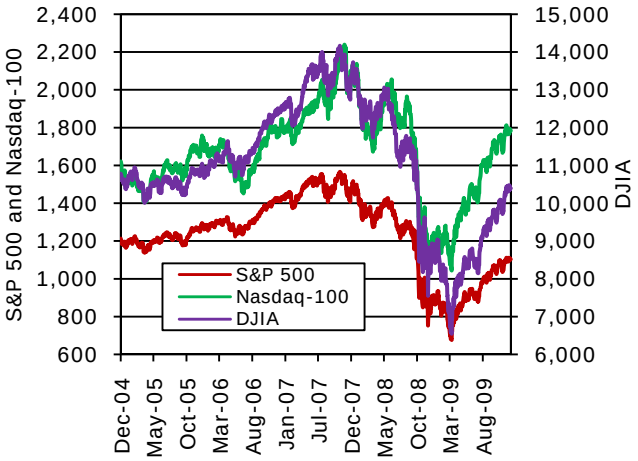
Spreading U.S. and Asian Stock Indexes

The process of globalization and electronic trading allows many securities dealers to operate virtually around the clock, passing their books from the Asian to the European to the American time zones as the clock ticks by. Likewise, equity asset managers often strategically rotate investments from one national equity market to the next. The purpose of this piece is to examine the relationship between U.S. and some of the most significant Asian stock markets in Hong Kong, Korea, Peoples Republic of China (China), Taiwan, India and Japan.

Major U.S. Stock Indexes

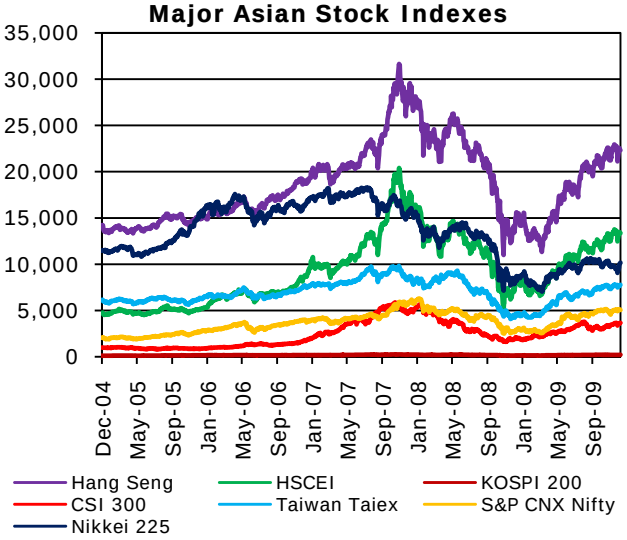


Stock Index Futures - CME Group offers active futures contracts on a number of macro U.S. indexes including the S&P 500, Nasdaq-100 and the Dow Jones Industrial Average (DJIA).

Likewise, Asian exchanges list futures on benchmark Asian indexes including the Hang Seng Index and Hang Sang China Enterprise Index (HSCEI) listed on the Hong Kong Exchange (HKEx); CSI 300 Index which soon will be listed on the China Financial Futures Exchange (CFFEX); KOSPI 200 futures and options available on the Korean Exchange (KRX); S&P CNX Nifty futures on the National Stock Exchange of India (NSE); the Taiwan Taiex Index listed on the Taiwan Stock Exchange (TSE); and, the Nikkei 225 listed on the Osaka Securities Exchange (OSE) and on CME in both US dollar (USD) and Japanese yen (JPY) denominated versions.

The characteristics of these futures contracts are summarized in the appendix to this article. The availability of these contracts makes it possible to execute and carry inter-market spreads between one continent and the other.

Major Asian Stock Indexes



Comparing Volatility – Volatility is calculated as the annualized standard deviation of logged daily price movements in a market. Asian indexes have generally been more volatile than their U.S. counterparts with some exceptions including the Taiwan Taiex index. While characteristic volatility levels vary across markets, the patterns are remarkably similar. Volatility rose to new heights in 2008 corresponding to the peak of the so-called sub-prime mortgage crisis but has since declined across all markets.

