A GLOBAL INVESTOR'S PERSPECTIVE

THE POTENTIAL FOR QUANT IN THE CHINA A-SHARE MARKET

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January 2020

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FOREWORD

As the China A-share market becomes more accessible to offshore investors, and with global index providers increasing the weight of China A stocks in regional and global indices, the option for global or regional investors to treat China as a rounding error in their benchmarks is fast disappearing. The size (and growth) of the Chinese market and the fact that it has relatively low correlation with other global markets add further compulsion for global investors.

In this paper, we take an objective look at the China A-share market, and with reference to other global markets where quantitative strategies have been prevalent for decades, and attempt to assess the viability and potential challenges of deploying quantitative strategies in China's local market.

Our overall assessment is that the China A-share market has many of the ideal characteristics in which quantitative strategies should flourish. It is a liquid market, with relatively low transaction costs, a broad and diverse universe of stocks and high return dispersion. All ingredients that bode well for active strategies. Data (a prerequisite for quantitative strategies) is bountiful and a moderate amount of history – though less than other more developed markets – is available for backtesting strategies. There are however clear signs of different investor behaviours as well as structural nuances that must be considered and respected by quantitative investors.

This paper is not intended to be an exhaustive analysis of the market dynamics, nor is it a statement of any permanent structure to the market – in fact, one of our core conclusions is to expect China's market dynamics to change and this should be factored into any systematic strategy for the Chinese market.

THE POTENTIAL FOR QUANT IN THE CHINA A-SHARE MARKET

HISTORY AND SIZE OF THE CHINA A-SHARE MARKET

The Chinese domestic stock market has a history spanning over 30 years. China launched the Shanghai Stock Exchange in 1990, after public company shares were first issued in 1984. Since then the market has grown rapidly both in terms of the number of listed stocks and aggregate market capitalisation (cap). Figure 1 shows the number of stocks listed on the Shanghai and Shenzhen stock exchanges (1a) and the total market capitalisation of all listed securities (1b).

As at 31 October 2019, the total market cap of the China A-share market, spanning across the Shanghai and Shenzhen Stock Exchanges was CNY 55.1 trillion (USD 7.8 trillion) and consisted of almost 4000 listed companies. This is approximately the equivalent size of the Hong Kong listed H-shares and US listed ADRs. See Figure 2.

China market milestones

- December 1990 – Shanghai Stock Exchange started operations.
- July 1991 – Shenzhen Stock Exchange started operations.
- October 1992 – China Securities Regulatory Commission (CSRC) was established.
- November 2002 – Temporary regulations for Qualified Foreign Institutional Investor (QFII) was published. This was China's first attempt to open its stock market to foreign investors.
- October 2009 – Growth Enterprise Board was launched.
- December 2011 – Renminbi Qualified Foreign Institutional Investor (RQFII) scheme was established.
- November 2014 - Shanghai-HongKong Connect started operations.
- December 2016 - Shenzhen-HongKong Connect started operations.
- June 2019 - Shanghai-London Connect started operations.
- June 2019 - Science and Technology Board was launched.

TIMELINE OF MARKET REFORMS

Since the launch of the Shanghai Stock Exchange, China's regulators have undertaken numerous measures to improve the depth and accessibility of China's stock markets.

It has been the Chinese government's long-term goal to open up China's capital markets to foreign investors. As a result, China's stock market has undergone multiple stages of reforms.

The reforms first started with the creation of B-shares, which allowed foreign investors to invest in USD. With the development of H-shares (listed in Hong Kong) and the Qualified Foreign Institutional Investors (QFII) programme, the popularity of B-shares soon faded. Today there are only around 100 B-share stocks listed on the Shanghai and Shenzhen exchanges.

The QFII scheme was launched in 2002 and became a major channel for foreign investors to invest in the A-share market. Under QFII, foreign institutional investors go through a lengthy application process and are permitted to invest within a fixed quota upon approval.

Fig.1a. Number of stocks listed on Chinese local stock exchanges[1]

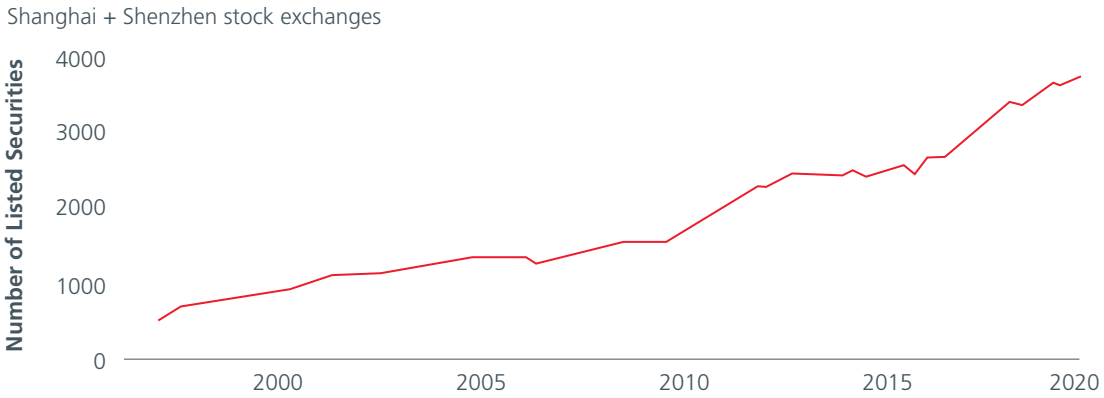


Fig. 1b. Total market capitalisation of stocks listed on China local stock exchanges[1]

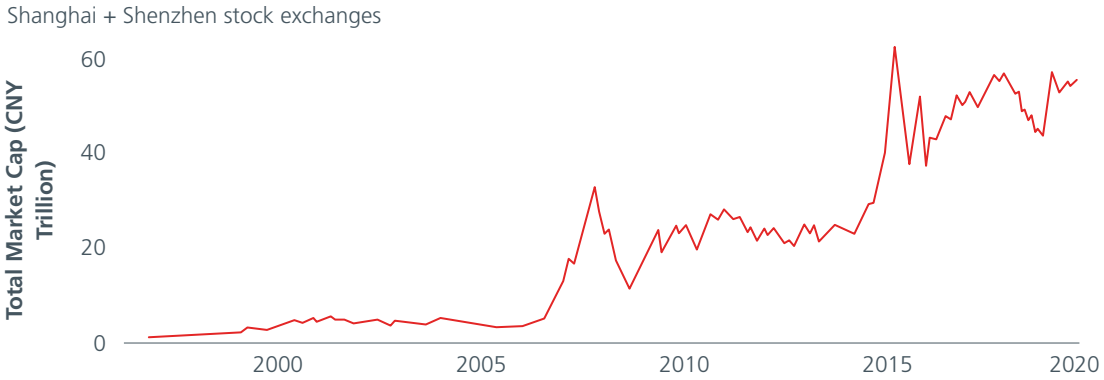


Fig. 2. Number of listings and total market cap of A, H–shares and Chinese ADRs[2]

	Number of Listings	Market Cap (CNY trillion)	Market Cap (USD trillion)
China A-Shares (Shanghai/Shenzhen Listed)	3,694	55.1	7.8
China H-Shares (Hong Kong Listed)	1,364	29.0	4.1
Chinese ADRs (US Listed)	316	23.3	3.3

[1]Eastspring Investments, Refinitiv (Datastream), 31 October 2019. [2]Eastspring Investments, Refinitiv (Datastream), Axioma 31 October 2019.

The Renminbi Qualified Foreign Instituitional Investor (RQFII) scheme, established in 2011, is an initiative which allows foreign investors with a RQFII quota to invest directly in China's bond and equity markets. At the end of 2018, the quotas for QFII and RQFII stood at USD 101 billion and RMB 656 billion respectively. The limits were removed in September 2019.

Around the same time, China launched the Qualified Domestic Institutional Investors (QDII) scheme which allowed domestic investors to invest in foreign markets. The quota for QDII stood at USD 103 billion as at the end of 2018, comparable to that of QFII.

However, the QFII and QDII programmes only allowed one-way investments and are two separate approval channels. On the other hand, the Shanghai-Hong Kong Stock Connect, launched in 2014, was a cross-border scheme which connected the Shanghai and Hong Kong stock markets.

Together with the Shenzhen-Hong Kong Stock Connect (launched in 2016), these two schemes became the major channels for foreign investors to invest in A-shares (Northbound), and domestic investors to invest in the Hong Kong market (Southbound). Over the period from January-October 2019, the trading volume of Northbound investors contributed to almost 8% of the A-share market's average daily stock turnover, while Southbound investors contributed to about 15% of the Hong Kong market's average daily stock turnover.

All of these efforts have gradually paved the way for Chinese A-shares to be included by major index providers in their indexes.

