

Building a Better “Low Vol” Mousetrap in Asia

Equity Research

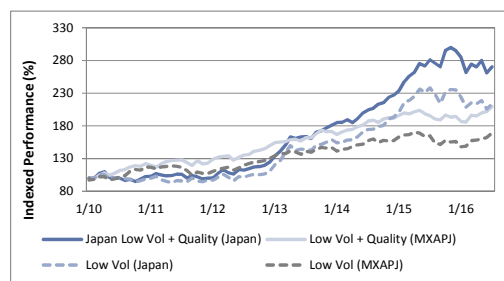
Enhancing “Low Vol” strategy with Fundamental Quality Factors

Why you should care about “Low Vol”

In our recent interaction with investors, “Low Vol” was one of the most frequently discussed topics. Among other quantitative strategies, we believe investors are increasingly interested in understanding how a “Low Vol” (companies with low price volatility) strategy works. We assess risks and rewards of “Low Vol” and introduce a strategy to help investors achieve a higher Sharpe ratio.

Quality enhanced “Low Vol” has produced a higher Sharpe ratio since 2010

Indexed price performance



Source: Factset, Goldman Sachs Global Investment Research

Overlaying Fundamental Quality

Overlaying fundamental quality factors (CFROI, RNOA, CROCI) has enhanced the simple “Low Vol” strategy by improving return (annualized return of 16.6% vs 12.6%) and lowering volatility (12.2% vs 12.6%) in Japan since 2010. In Asia Pacific ex-J, return increased to 14.1% vs 9.8% and volatility lowered from 9.0% to 8.7% since 2010.

Decoding Low Vol: Watch for signals suggesting a reversal

“Low Vol” tends to suffer from sharp drawdowns caused by technical reversals. We saw some signals suggesting a reversal in Japan in July. “Low Vol” stocks tend to be: 1) more highly correlated to each other because “Low Vol” stocks tend to stay as “Low Vol” longer, 2) crowded in a few sectors, and 3) less liquid. “Low Vol” as a strategy tends to: 1) lag during a bull market, and 2) trade at a higher premium than the market. We expect the recent reversal in Japan to continue, but we do not see significant reversal risk in Asia Pac ex-J currently.

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Portfolio Manager Summary: Building a Better “Low Vol” Mousetrap in Asia

“Low Vol” means low price volatility and/or minimum volatility portfolio construction

In our recent interaction with investors in Asia, one of the most frequently asked questions was on “Low Vol” strategy. While the exact methodology differs, “Low Vol” generally refers to strategies investing in stocks with minimum price volatility. Among other quantitative strategies, investors are increasingly interested in understanding “Low Vol” strategy given the impact in terms of valuation and performance. “Low Vol” ETFs have seen one of the strongest growth (AUM doubled in the past 12m globally and in Asia, and trebled in Japan¹). We highlighted the importance of understanding quantitative strategies in our previous Asian Quantamental report². Investors also seek to understand how a “Low Vol” strategy works because of its outperformance against benchmarks. However, we address risk associated with “Low Vol” strategies and explore possibilities of avoiding pitfalls.

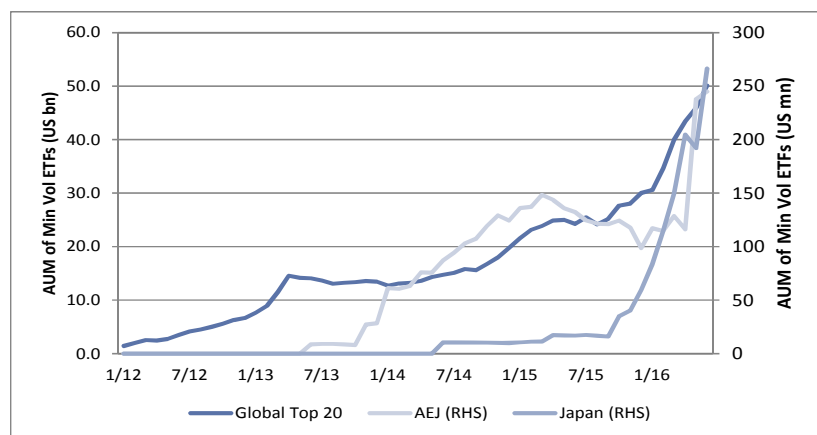
Risk: “Low Vol” strategy suffers from a large drawdown caused by short-term reversal because “Low Vol” stocks tend to be: 1) highly correlated to each other, 2) crowded in a few sectors/stocks, 3) less liquid. It is also vital to understand the characteristics of a “Low Vol” strategy such that it tends to: 1) lag during a bull market, outperforms in a bear and range-bound market, and 2) trade at about 15% higher premium in terms of valuations than high vol stocks on average.