Stock Index Volatility

	2007	2008	2009	2005-09
S&P 500	15.71%	40.31%	27.70%	23.80%
Nasdaq-100	18.33%	41.54%	26.80%	25.35%
DJIA	14.29%	37.14%	24.55%	21.82%
Hang Seng	25.54%	49.64%	32.83%	30.10%
HSCEI	34.25%	63.49%	37.54%	38.61%
KOSPI 200	22.72%	38.40%	26.17%	25.67%
CSI 300	35.74%	47.03%	32.18%	33.17%
Taiwan Taiex	20.48%	32.98%	24.48%	22.52%
S&P CNX Nifty	24.83%	44.10%	33.74%	30.60%
Nikkei 225	17.94%	44.97%	27.57%	27.07%

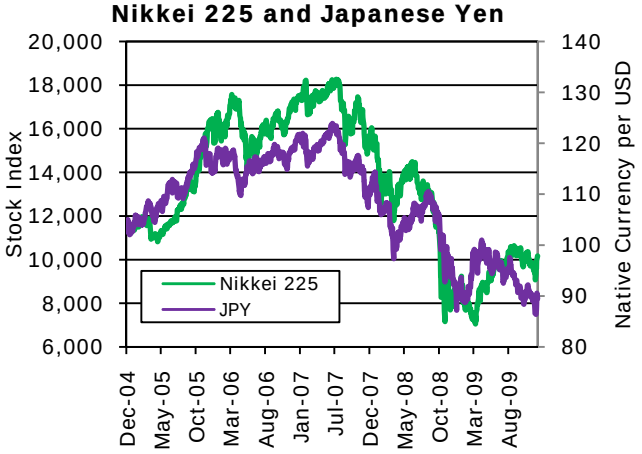
Correlations – There is generally positive correlation between movements of major U.S. and Asian stock indexes. As shown in our appendix, correlations amongst the 3 U.S. indexes are high, ranging from 0.8842 between the DJIA and Nasdaq-100 to a 0.9779 correlation between the S&P 500 and DJIA, suggesting that one index is a reasonable proxy for the other. (These figures are calculated using week-to-week changes in the spot index values from 2005 into early December 2009. Note

that closing times of U.S. and Asian markets are not synchronized, which may reduce the correlations.)

Correlations fall when comparing U.S. indexes to Asian stock indexes. Focusing on the S&P 500, the highest correlation amongst the Asian indexes is observed with respect to the Nikkei 225 with a 0.7011 correlation. This might be explained by observing that U.S. and Japanese economies are more similarly evolved than perhaps other Asian economies.

Correlations between the S&P 500 and other Asian indexes tend to fall in the 0.5000-0.6000 vicinity with the exception of the CSI where there was a scant 0.0538 correlation. Perhaps this can be explained by the fact that the Chinese economy is evolving at a much faster rate than practically any other economy worldwide.

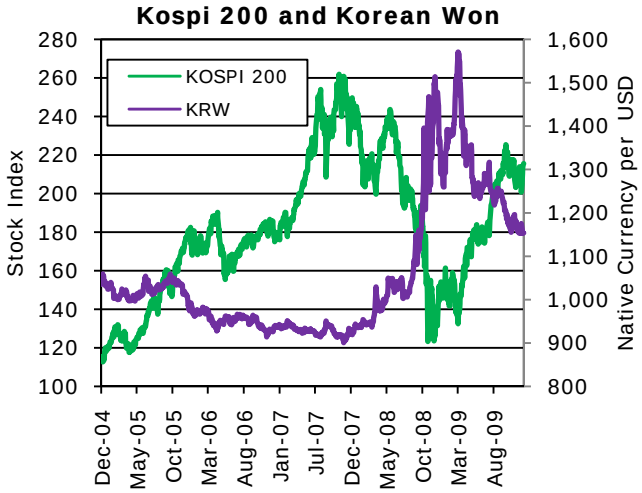
The relationship between an investment in U.S. stocks and an investment in Asian stock markets is also affected by exchange rates. Thus, we translated our stock indexes into the U.S. dollar (USD). Correlations, when translated into USD and shown in our appendix, do not change much from correlations derived using only spot index values.



