

Research

# Arbitraging the Chinese A-shares and H-shares Anomaly

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# 1. Introduction

The Chinese equity market is composed of a domestic and an offshore market. The Shanghai Stock Exchange and the Shenzhen Stock Exchange are the two exchanges operating in mainland China and they were established in the early 1990s. The majority of Chinese stocks are listed on the Shanghai or Shenzhen Stock Exchanges and these stocks are generally known as China A-shares. A-shares constitute China's domestic market. In addition, there is an offshore market. Twenty five years ago the then China Vice Premier Zhu Rongji gave his approval for Chinese State Owned Enterprises (SOEs) to list their stocks on the Hong Kong Stock Exchange. The intention, in addition to capital raising, was to upgrade the SOEs' corporate governance and management standards through fulfilling international practices. The offshore Chinese equity market has grown rapidly since. Nowadays it is easy to find Chinese companies listed on different exchanges globally including Hong Kong, New York, London or Singapore etc. In order to form a complete picture of the Chinese market both the domestic and offshore markets must be considered together.

When a PRC-incorporated company is listed on the Hong Kong Stock Exchange (HKEx), it is regarded as the H-share, with the letter H referring to Hong Kong. According to information provided by HKEx, nine state enterprises were approved for listing in Hong Kong on October 6, 1992. Tsingtao Brewery was the first company to be listed. Its shares started trading on the Hong Kong Stock Exchange on July 15, 1993. The second batch was announced on January 27, 1994 and altogether 22 companies, mainly from heavy industries such as energy, transport and raw materials were listed. The existence of A-share and H-share markets enables Chinese companies to choose their listing venue. Moreover, Chinese companies can also choose to list their stock on both the domestic and an offshore exchange simultaneously. The stock will then be dually-listed on both the A-share market and H-share market.

In an ideal environment, where capital flows are not restricted and information is symmetric, the A-share market and the H-share market should be integrated and a single price should prevail in both markets. Extensive research has gone into studying the relationship between A- and H-share prices. Cai, McGuinness and Zhang (2011) developed a non-linear Markov error correction approach to examine the co-integration relation between the H-shares and A-shares prices across the period from 1999 to 2009. Choi et al (2013) found consistent and significant co-integration among these A-shares and H-shares dual-listed stocks for the period 2004-2011. Li, Chui and Li (2014) demonstrated that co-integration and error-correction mechanism exist between the A-share and the H-share for the period from 2009-2013.

The behavior of the price differential between A-shares and H-shares of dual-listed companies will be studied in this article for the sample period from 2006-2016. In particular we investigate whether a share class selection mechanism applied to a universe of Chinese stocks can deliver a superior return/risk reward outcome compared to a market-capitalisation weighted China A-shares benchmark.

*The existence of A-share and H-share markets enables Chinese companies to choose their listing venue. Moreover, Chinese companies can also choose to list their stock on both the domestic and an offshore exchange simultaneously.*



## 2. The A-shares and H-shares market

We start by comparing the characteristics of the A-shares and H-shares market in terms of number of listings and market capitalization. Table 1 shows the market capitalization of the two markets. It can be seen that the A-shares market has expanded significantly in the last 10 years both in terms of the number of listings and market size. The number of listings increased from 855 to 2805 between 2000 to 2015 and market capitalization increased significantly from USD 477 billion to USD 8 trillion over the corresponding period. The H-shares market has also expanded over the same period, but more slowly than the A-shares market, particularly in the last ten years.

**Table 1. Market capitalization of the China A-shares market and China H-shares market**

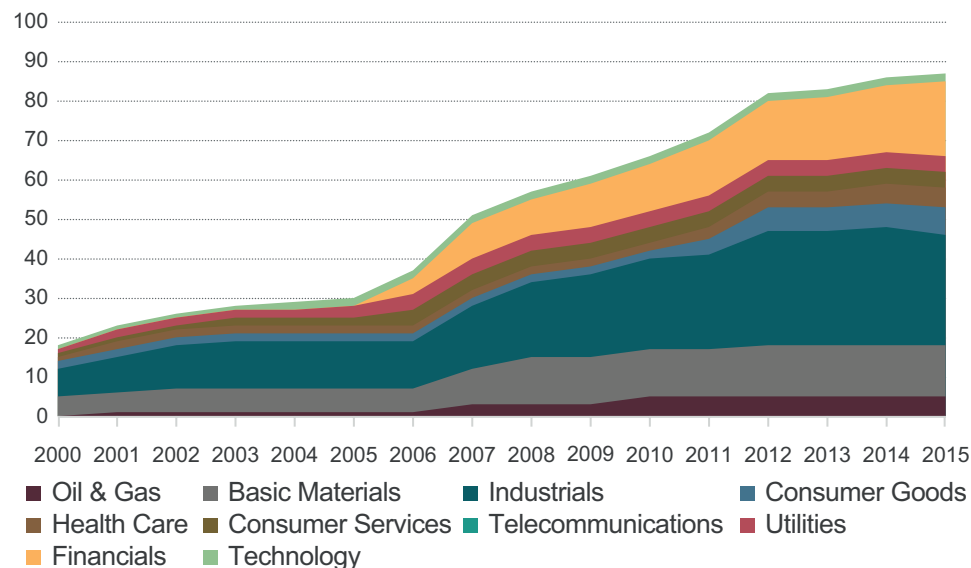
Calendar Year End	A-shares		H-shares	
	Num	Market Cap (USDm)	Num	Market Cap (USDm)
2000	855	477,169	50	11,042
2001	924	438,113	58	13,038
2002	987	394,830	74	16,917
2003	1058	445,138	92	52,610
2004	1155	393,210	109	59,489
2005	1158	355,765	120	166,001
2006	1230	1,070,030	141	433,793
2007	1394	4,311,315	146	651,992
2008	1544	1,734,533	150	352,735
2009	1654	3,540,446	156	607,950
2010	2041	4,005,318	162	672,379
2011	2320	3,391,012	168	528,506
2012	2472	3,672,039	174	629,793
2013	2468	3,928,429	182	633,958
2014	2580	5,966,369	198	727,606
2015	2805	8,171,049	226	665,888

Source: Bloomberg, data as at March 31, 2016

We now turn our attention to the characteristics of A/H dual-listed companies. Figure 1 shows the number of A/H dual-listed Chinese companies from 2000 to 2015. The number of dual-listed firms increased gradually from 19 in 2000 to 87 in 2015. Figure 1 also illustrates the industry breakdown of dual-listed companies over the same period. Industrial and Financial companies are the most numerous dual-listed companies by sector.