Quantamental solution: Overlaying fundamental quality factors (CFROI, RNOA, CROCI) has enhanced the simple “Low Vol” strategy by improving return (annualized return of 16.6% vs 12.6%) and lowering volatility (12.2% vs 12.6%) in Japan since 2010. In Asia Pacific ex-J, return increased to 14.1% vs 9.8% and volatility lowered from 9.0% to 8.7% also since 2010.

It also: 1) improved Sharpe ratio, 2) avoided heavily crowded stocks, and 3) increased liquidity in the portfolio.

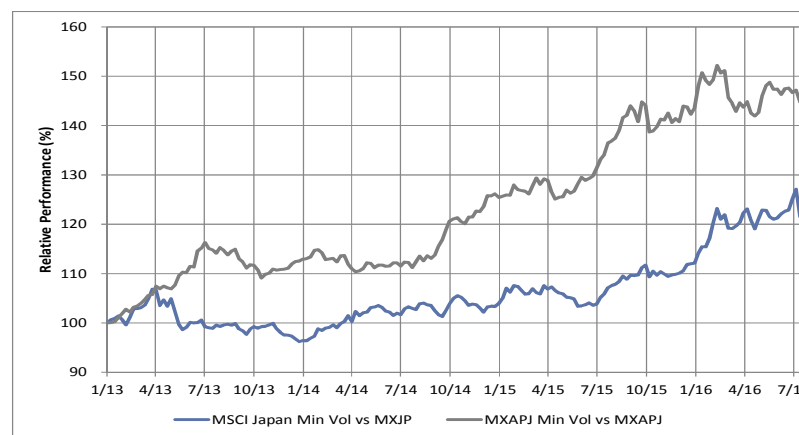
Risk of “Low Vol” strategy is a sudden and sharp drawdown

Exhibit 1: Inflows into low volatility ETFs globally have accelerated recently
AUM of low volatility ETFs



Source: Bloomberg

Exhibit 2: “Low Vol” strategies are outperforming the market in Asia
MSCI Minimum Volatility indices vs MSCI Japan and MXAP



Source: MSCI

¹ See ETF Spotlight, June 1, 2016 for more details on ETF flows

² Asian Quantamental: Myths vs Reality, July 14, 2016

Enhancing “Low Vol” with quality factors to avoid large drawdowns

We find that combining “Low Vol” strategy with quality factors enhances it in terms of liquidity, volatility, and correlation. Our backtest showed better annualized return and higher Sharpe ratio compared to simple “Low Vol” strategy both in Japan and Asia Pacific ex-Japan universe. Quality factors include CFROI, RNOA and CROCI.

Our Tactical Research Group (TRG) note that stocks with high CROIC are likely to continuously trade at a premium to the sector peers

“Low Vol” strategy can become victims of its own success due to crowding. We note that the recent “Low Vol” reversals are not caused by outflows from “Low Vol” strategies, but by unwinding of crowded stocks. Currently fundamental investors favor domestic and defensive stocks given uncertainty of global economic growth. These stocks tend to have lower volatility defined by price returns. Therefore, these stocks are also ranked highly by “Low Vol” type of strategies. In order to enhance the “Low Vol” strategy and avoid crowded stocks, we introduce “Low Vol” with quality strategy. We choose quality factors for a technical reason and for a fundamental reason.

- Technical reason is quality factors are unlike value and price return momentum factors; it has a slower alpha decay. While rebalancing monthly ensures the strategy can incorporate the information content of the short term volatility signal, having a slower alpha decay factor ensures lower turnover and potentially lower portfolio volatility. This saves transaction cost over the long run.
- Fundamental reason is that quality factors are designed to select stocks based on companies’ business condition. Our Tactical Research Group (TRG) highlights the benefits of focusing on a cash return-based valuation methodology than traditional earnings-based to eliminate distortions caused by different accounting techniques³. In addition to Cash Return on Cash Invested (CROCI), we used Cash Flow Return on Investments (CFROI) and Return on Net Operating Assets (RNOA). For financials, we used Cash Return on Adjusted Equity).

