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Asian Quantamental: Myths vs Reality

When Quant meets Fundamental investing in Asia

A better understanding is required

Investors of all types are increasingly under pressure to understand the marriage between the fundamental and quantitative performance of their portfolios. We explore three key myths about quantitative investing and introduce tools to help investors in their search for alpha.

Myth 1: It is all about asset allocation, not stock selection in Asia Pacific. False

Our analysis shows that 20% of returns from an active Asian Pacific portfolio would come from asset allocation, with the remaining 80% coming from stock selection. With a further return decomposition we find that stock specific factors account for 60% of the return on average in the region when compared to 75% and 60% in the US and Japan. This outweighs the local market and regional sector effects in most Asia Pacific countries.

Myth 2: Traditional quant factors don't work well in Asia. Yes, they do.

Traditional quant factors such as Value, Analyst sentiment, and Profitability have shown good signs of performance in our 10 years of back-tests. We also find more value to quant analysis in the ex-Japan universe vis-à-vis stocks in the TOPIX.

Myth 3: Liquidity is a problem. No, it isn't.

Contrary to popular belief, the Asia ex Japan markets have enough liquidity to construct a quant driven portfolio of roughly US$2bn in size with a 20% participation rate. We note the top 100 stocks by liquidity in the region offer an average and median ADVT of US$95 and US$60mn.

Quant meets Fundamental, new tools

We introduce new analysis and tools leveraging Goldman Sachs Global Investment Research analysts' data (stock level estimates) systematically. Our study shows that a composite of GS GIR estimates factors enhanced quantitative strategies.

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Contents

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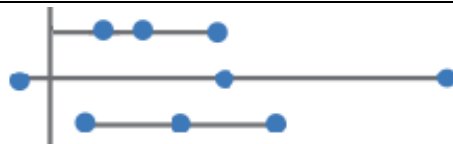
See our QUANTAMENTALS page for analysis of quantitative and fundamental strategies from a factor, technical and style perspective

Portfolio Manager Summary: Asian Quantamental: Myths versus Reality

Quantitative strategies, the impact of ETFs on single stocks/sectors and the rise of factor/smart beta strategies – we believe investors are increasingly under pressure to have a better understanding of these products and strategies. Investors in Asia-Pacific are no exception. However, there are three common myths often brought up in our conversations with clients on Asia-Pacific equities; in this report we attempt to demystify them with realities. We also leverage our in-house fundamental analysts' estimates and incorporate them in to our quantitative investment process. We provide a primer on quantamental investing[1] in the Asia region.

Myth 1: Asia is all about asset allocation (country/sector), not about stock selection.

Reality: Country effect is declining and stock specific factors account for more than 60% of return.

Our analysis shows that while 20% of the returns of an active Asian Pacific portfolio would come from asset allocation, the remaining 80% comes from stock selection. With a further return decomposition we find that stock specific factors account for 60% of the return on average in the region when compared to 75% and 60% in the US and Japan. This outweighs the local market and regional sector effects in most Asia Pacific countries.

Myth 2: Traditional quant factors don't work well in Asia.

Reality: Value, Analyst sentiment and Profitability factors show persistent performance over 10 years.

Traditional quant factors such as Value, Analyst sentiment, and Profitability show good signs of performance over 10 years. Over the last 5 years we have observed good performance for profitability factors such as ROA, OP margin, and ROE. We also find more value to quant analysis in the Asia ex-Japan universe vis-à-vis stocks in the TOPIX.

Myth 3: Liquidity is heavily skewed towards Japan.

Reality: Asia ex-Japan is still liquid.

Contrary to popular belief, the Asia ex Japan markets have enough liquidity to construct a quant driven portfolio of roughly US$2bn in size with a 20% participation rate. We note the top 100 stocks by liquidity in the region offer an average/median ADVT of US$95 and US$60mn, respectively.

Quantamental solution: Integrating signals beyond headline consensus with GS fundamental estimates

We introduce new analysis and tools leveraging our Goldman Sachs Global Investment Research (GS GIR) analysts' data (stock level estimates) systematically. Our study shows that several GS GIR estimates factors enhanced quantitative strategies for stocks with stock specific factor contributions that are higher than sector average.

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[1] *Quantamental refers to a concept of merging quantitative and fundamental investing.* Please see *Quantamental 101, Factor Investing: the Rise of the Machines II*, written by Robert Boroujerdi, March 14, 2016 for more information on "quantamental".

Myth I: Asia Pacific is all about asset allocation. Actually, it is all about stock selection.

Stock selection has much higher return contribution of dispersion than asset allocation

Our analysis shows that while 20% of the portfolio return of an active Asian Pacific portfolio would come from asset allocation, the remaining 80% comes from stock selections, based on data over the past three years (between Jan 2012 and Dec 2015). With a further return decomposition we find that stock specific factors account for 60% of the return on average in the region when compared to 75% and 60% in the US and Japan. This outweighs the effect of local market and regional sector effects in most Asia Pacific countries.

We are often asked by clients if they should place more emphasis on asset allocation given the Asian equity investment landscape has much more definitive dimensions of allocations (country and sector) than a single country. We argue with the following points;

● Stock selection contributes far more to returns than asset allocation in all regions/countries; and
● Only approximately 20% of returns come from asset allocation in Asia Pacific and DM Europe, vs. 10% in US and Japan.

Europe is slightly more asset allocation driven than Asia Pac ex Japan, but stock selection is still much more important

Exhibit 1: Tactical asset allocation is important in Asia Pac ex-Japan, but stock selection still contributes 80% of returns
Ratio of returns from asset allocation at different levels of IC ratio, US$1mn and above, from Jan 2012 to Dec 2015
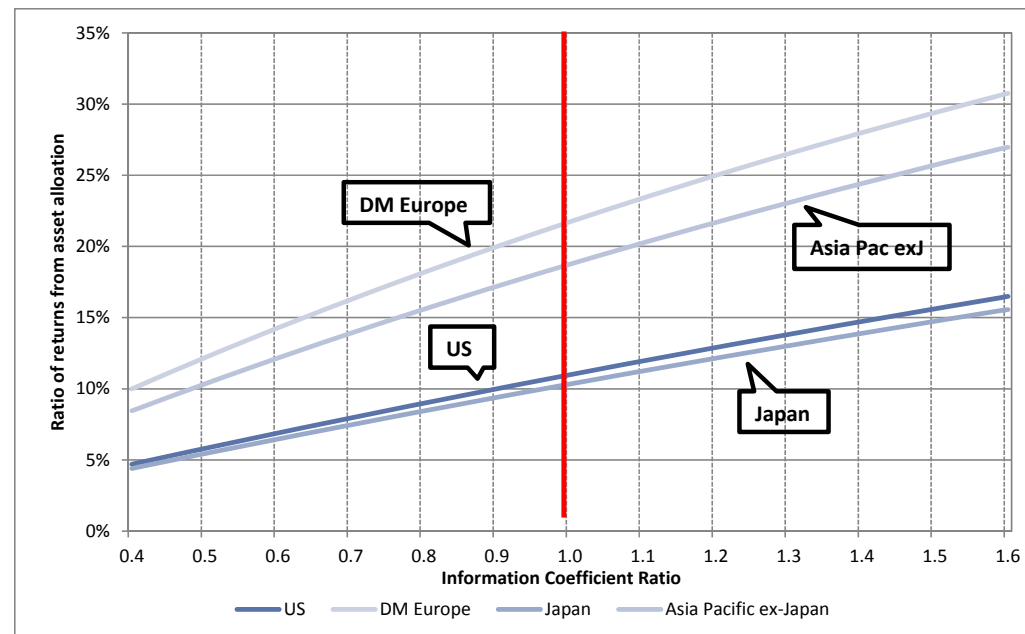
Source: FactSet, Goldman Sachs Global Investment Research

Information Coefficient is a measure used to evaluate the forecasting skill.

Exhibit 1 shows the return contribution from asset allocation and stock selection decisions assuming different levels of skill measured by Information Coefficient (IC)[2] over the past 3 years in Asia Pacific. If the skill in asset allocation and stock selection is the same (relative IC = 1, indicated by the red line in exhibit), 10% of returns are from asset allocation in US and Japan, meaning that the remaining 90% is contributed from stock selection. In the case of Asia Pacific ex Japan and DM Europe, approximately 20% of the portfolio return of an active European and Asian equity portfolio would come from asset allocation. Asset allocation in US and Japan refers to sector selection, while it is country and sector selection in DM Europe and Asia Pacific ex-Japan. The ratio of contribution of return remained similar for the US, Europe and Japan. However, it changed for Asia Pacific over the last 5 years, mainly due to an increase in the number of stocks available.

We explore the return decomposition analysis further and show the results by country (DM in Exhibit 2 and EM in 3). It is interesting that there is no significant difference (in terms of the contribution from country selection and stock selection) between DM and EM, even at the country level. Both Exhibits show that stock selection is much more important in most countries. For New Zealand and the Philippines, the reason for a much higher contribution by sectors is due to a much lower number of stocks available and hence, more limited sectors. Sectorial dispersion tends to be much wider than dispersion amongst stocks.

● Stock selection contribution is represents more than 70% of returns in most Asia Pacific countries; and

● Countries with sector skews tend to show a higher ratio of return from asset allocation (New Zealand and Philippines).

Exhibit 2: Return contribution from sector selection is limited for most Asian DM countries except for New Zealand
Ratio of returns from asset allocation at different levels of IC ratio, Asia Pacific DM countries with ADVT more than US$1mn and above, from Jan 2012 to Dec 2015
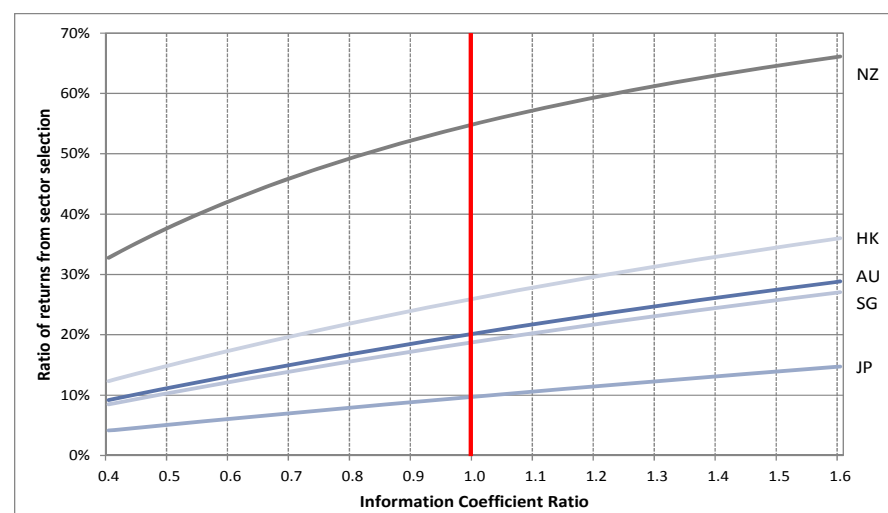
Source: FactSet, Goldman Sachs Global Investment Research

Exhibit 3: Return contribution from sector selection is limited for most Asian EM countries except for Philippines
Ratio of returns from asset allocation at different levels of IC ratio, Asia Pacific EM countries with ADVT more than US$1mn and above, from Jan 2012 to Dec 2015
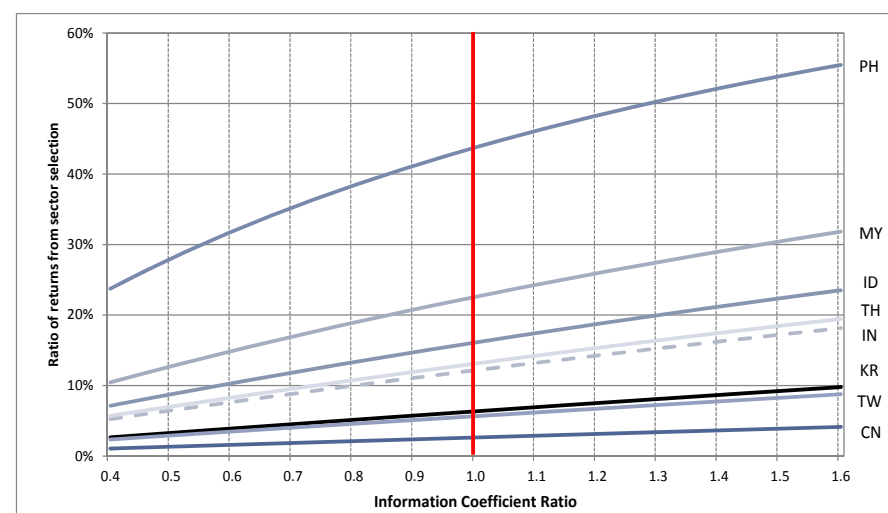
Source: FactSet, Goldman Sachs Global Investment Research

[2] We referenced "Where Should Active Asian Equity Strategies Focus: Stock Selection or Asset Allocation" by Gupta, Li and Sharma for the ratio of return calculation method. The detail calculation method is in Appendix I.

Skew in large caps creates large sectorial concentration and correlation

Asset allocation in Asia is further complicated by the fact that some sectors and countries are highly correlated. This occurs because Asian stocks are skewed in terms of sector classification, particularly amongst large caps. The fact that some stocks in one sector are significantly larger than others in the same sector is also a common problem faced by Asia fund managers.

- Having exposure or an overweight position in a country against the benchmark would mean an increase in sector exposure as some countries are highly correlated with sectors in Asia Pacific; and

- Indonesia, New Zealand, and Thailand are less correlated with specific sectors.