*The number of dual-listed firms increased gradually from 19 in 2000 to 87 in 2015. Industrial and Financial companies are the most numerous dual-listed companies by sector.*

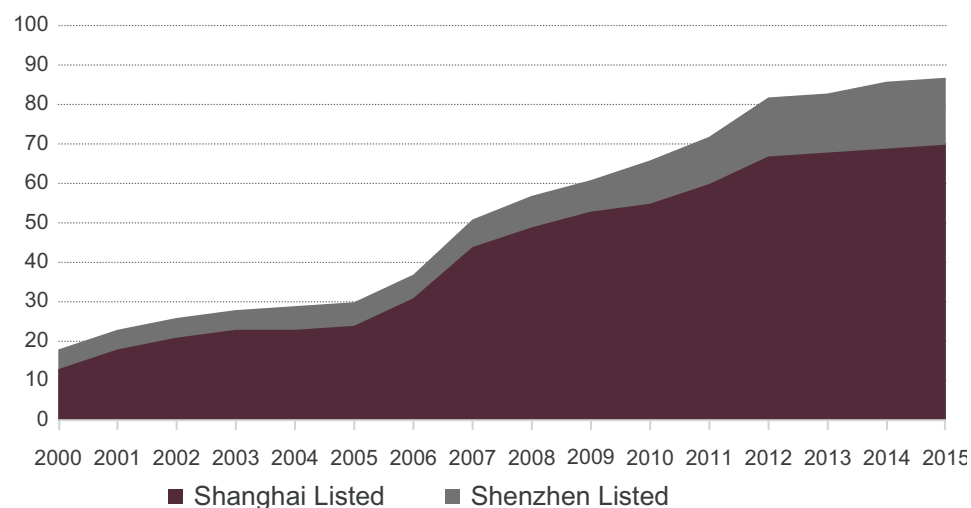
**Figure 1. Number of dual-listing Chinese companies per ICB industry from 2000 to 2015**



Source: FTSE Russell, Wind, data as at March 31, 2016.

Figure 2 shows the breakdown of the number of A/H dual-listed companies by stock exchange. The majority of dual-listed A/H stocks have their A-shares listing on the Shanghai Stock Exchange. The reason is that historically a relatively large number of SOEs were listed on the Shanghai Stock Exchange rather than on the Shenzhen Stock Exchange. As of December 2015, 70 and 17 companies were listed on the Shanghai and Shenzhen Stock Exchanges respectively out of the 87 dual-listed companies.

**Figure 2. Number of dual-listing Chinese companies by Stock Exchange from 2000 to 2015**



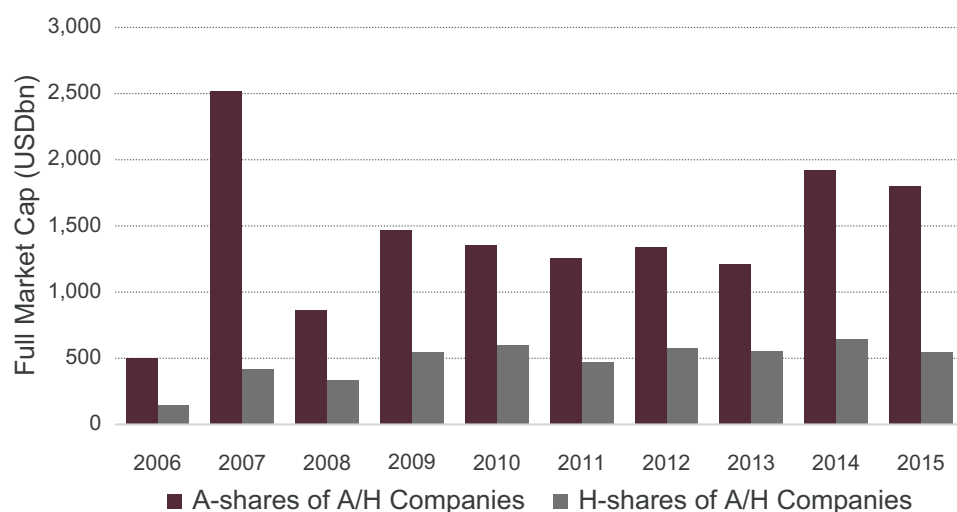
Source: FTSE Russell, Wind, data as at March 31, 2016.

*As of December 2015, 70 and 17 companies were listed on the Shanghai and Shenzhen Stock Exchanges respectively out of the 87 dual-listed companies.*

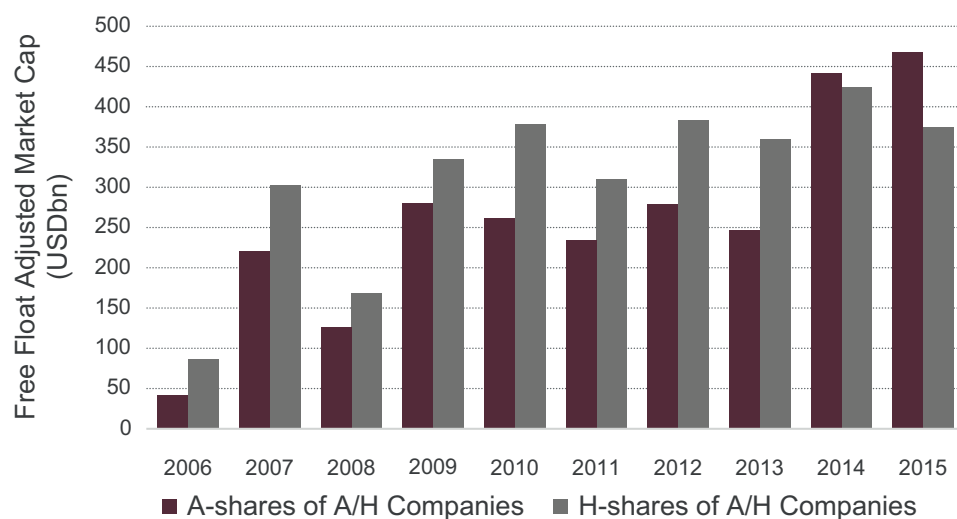
Figure 3a provides a comparison of the aggregate market capitalization of the A-shares and the H-shares of the A/H dual-listed companies. On average, the A-shares market of dual listed companies is two to three times larger than the H-shares market. Figure 3b provides an alternative perspective using aggregate free float market capitalization of each market. Interestingly, adjusting for free float results in more comparable levels of market capitalization of H- and A-shares. The implication is that the H-shares market has greater levels of free float and the control of dual-listed companies is exercised primarily through A-share holdings.

