

## **The A-H Premium and Implications for Global Investing in Chinese Stocks**

**Jennifer N. Carpenter**  
New York University

**Robert F. Whitelaw**  
New York University

**Dongchen Zou**  
University of Chicago

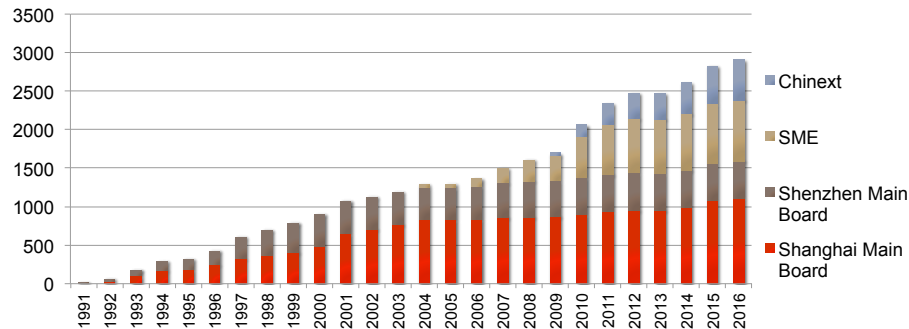


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### **Motivation and Context**

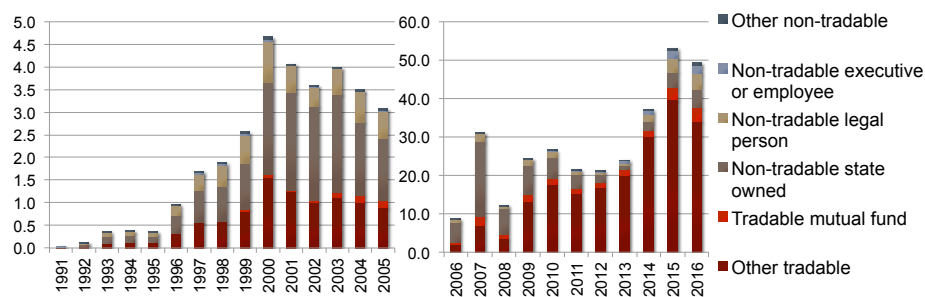
- China has a large, growing, and volatile equity market  
→ pricing is important both to domestic investors and increasingly to global investors
- However many Chinese firms have equity traded on exchanges other than Shanghai and Shenzhen  
→ we can potentially observe pricing by different groups of investors
- A-H dual-listed stocks, i.e., stocks listed both in Shanghai or Shenzhen and in Hong Kong provide a laboratory for examining this differential pricing  
→ implications for global investing in Chinese stocks (among other things)

## Number of Listed Firms on SSE and SZSE 1991-2016



- Opened in 1991 in Shanghai and Shenzhen as Deng Xiaoping's privatization experiment.
- Shanghai and Shenzhen main boards list larger, mature firms.
- SME and ChiNext boards on Shenzhen Stock Exchange list smaller, more entrepreneurial firms.
- Now has over 3300 stocks listed.

## Market Capitalization in Trillion RMB 1991-2016



- China's stock market now has \$8T capitalization. World's 2<sup>nd</sup> largest.
- Split between tradable and non-tradable shares has evolved over time.
  - Traditionally majority of shares were non-tradable state owned.
  - Split-Share Reform of 2005 enabled the unlock of non-tradable shares. Now over 75% of shares are tradable.

## China's A-Share Market – Casino? Or Crystal Ball?



- Many distinctive features – 80% of volume is retail, market segmented by capital controls.
- First labeled a casino in 2001 after period of speculation and fraud.
- Rollercoaster ride of 2015 cements market's casino reputation.
- Recent research suggests that since 2004 prices in China are as informative about future earnings as those in the US (Carpenter, Lu, Whitelaw 2017)