High correlation between some countries and sectors weakens asset allocation strategies

Exhibit 4: Certain sectors such as financials and IT are highly correlated with countries like China, Hong Kong, Korea and Taiwan
Correlation matrix MXAP countries and sectors, weekly returns since Jan 2011, blue highlighted = correlation above 80%

	MXAP	Australia	China	Hong Kong	India	Indonesia	Japan	Korea	Malaysia	New Zealand	Philippines	Singapore	Taiwan	Thailand
MSCI AC ASIA PACIFIC	1.00													
Australia	0.77	1.00												
China	0.82	0.59	1.00											
Hong Kong	0.80	0.55	0.86	1.00										
India	0.68	0.52	0.62	0.57	1.00									
Indonesia	0.51	0.41	0.43	0.44	0.44	1.00								
Japan	0.76	0.53	0.50	0.51	0.49	0.28	1.00							
Korea	0.77	0.60	0.70	0.61	0.58	0.46	0.47	1.00						
Malaysia	0.58	0.47	0.56	0.54	0.44	0.53	0.33	0.52	1.00					
New Zealand	0.34	0.34	0.23	0.27	0.19	0.14	0.32	0.20	0.24	1.00				
Philippines	0.57	0.44	0.53	0.54	0.50	0.53	0.39	0.51	0.52	0.23	1.00			
Singapore	0.82	0.63	0.71	0.75	0.60	0.51	0.57	0.64	0.58	0.27	0.55	1.00		
Taiwan	0.73	0.60	0.64	0.60	0.57	0.44	0.44	0.70	0.55	0.24	0.51	0.62	1.00	
Thailand	0.64	0.46	0.59	0.59	0.55	0.56	0.41	0.53	0.51	0.20	0.53	0.61	0.51	1.00
Consumer Discretionary	0.92	0.65	0.69	0.69	0.58	0.42	0.84	0.70	0.49	0.31	0.50	0.72	0.63	0.52
Consumer Staples	0.85	0.69	0.64	0.66	0.60	0.51	0.59	0.58	0.52	0.31	0.58	0.69	0.59	0.55
Energy	0.85	0.71	0.81	0.73	0.65	0.49	0.51	0.70	0.59	0.28	0.50	0.75	0.65	0.67
Financials	0.97	0.77	0.84	0.82	0.67	0.52	0.71	0.71	0.57	0.32	0.56	0.82	0.70	0.64
Health Care	0.68	0.52	0.39	0.42	0.44	0.25	0.60	0.41	0.22	0.28	0.35	0.50	0.41	0.34
Industrials	0.95	0.67	0.74	0.73	0.61	0.44	0.79	0.70	0.51	0.33	0.48	0.79	0.63	0.58
Information Technology	0.90	0.68	0.75	0.71	0.66	0.47	0.66	0.84	0.54	0.27	0.52	0.72	0.83	0.57
Materials	0.93	0.80	0.79	0.74	0.61	0.50	0.63	0.73	0.56	0.30	0.49	0.77	0.68	0.62
Telecommunication Services	0.78	0.57	0.62	0.63	0.50	0.44	0.63	0.52	0.46	0.32	0.51	0.66	0.56	0.50
Utilities	0.63	0.41	0.45	0.51	0.39	0.32	0.56	0.35	0.33	0.23	0.40	0.46	0.40	0.36

Source: Bloomberg, FactSet, Goldman Sachs Global Investment Research.

This can be a problem for a fund designed to manage a market and sector neutral strategy. Having a country exposure or overweight position in a country against the benchmark would also mean an increase in sector exposure. For example overweight in Australia would likely mean overweight in Materials: BHP Billiton (BHP.AX) and Rio Tinto (RIO.AX) or Financials: Commonwealth Bank of Australia (CBA.AX), ANZ Banking Group (ANZ.AX), and Westpac (WBC.AX). Similarly overweighting Korea would mean

overweight in Information Technology: Samsung electronics (005930.KS), SK Hynix (000660.KS) or Consumer discretionary: Hyundai Motor (005380.KS), KIA Motors (000270.KS). The same can be said about unintended exposure to a country as a result of taking an overweight position in a certain sector. For example, increasing an exposure to the financial sector means increasing exposure to China: Ping An Insurance H (2318.HK), CCB H (0939.HK), ICBC (1398.HK), Hong Kong: HKEx (0388.HK), AIA (1299.HK) and Singapore: DBS (DBSM.SI), OCBC (OCBC.SI) and UOB (UOBH.SI). Exhibit 4 shows the correlation between country and country as well as country and sectors. The table illustrates the point made earlier – Australia is highly correlated to regional Materials' sector performance. Similarly, China is highly correlated to Energy and Financials. The Financials sector is also highly correlated with Hong Kong and Singapore. Not surprisingly, the IT sector is highly correlated to Korea and Taiwan. This is an important consideration for portfolio construction, especially when attempting to diversify country and sector risk.

Average pairwise correlation refers to the average correlation of all possible pairs of country/sector/stocks.

Exhibit 5 shows the country-to-country average pairwise correlation and sector-to-sector pairwise correlation. Analyzing the historical trend of average pairwise correlation is one of the indicators that help fund managers determine asset allocation. Pairwise sector correlation and country pairwise correlation have been rising – and are the highest in 10 years in terms of inter-sector correlation.

● Sector-to-sector correlation is the highest in 10 years in Asia, making sector selection strategy less effective
● Country-to-country correlation has increased significantly over the last 2 years
● Stock-to-stock correlation still offers much greater opportunities in Asia Pacific ex-Japan

Exhibit 5: Both country pairwise and sector pairwise correlation has been on the rise
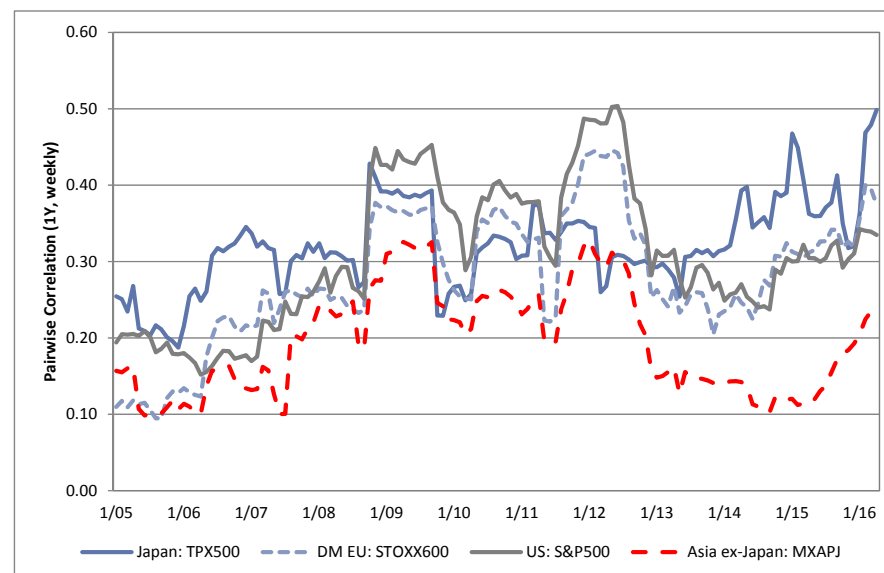Country-to-country, sector-to-sector pair-wise correlation for MXAP, Weekly frequency, using rolling 52W sector return
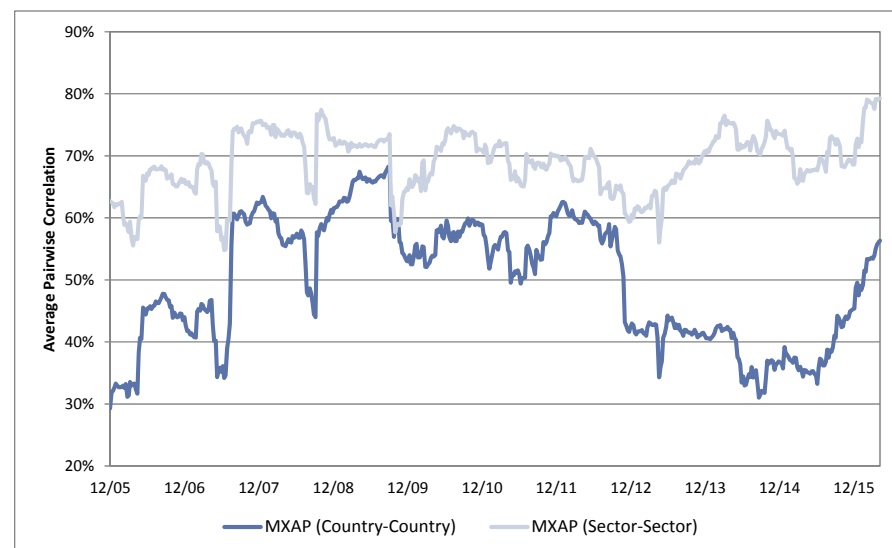
Source: FactSet, Goldman Sachs Global Investment Research

Exhibit 6: MXAPJ stocks tend to be less correlated to each other
Stock to stock pairwise correlation, weekly frequency, using rolling 52W sector return

Source: FactSet, Goldman Sachs Global Investment Research

The rise in correlation typically means tactical country/sector allocation strategies are less effective. This is because high correlation means different asset classes are moving in the same direction and it is likely that return dispersion amongst the asset classes have deteriorated. One of the interpretations of a high correlation means a macro driven market where a common factor (macro factor) explains a significant portion of returns. Given the current macro uncertainties globally, alpha opportunities through tactical asset allocation are becoming harder to achieve. On the other hand, we see better opportunities in stock selection, particularly in Asia Pacific ex-Japan. Despite the rising pairwise correlation at a stock level in Asia Pacific ex-Japan, the level of correlation in Asia Pacific ex-Japan is much lower than those of Japan, US or DM Europe. This suggests stocks in Asia Pacific ex-Japan tend to move more independently, and are potentially more fundamentally driven.

## Systematically speaking, how many stocks should an active Asian PM hold?

One of most frequently asked questions from investors is the optimal number of stock holdings. We find that holding 10 stocks in Asia Pacific excluding Japan removed about 65%% of unsystematic risk[3] (Exhibit 7). Increasing the number of holdings significantly, say adding 50 stocks to the portfolio would have removed 85% of unsystematic risk, but also would have eliminated a significant part of the unsystematic return, based on the simulation analysis. This illustrates the dilemma faced by an active fund manager – that adding too many stocks reduces risk, but also significantly reduces their opportunities to source alpha, and his/her portfolio performance becomes much like a passive fund. While 10 stocks or so are likely to be the optimal number of stocks for an active fund manager for Asian equities from a statistical point of view, in reality many active fund managers face other constraints that prevent them from managing such a concentrated portfolio. Similarly, systematic investors would have a much broader portfolio even though statistically return and risk profiles become similar to the market for portfolios beyond 15 stocks.

- Number of optimal stock holdings are not significantly different across markets.

Active managers can hold as few as 10 stocks in theory

Exhibit 7: 10 to 15 stocks remove approximately 70% of unsystematic risk in major markets globally
% of unsystematic risk removed by different number of stocks in portfolio, simulation based on returns in 2015.
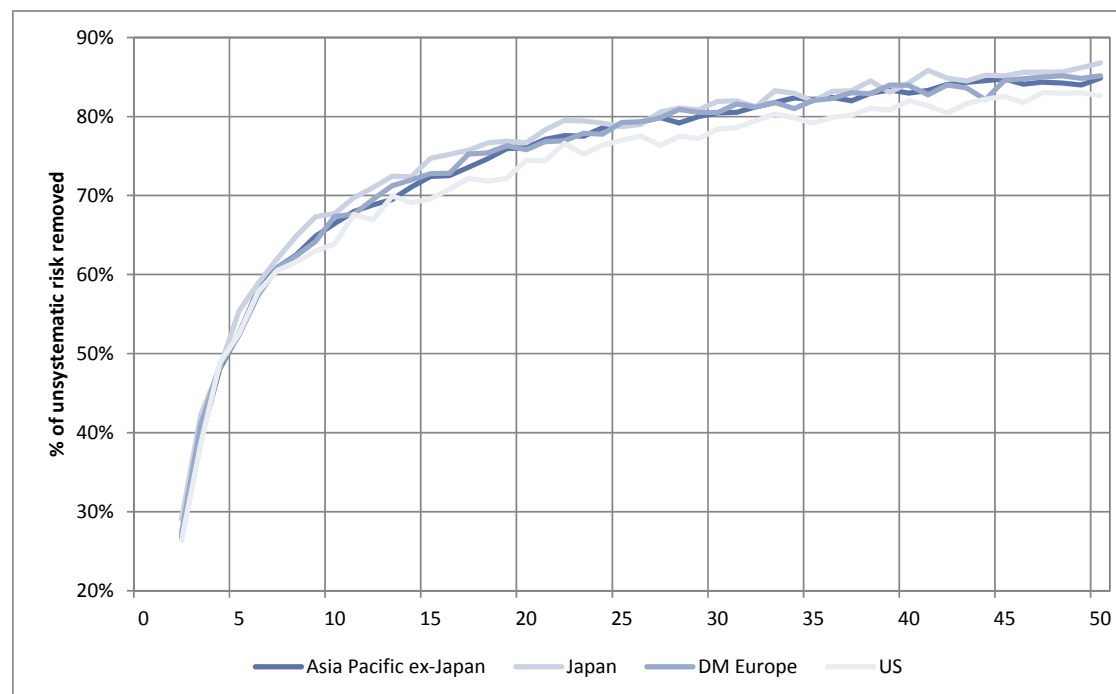
Source: Bloomberg, FactSet, Goldman Sachs Global Investment Research.

[3] Please refer to Appendix II for the calculation method

Stock level return decomposition also shows stock specific factors are still most important

To further illustrate the importance of stock specific factors, we decompose Asian equity returns into alpha (stock specific) and beta (market and sector). Exhibit 8 shows stocks' return decomposition over time in Asia Pacific ex-Japan[4]. Asian sector influences on share price return have increased at the expense of local market (i.e., country) influences. However, stock specific factors have been the largest contributor to returns in Asia Pacific ex-Japan. We therefore continue to see more scope for active stock selection in Asia and believe effective stock selection is the key to generating returns in Asia Pacific.

