

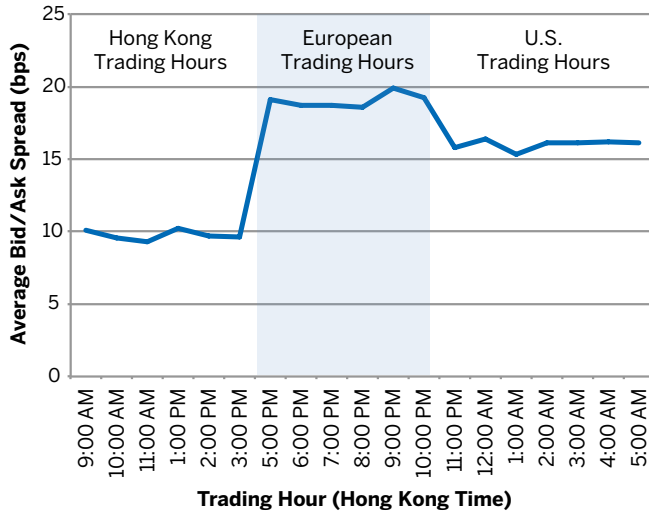
# **Trading China Exposure Index Arbitrage and Futures Bases**

MARCH 31, 2016

As volatility returned to the global equity market amid major turbulence in China's stock market in late 2015, CME Group launched E-mini FTSE China 50 Index futures to help market participants capitalize on market dislocations and better manage their risks during volatile periods. The FTSE China 50 Index measures the performance of Chinese companies listed in Hong Kong. It is constituted by including 50 of the largest and most liquid stocks. Approximately four months into its debut, the product has achieved good initial liquidity, especially during Hong Kong and U.S. trading hours.

Figure 1 shows the average bid/ask spread in the front month of the E-mini FTSE China 50 Index futures by trading hour, sampled from January 4 to February 18, 2016. During the Hong Kong trading hours, the bid/ask spread hovered around 10 basis points; after the Hong Kong market closes, the spread widened to approximately 19 basis points. When the market in the U.S. opened, the spread tightened again to 15-16 basis points. The bid/ask spread phenomenon in Figure 1 is very much expected considering index arbitrage and fair value.<sup>1</sup>

**Figure 1. Bid/Ask spread of E-mini FTSE China 50 Index futures by trading hour**



<sup>1</sup> A more thorough explanation of fair value is detailed in Appendix A.

## DYNAMICS OF RICHNESS AND CHEAPNESS IN ADJACENT MARKETS

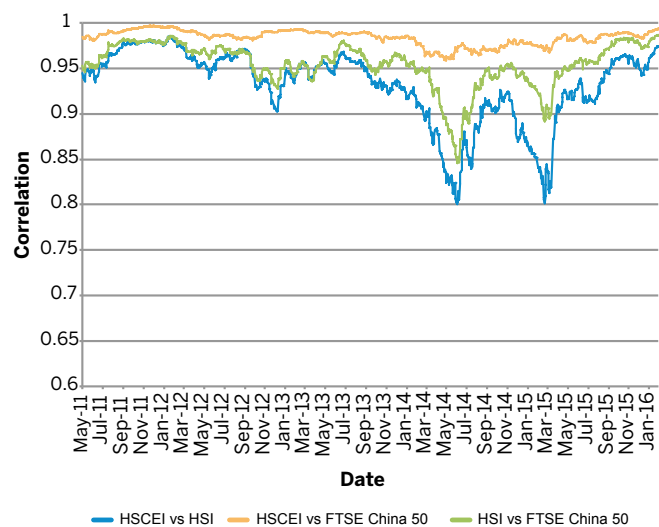
At its nascent stage, it is premature to describe with much certainty the richness or cheapness of the E-mini FTSE China 50 index futures market. However, adjacent futures markets exist in the Hang Seng Index futures as well as Hang Seng China Enterprise Index futures. They are both trading at the Hong Kong Exchange and Clearing. As illustrated in Table 1, these indices have many common constituents, both in terms of the count as well as the index weights.

