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Pan-Asian Yield Strategy

Combining Asian & Japanese Yield Using Risk Contribution

Quantitative Analysis

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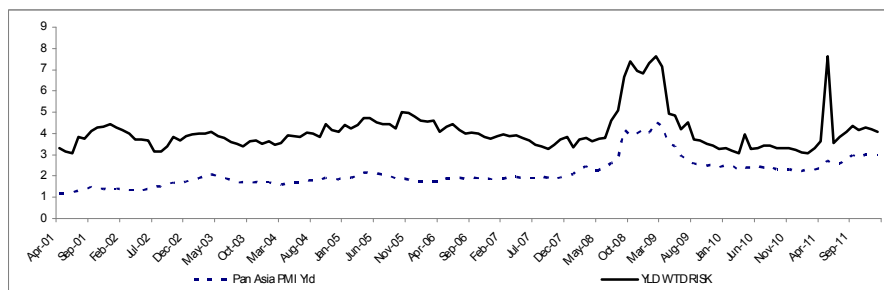
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- **Looking for Yield** — We have been devotees of yield, in both Asia and Japan, for several years. Here we extend on previous work to create an investible Pan-Asian income-strategy using a risk-controlled construction techniques to combine the two.
- **Looking for Sustainable Yield** — The starting point in both Asia and Japan is identifying suitable high-yielding names that are able to maintain dividends. This we do using a combination of factors including: forward payout ratios; cash-dividend coverage; a 6m ERR history; a three-year history of dividend payments; finally, we use our core quant models to weed out the most unattractive names.
- **Liquidity Banding & Quarterly Rebalance** — To make the strategy implementable we create separate liquidity-banded portfolios, which are rebalanced quarterly.
- **Towards Risk-Efficiency** — To create the final Pan-Asian portfolio we combine these Asian and Japanese portfolios such that the risk-contribution from each is proportional to their relative yields.
- **Strong Performance** — In isolation both the Asian and Japanese yield strategies perform well: but in combination the results are even more impressive. Since 2000, the IR of has been 0.96 in AxJ (0.62 better than the index); 0.48 in Japan (0.67 better than the index) and an impressive 1.03 on a pan-Asian basis (0.7 better than the index).
- **Income Characteristics** — Also in all cases the price-return of the strategies has been significantly above the total returns of the respective benchmarks: with the final pan-Asian portfolio has consistently delivered around a 4% yield.
- **Examples of Yield Opportunities** — Among the names this strategy is exposed to are: Takeda Pharmaceutical; NTT Docomo; China Mobile; Telstra; SK Telecom; Cheung Kong; Sun Hung Kai; Kepple Corp and PTT.

Figure 1. Market Cap Weighted Yield on the Strategy versus the Benchmark



See Appendix A-1 for Analyst Certification, Important Disclosures and non-US research analyst disclosures.

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Looking for Sustainable Yield

Historically, dividend yields have been under-appreciated in Asia. Investors, seeking growth, have paid too much for it, and in the process have ignored other attributes – including yield. But in Japan it has been different: while growth has been almost nonexistent, yields have been consistent and rising.

Despite these differences, Yield has been rewarded in both markets: with income-generating strategies consistently beating the benchmark. This strategy looks to identify companies which have shown both a willingness (i.e. have a consistent track record of paying) and ability (i.e. the dividends appear sustainable) to pay. Then, using a risk-efficient construction technique (equalizing risk-weighted alpha across the region), we combine our Asia and Japan portions.

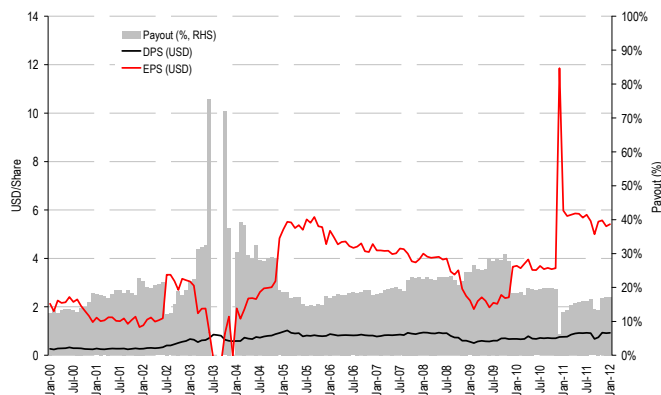
Yield Portfolio in Asia ex Japan region

In the past, focusing on growth in Asia has meant investors have tended to ignore the many of the more defensive value attributes – including yield.

But despite the many market shocks Asia has weathered, including the bursting of the TMT bubble, SARs and the GFC, when we examine how dividends and earnings have moved over the last ten years, it is apparent that companies in Asia generally maintain dividends, despite earnings volatility. We tend to believe that this partly reflects the fact that this is one area where the interests of the minority shareholders (us) are closely aligned with the interests of the majority shareholders (owners). This endows yield with attractive attributes – especially during times of market turmoil.

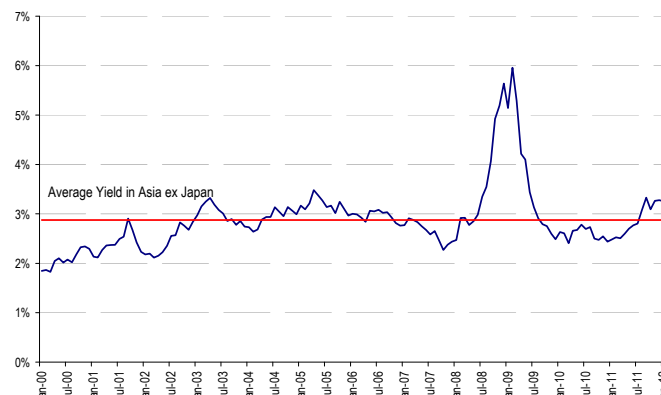
Since 2000, the average yield for the APxJ market¹ has been around 2.9%. We saw this spike over the financial crises: a time when companies continued to maintain their dividend per share even as earnings and stock prices fell, leading to a spike in both the payout ratio as well as the average yield.

Figure 2. Market Cap Weighted DPS vs. EPS for APxJ PMI



Source: Citi Investment Research and Analysis

Figure 3. Market Cap Weighted Dividend Yield for APxJ



Source: Citi Investment Research and Analysis

¹ In this case we mean the S&P Asia Pacific PMI index – which is composed of the large and mid-cap names

Looking for Sustainability in Asia ex Japan

Identifying high-yielding companies is easy: but in a yield strategy we need to ensure that yields are sustainable.

To this end, we look at a number of metrics for stocks in the S&P PMI universe to construct our portfolio.