## Where Are Chinese Firms Traded?

Designation	Exchange	Country of Incorporation	Currency	Number of Firms
A shares	SSE/SZSE	China	RMB	3384
B shares	SSE/SZSE	China	USD/HKD	100
H shares	HKEX	China	HKD	246
Dual-listed A, H	SSE/SZSE, HKEX	China	RMB, HKD	94
Red-chips (SOE)	HKEX	HK, CI, BVI, Bermuda	HKD	158
P-chips	HKEX	CI, BVI, Berm.	HKD	~600
N shares	NYSE/NASDAQ	Outside China	USD	90
S shares	SGX	Outside China	SGD/USD	100+
L shares	LSE	Outside China	GBP	50+

A, B, H shares, Red-chips: <https://www.hkex.com.hk/eng/csm/highlight.htm>

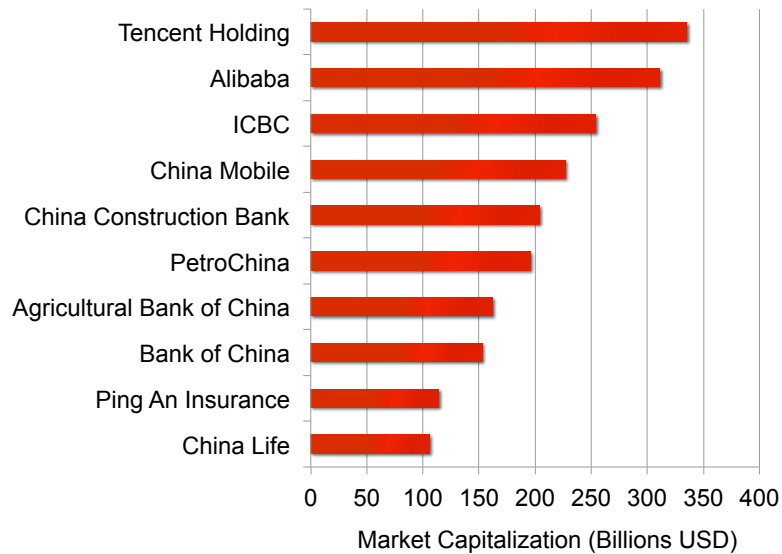
P-chips: [https://www.hkex.com.hk/eng/listing/listhk/our\\_markets.htm](https://www.hkex.com.hk/eng/listing/listhk/our_markets.htm)

N shares: <http://topforeignstocks.com/foreign-adrs-list/the-full-list-of-chinese-adrs/>

S shares: <http://www.cnbc.com/2017/04/27/more-chinese-firms-are-saying-goodbye-to-singapores-stock-market.html>

L shares: <http://www.lseg.com/sites/default/files/content/documents/Equity%20Primary%20Markets%20Presentation.pdf>

### 10 Largest Chinese Stocks as of May 22, 2017



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Company	Mkt Cap \$Billion	Share Class	Exchange	Inc	HQ	Industry
Tencent Holding	335	P-chip	SEHK	CI	SZ	TMT
Alibaba	311	N share	NYSE	CI	HZ	TMT
ICBC	254	A, H share	SSE, SEHK	CN	BJ	BANKS
China Mobile	227	Red-chip	SEHK	HK	HK	TMT
China Construction Bank	204	A, H share	SSE, SEHK	CN	BJ	BANKS
PetroChina	196	A, H share	SSE, SEHK	CN	BJ	OIL
Agricultural Bank of China	162	A, H share	SSE, SEHK	CN	BJ	BANKS
Bank of China	153	A, H share	SSE, SEHK	CN	BJ	BANKS
Ping An Insurance	114	A, H share	SSE, SEHK	CN	SZ	INSURANCE
China Life	106	A, H share	SSE, SEHK	CN	BJ	INSURANCE

## **How are these Companies Priced and Why Should We Care?**

- Why is this a difficult question to answer?
  - We have a relatively short time series.
  - The markets have high volatility.
  - Segmented markets and endogenous choice of listing venue make comparisons across markets and firms problematic.
- There are many issues for which pricing is critical.
  - Cost and allocation of capital.
  - Listing choice.
  - Investment decisions by Chinese and global investors, which will affect the first two issues if prices are affected.