**Table 1. Common index constituents among indices, by count and index weights, as of February 19, 2016.**

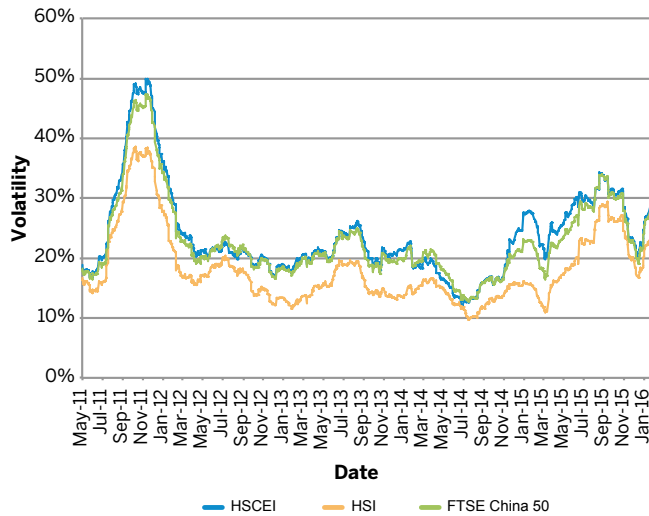
Index Pair	Common Constituents and Index Weights
Hang Seng vs. FTSE China 50	17 stocks (51% of HSI / 70% of FTSE China 50)
HSCEI vs. FTSE China 50	34 stocks (95% of HSCEI / 64% of FTSE China 50)
Hang Seng vs. HSCEI	9 stocks (58% of HSCEI / 24% of HSI)

Beyond having large overlaps in constituents, the price movements for the indices are highly correlated, as illustrated in Figure 2, especially between the FTSE China 50 and HSCEI indices. Their volatility profiles track one another closely as well, as illustrated in Figure 3.

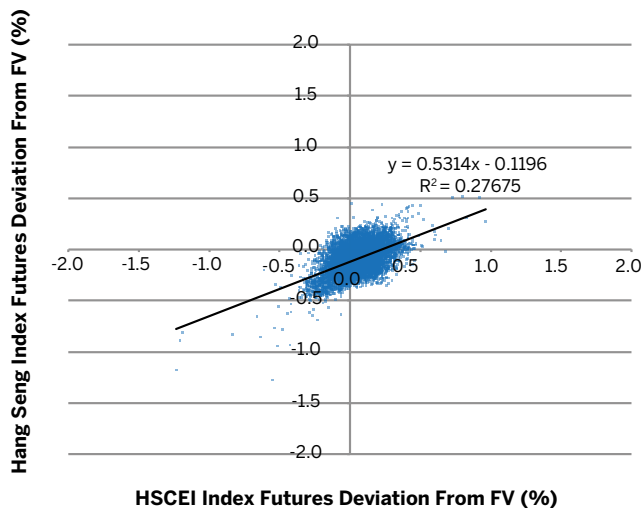
**Figure 2. Rolling 60-day correlation between indexes**



**Figure 3. 60-day historical volatility**



**Figure 4. Richness/Cheapness of front month HSI/HSCEI Index futures, August 5, 2015 – February 18, 2016**



While the indices are similar and track similar portfolios, relative supply and demand can often drive the futures prices in different directions. Figure 4 illustrates this phenomenon.

Data in Figure 4 was sampled from August 5, 2015 to February 18, 2016. The front month of the Hang Seng and HSCEI index futures, as well as their underlying indices, are sampled every five minutes during the Hong Kong trading hours, and are represented as a blue dot on the graph.

For each data point, the futures “arbitrage-free” prices were calculated.<sup>2</sup> The futures prices were then compared to these theoretical arbitrage-free prices. The horizontal and vertical axes represent the deviation of HSCEI and HSI index futures from their respective theoretical prices. For example, at a particular point in time, if the HSI futures are 0.5% above theoretical value and the HSCEI futures are 0.5% below theoretical value, it will be represented as a blue dot on the top left quadrant at (-0.5%, 0.5%).

During this sampling period, the correlation between HSI and HSCEI was at or above 0.95 – as illustrated in Figure 2. While the two contracts tend to trade “rich” or “cheap” to their respective fair value simultaneously, it is apparent that one futures contract can be trading “rich” while the other is trading “cheap”. In fact, the R-square of the regression is only 0.27.

These conditions are results of temporary imbalance of end investor demands, e.g. rotation of interest in and out of China-specific securities. These temporary imbalances revert quite often. As a result, there are plenty of trading opportunities.

The addition of the E-mini FTSE China 50 index futures adds another layer of trading opportunities to the existing set of trading instruments; as referenced earlier, participants in the FTSE China 50 ETF listed in the U.S. (FXI) can use futures to manage their exposure. This trading opportunity extends beyond Hong Kong trading hours, as the index arbitrage between the U.S.-listed ETF and the E-mini FTSE China 50 Index futures continues. As the latter continues to gain traction, trading opportunities will certainly expand for all market participants.