GLOBAL INDEX INCLUSION

MSCI first included China A-shares in their Global, China and Emerging Market indices at a 5% inclusion factor in May 2018. In February 2019, in response to further market reforms by Chinese regulators, the index provider announced a three-step process to lift the inclusion factor to 20% and to incorporate a larger number of A-share stocks:

Increased MSCI China A inclusion

May 2019	Increase to 10% inclusion factor and addition of ChiNext large cap stocks
August 2019	Increase to 15% inclusion factor
November 2019	Increase to 20% inclusion factor and addition of ChiNext mid cap stocks

Following MSCI, FTSE was the next index provider to include China-A shares in their Global and Emerging Market indices in June 2019. They have also put in place a series of steps that will lift the inclusion factor to 25% by March 2020.

While the next steps each of these index providers take and their timing may be less clear, they are expected to raise the inclusion factor for China A-shares as the Chinese regulators continue to reduce and/or lift market restrictions, particularly those impacting access for foreign investors.

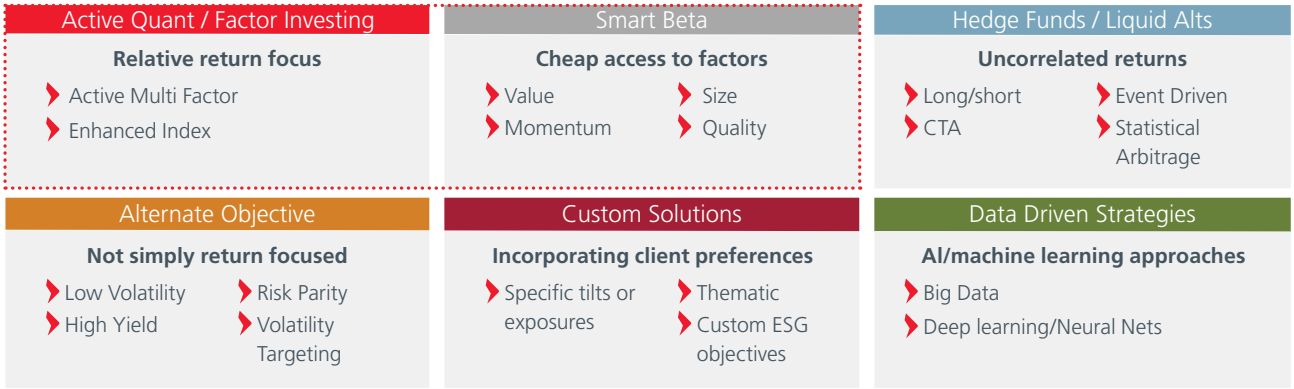
NARROWING THE SCOPE OF QUANT STRATEGIES

The range of investment approaches that are generally referred to as quantitative strategies is quite broad and the term "quant strategy" often needs to be further defined. Figure 3 shows a non-exhaustive list of such strategies in their different categories.

These strategies have several aspects in common:

- a belief that markets are not perfectly efficient
- a systematic approach to stock selection (e.g. scoring, ranking, return forecasts)
- a systematic approach to portfolio construction (e.g. sampling by quantiles, formula based, optimisation)
- a statistical or scientific approach to research in order to identify rewarded factors

Fig. 3. Illustrative list of investment strategies considered as quantitative strategies (non-exhaustive)



The observations and assessments made in this paper are done in the context of stock selection-based strategies which fall into the "Active Quant/ Factor Investing" and "Smart Beta" categories in Figure 3. They will however have some relevance to other quantitative strategies as well.

COMPARABLE UNIVERSES

In this paper, a series of comparative statistics is evaluated to give context to the Chinese market relative to other global markets and regions.

For China, the largest 800 stocks (by free float market cap) is used to represent China A-shares (large and mid-cap stocks). This is a proxy for the CSI 800 index, which is commonly used within China to represent large and mid-cap A-share stocks.

A comparable universe for several other markets and regions is formed from the members of the standard MSCI indices as these are widely used to represent large and mid-cap stocks within each market/region.

Developed Markets	MSCI World
Emerging Markets	MSCI Emerging Markets
Asia Pacific ex Japan	MSCI AC Asia Pacific ex Japan
US	MSCI USA
Japan	MSCI Japan
Hong Kong	MSCI Hong Kong

DATA

Quantitative strategies are highly dependent on data to support the necessary research to identify factors and to run backtest studies to validate the strategies. Ideally the data should be broad in coverage, reliable, accurate and have as long a history as possible. The following sections provide a high-level assessment of the data landscape for Chinese stocks.

Data Coverage

While quantitative strategies can benefit from many types of data, there are a few key datasets that are used to form many typical quantitative factors, including:

- market data (e.g. prices, volumes, corporate actions etc.)
- financial statement data (income statement, balance sheet and cashflow statement)
- sell-side analyst estimates and recommendations

For this data to be useful in forming typical quantitative factors, it must have broad coverage across the full spectrum of listed stocks. Global datasets have relatively good coverage for the China-A universe as shown in Figure 4.

Fig. 4. Percentage of securities with coverage in Datastream, Worldscope and IBES[3]

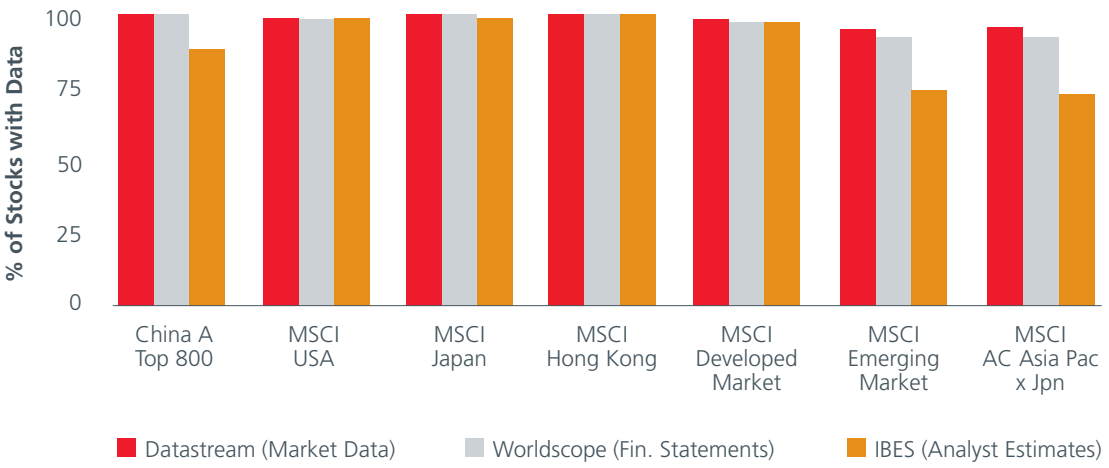
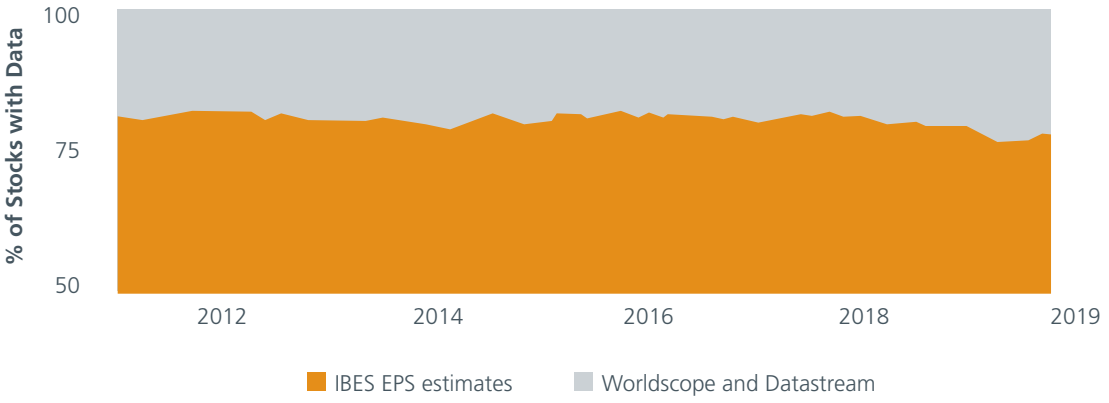


Fig. 5. Largest 800 China A-shares; percentage of securities with coverage[4]

Data Coverage: Dec 2010 to Oct 2019



[3]Eastspring Investments, MSCI, Refinitiv, 31 October 2019. [4]Eastspring Investments, Refinitiv, 31 October 2019. Coverage in Datastream is based on market capitalisation; Worldscope based on available historical financials data, and IBES based on avaialbe EPS forecast data.

Figure 5 shows that the historical coverage is also relatively robust for the largest 800 China A-shares.