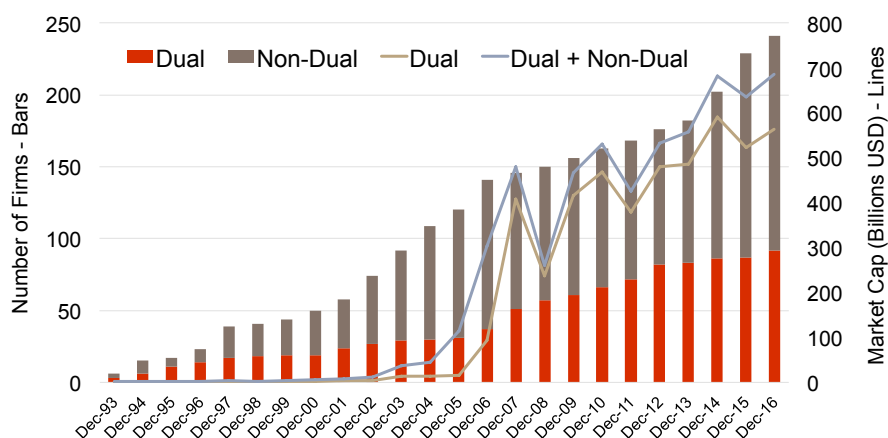
## **A Laboratory: A-H Dual Listing**

- 90+ companies have shares listed on both the Hong Kong Stock Exchange and either the Shanghai or Shenzhen Exchanges
- These shares have the same cash flows (dividends) and voting rights
- Nevertheless, they often trade at significantly different prices when converted to a common currency
- What can the relative pricing of these shares tell us?
- What about A-B dual listing and the associated premiums?
  - The B share market has atrophied since 2001 after Chinese investors were allowed to buy these shares and international investors could buy A shares through the QFII program.
  - See Carpenter and Whitelaw (ARFE 2017) for a comprehensive summary of the literature.

## Outline

- A-H dual listing
- The A-H premium
  - Descriptive statistics
  - Cross-sectional pricing of A and H shares
  - Explaining the A-H premium with discount rates in the cross-section and time series
- Implications for global investors

## Number & Market Capitalization of H Shares 1993-2016

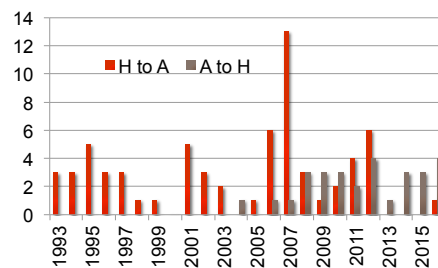


## An Aside: Listing Choice

- The ability to list in China is heavily restricted.
  - Onerous listing requirements include a history of positive earnings.
  - Listing requires CSRC not just exchange approval.
  - The CSRC limits the number of IPOs and frequently closes the IPO market.
  - 500 firms are currently in line to IPO.
- The offering price of an IPO is also tightly controlled.
  - Restrictions on P/E ratios at time of listing.
  - Extreme average underpricing of 100-150%
- Foreign ownership of firms in certain industries is prohibited, which motivates the Variable Interest Entity (VIE) structure.

## The History of Cross-Listings

- The market associated with the second listing.



- The first dual-listed stock: Tsingtao.
  - Listed on HKEX 7/15/1993
  - Listed on SSE 8/27/1993



## Measuring the A-H Premium

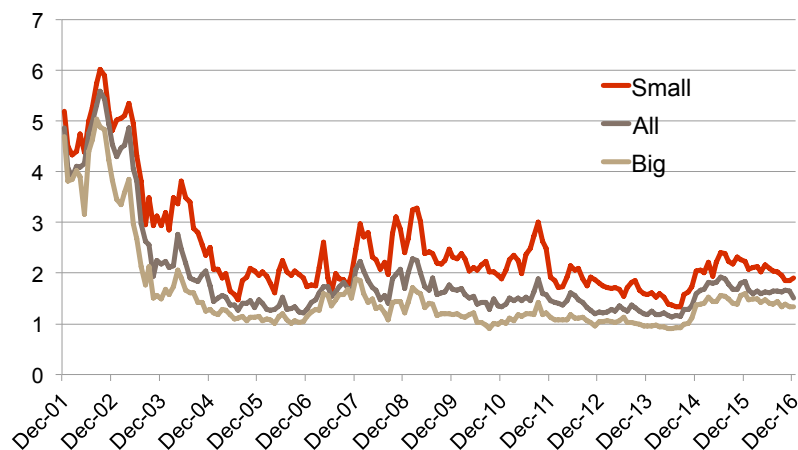
- Define the A-H premium as

$$\frac{\text{A price}}{\text{H price}} \quad \text{or} \quad \ln\left(\frac{\text{A price}}{\text{H price}}\right)$$

where prices are in a common currency.