Quality (CFROI, CROCI and RNOA) enhanced “Low Vol” has outperformed the simple “Low Vol” strategy

We combined volatility factors (1,3 and 12M combined, 40% weight total) and quality factors (CFROI, RNOA and CROCI, 20% weight each) and backtested since January 2010 with monthly rebalance. We chose those weights based approximately on factor predictability defined by Information Coefficient. For financials stocks, we replaced CFROI and CROCI by Cash Return on Adjusted Equity (CROAE). Portfolio characteristics comparison with simple “Low Vol” strategy is shown in Exhibit 3. Overlaying fundamental quality factors (CFROI, RNOA, CROCI) has enhanced simple “Low Vol” strategy⁴ by improving return (annualized return of 16.6% vs 12.6%) and lowering volatility (12.2% vs 12.6%) in Japan since 2010. In Asia Pacific ex-J, return increased to 14.1% vs 9.8% and volatility lowered from 9.0% to 8.7% since 2010. Exhibit 4 shows the historical portfolio performance from our backtest. We highlight top 50 stocks from the latest constituents of the Quality enhanced “Low Vol” strategy for Japan and Asia Pacific ex-J in Exhibits 7 and 8.

³ For more details on TRG’s cash based valuation methods, please see “Introducing Director’s Cut – returns matters more than growth”, August 7, 2009.

⁴ Simple ‘Low Vol’ strategy refers to selecting stocks with low 1M/3M/12M price volatility from TOPIX500 and MSCI AC Asia ex-Japan.

Exhibit 3: Quality overlay has enhanced Japan and MXAPJ “Low Vol” strategy

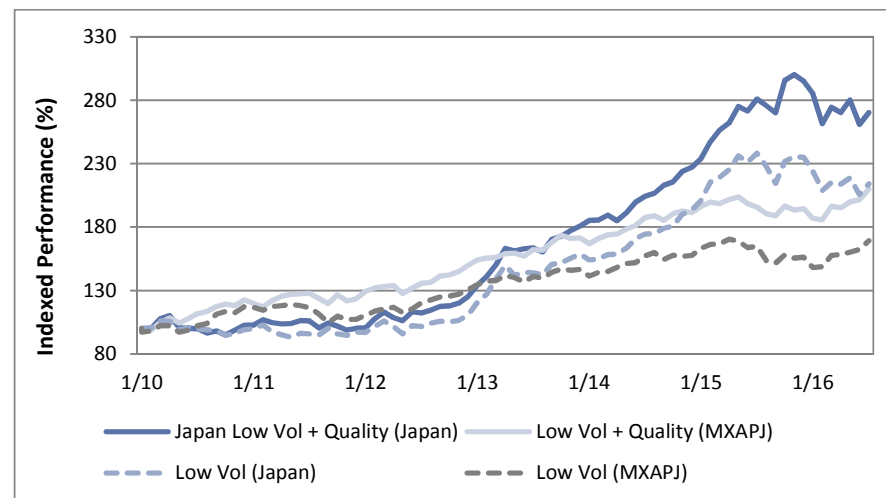
Performance and valuation statistics since 2013

	Japan		MXAPJ	
	Low Vol + High Quality	Low Volatility	Low Vol + High Quality	Low Volatility
Median ADVT	28.7	15.3	14.7	18.0
Average ADVT	50.7	28.3	39.2	25.3
NTM PE	19.8	30.5	21.1	20.4
Annualized Return	16.3	12.2	11.9	8.3
Annualized Volatility	12.6	13.0	8.5	9.4
Sharpe Ratio	1.3	0.9	1.4	0.9