Not in bottom 40% on Yield

- The current yield of any stock should be more than 60th percentile yield of the market. *This obviously means a dynamic yield cut-off – and also immediately makes the construction approach more portable as it can be applied to different region with different yield characteristics.*

Forward Payout Ratio <1

- The stock should have a payout ratio (current DPS divided by the forecast EPS) less than 1. *This factor screens out for companies which (quite literally) have to borrow, making dividend payouts unsustainable. A ratio greater than 1 would indicate that the current DPS is more than the forecast EPS numbers, and thus unsustainable.*

Cash Dividend Cover > 1

- The stock should have a cash dividend coverage ratio (Funds from Operations divided by the Cash Dividend) greater than 1. *This reflects the company's ability to fund dividend requirements from operating cash flow. A ratio of less than 1 would indicate that the dividends are draining more cash than the business is generating.*

Not loss-making

- The stock should have positive net income margin. *This filter ensures that the company is actually distributing yield from profit.*

Stable Dividends

- There should not be any cut in dividend per share in the last three years. *This criterion ensures that the company has the willingness to pay dividend in a consistent basis.*

Not bottom quintile on 6m ERR basis

- The 6m moving average earnings revision ratio of the stock should not be in the bottom quintile of that respective universe. *This helps in guaranteeing that the stock is still in the good books of analysts but it also ensures that any sudden change in analyst rating will not force the stock to drop out if the stock was consistently in the good book earlier.*

Not in Unattractive quadrant on RADAR
(our core-Quant model)

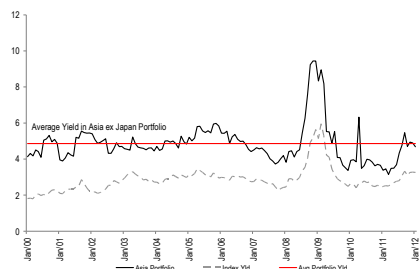
- Lastly, we exclude stocks which belong to our unattractive region or our RADAR stock selection model. *This ensures that we exclude stocks which show both low valuation and momentum potential.*

Use Liquidity Banded construction...

Finally, in order to make the performance of this portfolio real world, we implement a liquidity-banded weighting scheme which quintiles the portfolio by liquidity and assigns a weight of 35% to the top quintile, 30% to the next and 20%, 10% and 5% to the subsequent quintiles. We also rebalance the portfolio quarterly, which helps reduce turnover.

... and Rebalance quarterly

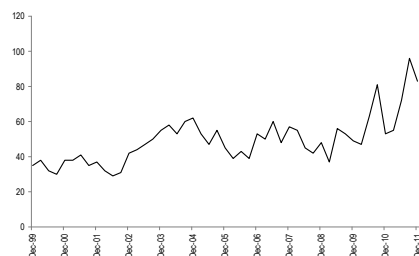
Figure 4. Yield of the portfolio and the index



Source: Citi Investment Research and Analysis

In Asia, the Price-Return of a yield Strategy has consistently been above the total-return of the benchmark...

Figure 6. Number of stocks selected by the strategy

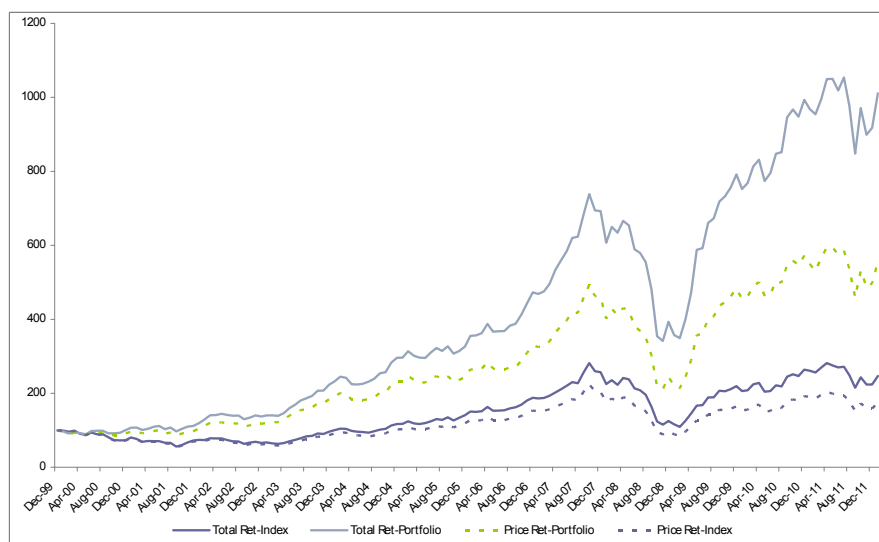


Source: Citi Investment Research and Analysis

These filters help ensure not only that the stocks we select have sustainable yields, but also results in our strategy having a higher dividend yield than the index on a consistent basis through time. The average yield of AsiaxJ PMI universe is 2.9% in the last ten years, whereas the average yield of our portfolio is 4.9% in that period (refer to Figure 4).

Figure 5 above shows the total return and price returns wealth curves for the strategy and that of the index. The difference in the price and total returns clearly highlights the difference made by the yield of the portfolio to its performance characteristics – to the tune of ~5% per annum.

Figure 5. Wealth Curves of the AsiaxJP Dividend Yield strategy and the Index



Source: Citi Investment Research and Analysis

Figure 7 shows a performance summary of the AsiaxJP portfolio as compared with the benchmark. The defensive attributes of this strategy are evident – starting with a beta of 0.89.

And while the average monthly return in an up-market of the index is 5.43%, for the strategy it is 5.72% - suggesting Yield is not only rewarded in down-markets.

But when the market does decline, while the average monthly returns of the index -4.8%, for the strategy it is -3%. With the higher annualized returns of the strategy (21% against 7.76% for the index), IR increases from 0.34 to 0.96, and drawdown characteristics (the worst drawdown being the GFC) are also improved: the yield strategy was only (!!) down 53.7%, massive, but still significantly better than the benchmark, which lost 61.21% of its value.

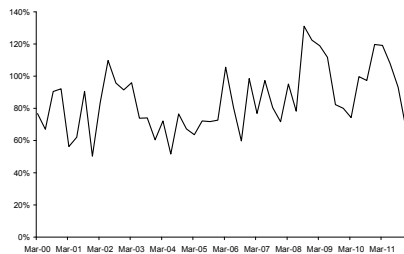
Figure 7. Performance Summary of Asia ex Japan Liquidity Banded Yield Portfolio