● Stock specific contribution has fluctuated but stayed around 60% since 2002; and

● Local market contribution has decreased by as much as 30% from the peak.

Exhibit 8: Stock specific factors continue to be the main driver of stock returns in Asia Pacific ex-Japan. Local market effect is declining.
Contribution of each factor to stock returns from MXAPJ stock return decomposition

Plenty of alpha opportunities in Asia Pacific
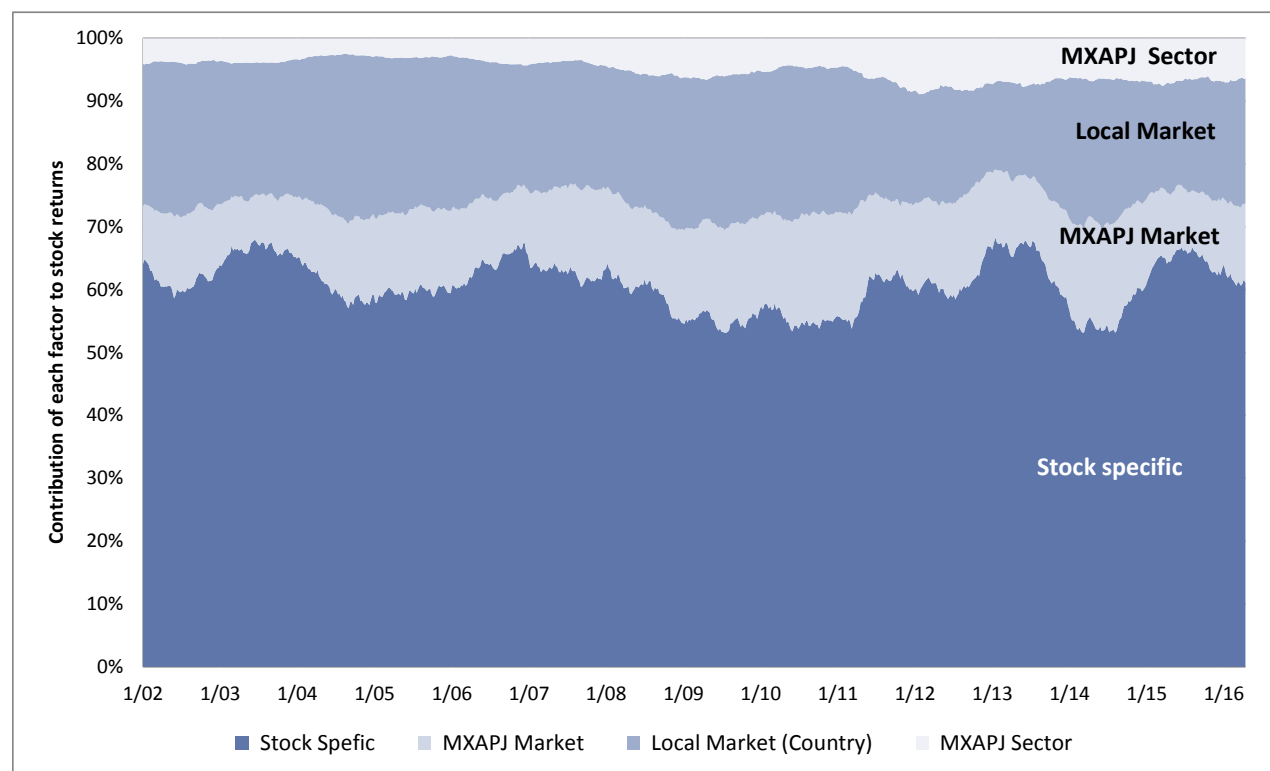
Source: Bloomberg, FactSet, Goldman Sachs Global Investment Research.

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[4] We followed methods in *Strategy Focus: Sun, sand and sectors* by Kerneis and Williams. See Appendix III for the methodology in detail.

It is similarly the case that the stock specific contribution has been the largest portion of the return in both the US and Europe. However, the contribution of other factors such as market and sector effects has been increasing, particularly in the US market.

● Sector effect is relatively stronger in the US compared to Europe, but stock specific is the most important factor in both.

Exhibit 9: Stock specific is the dominant factor but decreasing recently
Contribution of each factor to stock returns, SP500 stocks

Source: Bloomberg, FactSet, Goldman Sachs Global Investment Research.
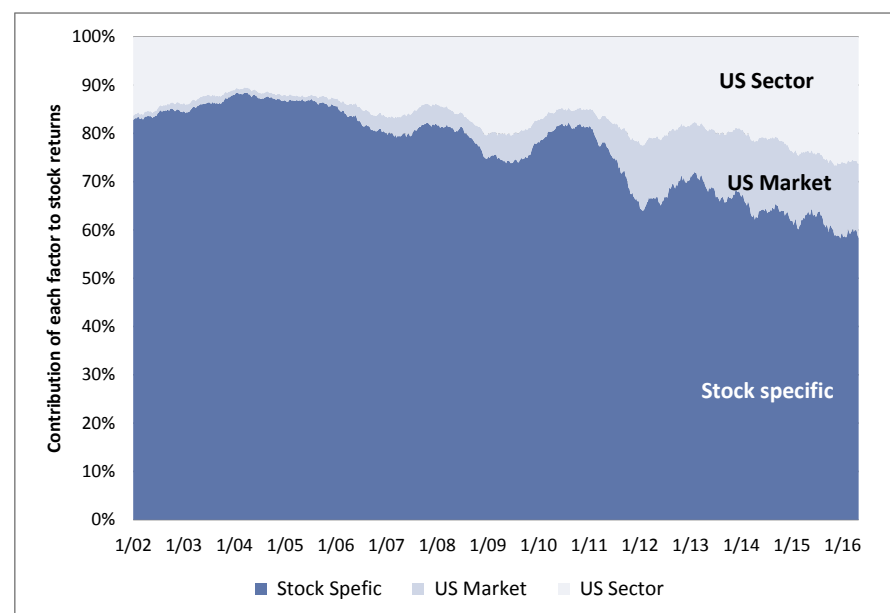
Exhibit 10: Stock specific is declining but still accounts for 70% of return
Contribution of each factor to stock returns, STOXX 600 stocks
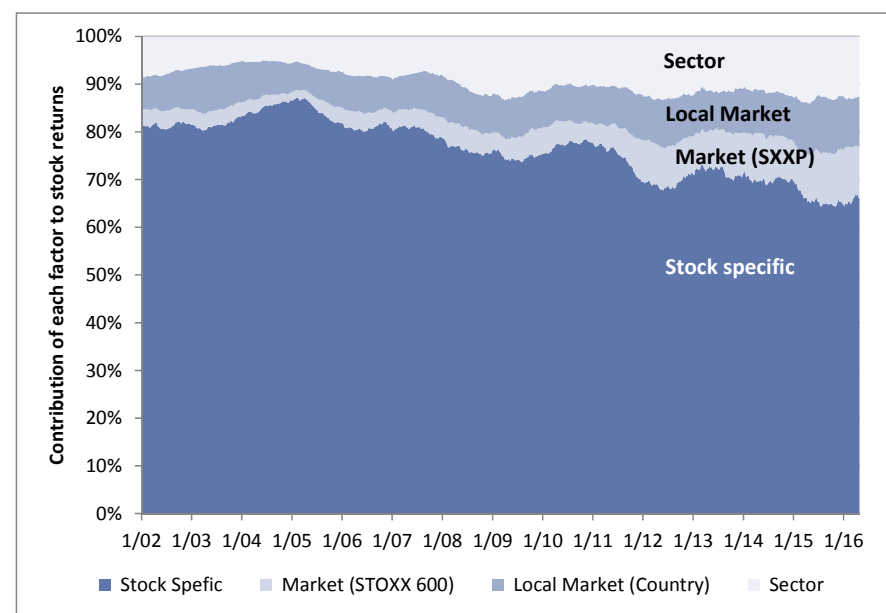
Source: Bloomberg, FactSet, Goldman Sachs Global Investment Research.

It is evident that stock specific factors outweigh the local market and regional sector effects in most of Asia Pacific countries (Exhibit 11). Also in most Asian countries, regional sectors factors are more important than local market. This suggests that stocks in the region are much more integrated, reflecting their stronger inter-regional business relationship.

Even by sector, stock specific factors outweigh the sector effect (Exhibit 12). Sectors where the stock specific factor is particularly dominant are IT, Materials, Industrials, Consumer discretionary, Consumer staples, Financials and Healthcare. The stock specific factor in those sectors account for more than 40%. These sectors offer considerably more scope for active stock selection strategies than those sectors with a low portion of stock specific factor contribution. These sectors include Utilities, Telecom services and Energy. Those sectors with less dominance of the stock specific factor tend to have higher contribution from local market. It is interesting that Telecom and Utilities are considered to be defensive, yet local market factor accounts for a significant portion of stock returns. This also indicates that active managers should focus less on those sectors relative to others with higher stock specific contribution.

- Stock specific factor contributes for more than 60% of return in China, Japan and Australia…

- … while sector effect dominates in Thailand, Philippines and New Zealand

- More alpha opportunities in Information Technology, Materials and Industrials than Telecom and Utilities sectors.

Exhibit 11: Stock specific factors dominate in Asia, but stronger regional sector influences over local market factors is also notable
Average since 2002, MXAP by Country
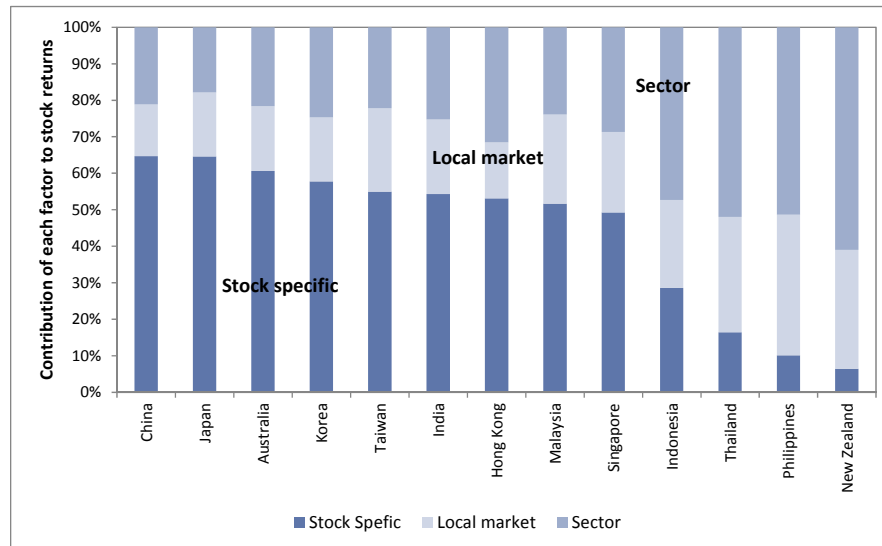
Source: Bloomberg, FactSet, Goldman Sachs Global Investment Research.

Exhibit 12: Active managers should focus on IT, Materials and Industrials where more alpha opportunities tend to exist
Average since 2002, MXAP by Sector
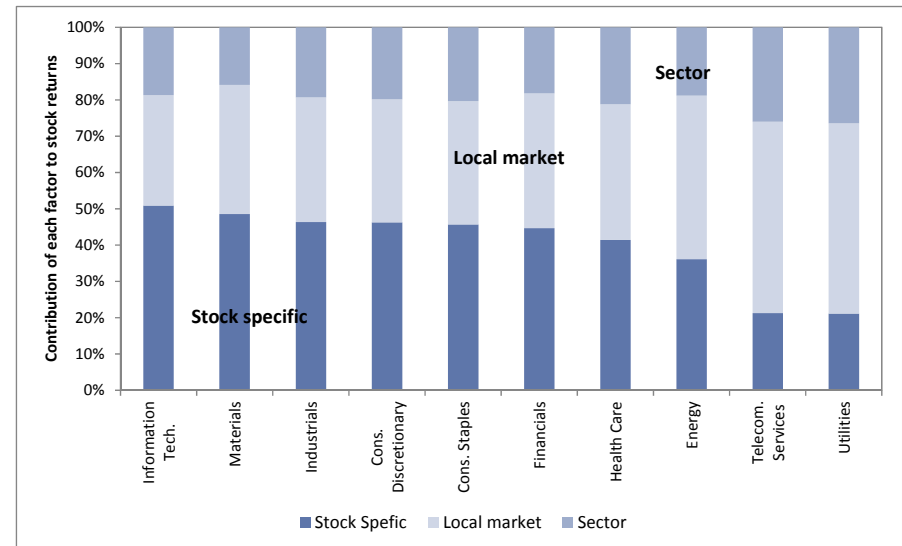
Source: Bloomberg, FactSet, Goldman Sachs Global Investment Research.

Among the top 100 stocks in Asia ex Japan by liquidity, it is much more evident that the Asia sector influences have become more important drivers of stock returns than local market factors in Asia Pacific (Exhibit 13). The Asia sector effect currently accounts for 27% of stock returns, compared with the local market effect at 22%, while the overall Asia Pacific market effect is also at 22%. The stock-specific factor accounts for the remaining 29%. It is clear that since 2007, local market influences have been declining at the expense of Asia sector, market and stock specific factors.