*Adjusting for free float results in more comparable levels of market capitalization of H- and A-shares.*

**Figure 3a. Full Market Capitalization of the dual-listed A/H shares companies**



**Figure 3b. Free Float Market Capitalization of the dual-listed A/H shares companies**



Source: FTSE Russell, Wind, data as at March 31, 2016

### 3. The A/H Price Differentials

There are a number of pieces of research which discuss pricing differences between A and H shares. This research covers a range of topics including the cause(s) of any pricing differential, the dynamics of the A/H premium and information asymmetries between the A/H markets. Wang and Jiang (2004) found that a large time-varying H-share price discount relative to A-shares exists and the discount is highly correlated with domestic and foreign market factors and relative market illiquidity. Li, Yang and Greco (2006) found that the risk premiums associated with the A-share and H-share markets can be used to explain the price differentials between the two classes of shares. Chung, Hui and Li (2013) investigated whether different assessments on the valuations and the risk of the dual-listed Chinese firms by mainland and Hong Kong investors are a determinant of the price disparity. Guo, Tang and Yang (2013) empirically examined whether the price difference can be explained by firms' corporate governance characteristics. They found that the A-share to H-share price premiums are higher for firms in which the controlling shareholders and corporate insiders have greater potential to expropriate wealth from outside investors. More recently, Li, Brockman and Zurbrugg (2015) showed that the H-shares traded by foreign investors incorporate significantly more firm-specific information than their A-share counterparts traded by domestic Chinese investors and their findings demonstrate that foreign non-Chinese investors have a comparative advantage in the utilization of firm-specific information.

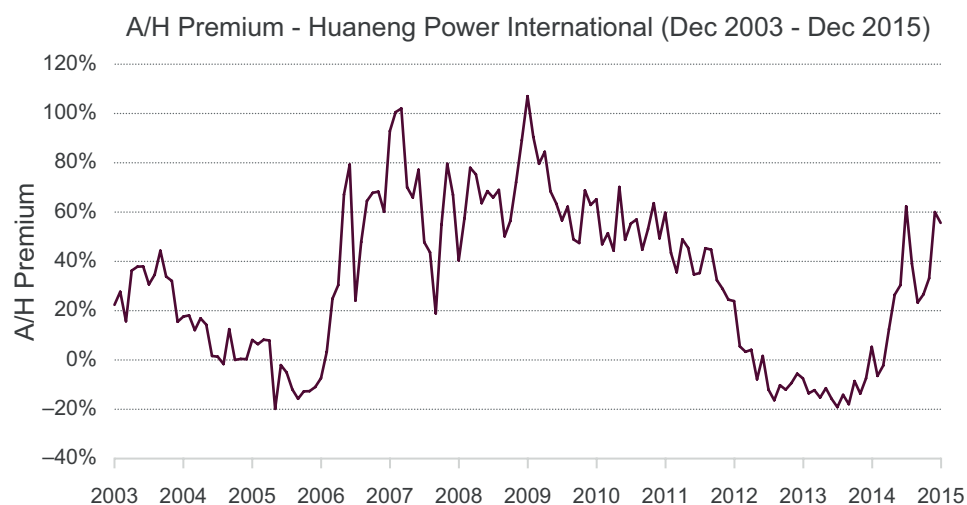
The typical pattern of A/H pricing differentials can be found in Figure 4a and Figure 4b. The graphs show the A/H premium of two dual-listed stocks. The A/H premium is defined as the ratio of the A-share's stock price to the H-share's stock price in U.S. dollars minus one. A feature of the A/H premium is the convergence/divergence pattern where the prices of the two markets diverge at times but tend to converge when the gap is wide enough. Despite the name describing as premium, the A/H premium can be negative at times and it will indicate that a discount exists.

In addition to specific stock examples it is interesting to examine the behaviour of a basket of dual-listed stocks. Figure 4c shows the premium/discount of all A/H dual-listed stocks on a market-capitalisation weighted basis. The A/H premium is calculated as the ratio of the market values of the two dual-listed stock baskets; one valued using A-shares prices and the other using H-shares prices. The combined number (A-shares & H-shares) of free float adjusted shares is used for both baskets.

The aggregate A/H premium displays similar behaviour to the individual stock examples. The A/H premium peaked in 2003 and gradually declined for several years. The A/H pricing gap widened again in 2007 and 2015 as the A-shares market performed strongly during those periods.

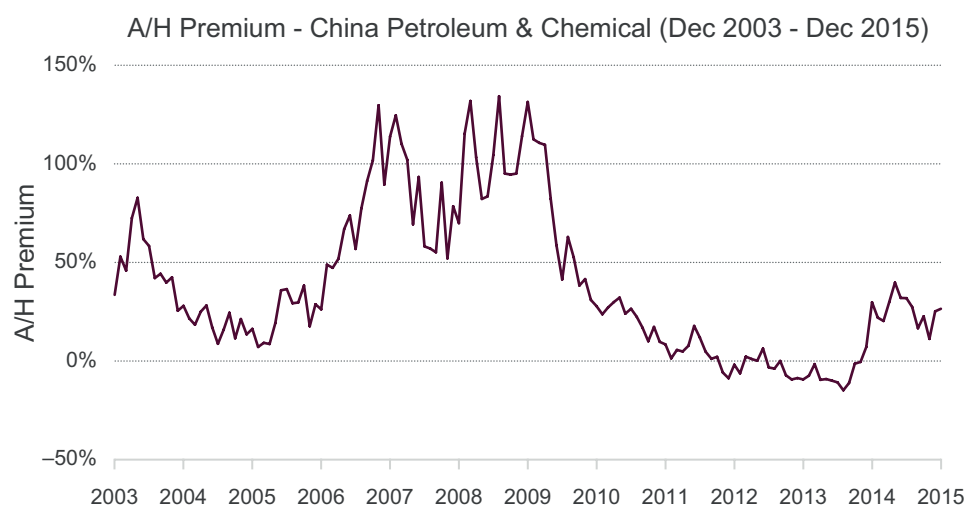
*A feature of the A/H premium is the convergence/divergence pattern where the prices of the two markets diverge at times but tend to converge when the gap is wide enough.*