	Index	Portfolio	Excess
2000	(27.18)	0.35	35.63
2001	(0.52)	11.33	8.28
2002	(8.97)	22.89	34.09
2003	45.71	62.58	11.45
2004	21.94	32.61	8.93
2005	20.16	10.21	(8.72)
2006	33.34	44.99	9.03
2007	36.80	46.45	6.52
2008	(51.15)	(43.23)	15.95
2009	74.85	101.35	16.34
2010	20.40	25.40	3.19
2011	(15.30)	(7.61)	9.00
2012	10.29	10.18	(0.11)
Annualized Returns	7.76	21.10	11.78
Annualized Volatility	22.94	22.03	8.82
IR	0.34	0.96	1.34
Annualized Tracking Error	-	8.82	-
Avg Mth Return Up Market	5.43	5.72	0.29
Avg Mth Return Down Market	(4.80)	(3.00)	1.79
Return in Up/Down Market	(1.13)	(1.91)	0.16
Percent of Mths with + Returns	55.17	68.28	65.52
Best Monthly Return	15.55	24.43	9.64
Worst Monthly Return	(24.43)	(26.32)	(6.22)
Beta against Market	1.00	0.89	(0.11)
Maximum Drawdown	(61.21)	(53.76)	(12.35)
Low Date	2/28/2009	11/30/2008	12/31/2001
Level of Highwater	2.82	7.38	1.68
High Date	10/31/2007	10/31/2007	9/30/2001
Months to Next High	52	25	6
Return/Max Drawdown	(0.13)	(0.39)	(0.95)

Source: Citi Investment Research and Analysis

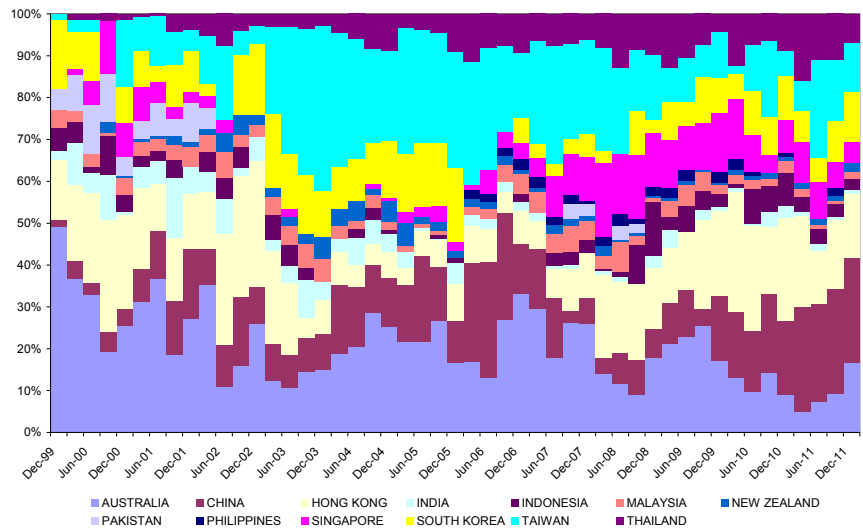
Figure 6 on the left show the number of stocks selected by the strategy over the course of last 11 years. Figure 8 shows the country-wise allocation of this portfolio. China, Hong Kong, Australia and Taiwan are the dominating countries.

Figure 9. Two way quarterly turnover



Source: Citi Investment Research and Analysis

Figure 8. Country wise allocation of Asia ex Japan Portfolio



Source: Citi Investment Research and Analysis

Figure 9 shows the quarterly two-way turnover this portfolio. The average turnover in the last ten years is 85%.

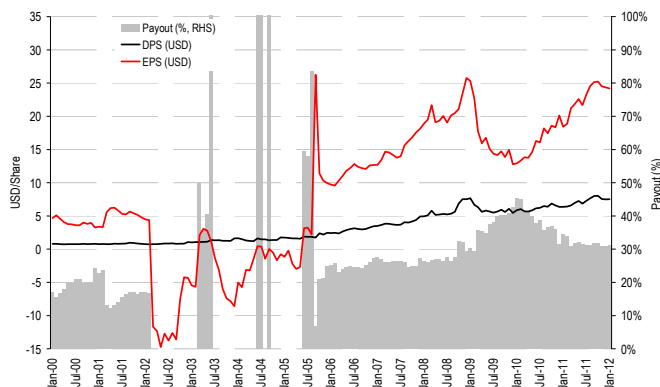
Yield in Japan

In Asia, with investors seeking growth, yield had been an under-appreciated alpha-attribute: but in Japan, where we have had little growth for (two) decades, we may have expected it to be different.

Again looking at the S&P Japan PMI (Large & Midcap) Index, when we examine how dividends and earnings have moved over the last ten years, we see that companies have again tended to maintain dividend payments, even when earnings have gone negative.

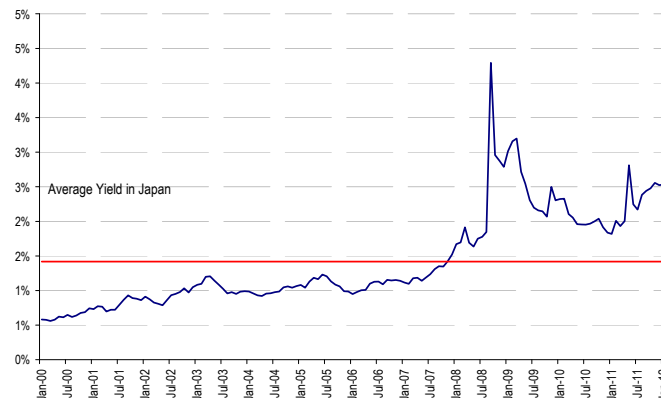
Excluding such troubled periods, we see that the aggregate payout ratios have tended to remain relatively stable (with a payout ratio around 30%), which has also meant that the yield has tended to rise. Although the average yield over the past ten years is about 1.4%, the current yield is currently almost 2%, or about twice the yield of a 10y JGB. This helps explain why Yield strategies are attractive in Japan.

Figure 10. Market Cap Weighted DPS vs. EPS for Japan



Source: Citi Investment Research and Analysis

Figure 11. Market Cap Weighted Dividend Yield for Japan



Source: Citi Investment Research and Analysis

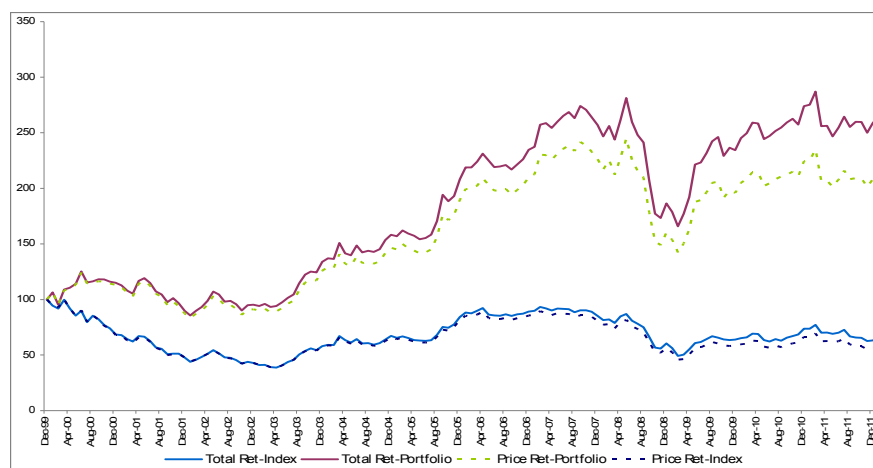
Looking for Sustainability in Japan

Similar to Asia ex Japan, we apply market driven condition of yield and sustainability in S&P Japan Large Mid cap index to select our portfolio:

- excluding companies in the bottom 40% of the market by yield
- ensuring dividend cover and Cash earnings are sufficient to maintain the dividend
- stripping out loss-making companies
- looking for companies with a three-year track record of sustaining dividends
- excluding companies with poor 6m ERRs, and
- excluding names that fall in the Unattractive

And again we have constructed the portfolio using a liquidity-banded approach with a quarterly rebalance schedule.

