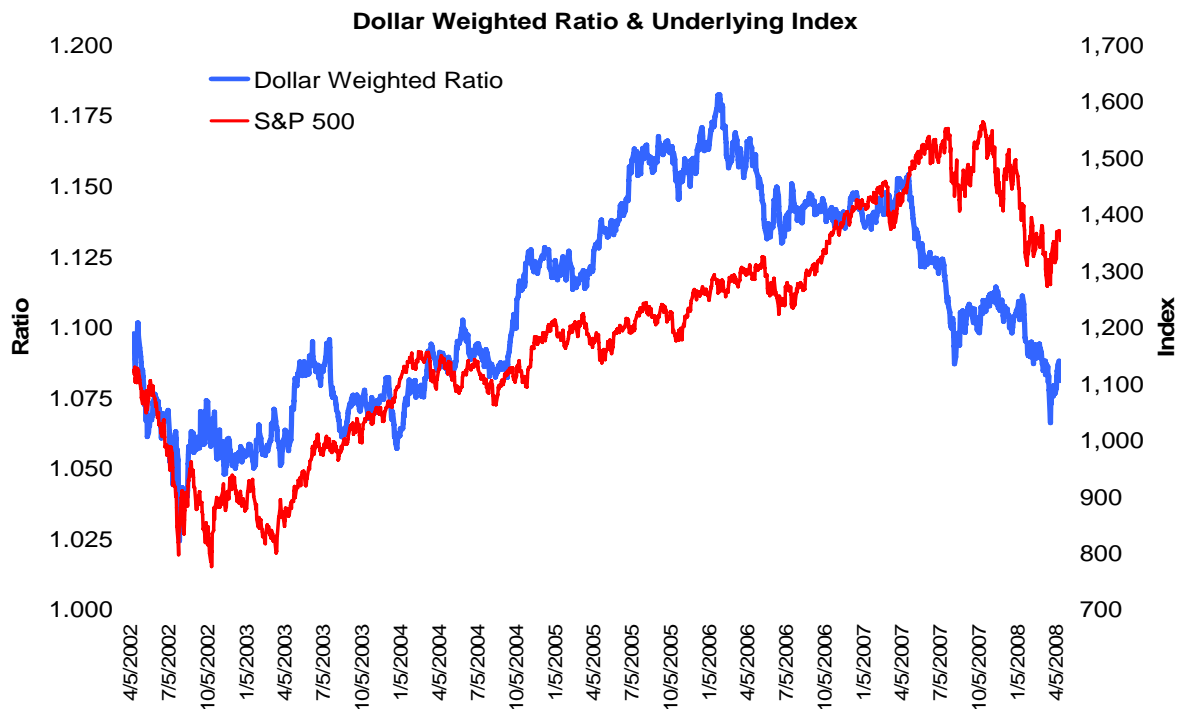
Source: Bloomberg



## Comparing the Weighted Ratio to the Underlying Cash Indexes



## Comparing the Weighted Ratio to the Underlying Cash Indexes



## Intra-Day Dollar Weighted Ratio Chart

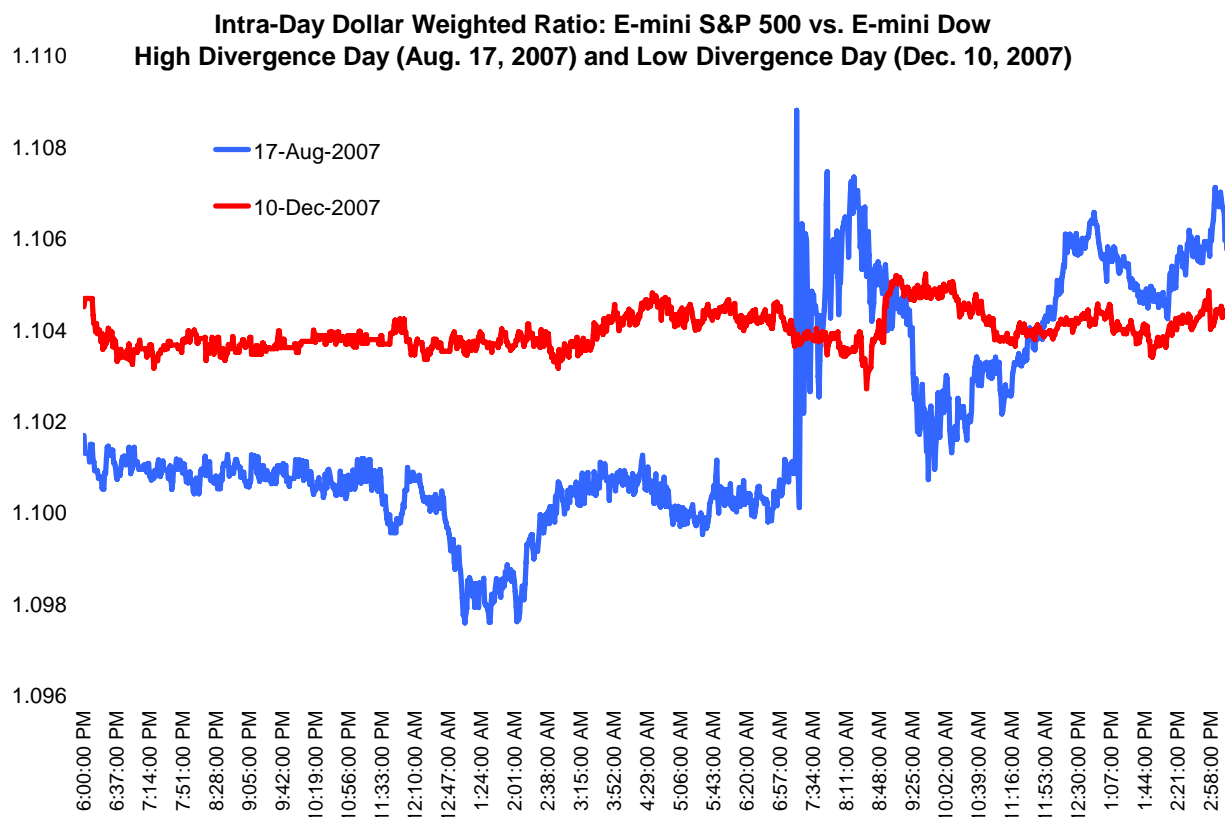
$(\text{S\&P 500 price} \times \$50) / (\text{DJIA price} \times \$5)$

The chart below illustrates the spread ratio on an intraday basis. August 17, 2007, was chosen as a High Divergence day and December 10, 2007, as a Low Divergence day.

August 17, 2007 – The S&P 500 increased by 2.43 percent while the DJIA increased by 1.80 percent, a divergence in net percentage change of 0.63 percent.

December 10, 2007 - The S&P 500 increased by 0.75 percent while the DJIA increased by 0.74 percent, a divergence in net percentage change of 0.01 percent.

Even on a day with a large price divergence between the S&P 500 and DJIA, the spread ratio was very stable. To be on the conservative side, for all traders of this spread, the spread ratio does need to be monitored daily and adjusted when necessary.



## Historical Ranges for Spread Ratios

### Historical Ratio Levels

(S&P 500 x \$50) / (DJIA x \$5)

#### April 2002 ~ December 2007

Open	1.093
High	1.183
Low	1.024
Last	1.107
Range	0.158

#### January 2004 ~ December 2004

Open	1.064
High	1.129
Low	1.064
Last	1.124
Range	0.064

#### January 2005 ~ December 2005

Open	1.120
High	1.171
Low	1.114
Last	1.165
Range	0.057

#### January 2006 ~ December 2006

Open	1.170
High	1.183
Low	1.130
Last	1.138
Range	0.053

#### January 2007 ~ December 2007

Open	1.136
High	1.154
Low	1.087
Last	1.107
Range	0.067

#### January 2008 ~ March 2008

Open	1.109
High	1.111
Low	1.066
Last	1.079
Range	0.045

## Sensitivity of the Spread

On some days the spread between the S&P 500 index and the DJIA index will not perform as expected. Those will be the days when either the end of day net percentage changes are significantly different and/or when the intraday correlations are low or volatile. The net effect is that on those days, trading this spread will be a challenge.

However, keeping a close vigil on the main “high discrepancy” stocks (such as IBM, Boeing, 3M and others) can help reduce the spread trading risk by helping a trader to determine if this will be a High Divergence (HD) day or a Low Divergence (LD) day. Obviously, there will be more risk on the HD days (this is not to say that a trader can expect to make money just because he sees an LD day – like all trading, there is risk involved, and a trader’s job is to manage risk).

Example: If all the stocks in both the S&P 500 and DJIA were unchanged on a given day except for IBM, the effect on each index would be as follows.

January 4, 2008 closing prices –

IBM = 101.13  
S&P 500 = 1411.63  
DJIA = 12800.18

If IBM were to increase by 1.00 percent while all the other stocks remained unchanged:

IBM = Increase from 101.13 to 102.14, up 1.01 or + .998715 percent  
S&P 500 = Increase from 1411.63 to 1411.79, up .16 points or + .011334 percent  
DJIA = Increase from 12,800.18 to 12,808.39, up 8.21 points or + .064140 percent

So, just a relatively small move in IBM, coupled with other stocks remaining unchanged, can cause a measurable divergence in the spread.

January 4, 2008, closing prices:

Boeing = 85.82  
S&P 500 = 1411.63  
DJIA = 12800.18

If Boeing were to increase by 5.00 percent while all the other stocks remained unchanged:

BA = Increase from 85.82 to 90.11, up 4.29 or + 4.9988 percent  
S&P 500 = Increase from 1411.63 to 1412.01, up .38 points or + .02691 percent  
DJIA = Increase from 12,800.18 to 12,835.05, up 34.22 points or + .27242 percent

### **Spread Risk – Earnings Release Days for “High Discrepancy” Stocks**

One potential source of volatility in the S&P 500 – DJIA spread could be earnings announcements among the group of so-called High Discrepancy stocks. The list of seven stocks shown in the following table all had weighting discrepancies of at least 3.00 percent (as of March 31, 2008).

All the stocks listed above have a March/June/September/December earnings cycle. Their normal earnings announcements usually occur the following month, ie. January/April/July/October.

### **Spread Risk Example: April 11, 2008 – General Electric Co. Earnings Release**

General Electric (GE) released Q1 2008 earnings on April 11, 2008. The results were well below market expectations, and GE stock closed down 12.79 percent (second worst day for GE since Oct. 1987). GE Q1 earnings were \$0.43/share actual vs. \$0.51/share expected.

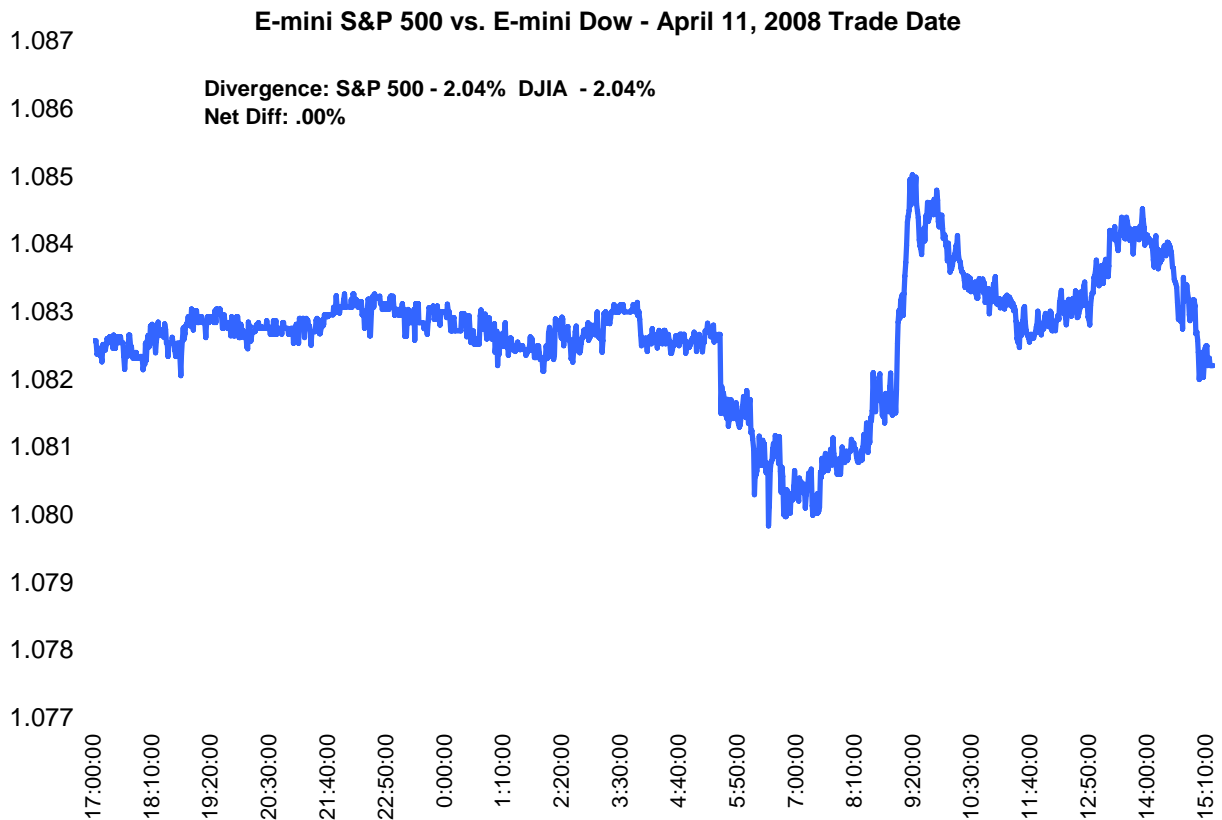
March 31, 2008		Top High Discrepancy Stocks		
Firm	Ticker	DJIA Weight	S&P 500 Weight	Weight Discrepancy
IBM	IBM	7.64%	1.39%	6.25%
Caterpillar	CAT	5.20%	0.42%	4.78%
3M	MMM	5.25%	0.49%	4.76%
Boeing	BA	4.94%	0.49%	4.45%
Chevron	CVX	5.67%	1.54%	4.13%
United Technologies	UTX	4.57%	0.59%	3.98%
McDonalds	MCD	3.70%	0.56%	3.14%

However, GE is a “low discrepancy” stock – its weightings difference between the S&P 500 and DJIA is only 0.64 percent. So even a 12.79 percent change in GE’s stock did not impact the spread – both the S&P 500 and DJIA closed down 2.04 percent for the day.

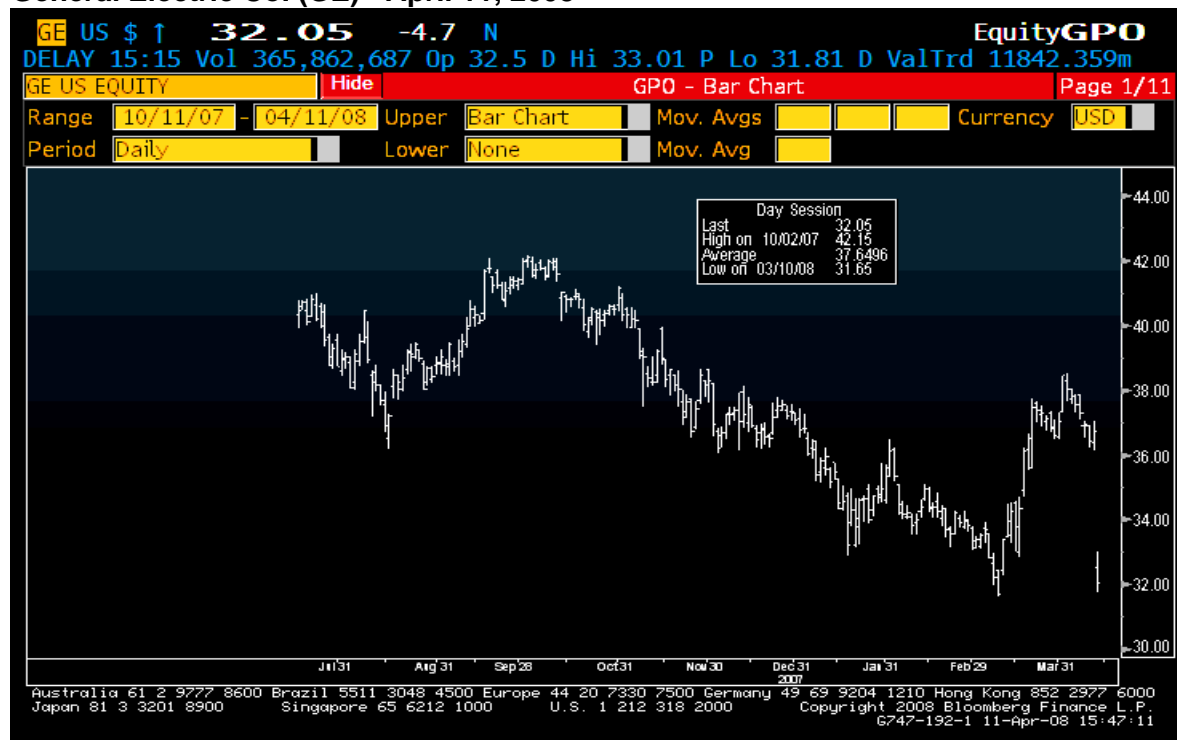
GE weightings on April 11, 2008 were 2.117 percent in the DJIA and 2.76 percent in the S&P 500.