This is no surprise with HKD and CNY denominated indexes where the currency remains pegged to USD. Thus, correlations between the S&P 500 and the Hang Seng, HSCI and CSI 300 are virtually unchanged when all values are translated into USD. The only notable exception is found with respect to the correlation between the S&P 500 and the Nikkei 225 which drops from 0.7011 to 0.6120 when translating the indexes into a common currency.
That might be explained by the negative correlation between movements in the Nikkei 225 and the JPY/USD exchange rate. Both series tend to rally and fall in reasonably close lockstep.

Note that because we are quoting in JPY per 1 U.S. dollar, the yen is strengthening (weakening) when the quote declines (advances). This might be explained by the fact that the Japanese economy has historically been driven by export power. A strong yen translates into a weaker economy and vice versa.

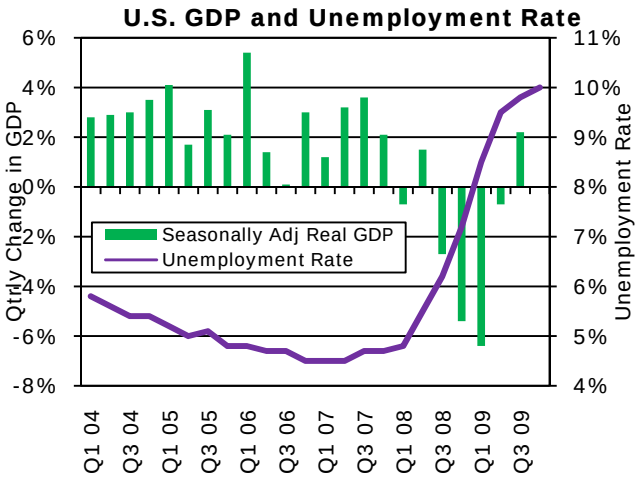
By contrast, there is a generally positive correlation between other Asian currencies and their national stock markets including Korea, Taiwan and India. Note, for example, that the Korean stock market has rallies on Korean won strength and vice versa.



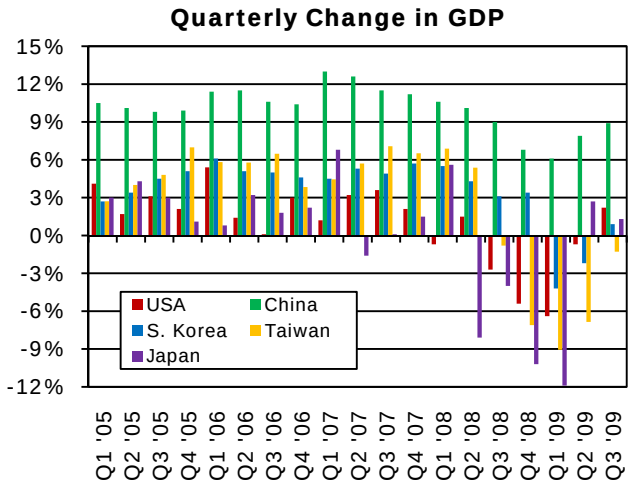
Equity Market Drivers – The fundamental drivers of these markets are found in basic economic conditions. Let's try to correlate U.S. economic circumstances with stock market movements over recent years.