Figure 12. Wealth Curves of the Japan dividend strategy and the Index



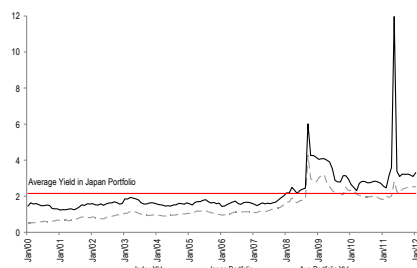
Source: Citi Investment Research and Analysis

And in Japan as well, the yield Strategy has delivered a price-return well in excess of the benchmarks total-return...

The average yield of Japan universe is 1.4% in the last ten years whereas the average yield of our portfolio is 2.14% in that period (refer Figure 13).

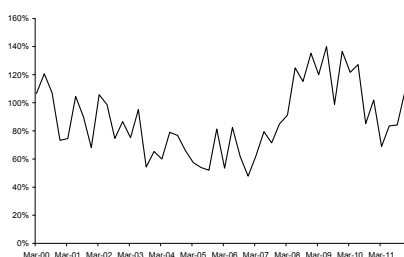
With a beta to market of 0.84, this strategy is clearly a defensive strategy. The outperformance of this strategy over benchmark is more than 12% on an annualized basis. The average monthly returns in down market of the index -4.07%, for the strategy it is -2.5%. Combined with the higher annualized returns of the strategy (8.38% against -3.37% for the index), IR increases from -0.19 to 0.48. It's also worth highlighting the drawdown during the GFC, which was 41.06%, far lower than 61.2% of the index.

Figure 13. Yield of Japan strategy and index



Source: Citi Investment Research and Analysis

Figure 15. Two way quarterly turnover (Japan)



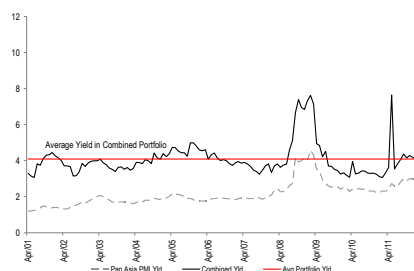
Source: Citi Investment Research and Analysis

Figure 14. Performance Summary of Japanese Liquidity Banded Yield Portfolio

	Index	Portfolio	Excess
2000	(31.53)	15.05	62.59
2001	(30.26)	(21.82)	11.66
2002	(10.31)	6.04	17.49
2003	35.69	40.50	2.74
2004	15.64	18.08	1.45
2005	25.41	31.63	5.13
2006	5.85	12.65	6.24
2007	(4.45)	9.55	14.76
2008	(29.11)	(27.50)	2.74
2009	5.68	25.78	18.50
2010	15.38	16.93	0.62
2011	(14.17)	(5.49)	9.86
2012	4.52	2.11	(2.41)
Annualized Returns	(3.37)	8.38	11.54
Annualized Volatility	18.00	17.58	9.46
IR	(0.19)	0.48	1.22
Annualized Tracking Error	-	9.46	-
Avg Mth Return Up Market	4.16	4.45	0.28
Avg Mth Return Down Market	(4.07)	(2.51)	1.56
Return in Up/Down Market	(1.02)	(1.77)	0.18
Percent of Mths with + Returns	47.59	57.93	65.52
Best Monthly Return	13.73	15.15	11.95
Worst Monthly Return	(14.87)	(14.59)	(7.53)
Beta against Market	1.00	0.84	(0.16)
Maximum Drawdown	(61.23)	(41.06)	(11.96)
Low Date	4/30/2003	2/28/2009	5/31/2011
Level of Highwater	1.00	2.81	3.81
High Date	1/31/2000	5/31/2008	8/31/2010
Months to Next High	145	33	16
Return/Max Drawdown	0.06	(0.20)	(0.96)

Source: Citi Investment Research and Analysis

Figure 16. Yield of Comd' strategy vs index



Source: Citi Investment Research and Analysis

Combining Japan and Asia ex Japan

In isolation, both these yield strategies work well. But with more investors looking at the region on a pan-Asian basis there is increasing demand for pan-Asian products.

Given the radical different characteristics of Asia (a dynamic growing region that encompasses ~60% of the GEM universe) and Japan (a low-growth developed market with an aging population still suffering a multi-decade “growth-recession”) constructing a pan-Asian portfolio in one go seemed very unlikely to deliver an optimum results.

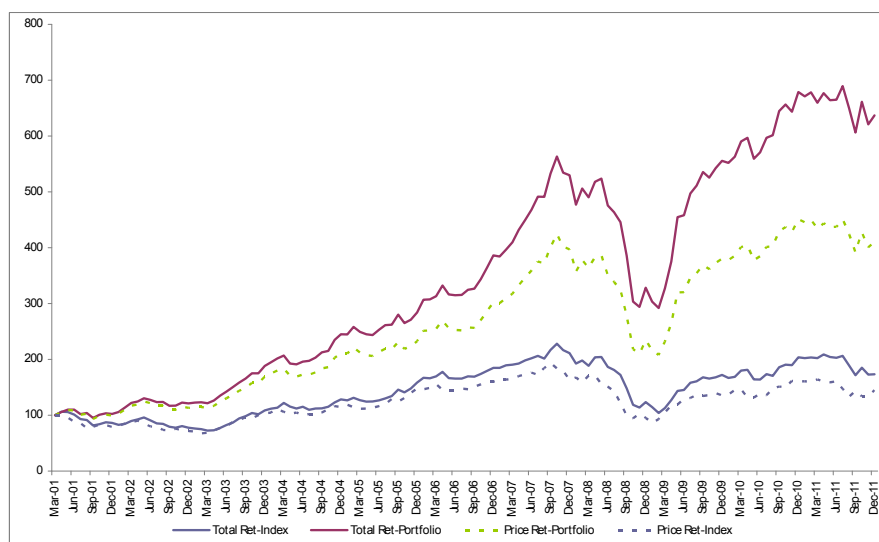
The different economic fundamentals ultimately mean that the risk profiles of both the individual stocks, and the two aggregate regions, are radically different - especially when it comes to macro sensitivity. But fortunately some of our recent research has focused on alternative portfolio construction techniques that should help us meet this challenge.