This coverage, particularly for analyst estimate data, can be further improved by accessing local Chinese datasets. Well-known local data vendor, Wind, has >85% coverage for CSI 800 constituents (as at 30 August 2019).

Incorporating both global and local datasets has the additional advantage of capturing data from different brokers. Local datasets will have a better coverage of domestic brokers. Global datasets on the other hand will have additional coverage from non-Chinese brokers who do not have onshore presence.

Breadth of Data Sources

Data quality is always a key consideration for any dataset. Ideally, there should be competing products covering similar data. This not only allows comparison and cross validation of datasets, it also ensures that data vendors are incentivised (through competition) to validate their data and ensure high data quality.

The presence of several large global data vendors with coverage of the China-A market (e.g. Refinitiv, Factset, Bloomberg, S&P) alongside local vendors (e.g. Wind) bodes well for the long-term quality of Chinese market data and the ability to cross validate data points across multiple vendors.

Data History

One of the core research elements in forming quantitative strategies is estimating the performance (and other characteristics) of factors and strategies over as long a history as possible.

Longer histories allow the analyst to assess the implications of a factor or strategy's behaviour in different market environments, different phases of the business cycle and in the presence of different macro shocks and events.

The Chinese stock market is relatively young with relatively few listings in its early history, however the number and size of listings have grown rapidly over the past decade. Figure 6 shows the number of stocks and their total market cap within China's A-share market since 1997.

There is arguably sufficient breadth in terms of the number of shares, even back to 1997. However, the market's low capitalisation up until the second half of 2000s suggests that any market observations prior to then are not likely to be representative of the current market makeup or dynamics.

While a longer history and the ability to span multiple periods of varied market conditions would be preferable, the China A-share market's 12-year history is sufficient for researching and forming a quantitative strategy. Nevertheless, it would be prudent to re-evaluate findings with the passage of time. There is a need to be watchful for changes in market conditions and structural factors (e.g. increased foreign ownership and increased institutional ownership) that may not have been well represented in the earlier data.

IDEAL MARKET DYNAMICS FOR QUANT STRATEGIES

The ideal market characteristics for a quantitative stock-selection strategy include:

- Broad investable universe
- Sufficient liquidity
- Low direct trading costs
- Low indirect trading costs (market impact)
- Diverse stock and sector representation
- High cross-sectional return dispersion
- Moderate volatility

The following sections provide a high-level assessment of the characteristics of the Chinese market in comparison with other global markets.

Investable Universe Breadth

Cross-sectional stock selection models are formed by comparing stocks on selected factors against their peers at each point in history. In factor construction, a higher number of available stocks provides more

options to refine the peer comparison.

In a narrow market, for example, it may only be possible to compare against all the stocks in the market. In a broad market, however, the ability to compare against more homogenous peer groups (i.e. within sector, industry or even sub-industry) can enrich factor definitions.

A wider number of stocks also ensures a more reliable and robust estimation of factor returns and other aspects of factor behaviour.

In implementing a factor-based strategy, the greater the number of stocks available, the more diversified portfolios can be – thus gaining exposure to the desired factors while minimising idiosyncratic (stock specific) effects. This ability to have more diversified portfolios also plays a key role in the scalability in terms of strategy capacity for a factor-based strategy.

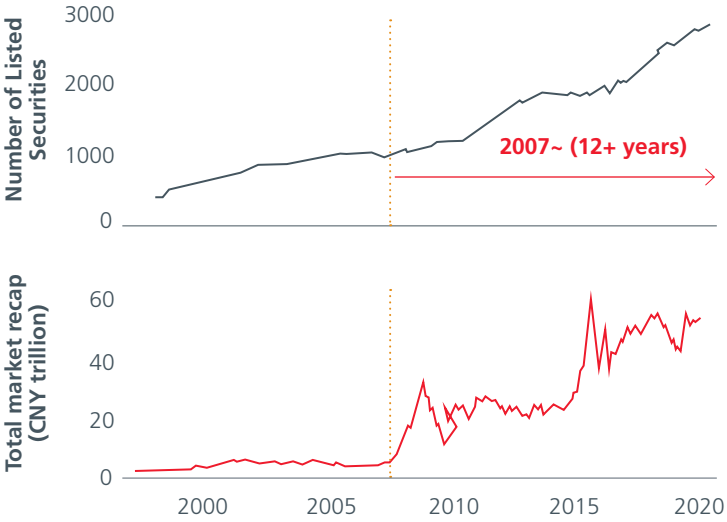
As highlighted earlier in Figure 6, the China A-share market today is very broad with almost 4,000 stocks listed on the local exchanges. While market breadth was narrower in the earlier years, as should be expected in a relatively young stock market, there is ample breadth relative to other global markets where quantitative strategies have been effectively employed.

Of course, the stocks need to be of sufficient liquidity to allow implementation at reasonable levels of assets under management. To assess this, we assume an average daily value traded (ADVT) of USD 25m. A portfolio manager with a fund size of USD 500m would be able to trade a 1% position in a single day while only accounting for 20% of the total (average) daily volume. This is a proxy for a tradeable size that does not adversely impact the market price.

Figure 7 shows the historical number of stocks listed in China (red) and globally (grey) with at least USD 25m of average daily value traded. About half of all global stocks that have this level of liquidity can be found in the China A-share market. In fact, there are over 2,400 stocks in China at the end of October 2019 that meet this condition.

Figure 6: Number and market cap of stocks listed on Chinese local stock exchanges[5]

Shanghai + Shenzhen stock exchanges

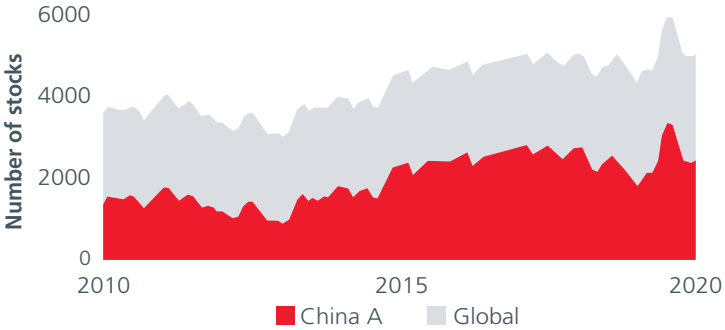


Market Liquidity

The previous assessment of market breadth considered a minimum level of liquidity at the individual stock level. However, it is also important to assess how much liquidity there is in aggregate across a typical investible universe.

Figure 7: Number of stocks listed on Chinese local stock exchanges and globally[6]

Stocks with 20-day average daily volume > USD25m
(Nov 2009 to Oct 2019)



[5]Eastspring Investments, Refinitiv, 31 October 2019. [6]Eastspring Investments, MSCI, Refinitiv, 31 October 2019.

Figure 8 shows the total value traded as a proportion of free float market cap (turnover) for the 800 largest China A-share stocks compared to other global markets and regions over a 12-month period to October 2019.

The turnover of the Chinese market is significantly higher than the other global markets and regions. This is good news from the perspective of being able to effectively implement quantitative strategies. However, it also reflects a very different set of investor behaviours in the China A-share market.

As later exhibits will show, retail investors in China hold a much higher proportion of shares (and ultimately trading activity) compared to other markets. The tendency for these investors to actively trade their shares drives pronounced market inefficiencies that must be acknowledged and potentially exploited.

Direct Trading Costs

In addition to the ability to access sufficient liquidity, the costs of trading are a critical consideration in any strategy. This includes both direct costs (from broker commissions, exchange fees, trade-based taxes etc.) as well as the indirect costs arising from the bid/ask spread of stocks and market impact.

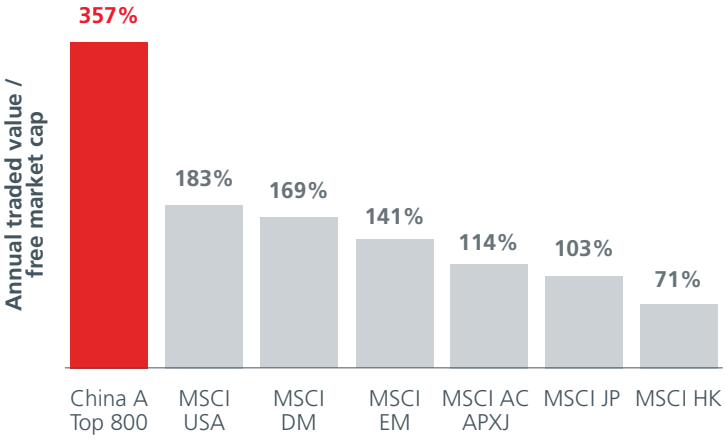
Figure 9 shows the round-trip (buy + sell) fixed costs from trading USD 1m worth of stocks in the China A-share market versus US, Hong Kong and Japan. A commission rate of 0.10% is assumed for all four markets.