The U.S. experienced solid growth between 2002 and 2007 when the so-called sub-prime mortgage crisis began to unfold. The U.S. housing bubble began to burst by mid 2006 as home values plummeted with the S&P/Case-Shiller Home Price Composite Index of 10 U.S. cities down approximately 30% from its peak. Mortgage delinquencies and foreclosures rose to unprecedented levels and activity in the housing market ground down to a halt. Mortgage investors, often involved in complex, levered and generally illiquid structures including SIVs and CDOs saw the value of these investments decline quickly. Faced with the need to raise capital, many of these investors including levered asset managers turned to

the equity markets as a source of liquidity. The result was a 37% decline in the value of the S&P 500 in 2008.



Distressed conditions on Wall Street quickly filtered onto Main Street. U.S. GDP fell 6.4% in the 1st quarter 2009. U.S. unemployment soared to 10.2% by October 2009. Since those low points, however, conditions have begun to improve with 3rd quarter 2009 GDP at 2.2%. Unemployment remains high, but has backed off to 10.0%. Stock markets are often regarded as a leading indicator of economic events and have been rallying impressively since the lows of spring 2009.



U.S. and Asian economies have all experienced economic reverses. Japanese and Taiwanese GDPs have fared worse than U.S. GDP, declining by 1.9% and 9.1%, respectively, during the Q1 2009. While many Asian economies depend on export activity, Japan may be more dependent than most and continues to carry a large bad debt overhang. Tawian economy has been dynamic but Taiwanese capitalists are more likely than not to outsource production to other locations notably China. South Korea and China have been much more resilient. During the 1st quarter 2009, the South Korean and Chinese economies experienced GDP growth of -4.1% and +6.1%, respectively. The Chinese economy has continued to grow at a torrid pace throughout the crisis by all measures.

Spread Ratio – Because spreads between U.S. and Asian stock index futures are driven by basic economic conditions, you can take a position in stock index futures spreads to capitalize. Placement of a spread requires to one to derive the appropriate ratio of Hang Seng relative to E-mini S&P 500 futures to equalize the monetary value of the positions held on both legs of the spread. The following formula may be used for this purpose.

$$\text{Spread Ratio} = \text{Value}_{\text{Hang Seng futures}} \div \text{Value}_{\text{S\&P futures}}$$

E.g., on December 31, 2004, the Hang Seng index was quoted at 14,230.14 with the HKD/USD rate at 7.7726 Hong Kong dollars per U.S. dollar. Thus, the Hang Seng futures contract was valued at $91,540 [= (HKD 50 x 14,230.14) ÷ 7.7726]. The S&P 500 index was quoted at 1,211.92 and E-mini S&P 500 futures were valued at $60,596 (=$50 x 1,211.92).

$$\begin{aligned} \text{Spread Ratio} &= \text{Value}_{\text{Hang Seng futures}} \div \text{Value}_{\text{S\&P futures}} \\ &= \$91{,}540 \div \$60{,}596 \\ &= 1.51 \\ \text{or} \quad & 2 \text{ Hang Seng} : 3 \text{ S\&P 500 futures} \end{aligned}$$

Because Hang Seng futures are valued at roughly 50% more than an E-mini S&P 500 futures contract, one might balance the spread by using more S&P futures. Thus, you might have bought (sold) 2 Hang Seng futures; and, sold (bought) 3 E-mini S&P 500 futures. Applying similar logic, one might place a spread in the ratio of 1-for-1 in KOSPI 200 vs. E-mini S&P 500 futures; or, a ratio of 3-for-2 in Taiwan Taiex vs. E-mini S&P 500 futures.

Fluctuating Spread Ratios – Spread ratios change as a function of the fluctuating values of the two futures contracts. The appropriate ratio between Hang Seng vs. E-mini S&P 500 futures was 1.51 (or 2-to-3 Hang Seng to S&P futures) in December 2004. But the ratio changed to 2.62 (or 2-to-5 Hang Seng to S&P futures) by December 2009. Similarly, one might recommend a 3-to-5 ratio of

KOSPI 200 to S&P 500 futures; or, 1-to-1 ratio of Taiwan Taiex to S&P 500 futures by December 2009.