**Figure 4a. The A/H Premium of Huaneng Power International**



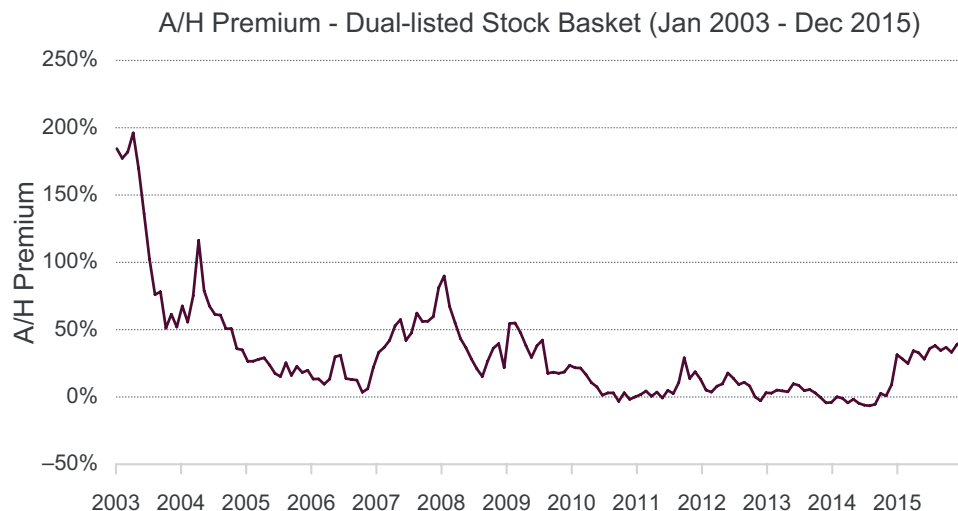
Source: FTSE Russell, data as at March 31, 2016. Past performance is no guarantee of future results. Please see the end for important legal disclosures.

**Figure 4b. The A/H Premium of China Petroleum and Chemical**



Source: FTSE Russell, data as at March 31, 2016. Past performance is no guarantee of future results. Please see the end for important legal disclosures.

**Figure 4c. The A/H Premium of the A/H dual-listed basket**



Source: FTSE Russell, data as at March 31, 2016. Past performance is no guarantee of future results. Please see the end for important legal disclosures.

## 4. Capturing the A/H anomaly

In this section, we describe a mechanism which makes use of the convergence/divergence properties of the A/H price differentials. We construct an index containing both A and H-shares and compare it to a market cap benchmark consisting of China A-shares only. The constituents of the FTSE China A50 Index and the FTSE China A Index respectively are used as the starting universe. The FTSE China A50 Index represents the largest segment of the market (equivalent to the largest 50 companies in terms of full market capitalization) and the FTSE China A Index represents the large and mid-sized segments of the market. The selection mechanism is applied to both segments and the results of each segment are analyzed.

At each rebalance, we identify dual-listed stocks in each index universe and compare the price of the A-shares and H-shares in USD of each company. The ratio of the prices of the A-shares and H-shares is calculated and denoted as AHPR. If AHPR is greater than one, the A-share is more expensive than the H-share and the H-share is selected and included in the index. If the AHPR is less than one, the A-share is selected. Stocks that consist only of an A-share listing are included in the index.

The selected share class is weighted using the free-float number of A-shares, irrespective of whether the H- or A-shares class is selected. The index weights will therefore mimic those of the underlying A-shares market cap indexes at each rebalance, but will drift between rebalances due to differences in price movements between A and H-shares. Consequently, the A/H index is expected to outperform the market-cap weighted China A-shares index when the A/H share pricing differential converges and underperform when the differential diverges.

It is useful to know the extent of discount obtained by selecting the cheaper share class. We construct a discount indicator to measure the price discount offered by selecting the cheaper H-shares whilst employing the same A share



weighting scheme in both the A/H index and the market-cap weighted (China A) benchmark. The A/H discount indicator<sup>1</sup> is calculated as follows:

$$\text{Discount Indicator} = 1 - \frac{\sum_{i=1}^N (p_i^{AH} f_i^A s_i^A)}{\sum_{j=1}^N (p_j^A f_j^A s_j^A)}$$

Where

N is the number of securities in the underlying index.

$f^A$  is the A-shares free float factor.

$s^A$  is the A-shares number of shares.

$p_i^{AH}$  is the latest trade price of the component security of the A/H index in U.S. dollars.

$p_j^A$  is the latest trade price of the component security of the underlying index universe in U.S. dollars.

In the share class selection process we set the threshold for the AHPR to level to 1, since theoretically if the domestic China A-share market were to open up fully prices of A and H-shares should converge. With the launch of market access schemes, including the R/QFII scheme and the Northbound Stock Connect Scheme for international investors, and the QDII scheme and the Southbound Stock Connect Scheme for mainland investors, the two markets are expected to become increasingly aligned.

The two remaining parameters that are required to fully determine the selection approach are the rebalancing frequency and the buffer zone around the AHPR threshold. These parameter choices aim to strike a balance between the timeliness and incorporation of new information and turnover. A higher rebalance frequency will ensure more timely incorporation of information at the expense of higher levels of turnover. A tighter buffer zone allows greater precision, but ignores the fact that prices are inherently noisy. In order to understand the interaction between parameter choices and index outcomes we assess different buffer zones around the A/H price ratio and different rebalancing frequencies. The default parameters we use to illustrate our principal empirical results employ quarterly rebalancing and a buffer of 3% around the AHPR threshold. We assess the robustness of these results to different parameter combinations in a later section.

<sup>1</sup> The calculation of the discount indicator is different from that of the A/H premium. The discount indicator illustrates the discount offered by selecting the cheaper share class while the A/H premium compares the ratio of the A-shares and H-shares prices.

## 5. Empirical Findings

The empirical findings presented in this section use data from January 2006 to March 2016, covering a ten-year period approximately.<sup>2</sup> Index characteristics including turnover, risk adjusted performance and valuation metrics are examined relative to the market cap weighted benchmark.

### 5.1 Number of switches

Switching between A and H share classes is the essential feature of the A/H selection mechanism and we therefore initially focus on these results employing our default parameters of a quarterly rebalancing frequency and a 3% buffer zone around the AHPR.

Table 2 shows the number of switches by calendar year for signals drawn from the FTSE China A50 and the FTSE China A universes respectively. On average there are 12 switches per year (three per quarter); 7 per year from A to H and 5 from H to A for the FTSE China A50 universe. The number of switches is higher for the FTSE China A universe since the number of dual-listed stocks is greater. The average number of switches is 17 per year; 10 from A to H and 7 from H to A.