Large liquid stocks are more beta-driven but stock specific factor still represents a significant portion of returns

Exhibit 13: Local market influences are declining, while other factors have become more important such as stock specific factors
Top 100 by liquidity in MXAP
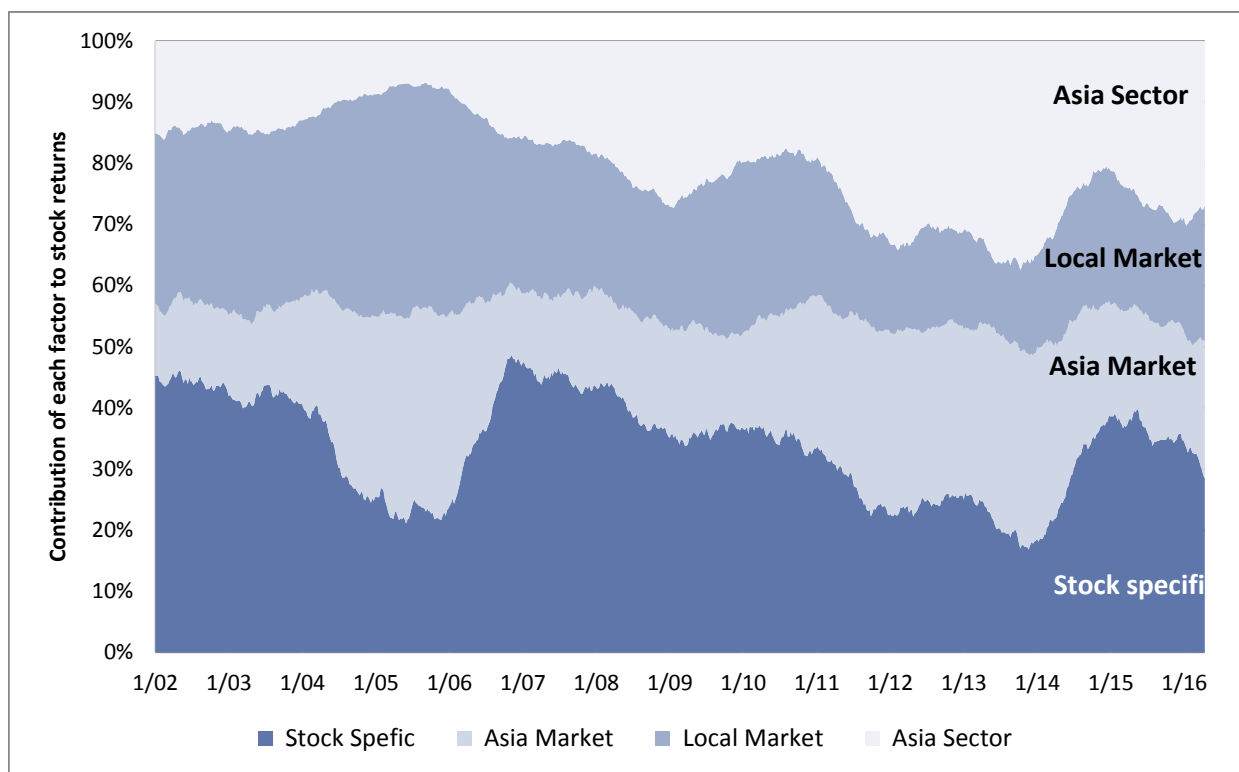
Source: Bloomberg, FactSet, Goldman Sachs Global Investment Research.

Asia Pacific is not all about growth – dividend yield and valuation changes are core drivers

One of common questions we receive from investors is what the key driver of returns from valuation changes and other fundamental factors is. We find dividend yield and valuation changes are the core drivers of Asian equity returns over the past 10 years.

We decompose the total return of Asian equities, measured by the MSCI AC Asia Pacific index into: 1) dividend yield, 2) dividend growth, and 3) valuation changes[5] of MSCI AC Asia Pacific ex-Japan and MSCI Japan over the last 10 years (Exhibit 19 and Exhibit 20). In Asia Pacific ex-Japan, the highest contributor of total return is the valuation adjustment term, which accounts for 49.2% of

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[5] See derivation in Appendix IV

total return on average. Dividend growth is the second, and dividend yield is the third with 12.7%. What is interesting is the valuation adjustment term becomes smaller over a longer investment horizon. The valuation changes contribution fell from 49.2% over a 1-year investment horizon, to 17.7% over 10-year horizon. It suggests that the valuation changes are not as important when investing for a long term. On the other hand, dividend growth is the most important and the highest contributor to total return over a 10-year horizon. It accounts for over 60% of total return in Asia Pacific ex-Japan. Identifying stocks with the ability to increase dividends over time or consistently is the key when investing in Asia Pacific ex-Japan. Nonetheless, over 1 to 5 years, valuation changes are almost as important as dividend growth, both accounting for approximately 40% of total return over the period.

The average total return contribution decomposition for Japan is interesting. Over a 1 year period, valuation changes are the highest contributor, accounting for more than half of the returns. Dividend growth is about 40% and dividend yield only accounts for 5% of the total return over a 1-year time horizon. As the investment horizon increases, dividend growth's contribution increases, similar to the case we observed in Asia Pacific ex-Japan. However, the contribution from valuation changes still accounts for 46% over a 10-year horizon in Japan. This suggests that unlike in Asia Pacific ex-Japan, it is vital to focus on both changes in valuation, as well as dividend growth in Japan even for long term investment horizon. Identifying the relative valuation expansion and contraction is an important alpha source in Japan. In another words, mean-reversion in the long run still is an important part of return contribution.

● Valuation changes are not as important when investing for a longer term in Asia Pacific ex Japan but remains important in Japan.

● Dividend growth is the highest contributor to total return for a longer term investment in Asia Pacific ex Japan, second in Japan.

Exhibit 14: Valuation change is highest contributor over 1-year period, but dividend growth is more important for longer term investment horizons
Average total return contribution from dividend yield, dividend growth and valuation change for MXAPJ

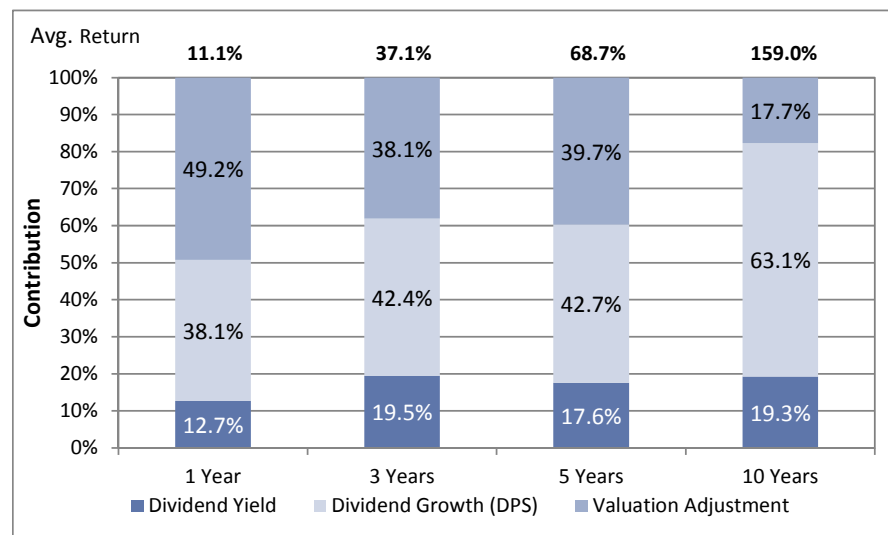*Source: Bloomberg, FactSet, Goldman Sachs Global Investment Research*

Exhibit 15: Unlike in Asia Pacific ex-Japan, valuation changes are as important as dividend growth, even for longer term horizons in Japan
Average total return contribution from dividend yield, dividend growth and valuation change for Japan
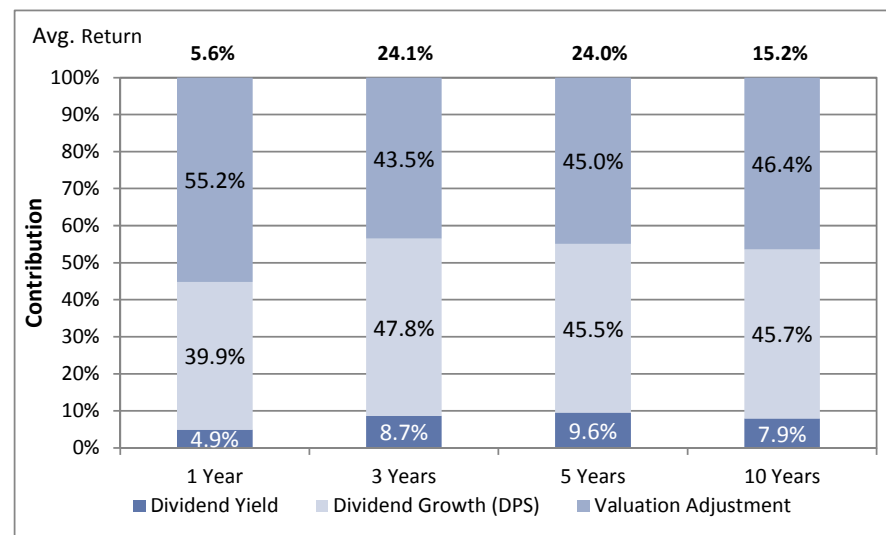
Source: Bloomberg, FactSet, Goldman Sachs Global Investment Research

Myth II: Quant factors don't work well in Asia Pacific. Yes, they do.

Traditional quant factors don't work well because beta is large and alpha is small

Empirical evidence of historical return decomposition proves that stock specific (alpha) is much higher than beta in Asia Pacific. Our backtest of quant factors also show some traditional quant factors perform well in the region.

We show which quant factors have and have not worked in Asia Pacific over the past 10 years. We perform back tests of various traditional quantitative factors in AEJ and Japanese markets[6]. Exhibit 16 shows the results. Identifying historical factor trends is helpful in estimating which factors could prove effective going forward. We summarize our backtest results in two sections:

1. Factors that have performed stably over the past 10 years and past 5 years; and

2. Recent trends (last 12 months).

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[6] For Quantitative Factor Assessment Methodology, see Appendix V

Exhibit 16: Value, Analyst sentiment and Profitability factors have produced consistent and good performance over last 10 years
Information ratio, Universe MXAPJ, TPX500 and MXAP

Value has worked well over 10 years in both Asia Pacific ex Japan and Japan. Profitability has been a consistent outperformer.

Information Ratio above 1 is considered to be a good signal. Negative IR indicates strong counter-intuitive effect or reversal in case of momentum.

		Information Ratio								
		10-year			5-year			1-year		
		MXAPJ	Japan	MXAP	MXAPJ	Japan	MXAP	MXAPJ	Japan	MXAP
Value	Book yield (Act)	-0.20	0.55	-0.11	-0.63	0.09	-0.16	-0.44	-1.95	-1.01
	Dividend yield (FY1)	0.89	0.69	1.50	1.33	0.48	0.84	1.37	-0.99	1.12
	Earnings yield (Act)	1.13	0.24	1.12	0.18	-0.01	0.22	-0.92	-2.09	-1.07
	Earnings yield (FY1)	0.61	-0.26	0.71	-0.19	-0.40	-0.17	-0.85	-2.39	-1.31
	Cash yield (FY1)	0.97	-0.08	0.98	0.35	-0.36	1.04	-0.07	-1.20	-0.39
	EBITDA/EV (FY1)	0.80	0.03	1.03	-0.13	-0.41	1.16	-0.30	-1.67	-0.41
Growth	Sales growth (Act to FY10	-0.08	-0.26	0.11	0.12	-0.22	-0.37	-0.24	1.13	0.03
	Sales growth (FY1 to FY2)	-0.40	-0.29	-0.03	-0.23	-0.29	-0.85	-0.26	0.53	0.16
	OP growth (Act to FY1)	-0.20	-0.50	-0.24	0.25	-0.46	-0.21	-0.08	-0.11	-0.53
	OP growth (FY1 to FY2)	-1.15	-0.20	-0.80	-1.37	-0.22	-1.42	-0.98	1.19	-1.19
	EPS growth (Act to FY1)	0.02	-0.80	-0.35	-0.11	-0.50	-0.29	-0.70	0.98	-0.80
	EPS growth (FY1 to FY2)	-1.13	-0.06	-0.81	-1.29	-0.22	-1.10	-0.76	1.48	-0.43
Price momentum	1M Price momentum	-0.32	-0.16	-0.26	-0.33	-0.01	-0.46	-0.32	0.21	-0.06
	3M Price momentum	-0.10	-0.10	0.05	-0.16	0.13	-0.20	-1.64	-0.68	-1.83
	6M Price momentum	0.07	-0.36	-0.01	0.00	0.18	-0.12	-0.32	0.67	0.19
	12M Price momentum	0.46	0.06	0.28	0.62	0.34	0.14	-0.16	0.75	-0.25
	24M Price momentum	0.31	-0.03	0.30	0.50	0.30	0.34	-0.46	0.89	-0.07
Analyst sentiment	EPS Revision (1M)	1.33	-0.02	1.05	1.40	0.07	0.99	-0.40	-0.28	-0.02
	Consensus Rating	0.62	-0.16	0.61	0.22	0.08	0.00	-0.91	-0.94	-0.36
	Rec Revision (1M)	1.14	0.20	0.75	0.86	0.44	0.53	1.29	-0.23	0.48
	Target Price Rev (1M)	0.45	0.02	0.42	0.27	0.30	0.30	-0.92	-0.12	-0.73
Profitability	ROA (FY1)	0.69	0.15	0.87	0.87	0.15	0.72	1.70	1.36	2.32
	ROE (FY1)	1.11	0.41	0.76	1.16	-0.20	0.20	0.58	-0.13	0.88
	CFROI (Act)	1.11	0.48	1.30	1.13	0.42	1.21	1.00	0.08	0.97
	OP margin (FY1)	1.17	-0.27	0.95	1.54	0.22	0.85	1.09	-1.95	1.77
	ROA (FY0)	0.97	0.35	1.03	1.05	0.23	0.65	1.68	1.35	2.40
	ROE (FY0)	1.23	0.01	0.92	1.43	0.02	0.45	0.78	-0.15	1.20
Efficiency /Quality	Net Cash / Mkt cap	-0.26	0.39	-0.29	-0.53	0.48	-0.59	-0.25	1.37	-1.27
	Quick Ratio	0.52	0.51	0.70	0.94	0.53	0.66	1.16	1.79	1.71
	Equity / Debt	0.46	0.58	0.79	0.74	0.47	1.21	0.59	1.65	0.93
Risk/Profile	Overseas sales ratio	0.61	-0.14	0.85	0.63	-0.45	1.05	1.80	-0.40	1.58
	250D Volatility	-0.49	-0.32	-0.41	-0.94	-0.38	-0.82	-2.01	-0.36	-1.85
	Market cap	0.28	0.16	-0.12	0.57	-0.09	0.62	0.67	-1.38	0.71
	USD/JPY FX beta	-0.50	-0.43	-0.33	-0.67	-0.79	0.23	-0.74	-2.40	-0.44

Information Ratio = Average Information Coefficient/Volatility of Information Coefficient.