- The log transformation
  - Treats premiums and discounts symmetrically.
  - Makes the cross-sectional distribution of the premiums symmetric.

## Median A-H Premium (A Price/H Price)



Median A-H premium of dual listed stocks. All is the full sample of all dual-listed stocks. Small and Big are the subsamples of the smallest half and the largest half of stocks ranked by market capitalization.



## Observations

- On average, A shares trade at a premium, in contrast to most evidence on cross-listing effects.
- There is substantial time-variation in the premium.
- The premium dropped dramatically, from 5 to 1.5, over the initial years of the sample, but it has arguably been stationary thereafter.
- There is substantial cross-sectional variation. For example, currently

Company	Industry	A-H Premium
Tianjin Capital	Utilities	3.67
SH Electric	Industrials	2.98
Jiangsu Express	Industrials	0.99
Conch Cement	Properties & Construction	0.92

## Thinking About the A-H Premium

- The existence of an A-H premium does not imply an arbitrage opportunity.
  - No maturity/convergence date.
  - Short sales restrictions on the Shanghai and Shenzhen exchanges.
- But it is a violation of the law of one price.
- Under discounted cash flow valuation only two things effect value (price).
  - Expected cash flows.
  - Discount rates.
- Cash flows are the same.
  - Does this mean expected cash flows are the same? (Jia, Wang, Xiong 2016)
  - Differential "expropriation" risk?
- The natural place to look is discount rates (segmented markets)

## Are Dual-Listed Firms Representative of the Broader Markets?

Tradable-value-weighted annualized monthly portfolio excess USD returns 2002-2016

		All Firms		Dual-Listed Firms	
		A Shares	H Shares	A shares	H Shares
Mean (%)		11.75	23.60	10.24	21.09
Volatility (%)		30.05	29.09	25.87	27.24
Correlation	US Market	0.29	0.52	0.34	0.52
	Global Market	0.34	0.60	0.38	0.60
	A Shares - All			0.82	
	H Shares - All				0.996
	A Shares - DL				0.68

- Means and volatilities are very similar for dual-listed and other stocks.
- Dual-listed A and H shares are highly correlated with their non-dual-listed counterparts traded on the same exchange.

## Thinking About Discount Rates

- Classic Fama-Macbeth cross-sectional regression methodology with Newey-West standard error adjustment in the second stage.
- Taking the US as a basis for comparison, although we know many international developed markets exhibit similar pricing patterns.
- Scale variables as needed so that the coefficients are comparable across markets.
  - US, monthly, 1995-2016
  - China A shares, monthly, 1995-2016
  - Hong Kong H shares, monthly, 2002-2016
- Short sample will reduce the power of the estimation.
- Weighted least squares in the second stage to account for the increasing size of the cross-section in China and Hong Kong.

### US 1995-2016

	Beta	Size	BM	Mom	Illiq	Max	Rev
Mean	0.91	19.75	0.61	0.124	1.1398	0.070	0.010
Std. Dev.	1.36	1.89	0.46	0.483	4.2608	0.049	0.125
Skewness	0.22	0.15	1.52	1.20	6.85	2.18	3.44
5th percentile	-1.24	16.71	0.10	-0.497	0.0003	0.021	-0.184
25th percentile	0.12	18.37	0.29	-0.181	0.0034	0.037	-0.063
50th percentile	0.83	19.70	0.50	0.049	0.0292	0.057	0.003
75th percentile	1.65	21.05	0.81	0.320	0.3174	0.087	0.073
Coeff.	-0.06	-0.16	0.22	0.12			
(t-stat.)	(-0.80)	(-2.25)	(1.16)	(0.34)			
	-0.03	-0.15	0.23	0.09	0.057	-3.77	-2.09
	(-0.42)	(-2.80)	(1.29)	(0.25)	(1.71)	(-1.98)	(-3.36)
WLS	-0.02	-0.16	0.23	0.19	0.056	-3.48	-2.30
	(-0.36)	(-2.70)	(1.19)	(0.54)	(1.92)	(-1.72)	(-3.65)