April 11, 2008

DJIA	12325.42	-256.56	-2.04 percent
S&P 500	1332.83	-27.72	-2.04 percent
GE	32.05	-4.70	-12.79 percent



**General Electric Co. (GE) - April 11, 2008**



Source: Bloomberg.

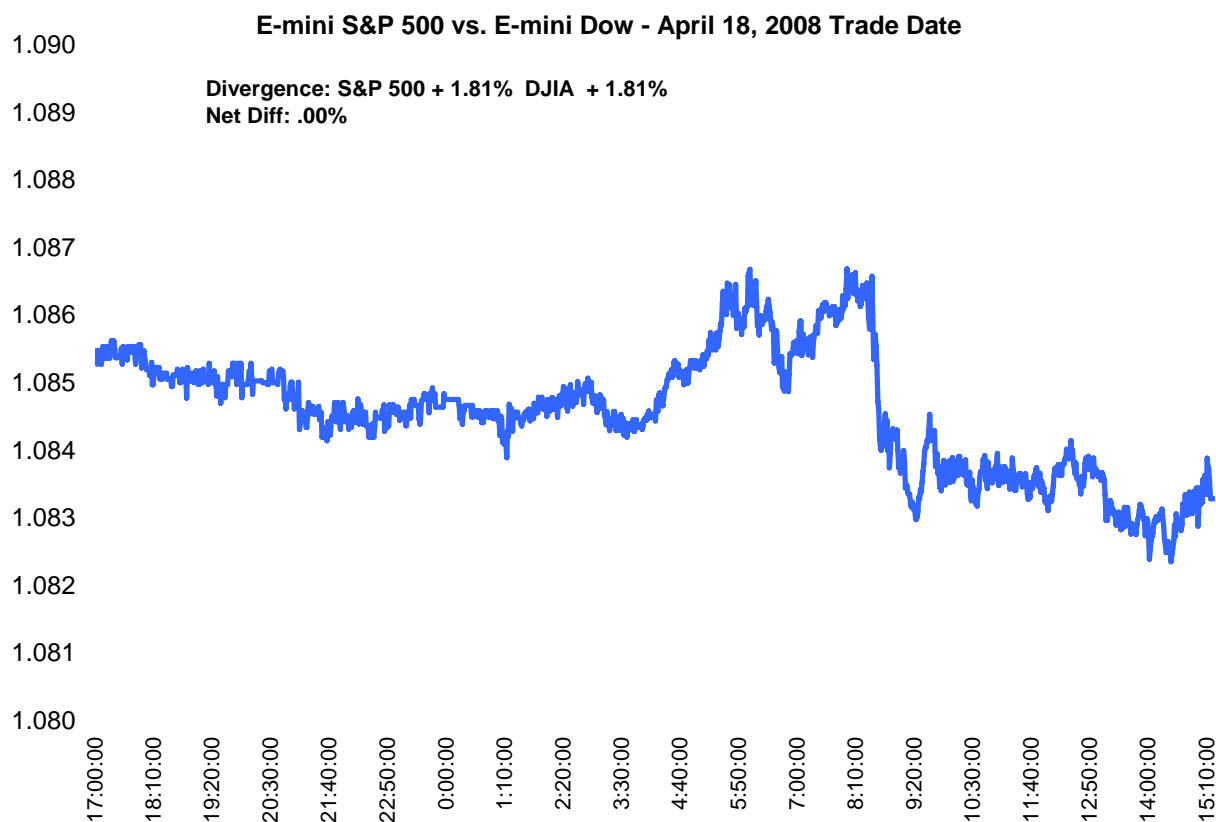
### Spread Risk Example: April 18, 2008 – Caterpillar (CAT) Earnings Release

Caterpillar (CAT) was the second highest “high discrepancy” stock after IBM. CAT released Q1 2008 earnings on Friday April 18, 2008. Earnings per share were \$1.45 actual vs. \$1.34 expected, while revenues were \$11.86 billion actual vs. \$10.6 billion expected.

CAT shares jumped by 6.69 to close at 85.28, which was a rise of 8.51 percent for the day. On April 18, 2008 CAT accounted for 5.40 percent of the DJIA and only 0.44 percent of the S&P 500. So, on a day when CAT increased by 8.51 percent, this could have had a large impact on the spread. However, on this particular day, the S&P 500 and DJIA had the exact same net percentage change on the day – the spread ended unchanged.

#### April 18, 2008

DJIA	12849.36	+228.87	+1.81 percent
S&P 500	1390.33	+24.77	+1.81 percent
CAT	85.28	+6.69	+8.51 percent





## Calculating the Spread's P+L - Trading Examples

### E-mini S&P 500 vs. E-mini Dow

#### Trade Example - Buying the Spread

Day Trade - April 11, 2008

<b>S&amp;P 500</b>		<b>1x1</b>	<b>5x6</b>	<b>10x11</b>
8:46:00 AM	Buy	1346.50	1346.50	1346.50
9:52:00 AM	Sell	1350.00	1350.00	1350.00
Net		<b>\$175.00</b>	<b>\$875.00</b>	<b>\$1,750.00</b>

<b>DJIA</b>				
8:46:00 AM	Sell	12452.00	12452.00	12452.00
9:52:00 AM	Buy	12449.00	12449.00	12449.00
Net		<b>\$15.00</b>	<b>\$90.00</b>	<b>\$165.00</b>

<b>NET P+L</b>	<b>\$190.00</b>	<b>\$965.00</b>	<b>\$1,915.00</b>
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#### Ratio Spread Level

8:46:00 AM	<b>Buy</b>	<b>1.0814</b>
9:52:00 AM	<b>Sell</b>	<b>1.0844</b>

#### Trade Example - Selling the Spread

Day Trade - April 18, 2008

<b>S&amp;P 500</b>		<b>1x1</b>	<b>5x6</b>	<b>10x11</b>
9:43:00 AM	Sell	1391.25	1391.25	1391.25
10:08:00 AM	Buy	1390.00	1390.00	1390.00
Net		<b>\$62.50</b>	<b>\$312.50</b>	<b>\$625.00</b>

<b>DJIA</b>				
9:43:00 AM	Buy	12804.00	12804.00	12804.00
10:08:00 AM	Sell	12830.00	12830.00	12830.00
Net		<b>\$130.00</b>	<b>\$780.00</b>	<b>\$1,430.00</b>

<b>NET P+L</b>	<b>\$192.50</b>	<b>\$1,092.50</b>	<b>\$2,055.00</b>
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#### Ratio Spread Level

9:43:00 AM	<b>Sell</b>	<b>1.0866</b>
10:08:00 AM	<b>Buy</b>	<b>1.0834</b>

### Spread Margin Requirements

Initial margin requirements for U.S. stock index futures have often been in the range of 5 - 7 percent of the underlying notional value of the contract (note: Margin requirements can and will be increased if market conditions warrant such a decision).

The CME Group Clearing Division offers “**spread credits**” for spread trades between similar products. These spread credits can have a dramatic impact on the initial margin requirements for highly correlated spread such as the S&P 500 vs. the DJIA.

Currently, the CME Group offers a spread credit rate of 90 percent for the S&P 500 vs. the DJIA spread. That means that the margins for a spread would only be 10% of the normal outright initial margins.

The spread credit for the E-mini S&P 500 index vs. the E-mini Dow index applies a standard spread ratio of 5:6 (five contracts of E-mini S&P 500 vs. six contracts of E-mini Dow).

### Fractional Spreads

The CME Group Clearing Division will calculate spread credits based on whole and fractional spreads. For example, the standard ratio for margin purposes is 5:6 (five contracts of E-mini S&P 500 vs. six contracts of E-mini Dow). So, spread quantities based exactly on the 5:6 ratio (i.e., 10 x 12, 50 x 60, and so on) will enjoy the full 90 percent spread credit.

Spread ratios that are not exactly on a 5:6 ratio will receive spread credits at an effective rate of less than 90 percent, as all of the spread that qualifies for the 5:6 rate will be margined at the 90 percent credit, while the remaining fractional quantities will be margined at a combination of the 90 percent credit rate and the normal outright margin rate. The following example will help illustrate this point.

Position: Long 10 E-mini S&P 500 futures and Short 11 E-mini Dow futures

- 1) Margin the 11 E-mini Dow futures at the 90% spread credit rate
- 2) Multiply 11 x .8333 (the standard ratio of 5 divided by 6) to arrive at 9.166, rounding this up to 9.17. The number of E-mini S&P 500 futures that can be margined at the 90 percent spread credit rate is 9.17.
- 3) The remaining .83 contracts of E-mini S&P 500 futures will be margined at the normal outright margin rate of \$4,500 per contract.

Please see the following table to view examples using both the 5:6 Standard Ratio and also the 10:11 Ratio.

### Standard Ratio - 5 E-mini S&P 500 vs. 6 E-mini Dow

Initial Margins		Outright Margin	
E-mini S&P 500		4,500	
E-mini Dow		3,503	
<b>Total</b>		<b>8,003</b>	
<b>Spread Credit</b>		<b>90% Spread Credit</b>	
E-mini S&P 500		450	(4500 x .10)
E-mini Dow		350	(3503 x .10)
<b>Total</b>		<b>800</b>	
<b>Spread with 5:6 Ratio</b>		<b>Outright Margin</b>	
Long 5 E-mini S&P 500		22,500	(5 x 4500)
Short 6 E-mini DJIA		21,018	(6 x 3503)
<b>Total</b>		<b>\$43,518</b>	
<b>Spread Credit</b>		<b>90% Spread Credit</b>	
Long 5 E-mini S&P 500		2,250	(5 x 450)
Short 6 E-mini DJIA		2,102	(6 x 350)
<b>Net Margin Due</b>		<b>\$4,352</b>	
<b>Net Margin Savings</b>		<b>\$39,166</b>	
<b>Net Savings Percent</b>		<b>90%</b>	

### Refined Ratio - 10 E-mini S&P 500 vs. 11 E-mini Dow

Initial Margins		Outright Margin	
E-mini S&P 500		4,500	
E-mini Dow		3,503	
<b>Total</b>		<b>8,003</b>	
<b>Spread Credit</b>		<b>90% Spread Credit</b>	
E-mini S&P 500		450	(4500 x .10)
E-mini Dow		350	(3503 x .10)
<b>Total</b>		<b>800</b>	
<b>Spread with 10:11 Ratio</b>		<b>Outright Margin</b>	
Long 10 E-mini S&P 500		45,000	(10 x 4500)
Short 11 E-mini DJIA		38,533	(11 x 3503)
<b>Total</b>		<b>\$83,533</b>	
<b>Spread Credit</b>		<b>90% Spread Credit</b>	
Long 9.17 E-mini S&P 500		4,127	(9.17 x 450)
Long 0.83 E-mini S&P 500		3,735	(0.83 x 4500)
Short 11 E-mini DJIA		3,853	(11 x 350)
<b>Net Margin Due</b>		<b>\$11,715</b>	
<b>Net Margin Savings</b>		<b>\$71,818</b>	
<b>Net Savings Percent</b>		<b>86%</b>	

(Outright margin levels and spread credits of 90 percent as of January 2008)

## Index Correlations

### Correlation between the S&P 500 Index and the Dow Jones Industrial Average

The correlation between the S&P 500 index and the Dow Jones Industrial Average is among the highest among all indexes overall, and certainly when considering the major high volume stock index futures with the most liquidity available. While correlations will vary over time, the S&P 500 and the DJIA are consistently correlated above 95 percent during the majority of trading days.

Rolling correlations of percentage price changes, over varying time periods, have been used as a way to measure the relationship between the S&P 500 and the DJIA thoroughly. The time periods studied are five days, 10 days, 20 days, 50 days and 63 days. Additionally, in eight separate and specific trading day examples, 10 minute rolling correlations have also been calculated. These are shown in the examples included in this paper.

The following table helps to describe in further detail the correlation between the S&P 500 and the DJIA. The data covers all trading days from January 2002 through December 2007 for a total of six years, or to be exact, 1,510 trading days.

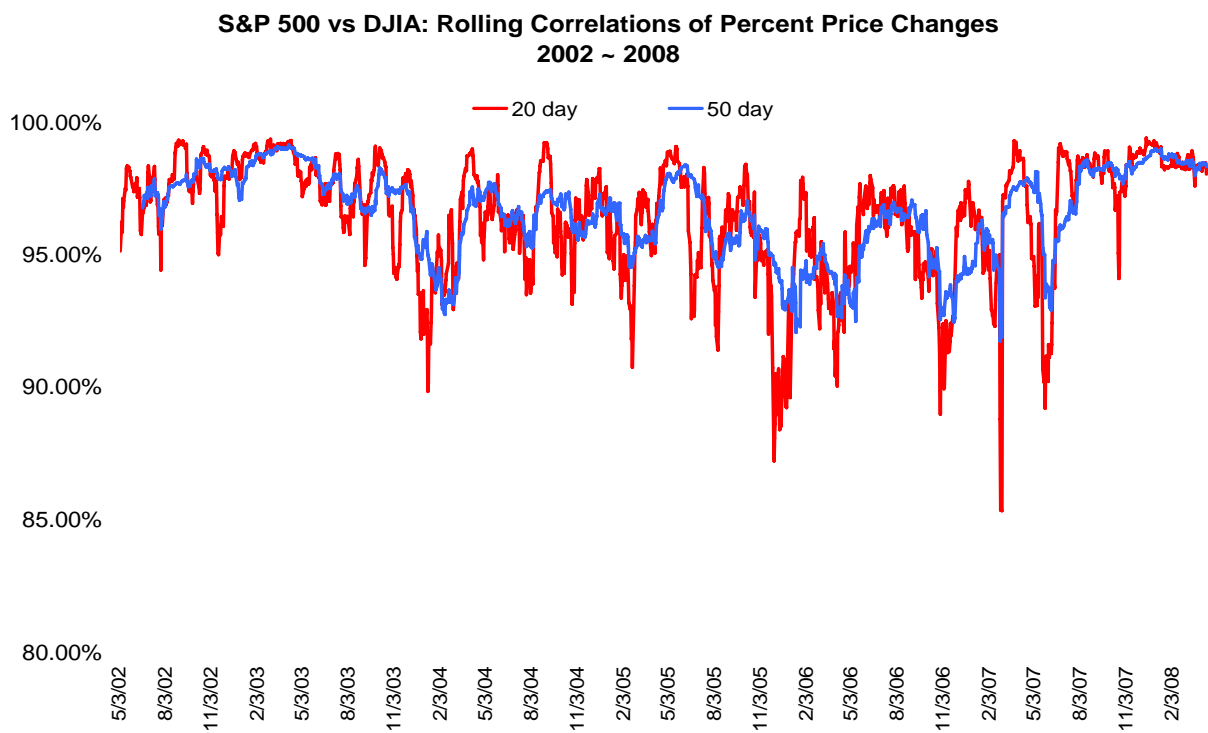
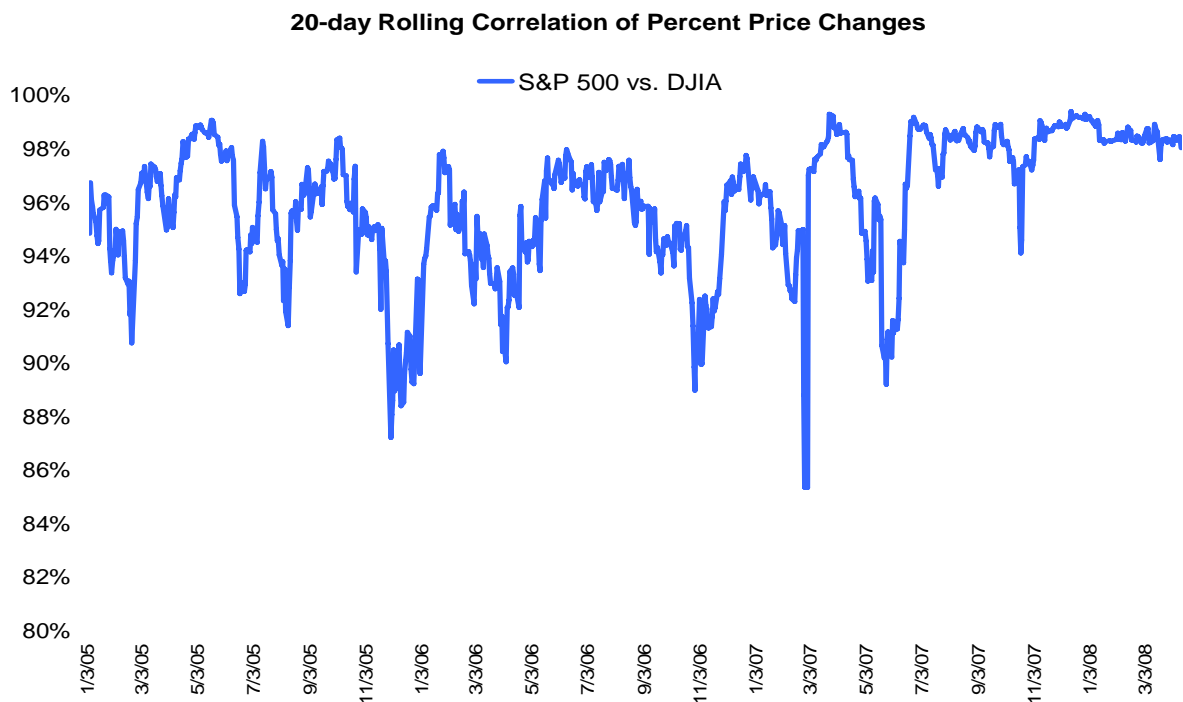
	5d	10d	20d	50d	63d
Total days	1510	1510	1510	1510	1510
"< 85%"	77	19	0	0	0
"< 90%"	127	61	24	0	0
"< 95%"	346	383	339	258	245
	5d	10d	20d	50d	63d
Pct of Days					
"< 85%"	5.10%	1.26%	0.00%	0.00%	0.00%
"< 90%"	8.41%	4.04%	1.59%	0.00%	0.00%
"< 95%"	22.91%	25.36%	22.45%	17.09%	16.23%