**Table 2. Number of switches between A and H share classes from 2006 to 2015**

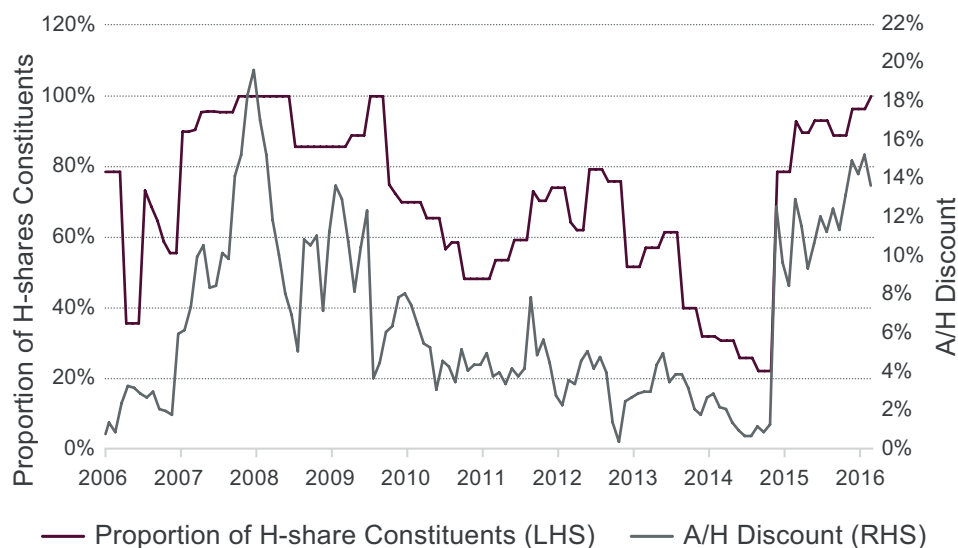
Year	FTSE China A50 Index Universe				FTSE China A Universe			
	Total Switches	A to H Switches	H to A Switches	No of Available AH Pairs	Total Switches	A to H Switches	H to A Switches	No of Available AH Pairs
2006	15	6	9	15	10	8	2	24
2007	8	8	0	22	8	8	0	34
2008	5	1	4	27	10	3	7	43
2009	12	5	7	28	9	6	3	48
2010	12	3	9	29	21	5	16	52
2011	13	11	2	28	21	18	3	57
2012	15	5	10	29	26	7	19	65
2013	14	6	8	27	24	11	13	68
2014	17	15	2	27	25	21	4	75
2015	8	7	1	28	15	14	1	75
<b>Average</b>	<b>12</b>	<b>7</b>	<b>5</b>		<b>17</b>	<b>10</b>	<b>7</b>	

Source: FTSE Russell, data as at March 31, 2016.

Figures 5a & 5b illustrate the proportion index members represented by H-Shares in each simulated A/H index respectively. Over the 10-year historical period, there were several occasions all the selected share classes belong to the H-shares.

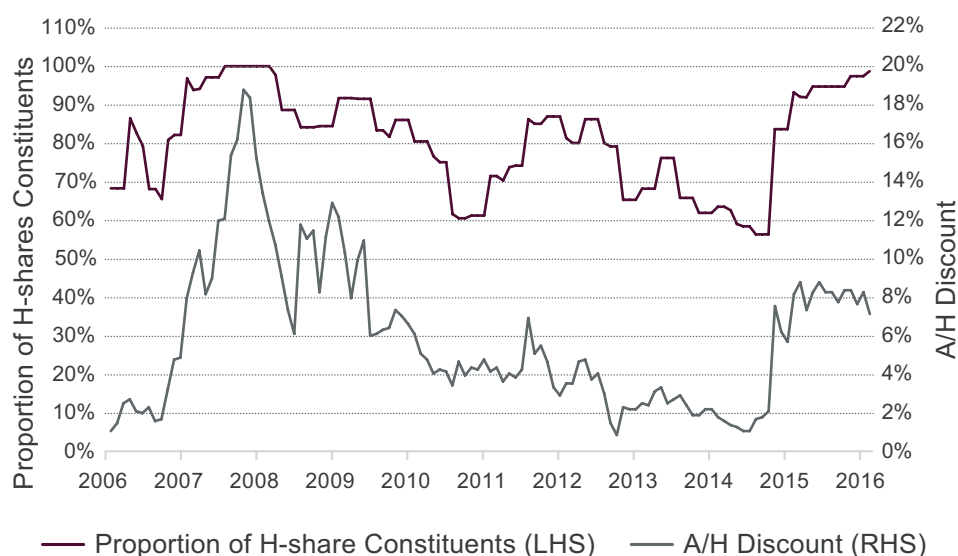
<sup>2</sup> The FTSE China A50 Index was launched on December 13, 2003. The FTSE China A Index was launched on June 5, 2014 and index history before launch date is simulated based on the methodology specified in FTSE ground rules. The AH index performance is simulated according rules detailed in Section 4.

**Figure 5a. Proportion of H-share Constituents t v.s. A/H Discount – FTSE China A50 Universe**



Source: FTSE Russell, data as at March 31, 2016.

**Figure 5b. Proportion of H-share Constituents v.s. A/H Discount – FTSE China A Universe**



Source: FTSE Russell, data as at March 31, 2016.

Figures 5a & 5b also include the A/H discount indicator which is described in the previous section. The discount indicator ranges from 0% to 20% in the last ten years. It is observed that the proportion of H-shares constituents co-moves with the indicator level. Generally, the less expensive the H-share compared to its A-share counterpart the higher the discount level. Consequently, the number of H-shares in the A/H index is expected to increase as the discount level widens. Such a finding is applicable to both the FTSE China A50 and broader FTSE China A universe.

## 5.2 Turnover

It is important to understand the level of turnover that results from such an arbitrage strategy. Turnover of the simulated A/H index is attributable to both changes in the underlying market cap universe and the switching between A and H shares. Table 3 shows the calendar year turnover of the A/H index compared to the market-cap index.

**Table 3. Turnover of the Simulated A/H Index**

Year	FTSE China A50 Universe		FTSE China A Universe	
	Simulated A/H50 Index	Market Cap Index	Simulated A/H Index	Market Cap Index
2007	86.3	47.6	54.9	19.4
2008	116.8	81.5	55.5	12.3
2009	107.1	20.3	57.6	18.9
2010	89.0	18.3	45.2	11.3
2011	90.3	35.6	55.6	26.5
2012	107.6	21.3	69.5	22.5
2013	121.1	46.9	48.3	10.7
2014	115.7	14.3	63.1	20.6
2015	95.4	40.3	47.5	23.8
<b>Average</b>	<b>103.2</b>	<b>36.2</b>	<b>55.2</b>	<b>18.5</b>

Source: FTSE Russell, data as at March 31, 2016. Past performance is no guarantee of future results. Returns of the simulated indexes are hypothetical. Please see the end page for important legal disclosures.

The average annual turnover for the A/H index for the period 2007 to 2015 is approximately 103.2% compared to 36.2% for the FTSE China A50 Index. For the broad China A universe, the comparable figures are 55.2% and 18.5%. These turnover figures are a useful starting point for estimating trading costs associated with implementing a strategy that replicates the A/H index and thereby obtaining an estimate of performance outcomes net of costs.

## 5.3 Risk and Return Characteristics

We now compare the risk and return characteristics of the simulated A/H index with those of its market cap counterpart. Table 4 summarizes the return and risk characteristics of the simulated A/H index. We first look at the return/risk characteristics for the FTSE China A50 index universe. The performance of the simulated A/H 50 index is 16.0% per annum for the 10-year sample period from March 2006 to March 2016 while that of the market cap index is 13.0% per annum. The volatility of the simulated A/H 50 index in the same ten year period is 33.8% per annum and that of the market-cap index is 35.6%.