Fluctuating Spread Ratios

	Hang Seng vs. S&P 500	KOSPI 200 vs. S&P 500	Taiwan Taiex vs. S&P 500
12/31/04	1.51	0.92	0.64
12/30/05	1.54	1.41	0.64
12/29/06	1.81	1.41	0.68
12/28/07	2.37	1.74	0.70
12/26/08	2.10	1.29	0.61
12/04/09	2.62	1.68	0.86

Fundamental Driven Strategy - The value of these spreads, based upon December 2004 ratios, is shown in our graphic. Note that it has generally been more profitable to be long these spreads, *i.e.,* long Asian indexes and short the U.S. based S&P 500 over the past five years.

Spreading Asian Indexes & S&P 500

That is explained insofar as Asian economies have generally been more expansive than the U.S. economy. But this changed during the recent financial crisis. All stock indexes experienced setbacks of varying severity during 2008 at the height of the crisis before resuming a generally upwards climb by the 2nd quarter of 2009.

Although the crisis started in the U.S., the USD and USD denominated investments were regarded as a safe haven. Thus, the USD generally advanced vs. Asian currencies during the crisis while the S&P 500 tended to outperform Asian stock markets with some exceptions on the way down. Thus, one might buy Asian indexes and sell U.S. indexes during periods of growth. During periods of contraction or economic distress, one might sell Asian indexes and buy U.S. indexes.

For example … in May 2008, the financial crisis was well under way. Thus, one might have sold Hang Seng futures and bought S&P 500 futures. The spread ratio as of May 2, 2008 was 2.38 implying that one should sell 2 Hang Seng futures and buy 5 E-mini S&P 500 futures. This strategy might have generated a $37,502 profit as seen in our table.

	Sep-08 Hang Seng Futures	Sep-08 E-mini S&P 500 futures
5/2/08	Sell 2 @ 26,120 = $335,108	Buy 5 @ 1,417.50 = $354,375
8/15/08	Buy 2 @ 20,951 = $268,169	Sell 5 @ 1,299.75 = $324,937
	Profit of $66,939	Loss of $29,437
	Net Profit of $37,502	

By December 2008, we were past the height of the crisis and while the U.S. stock market was still slipping, many Asian equity markets were rebounding. Thus, one might have bought 1 Mar-09 KOSPI futures contract at 133.00 and sold 1 Mar-09 E-mini S&P 500 futures at 871.50 on December 5, 2008. This strategy might have generated a profit on both sides of the spread for a net $14,435 gain.

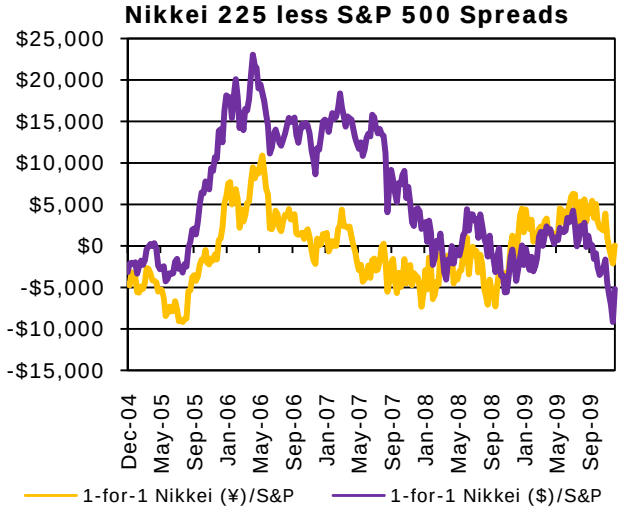
	Mar-09 KOSPI 200 Futures	Mar-09 E-mini S&P 500 futures
12/5/08	Buy 1 @ 133.00 = $43,575	Sell 1 @ 871.50 = $43,575
2/13/09	Sell 1 @ 155.70 = $55,435	Buy 1 @ 820.00 = $41,000
	Profit of $11,860	Profit of $2,575
	Net Profit of $14,435	

Nikkei 225 vs. S&P 500 – There are several Nikkei 225 futures contracts available. The OSE lists a contract valued at ¥1,000 x Index. CME Group lists both JPY and USD denominated contracts valued at ¥500 and $5 x Index, respectively. These two contracts turn in similar performance but diverge to the extent that the JPY/USD fluctuates.