For example, looking at the 20 day rolling correlation of percentage price changes from January 2002 through December 2007, the correlation between the S&P 500 and the DJIA was below 90 percent on only 24 days or only during 1.59 percent of trading days.

If correlations are virtually 100 percent, then there are almost no trading opportunities. Conversely, low correlations, or those that are often moving erratically, may indicate a spread that can be very risky to trade, especially if overnight positions need to be maintained.

The following charts show the rolling correlations from January 2002 through December 2007.

## Rolling Correlations of Percentage Price Changes

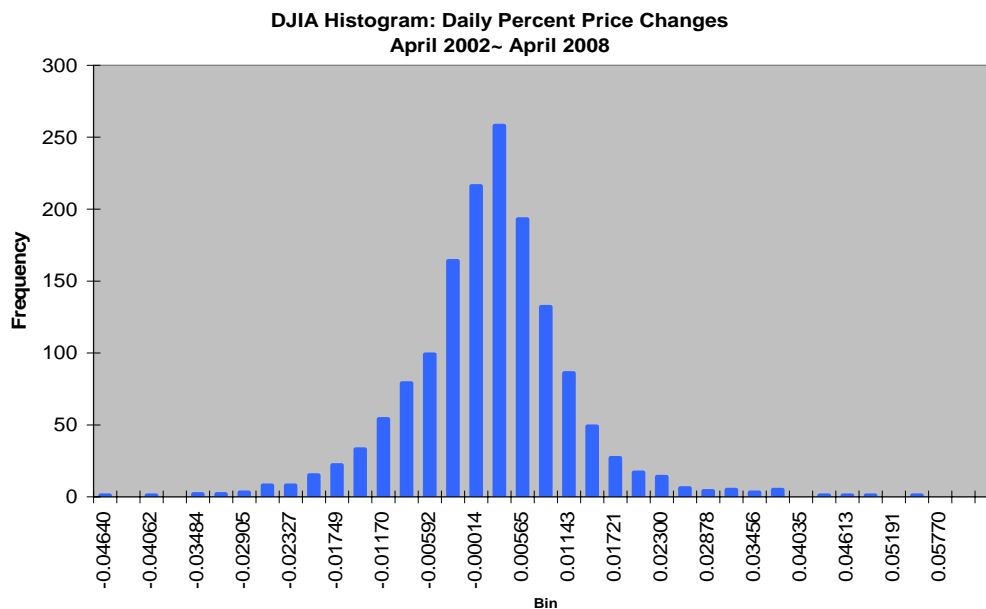
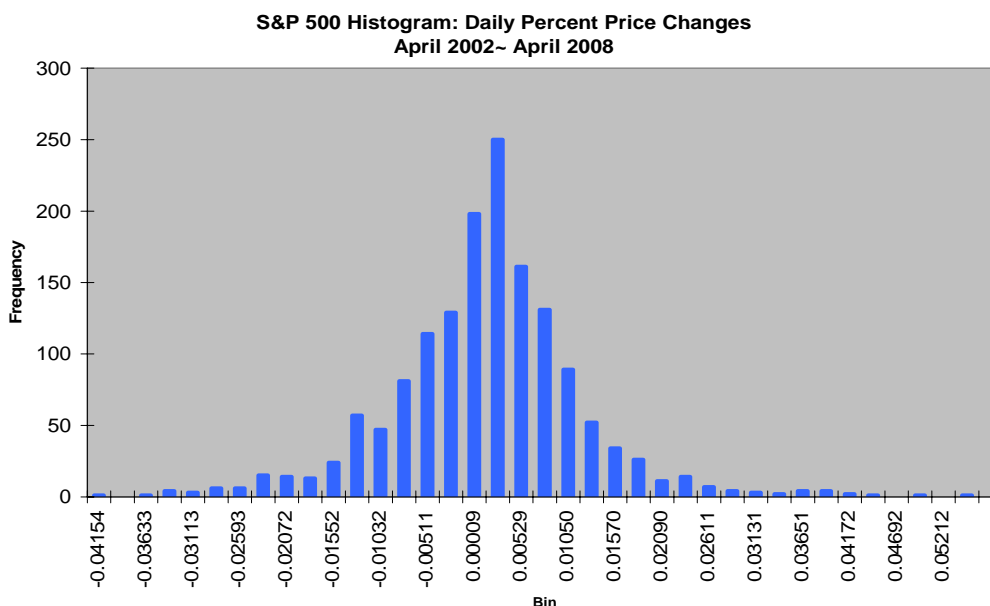


## Price Change Distribution

The following illustrates the distribution of daily percentage price changes for the S&P 500 and DJIA. Daily percentage returns for the DJIA have recently been less volatile than for the S&P 500 index. With the DJIA being a price weighted index, meaning that a single stock could potentially have a big impact on the index, we also see that the total range of occurrences for the DJIA is slightly larger as well:

Minimum: -.0464 for DJIA and -.04154 for S&P 500 (-4.64% and -4.15%)

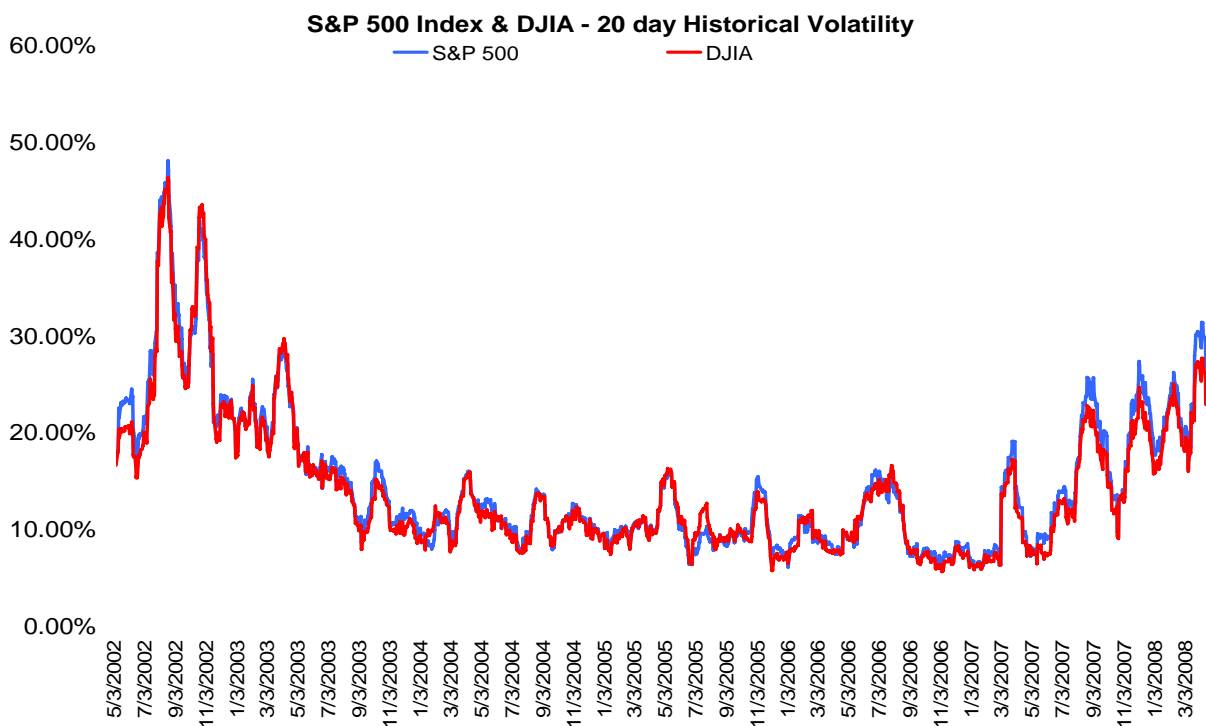
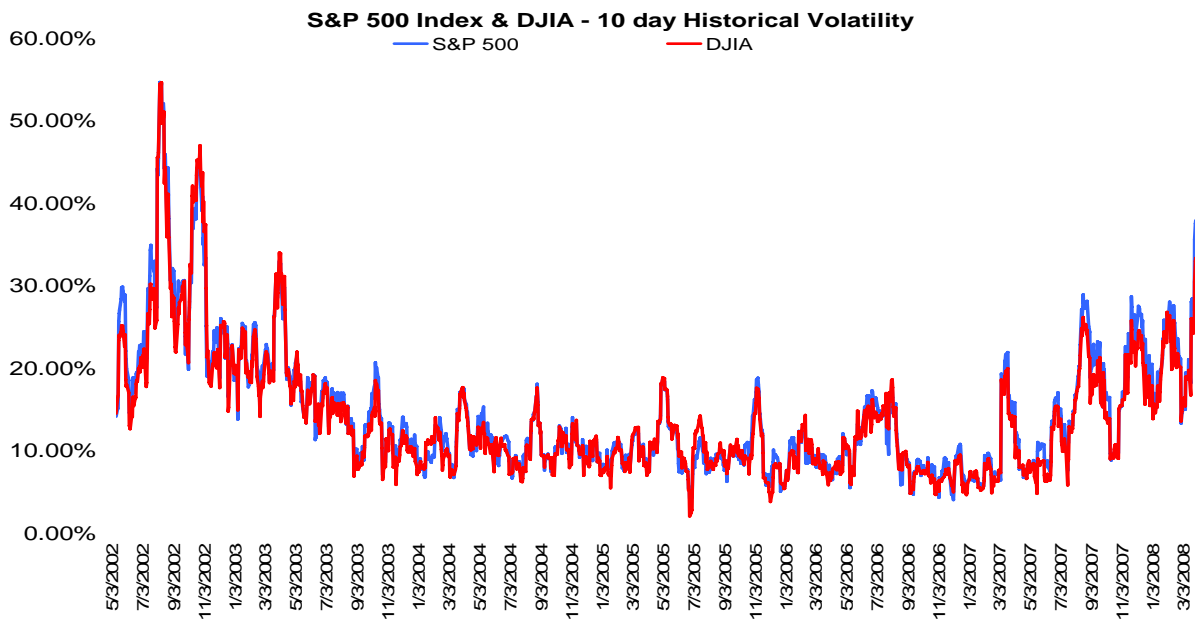
Maximum: +.06348 for DJIA and +.0573 for S&P 500 (+6.348% and +5.73%)



## Historical Volatilities

### Historical Volatility Comparisons

The Historical Volatilities (HVs) of the S&P 500 and DJIA are extremely similar, as can be expected since these indexes have very high degrees of correlation.



## S&P MidCap 400 vs. S&P SmallCap 600

### Introduction and Index Methodology

The Standard and Poor's MidCap 400 and SmallCap 600 indexes were developed to cover the midsize and small firm sectors of the US stock market. Together, with the S&P 500 index, they form the S&P 1500 Composite, which covers 85 percent of the total U.S. stock market capitalization. The S&P MidCap 400 was introduced in 1991 while the SmallCap 600 was introduced in 1994.

Although there is no direct overlap of any individual stocks (unlike the S&P 500 vs. DJIA spread), the S&P MidCap 400 and SmallCap 600 do have a high level of correlation. During 2006, the correlation of percentage prices changes was 96.05 percent, while during 2007 it was 95.50 percent. During the three-year period starting in January 2005 and ending December 2007, the rolling 20 day correlation ranged from 90 percent to above 99 percent.

#### Standard & Poor's Indexes

December 31, 2007	Percent of US equity market (est.)	Market Capitalization	Total Market Cap - \$ Bil
S&P 500	75%	Minimum US\$ 5 billion US\$1.5 billion to US\$	\$12,868
S&P MidCap 400	7%	5.5 billion US\$300 million to US\$	\$1,130
S&P SmallCap 600	3%	2 billion	\$526
S&P 1500 Composite	85%		\$14,524

#### Standard & Poor's Indexes

March 31, 2008	Percent of US equity market (est.)	Market Capitalization	Total Market Cap - \$ Bil
S&P 500	75%	Minimum US\$ 5 billion US\$1.5 billion to US\$	\$11,510
S&P MidCap 400	7%	5.5 billion US\$300 million to US\$	\$1,021
S&P SmallCap 600	3%	2 billion	\$480
S&P 1500 Composite	85%		\$13,011



## **CME Group E-mini S&P MidCap 400 & E-mini S&P SmallCap 600 Index Futures**

### **Through December 31, 2008: Fee Waivers for S&P MidCap 400 and S&P SmallCap 600 Products**

Take advantage of waived CME Globex and CME Clearing fees for all S&P MidCap 400 and S&P SmallCap 600 products. This includes both standard-sized and E-mini contracts.