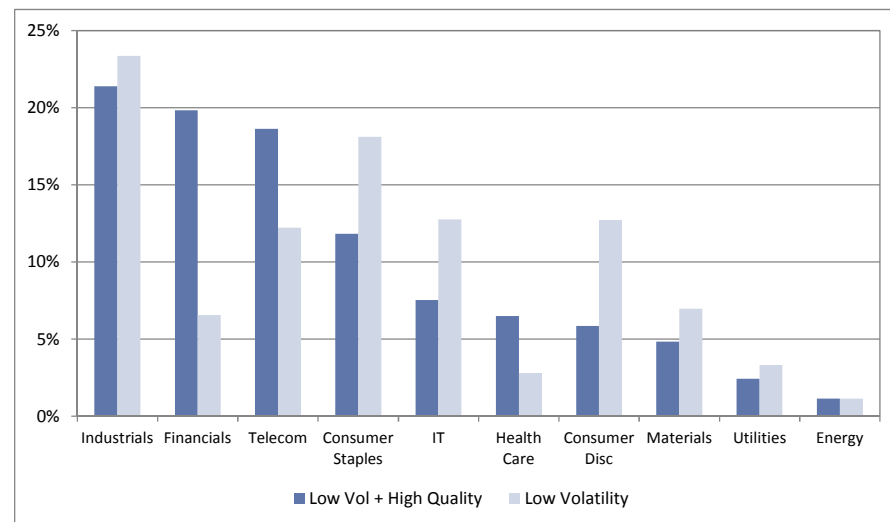
Source: Factset, Goldman Sachs Global Investment Research

Exhibit 4: Enhanced strategy has less drawdown, particularly in Japan

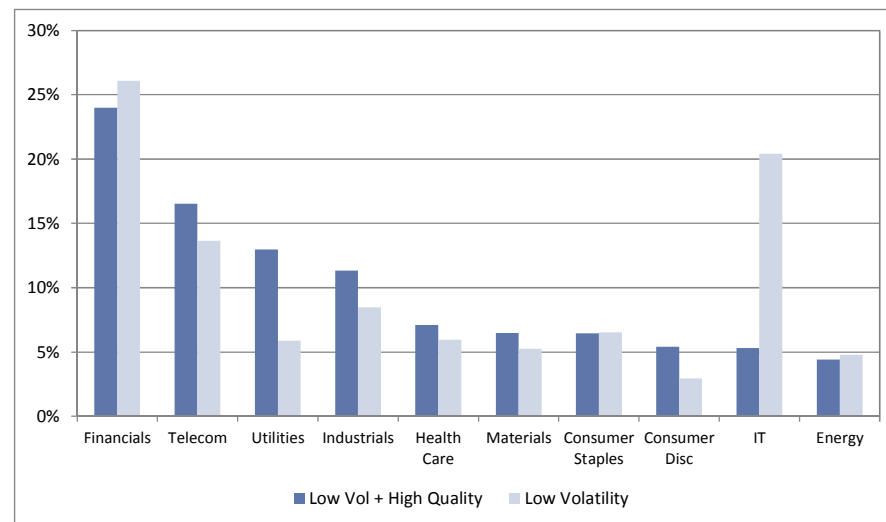
Indexed performance comparison of simple Low Vol vs enhanced



Source: Factset, Goldman Sachs Global Investment Research

Exhibit 5: Quality enhanced has more stocks in financials and telecom
 Sector allocation in Japan


Source: Factset, Goldman Sachs Global Investment Research

Exhibit 6: Utilities and IT have the largest differences in Asia Pacific ex-J
 Sector allocation in Asia Pacific ex-J


Source: Factset, Goldman Sachs Global Investment Research

Exhibit 7: Top 50 Japan stocks in our Quality enhanced “Low Vol” strategy

Stock selected based on Volatility (1,3 and 12M combined, 40% weight total) and quality factors (CFROI, RNOA and CROCI, 20% weight each for Non-financial stocks). For financials, 40% Volatility, 40% CROAE and 20% RNOA.