Yield in Pan Asia Region

Because of the differences in risk characteristics between these two regions, we have chosen to adopt a yield-weighted risk-contribution approach² to combining these two portfolios. This process looks to allocation of weights in proportion to the risk-adjusted yields of the different regions.

To do this we have used our Global Risk Attribution Model (GRAM) to calculate variance-covariance matrix of these two asset classes, and then we combined these such that the risk-contribution from each of the assets is proportional to relative yields.

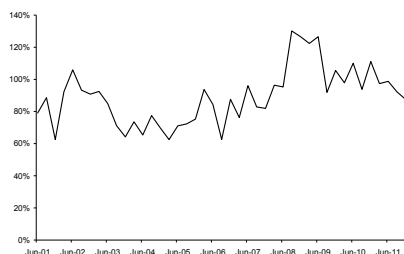
Figure 17. Wealth Curves of the our combined strategy and the Pan Asia PMI Index



Source: Citi Investment Research and Analysis

¹ See - [Shedding the Tyranny of the Benchmark](#) and [Risk Efficient Portfolio Construction in HK & China](#)

Figure 18. Two way turnover (combined)



Source: Citi Investment Research and Analysis

After applying this yield weighted risk contribution approach, the average yield of combined portfolio is 4.08% in the last ten years where as the average yield of benchmark is 2.14% in that period (refer to Figure 16).

Figure 19 shows a performance summary of the combined portfolio as compared with the Pan Asia S&P PMI index.

Figure 19. Performance Summary of Combined Pan Asian Portfolio

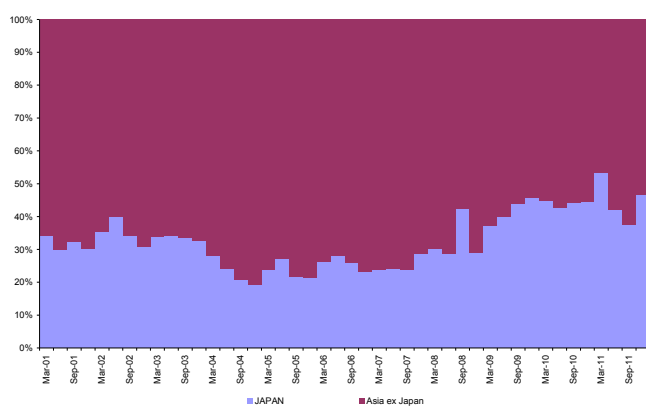
	Index	Portfolio	Excess
2001	(13.90)	2.33	18.15
2002	(9.78)	18.48	30.53
2003	39.79	55.32	10.65
2004	18.25	30.13	9.59
2005	23.44	15.87	(6.46)
2006	16.65	36.07	17.03
2007	14.22	37.19	20.37
2008	(41.55)	(38.05)	6.43
2009	39.39	69.13	22.47
2010	18.38	22.27	2.35
2011	(14.85)	(6.21)	9.72
2012	8.12	6.43	(1.69)
Annualized Returns	5.97	19.32	12.39
Annualized Volatility	18.56	18.74	7.21
IR	0.32	1.03	1.72
Annualized Tracking Error	-	7.21	-
Avg Mth Return Up Market	4.15	4.85	0.70
Avg Mth Return Down Market	(4.32)	(2.91)	1.41
Return in Up/Down Market	(0.96)	(1.67)	0.50
Percent of Mths with + Returns	58.46	67.69	68.46
Best Monthly Return	12.73	21.17	8.46
Worst Monthly Return	(19.83)	(21.37)	(5.13)
Beta against Market	1.00	0.93	(0.07)
Maximum Drawdown	(54.38)	(48.20)	(11.19)
Low Date	2/28/2009	2/28/2009	12/31/2005
Level of Highwater	2.28	5.63	1.97
High Date	10/31/2007	10/31/2007	7/31/2005
Months to Next High	52	29	16
Return/Max Drawdown	(0.11)	(0.40)	(1.11)

Source: Citi Investment Research and Analysis

While the average monthly return in up market of the index is 4.15%, for the strategy it is 4.85%. However, on the down side, while the average monthly returns in down market of the index -4.32%, for the strategy it is -2.91%. Combined with the higher annualized returns of the strategy (19.32% against 5.97% for the index), IR increases from 0.32 to 1.03. It's also worth highlighting the drawdown during the GFC, which was 48.2%, far lower than 54.3% of the index.

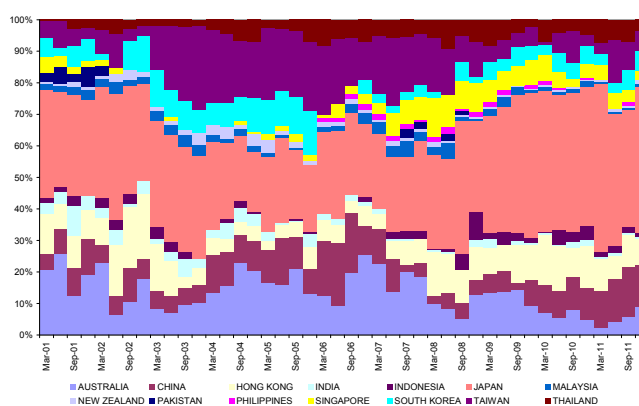
The tables below show the country-wise allocation of this portfolio: Japan has 46% allocation currently followed by China and Australia. On the subsequent pages we also include the latest portfolio along with weights for further reference.