Source: I/B/E/S, Worldscope, Toyo Keizai, FactSet, Goldman Sachs Global Investment Research.

Factors that have stable performance over the past 10 years (IR of at least 1)

Value: Dividend yield, Earnings yield (inverse of P/E) and EBITDA/EV (inverted) were comparatively stable alpha factors over the past 10 years. Flow value factors were particularly effective in AEJ markets. Stocks seen as undervalued by the market performed well – evidence that valuation is an effective tool, which should come as good news for most investors.

Sell-side analyst sentiment: Our back-test shows that consensus EPS revision (1-month) is an effective factor in Asia Pacific, less so in Japan. We believe consensus EPS revision was an effective factor because investor under-reaction provides one source of returns. The earnings revision factor is likely to be effective since buying (selling) pressure is sustained for a certain period as a result.

Profitability: Profitability factors have generally worked well over the 10 years. In particular, CFROI and ROA are highly effective in Asia Pacific markets.

Momentum: We observe short term mean-reversal effect but not that consistent. Similarly we observe long term positive momentum effect, but not that consistent. None of the momentum factors have produced information above 1 due to high volatility of the factor performance.

Growth: Consensus estimated base growth factors do not work well, particularly excluding the Japan universe. One of the reasons could be that consensus estimates are often too high and the negative effect might come from disappointment post earnings announcements.

Asian markets reward on quality and profitability recently

Prolonged value factor underperformance has been a concern for investors.

Our recent conversations with investors have been around prolonged value underperformance particularly in Japan. We observe weakness in recent value performance in Asia as well. For example, book yield (inverse of P/B) and earnings yield (both actual and estimated base) have underperformed other factors over the last 12 months (April 2015 to May 2016) both in Japan and Asia Pacific. In Asia Pacific markets, there may be a tendency for investors to react more gradually to analysts' earnings estimate revisions because of differences in how information is communicated and the speed at which the revisions penetrate the market. We highlighted previously on value factor underperformance[7]. We note that value factors behave like a risk indicator and the factor volatility has risen, which is causing the factor to underperform. On the contrary, factors such as ROA, ROE and Operating Profit margin factors are performing well. This is a reflection of various macro risks and economic growth slowdown risks that investors have preferred stocks with sufficient cash holdings and higher earnings quality.

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[7] See November 26, 2014 Questionable whether value can sustain its advantage, February 15, 2014 Roadmap to a value (P/B) comeback.

Myth III: Liquidity is a problem. It is skewed to Japan, but not that much.

Liquidity can be a problem. Asia ex-Japan top 100 stocks still offer an average ADVT of US$ 95mn.

### Liquidity is skewed when Japan is included, but ex-Japan is still liquid enough

Contrary to popular belief, the Asian markets have enough liquidity to construct a quant driven portfolio roughly of US$2bn in size with a 20% participation rate. We note the top 100 stocks by liquidity in the region offer the average and median ADVT of US$95 and US$60mn.

Of the top 100 stocks by liquidity in the MSCI AC Asia Pacific (MXAP) universe, 60 stocks are Japanese stocks and they account for 50% both by market cap and liquidity (Exhibit 17). China domiciled stocks and ADRs, of which there are only 12 stocks and 8 stocks respectively, are the next largest and account for 28% and 31% of the universe in terms of market cap and total liquidity. Australia accounts for 10% by market cap, but only 7% in terms of liquidity. So if one of the allocation criteria was liquidity, investing in Asia Pacific including Japan would typically have a large skew. The remaining allocation options are limited in terms of country and sectors as sector weights are skewed. China, Australia and Hong Kong offer Financials stocks, while China, Korea and Taiwan offer IT related stocks. This means that an Asian hedge fund portfolio manager, who typically prefers markets with depth and width, is likely to trade a significant amount of Japanese stocks, as well as Asian financials and IT stocks. High concentration of one or two countries/sectors is a common problem when investing in Asia. The picture is likely to be similar for a long-only active fund manager who is benchmarked to an index like MSCI AC Asia Pacific. In terms of weight breakdown, Japan accounts for 42% of the index (Exhibit 18), the next largest countries are China with 12.8%, Australia with 12.4%, Korea with 8.1%, Taiwan with 6.5%, and Hong Kong with 5.7%.

Exhibit 17: Japan offers fund managers depth and width in the Asian equity market. Other Asian markets offer IT and Financial stocks.

Top 100 stocks by 6M ADVT as of 12/2015 in MXAP universe, width of bars is proportional to aggregate value to total. (Number of stocks in parentheses)

Japan dominates in terms of offering depth and width in Asia Pacific
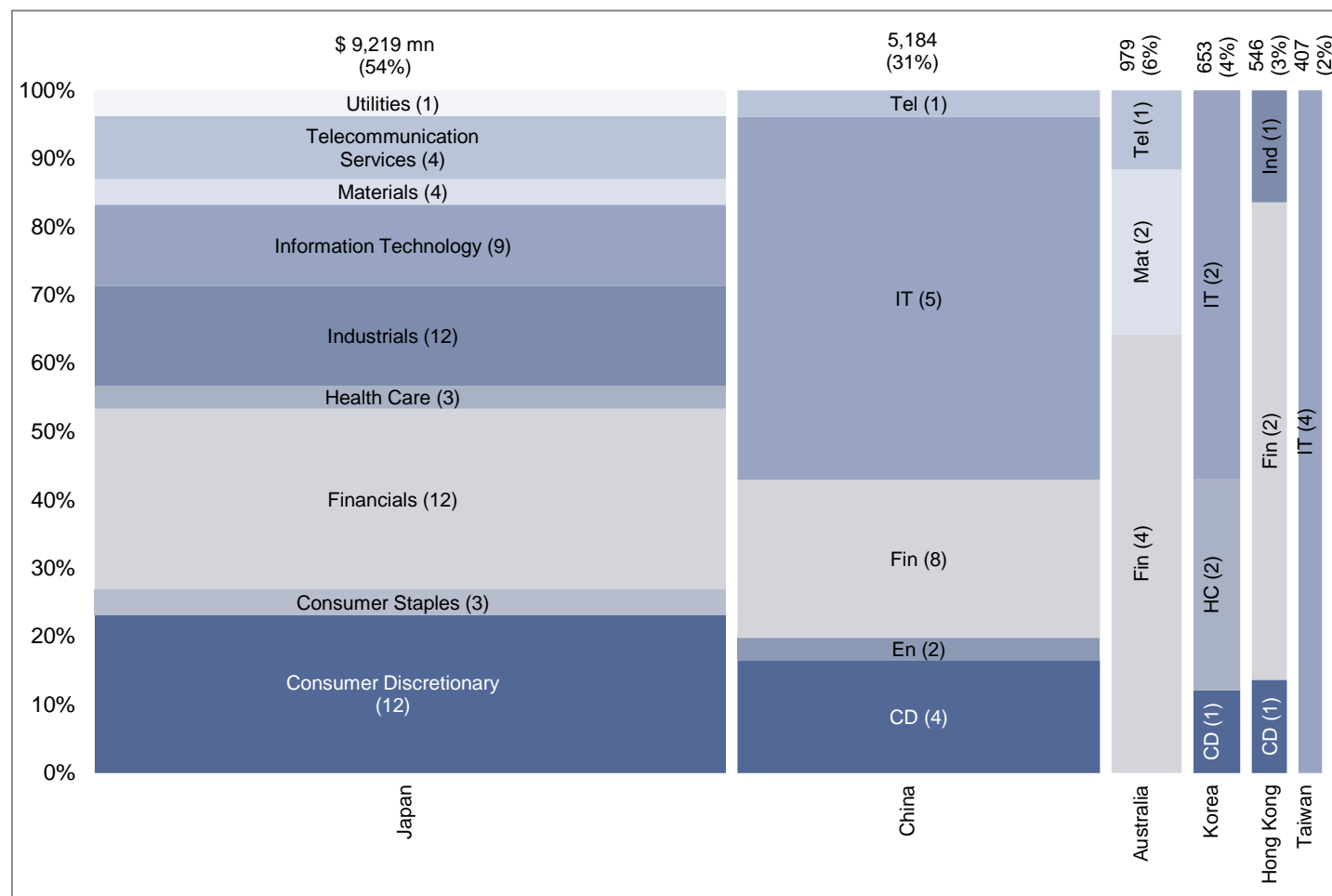
Source: FactSet, Goldman Sachs Global Investment Research.

Exhibit 18: Japan is by far the largest country in the MXAP, likely to limit significant investment into smaller countries in the region
MXAP country weights based on last 12M average
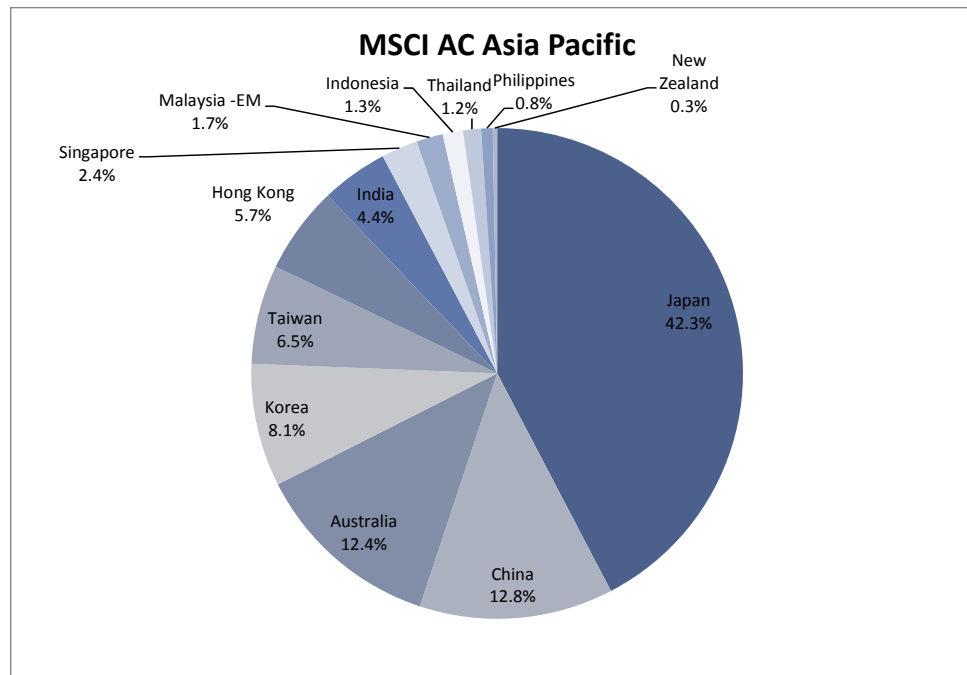
Source: FactSet, Goldman Sachs Global Investment Research.

More balanced opportunities in Asia Pacific excluding Japan

If we exclude Japan from the analysis, the investment opportunities actually look more attractive in terms of diversification across countries and sectors. Exhibit 19 shows the top 100 stocks from MSCI AC Asia Pacific excluding Japan (MXAPJ) broken down by country and sectors. Largest is China ADRs which include stocks like Alibaba (BABA), Baidu (BIDU), JD.com (JD), and Ctrip.com (CTRP). Alibaba group trades about US$1.3bn a day which accounts for about 10% of the total. Other ADRs also trade significantly more than those listed in Asia. Also, those China ADRs belong to either IT or consumer discretionary sectors. In terms of width, inter sector differentiation, top 100 liquid stocks offer a wider range of stocks from a wider number of sectors. In fact, when comparing to investment opportunities in terms of liquidity, and return dispersion between MXAP and MXAPJ, we find plenty of opportunities in AeJ market as shown in Exhibit 4. The average liquidity of the top 100 stocks in MXAP and MXAPJ is US$170mn vs US$110 mn, and the minimum is US$74mn vs US$40mn (Exhibit 20). More interestingly, the return dispersion, which in a way shows alpha opportunities, indicates MXAPJ offers more than MXAP. The only significant difference between the distribution of stocks by different liquidity baskets is the number of stocks trading between US$100mn and US$150mn (Exhibit 21). AeJ market still offers enough depth, in our view.