For the China A-share market, the trading costs for a domestic investor in China versus the costs for an offshore investor investing through the Stock Connect platform are also shown.

The direct transaction costs for the China A-share market at 0.31% (onshore investor) to 0.32% (offshore investor) are cheaper than for Hong Kong (0.42%) or Japan (0.40%), although the costs are more expensive than for the US (0.20%).

Fig. 8. Proportion of free float market cap traded in the 1-year period[7]

Nov 2018 to Oct 2019



Indirect Trading Costs

In addition to fixed costs, any implemented strategy will incur (and should be compensated for) indirect trading costs. This includes crossing the bid-ask spread and the impact on market prices as a result of the orders from the strategy.

Figure 10 shows the median bid-ask spread (as a percentage of the closing stock price) for the 800 largest China A stocks relative to other global markets and regions.

The spreads in the China A-share market are narrow, particularly relative to its Emerging market and Asian peers. This will help lower the indirect cost of implementing quantitative strategies in the China A -share market.

Our earlier observations suggest there is ample liquidity in the China A-share market and the impact of trading is expected to be minimal at moderate asset (AUM) levels. While we have not explicitly considered the likely market impact of large AUM levels, it is not expected to be a major hinderance for quantitative strategies with a moderate turnover, given the liquidity of the China A-share market relative to the other global markets.

[7]Eastspring Investments, MSCI, Refinitiv, 31 October 2019

Fig. 9. Fixed costs for a USD 1m trade round trip (buy + sell)[8]

Assumes 0.10% commission

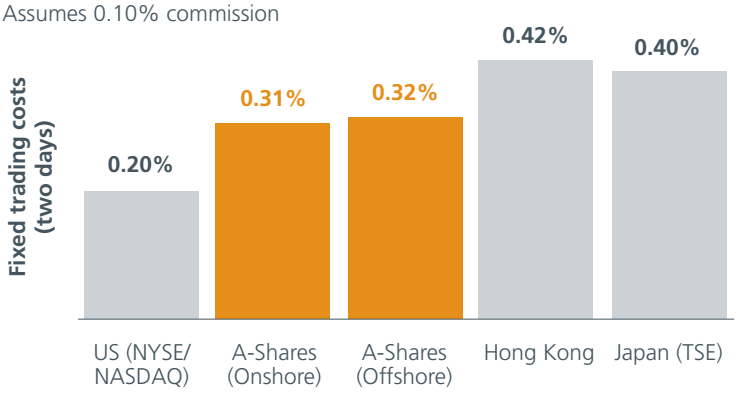
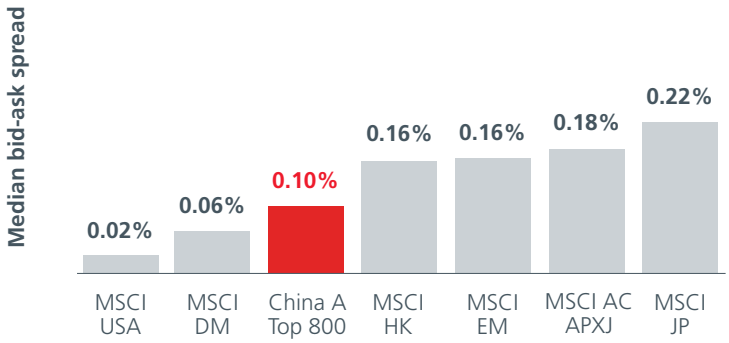


Fig. 10. Median bid-ask spread (as a proportion of the closing mid-price)[9]

As at Oct 2019



[8]ITG (May 2019). [9]Eastspring Investments, MSCI, Refinitiv, 31 October 2019. [9]Eastspring Investments, MSCI, Refinitiv, 31 October 2019.

Diverse Stock and Sector Representation

Market concentration in a small number of stocks or in a specific industry or sector is sub-optimal for a stock-selection based quantitative strategy. Particularly for a long-only strategy that aims to be relative sector neutral and with moderate relative stock positions, dominant stocks and sectors will tie up large proportions of the fund's capital in matching index weights.

Figure 11 shows the breakdown (proportion of market cap) by decile of market cap for the largest 800 China A stocks against USA, Japan and Hong Kong. The first bar in each facet represents the proportion of total market cap accounted for by 10% of the stocks with the largest market cap.

While the China A-share market is highly concentrated in this first decile (80 largest stocks), the concentration is similar in scale to that of MSCI USA. Beyond the first decile, the concentration is much more moderate – even more so than for the US.

On the sector front, the China A-share market enjoys broad diversity. Figure 12 shows the breakdown of market cap by GICS sector (level 1). Financials are a large proportion of the overall market cap (at almost 30%), but all other sectors have meaningful contribution beyond that.

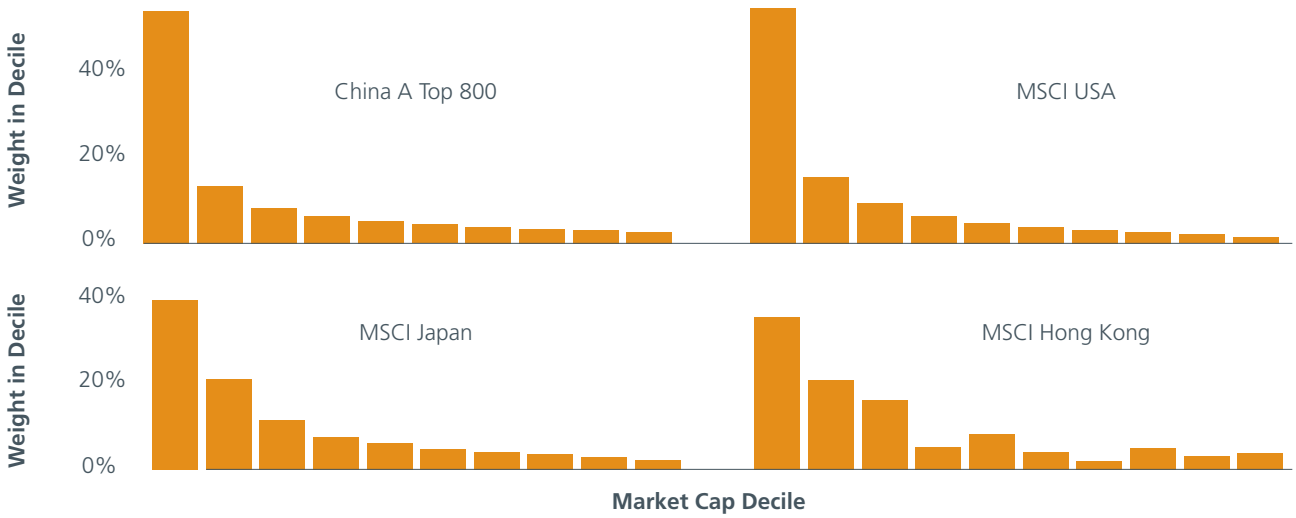
By comparison, the sector breakdown in China appears more diverse than the rest of Asia and the US. Figure 13 shows the same market cap breakdown by GICS sector for MSCI Asia Pacific ex Japan, USA, Japan and Hong Kong.

Not only does the China A-share market have broad sector diversity, this diversity has remained fairly stable. Figure 14 shows the same market cap breakdown by GICS sector for the 800 largest China A-shares since December 2010. The market's broad and stable sector diversity would be very useful when assessing any factor or strategy backtesting results over this period.

Cross-sectional Return Dispersion

A cross-sectional stock selection strategy that aims to separate winners and losers is dependent on stock prices varying from each other in each period. The wider the spread of returns in each period, the more opportunity there is for a quantitative strategy (or an active investor) to be rewarded for its stock selection ability.