Figure 20. Japan and AxJ Allocation through time



Source: Citi Investment Research and Analysis

Figure 21. Country Allocation across Combined Portfolio



Source: Citi Investment Research and Analysis

Figure 22. Current Portfolio Constituents

BB_CODE	SEDOL	NAME	Country	Sector	Radar Quadrant	CIRA	YLD	MCAP	ATV (USD mm)	LC Prices (29 Feb 12)	WEIGHTT
4502 JT	687044	Takeda Pharmaceutical Co. Ltd.	Japan	Health Care	C	1	5.3	31464.1	119.6	3670	2.30%
4503 JT	698538	Astellas Pharma Inc.	Japan	Health Care	G	1	4	17908.4	68.5	3340	2.30%
9437 JT	612927	Ntt Docomo Inc.	Japan	Telecommunication Services	C	2	3.7	25439.6	94.3	138800	2.30%
9432 JT	664137	Nippon Telegraph & Telephone Corp.	Japan	Telecommunication Services	C	1	3	22555.5	107.5	3835	2.30%
7733 JT	665880	Olympus Corp.	Japan	Health Care	U	NR	3	2899.9	109.7	1359	2.30%
3382 JT	B0FS5D	Seven & I Holdings Co. Ltd.	Japan	Consumer Staples	C	1	2.7	21297.7	76	2246	2.30%
9433 JT	624899	Kddi Corp.	Japan	Telecommunication Services	C	1	2.6	17673.5	124.5	516000	2.30%
9503 JT	648348	Kansai Electric Power Co. Inc.	Japan	Utilities	A	1H	5.1	10989.9	54.1	1346	2.00%
9502 JT	619560	Chubu Electric Power Co. Inc.	Japan	Utilities	C	2H	4.2	11958.5	56.7	1491	2.00%
5020 JT	B627LW	Jx Holdings, Inc	Japan	Energy	C	1	3.3	13563.1	67.2	510	2.00%
9531 JT	689544	Tokyo Gas Co. Ltd.	Japan	Utilities	C	1	2.5	10441.8	53.2	371	2.00%
9735 JT	679159	Secom Co. Ltd.	Japan	Industrials	C	NR	2.5	9675.7	41.4	3855	2.00%
6702 JT	635694	Fujitsu Ltd.	Japan	Information Technology	C	2	2.5	9895.4	59.6	441	2.00%
3407 JT	605460	Asahi Kasei Corp.	Japan	Materials	C	1	2.4	7412.4	40.6	515	2.00%
9508 JT	649980	Kyushu Electric Power Co. Inc.	Japan	Utilities	C	2H	5.4	5841.5	24.5	1195	1.30%
5202 JT	664144	Nippon Sheet Glass Co. Ltd.	Japan	Industrials	C	2	4.2	1691.1	33.2	136	1.30%
2651 JT	626691	Lawson Inc.	Japan	Consumer Staples	U	2	3.5	3764	21.6	4780	1.30%
4042 JT	690028	Tosoh Corp.	Japan	Materials	C	2	2.9	1392.3	20.7	239	1.30%
9532 JT	666176	Osaka Gas Co. Ltd.	Japan	Utilities	C	2	2.6	7084.3	28	312	1.30%
9613 JT	612563	Ntt Data Corp.	Japan	Information Technology	A	2	2.4	4106	29.3	273900	1.30%
6460 JT	B02RK0	Sega Sammy Holdings Inc.	Japan	Consumer Discretionary	C	1	2.4	4193.8	29.6	1541	1.30%
TLS AU	608728	Telstra Corp. Ltd.	Australia	Telecommunication Services	A	2	8.4	8495.9	158.7	3.3	1.10%
030200 KS	650531	Kt Corp.	South Korea	Telecommunication Services	C	1	6.8	3959.4	31.8	32600	1.10%
017670 KS	622487	Sk Telecom Co. Ltd.	South Korea	Telecommunication Services	C	1	6.6	4859.8	25.7	145500	1.10%
KEP SP	B1VQ5C	Keppel Corp	Singapore	Industrials	A	1	4.6	10053.6	48.6	11.1	1.10%
6176 TT	652027	Radiant Opto-Electronics Corp.	Taiwan	Information Technology	A	1	4.4	1253.2	26.5	131	1.10%
CCL AU	612345	Coca-Cola Amatil Ltd.	Australia	Consumer Staples	G	2	4.2	6233.2	31.2	12	1.10%
SCC TB	660991	Siam Cement Pcl	Thailand	Materials	G	1	4	2976.2	25.1	357	1.10%
941 HK	607355	China Mobile (Hong Kong) Ltd.	China	Telecommunication Services	A	1	4	50605.9	197.9	82.8	1.10%
1068 HK	B0D01C	China Yurun Food Group Ltd.	China	Consumer Staples	C	3H	3.9	1786.5	37.4	11.8	1.10%
IPL AU	667304	Incitec Pivot	Australia	Materials	C	1	3.7	5193	40.2	3.3	1.10%
033780 KS	617507	Kt&G Corp.	South Korea	Consumer Staples	A	1	3.7	9701.1	27.8	73200	1.10%
6 HK	643532	Power Assets Holdings Ltd	Hong Kong	Utilities	G	1	3.7	8755.6	24	58.1	1.10%
16 HK	685992	Sun Hung Kai Properties Ltd.	Hong Kong	Financials	A	1	3.4	18858.1	68.4	119.4	1.10%
883 HK	B00G0S	Cnooc Ltd.	China	Energy	A	1	3.4	27797.5	145.6	17.8	1.10%
1 HK	619027	Cheung Kong (Holdings) Ltd.	Hong Kong	Financials	C	1	3.2	16690.4	62.2	113.4	1.10%
386 HK	629181	China Petroleum & Chemical Corp.	China	Energy	A	2	3.2	17652.1	86.3	8.9	1.10%
PTT TB	642038	Ptt Pcl	Thailand	Energy	A	1	3.1	8624.1	55.2	363	1.10%
CFX AU	636137	Cfs Gandel Retail Trust	Australia	Financials	A	1	7.5	4056.2	20	1.8	0.90%
MGR AU	616197	Mirvac Group Ltd.	Australia	Financials	G	1	6.9	4131.6	20.1	1.2	0.90%
813 HK	B16YNS	Shimao Property Holdings Ltd.	China	Financials	C	1	6.4	1183.7	16.5	10.1	0.90%
TOL AU	669374	Toll Holdings Ltd.	Australia	Industrials	G	NR	5.9	2828.7	15.7	5.7	0.90%
YZJ SP	B1VT03	Yangzijiang Shipbuilding Hldgs Ltd	China	Industrials	C	1	5.2	2069.8	20.3	1.4	0.90%
SHL AU	682112	Sonic Healthcare Ltd.	Australia	Health Care	U	1	5.2	4491.9	14	12	0.90%
ADVANC TB	641256	Advanced Info Service Pcl	Thailand	Telecommunication Services	G	1	4.9	5072.8	20.1	160	0.90%