Exhibit 19: 11 China ADRs offer significant liquidity, but other stocks from various countries also show depth

Top 100 stocks by 6-month ADVT as of 12/2015 in MXAPJ universe, width of bars is proportional to aggregate value to total. (Number of stocks in parentheses)

China offers depth, with just 9 stocks but more breadth exist across other countries in Asia Pacific ex Japan
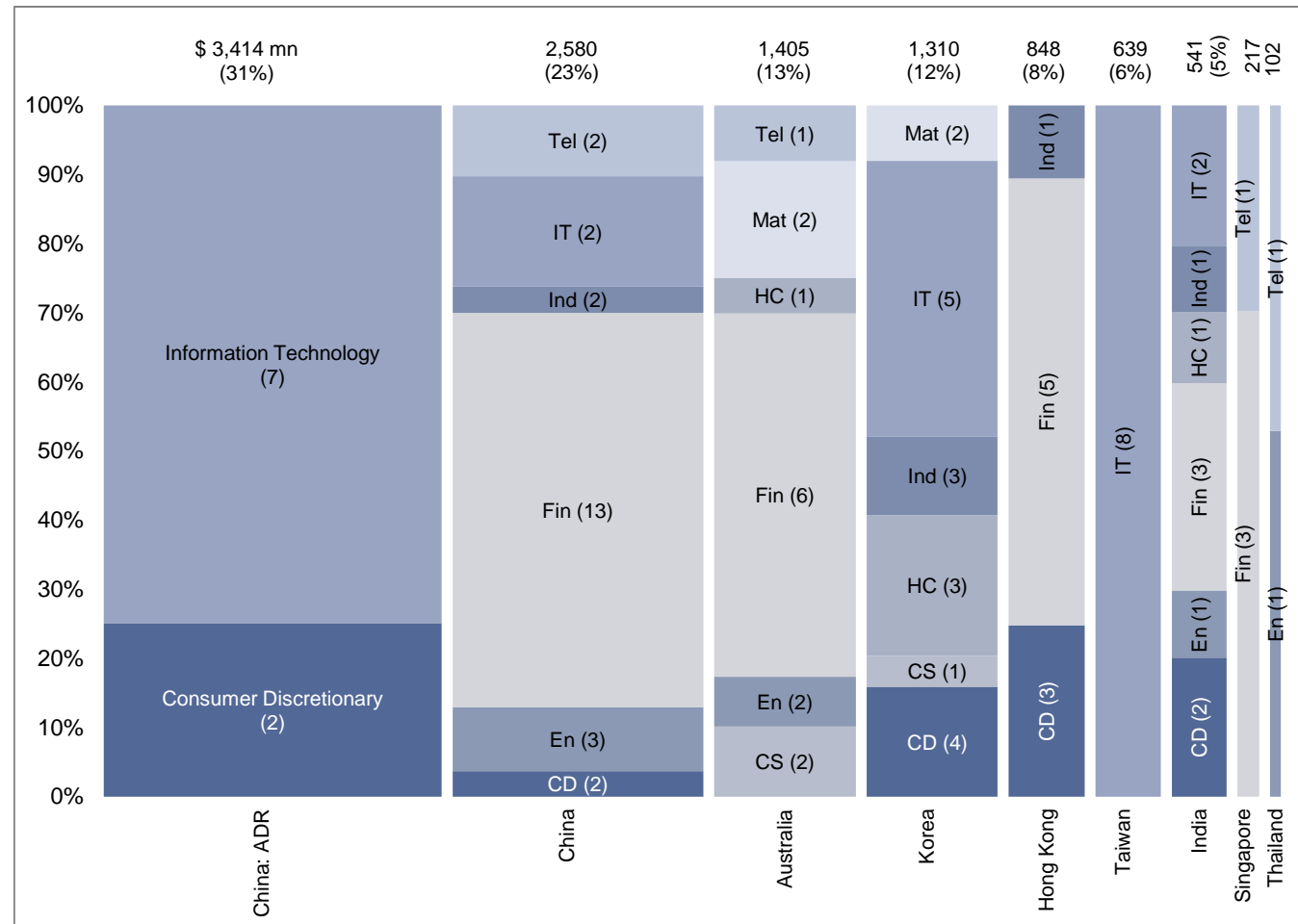
Source: FactSet, Goldman Sachs Global Investment Research.

- More than 75% of the top 100 stocks in MXAPJ trade more than US$50mn per day; and

- 22% of the top 100 MXAPJ stocks trade less than US$50mn per day but the minimum is US$40 per day.

Exhibit 20: AeJ universe offers enough liquidity and more dispersion
Liquidity and return dispersion for top 100 stocks by liquidity in MXAP and MXAPJ

Top 100 by Liquidity	Liquidity (2H 2015, US$ mn)		
	Avearge	Max	Min
MSCI AC Asia Pacific ex-Japan	110.6	1,320.6	40.2
MSCI AC Asia Pacific	169.9	1,320.6	74.3
Top 100 by Liquidity	Return Dispersion		
	3M	6M	12M
MSCI AC Asia Pacific ex-Japan	10.3	14.0	26.4
MSCI AC Asia Pacific	8.7	13.7	25.7

Exhibit 21: No significant difference in stock distribution by liquidity bucket
Number of stocks by liquidity bucket, top 100 stocks by liquidity in MXAP and MXAPJ

Source: FactSet, Goldman Sachs Global Investment Research.
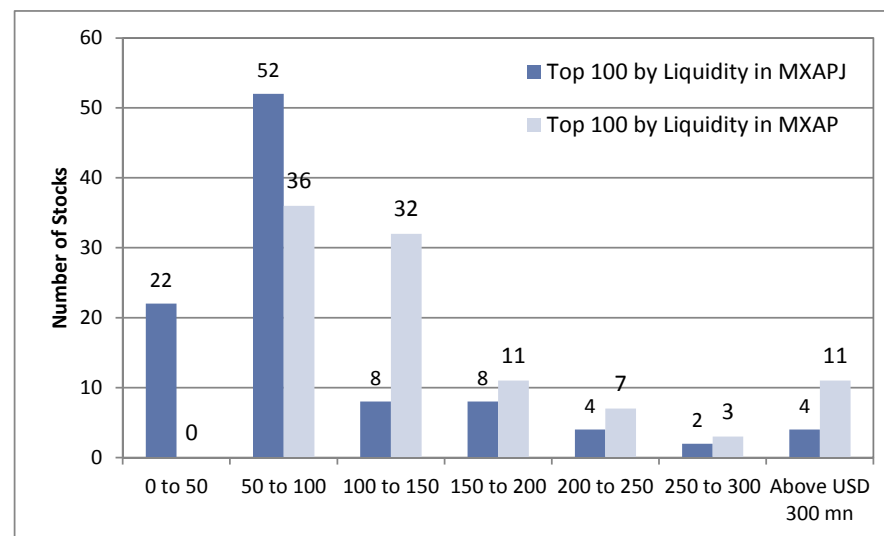
Source: FactSet, Goldman Sachs Global Investment Research.

Excluding 7 China ADR stocks, the distribution of stocks and sectors is much wider. The universe is based on stocks with adjusted ADVT[8] above US$20mn in Asia Pacific excluding Japan (exhibit 22)

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[8] In Asia Pacific, due to unusual events (corporate action, shares offerings), stocks can have significant increase in shares traded on certain day(s). Adjusted ADVT excludes those events and calculate "true" daily average value traded

Exhibit 22: Plenty of diversification among stocks with ADVT above US$20mn in Asia Pacific excluding Japan
Stocks with 1-year adjusted ADVT above US$20mn in MXAPJ universe, width of bars is proportional to aggregate value to total. (Number of stocks in parentheses)

Stocks with ADVT above US$20mn (206 stocks) offer breadth and depth
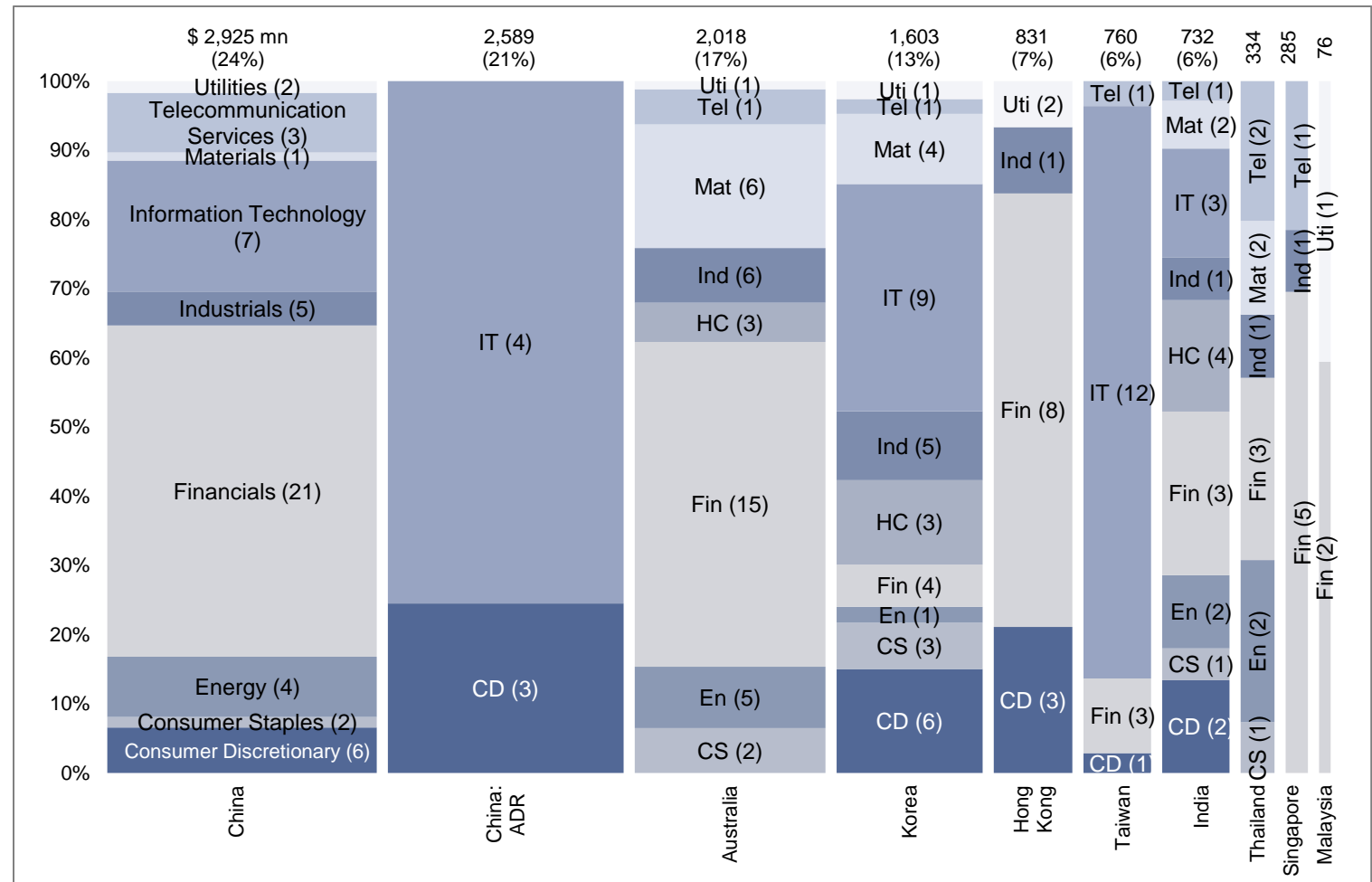
Source: FactSet, Goldman Sachs Global Investment Research.

Quantamental Solution: Incorporating GS fundamental estimate factors

Enhancing quant factors with GS fundamental estimates

We introduce a new way of implementing Goldman Sachs Global Investment Research (GS GIR) analysts' data (stock level estimates) systematically. Our study shows that several GS GIR Fundamental Estimates Factors (FEF) outperformed factors based on consensus estimates. In this section, first we show the backtest results of GS FEF against consensus based factors. Secondly, we select GSFEF based on historical performance (Sharpe ratio) and build a GSFEF composite alpha model and analyze the effectiveness of the model. We finally show the latest constituents selected by the model.

As we believe our GS FEF is designed to explain a certain portion of idiosyncratic returns rather than the systematic portion, we split the universe into two, one with stocks that have a higher idiosyncratic portion based on multi-factor model[9]. For back tests, we used the universe of stocks with idiosyncratic return portion higher than sector median.

In Exhibit 22, we highlight the list of GS FEF that has produced better performance compared to consensus estimate based factors. The backtest details were as follow;

- Period: From January 2011 to May 2016, monthly rebalance

- Universe: GS Covered stocks that are in MXAP universe

- Return: Equal-weighted portfolio return spread

Exhibit 23: GS Fundamental Estimate Factors that have outperformed consensus based factors
Summary Statistics

Factor	High Residual: High Factor - Low Factor											
	Ann. Return		Ann. Volatility		Sharpe Ratio		Hit Rate (%)		Max Return		Min Return	
	TRG	Con.	TRG	Con.	TRG	Con.	TRG	Con.	TRG	Con.	TRG	Con.
EPS growth	6.09	1.49	7.60	4.80	0.80	0.31	56.9%	61.5%	14.11	2.59	-1.98	-4.01
FCF conversion	4.81	-3.59	7.08	3.84	0.68	-0.94	70.8%	35.4%	3.65	3.35	-8.32	-2.56
Pre-tax profit growth	3.48	1.71	5.16	4.59	0.67	0.37	52.3%	58.5%	5.64	3.36	-2.81	-5.34
Manufactured earnings growth measure	2.92	-4.23	4.81	4.42	0.61	-0.96	60.0%	36.9%	6.08	2.85	-2.74	-2.71
Cash conversion (lower the better)	1.78	1.64	5.56	5.92	0.32	0.28	52.3%	53.8%	6.42	5.81	-2.43	-4.05
Unlevered free cash flow yield	1.32	0.34	5.12	4.71	0.26	0.07	53.8%	47.7%	3.09	2.95	-4.17	-3.05
DPS growth	0.49	0.39	5.98	5.56	0.08	0.07	61.5%	50.8%	3.17	4.41	-8.65	-5.42

Source: I/B/E/S, Worldscope, FactSet, Goldman Sachs Global Investment Research.

[9] Please see Appendix VI for the regression model specification.