### China A Shares 1995-2016

	Beta	Size	BM	Mom	Illiq	Max	Rev
Mean	1.05	19.74	0.40	0.222	0.0073	0.059	0.020
Std. Dev.	0.71	0.81	0.24	0.386	0.0179	0.031	0.108
Skewness	-0.57	0.99	0.24	1.86	9.76	2.95	1.77
5th percentile	0.11	18.67	0.13	-0.259	0.0005	0.029	-0.117
25th percentile	0.73	19.16	0.26	-0.022	0.0020	0.042	-0.044
50th percentile	1.07	19.62	0.37	0.163	0.0045	0.055	0.005
75th percentile	1.39	20.17	0.52	0.400	0.0089	0.072	0.068
Coeff.	0.27	-0.88	0.58	0.25			
(t-stat.)	(1.85)	(-4.97)	(1.19)	(1.00)			
	0.32	-0.67	0.70	0.20	256.6	-16.38	-2.38
	(2.31)	(-3.74)	(1.64)	(0.82)	(2.46)	(-7.01)	(-2.29)
WLS	0.41	-0.73	0.37	0.17	294.6	-14.42	-3.94
	(4.41)	(-3.60)	(1.08)	(0.65)	(2.74)	(-6.72)	(-4.26)

## Hong Kong H Shares 2002-2016

	Beta	Size	BM	Mom	Illiq	Max	Rev
Mean	1.07	20.49	1.04	0.110	2.8539	0.080	0.015
Std. Dev.	1.47	2.31	0.86	0.516	13.5709	0.073	0.144
Skewness	-0.41	0.10	1.77	3.750	11.5537	12.795	1.286
5th percentile	-1.07	16.68	0.18	-0.425	0.0003	0.025	-0.189
25th percentile	0.42	18.71	0.50	-0.006	0.0026	0.042	-0.065
50th percentile	1.10	20.54	0.83	0.000	0.0178	0.062	0.000
75th percentile	1.77	22.16	1.38	0.091	0.2474	0.094	0.078
Coeff.	-0.05	-0.12	0.45	0.79			
(t-stat.)	(-0.62)	(-1.14)	(1.55)	(0.97)			
	-0.10	-0.03	0.37	0.67	0.09	-0.67	-2.57
	(-1.08)	(-0.26)	(1.22)	(0.77)	(1.52)	(-0.22)	(-1.84)
WLS	-0.11	-0.10	0.32	0.12	0.13	-0.22	-2.27
	(-1.17)	(-1.01)	(1.17)	(0.16)	(1.80)	(-0.08)	(-1.54)

## Highlights

US	Beta	Size	BM	Mom	Illiq	Max	Rev
WLS	-0.02	-0.16	0.23	0.19	0.056	-3.48	-2.30
	(-0.36)	(-2.70)	(1.19)	(0.54)	(1.92)	(-1.72)	(-3.65)
China A	Beta	Size	BM	Mom	Illiq	Max	Rev
WLS	0.41	-0.73	0.37	0.17	294.6	-14.42	-3.94
	(4.41)	(-3.60)	(1.08)	(0.65)	(2.74)	(-6.72)	(-4.26)
HK H	Beta	Size	BM	Mom	Illiq	Max	Rev
WLS	-0.11	-0.10	0.32	0.12	0.13	-0.22	-2.27
	(-1.17)	(-1.01)	(1.17)	(0.16)	(1.80)	(-0.08)	(-1.54)

- (Surprisingly?) similar cross-sectional pricing patterns, especially between the US and Hong Kong H shares
- Key differences in China—beta is priced, the size and max effect are large, illiq???