Ticker	Name	Sector	Mkt-Cap (US\$ mn)	20D advt (US\$ mn)	Total Score	Volatility Score	Quality Score
1878 JT	Daito Trust Construction Co., Ltd.	Financials	12605.2	65.0	2.34	2.64	2.15
4716 JT	Oracle Corporation Japan	Information Technology	7483.7	9.7	1.78	1.27	2.12
2371 JT	Kakaku.com, Inc.	Information Technology	3871.9	27.5	1.70	0.88	2.25
9201 JT	Japan Airlines Co., Ltd.	Industrials	11113.8	67.8	1.68	0.39	2.53
9744 JT	Meitec Corporation	Industrials	1017.8	8.7	1.62	1.17	1.92
7741 JT	HOYA CORPORATION	Health Care	15815.3	62.6	1.59	0.87	2.07
3092 JT	Start Today Co., Ltd.	Consumer Discretionary	4947.1	34.8	1.51	-0.42	2.80
4704 JT	Trend Micro Incorporated	Information Technology	5102.9	29.9	1.43	0.54	2.02
8439 JT	Century Tokyo Leasing Corporation	Financials	3883.5	5.2	1.42	1.20	1.58
6465 JT	HOSHIZAKI Corp.	Industrials	6102.4	24.3	1.40	0.59	1.94
9533 JT	Toho Gas Co., Ltd.	Utilities	4619.4	13.0	1.38	1.12	1.56
8028 JT	Familymart Co., Ltd.	Consumer Staples	6753.2	93.7	1.31	1.16	1.42
2127 JT	Nihon M&A Center Inc.	Financials	2362.4	22.3	1.31	0.72	1.70
7181 JT	Japan Post Insurance Co., Ltd.	Financials	13416.7	11.3	1.30	0.88	1.58
2651 JT	Lawson, Inc.	Consumer Staples	7433.6	36.0	1.29	1.28	1.30
3391 JT	Tsuruha Holdings Inc.	Consumer Staples	5161.3	23.7	1.25	0.83	1.52
4666 JT	Park24 Co., Ltd.	Industrials	4410.8	30.9	1.23	0.62	1.63
4521 JT	Kaken Pharmaceutical Co., Ltd.	Health Care	2975.2	16.7	1.22	-0.43	2.33
7270 JT	Fuji Heavy Industries Ltd.	Consumer Discretionary	29446.3	148.1	1.19	-0.66	2.42
9989 JT	Sundrug Co., Ltd.	Consumer Staples	5509.1	21.2	1.14	0.33	1.68
4768 JT	Otsuka Corporation	Information Technology	4123.4	22.5	1.14	0.69	1.44
9202 JT	ANA Holdings Inc.	Industrials	9569.7	45.3	1.11	1.32	0.98
1821 JT	Sumitomo Mitsui Construction Co., Ltd.	Industrials	754.5	3.5	1.11	-0.30	2.04
6098 JT	Recruit Holdings Co., Ltd.	Industrials	20811.0	43.8	1.10	1.82	0.61
4452 JT	Kao Corp.	Consumer Staples	25517.4	149.6	1.04	1.20	0.94
6861 JT	Keyence Corporation	Information Technology	44017.7	121.1	1.01	0.88	1.10
4503 JT	Astellas Pharma Inc.	Health Care	35479.9	151.2	0.97	0.90	1.02
8933 JT	Ntt Urban Development Corporation	Financials	3162.3	9.1	0.97	1.70	0.48
7309 JO	Shimano Inc.	Consumer Discretionary	14024.3	55.2	0.97	-0.32	1.82
6758 JT	Sony Corporation	Consumer Discretionary	40648.9	209.8	0.96	0.10	1.53
4661 JT	Oriental Land Co., Ltd.	Consumer Discretionary	21929.4	60.2	0.95	1.05	0.87
9719 JT	SCSK Corporation	Information Technology	4207.3	18.3	0.93	0.49	1.22
8848 JT	Leopalace21 Corporation	Financials	1919.5	14.6	0.91	0.82	0.97
8410 JT	Seven Bank, Ltd.	Financials	4211.8	30.1	0.91	0.06	1.47
6806 JT	HIROSE ELECTRIC CO., LTD.	Information Technology	5279.6	12.3	0.88	0.63	1.05
9684 JT	Square Enix Holdings Co., Ltd.	Information Technology	3668.0	33.0	0.87	0.11	1.38
7832 JT	BANDAI NAMCO Holdings Inc.	Consumer Discretionary	5918.0	28.9	0.87	0.31	1.24
9045 JO	Keihan Holdings Co.,Ltd.	Industrials	4017.4	4.8	0.85	1.48	0.42
4732 JT	USS Co., Ltd.	Consumer Discretionary	5224.4	12.1	0.83	0.23	1.22
7649 JT	Sugi Holdings Co., Ltd.	Consumer Staples	3135.3	11.0	0.82	0.78	0.84
4751 JT	CyberAgent, Inc.	Consumer Discretionary	3456.6	57.5	0.81	-1.36	2.27
1801 JT	Taisei Corporation	Industrials	8978.1	107.7	0.81	0.82	0.80
4684 JT	OBIC Co., Ltd.	Information Technology	5436.6	10.1	0.79	0.61	0.92
5232 JT	Sumitomo Osaka Cement Co., Ltd.	Materials	1940.2	18.3	0.78	0.78	0.78
1893 JT	Penta-Ocean Construction Co., Ltd.	Industrials	1491.4	17.8	0.78	0.03	1.28
1802 JT	Obayashi Corporation	Industrials	7080.5	44.1	0.78	0.59	0.91
6869 JT	Sysmex Corporation	Health Care	13618.2	41.4	0.76	-0.20	1.41
8630 JT	Sompo Japan Nipponkoa Holdings, Inc.	Financials	13538.2	77.7	0.76	0.06	1.23
8729 JT	Sony Financial Holdings Inc.	Financials	6065.6	44.0	0.76	-0.43	1.55
8593 JT	Mitsubishi UFJ Lease & Finance Company Limit	Financials	4032.6	12.9	0.76	0.04	1.24