Exhibit 24: GS Fundamental Estimate Factors have shown persistent outperformance
Index return for back test results
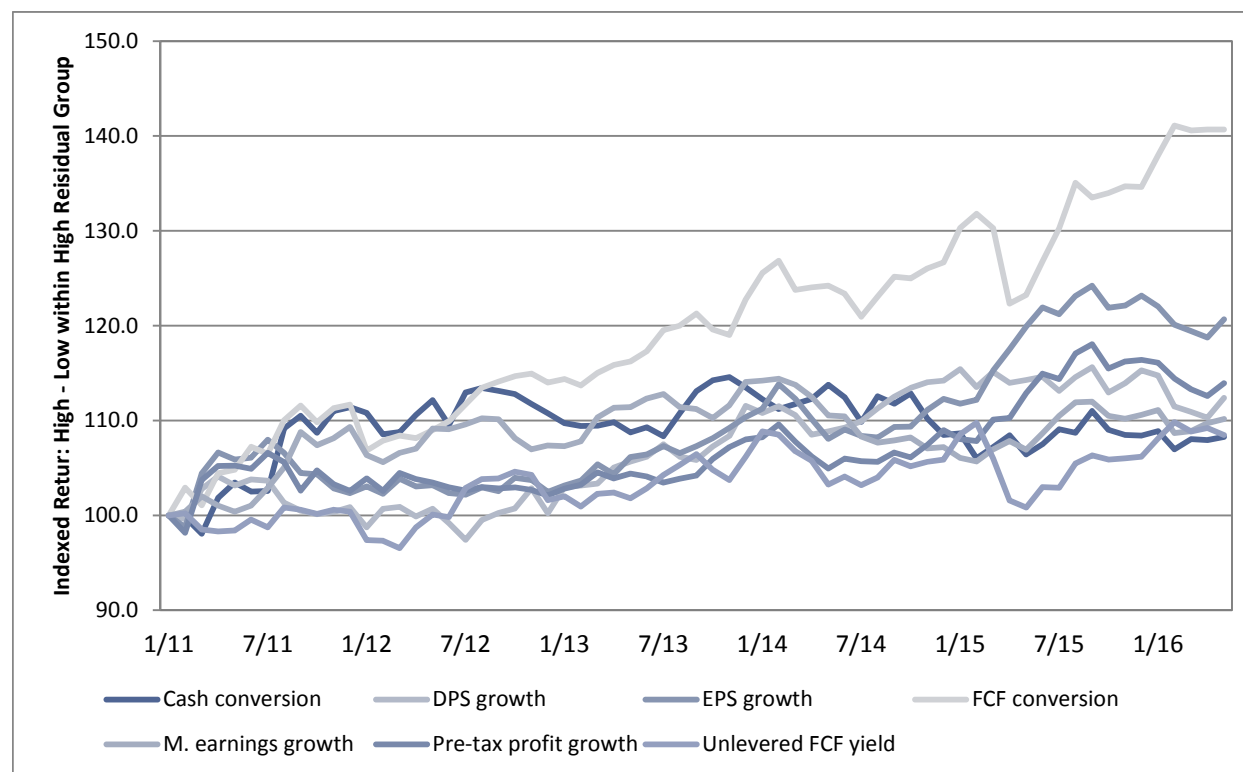
Source: I/B/E/S, Worldscope, FactSet, Goldman Sachs Global Investment Research.

Building a composite model with GS Fundamental Estimates Factors

In this section, we construct a portfolio with GS composite alpha signal where we compile alpha scores based on factors that have shown positive annualized returns over the period and those factors that have produced superior returns over the consensus estimate based factors (Exhibit 23).

Determining Factor Weight

To build the model, we first decide the factor weighting. The idea is to use minimum volatility optimization. For a given level of return (we set the return 50 basis points above an equally weighted portfolio return), we use optimization to find the weights for

each of the 7 factors so that the combined factor return has minimum level of volatility. Optimization is done every month based on the past 2 years' monthly return. Exhibit 25 shows the historical factor weighting over time.

Methodology of portfolio construction
To create the composite portfolio, we start with GS covered stocks in Asia Pacific with available factor data. For each factor, we calculate standardized Z-score. A total Z-score is obtained from the weighted average of each factor Z-score, where the weights are from optimization in previous step. We exclude stocks with Sell rating or stocks that do not have a rating[10]. The top 50 stocks ranked by total Z-score build up the GS FEF composite basket. Stock weights are determined by the total Z-score. Exhibit 26 shows the back tests result for GS FEF Composite Model with monthly rebalance.

Exhibit 25: Factor Weights differ across time
Historical Factor Weighting using Minimum Variance Optimization
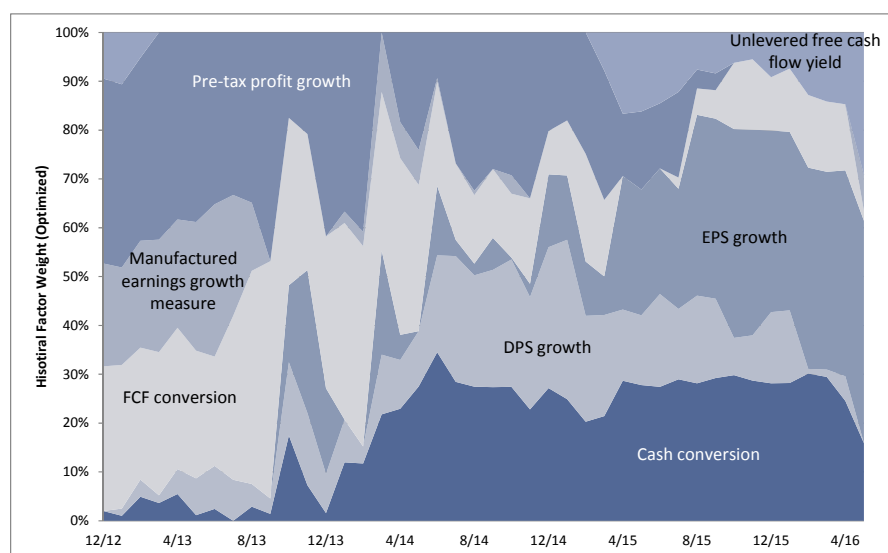
Source: FactSet, Goldman Sachs Global Investment Research.

Exhibit 26: GS FEF Composite model has outperformed MXAP since 2012
Indexed return for GS FEF Composite Model
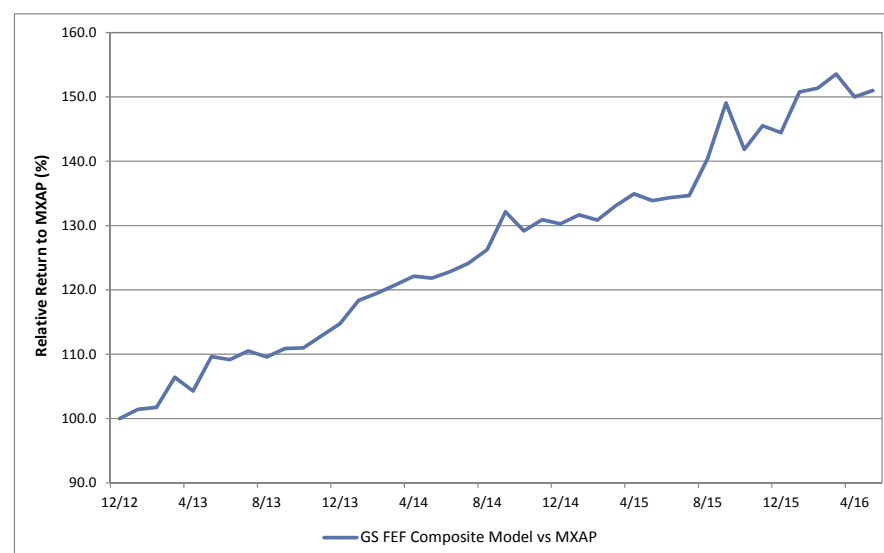
Source: FactSet, Goldman Sachs Global Investment Research.

We list top 50 stocks in Asia ex Japan ranked by GS composite alpha signal in Exhibits 27 and 28.

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[10] Stocks that do not have a rating due to: Coverage Suspended, Not Rated, Rating Suspended

Exhibit 27: Top 50 stocks by GS composite alpha signal (1)
GS FEF Composite Model Constituents (1)

Top 50 stocks from GS composite alpha signal which combines GS Fundamental Estimates Factor (GS FEE)

Bloomberg Ticker	Sedol	Company Name	Mkt cap (US$mn)	Adj. Liquidity (20D advt, US$ mn)	Prices as of Jul 11	Total Score	Weight	GS Rating	GICS Sector	Country
006400 KS	6771645	Samsung SDI Co	6,408.4	28.1	106,000	2.18	7.3%	Neutral	Information Technology	KR
EXCL IJ	B0LD0W9	PT XL Axiata	2,326.2	1.2	3,580	1.85	6.2%	Neutral	Telecommunication Services	ID
GENS SP	6366795	Genting Singapore Plc	6,814.7	8.7	0.8	1.79	6.0%	Sell	Consumer Discretionary	SG
005490 KS	6693233	POSCO	14,252.6	53.7	207,000	1.77	6.0%	Neutral	Materials	KR
4612 JP	6640507	Nippon Paint Holdings	7,773.2	26.2	2,437	1.55	5.2%	Neutral	Materials	JP
7974 JP	6639550	Nintendo	24,206.3	72.3	20,260	1.37	4.6%	Neutral	Information Technology	JP
6702 JP	6356945	Fujitsu	7,434.6	50.0	361.3	1.21	4.1%	Buy*	Information Technology	JP
009150 KS	6771689	Samsung Electro-Mechanics	3,082.2	15.0	47,400	1.15	3.9%	Neutral	Information Technology	KR
AL IN	B01NFT1	Ashok Leyland	3,877.8	17.8	93.4	1.11	3.8%	Neutral	Industrials	IN
023530 KS	B0WGPZ5	Lotte Shopping	5,011.0	11.3	197,000	1.11	3.8%	Sell	Consumer Discretionary	KR
BPCL IN	6099723	Bharat Petroleum	12,156.6	18.7	1,132.6	0.95	3.2%	Buy*	Energy	IN
2324 TT	6225744	Compal Electronics	2,793.7	7.0	20.9	0.87	2.9%	Neutral	Information Technology	TW
8 HK	6574071	PCCW Ltd.	5,099.3	4.7	5.4	0.77	2.6%	Buy	Telecommunication Services	HK
BHARTI IN	6442327	Bharti Airtel	21,157.5	16.5	359.8	0.67	2.3%	Buy*	Telecommunication Services	IN
TOP TB	B0300P1	Thai Oil	3,486.8	7.7	60.3	0.64	2.2%	Neutral	Energy	TH
2357 TT	6051046	ASUSTeK Computer	6,522.4	12.1	271.0	0.60	2.0%	Neutral	Information Technology	TW
7267 JP	6435145	Honda Motor	46,184.5	122.4	2,576.5	0.51	1.7%	Buy	Consumer Discretionary	JP
069960 KS	6568610	Hyundai Department Store	2,550.2	7.1	130,000	0.51	1.7%	Neutral	Consumer Discretionary	KR
009830 KS	6407768	Hanwha Chemical	3,368.5	20.5	24,000	0.47	1.6%	Buy	Materials	KR
694 HK	6208422	Beijing Capital Intl Airport	4,573.8	3.2	8.4	0.47	1.6%	Buy	Industrials	CN
7832 JP	B0JDQD4	Bandai Namco Holdings	5,999.7	23.0	2,746	0.46	1.5%	Neutral	Consumer Discretionary	JP
688 HK	6192150	China Overseas Land & Investment	26,703.6	46.0	25.4	0.45	1.5%	Buy	Financials	CN
410 HK	B27WLD2	SOHO China	2,600.3	2.5	3.9	0.43	1.5%	Neutral	Financials	CN
005380 KS	6451055	Hyundai Motor Co.	30,293.7	49.6	131,000	0.40	1.3%	Neutral	Consumer Discretionary	KR
IDEA IN	B1MP4H4	Idea Cellular	5,545.1	11.7	103.3	0.39	1.3%	Neutral	Telecommunication Services	IN

Source: Bloomberg, FactSet, Goldman Sachs Global Investment Research.