PGAS IJ	671976	Perusahaan Gas Negara	Indonesia	Utilities	G	1	4.9	3653.3	14.5	3750	0.90%
CWN AU	B29LCJ	Crown Limited	Australia	Consumer Discretionary	G	1	4.6	3543	17.7	8.4	0.90%
AGK AU	B0ZNPN	Agl Energy	Australia	Utilities	A	NR	4.2	6731.8	20.2	14	0.90%
823 HK	B0PB4M	Link Real Estate Investment Trust	Hong Kong	Financials	A	1	3.9	8283.8	16.8	29.1	0.90%
2 HK	609701	Clp Holdings Ltd.	Hong Kong	Utilities	NR	2	3.8	16073.5	23.8	68.5	0.90%
035250 KS	668344	Kangwon Land Inc.	South Korea	Consumer Discretionary	G	1	3.6	2899	14.1	25800	0.90%
HKL SP	643491	Hongkong Land Holdings Ltd.	Hong Kong	Financials	C	1	3.5	5304.4	13.7	5.5	0.90%
1800 HK	B1JKTQ	China Communications Construction H	China	Industrials	A	2H	3.3	3460.9	17.2	7.9	0.90%
267 HK	619615	Citic Pacific Ltd.	China	Industrials	C	3	3.2	2795.2	13.4	14.6	0.90%
6121 TT	642192	Simplo Technology Co. Ltd.	Taiwan	Information Technology	G	1	3.1	1638.3	14.6	211	0.90%
2777 HK	B19H8Y	R&F Properties	China	Financials	C	3H	10	802.7	12.5	10.2	0.70%
KPLD SP	685346	Keppel Land Ltd.	Singapore	Financials	C	2	9	1215	10.6	3.4	0.70%
003450 KS	649788	Hyundai Securities Co. Ltd.	South Korea	Financials	C	NR	5.7	977.3	8.5	11050	0.70%
1102 TT	605633	Asia Cement Corp.	Taiwan	Materials	A	NR	5.6	2735.8	11.2	37.6	0.70%
2020 HK	B1YVKN	Anta Sports Produc	China	Consumer Discretionary	C	2	5.2	919.4	10.4	8.6	0.70%
032640 KS	629090	Lg Telecom Co. Ltd.	South Korea	Telecommunication Services	C	1	4.7	1520.5	11.1	6340	0.70%
2103 TT	687087	Tsrc Corp.	Taiwan	Materials	A	NR	4.7	1479.5	11.7	75.1	0.70%
119 HK	622098	Poly (Hong Kong) Investments Ltd.	China	Materials	C	1H	4.6	837.8	9.9	4.9	0.70%
SCI SP	B08X16	Sembcorp Industries Ltd.	Singapore	Industrials	A	1	4.2	2811	12.7	5.3	0.70%
83 HK	681042	Sino Land Co. Ltd.	Hong Kong	Financials	A	1	4.1	4877.4	12.4	13.8	0.70%
029780 KS	B1WQQ4	Samsung Card	South Korea	Financials	A	1	3.9	1590.2	10.5	42350	0.70%
KLK MK	649744	Kuala Lumpur Kepong Bhd	Malaysia	Consumer Staples	G	1	3.7	3154	7.9	23.4	0.70%
2204 TT	619132	China Motor Corp.	Taiwan	Consumer Discretionary	A	NR	3.6	583.8	8.6	32.6	0.70%
165 HK	645514	China Everbright Ltd.	China	Financials	A	1	3.5	1339.1	9.1	14.7	0.70%
683 HK	648631	Kerry Properties Ltd.	Hong Kong	Financials	C	1	3.4	2528.3	9	36.8	0.70%
2347 TT	686843	Synnex Technology International Corp.	Taiwan	Information Technology	NR	NR	3.1	3019.4	12.7	74.5	0.70%
6417 JT	677543	Sankyo Co. Ltd. (6417)	Japan	Consumer Discretionary	C	2	3.9	2536.6	13.6	3910	0.70%
9513 JT	B02Q32	Electric Power Development Co. Ltd.	Japan	Utilities	U	1	3.4	3338.3	14	2077	0.70%
9062 JT	664212	Nippon Express Co. Ltd.	Japan	Industrials	A	NR	3.3	3373.3	15.9	319	0.70%
4519 JT	619640	Chugai Pharmaceutical Co. Ltd.	Japan	Health Care	U	1	3.2	3371.2	17.6	1330	0.70%
4307 JT	639092	Nomura Research Institute Ltd.	Japan	Information Technology	C	NR	3	2510.1	11.3	1933	0.70%
9507 JT	680434	Shikoku Electric Power Co. Inc.	Japan	Utilities	U	2	2.7	4757.6	11.6	2238	0.70%
9783 JO	612192	Benesse Corp.	Japan	Consumer Discretionary	U	NR	2.6	3962.9	9	3725	0.70%
2548 TT	627545	Huaku Construction Co. Ltd.	Taiwan	Financials	A	3	10.1	461	4.4	77	0.30%
INCO IJ	B0217K	International Nickel Indonesia	Indonesia	Materials	C	NR	9.6	743.8	3.7	3625	0.30%
2301 TT	651948	Lite-On Technology Corp.	Taiwan	Information Technology	A	NR	8.4	2601.5	5.2	39.9	0.30%
2385 TT	614057	Chicony Electronics Co. Ltd.	Taiwan	Information Technology	A	2	7.8	847.8	3.9	60.6	0.30%
576 HK	699076	Zhejiang Expressway Co. Ltd.	China	Industrials	C	2	7.6	930.3	3.7	5.9	0.30%
410 HK	B27WLD	Soho China Ltd.	China	Financials	C	2	6.2	1241.3	5.7	5.7	0.30%
8 HK	657407	Pccw Ltd.	Hong Kong	Telecommunication Services	A	1	5.7	1505.8	5.9	2.9	0.30%
SKC NZ	682319	Sky City Entertainment Group Ltd.	New Zealand	Consumer Discretionary	G	2	5.1	1543.3	3	3.8	0.30%
148 HK	649131	Kingboard Chemical Holdings Ltd.	China	Information Technology	C	1	4.8	1740.1	5.7	28.8	0.30%
338 HK	679745	Sinopec Shanghai Petro Co. Ltd.	China	Materials	C	1	4.8	777	6.5	3	0.30%
1504 TT	687985	Teco Electric & Machinery Co. Ltd.	Taiwan	Industrials	G	NR	4.5	1081	7.6	20.8	0.30%
552 HK	B1HVJ1	China Communication Services Corp H	China	Telecommunication Services	C	1	4.4	898.1	4	4	0.30%
2007 HK	B1VKYN	Country Garden Holdings Co. Ltd.	China	Financials	A	3	4.1	2149.2	6.1	3.5	0.30%
CD SP	660373	Comfortdelgro Corp. Ltd.	Singapore	Industrials	G	1	3.9	1655.4	3.6	1.5	0.30%
551 HK	658653	Yue Yuen Industrial (Holdings) Ltd.	Hong Kong	Consumer Discretionary	A	1	3.7	2607.1	5	26.7	0.30%
270 HK	691316	Guangdong Investment Ltd.	China	Utilities	A	NR	3.2	1495.4	4.9	5.1	0.30%