Fig. 11. Proportion of market cap in each decile (ranked by descending market cap)[10]



[10]Eastspring Investments, MSCI, Refinitiv, 31 October 2019

Fig. 12. Breakdown of total market cap by GICS sector for the largest 800 China A-shares[11]

As at Oct 2019

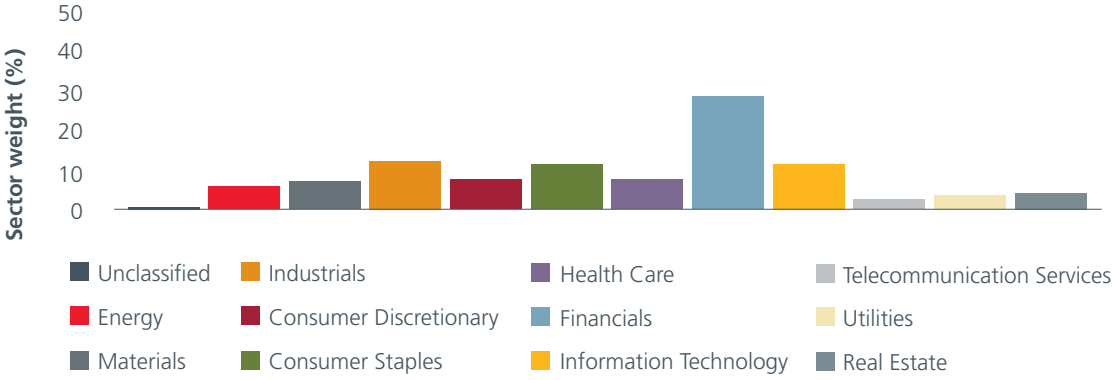


Fig.13. Breakdown of total market cap by GICS sector for the largest 800 China A-shares[11]

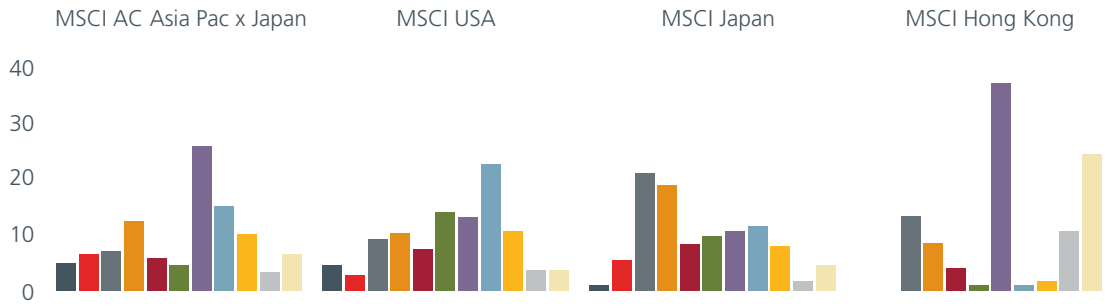
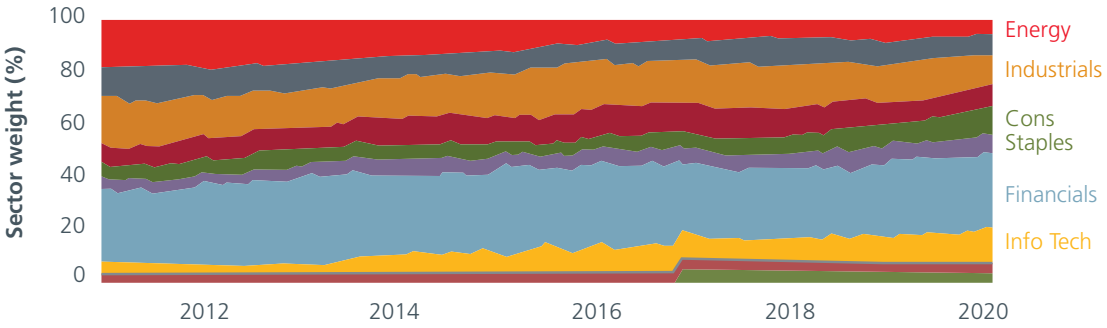


Fig. 14. Breakdown of total market cap by GICS sector for the largest 800 China A-shares[13]

China A Top 800: Dec 2010 to Oct 2019



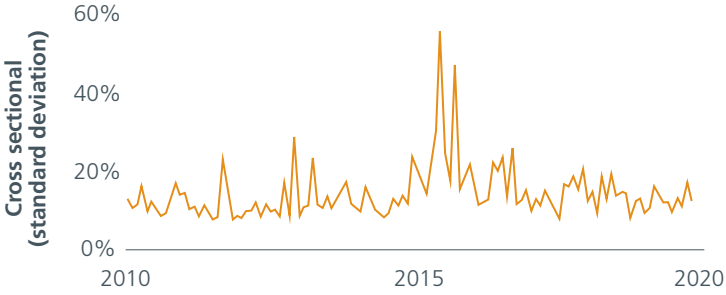
[11]Eastspring Investments, MSCI, Refinitiv, 31 October 2019. [12]Eastspring Investments, MSCI, Refinitiv, 31 October 2019. [13]Eastspring Investments, MSCI, Refinitiv, 31 October 2019.

Figure 15 shows the time series of the cross-sectional return dispersion for the largest 800 China A stocks (measured as the standard deviation of stock returns within each month). Over the 10-year period to October 2019, the monthly average of the cross-sectional standard deviation of returns is 13.9% with the return dispersion significantly higher in some periods.

By comparison, figure 16 shows that the spread of returns in the China A-share market is consistently higher than that of the developed and emerging markets where the average cross-sectional standard deviation over the same period was 7.0% and 8.7% respectively.

Fig. 15. Monthly cross-sectional standard deviation of returns for largest 800 China A-shares[14]

China A Top 800: Nov 2009 to Oct 2019



Market Volatility

High cross-sectional volatility is ideal for active quantitative strategies, but for a long-only strategy, the volatility of the overall market also needs to be considered. The China A-share market is known for being more volatile.

Figure 17 shows the rolling 250-day (1-year) volatility for both the CSI 800 index and the MSCI USA index. The average volatility for the CSI 800 index over the 10 years to October 2019 was 22.7%, significantly higher than the MSCI USA's average volatility of 14.6%.

On the other hand, the average volatility of the CSI 800 index appears relatively similar to that of the emerging markets (which have a moderate weighting in China A shares since 2014) at 20.8%. See figure 18. Both markets however exhibited heightened volatility over different periods.

In 2011-2012, the emerging markets experienced heightened volatility as investors feared contagion from the European debt crisis and slowing global growth. This did little to dampen Chinese investor sentiment as the domestic economy appeared resilient.

In 2015-2016, it was the China A-share market's turn for a bumpy ride. The market rallied strongly on the back of accommodative macro policies and supportive regulatory changes. The Chinese central bank had eased its monetary policy and President Xi Jinping had just announced the "One-Belt-One-Road" initiative. A sharp rise in margin lending fuelled a frenzied rally in the Chinese stock market – at one point, retail investors were permitted to open up to 20 brokerage accounts. Meanwhile, investor sentiment was riding high on expectations that MSCI was going to include A-shares into their major index for the first time. The rally peaked in the middle of June 2015, triggered by MSCI's rejection and the Chinese regulator's clamp down on margin lending. The over-heated A-share market started its meltdown before it bottomed out in 2016.

More recently, the increase in volatility in China A-shares on the back of the US-China trade dispute has not spilled over (entirely) into the broader emerging markets.

RELEVANT INVESTOR DEMOGRAPHICS

Markets and changes in underlying asset prices are ultimately driven by the actions of investors as they digest all available information, assess the relative attractiveness of alternate investment opportunities and then ultimately transact on those assessments.

There are many participants in the markets, ranging from individual retail investors to asset management firms, hedge funds and institutional

[14]Eastspring Investments, Refinitiv, 31 October 2019.

Fig. 16. Monthly cross-sectional standard deviation of returns for largest 800 China A-shares versus MSCI World and MSCI Emerging Markets indices[15]

China A Top 800 vs MSCI World (developed markets) and MSCI EM: Nov 2009 to Oct 2019

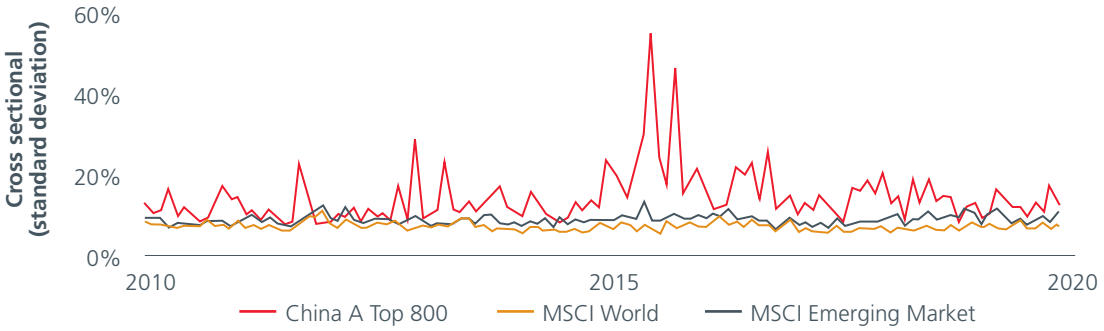


Fig. 17. Rolling 250-day index return volatility for CSI 800 compared with MSCI USA[16]