From early 2005 through mid 2007, the value of the JPY was in a general decline vs. the USD. Thus, one might have been happier holding USD denominated Nikkei futures. Subsequently, the JPY generally strengthened vs. USD and the JPY version of the contract was the stronger of the two.

Currency fluctuations may impact the Nikkei 225 vs. E-mini S&P 500 spread. Because the JPY/USD rate

is negatively correlated with the Nikkei 225, the JPY Nikkei contract tends to be more stable when translated into USD. The JPY Nikkei vs. S&P 500 spread tends to be less reactive to changing conditions than the USD Nikkei vs. S&P 500 spread.

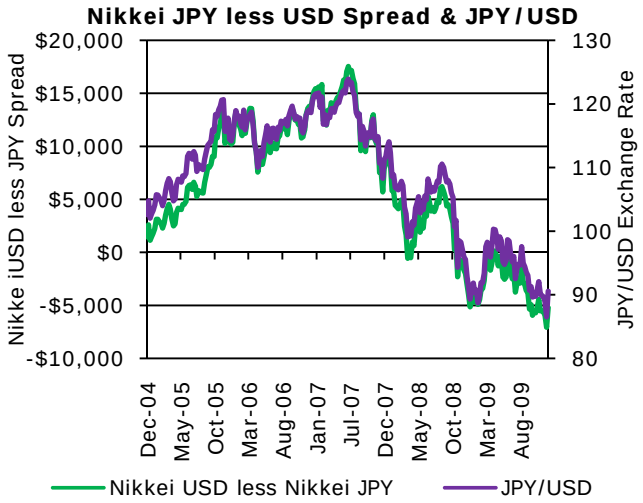


The value of these spreads has not rallied in recent months unlike other Asian index vs. S&P 500 spreads. Rather, they have been weak since mid 2006 and well before the height of the financial crisis. This may be explained by early and ongoing sluggishness of the Japanese economy.

"Correlation Trade" **-** USD and JPY denominated Nikkei 225 futures provides a unique spreading opportunity. This spread has become so popular that these two CME Group products often post nearly identical daily volumes. This is called a "correlation trade" in reference to the strong negative correlation between the Nikkei 225 index and the JPY/USD exchange rate.

JPY weakens as the quoted JPY/USD rate increases; and, strengthens as the quoted rate decreases. Or, one may say that there is a positive correlation with the USD/JPY exchange rate. *I.e.,* as the USD advances vs. JPY, U.S. consumer purchasing power for JPY denominated goods and services increases. This bolsters the export driven Japanese economy and the Nikkei 225 may advance. If the USD should decline vs. the JPY, U.S. consumer purchasing power for Japanese products diminishes, detracting from Japanese strength and the Nikkei 225 may decline.

Because of the more dynamic nature of the USD version of the contract, there is often a premium of up to 100 index points in the value of the $ Nikkei vs. ¥ Nikkei futures. Professional trading groups including hedge funds follow this relationship closely as part of their short-term correlation trading activities. This spread offers significant cross-margining efficiencies currently in the vicinity of 85%.



Conclusion – In today's electronically interlocked world economy, investors frequently rotate investment from one economy to another. U.S. and Asian stock index futures similarly may be used to spread the relative performance of one economy vs. the next. Generally, go long Asian and short U.S. equities during periods of economic expansion; go short Asian and long U.S. indexes in a contraction. These spreads may be enhanced by positively correlated exchange rate movements. An exception is the Japanese market where the JPY is negatively correlated to the Nikkei 225. Finally, one may spread the USD and JPY denominated Nikkei 225 futures offered at CME Group.