### **Volume and Liquidity**

#### **E-mini S&P MidCap 400 Index Futures - Average Daily Volume**

2006		22,025
2007		29,296
2008	Q1	34,807

#### **E-mini S&P 600 SmallCap index futures - Average Daily Volume (launched in August 2008).**

2007	Q4	255
2008	Q1	348

The snapshots on the following page show the actual order books for the E-mini S&P MidCap 400 and E-mini S&P SmallCap 600 index futures contracts. The actual order books provide a better representation of market liquidity than the average daily volumes stated above. These contracts have dedicated liquidity providers actively making two-sided markets throughout the U.S. trading day

## Actual Order Book on CME Globex – April 18, 2008

### E-mini S&P MidCap 400 Index futures

<b>FAM8</b> ↓ <b>839.10</b> +14.70 M M 839.10/839.20 M 14x1 Index <b>BBO</b> At 11:28 Vol 9,337 Op 822.20 Hi 839.30 Lo 822.20 Prev 824.40 1 <GO> Calculator 2 <GO> Change View 3 <GO> Yellow Strip 4 <GO> Montage View									
<b>BEST BID AND OFFER</b> <b>S&amp;P MID 400 EMIN</b>									
		Size	Price						
		66	839.60	10					
<b>A</b>		28	839.50	15					
<b>S</b>		25	839.40	11					
<b>K</b>		5	839.30	5					
		1	839.20	1	11:28				
		9337	839.10		11:28				
		14	839.10	5	11:28				
<b>B</b>		7	839.00	7					
<b>I</b>		18	838.90	12					
<b>D</b>		17	838.80	12					
		19	838.70	7					
Australia 61 2 9777 8600 Brazil 5511 3048 4500 Europe 44 20 7330 7500 Germany 49 69 9204 1210 Hong Kong 852 2977 6000 Japan 81 3 3201 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000 Copyright 2008 Bloomberg Finance L.P. 6643-192-0 18-Apr-08 11:28:23									

### E-mini S&P SmallCap 600 Index futures

<b>GNM8</b> ↓ <b>382.30</b> +7.50 M M 382.10/382.30 M 50x5 Index <b>BBO</b> At 11:29 Vol 61 Op 380.00 Hi 382.40b Lo 378.30a Prev 374.80 1 <GO> Calculator 2 <GO> Change View 3 <GO> Yellow Strip 4 <GO> Montage View									
<b>BEST BID AND OFFER</b> <b>S&amp;P SMCAP600Emin</b>									
		Size	Price						
		3	382.70	2					
<b>A</b>		4	382.60	3					
<b>S</b>		3	382.50	2					
<b>K</b>		55	382.40	4					
		5	382.30	3	11:29				
		61	382.30		11:29				
		50	382.10	1	11:29				
<b>B</b>		2	382.00	1					
<b>I</b>		4	381.90	2					
<b>D</b>		2	381.70	2					
		1	381.60	1					
Australia 61 2 9777 8600 Brazil 5511 3048 4500 Europe 44 20 7330 7500 Germany 49 69 9204 1210 Hong Kong 852 2977 6000 Japan 81 3 3201 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000 Copyright 2008 Bloomberg Finance L.P. 6643-192-0 18-Apr-08 11:29:46									

Source: Bloomberg

## Spread Calculations, Risks and Margins

### Calculating the Spread Ratio

**Note:** Examples in this guide will use the E-mini S&P MidCap 400 and SmallCap 600 futures contracts only. Buying the spread means buying the E-mini S&P MidCap 400 index and selling the E-mini S&P SmallCap 600 index, and selling the spread means selling the E-mini S&P MidCap 400 index and buying the E-mini S&P SmallCap 600 index.

For example, if a trader expects the S&P MidCap 400 to outperform the S&P SmallCap 600 (either up or down regardless of time frame), the trader would want to “buy the spread” – that is, **buy the E-mini S&P MidCap 400** index and **sell the E-mini S&P SmallCap 600** index. If the spread ratio was at 2.1350, the trader who bought the spread would be looking to sell it for a ratio above 2.1350.

When trading the spread between the E-mini S&P MidCap 400 index and the E-mini S&P SmallCap 600 index futures, the different index levels and their respective multipliers need to be taken into account. Ideally, a spread ratio which closely balances the notional values of the contracts should be used, so that the net effect of market movements is captured more precisely. This can be called a “dollar neutral” spread when it is initiated.

Required ratios to have “dollar neutral” at spread initiation –

	A	B	C	D	E
Year End	S&P 400	\$notional	S&P 600	\$notional	Ratio
		= A x \$100		= C x \$100	= B / D
2002	429.79	\$42,979	196.61	\$19,661	2.18600
2003	576.01	\$57,601	270.41	\$27,041	2.13014
2004	663.31	\$66,331	328.80	\$32,880	2.01737
2005	738.05	\$73,805	350.67	\$35,067	2.10469
2006	804.37	\$80,437	400.02	\$40,002	2.01082
2007	858.20	\$85,820	395.14	\$39,514	2.17189
2008 Q1	779.51	\$77,951	364.59	\$36,459	2.13805

For example, given closing prices at the end of Q1 2008 of 779.51 and 364.59, initiating a spread as dollar neutral would require buying one E-mini S&P 400 MidCap index futures contract and selling 2.14 E-mini S&P 600 SmallCap index futures contracts. This can be rounded to being a 1 to 2.1 or 2.2 ratio (effectively this means trading 5 vs. 11). However, for many traders, a simple ratio of 1 vs. 2 is sufficient. While there is no single “correct” ratio, the following two ratio alternatives have covered price scenarios for the past six years.\*

- 1) **1 x 2 ratio** = Buy one contract E-mini S&P MidCap 400 - Sell two contracts E-mini S&P SmallCap 600
- 2) **5 x 11 ratio** = Buy five contracts E-mini S&P MidCap 400 - Sell 11 contracts E-mini S&P SmallCap 600

\* During the extremely volatile two-year period from March 2000 to March 2002, the dollar-weighted ratio increased from 2.12 to 2.49. A trader using the 5 x 11 ratio in March 2000 would have adjusted up to 5 x 13 during that time.

## Sector Distribution, Weightings and Performance

Another way to examine the similarities / differences between the S&P MidCap 400 index and the S&P SmallCap 600 index is by comparing the percentage weights of each index in the main index sector categories. The table below illustrates which of the specific sectors have significantly different weightings in the S&P MidCap 400 and the S&P SmallCap 600.

The largest difference in sector weightings is in Information Technology (4.86 percent difference), followed by Basic Materials and Utilities.

<b>Sectors</b>		
<b>March 31, 2008</b>	<b>S&amp;P MidCap 400</b>	<b>S&amp;P SmallCap 600</b>
Consumer Discretionary	12.42%	12.89%
Consumer Staples	3.43%	3.62%
Energy	10.13%	9.46%
Financials	16.13%	17.34%
Health care	12.35%	11.93%
Industrials	16.09%	17.48%
Information Technology	13.52%	18.38%
Basic Materials	7.47%	4.16%
Telecom	0.51%	0.05%
Utilities	7.95%	4.69%
	<b>100.00%</b>	<b>100.00%</b>

### Sector Performance

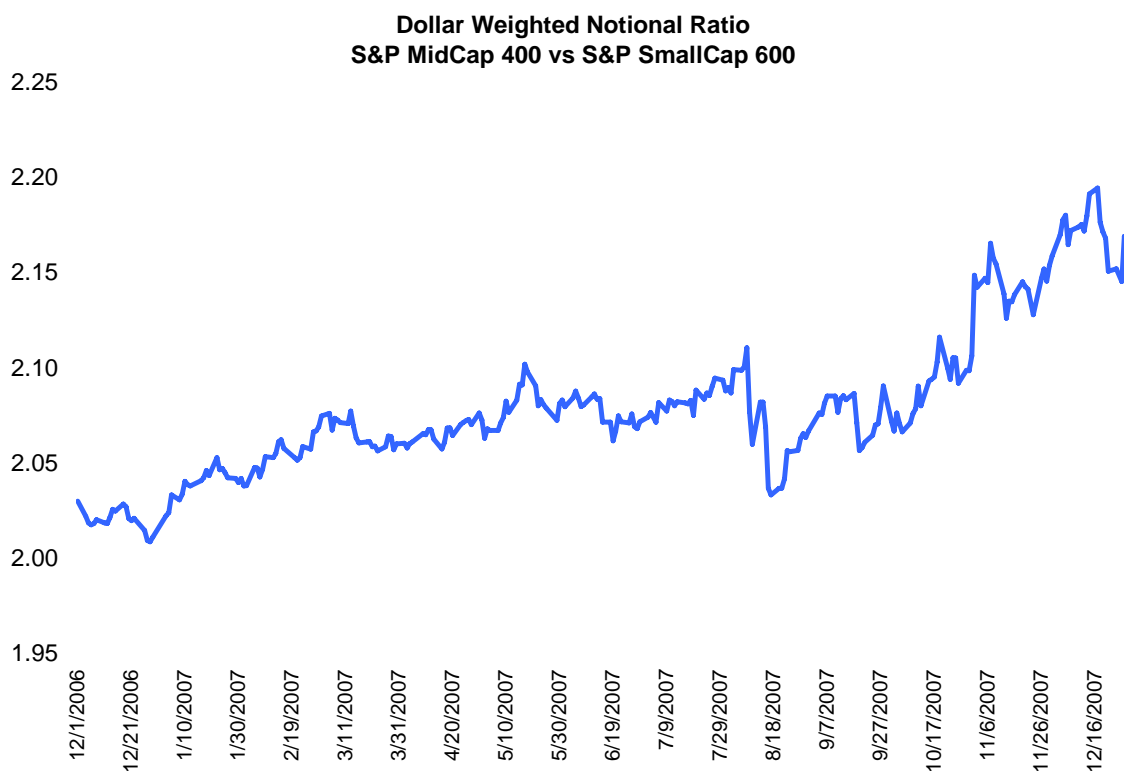
During the period of December 1, 2006, through December 31, 2007, the Dollar-Weighted Ratio increased from 2.00 to approximately 2.20 – the S&P MidCap 400 outperformed the S&P SmallCap 600). During this time, both the Financial and Consumer Discretionary sectors were down substantially, and both of these sectors have higher weights in the S&P SmallCap 600. Although the S&P SmallCap has a much higher weight in Information Technology (which was up 14.32 percent), the S&P MidCap 400 made up for that with increases in Basic materials and Utilities, where it has higher weightings.

## Sector Performance\*

December 1, 2006 ~ December 31, 2007

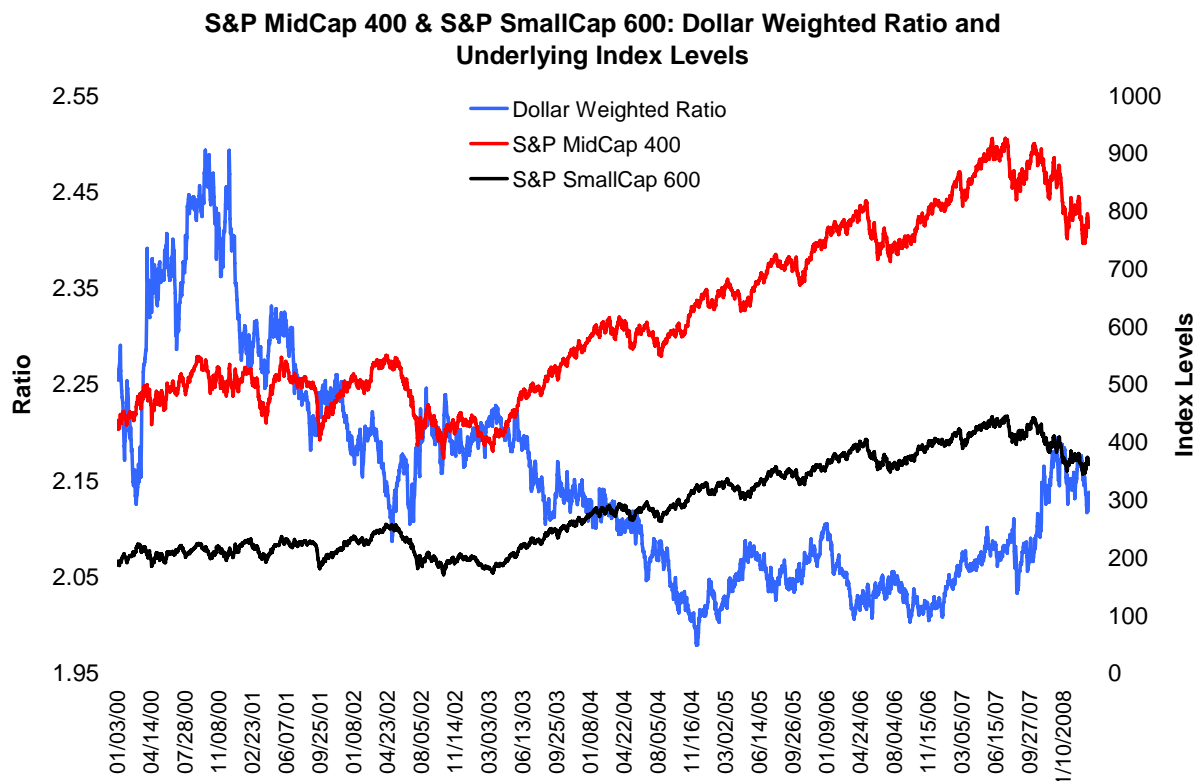
	Price Appreciation	Total Return
S&P MidCap 400	6.04%	7.43%
S&P SmallCap 600	-0.90%	0.14%
Consumer Discretionary	-13.10%	-11.68%
Consumer Staples	12.81%	15.86%
Energy	30.68%	32.56%
Financials	-18.44%	-15.66%
Health care	6.26%	8.37%
Industrials	12.14%	14.69%
Information Technology	14.32%	15.81%
Basic Materials	20.10%	23.81%
Utilities	15.28%	19.49%

\* "Select Sector SPDRs" used to measure sector performance



### Historical Dollar Weighted Spread and Underlying Markets

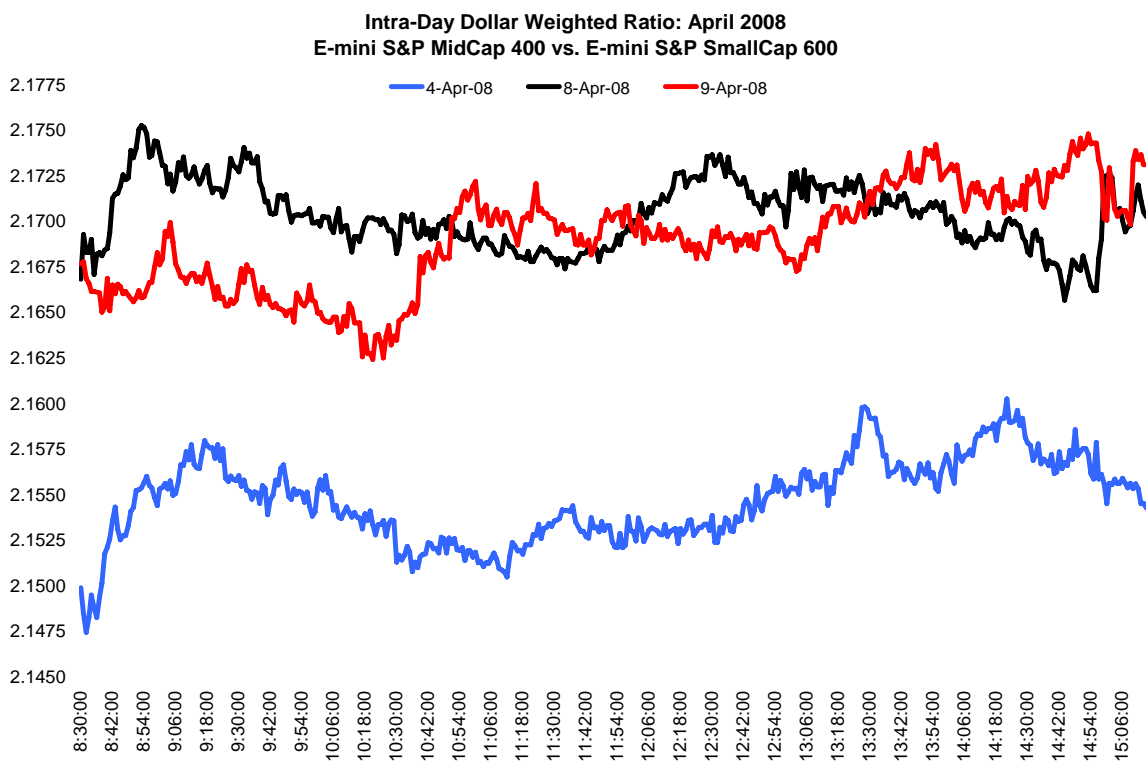
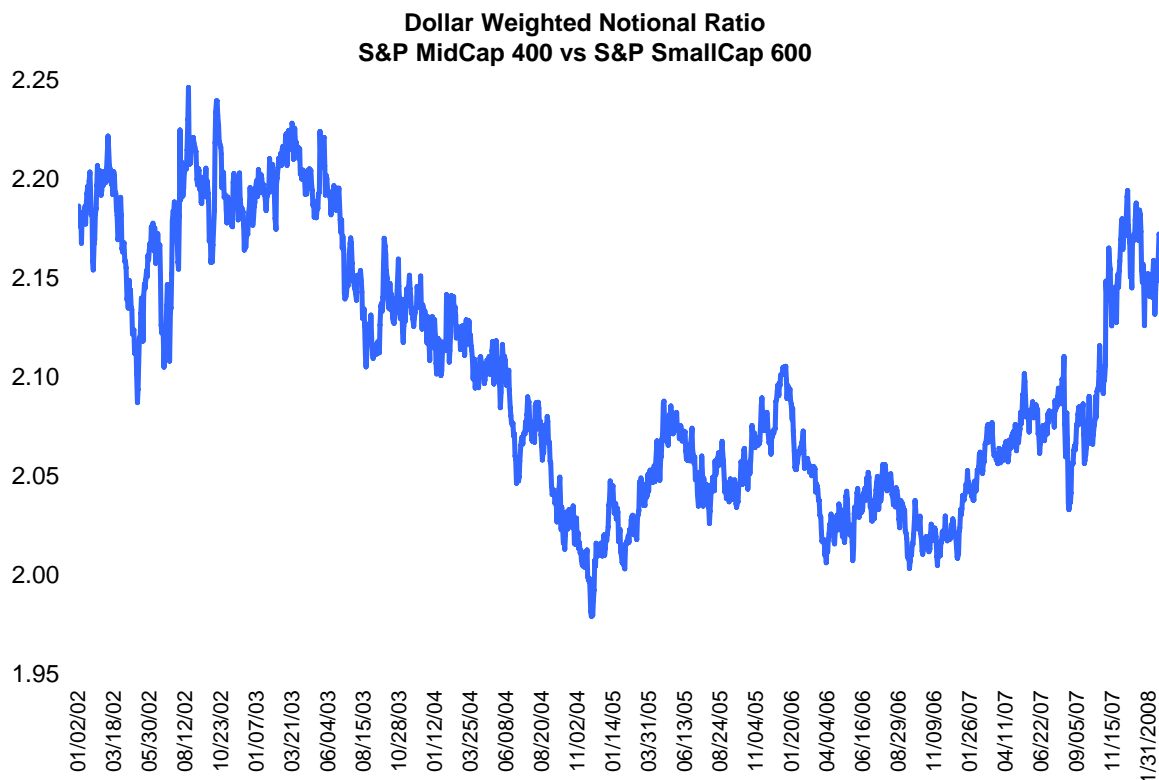
Since the dollar weighted ratio is the E-mini S&P MidCap 400 divided by the E-mini S&P SmallCap 600, the ratio can also be viewed as an indicator of the relative strength of the S&P MidCap 400 index vs. the S&P SmallCap 600 index. Following the market correction from early 2000 ~ mid 2002, the large-, mid- and small-cap markets began increasing in value, continuing until Q4 2007. During this five-year bull market, the dollar-weighted ratio declined from above 2.40 to below 2.00 as the gains in the S&P 600 SmallCap index outpaced the S&P 400 MidCap index. As the market reached a top and began a new correction starting in Q4 2007, the ratio has since increased from approximately 2.00 to 2.15.\*