China A Top 800 vs MSCI US: Nov 2009 to Oct 2019

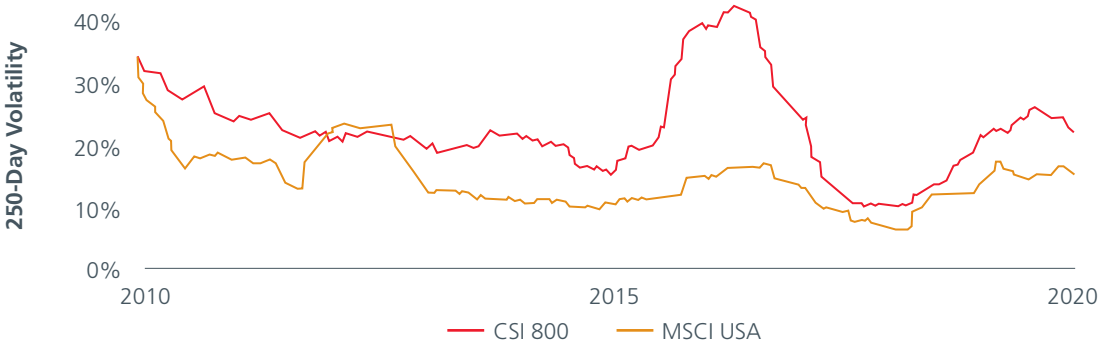
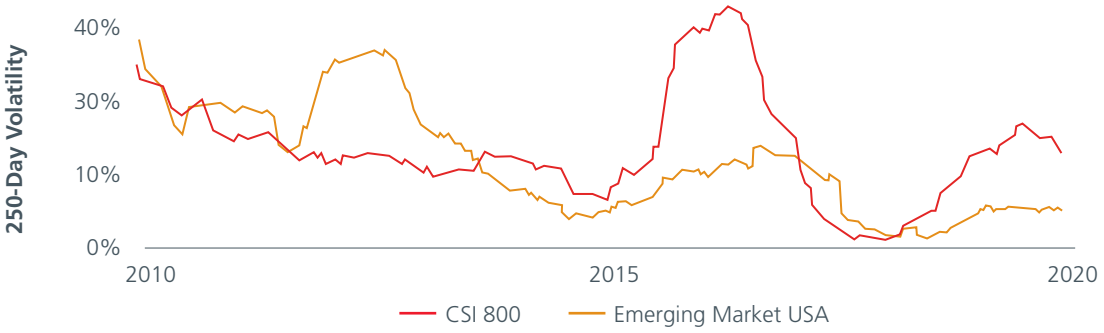


Fig. 18. Rolling 250-day index return volatility for CSI 800 compared with MSCI Emerging Markets[17]

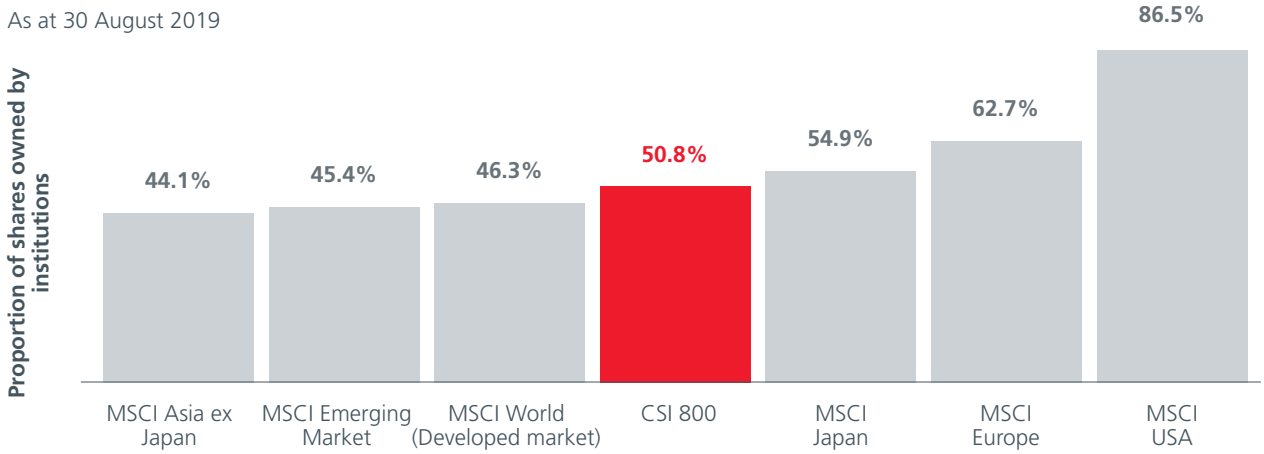
China A Top 800 vs MSCI EM: Nov 2009 to Oct 2019



[15]Eastspring Investments, MSCI, Refinitiv, 31 October 2019. [16]Eastspring Investments, Bloomberg, CSI, MSCI, 31 October 2019. [17]Eastspring Investments, Bloomberg, CSI, MSCI, 31 October 2019.

Fig. 19. Proportion of stocks owned by institutions in various markets[18]

As at 30 August 2019



asset owners such as pension funds, insurance companies and government agencies. Ultimately the efficiency of markets is largely determined by the proportion of shareholdings and trading activity represented by the more sophisticated investors.

The ideal setting for a quantitative investor is a market where there are observable and persistent market inefficiencies fuelled by the actions of less sophisticated investors.

Institutional Ownership

Asset owners and experienced asset managers tend to have established and disciplined approaches to their investment decisions, taking care not to fall victim to their own behavioural biases or get caught up in unjustified surges in sentiment. However less sophisticated investors tend to lack the discipline and experience to mitigate many of these behavioural biases. This ultimately results in more prevalent market inefficiencies that can be identified and exploited by systematic or quantitative investment strategies.

Figure 19 shows the proportion of stocks held by institutions within the CSI 800 index versus global markets and regions. Institutional investors (as defined by Bloomberg) own about 50% of the China A-share market. This is moderate when compared to the other regional markets, however, it is significantly lower relative to the US (86.5%) and Europe (62.7%).

This suggests that less sophisticated investors own the other half of the China A-share market which supports the hypothesis that the China A-share market has ample inefficiencies to be exploited. While we do not have the available data, anecdotally, retail investors appear to drive an even larger proportion of trading activity. This seems consistent with the outsized turnover levels in China (see figure 8), the wide dispersion of cross-sectional returns (Figures 15 and 16) and high volatility (see figures 17 and 18).

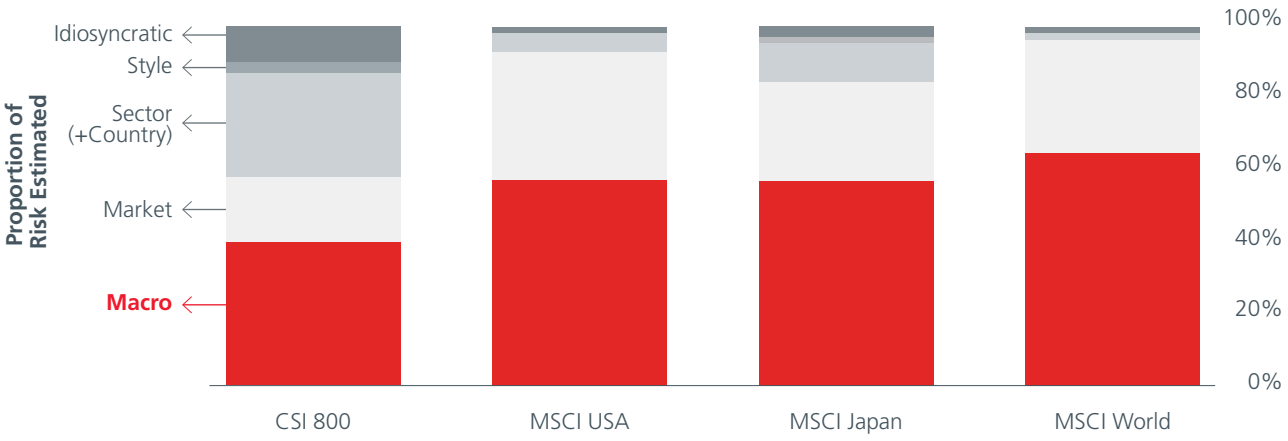
STOCK PRICE DRIVERS

In a quantitative strategy based on cross-sectional stock selection, the goal is to isolate relative winners and losers based on quantitative factors and to build diversified exposure to those factors in managed portfolios. However, the factors pursued by a quantitative strategy are not the only factors that will influence the subsequent returns of stocks.

[18]Eastspring Investments, Bloomberg, CSI, MSCI, 30 August 2019.

Fig. 20. Average contributions to estimated risk from the Citi Risk Attribution Model (RAM)[19]

May 2009 to Apr 2019



Many of these unintended influences can be managed quite effectively in a portfolio through risk management. For example, one can offset the sector risk arising from overweighting one stock by underweighting another stock in the same sector. However, there are other exogenous factors that can ultimately drive stock prices including global macro influences (e.g. commodity prices, interest rates, changes in the market's inflation expectations) or sensitivity to the broader moves of global equity markets.