Source: Factset, Bloomberg, Goldman Sachs Global Investment Research

Exhibit 8: Top 50 MXAPJ stocks selected by our Quality enhanced “Low Vol” strategy

Stock selected based on Volatility (1,3 and 12M combined, 40% weight total) and quality factors (CFROI, RNOA and CROCI, 20% weight each for Non-financial stocks). For financials, 40% Volatility, 40% CROAE and 20% RNOA.

Ticker	Name	Sector	Mkt-Cap (US\$ mn)	20D advt (US\$ mn)	Total Score	Volatility Score	Quality Score
SGX SP	Singapore Exchange Ltd.	Financials	6074.8	8.9	1.96	1.26	2.43
2912 TT	President Chain Store Corporation	Consumer Staples	8248.2	12.8	1.91	0.28	3.00
JHX AT	James Hardie Industries PLC Chess Units of Foreign Securities	Materials	7212.7	20.2	1.82	0.73	2.55
700 HK	Tencent Holdings Ltd.	Information Technology	230408.1	304.0	1.63	0.82	2.17
PTM AT	Platinum Asset Management Ltd	Financials	2701.0	4.7	1.58	-0.56	3.00
IAG AT	Insurance Australia Group Limited	Financials	11194.0	22.9	1.56	0.64	2.18
SUN AT	Suncorp Group Limited	Financials	13477.6	33.1	1.54	0.76	2.05
2881 TT	Fubon Financial Holding Co., Ltd.	Financials	13526.6	23.4	1.48	0.27	2.28
2354 TT	Foxconn Technology Co., Ltd.	Information Technology	3488.6	7.0	1.46	0.79	1.90
ROTH MK	British American Tobacco Malaysia Bhd.	Consumer Staples	3674.6	4.5	1.44	-0.88	2.99
DIGI MK	DiGi.Com Bhd	Telecommunication Services	9551.4	7.2	1.44	1.54	1.37
1339 HK	People's Insurance Co. (Group) of China Ltd. Class H	Financials	3487.4	8.7	1.43	0.21	2.24
TNB MK	Tenaga Nasional Bhd	Utilities	20379.8	38.0	1.39	2.35	0.75
AMP AT	AMP Limited	Financials	13459.2	29.1	1.37	0.57	1.90
2628 HK	China Life Insurance Co. Ltd. Class H	Financials	17401.8	105.7	1.37	0.14	2.19
1336 HK	New China Life Insurance Co., Ltd. Class H	Financials	3839.5	11.8	1.34	-0.07	2.28
035420 KP	NAVER Corp.	Information Technology	22277.5	54.5	1.32	0.16	2.09
941 HK	China Mobile Limited	Telecommunication Services	257895.3	201.6	1.30	0.52	1.82
ITC IS	ITC Limited	Consumer Staples	45204.4	3.6	1.29	0.74	1.65
5347 TT	Vanguard International Semiconductor Co.	Information Technology	2845.2	5.8	1.27	0.31	1.92
000810 KP	Samsung Fire & Marine Insurance Co., Ltd	Financials	11755.5	13.5	1.26	0.61	1.70
REA AT	REA Group Ltd	Consumer Discretionary	6054.0	16.1	1.25	1.03	1.40
2328 HK	PICC Property & Casualty Co. Ltd. Class H	Financials	7471.3	30.5	1.25	-0.97	2.73