\* This illustration is simply an example. The small-cap sector led the way during both the up move (2002-2007) and subsequent correction (Q4 2007 – present). It is entirely possible that we could witness a general market rally (or decline) with either mid-cap or small-cap indexes leading the way, or even one where neither does – in which their net changes and the ratio itself could remain the same.

# Historical and Intra-day Dollar -Weighted Spread Ratio Chart

(S&P MidCap 400 price x \$100) / (S&P SmallCap 600 price x 100)



### Intra-day Dollar Weighted Ratio Chart

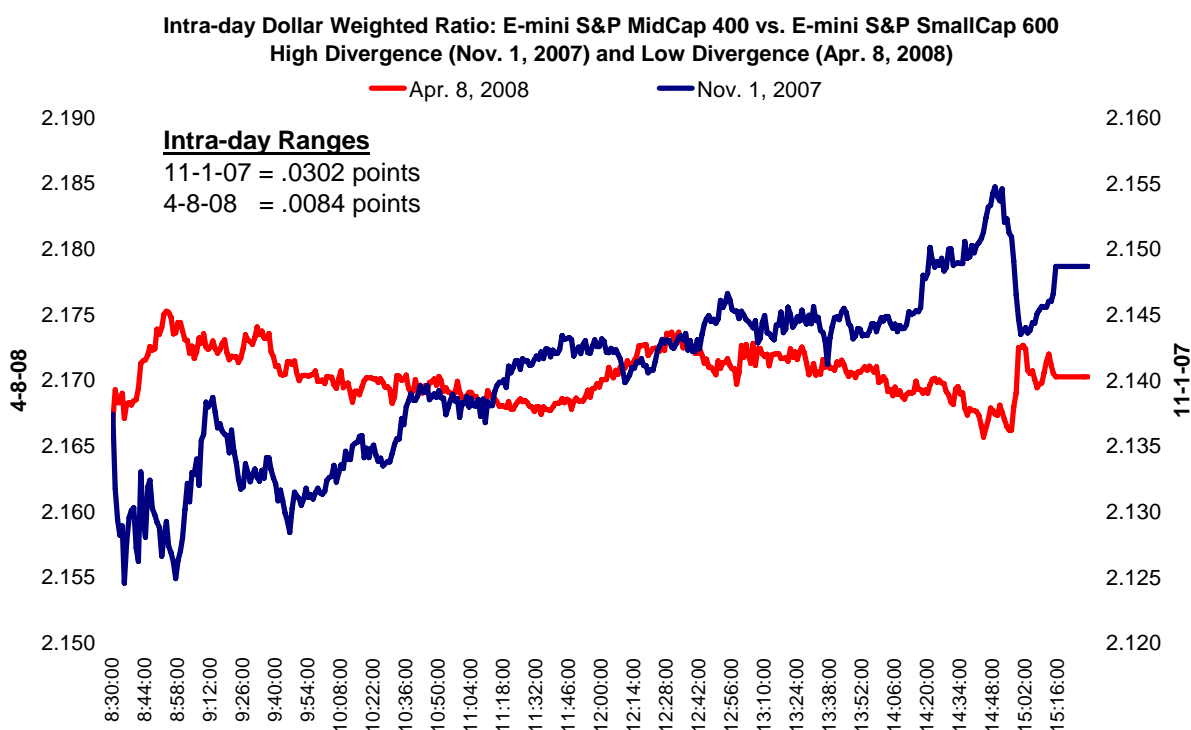
The chart below illustrates the spread ratio on an intraday basis. November 1, 2007, was chosen as a high divergence day and April 8, 2008, was chosen as a low divergence day. Other days could have been easily selected as there are scores of each example.

November 1, 2007

S&P MidCap 400	-2.191%
S&P SmallCap 600	-4.121%
<b>Difference</b>	<b>1.929%</b>

April 8, 2008

S&P MidCap 400	-0.077%
S&P SmallCap 600	-0.098%
<b>Difference</b>	<b>0.021%</b>





## Calculating the Spread's P+L - Trading Examples

### E-mini S&P MidCap 400 vs. E-mini S&P SmallCap 600

#### Trade Example - Selling the Spread Day Trade - January 25, 2008

<b>S&amp;P MidCap 400</b>			<b>1x2</b>
	9:46:00 AM	Sell 1	785.30
	9:56:00 AM	Buy 1	783.90
Net			<b>\$140.00</b>

<b>S&amp;P SmallCap 600</b>			
	9:46:00 AM	Buy 2	366.10
	9:56:00 AM	Sell 2	366.40
Net			<b>\$60.00</b>

**NET P+L** **\$200.00**

<b>Ratio Spread Level</b>			
	9:46:00 AM	<b>Sell</b>	<b>2.1450</b>
	9:56:00 AM	<b>Buy</b>	<b>2.1395</b>

---

#### Trade Example - Buying the Spread Day Trade - January 25, 2008

<b>S&amp;P MidCap 400</b>			<b>1x2</b>
	10:44:00 AM	Buy 1	783.40
	2:18:00 PM	Sell 1	776.50
Net			<b>-\$690.00</b>

<b>S&amp;P SmallCap 600</b>			
	10:44:00 AM	Sell 2	367.10
	2:18:00 PM	Buy 2	361.50
Net			<b>\$1,120.00</b>

**NET P+L** **\$430.00**

<b>Ratio Spread Level</b>			
	10:44:00 AM	<b>Buy</b>	<b>2.1340</b>
	2:18:00 PM	<b>Sell</b>	<b>2.1480</b>

### **Spread Margin Requirements**

Initial margin requirements for U.S. stock index futures have often been in the range of 5 - 7 percent of the underlying notional value of the contract. Margin requirements can and will be increased if market conditions warrant such a decision.

CME Clearing offers “**spread credits**” for spread trades between similar products. These spread credits can have a dramatic impact on the initial margin requirements for highly correlated spread such as the S&P MidCap 400 vs. the S&P SmallCap 600.

Currently, CME Group offers a spread credit rate of 80 percent for the S&P MidCap 400 vs. the S&P SmallCap 600 spread. That means that the margins for a spread would only be 20 percent of the normal outright initial margins.

The spread credit for the E-mini S&P MidCap 400 vs. the E-mini S&P SmallCap 600 applies a standard spread ratio of 1:2 (one contract of E-mini S&P MidCap 400 vs. two contracts of E-mini S&P Small Cap 600).

### **Fractional Spreads**

CME Clearing will calculate spread credits based on whole and fractional spreads. For example, the standard ratio for margin purposes is 1:2 (one contract of E-mini S&P MidCap 400 vs. two contracts of E-mini S&P SmallCap 600). So, spread quantities based exactly on the 1:2 ratio (i.e., 2 x 4, 10 x 20 and so on) will enjoy the full 80 percent spread credit.

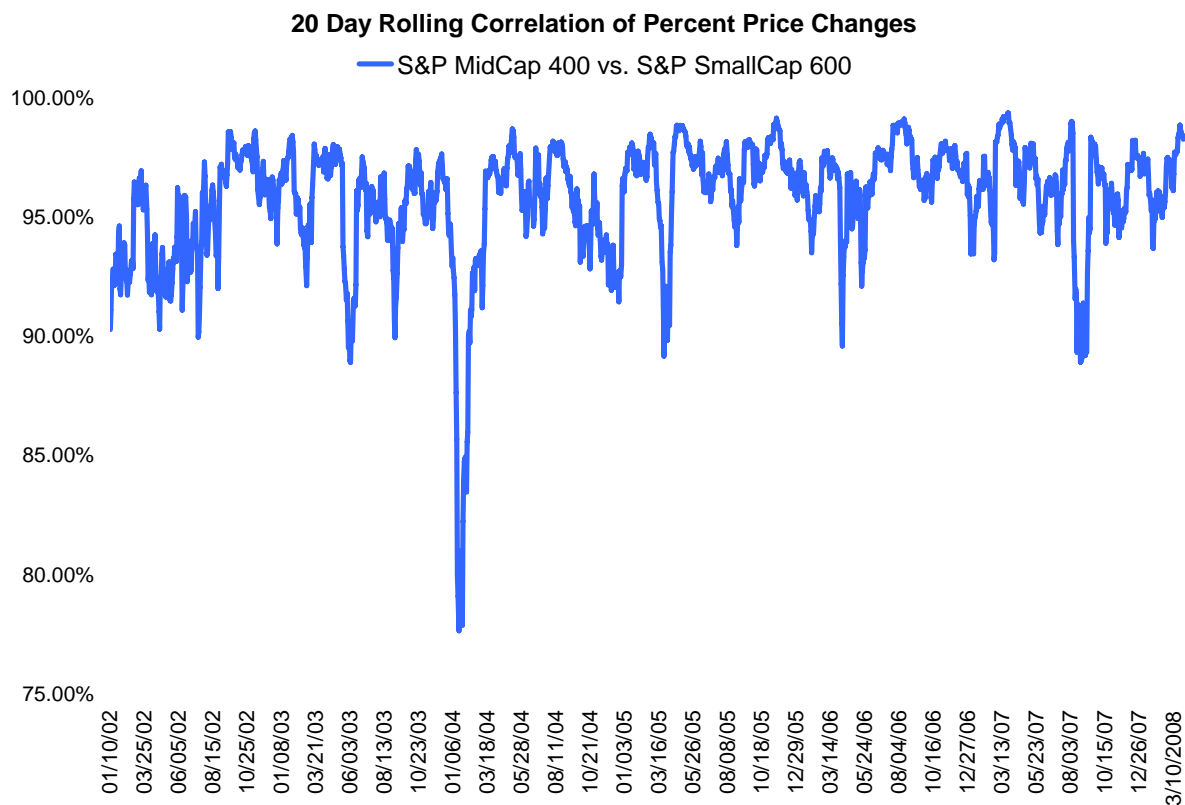
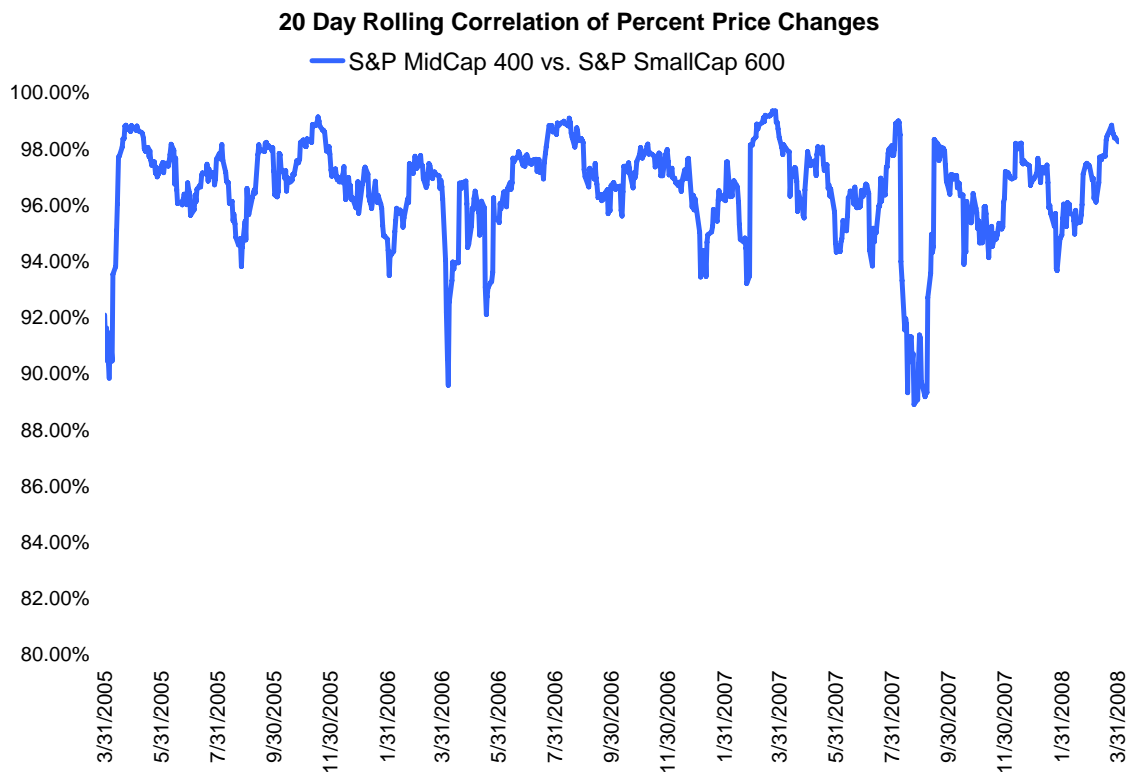
Spread ratios that are not exactly on a 1:2 ratio will receive spread credits at an effective rate of less than 80 percent, as all of the spread that qualifies for the 1:2 rate will be margined at the 80 percent credit, while the remaining fractional quantities will be margined at a combination of the 80 percent credit rate and the normal outright margin rate.