<sup>2</sup> Futures prices were calculated based on the then current index value and the 1-month HIBOR as the interest rate benchmark.

## E-mini FTSE China 50 Index Futures

<b>Ticker Symbols</b>	CME Globex: FT5 Clearing: FT5 BTIC: FTC
<b>Contract Size</b>	USD \$2 x FTSE China 50 Index
<b>Min. Price Increments</b>	Outrights: 5 index points = USD \$10.00 Calendar Spreads: 1 index point = USD \$2.00 BTIC: 1 index point = \$2.00
<b>Trading Hours</b>	CME Globex: Mon – Fri: 5:00pm CT previous day – 4:00pm CT
<b>Contract Months</b>	Five quarterly months (March quarterly cycle – Mar, Jun, Sep, Dec)
<b>Last Trading Day</b>	Trading can occur up to the close of trading at the Hong Kong Stock Exchange (HKEX) on the third Friday of the contract month: 3:00 am CST / 2:00 am CDT
<b>Final Settlement</b>	Via cash settlement based on the official closing index value of the FTSE China 50 Index

As of the end of March 31, 2016, the FTSE China 50 Index consisted of the following constituents:

<b>Ticker</b>	<b>Constituent Name</b>	<b>Weight</b>
700 HK Equity	Tencent Holdings Ltd	9.226252
941 HK Equity	China Mobile Ltd	8.627603
939 HK Equity	China Construction Bank Corp	8.523511
1398 HK Equity	ICBC	6.296481
3988 HK Equity	Bank of China Ltd	5.153089
2318 HK Equity	Ping An Insurance Group Co of China Ltd	4.604837
2628 HK Equity	China Life Insurance Co Ltd	3.918043
883 HK Equity	CNOOC Ltd	3.888586
386 HK Equity	China Petroleum & Chemical Corp	3.653219
857 HK Equity	PetroChina Co Ltd	3.198885
688 HK Equity	China Overseas Land & Investment Ltd	2.798239
267 HK Equity	CITIC Ltd	2.238301
2601 HK Equity	China Pacific Insurance Group Co Ltd	2.218488
3968 HK Equity	China Merchants Bank Co Ltd	2.21795
1288 HK Equity	Agricultural Bank of China Ltd	2.135192
728 HK Equity	China Telecom Corp Ltd	1.96699
762 HK Equity	China Unicom Hong Kong Ltd	1.744335
2328 HK Equity	PICC Property & Casualty Co Ltd	1.624937
1109 HK Equity	China Resources Land Ltd	1.594322
1044 HK Equity	Hengan International Group Co Ltd	1.459311
1988 HK Equity	China Minsheng Banking Corp Ltd	1.398589
6837 HK Equity	Haitong Securities Co Ltd	1.340013
1088 HK Equity	China Shenhua Energy Co Ltd	1.22892
6030 HK Equity	CITIC Securities Co Ltd	1.227655
3328 HK Equity	Bank of Communications Co Ltd	1.217249
1800 HK Equity	China Communications Construction Co Ltd	1.216478
998 HK Equity	China CITIC Bank Corp Ltd	1.068553
1766 HK Equity	CRRC Corp Ltd	0.940995

Ticker	Constituent Name	Weight
6886 HK Equity	Huatai Securities Co Ltd	0.940557
3699 HK Equity	WANDA COMM	0.924883
1211 HK Equity	BYD Co Ltd	0.905125
902 HK Equity	Huaneng Power International Inc	0.870165
1776 HK Equity	GF Securities Co Ltd	0.868433
1816 HK Equity	CGN Power Co Ltd	0.779411
656 HK Equity	Fosun International Ltd	0.76067
2202 HK Equity	China Vanke Co Ltd	0.741313
914 HK Equity	Anhui Conch Cement Co Ltd	0.737101
1359 HK Equity	China Cinda Asset Management Co Ltd	0.730741
390 HK Equity	China Railway Group Ltd	0.668399
1336 HK Equity	New China Life Insurance Co Ltd	0.652059
1339 HK Equity	People's Insurance Co Group of China Ltd	0.618647
2333 HK Equity	Great Wall Motor Co Ltd	0.578767
2238 HK Equity	Guangzhou Automobile Group Co Ltd	0.529395
1186 HK Equity	China Railway Construction Corp Ltd	0.51689
6818 HK Equity	China Everbright Bank Co Ltd	0.368405
753 HK Equity	Air China Ltd	0.298056
2727 HK Equity	Shanghai Electric Group Co Ltd	0.29633
2799 HK Equity	China Huarong Asset Management Co Ltd	0.200799
1618 HK Equity	Metallurgical Corp of China Ltd	0.180399
1033 HK Equity	Sinopec Oilfield Service Corp	0.106434