The following analysis makes use of the Citi Risk Attribute Model (RAM) to estimate the contribution to the risk of stocks in China (compared to other regions) from macro factor sensitivity, global market sensitivity, sector (and country for regions) sensitivity and other style factors. The residual estimated risk is an idiosyncratic element (i.e. not explained by the RAM model).

The ideal situation for a stock selection strategy is to have these risk factors explain as little as possible of the overall volatility of stock prices. This leaves ample opportunity for additional stock attribute-based (quant) factors to be identified that help explain variations in stock prices and can therefore be systematically exposed to in portfolios.

Figure 20 shows that the average contribution (over the 10 years to April 2019) to total risk for a portfolio of the largest 800 China A-shares from macro factors is significantly less than in other regions. This implies that global macro influences including global bond yields, credit spreads, commodity prices and currencies only explain a small proportion of China A stock price variation.

In addition, the movements in the broader global equity market account for a much smaller proportion of China A stock price variation than it does in other regions (including Japan). Style factor risk, which includes factors such as Value, Growth, and Size (small cap) explains a small part of the remaining risk.

Figure 21 breaks out the average idiosyncratic (unexplained by the RAM model) portion of total estimated risk. The introduction of China specific macro factors would likely account for added explanation of risk, but the same could be argued for Japan. On balance this suggests that the variance in China A-share stock price returns is less driven by macro effects – an ideal situation for a quantitative stock selection strategy.

[19]Eastspring Investments, Citi, CSI, MSCI, 30 April 2019.

OTHER MARKET STRUCTURE CONSIDERATIONS

There are various other considerations for investors in China's A-share market and we highlight a few of the key ones in this section.

Hedging Instruments

The ability for investors to hedge market risk is more limited in the Chinese market than in many other markets.

While domestic investors in China have access to the relatively liquid SSE 50, CSI 300, and CSI 500 futures contracts, the options for foreign investors are more limited. Two relatively new contracts available to foreign investors are a CSI 300 futures contract traded on the Hong Kong Exchange and a FTSE A50 contract traded on the Singapore Exchange (SGX). While the latter is more liquid and has more open interest, the FTSE A50 index is a narrow large cap index that is not as suitable as a hedge for an investor managing against an MSCI or CSI 300/800 index.

Meanwhile, European options are only available for the FTSE A50 and CSI 300 ETFs, with the latter only added in December 2019.

Index Level Short Selling

Due to the limited number of stocks permitted to be short sold and high shorting costs, index futures are currently the major hedging instrument for the China A-share market. However, for domestic investors, there are further complications that make this option slightly challenging.

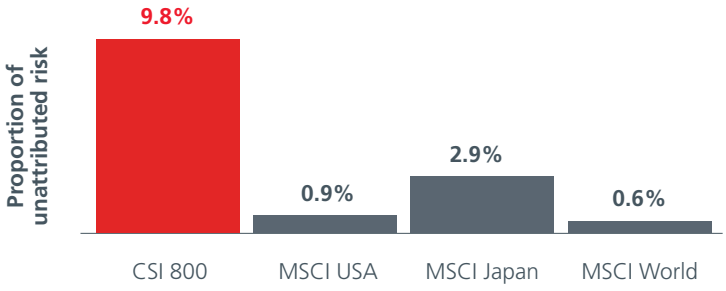
For one, the margin requirements are much higher (8% in the China A-share market) than in most other markets. By comparison, the margin requirements for the FTSE China A50 futures and E-mini S&P 500 futures are 5.6% and 4% respectively.

The Chinese regulators had restricted the trading of index futures during the stock market crash in 2015. While the restrictions have been gradually relaxed, trading volumes have not returned to the levels seen before 2015.

The general trend in recent years has been towards increasing trading volume/open interest and gradually lowering margin requirements. Although we expect this trend to continue, the possibility of tighter restrictions during extreme market events cannot be ruled out.

Fig. 21. Average residual (unexplained) proportion of estimated risk from Citi Risk Attribution Model (RAM)[20]

Average idiosyncratic contribution: May 2009 to Oct 2019



Stock Level Short Selling

Stock level shorting is allowed in the China A-share market for approved stocks only. The number of approved stocks was recently increased from 950 to 1,600 in August 2019, causing the total market cap weight of stocks that can be short sold to rise to over 80% from 70%. However, in practice, the total amount of shorting is still small.

According to Eastmoney, as of December 2019, the total margin balance for short positions is RMB 10 billion, whereas the margin balance for long positions is RMB 542 billion.

Borrowing costs for shorting positions is around 9%-10% p.a., and is usually 3% above the prevailing the benchmark interest rate for loans. This is considerably higher than the borrowing costs in other major markets and presents a significant hurdle for effectively implementing a long-short strategy in China A-shares.

[20]Eastspring Investments, Citi, CSI, MSCI, 30 April 2019.

Asymmetric Two-Way Trading Rules

Currently, the A-share market adopts an asymmetric trading rule whereby shares bought cannot be sold on the same day. However, the cash raised from selling a stock can be used to buy the same stock on the same day. As such, investors can sell shares on the market open and buy the same stock as the trading session progresses during the day.

This restriction creates a bias in trading activity for short-term investors, resulting in unique market anomalies.

Settlement Periods – Stock Connect

Security settlement for China A-share trading is on a T+1 basis, for both dometsic investors in China or investors trading through the Stock Connect (Northbound).

Fig. 22. Universe of stocks at each date in the factor backtest analysis

Country	Universe
China A-Shares	All listed securities (Datastream)
US	S&P Broad Market Index (US companies)
World (Developed Markets)	S&P Broad Market Index (Developed countries)
Asia Pacific ex Japan	S&P Broad Market Index (Asia Pacific ex Japan countries)
Japan	S&P Broad Market Index (Japan companies)

PERFORMANCE OF COMMON QUANT FACTORS

The earlier sections of this paper have given consideration to the characteristics of the China A-share market and the likely implications for quantitative strategies.

The following section attempts to get a sense of whether a typical quant approach that has worked well in other global markets would capture similar results in the Chinese market. This is not a fully-researched investment strategy but rather a quick assessment of the efficacy of some common quant factors used by quantitative investors globally. Results are compared for the Chinese A-share market against other global markets and regions over the 10-year period to March 2019. Figure 22 details the universe of stocks considered for each of these backtests by market/region.

In this simplified analysis, the factors used are relatively basic and involve a single metric used to rank stocks cross-sectionally at each monthly rebalance in the backtest period.

At each rebalance point, a long factor portfolio is formed from quintile 1 (the highest factor scores) and a short factor portfolio is formed from quintile 5 (the lowest factor scores). The long and short quintiles are

Fig. 23. Factor definitions and data sources used

Factor	Underlying Metric Definition	Data Source
Price/Book	Closing Market Cap / Last Reported Book Value	Datastream (Market Cap) Worldscope (Book Value)
Price/Earnings	Closing Market Cap / Trailing 12m Net Income	Datastream (Market Cap) Worldscope (Net Income)
Earnings Revisions (3m)	% change in consensus EPS vs 3-months prior	IBES (consensus EPS estimates)
Low Volatility	Trailing 60-day return volatility	Datastream (Returns)
Momentum (12m minus 1m)	12-month total return minus 1-month total return	Datastream (Returns)
Reversal (1m)	Minus 1-month total return	Datastream (Returns)

Fig. 24. Relative long-short return rankings by country/region[21]

Price/Book	Price/Earnings	Earnings Revisions (3m)	Low Volatility	Momentum (12m - 1m)	Reversal (1m)
Japan	Asia Pacific ex Japan	Europe	China	Europe	China
China	Europe	Asia Pacific ex Japan	Asia Pacific ex Japan	Asia Pacific ex Japan	World (DM)
World (DM)	World (DM)	China	Europe	World (DM)	USA
Asia Pacific ex Japan	Japan	World (DM)	World (DM)	USA	Europe
USA	China	USA	USA	Japan	Japan
Europe	USA	Japan	Japan	China	Asia Pacific ex Japan

Higher long - short performance

equally weighted to form a long-short factor portfolio.

Returns to these factor portfolios are then observed in the subsequent month and then rebalanced to form new long and short portfolios at the end of the month. The analysis does not consider transaction costs or limitations on turnover at each rebalance. The metrics used to define the factors analysed are shown in figure 23.

Figure 24 shows the relative rankings of the long-short performance for each of these factors by region.

Tabulated long, short and long-short returns for each region are included in Appendix 1.

Generally, these commonly used factors are as efficacious in the China A-share market over the analysed period as they are in other regions. In the case of Price-Book, Low Volatility and Reversal, China ranks high versus the other regions.