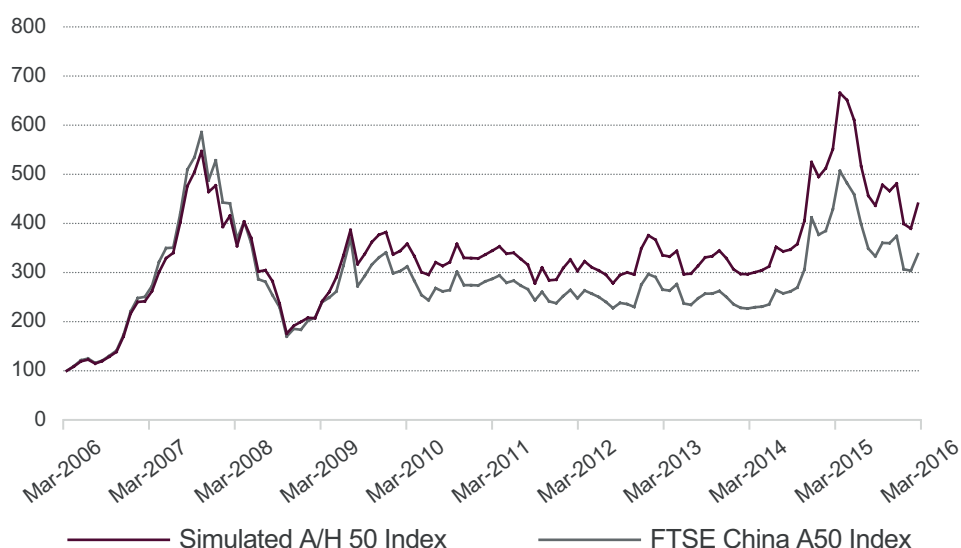
The comparable annualized return figures for the broader China A universe are 16.9% and 14.5%, whilst the comparable volatility numbers are 32.4% and 34.3% per annum respectively.

The performance characteristics for different time periods are also shown in Table 4. The results show that the simulated A/H index delivered a higher return with lower volatility across 3, 5 and 10-year horizons. Figures 6a and 6b plot the performance of the simulated A/H index against the relevant market-cap benchmark. The findings indicate that the A/H switching mechanism successfully captures the A/H price anomaly.

**Table 4. Annualized return and volatility of the China Simulated A/H Index compared with the market-cap weighted China A Index for the period from March 2006 to March 2016**

	Index	FTSE China A50 Universe			FTSE China A Universe		
		3Y	5Y	10Y	3Y	5Y	10Y
Annualized Return (%)	Simulated A/H Index	9.5	5.0	16.0	10.2	2.9	16.9
	Market Cap Index	8.4	3.3	13.0	10.1	1.8	14.5
Annualized Volatility (%)	Simulated A/H Index	27.8	29.4	33.8	30.2	27.8	32.4
	Market Cap Index	30.1	29.7	35.6	31.7	28.3	34.3

**Figure 6a. Performance of China A/H50 Index against FTSE China A50 Index**





**Figure 6b. Performance of China A/H Index against FTSE China A Index**



Source: FTSE Russell, data as at March 31, 2016. Past performance is no guarantee of future results. Returns are simulated and hypothetical. Returns shown of the FTSE China A50 Index and FTSE China A Index may reflect hypothetical historical performance. Please see the end page for important legal disclosures.

## 5.4 Valuation Metrics

In addition to risk and return characteristics, we also examine valuation metrics including earnings yield, book-to-price ratio and dividend yield for the A/H index. As we select the less expensive dual-listed share a cheaper aggregate valuation measure should arise by construction. As an example, consider dividend yield; dividend per share is the same for both the A and H class shares since the economic rights of shareholders are the same for both classes. The share class with a lower stock price will therefore display a higher dividend yield. Table 5 shows the valuation metrics of the A/H index and the comparable market cap index for both the narrow FTSE China A50 universe and the broader FTSE China A universe. As expected, earning yield, book-to-price ratio and dividend yield are all higher for the A/H index over the ten year. The results highlight that the A/H selection mechanism results in an index with a lower valuation compared to the equivalent market cap index and this characteristic will be of interest to market participants who have a yield focus.

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**Table 5. Valuation Metrics of the Simulated A/H Index against its market-cap benchmark for calendar year end from 2006-2015**

**a) FTSE China A50 Index as universe**

Year	Earning Yield (%)		Book to Price		Dividend Yield (%)	
	Simulated A/H50 Index	FTSE China A50 Index	Simulated A/H50 Index	FTSE China A50 Index	Simulated A/H50 Index	FTSE China A50 Index
2006	2.70	2.61	0.26	0.25	1.13	1.09
2007	2.76	1.46	0.19	0.14	0.80	0.44
2008	6.69	6.76	0.51	0.44	2.58	2.28
2009	3.48	3.13	0.30	0.27	1.14	1.02
2010	5.92	5.30	0.39	0.37	1.64	1.59
2011	9.38	8.90	0.58	0.54	2.20	2.19
2012	10.14	9.71	0.57	0.56	2.64	2.58
2013	12.25	11.70	0.72	0.70	3.41	3.35
2014	9.74	8.55	0.56	0.49	2.60	2.34
2015	11.42	8.93	0.70	0.57	3.01	2.55

**b) FTSE China A Index as universe**

Year	Earning Yield (%)		Book to Price		Dividend Yield (%)	
	Simulated A/H Index	FTSE China A Index	Simulated A/H Index	FTSE China A Index	Simulated A/H Index	FTSE China A Index
2006	2.75	2.64	0.32	0.30	1.35	1.30
2007	2.73	1.40	0.19	0.14	0.85	0.49
2008	5.39	6.30	0.51	0.44	2.57	2.27
2009	3.13	2.61	0.31	0.27	1.12	0.99
2010	4.50	3.77	0.33	0.31	1.30	1.26
2011	7.34	6.73	0.52	0.47	1.93	1.82
2012	7.03	6.99	0.52	0.51	2.00	1.95
2013	7.70	7.30	0.61	0.59	2.37	2.32
2014	5.95	5.45	0.47	0.41	1.79	1.63
2015	6.05	4.95	0.49	0.40	1.78	1.56

Source: FTSE Russell, data as at March 31, 2016. Past performance is no guarantee of future results. Please see the end page for important legal disclosures.

## 5.5 Robustness Test

This section examines the impact of the rebalance frequency and buffer around the switching threshold on the performance characteristics and turnover level.