## APPENDIX A: Understanding "Fair Value"

The fair value, or theoretical level at which futures should be expected to trade, is a function of the cash index value plus implied financing, less dividends paid over the life of the contract:

$$\text{Fair Value} = \text{Spot} + \text{Financing Advantage} - \text{Foregone Dividends}$$

Unlike the buyer of a cash basket of index securities, who must finance the full notional value of the trade at inception, the buyer of a futures contract must only post a fraction of the notional as margin, and can invest the remaining cash in an interest-generating instrument. At the same time, the seller of futures must replicate the index returns. The amount of financing advantage above the cash basket depends on the interest rate (e.g. Interbank offer rate), as well as the time to expiration

of the futures, and is reflected in the futures price. The magnitude of the financing advantage will shrink over time, until it reaches zero on the expiration day of the futures contract.<sup>3</sup>

Mathematically, the financing advantage is:

$$\text{Spot Index} \times \text{Interest Rate Benchmark} \times \text{Time to Futures Expiry}$$

Conversely, the buyer of a cash basket is entitled to dividend payments, while the buyer of futures is not. As a result, futures prices are adjusted downward by the amount of this foregone dividend stream to reflect this disadvantage to the buyer. Much like the financing advantage, the foregone dividend also shrinks over time, until it reaches zero on the expiration day of the futures contract.<sup>4</sup>

<sup>3</sup> Another way to interpret this futures premium due to financing advantage is to see it as the cost of leverage being grossed up and added to the price of the futures contract. As this gross-up amount declines, the financing cost is paid.

<sup>4</sup> Alternatively, you can interpret the reduction of the discount of futures price due to foregone dividend as constructively receiving the foregone dividend via capital gains, as the futures price drifts up over time.

Hence, equity index futures trade at a premium or discount (known as the basis) relative to the cash index level, depending on whether the implied financing is greater or less than expected dividends over the duration of the contract.

Most CME Group index futures, including E-mini FTSE China 50 Index futures, can be traded through a Basis Trade at Index Close (BTIC) mechanism. The buyer and seller consummate the initial trade in terms of the basis, i.e. the difference between futures price and the spot index. This is the same as the financing advantage less the foregone dividends. At the close of trading in the cash security market, the closing index value is known. The trade of the index futures will be concluded at the price of the closing index value plus this basis.

In essence, this mechanism allows participants to trade at fair value based on the closing index value of the day. For more information, please visit [cmegroup.com/btic](http://cmegroup.com/btic).

#### “Classic” Index Arbitrage

Market participants monitor the fair value and capitalize on price discrepancies between spot and futures levels by purchasing the cheaper alternative and selling the more expensive one. This activity, known as index arbitrage, prevents futures from trading far above or below fair value.

Futures and cash index value are publicly observable variables. Dividend streams are highly forecastable as company paying dividends would declare the dividend ahead of the ex-dividend dates. Given these quantities, the only “free” variable is the financing rate priced in by the relative prices of futures and cash index. It is thus customary to describe the market as “rich” if the implied financing rate of futures is higher than benchmark interbank financing rates. Conversely, the market is described as “cheap” if the implied financing rate<sup>5</sup> is lower than the benchmark interbank financing rates.

When the futures price is trading “rich” or above its fair value, the premium over the spot price paid by the buyer of futures is greater than the actual cost to buy the cash basket until maturity. In this scenario, traders can sell short the futures and purchase the cash basket, thereby exerting downward pressure on the futures price and