The glaring exception is Momentum which is not only weaker than in other regions, but is also negatively rewarded. In other words, stocks that have been trending over the prior 12 months (less the most recent month) have tended to reverse that trend in the following month. This runs contra to the observed behaviour of this factor in many other markets. That said, there are other markets that exhibit a similar behaviour, most notably Japan, where Momentum has long been understood by quants to be ineffective.

The other standout observation is the strength of the shorter-term reversal factor. As in most other markets, stocks that have risen or fallen in the prior month, tend to reverse in the subsequent month. However, the strength and persistence of this reversal behaviour is particularly strong in the Chinese market, particularly the reversal of stocks that rallied in the previous month.

One explanation for this observation likely lies in the outsized individual investor participation and their high turnover trading behaviour observed in the earlier market liquidity analysis. Uninformed trends in stock prices (i.e. not backed by any real change in fundamentals) would be expected to be corrected in the near term by more sophisticated investors who observe the price anomaly.

These effects warrant further analysis and likely lead to more refined factors being formed to capture the underlying market inefficiencies.

On balance, while it is reasonable to assess from this simplified analysis that generally commonly used quant factors appear to have similar rewards in the China A-share market, there is also strong evidence that there are nuances to the market that must be considered, more deeply analysed and ultimately accounted for in investment strategies.

[21]Eastspring Investments, S&P, Refinitiv (Datastream, IBES, Worldscope).

CONCLUSION

The China A-share market presents a unique opportunity for global investors and has many of the ideal characteristics for implementing successful quantitative strategies. Our analysis indicates that traditional approaches to quantitative investing and the transfer of knowledge about factors that work in other markets are reasonable starting points. However, there are also notable nuances to the market (some are addressed in this paper) that must be considered, which may give rise to China-specific factors that can be exploited.

This paper has focussed on the broad aspects of the China A-share market and the requisite conditions for a quantitative strategy. There are however other considerations that warrant deeper research and understanding to access factor rewards in China. These include acknowledging the differences in accounting treatment and market norms in financial statements as compared to other global markets. Investors must also be mindful of the impact of the domestic macro environment, policies and changing market dynamics as the China-A market opens up further to foreign investment and as the aggregate level of institutional investment rises.

A key observation in this paper is that the China market is developing and evolving rapidly. As such, assumptions about the market need to be made carefully and should be regularly re-assessed. While the China A-share market may possess some ideal conditions for quantitative strategies to thrive, the rewards will only be realised with extensive research and expertise.

APPENDIX 1

Summarised Factor Backtest Results

Value: Price-to-Book Ratio

Region	Long: Quintile 1			Short: Quintile 5			Long - Short		
	Return (p.a.)	Volatility (p.a.)	Info Ratio	Return (p.a.)	Volatility (p.a.)	Info Ratio	Return (p.a.)	Volatility (p.a.)	Info Ratio
Japan	5.4%	5.4%	1.0	-3.1%	5.2%	-0.6	8.5%	9.8%	0.9
China	3.3%	7.3%	0.5	-4.6%	6.4%	-0.7	7.9%	13.2%	0.6
World (DM)	2.6%	5.3%	0.5	-2.3%	3.0%	-0.8	5.0%	8.1%	0.6
Asia Pacific ex Japan	1.6%	4.4%	0.4	-3.3%	4.0%	-0.8	4.9%	8.2%	0.6
USA	3.3%	7.6%	0.4	-1.6%	3.6%	-0.4	4.8%	10.6%	0.5
Europe	-0.5%	5.6%	-0.1	-0.8%	3.4%	-0.2	0.3%	8.8%	0.0

Value: Price-to-Earnings Ratio

Region	Long: Quintile 1			Short: Quintile 5			Long - Short		
	Return (p.a.)	Volatility (p.a.)	Info Ratio	Return (p.a.)	Volatility (p.a.)	Info Ratio	Return (p.a.)	Volatility (p.a.)	Info Ratio
Asia Pacific ex Japan	4.3%	3.2%	1.4	-8.1%	3.2%	-2.5	12.4%	4.5%	2.8
Europe	4.0%	2.8%	1.4	-5.3%	3.7%	-1.4	9.3%	4.3%	2.1
World (DM)	3.5%	2.6%	1.4	-3.1%	5.2%	-0.6	6.6%	5.9%	1.1
Japan	3.8%	3.5%	1.1	-1.9%	5.6%	-0.3	5.7%	7.4%	0.8
China	1.9%	7.3%	0.3	-1.0%	5.1%	-0.2	2.9%	10.5%	0.3
USA	1.7%	3.3%	0.5	-0.9%	8.0%	-0.1	2.6%	9.3%	0.3

Earnings Revisions: 3-Month Change in Consensus EPS Estimate

Region	Long: Quintile 1			Short: Quintile 5			Long - Short		
	Return (p.a.)	Volatility (p.a.)	Info Ratio	Return (p.a.)	Volatility (p.a.)	Info Ratio	Return (p.a.)	Volatility (p.a.)	Info Ratio
Europe	3.3%	2.9%	1.1	-5.4%	4.6%	-1.2	8.7%	6.9%	1.3
Asia Pacific ex Japan	3.9%	2.6%	1.5	-4.5%	3.9%	-1.2	8.4%	5.9%	1.4
China	4.9%	2.6%	1.9	-3.1%	3.6%	-0.9	8.0%	5.4%	1.5
World (DM)	1.6%	2.8%	0.6	-1.9%	4.6%	-0.4	3.5%	6.8%	0.5
USA	0.3%	3.7%	0.1	-1.2%	5.7%	-0.2	1.5%	8.3%	0.2
Japan	-1.7%	3.7%	-0.4	2.5%	5.4%	0.5	-4.2%	8.2%	-0.5

Low Volatility: 60-Day Return Volatility

Region	Long: Quintile 1			Short: Quintile 5			Long - Short		
	Return (p.a.)	Volatility (p.a.)	Info Ratio	Return (p.a.)	Volatility (p.a.)	Info Ratio	Return (p.a.)	Volatility (p.a.)	Info Ratio
China	2.3%	6.5%	0.3	-7.1%	6.4%	-1.1	9.4%	12.5%	0.7
Asia Pacific ex Japan	2.0%	5.2%	0.4	-7.3%	5.0%	-1.5	9.3%	10.0%	0.9
Europe	0.9%	4.4%	0.2	-3.9%	5.2%	-0.7	4.7%	9.3%	0.5
World (DM)	0.3%	6.1%	0.1	-2.5%	7.5%	-0.3	2.8%	13.5%	0.2
USA	-1.2%	8.3%	-0.1	-1.7%	9.5%	-0.2	0.5%	17.7%	0.0
Japan	0.1%	6.0%	0.0	1.0%	7.1%	0.1	-0.9%	12.8%	-0.1

Momentum: 12-Month Return minus 1-Month Return

Region	Long: Quintile 1			Short: Quintile 5			Long - Short		
	Return (p.a.)	Volatility (p.a.)	Info Ratio	Return (p.a.)	Volatility (p.a.)	Info Ratio	Return (p.a.)	Volatility (p.a.)	Info Ratio
Europe	3.4%	5.0%	0.7	-4.7%	7.2%	-0.6	8.1%	12.0%	0.7
Asia Pacific ex Japan	2.6%	5.4%	0.5	-4.9%	6.6%	-0.7	7.4%	11.6%	0.6
World (DM)	0.2%	5.5%	0.0	-1.7%	8.1%	-0.2	1.9%	13.4%	0.1
USA	-1.1%	6.6%	-0.2	-0.4%	10.5%	0.0	-0.7%	16.7%	0.0
Japan	-1.7%	5.8%	-0.3	1.4%	7.5%	0.2	-3.1%	12.5%	-0.2
China	-2.9%	5.5%	-0.5	0.4%	4.9%	0.1	-3.3%	9.6%	-0.3

Reversal: Minus (1-Month Return)

Region	Long: Quintile 1			Short: Quintile 5			Long - Short		
	Return (p.a.)	Volatility (p.a.)	Info Ratio	Return (p.a.)	Volatility (p.a.)	Info Ratio	Return (p.a.)	Volatility (p.a.)	Info Ratio
China	5.5%	6.1%	0.9	-13.3%	6.1%	-2.2	18.7%	11.3%	1.7
World (DM)	1.1%	4.5%	0.2	-2.5%	3.5%	-0.7	3.6%	7.3%	0.5
USA	1.0%	5.5%	0.2	-2.6%	4.1%	-0.6	3.5%	8.1%	0.4
Europe	0.5%	3.9%	0.1	-2.4%	2.9%	-0.8	2.9%	5.8%	0.5
Japan	0.7%	5.2%	0.1	-1.9%	4.5%	-0.4	2.6%	9.0%	0.3
Asia Pacific ex Japan	-0.5%	4.3%	-0.1	-1.6%	3.4%	-0.5	1.1%	7.3%	0.2

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