Table 6 shows the annualized returns and volatilities of simulated A/H indexes constructed using different buffer zones and rebalance frequencies. The results indicate that a monthly rebalance frequency historically delivered higher returns irrespective of the buffer zone employed. For the FTSE China A50 universe, the performance difference between monthly and quarterly rebalance frequencies is approximately 1% per annum. The difference is smaller for the broader FTSE China A universe.

The buffer zone around the switching threshold also affects the A/H performance outcomes as shown in Table 6. Generally, as the size of the buffer increases, performance outcomes deteriorate at both monthly and quarterly rebalance frequencies. However, the historical annualized returns of the simulated A/H indexes remain higher than those of the market-cap benchmark irrespective of the choice of rebalancing frequency and buffer zone. It should be borne in mind that these performance figures are before transaction costs and an assessment that spans trading costs is required for a more complete understanding.

Table 6b shows the annualized volatility of each scenario. Volatility levels are relatively insensitive to different parameters choices and is lower than the volatility of the market capitalization weighted counterpart.

In terms of turnover, we anticipate and observe that a higher rebalance frequency and a tighter buffer zone results in higher turnover – see Table 6c. For the FTSE China A50 universe, with no buffer, moving from monthly to quarterly rebalances results in turnover dropping from 210% to 121% p.a.. A similar pattern is observed as the size of the buffer is increased. For the broader FTSE China A universe, a corresponding reduction in turnover is also observed with less frequent rebalancing and wider buffers. Average annual turnover falls from 210% to 157% under a monthly rebalance regime that is applied to the FTSE China A50 universe when the buffer zone moves from 0% to 3%. A similar result is observed on a quarterly rebalance cycle.

**Table 6. Annualized return, volatility and turnover of the simulated A/H indexes for different rebalancing frequency and buffer zones for the period from March 2006 to March 2016**

		FTSE China A50 Universe		FTSE China A Universe	
		Rebalance Frequency		Rebalance Frequency	
a. Annualized Return		Monthly	Quarterly	Monthly	Quarterly
Buffer Zone	0%	17.11%	15.93%	17.32%	16.97%
	3%	17.22%	15.99%	17.23%	16.89%
	5%	16.93%	15.52%	17.23%	16.96%
	10%	16.26%	15.45%	16.97%	16.70%
	Market Cap Index	13.00%		14.50%	
b. Annualized Volatilities		Monthly	Quarterly	Monthly	Quarterly
Buffer Zone	0%	33.56%	33.68%	32.37%	32.29%
	3%	33.67%	33.79%	32.47%	32.43%
	5%	33.85%	33.70%	32.57%	32.46%
	10%	33.76%	33.71%	32.49%	32.43%
	Market Cap Index	35.60%		34.26%	
c. Turnover		Monthly	Quarterly	Monthly	Quarterly
Buffer Zone	0%	210.46%	120.98%	120.48%	64.59%
	3%	157.05%	103.25%	91.16%	55.23%
	5%	139.02%	94.31%	84.66%	53.45%
	10%	108.30%	77.77%	69.69%	43.96%
	Market Cap Index	36.20%		18.50%	

Source: FTSE Russell, data as at March 31, 2016. Past performance is no guarantee of future results. Returns shown may reflect hypothetical historical performance. Please see the end page for important legal disclosures.

## 6. Conclusion

When the H-share market was established in the early 1990s, the China capital market was still relatively insulated from other parts of the world. It was not easy for investors to exchange domestic Chinese currency and invest in the domestic A-shares market. The H-share market became an important venue for international investors who were interested in gaining exposure to China's domestic economic growth. Twenty years later, the domestic China A-shares market is now one of the largest equity markets in the world. In contrast to the 1990s when market access was restricted, there are now various channels that enable international investors to invest in the onshore China A-share market. At the same time the offshore H-share market is accessible not only to international investors but also to mainland investors. We are getting closer to the point at which the onshore and offshore markets become integrated. The increasing openness of the mutual access schemes, including the Stock Connect Scheme, QFII/QDII program and the Mainland-HK Mutual Fund Recognition, will act as the catalysts for this integration in terms of capital movement, information flows, regulatory framework and trading practices.

There are a number of Chinese companies which have listed their shares in the A and H-share markets. In an ideal world without market frictions the price of two different share classes in the same company should be close to one other. However, the empirical evidence indicates that price of A and H-shares of the same stock can diverge. Our analysis indicates that the gap between the A and H-share prices fluctuates, but is mean reverting. If the A and H-share prices of the dual-listed stocks were to converge to the same level in the long run, any price divergence would ultimately be corrected. On this basis we develop an A/H share selection mechanism to identify the share class with the lower price and form an A/H share class index. We compare the performance of such an index to a comparable market-cap weighted China A-shares index. This approach generates improvements in performance outcomes, before transactions costs in both the largest and broad market-cap segments over a period of 10 years. The results are robust to different choices of parameters in terms of buffer zone and rebalance frequency. The A/H selection mechanism, by construction results in an index displaying a higher dividend yield and less expensive valuation metrics and will be of interest to those who focus on valuation measures.