Top 50 stocks from GS composite alpha signal which combines GS Fundamental Estimates Factor (GS FEE)

Exhibit 28: Top 50 stocks by GS composite alpha signal (2)
GS FEF Composite Model Constituents (2)

Bloomberg Ticker	Sedol	Company Name	Mkt cap (US$mn)	Adj. Liquidity (20D advt, US$ mn)	Prices as of Jul 11	Total Score	Weight	GS Rating	GICS Sector	Country
HPHT SP	B56ZM74	Hutchison Port Holdings Trust	4,006.1	7.1	0.5	0.37	1.3%	Neutral	Industrials	SG
1880 HK	B1WJ4X2	Belle International Holdings	4,946.4	11.3	4.6	0.37	1.2%	Neutral	Consumer Discretionary	CN
6505 TT	6718716	Formosa Petrochemical Corp.	25,459.2	11.0	86.3	0.34	1.1%	Neutral	Energy	TW
CPU AU	6180412	Computershare	3,727.2	10.6	9.0	0.33	1.1%	Neutral	Information Technology	AU
4739 JP	6200194	Itochu Techno Solutions	2,628.7	15.0	2,286	0.31	1.0%	Neutral	Information Technology	JP
991 HK	6080716	Datang International Power (H)	3,311.1	6.1	1.9	0.30	1.0%	Neutral	Utilities	CN
3800 HK	B28XTR4	GCL-Poly Energy Holdings	2,783.2	5.7	1.2	0.30	1.0%	Neutral	Information Technology	CN
004020 KS	6461850	Hyundai Steel	5,195.2	18.0	46,300	0.29	1.0%	Neutral	Materials	KR
2386 HK	B92NYC9	Sinopec Engineering Group	4,092.3	2.2	7.2	0.28	0.9%	Neutral	Industrials	CN
3699 HK	BTDYF84	Dalian Wanda Commercial Properties	28,083.5	25.7	48.2	0.28	0.9%	Neutral	Financials	CN
392 HK	6081690	Beijing Enterprises Holdings	7,447.0	9.8	45.0	0.25	0.9%	Buy*	Industrials	CN
ASTRO MK	B7W5GK3	Astro Malaysia Holdings	3,728.7	1.0	2.9	0.25	0.8%	Neutral	Consumer Discretionary	MY
161390 KS	B7T5KQ0	Hankook Tire	5,564.7	11.2	52,200	0.23	0.8%	Buy*	Consumer Discretionary	KR
3311 HK	B0BM5T8	China State Construction Intl	5,417.7	13.8	10.4	0.23	0.8%	Buy	Industrials	CN
MRP NZ	B8W6K56	Mighty River Power Ltd.	3,061.9	2.1	3.1	0.21	0.7%	Buy	Utilities	NZ
2212 JP	6985509	Yamazaki Baking	6,428.8	15.3	2,945	0.21	0.7%	Neutral	Consumer Staples	JP
036570 KS	6264189	NCSOFT Corp.	4,664.4	20.4	254,500	0.20	0.7%	Buy	Information Technology	KR
494 HK	6286257	Li & Fung	4,017.5	10.3	3.7	0.19	0.6%	Neutral	Consumer Discretionary	HK
LPKR IJ	B19HDX2	Lippo Karawaci Tbk	2,054.9	5.0	1,170	0.18	0.6%	Neutral	Financials	ID
2875 JP	6899967	Toyo Suisan Kaisha	4,312.2	16.0	4,245	0.16	0.5%	Sell	Consumer Staples	JP
4904 TT	6421854	Far EasTone Telecommunications	8,244.5	8.9	81.7	0.16	0.5%	Neutral	Telecommunication Services	TW
902 HK	6099671	Huaneng Power International (H)	8,797.1	27.8	4.5	0.15	0.5%	Neutral	Utilities	CN
MEL NZ	BWFD052	Meridian Energy Ltd.	5,008.4	4.4	2.7	0.14	0.5%	Neutral	Energy	NZ
6465 JP	B3FF8W8	Hoshizaki Corp.	6,735.7	20.5	9,380	0.13	0.5%	Neutral	Industrials	JP
SPK NZ	6881436	Spark New Zealand	5,093.1	11.2	3.8	0.12	0.4%	Neutral	Telecommunication Services	NZ

Source: Bloomberg, FactSet, Goldman Sachs Global Investment Research.

Acronyms:

Following table explains the acronyms in this report.

Acronym	Full Name
MXAP	MSCI AC Asia Pacific Index
MXAPJ	MSCI AC Asia Pacific Ex-Japan Index
AU	Australia
CN	China
HK	Hong Kong
IN	India
ID	Indonesia
JP	Japan
KR	Korea
MY	Malaysia
NZ	New Zealand
PH	Philippines
SG	Singapore
TW	Taiwan
TH	Thailand
CD	Consumer Discretionary
CS	Consumer Staples
En	Energy
Fin	Financials
HC	Health Care
Ind	Industrials
IT	Information Technology
Mat	Materials
Tel	Telecommunication Services
Uti	Utilities

Appendix I: Calculation for Ratio of Return from Asset Allocation

We referenced Gupta, Li and Sharma (2014)[11] in calculating the asset allocation contribution.

In Asia Pacific, there are two dimensions of allocation - both country and sector, where as in the US and Japan, there is only sector. DM Europe also has two dimensions - country and sector. In our analysis, we used country (13 countries in Asia Pacific and 15 countries in DM Europe) and sector (10 GICS Level 1 Sectors). An asset allocation can be made to number of countries multiplied by number of sectors. On the other hand, stock selection decision is based on all of available stocks in each universe.

One of the ways to measure the breadth of asset allocation and stock selection is to look at the ratio of the two, which is:

$$\frac{R_{aa}}{R_{ss}} = \frac{IC_{aa}}{IC_{ss}} \times \frac{D_{aa}}{D_{ss}} \times \sqrt{\frac{B_{aa}}{B_{ss}}} \times \sqrt{\frac{1 + \sigma_{IC}{}^2 B_{ss}}{1 + \sigma_{IC}{}^2 B_{aa}}}$$

Where:

R_{aa} — Excess return from only from an asset allocation decision

R_{ss} — Excess return from a stock selection decision

D_{aa} — Cross-sectional dispersion for asset allocation (Standard deviation based on sector returns)

D_{ss} — Stock level cross-sectional dispersion

B_{aa} — Breadth of asset allocation process

B_{ss} — Breadth of stock selection process

σ_{IC} — Skill variation, which is typically assumed to be 10%

In this report, the ratio is return from asset allocation (R_{aa}) divided by the sum of return from asset allocation and return from stock selection ($R_{aa} + R_{ss}$). It can be derived from $\frac{R_{aa}}{R_{ss}}$.

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[11] P. Gupta, B. Li, and R. Sharma (July 17, 2014), *Where Should Active Asian Equity Strategies Focus: Stock Selection or Asset Allocation*

Appendix II: Calculation for Percentage of Unsystematic Risk Removed

We referenced Stotz and Lu (2014)[12] to calculate percentage of unsystematic risk removed.

For each country/region (US, DM EU, Japan, Asia Pac ex-J), we construct portfolio using simulation to select stock(s) from our investable universe (Top 500 stocks by market value). Starting from a portfolio with only 1 stock, we increase the number of stocks in portfolio by 1 stock each time.

For each simulation run, the volatility of an N-stock portfolio is defined as portfolio's time-series standard deviation:

$$TSSD_N^i = \sqrt{\sum_{s=1}^{S} \frac{\left(R_s^i - \overline{R_n^i}\right)^2}{S-1}}$$

$\overline{R_n^i}$ = Average time series return over time

R_s^i = monthly stock return

The average time-series standard deviation for a portfolio of size N is the average from 5,000 simulation results. The simulation is done 5,000 times for an N-stock portfolio with N=1,2,3,... and we get the average volatility for each of the N-stock portfolio

Data used are monthly total price return from FactSet, time period is whole year of 2015.

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[12] A Stotz, W, Lu, (July 17, 2014) *Ten Stocks are Enough in Asia*

Appendix III: Method for Contribution Analysis

We modified the approach Kerneis and Williams (2000)[13] used to estimate the decomposition of stock returns.

The following regression model is run each week on constituents in the parent index.

$$R_{Stock} = \alpha + \sum \beta_{Country} \times Country_i + \sum \beta_{Sector} \times Sector_i + \varepsilon$$

With the regression variables:

R_{Stock} Weekly stock total return attend of month for stock i in local currency

$Country_i$ Return from country of origin of stock i (Dummy variable)

$Sector_i$ Parent index GICS Level 1 sector return (Dummy variable)

Contribution of each of the four components is estimated using following formula:

Component	Estimation of contribution
Global Market **	$(n \times \alpha^2)$ / **Total Square**
Local Market	$\sum_{i=1}^{n}(\beta_{Country} \times Country_i)^2$ / **Total Square**
Sector	$\sum_{i=1}^{n}(\beta_{Sector} \times Sector_i)^2$ / **Total Square**
Stock Specific	$\sum_{i=1}^{n}(\varepsilon_i)^2$ / **Total Square**
Total Square	$n \times \alpha^2 + \sum_{i=1}^{n}(\beta_{Country} \times Country_i)^2 + \sum_{i=1}^{n}(\beta_{Sector} \times Sector_i)^2 + \sum_{i=1}^{n}(\varepsilon_i)^2$

*** Depends on the universe used, the 'Global' refers to overall market within the parent index universe.*

Parent index used in this report includes: MXAP, MXAPJ, Country Indices in MXAP universe, GICS Level 1 Sector Indices in MXAP universe. Hence if the parent index is Sector Index return, for example, contribution from Global Market is essentially the sector contribution and there is only three components, Global (Sector), Local Market and Stock Specific.

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[13] A. Kerneis, N. William (August 2, 2000), *Strategy Focus: Sun, sand and sectors,* Goldman Sachs Global Equity Research

Appendix IV: Drivers of Stock Return using Dividend

We referenced decomposition equation from Gupta, Melas, Suryanarayanan and Urban (2016)[14].

Total return of a stock over a period comes from two parts: price change and dividends paid:

$$R_1 = \frac{(P_1 - P_0) + D_1}{P_0}$$

Where:

P_0 Price at the beginning of the period

P_1 Price at the end of the period

D_1 Gross dividend (Assuming to be paid at the end of period)

By derivation, the formula can be decomposed to parts where total return is sum of

1) Dividend yield at the beginning of period,

2) Dividend growth (G), and

3) Valuation adjustment and a cross term:

$$R = \frac{D_0}{P_0} + G + \frac{D_0}{P_0}G + \frac{P_1 - P_0(1 + G)}{P_0}$$

The equation shows that if prices increase (decrease) more than dividends, the third part becomes positive (negative) resulting in positive (negative) contribution to total return. By decomposing total return in this way one can indicate the drivers of total return over time. The decomposition is then applied every year with 1/3/5/10-year holding period.

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[14] A. Gupta, D. Melas, R. Suryanarayanan and A. Urban (February 2016), *GLOBAL MARKETS & RETURN DRIVERS: Analysis for the Ministry of Finance, Norway*, MSCI Research Insight

Appendix V: Quantitative Factor Assessment Methodology

Factor performance measurement

At the end of each month, we calculate a factor score for each stock, and rank the stocks based on these factor scores accordingly. At the end of the following month, we rank stocks based on their 1-month total return. The information coefficient (IC) is the correlation coefficient for these two rankings. Should a factor have the ability to explain the return in full, it has an IC rank of 1.

Based on monthly time series IC data, if a factor has: (1) a high average IC, (2) low IC volatility, and (3) consistent signs (positive or negative), it is deemed to be highly effective (have strong predictive power) and therefore useful for a stock-picking model.

Interpreting the level of rank information coefficient

The expected return resulting from factor tilt can be expressed as follows:

$$r_{i,t} = IC_{avg} \times Volatility_{avg} \times Factor\ Score_{i,t}$$

where volatility = standard deviation of cross-sectional return.

Assuming an average monthly volatility for the entire universe of 7.5% and an average IC of 3.5% for factor X, the expected return (annualized) for a one standard deviation factor exposure is calculated as follows:

$$3.5\% \times 7.5\% \times 1 \times 12 = 3.15\%$$

This means the expected annualized active return for each 1 standard deviation of factor exposure is 3.15%.

Appendix VI: Regression Model for MXAP Stock Return Decomposition

For each stock in MXAP universe, we construct two models to decompose the weekly stock return. The regression models are as follows;

Multi-Factor Model

The multifactor model decomposes stock return into Market, Local, Size and 10 factors (See definition below).

$$R_{Stock\ i} = \alpha + \beta_i^{Mkt} \times R_{Mkt} + \beta_i^{Local} \times R_{Local} + \beta_i^{Size} \times R_{Size} + \sum_{k=1}^{10} \beta_i^{Factor\ k} \times R_{Factor\ k} + \varepsilon$$

Factor Definition

To calculate factor data, we separate the universe (MXAP) into 2 groups by standardized factor score, and take the return difference between the groups.

Name	Definition	Calculation and/or Components
Market	MXAP Weekly Return	MXAP Weekly Return (Local)
Sector	MXAP Sector Weekly Excess Return	MXAP GICS1 Sector Weekly Return - MXAP Weekly Return (Local)
Country	Local Stock Index Weekly Return	Local Stock Index Return
Size	MXAP Small Cap - Large Cap	Low Market Cap - High Market Cap; Market Cap in USD
Factor		
Value	MXAP High Value - Low Value	Combined score of NTM Earnings Yield (50%) and FY0 Book Yield (50%)
Yield	MXAP High Yield - Low Yield	FY1 Dividend Yield
Growth	MXAP High Growth - Low Growth	Combined score of Sales Growth (1/3), OP Growth (1/3) and EPS Growth (1/3)
Reversal	MXAP High 1M return - Low 1M return	Lagged 1M (Calendar month)
Momentum	MXAP High Momentum - Low Momentum	Combined score of 6M return (50%) and 12M return (50%)
Revision	MXAP High Revision - Low Revision	Combined score of Rating Revision (50%) and EPS Revision (50%)
Quality	MXAP High Quality - Low Quality	Combined score of Net Cash / Mkt Cap (50%) and Equity/Debt (50%)
Profitability	MXAP High Profitability - Low Profitability	Combined score of FY1 ROA (1/3), FY1 ROE (1/3) and OP Margin (1/3)
Volatility	MXAP Low Volatility - High Volatility	250D Price Volatility
FX*	Foreign exchange rate to USD	-

For each country, local index and exchange rate data are:

Country	Local Index	FX
Australia	S&P/ASX 200 INDEX	USD-AUD Exchange Rate
China	HANG SENG CHINA ENT INDX	USD-CNY Exchange Rate
Hong Kong	HANG SENG COMPOSITE INDX	USD-HKD Exchange Rate
India	S&P BSE SENSEX INDEX	USD-INR Exchange Rate
Indonesia	JAKARTA COMPOSITE INDEX	USD-IDR Exchange Rate
Japan	TOPIX INDEX (TOKYO)	USD-JPY Exchange Rate
Korea	KOSPI INDEX	USD-KRW Exchange Rate
Malaysia	FTSE Bursa Malaysia KLCI	USD-MYR Exchange Rate
New Zealand	S&P NZX All Index	USD-NZD Exchange Rate
Philippines	PSEi - PHILIPPINE SE IDX	USD-PHP Exchange Rate
Singapore	Straits Times Index STI	USD-SGD Exchange Rate
Taiwan	TAIWAN TAIEX INDEX	USD-TWD Exchange Rate
Thailand	STOCK EXCH OF THAI INDEX	USD-THB Exchange Rate

The frequency of the regression model is weekly, and regression is based on 52-week data.

Contribution Analysis

Using similar method from Appendix II, we calculate contribution for each stock using regression results.

Disclosure Appendix

Reg AC

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