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Appendix of Miscellaneous Data

Comparing Stock Index Futures
(As of 12/7/09)

Futures Contract	Exchange	Contract Multiplier	Index	Curr	Curr Value	Cnt Value (USD)
E-mini S&P 500	CME Group	$50	1,103.25	USD	1.00	$55,163
E-mini Nasdaq-100	CME Group	$20	1,783.65	USD	1.00	$35,673
E-mini ($5) DJIA	CME Group	$5	10,390.11	USD	1.00	$51,951
Hang Seng	HKEx	HKD 50	22,324.96	HKD	7.7501	$144,030
HSCEI	HKEx	HKD 50	13,358.30	HKD	7.7501	$86,181
CSI 300 *	CFFEX	CNY 300	3,668.83	CNY	6.8294	$161,163
KOSPI 200	KRX	KRW 500,000	1,632.65	KRW	215.55	$93,443
S&P CNX Nifty	NSE	INR 50	5,066.70	INR	46.5713	$5,440
Taiwan Taiex	TFE	TWD 200	7,775.64	TWD	32.246	$48,227
Nikkei 225	CME Group	¥500	10,167.60	JPY	89.51	$56,796
Nikkei 225	CME Group	$5	10,167.60	USD	1.00	$50,838
Nikkei 225	CME Group	¥1,000	10,167.60	JPY	89.51	$113,592

* Futures contract has yet to be listed and specifications are tentative.

Correlations between Spot Index Values
(Sampled Weekly from 12/31/04-12/3/09)

	S&P 500	Nasdaq -100	DJIA	Hang Seng	HSCEI	Kospi 200	CSI 300	Taiwan Taiex	S&P CNX Nifty	Nikkei 225
S&P 500	-									
Nasdaq-100	0.9072	-								
DJIA	0.9779	0.8842	-							
Hang Seng	0.6391	0.6144	0.6066	-						
HSCEI	0.5542	0.5508	0.5240	0.9127	-					
Kospi 200	0.5941	0.6214	0.5719	0.7009	0.6818	-				
CSI 300	0.0538	0.0843	0.0524	0.3078	0.4568	0.2314	-			
Taiwan Taiex	0.5052	0.5420	0.4778	0.6578	0.6319	0.6829	0.2771	-		
S&P CNX Nifty	0.5242	0.5290	0.5164	0.6512	0.6190	0.5881	0.1655	0.5374	-	
Nikkei 225	0.7011	0.6572	0.6901	0.7327	0.6823	0.7349	0.1963	0.6110	0.5584	-

Correlations between Spot Index Values Translated from Native Currency to USD
(Sampled Weekly from 12/31/04-12/3/09)

	S&P 500	Nasdaq -100	DJIA	Hang Seng	HSCEI	Kospi 200	CSI 300	Taiwan Taiex	S&P CNX Nifty	Nikkei 225
S&P 500	-									
Nasdaq-100	0.9072	-								
DJIA	0.9779	0.8842	-							
Hang Seng	0.6392	0.6148	0.6067	-						
HSCEI	0.5544	0.5511	0.5241	0.9131	-					
Kospi 200	0.6262	0.6374	0.5999	0.7246	0.6947	-				
CSI 300	0.0547	0.0854	0.0529	0.3119	0.4612	0.2325	-			
Taiwan Taiex	0.5119	0.5443	0.4833	0.6595	0.6369	0.7243	0.2747	-		
S&P CNX Nifty	0.5317	0.5332	0.5182	0.6668	0.6290	0.6210	0.1901	0.5685	-	
Nikkei 225	0.6120	0.5546	0.5932	0.6848	0.6394	0.6842	0.2186	0.6182	0.5073	-