## Discount Rates and the A-H Premium

- We hypothesize that two types of factors affect the A-H premium.
  - Discount rates, i.e., systematic risk factors.
  - Barriers to convergence, i.e., factors that discourage convergence trading.
- Methodology
  - The natural setup is arguably a panel regression.
  - Time series average of cross-sectional coefficients (Fama-Macbeth style):

$$\ln \frac{P_i^A}{P_i^H} = X_i \gamma + \varepsilon_i$$

- Time series regressions of mean A-H premium:

$$\ln \left( \frac{P^A}{P^H} \right)_t = Z_t \delta + \varepsilon_t$$

- Variables?

## Cross-Sectional Regressions of Log(A price/H price) 2002-2016

Beta (A)	Beta (H)	Size	BM	Illiq Avg	Vol (A)	Vol (H)	D/P Avg	Rel. Float	Max (A)	Max (H)	Avg R <sup>2</sup>
-	+	-	+	+	+	+/-	-	-	+	-	
		-0.29									0.45
		(-18.76)									
				0.24							0.33
				(14.35)							
-0.06	0.05	-0.21	0.03	0.09	0.12	-0.03	-0.05	-0.08	0.00	-0.01	0.74
(-5.32)	(4.82)	(-8.90)	(2.19)	(6.43)	(6.17)	(-2.09)	(-5.09)	(-6.57)	(0.67)	(-1.09)	
-0.05	0.05	-0.24	0.03	0.07	0.10	-0.03	-0.06	-0.09	0.00	-0.01	0.80
(-3.95)	(5.06)	(-7.54)	(2.64)	(5.00)	(4.07)	(-2.08)	(-6.09)	(-6.46)	(0.38)	(-0.62)	

Bottom row includes industry controls

## Observations

- For some variables, e.g., size, there is only a single value across both markets.
- For some variables, e.g., illiquidity, the dominant effect has the same sign in both markets and the values are highly correlated across markets, so we use only the average value across the two markets.
- The coefficients have the predicted signs.
  - Higher discount rate in A share market → lower premium
  - Higher discount rate in H share market → higher premium
  - Greater barriers to convergence trading → higher premium
- Two of the most powerful variables are size and illiquidity, although size appears to partly subsume illiquidity.
- The R-squareds are consistently high.
- In spite of univariate evidence to the contrary, the industry effects are relatively weak.

## Is It Really Discount Rates?

- If the A-H premium depends on the relative discount rates of stocks in the two markets, then this premium should predict returns in the cross-section.
- To test this hypothesis, we run cross-sectional predictive regressions of the return spread on the A-H premium

$$r_{i,t+1}^H - r_{i,t+1}^A = \alpha + \beta \ln \left( \frac{P_i^A}{P_i^H} \right)_t + \varepsilon_{i,t+1}$$

	OLS	WLS	Avg R <sup>2</sup>
Coeff.	2.21	2.24	0.09
t-stat	(4.25)	(4.74)	

### Time Series Regressions of Log(A Price/H price) 2007-2016

Repo (A)	3-mth T-bill	TED Spd	SH Cnct	SZ Cnct	Vol (A)	Vol (H)	Pol Risk	Lag A-H	R <sup>2</sup>
-	+	+	-	-	-	+	-	+	
		0.13							0.27
		(6.66)							
					10.57				0.33
					(7.55)				
						12.34			0.42
						(9.20)			
								0.88	0.79
								(20.92)	
-0.01	0.01	0.04	0.06	0.01	-0.39	2.09	0.00	0.69	0.83
(-1.77)	(0.95)	(2.49)	(3.35)	(0.13)	(-0.36)	(1.43)	(-1.39)	(11.07)	

### Observations

- There is substantial common time-variation in the A-H premiums across stocks, which we proxy for with the average premium.
- In general, the coefficients have the predicted signs.
  - Higher discount rate in A share market → lower premium
  - Higher discount rate in H share market → higher premium
- Two of the most powerful variables are the TED spread and volatility.
- The volatility effect may be complex—(i) volatility is highly correlated across markets, (ii) there are two possibly offsetting effects on discount rates and barriers to convergence.
- The R-squareds are consistently high.
- The A-H premium is very persistent, which may generate spurious regression problems.
- We find consistent, although somewhat weaker, results using first differences of the A-H premium.