**Margin Example: E-mini S&P MidCap 400 futures and the E-mini S&P SmallCap 600 futures**

**Standard Ratio - 1 E-mini S&P MidCap 400 vs. 2 E-mini S&P SmallCap 600**

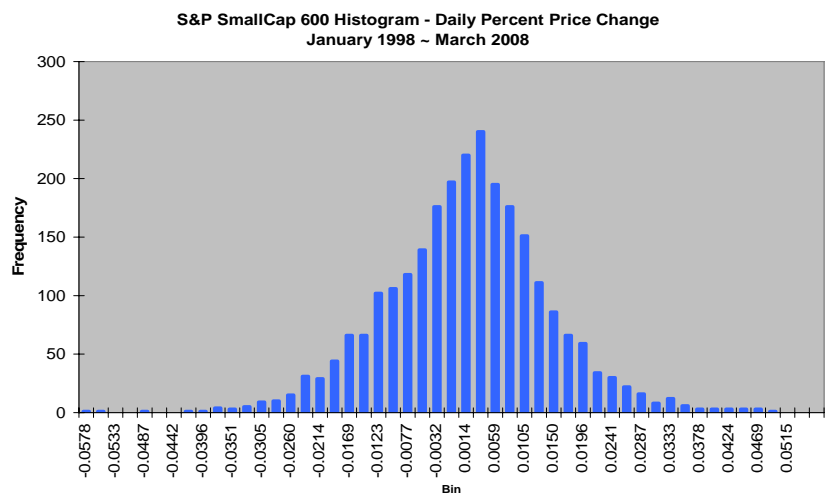
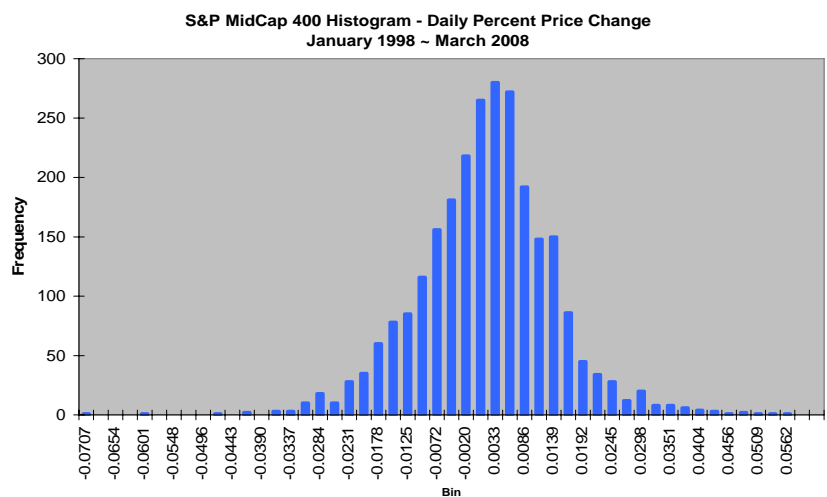
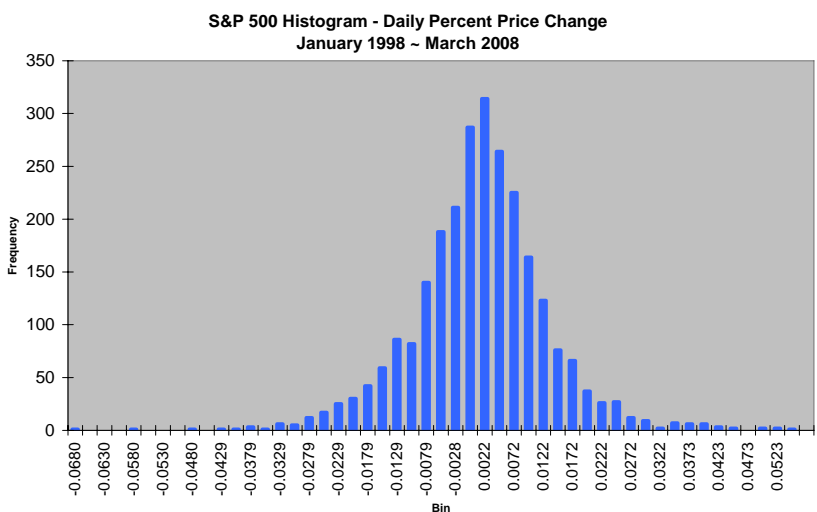
<b>Initial Margins</b>		<b>Outright Margin</b>	
E-mini S&P MidCap 400		4,000	
E-mini S&P SmallCap 600		2,250	
<b>Total</b>		<b>6,250</b>	
<b>Spread Credit</b>		<b>80% Spread Credit</b>	
E-mini S&P MidCap 400		800	(4000*.20)
E-mini S&P SmallCap 600		450	(2250*.20)
<b>Total</b>		<b>1,250</b>	
<b>Spread with 1:2 Ratio</b>		<b>Outright Margin</b>	
Long 1 E-mini S&P MidCap 400		4,000	(1*4000)
Short 2 E-mini S&P SmallCap 600		4,500	(2*2250)
<b>Total</b>		<b>\$8,500</b>	
<b>Spread Credit</b>		<b>80% Spread Credit</b>	
Long 1 E-mini S&P MidCap 400		800	(1*800)
Short 2 E-mini S&P SmallCap 600		900	(2*450)
<b>Net Margin Due</b>		<b>\$1,700</b>	
<b>Net Margin Savings</b>		<b>\$6,800</b>	

## Index Correlations

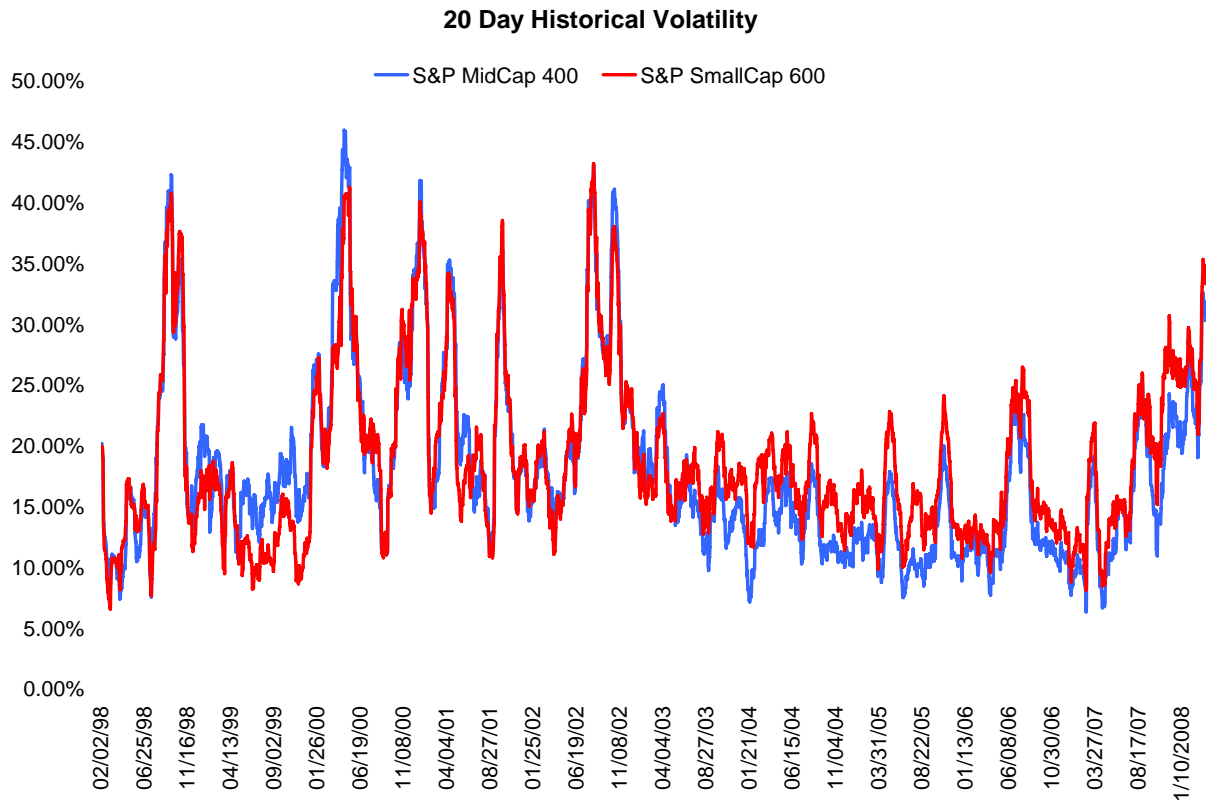
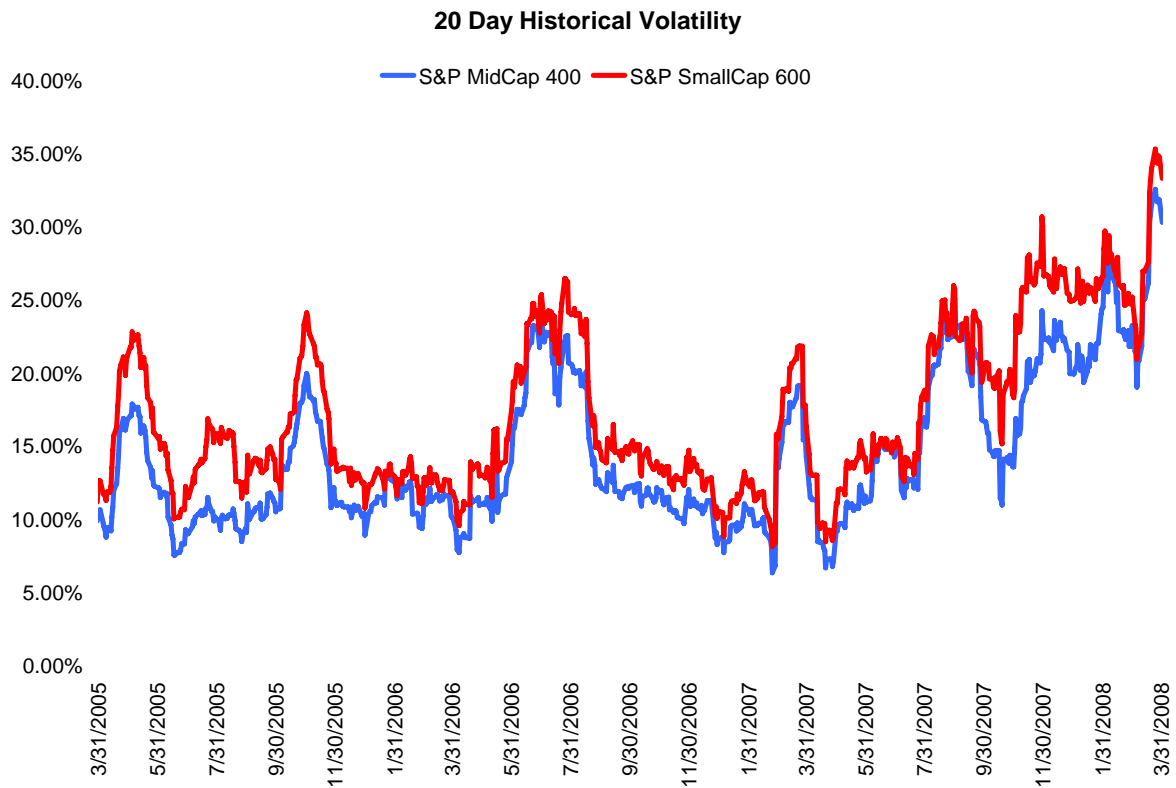


## Price Change Distribution

The following charts illustrate the distribution of daily percentage price returns for the S&P MidCap 400 and S&P SmallCap 600 (with S&P 500 for comparison).



## Historical Volatilities



## **Appendix**

Contract Specifications

Average Daily Volumes

Liquidity and Hourly Analysis

Index Calculations

Stock Index Futures Fair Values

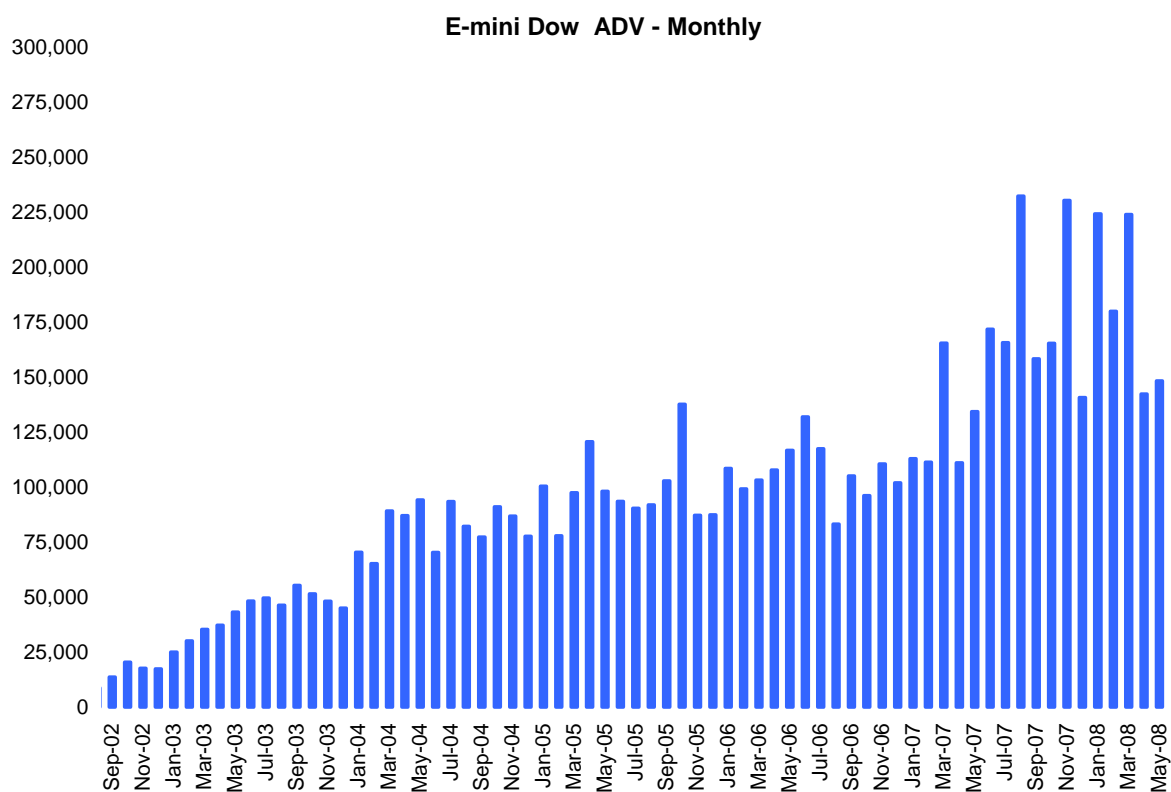
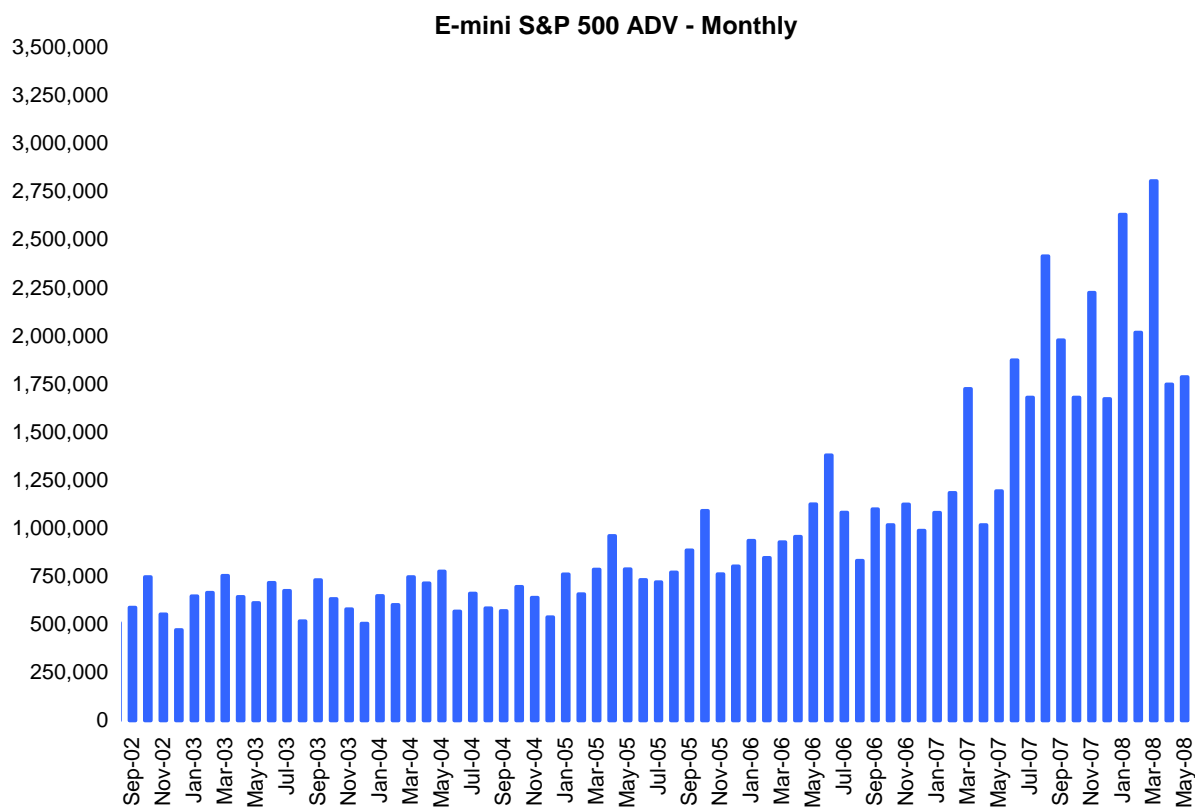
Equity Price Limit Guide