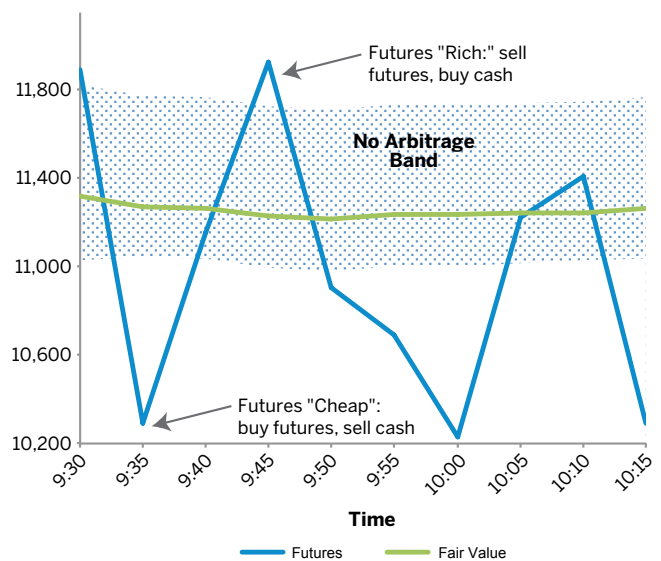
pushing upward on the cash index level until the actual basis is brought in line with fair value.

Alternatively, when the futures price is trading “cheap” or below its fair value, traders can buy the futures and sell short the underlying stocks to reestablish equilibrium. This scenario differs slightly in that a short sale of securities requires a loan of shares to sell short by a prime broker.

In reality, the costs associated with executing the arbitrage result in a no-arbitrage band within which the prices of spot and futures move without creating an arbitrage. In the scenario where futures are “cheap”, the short sale of securities requires a loan of shares to sell short by a prime broker. This borrow cost, quoted as an annualized fee, can vary significantly depending on the number of lenders and the demand for borrow, and must be known before evaluating the arbitrage opportunity. For example, if the broker fee is 50bps for borrowing the basket of securities to sell short, the implied financing cost of futures must be at least 50bps in order for the arbitrage to be attainable.

Figure 5 illustrates this arbitrage-bound band around fair value. Should the futures price exceed the upper bound or fall below the lower bound, then an arbitrage opportunity would emerge.

**Figure 5: No Arbitrage-Band**



<sup>5</sup> The “richness” or “cheapness” is the most apparent into the “roll market”, in which traders swap the front month position for a back month position. These calendar spread trades are purely driven by the implied financing rate. See, for example, the quarterly roll monitor at CME Group’s website for U.S. indices: [www.cmegroup.com/rollpace](http://www.cmegroup.com/rollpace).





#### CME GROUP HEADQUARTERS

20 South Wacker Drive  
Chicago, Illinois 60606  
cmegroup.com

#### CME GROUP GLOBAL OFFICES

New York	London	Singapore
Bangalore	Beijing	Belfast
Boston	Calgary	Hong Kong
Houston	São Paulo	Seoul
Tokyo	Washington D.C.	

CME Group® is a registered trademark of Chicago Mercantile Exchange Inc. The Globe logo, CME, Chicago Mercantile Exchange, Globex, CME Direct and CME Direct Messenger are trademarks of Chicago Mercantile Exchange Inc. Chicago Board of Trade is a trademark of the Board of Trade of the City of Chicago, Inc. NYMEX is a trademark of the New York Mercantile Exchange, Inc.

All rights in the FTSE China 50 (the "Index") vest in FTSE International Limited ("FTSE"). "FTSE®" is a trade mark of the London Stock Exchange Group companies and is used by FTSE under licence.

E-mini FTSE China 50 Index futures (the "Product") has been developed solely by Chicago Mercantile Exchange Inc. ("CME"). The Index is calculated by FTSE or its agent. FTSE and its licensors are not connected to and do not sponsor, advise, recommend, endorse or promote the Product and do not accept any liability whatsoever to any person arising out of (a) the use of, reliance on or any error in the Index or (b) investment in or operation of the Product. FTSE makes no claim, prediction, warranty or representation either as to the results to be obtained from the Product or the suitability of the Index for the purpose to which it is being put by CME.

Futures trading is not suitable for all investors, and involves the risk of loss. Futures are a leveraged investment, and because only a percentage of a contract's value is required to trade, it is possible to lose more than the amount of money deposited for a futures position. Therefore, traders should only use funds that they can afford to lose without affecting their lifestyles. And only a portion of those funds should be devoted to any one trade because they cannot expect to profit on every trade. All examples in this brochure are hypothetical situations, used for explanation purposes only, and should not be considered investment advice or the results of actual market experience.

The information within this brochure has been compiled by CME Group for general purposes only and has not taken into account the specific situations of any recipients of this brochure. CME Group assumes no responsibility for any errors or omissions. All matters pertaining to rules and specifications herein are made subject to and are superseded by official CME, NYMEX and CBOT rules. Current CME/CBOT/NYMEX rules should be consulted in all cases before taking any action.