## Appendix 1: List of Dual-listed A/H Companies as of 31st March 2016

Company Name	Local Code (A)	Local Code (H)	ICB Supersector
China Oilfield Services Limited	601808.SH	2883.HK	Oil & Gas
China Petroleum & Chemical Corporation	600028.SH	0386.HK	Oil & Gas
Petrochina Company Limited	601857.SH	0857.HK	Oil & Gas
Shandong Molong Petroleum Machinery Co.,Ltd.	002490.SZ	0568.HK	Oil & Gas
Xinjiang Goldwind Science&Technology Co.,Ltd	002202.SZ	2208.HK	Oil & Gas
Sinopec Oilfield Service Corporation	600871.SH	1033.HK	Chemicals
Sinopec Shanghai Petrochemical Company Limited	600688.SH	0338.HK	Chemicals
Aluminum Corporation of China Limited	601600.SH	2600.HK	Basic Resources
Angang Steel Company Limited	000898.SZ	0347.HK	Basic Resources
China Coal Energy Company Limited	601898.SH	1898.HK	Basic Resources
China Molybdenum Co.,Ltd.	603993.SH	3993.HK	Basic Resources
China Shenhua Energy Company Limited	601088.SH	1088.HK	Basic Resources
Chongqing Iron & Steel Company Limited	601005.SH	1053.HK	Basic Resources
Jiangxi Copper Company Limited	600362.SH	0358.HK	Basic Resources
Maanshan Iron & Steel Company Limited	600808.SH	0323.HK	Basic Resources
Shandong Chenming Paper Holdings Limited	000488.SZ	1812.HK	Basic Resources
Yanzhou Coal Mining Company Limited	600188.SH	1171.HK	Basic Resources
Zijin Mining Group Company Limited	601899.SH	2899.HK	Basic Resources
Anhui Conch Cement Company Limited	600585.SH	0914.HK	Construction & Materials
BBMG Corporation	601992.SH	2009.HK	Construction & Materials
China Communications Construction Company Limited	601800.SH	1800.HK	Construction & Materials
China Railway Construction Corporation Limited	601186.SH	1186.HK	Construction & Materials
China Railway Group Limited	601390.SH	0390.HK	Construction & Materials
Luoyang Glass Company Limited	600876.SH	1108.HK	Construction & Materials
Metallurgical Corporation of China Ltd.	601618.SH	1618.HK	Construction & Materials
Anhui Expressway Company Limited	600012.SH	0995.HK	Industrial Goods & Services
Beijing Jingcheng Machinery Electric Company Limited	600860.SH	0187.HK	Industrial Goods & Services
China COSCO Holdings Company Limited	601919.SH	1919.HK	Industrial Goods & Services
China International Marine Containers (Group) Co., Ltd	000039.SZ	2039.HK	Industrial Goods & Services
China Shipping Container Lines Company Limited	601866.SH	2866.HK	Industrial Goods & Services
China Shipping Development Company Limited	600026.SH	1138.HK	Industrial Goods & Services
CRRC Corporation Limited	601766.SH	1766.HK	Industrial Goods & Services
CSSC Offshore & Marine Engineering (Group) Company Limited	600685.SH	0317.HK	Industrial Goods & Services
Dalian Port (PDA) Company Limited	601880.SH	2880.HK	Industrial Goods & Services
Dongfang Electric Corporation Limited	600875.SH	1072.HK	Industrial Goods & Services
Dongjiang Environmental Company Limited	002672.SZ	0895.HK	Industrial Goods & Services

Company Name	Local Code (A)	Local Code (H)	ICB Supersector
First Tractor Company Limited	601038.SH	0038.HK	Industrial Goods & Services
Jiangsu Expressway Company Limited	600377.SH	0177.HK	Industrial Goods & Services
Northeast Electric Development Company Limited	000585.SZ	0042.HK	Industrial Goods & Services
Shanghai Electric Group Company Limited	601727.SH	2727.HK	Industrial Goods & Services
Shenji Group Kunming Machine Tool Company Limited	600806.SH	0300.HK	Industrial Goods & Services
Shenzhen Expressway Company Limited	600548.SH	0548.HK	Industrial Goods & Services
Sichuan Expressway Company Limited	601107.SH	0107.HK	Industrial Goods & Services
Weichai Power Co.,Ltd.	000338.SZ	2338.HK	Industrial Goods & Services
Zhengzhou Coal Mining Machinery Group Co., Ltd	601717.SH	0564.HK	Industrial Goods & Services
Zoomlion Heavy Industry Science and Technology Co., Ltd.	000157.SZ	1157.HK	Industrial Goods & Services
BYD Company Limited	002594.SZ	1211.HK	Automobiles & Parts
Fuyao Glass Industry Group Co.,Ltd	600660.SH	3606.HK	Automobiles & Parts
Great Wall Motor Company Limited	601633.SH	2333.HK	Automobiles & Parts
Guangzhou Automobile Group Co., Ltd.	601238.SH	2238.HK	Automobiles & Parts
Zhejiang Shibao Company Limited	002703.SZ	1057.HK	Automobiles & Parts
Tsingtao Brewery Company Limited	600600.SH	0168.HK	Food & Beverage
Hisense Kelon Electrical Holdings Company Limited	000921.SZ	0921.HK	Personal & Household Goods
Guangzhou Baiyunshan Pharmaceutical Holdings Company Limited	600332.SH	0874.HK	Health Care
Livzon Pharmaceutical Group Inc.	000513.SZ	1513.HK	Health Care
Shandong Xinhua Pharmaceutical Company Limited	000756.SZ	0719.HK	Health Care
Shanghai Fosun Pharmaceutical (Group) Co., Ltd.	600196.SH	2196.HK	Health Care
Shanghai Pharmaceuticals Holding Co.,Ltd	601607.SH	2607.HK	Health Care
Air China Limited	601111.SH	0753.HK	Travel & Leisure
China Eastern Airlines Corporation Limited	600115.SH	0670.HK	Travel & Leisure
China Southern Airlines Company Limited	600029.SH	1055.HK	Travel & Leisure
Guangshen Railway Company Limited	601333.SH	0525.HK	Travel & Leisure
Datang International Power Generation Co.,Ltd.	601991.SH	0991.HK	Utilities
Huadian Power International Corporation Limited	600027.SH	1071.HK	Utilities
Huaneng Power International,Inc.	600011.SH	0902.HK	Utilities
Tianjin Capital Environmental Protection Group Company Limited	600874.SH	1065.HK	Utilities
Agricultural Bank of China Limited	601288.SH	1288.HK	Banks
Bank of China Limited	601988.SH	3988.HK	Banks
Bank of Communications Co.,Ltd.	601328.SH	3328.HK	Banks
China CITIC Bank Corporation Limited	601998.SH	0998.HK	Banks
China Construction Bank Corporation	601939.SH	0939.HK	Banks
China Everbright Bank Co.,Ltd.	601818.SH	6818.HK	Banks
China Merchants Bank Co., Ltd.	600036.SH	3968.HK	Banks
China Minsheng Banking Corp., Ltd.	600016.SH	1988.HK	Banks

Company Name	Local Code (A)	Local Code (H)	ICB Supersector
Industrial and Commercial Bank of China Limited	601398.SH	1398.HK	Banks
China Life Insurance Company Limited	601628.SH	2628.HK	Insurance
China Pacific Insurance (Group) Co., Ltd.	601601.SH	2601.HK	Insurance
New China Life Insurance Company Ltd.	601336.SH	1336.HK	Insurance
Ping An Insurance (Group) Company of China, Ltd.	601318.SH	2318.HK	Insurance
Beijing North Star Company Limited	601588.SH	0588.HK	Real Estate
China Vanke Co.,Ltd.	000002.SZ	2202.HK	Real Estate
CITIC Securities Company Limited	600030.SH	6030.HK	Financial Services
GF Securities Co., Ltd.	000776.SZ	1776.HK	Financial Services
HAITONG Securities Company Limited	600837.SH	6837.HK	Financial Services
Huatai Securities Co.,Ltd.	601688.SH	6886.HK	Financial Services
Nanjing Panda Electronics Company Limited	600775.SH	0553.HK	Technology
ZTE Corporation	000063.SZ	0763.HK	Technology

Source: FTSE Russell, data as at 31 March 2016.

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