## Contract Specifications

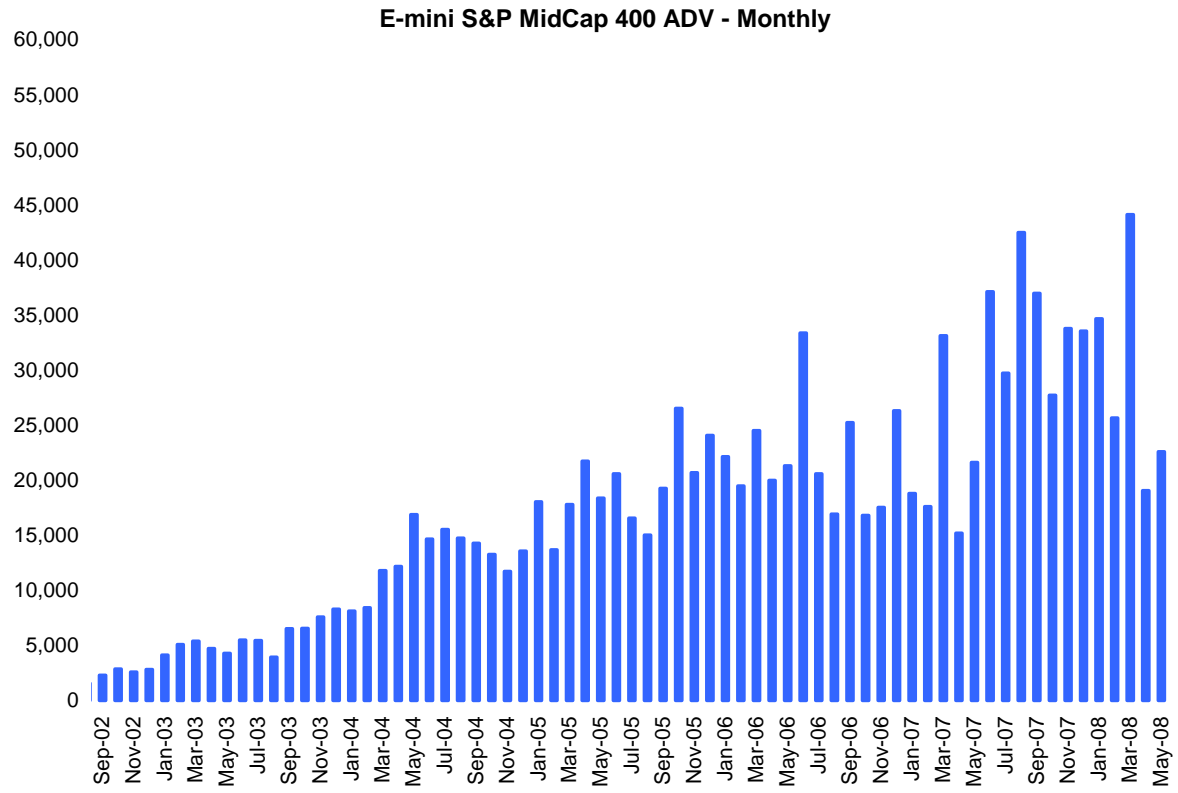
CME E-mini S&P 500 Futures		CME E-mini Dow Futures	
Trade Unit	\$50 times the Standard & Poor's 500 Stock Index	Trade Unit	\$5 times the Dow Jones Industrial Average
Contract Listing	Five months in the March Quarterly Cycle.	Contract Listing	Four months in the March Quarterly Cycle.
Product Code	Clearing=ES ; Ticker= ES	Product Code	Clearing=YM ; Ticker=YM
Trading Venue: CME® Globex®		Trading Venue: CME® Globex®	
Hours	Mon/Thurs 5:00 p.m.-3:15 p.m. & 3:30 p.m.-4:30 p.m.; Shutdown period from 4:30 p.m. to 5:00 p.m. nightly; Sun & Holidays 5:00 p.m.-3:15 p.m. Month end(3:15 p.m.) LTD(8:30 a.m.)~~~~~ (AON FLOOR ONLY! 8:30 a.m.-3:15 p.m.)	Hours	Mon/Thurs 5:00 p.m.-3:15 p.m. & 3:30 p.m.-4:30 p.m.; Shutdown period from 4:30 p.m. to 5:00 p.m. nightly; Sun & Holidays 5:00 p.m.-3:15 p.m. Month end(3:15 p.m.) LTD(8:30 a.m.)~~~~~ (AON FLOOR ONLY! 8:30 a.m.-3:15 p.m.)
Limits	Overnight Hours: 5% (up & down) Daytime Hours: 10%, 20% and 30% limits (down only)	Limits	Overnight Hours: 5% (up & down) Daytime Hours: 10%, 20% and 30% limits (down only)
Minimum Fluctuation	Regular 0.25=\$12.50	Minimum Fluctuation	Regular 1=\$5.00
	Calendar Spread 0.05=\$2.50		Calendar Spread 1=\$5.00
CME E-mini S&P MidCap 400 Futures		CME E-mini S&P SmallCap 600 Futures	
Trade Unit	\$100 times the Standard & Poor's 400 Midcap Stock Index	Trade Unit	\$100 times the Standard & Poor's 600 Smallcap Stock Index
Contract Listing	Five months in the March Quarterly Cycle.	Contract Listing	Four months in the March Quarterly Cycle.
Product Code	Clearing=ME ; Ticker= EMD	Product Code	Clearing=SMC ; Ticker= SMC
Trading Venue: CME® Globex®		Trading Venue: CME® Globex®	
Hours	Mon/Thurs 5:00 p.m.-3:15 p.m. & 3:30 p.m.-4:30 p.m.; Shutdown period from 4:30 p.m. to 5:00 p.m. nightly; Sun & Holidays 5:00 p.m.-3:15 p.m. Month end(3:15 p.m.) LTD(8:30 a.m.)~~~~~ (AON FLOOR ONLY! 8:30 a.m.-3:15 p.m.)	Hours	Mon/Thurs 5:00 p.m.-3:15 p.m. & 3:30 p.m.-4:30 p.m.; Shutdown period from 4:30 p.m. to 5:00 p.m. nightly; Sun & Holidays 5:00 p.m.-3:15 p.m. Month end(3:15 p.m.) LTD(8:30 a.m.)~~~~~ (AON FLOOR ONLY! 8:30 a.m.-3:15 p.m.)
Limits	Overnight Hours: 5% (up & down) Daytime Hours: 10%, 20% and 30% limits (down only)	Limits	Overnight Hours: 5% (up & down) Daytime Hours: 10%, 20% and 30% limits (down only)
Minimum Fluctuation	Regular 0.10=\$10.00	Minimum Fluctuation	Regular 0.10=\$10.00
	Calendar Spread 0.05=\$5.00		Calendar Spread 0.10=\$10.00

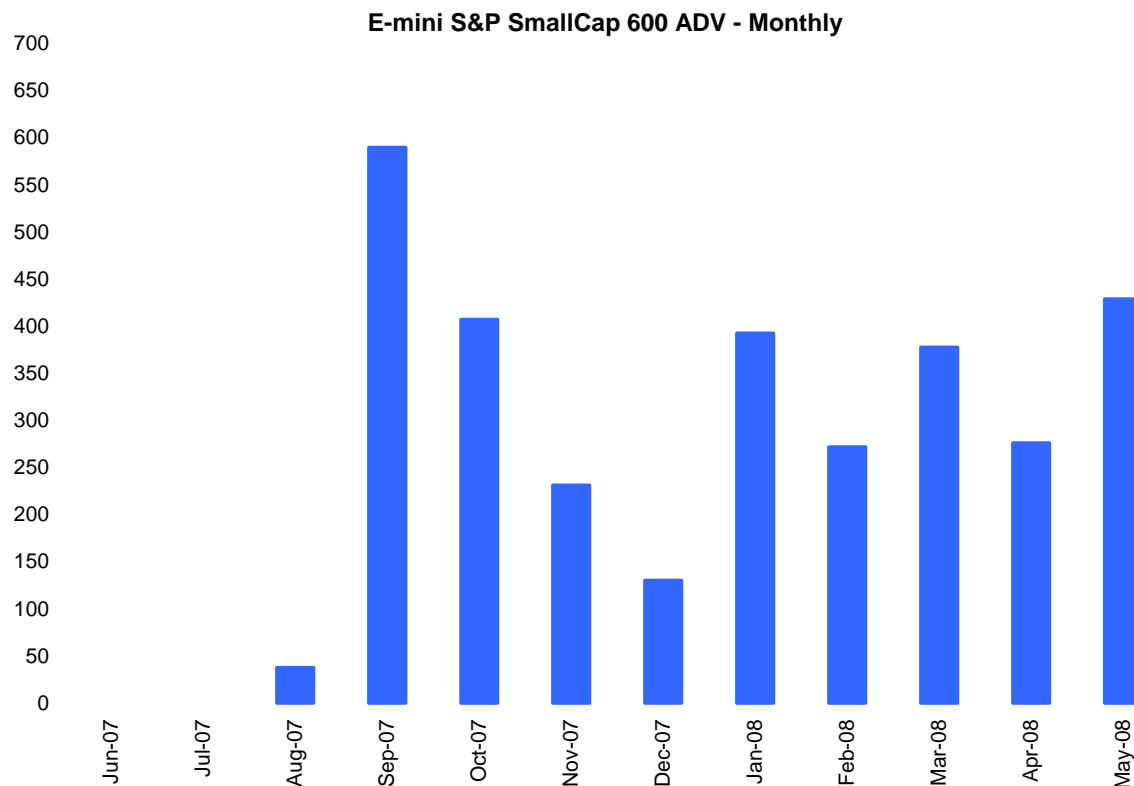


## Average Daily Volumes



## Average Daily Volumes (ADVs)



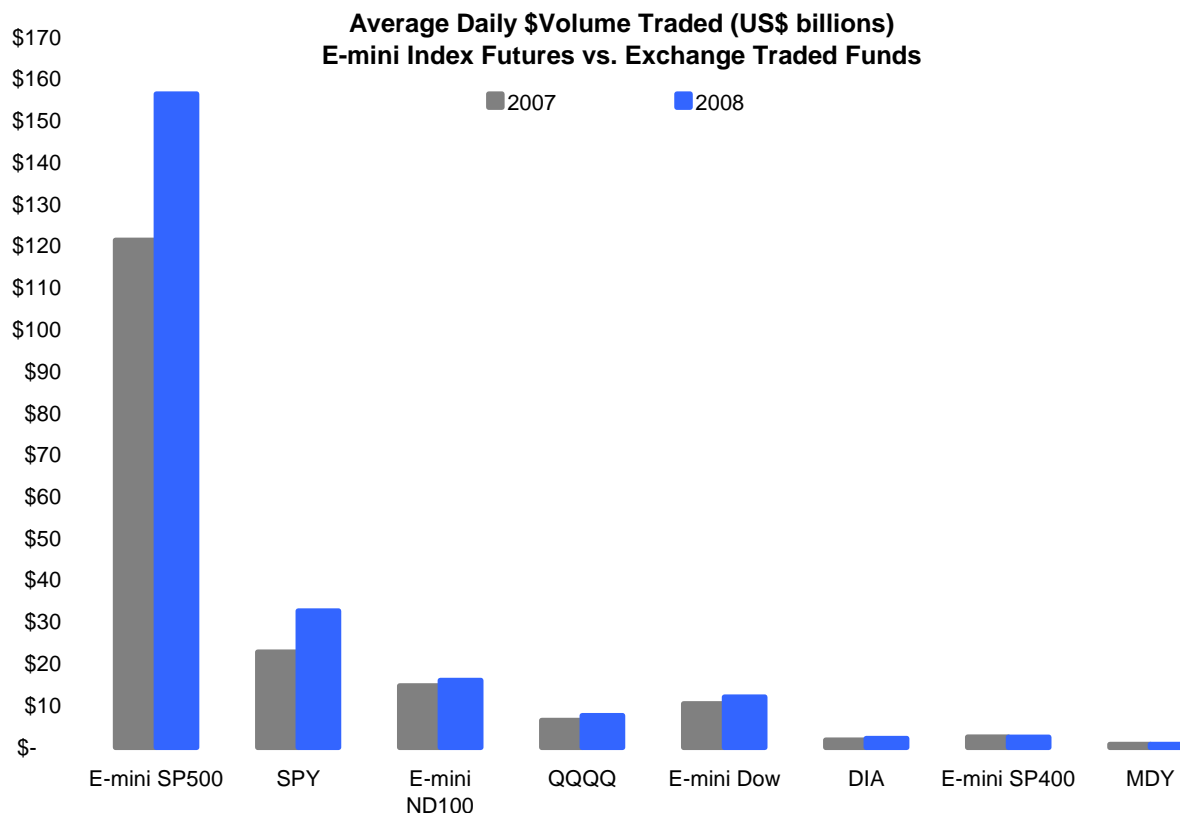


## Liquidity and Hourly Analysis

### Liquidity vs. ETFs (Exchange Traded Funds)

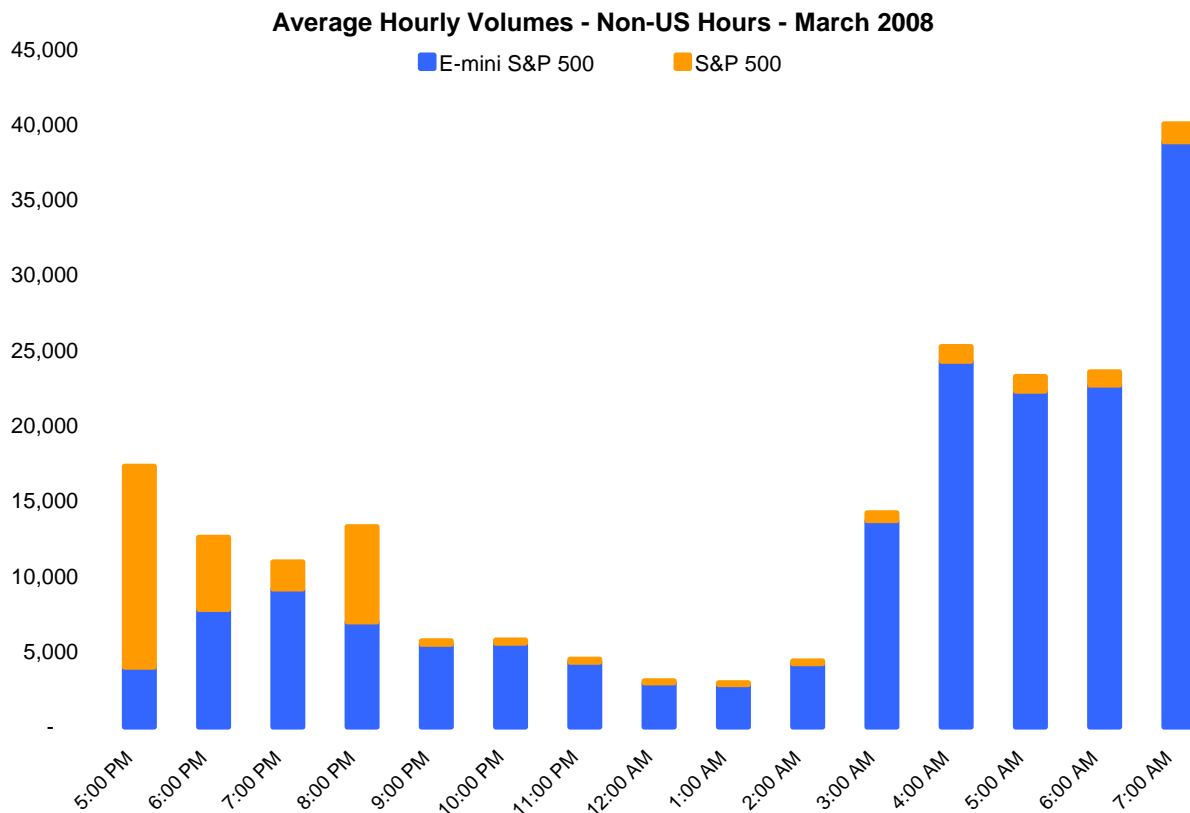
Both the E-mini S&P 500 index futures (ES) and the E-mini Dow index futures (YM) have daily average notional value traded of at least five times the comparative underlying ETF. Liquidity is therefore significantly better in the E-mini index futures than their ETF counterpart.