9505 JT	643312	Hokuriku Electric Power Co.	Japan	Utilities	G	2	3.5	3131.3	8.4	1513	0.30%
9987 JT	686556	Suzuken Co. Ltd.	Japan	Health Care	A	2	2.9	2212.3	5.9	2395	0.30%
4732 JT	617149	Uss Co. Ltd.	Japan	Consumer Discretionary	G	1	2.8	2172	6.1	7960	0.30%
2784 JT	668721	Alfresa Holdings Corp.	Japan	Health Care	A	NR	2.7	1979.8	5.3	3575	0.30%
4739 JT	620019	Itochu Techno-Science Corp.	Japan	Information Technology	U	NR	2.6	1248.6	7.9	3620	0.30%
9404 JT	664406	Nippon Television Network Corp.	Japan	Consumer Discretionary	A	1	2.5	776.7	8.1	12020	0.30%
2501 JT	677690	Sapporo Holdings Ltd.	Japan	Consumer Staples	U	NR	2.4	1278.5	9	301	0.30%
TPW NZ	690628	Trustpower Ltd.	New Zealand	Utilities	G	NR	5.8	289.7	0.2	7.2	0.20%
VCT NZ	B0H0BC	Vector Ltd.	New Zealand	Utilities	A	NR	5.8	472.2	0.5	2.6	0.20%
HPCL IN	610047	Hindustan Petroleum Corp. Ltd.	India	Energy	NR	NR	5.5	387.1	0.9	313.6	0.20%
HMCL IN	632732	Hero Motocorp Ltd	India	Consumer Discretionary	G	3	5.5	2865.5	2.5	1946.1	0.20%
YTLP MK	B01GQS	Ytl Power International Bhd	Malaysia	Utilities	C	NR	5.3	1790.2	2.9	1.9	0.20%
RATCH TB	629423	Ratchaburi Elec Generating Holding Pcl	Thailand	Utilities	NR	NR	5.1	505.5	1.6	42.5	0.20%
FPH NZ	634025	Fisher & Paykel Healthcare Corp. Ltd.	New Zealand	Health Care	0	1	4.9	1017.2	1.7	2.1	0.20%
RECL IN	B2Q7WL	Rural Electrification Corp. Ltd.	India	Financials	C	NR	4.9	949.2	1.7	215.7	0.20%
1507 TT	698869	Yungtay Engineering Co. Ltd.	Taiwan	Industrials	C	NR	4.4	529.7	2.4	46.4	0.20%
9921 TT	637216	Giant Manufacturing Co. Ltd.	Taiwan	Consumer Discretionary	G	NR	4.3	1157.8	1.7	126.5	0.20%
SCCC TB	680637	Siam City Cement Pcl	Thailand	Materials	G	NR	4.3	591.3	0.9	301	0.20%
525 HK	638870	Guangshen Railway Co. Ltd.	China	Industrials	A	2	4	506.8	1.7	3.1	0.20%
AIA NZ	612370	Auckland International Airport Ltd.	New Zealand	Industrials	G	NR	4	1990	1.9	2.4	0.20%
KLCC MK	B02FW1	Klcc Property Holdings Bhd	Malaysia	Financials	A	1	3.8	333	0.5	3.4	0.20%
POWF IN	B1S722	Power Finance Corp	India	Financials	C	NR	3.6	824.1	1.7	199	0.20%
GLOW TB	B07439	Glow Energy Pcl	Thailand	Utilities	G	NR	3.4	816.4	2.2	54	0.20%
POT NZ	669576	Port Of Tauranga Ltd.	New Zealand	Industrials	G	NR	3.1	468.5	0.3	10.9	0.20%

Source: Worldscope, Citi Investment Research and Analysis

Appendix-GRAM

Below, we provide definitions of the seven macroeconomic risk factors and five equity market risk factors used in the GRAM model.

Macroeconomic Factors

1. **Global Yield** : The global yield factor is the weekly percentage change of GDP-weighted 10-year benchmark government bond yields from the top nine countries by GDP.
2. **Emerging Markets Bond Yield** : The emerging market bond yield factor is the weekly percentage change of the yield of the CITI Emerging Market Sovereign-Capped Bond Index (ESBI-C).
3. **Credit** : The credit factor is the weighted composite of weekly percentage changes of four regional Credit Default Swap (CDS) indices. The indices are as follows: Markit Credit Indices for North America (CDX, 5-year Investment Grade), Europe (iTraxx, 5-year Investment Grade), Japan (iTraxx, 5-year Investment Grade) and Emerging Markets (CDX Diversified, 5-year Investment Grade). Each regional CDS index is equally-weighted. In forming the composite, we weight each regional index by the number of issues in each respective index.
4. **Oil Price** : The oil price factor is the percentage change of the spot price (in US dollars) of the West Texas Intermediate (WTI) crude oil. Other than the direct impact of oil prices on energy costs, changes in oil prices also serve as an important proxy for global inflation and growth expectations.
5. **Commodities Price** : The commodity price factor is the weekly percentage change of the S&P GSCI All Commodities Ex-Energy Index. We have observed decoupling of Energy and other commodities prices which warrants the inclusion of a separate commodities price risk factor in addition to the oil price factor.
6. **Currency - Euro/US\$ and JPY/US\$ Exchange Rates** ; We have included the two most important global exchange rates in the risk model – the Euro/US\$ and the JPY/US\$, measured as the weekly percentage changes of the exchange rates.

Equity Market Factors

Equity market performance is impacted by macroeconomic factors and the correlations between different segments of the market. Therefore we measure the global market, small-cap premium, growth/value style premium, sector, and country factors after adjusting for the correlations with other factors. We refer to these adjusted factors as residualized factors.

1. **Global Market (residual)** : The market factor is based on the weekly total returns of the MSCI ACWI Index in US dollars. We perform an OLS regression of this variable on the above seven macroeconomic variables. We then use the residuals of this regression as the final global market factor.
2. **Global Small-Cap Premium (residual)** : The small-cap premium factor is based on the weekly total return spread in US dollar between the S&P BMI World Small Cap Index and the S&P BMI World Large Cap Index. We then

perform an OLS regression of this variable on the seven macroeconomic factors and the residual global market factor. The final residual small cap factor uses the residuals of this regression.

3. **Global Growth/Value Style Premium (residual)** : The style premium factor is based on the weekly total return spread in US dollar between the S&P BMI World Large-Cap Growth and Value Indices. We then perform an OLS regression of this variable on the seven macroeconomic factors and the two residualized equity market factors described above. We use the residuals of this regression as the final residual style factor.
4. **Global Sector Factors (residual)** : The sector factor for a given individual stock is based on the weekly total return in US dollars of the MSCI ACWI GICS sector index to which that stock belongs. We then perform an OLS regression of this variable on the seven macroeconomic factors and the three residualized equity market factors listed above. The residuals of this regression are the final sector factor. There are ten GICS sectors.
5. **Local Market/Country Factors (residual)** : The local market/country factor for a given individual stock is based on the weekly total return in local currency of the MSCI country index to which that stock belongs, except for stocks from the frontier markets. For stocks in the frontier markets, the local market factor is the weekly total return in local currencies of the MSCI Frontier Markets Index. We then perform an OLS regression of this variable on the seven macroeconomic factors, the first three residualized equity market factors and all ten residualized sector factors. The residuals from this regression are the local market factor.

For more details please refer to [Global Risk Attribute Model \(GRAM\) Version 2.0](#).

Appendix A-1

Analyst Certification

The research analyst(s) primarily responsible for the preparation and content of this research report are named in bold text in the author block at the front of the product except for those sections where an analyst's name appears in bold alongside content which is attributable to that analyst. Each of these analyst(s) certify, with respect to the section(s) of the report for which they are responsible, that the views expressed therein accurately reflect their personal views about each issuer and security referenced and were prepared in an independent manner, including with respect to Citigroup Global Markets Inc and its affiliates. No part of the research analyst's compensation was, is, or will be, directly or indirectly, related to the specific recommendation(s) or view(s) expressed by that research analyst in this report.

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