## Investment Opportunities for USD Global Investors

- Stocks traded in Hong Kong are accessible to global investors and have long been included in emerging market indexes.
- Stocks traded in Shanghai and Shenzhen are less accessible, although accessibility has been improving.
  - QFII/RQFII programs.
  - Shanghai-Hong Kong Stock Connect.
  - Shenzhen-Hong Kong Stock Connect.
  - MSCI and FTSE-Russell inclusion of A shares in their EM indexes.

## Opportunities in China for Global Equity Investors

- In contrast to perception, China's market has performed very well using traditional performance measures 1995-2016.

$R_M - R_F$	China	US	Europe
Ann. mean (%)	14.77	7.83	6.44
Ann. vol. (%)	31.63	15.32	17.51

- China has a low correlation with other large economies.

	China	US
US	0.19	
Europe	0.23	0.80

- Together these facts imply high potential alphas for global investors.

China		US		Global	
		1-factor	4-factor	1-factor	4-factor
$R_M - R_F$	Alpha	1.10	1.05	1.11	1.05
	t-stat.	1.49	1.37	1.55	1.38



## Does the A-H Premium Imply H Shares Are a Better Buy for Global Investors?

- Perhaps, though not necessarily.
- Time series variation in the premium means the convergence trade is risky.
- If the A-H premium is stationary or declining, then H shares will out-return their A counterparts through dividend yield or price appreciation.
- But from the viewpoint of a globally diversified investor, average security return and volatility are not the only considerations.
  - From portfolio theory, covariance with other global equity returns is a key consideration, and alpha is a better measure of performance than expected return.
  - The higher correlation of H shares with the global market erodes their alpha.

## H Share Versus A Share Correlations

Tradable-value-weighted annualized monthly portfolio excess USD returns 2002-2016

		All Firms		Dual-Listed Firms	
		A Shares	H Shares	A shares	H Shares
Mean (%)		11.75	23.60	10.24	21.09
Volatility (%)		30.05	29.09	25.87	27.24
Correlation	US Market	0.29	0.52	0.34	0.52
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	A Shares - All			0.82	
	H Shares - All				0.996
	A Shares - DL				0.68

- H shares, both dual-listed and non-dual, are more correlated with global market than their A share counterparts.
- Dual-listed A shares are not that highly correlated with their H shares.

## Annualized Global Four-Factor Alphas

	Exc Returns		Global Four-Factor Alphas & Betas						
	Mean	Vol		Alpha	Mkt	Size	Value	Mom	R <sup>2</sup>
Full 15-Year Sample Period 2002-2016									
A - All	11.75	30.05	Coeff	6.90	0.70	0.17	-0.28	0.12	0.12
			t-stat	0.90	4.62	0.44	-0.76	0.67	
H - All	23.60	29.09	Coeff	13.21	1.19	0.52	0.02	0.21	0.38
			t-stat	2.11	9.58	1.61	0.08	1.41	
Last 5-Year Sub Period 2012-2016									
A - All	9.33	25.29	Coeff	3.10	0.72	0.98	0.05	-0.30	0.18
			t-stat	0.26	2.38	1.49	0.07	-0.70	
H - All	11.21	22.74	Coeff	1.76	1.02	0.74	0.29	-0.38	0.40
			t-stat	0.19	4.38	1.46	0.58	-1.16	

- H share beta absorbs much of the return differential over A shares.
- The H share outperformance is attributable to the 2002-2006 subperiod, when the premium declined dramatically.
- A shares outperform H shares in the last 5 years.

## Conclusions

1. The A-H premium exhibits substantial cross-sectional and time series variation.
2. A significant fraction of this variation can be explained by factors that proxy for differential discount rates in the two markets and barriers to convergence trading.
3. There are apparent investment opportunities for global investors in both the A share and H share markets. However, the relative attractiveness depends on both the future evolution of the A-H premium and the extent to which the correlations between these markets and other global markets remain stable. Trading to exploit these potential investment opportunities will likely affect both these factors.