Additionally, E-mini index futures have a significant advantage vs. the ETF in terms of initial margin requirements. Current initial margins for E-mini S&P 500 index futures (ES) and the E-mini Dow index futures (YM) are \$4500 and \$3503 respectively, or about 6.8 percent and 5.7 percent of the underlying value. This compares to initial deposit requirements for ETFs of 50 percent (Reg T).



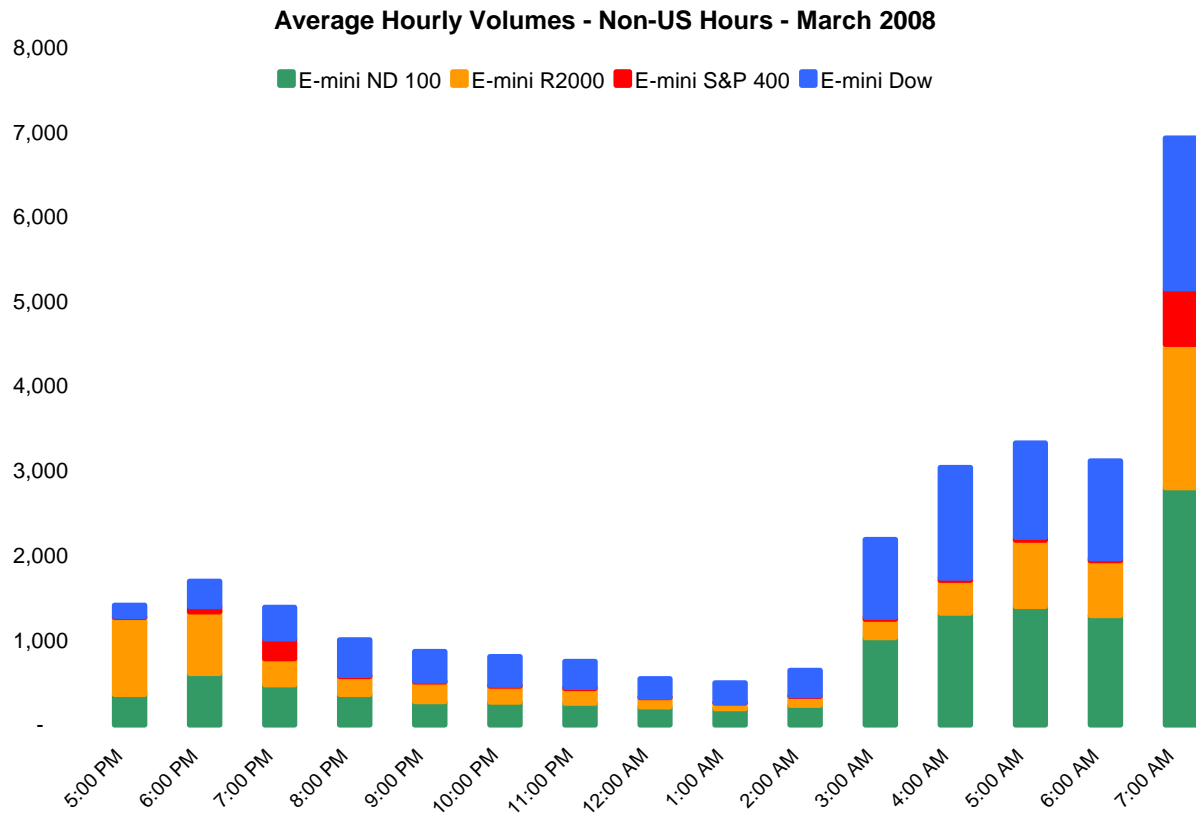
### Liquidity in Non-US Trading Hours – E-mini S&P 500

The E-mini S&P 500 index futures are very liquid even during non-U.S. standard hours. All times shown in the chart below are in Central Time. Average volume per hour increases substantially once the London day session begins at approximately 2:00 a.m. Central Time (8:00 a.m. London time). The times shown below represent the one hour period ending at that time (4:00 a.m. means the one hour period between 3:00 a.m. and 4:00 a.m.). During the 2:00 a.m. to 7:00 a.m. periods, there may be increased spreading activity between U.S. and European stock index futures.



### Liquidity in Non-US Trading Hours

Overnight liquidity patterns are similar for other stock index futures, with the E-mini Nasdaq 100 and the E-mini Dow showing the best volume levels on average. Some of the volume in these contracts can be linked to spreading activity with the E-mini S&P 500 index futures contract.



## Index Calculations

### Index Calculation – March 31, 2008

S&P 500 = Sum (S&P 500 component prices x float adjusted shares) / SPX Divisor

DJIA = Sum (DJIA component prices) / DJIA Divisor

		DJIA	S&P 500
	March 31, 2008	12,262.89	1,322.70
Symbol	Name	Last Trade	Float Adj Mkt Cap
AA	Alcoa Inc	36.06	11,510,418,587,426
AIG	American International Group Inc	43.25	Divisor
AXP	American Express Co	43.72	8,702,191,481
BA	Boeing Co	74.37	
BAC	Bank of America Corp	37.91	1,322.70
C	Citigroup Inc	21.42	Close March 31, 2008
CAT	Caterpillar Inc	78.29	
CVX	Chevron Corp	85.36	
DD	El Du Pont de Nemours & Co	46.76	
DIS	Walt Disney Co/The	31.38	
GE	General Electric Co	37.01	
GM	General Motors Corp	19.05	
HD	Home Depot Inc	27.97	
HPQ	Hewlett-Packard Co	45.66	
IBM	International Business Machines	115.14	
INTC	Intel Corp	21.18	
JNJ	Johnson & Johnson	64.87	
JPM	JPMorgan Chase & Co	42.95	
KO	Coca-Cola Co/The	60.87	
MCD	McDonald's Corp	55.77	
MMM	3M Co	79.15	
MRK	Merck & Co Inc	37.95	
MSFT	Microsoft Corp	28.38	
PFE	Pfizer Inc	20.93	
PG	Procter & Gamble Co	70.07	
T	AT&T Inc	38.30	
UTX	United Technologies Corp	68.82	
VZ	Verizon Communications Inc	36.45	
WMT	Wal-Mart Stores Inc	52.68	
XOM	Exxon Mobil Corp	84.58	
	Sum of Prices	1506.300	
	Divisor	0.122834016	
	Close March 31, 2008	12,262.89	
	Source: Bloomberg		

## Components and Ranking of the DJIA and Their Relative Positions in the S&P 500

March 31, 2008		USD CLOSE	DJIA Rank	DJIA Weight	SP500 Weight	SP500 Rank	Weight Diff
IBM	IBM	115.14	1	7.64%	1.39%	9	6.25%
Chevron Corp	CVX	85.36	2	5.67%	1.54%	7	4.13%
Exxon Mobil Corp	XOM	84.58	3	5.62%	3.93%	1	1.69%
3M Co	MMM	79.15	4	5.25%	0.49%	41	4.77%
Caterpillar Inc	CAT	78.29	5	5.20%	0.42%	51	4.77%
Boeing Co	BA	74.37	6	4.94%	0.49%	40	4.44%
Procter & Gamble Co	PG	70.07	7	4.65%	1.87%	5	2.78%
United Technologies	UTX	68.82	8	4.57%	0.59%	31	3.98%
Johnson & Johnson	JNJ	64.87	9	4.31%	1.60%	6	2.71%
Coca-Cola Co	KO	60.87	10	4.04%	1.06%	16	2.98%
McDonald's Corp	MCD	55.77	11	3.70%	0.56%	34	3.14%
Wal-Mart Stores Inc	WMT	52.68	12	3.50%	1.08%	14	2.42%
El Du Pont	DD	46.76	13	3.10%	0.37%	65	2.74%
Hewlett-Packard Co	HPQ	45.66	14	3.03%	0.98%	19	2.05%
American Express Co	AXP	43.72	15	2.90%	0.44%	48	2.46%
AIG	AIG	43.25	16	2.87%	0.95%	21	1.92%
JPMorgan Chase & Co	JPM	42.95	17	2.85%	1.27%	10	1.58%
AT&T Inc	T	38.30	18	2.54%	2.01%	3	0.53%
Merck & Co Inc	MRK	37.95	19	2.52%	0.71%	28	1.81%
Bank of America Corp	BAC	37.91	20	2.52%	1.46%	8	1.05%
General Electric	GE	37.01	21	2.46%	3.21%	2	-0.75%
Verizon	VZ	36.45	22	2.42%	0.91%	23	1.51%
Alcoa Inc	AA	36.06	23	2.39%	0.26%	96	2.14%
Walt Disney	DIS	31.38	24	2.08%	0.51%	37	1.57%
Microsoft Corp	MSFT	28.38	25	1.88%	1.97%	4	-0.09%
Home Depot Inc	HD	27.97	26	1.86%	0.41%	55	1.45%
Citigroup Inc	C	21.42	27	1.42%	0.97%	20	0.45%
Intel Corp	INTC	21.18	28	1.41%	1.07%	15	0.34%
Pfizer Inc	PFE	20.93	29	1.39%	1.23%	12	0.16%
General Motors Corp	GM	19.05	30	1.26%	0.09%	252	1.17%
<b>Total Index Weight</b>				<b>100.00%</b>	<b>33.83%</b>		

On March 31, 2007 the 30 stocks listed above accounted for 100.00 percent of the DJIA and 33.83 percent of the S&P 500.

The following five stocks had weighting discrepancies of at least 400bp on March 31, 2008: IBM, Boeing, 3M, Chevron and Caterpillar.



## Stock Index Futures Fair Value

### Calculating Index Futures Fair Value

Stock index futures fair value (FV) levels are calculated using the following inputs:

- Cash index level
- Days to futures expiration
- Applicable short term interest rate
- Estimated dividends to be paid up to futures expiration

There is more than one variation on the fair value formula, but the results will be very similar. However, one of the most important factors which determine the results for FV calculations is the estimated dividends to expiration. Whether you estimate your own dividends to expiration or simply get them from one of the financial services, it is possible that the various sources will have slightly different estimates for dividends remaining. These differences will likely be extremely small, but they do illustrate how different sources may have different FV estimates.

Additionally, the short term interest rate being used will also have a slight impact on the FV estimate. For example, using the numbers below for the S&P 500 – setting the interest rate at 4.00 percent produces a theoretical futures price of 1421.36. By changing the interest rate slightly to 4.10 percent, the theoretical futures price increases to 1421.63.

### Fair Value Examples

Fair Value = cash index x {1+r(x/360)} - Div

R = applicable short term interest rate

X = Days until expiration

Div = Estimated dividends to be paid up to expiration

### E-mini S&P 500

Trade Date:	January 15, 2008
Days to Expiration:	68
Cash Index:	1416.25
Dividends to Expiration:	5.59
Interest Rate:	4.00%
Theoretical Fair Value Spread:	5.11
Theoretical Futures Price:	1421.36

### E-mini Dow

Trade Date:	January 15, 2008
Days to Expiration:	68
Cash Index:	12778.15
Dividends to Expiration:	62.13
Interest Rate:	4.00%
Theoretical Fair Value Spread:	34.42
Theoretical Futures Price:	12812.57

## Equity Price Limit Guide

### CME Group U.S. Equity Index Futures Daily Price Limits Price Limits for 2<sup>nd</sup> Quarter 2008

Contracts	Overnight Hours (5% up or down)	10% Limit (down only)	20% Limit (down only)	30% Limit (down only)
<b>S&amp;P 500® &amp; E-mini®</b>	65.00	130.00	260.00	390.00
<b>S&amp;P MidCap 400™ &amp; E-mini</b>	37.00	75.00	150.00	225.00
<b>S&amp;P/Citigroup Growth™</b>	30.00	60.00	120.00	180.00
<b>S&amp;P/ Citigroup Value™</b>	32.00	65.00	130.00	195.00
<b>Russell 2000® &amp; E-mini</b>	32.00	65.00	130.00	195.00
<b>NASDAQ-100® &amp; E-mini</b>	85.00	170.00	340.00	510.00
<b>E-mini NASDAQ Composite®</b>	110.00	220.00	440.00	660.00
<b>E-mini NASDAQ Biotechnology®</b>	35.00	70.00	140.00	210.00
<b>S&amp;P 500 Financial SPCTR™</b>	16.00	32.00	64.00	96.00
<b>Technology SPCTR™ (S&amp;P 500 Technology)</b>	12.00	24.00	48.00	72.00
<b>S&amp;P SmallCap 600™ &amp; E-mini</b>	18.00	36.00	72.00	108.00
<b>DJIA (\$5, \$10 and \$25 multiplier)</b>	600.00	1,200.00	2,450.00	3,650.00
<b>DJIA US Real Estate</b>	600.00	1,200	2,450.00	3,650.00

#### Limits Level:

*RULES for S&P 500, E-mini S&P 500, Nasdaq 100, E-mini Nasdaq 100, E-mini Nasdaq Biotechnology, E-mini Nasdaq Composite, S&P MidCap 400, E-mini S&P MidCap 400, S&P SmallCap 600, E-mini S&P SmallCap 600, Russell 2000, E-mini Russell 2000, S&P 500/Citigroup Growth, S&P 500/Citigroup Value, DJIA (\$5, 10 and \$25 multiplier), DJIA US Real Estate and SPCTR futures*

- 10% Down only. Once a limit offer has been established, trading can occur at or above this limit for 10 minutes. Trading will halt for two minutes if the primary futures is limit offer at the end of the 10 minutes. Trading will resume with the 20% limit in effect.
- 20% Down only. Once a limit offer has been established, trading can occur at or above this limit for 10 minutes. Trading will halt for two minutes if the primary futures is limit offer at the end of the 10 minutes. Trading will resume with the 30% limit in effect.
- 30% Down only. Limit shall be effect during all regular trading hours (RTH).
- 5% Up or down. CME Group overnight hours price limit. If the market is limit bid or limit offered during a period commencing two minutes prior to the opening of Regular Trading Hours (RTH). Once RTH commences, the next applicable trading limit shall be in effect.

If either a trading halt was in effect or the primary futures contract was locked at a limit at the close of trading, then the opening time of trading on CME Globex shall be delayed until 6:00 p.m.

**Trading Halts:** If there is a halt declared in the primary securities market due to NYSE Rule 80B, trading will halt in all domestic stock index futures and options, whether a limit has been hit or

not. Trading will resume in CME Group domestic stock index contracts when the primary securities market reopens for trading. Once CME Group markets have reopened, the next applicable limit will be in effect.

Daily Price Limits for all U.S. Equity Index Futures are tied to movements in E-mini contracts as opposed to standard contracts.

**DJIA % Declines:**

- 10% If the DJIA declines 10% prior to 1:00 p.m. CT, the NYSE will declare a one-hour trading halt. If the DJIA decline 10% between 1:00 p.m. and 1:30 p.m. CT, the NYSE will declare a half-hour trading halt. After 1:30 p.m. CT, the 10% limit is not in effect.
- 20% If the DJIA declines 20% prior to 12:00 p.m. CT, the NYSE will declare a two-hour trading halt. If the DJIA declines 20% after 1:00 p.m. CT, the NYSE will declare a trading halt and will no reopen.
- 30% If the DJIA declines 30%, the NYSE will declare a trading halt and will not reopen.

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