2330 TT	Taiwan Semiconductor Manufacturing Co., Ltd.	Information Technology	146478.3	153.4	1.24	0.82	1.51
BBCA IJ	PT Bank Central Asia Tbk	Financials	28354.2	32.9	1.16	1.08	1.21
ADVANC TB	Advanced Info Service Public Co., Ltd.	Telecommunication Services	15726.4	50.7	1.14	-0.14	2.00
SIA SP	Singapore Airlines Ltd.	Industrials	9650.4	12.4	1.14	1.36	0.98
STH SP	StarHub Ltd	Telecommunication Services	4985.2	6.8	1.13	1.33	1.00
2882 TT	Cathay Financial Holding Co., Ltd.	Financials	14851.5	23.7	1.13	0.17	1.76
T MK	Telekom Malaysia Bhd.	Telecommunication Services	6329.1	11.4	1.11	2.46	0.22
8299 TT	Phison Electronics Corp.	Information Technology	1522.1	9.2	1.10	-0.13	1.92
PTG MK	Petronas Gas Bhd.	Utilities	10781.9	6.5	1.09	1.53	0.80
MPL AT	Medibank Private Ltd.	Financials	6434.3	36.7	1.08	-0.33	2.01
2318 HK	Ping An Insurance (Group) Company of China, Ltd. Class H	Financials	36052.9	135.4	1.06	-0.10	1.84
2601 HK	China Pacific Insurance (Group) Co., Ltd. Class H	Financials	10089.6	25.5	1.05	-0.83	2.30
CPN TB	Central Pattana Public Co. Ltd.	Financials	7250.2	14.7	1.04	0.42	1.44
1299 HK	AIA Group Limited	Financials	77048.8	155.2	1.02	0.47	1.39
XRS UN	TAL Education Group Unsponsored ADR Class A	Consumer Discretionary	2657.6	52.0	1.00	-0.45	1.96
INFO IS	Infosys Limited	Information Technology	37090.8	6.1	0.99	0.13	1.57
TLKM IJ	PT Telekomunikasi Indonesia, Tbk Class B	Telecommunication Services	33779.1	27.3	0.97	0.34	1.38
DELTA TB	Delta Electronics (Thailand) Public Co. Ltd.	Information Technology	2541.2	3.2	0.94	-0.53	1.92
035250 KP	Kangwon Land, Inc.	Consumer Discretionary	7934.1	13.0	0.94	0.82	1.02
015760 KP	Korea Electric Power Corporation	Utilities	35450.7	44.4	0.93	1.14	0.80
VIPS UN	Vipshop Holdings Ltd Sponsored ADR	Consumer Discretionary	7184.1	86.8	0.93	-1.88	2.80
PBK MK	Public Bank Bhd	Financials	18884.2	25.6	0.91	2.56	-0.19
COH AT	Cochlear Limited	Health Care	5616.3	17.2	0.91	0.99	0.85
009240 KP	Hanssem Co., Ltd	Consumer Discretionary	3705.5	8.8	0.90	-0.97	2.15
TLS AT	Telstra Corporation Limited	Telecommunication Services	52365.9	86.5	0.90	1.65	0.39
SPN AT	AusNet Services Limited	Utilities	4750.3	6.1	0.90	1.37	0.58
1216 TT	Uni-President Enterprises Corp.	Consumer Staples	11432.4	19.0	0.87	0.96	0.81

Source: Factset, Bloomberg, Goldman Sachs Global Investment Research

Exhibit 9: Bottom 50 Japan stocks in our “Low Vol High Quality” strategy

Stock selected based on Volatility (1,3 and 12M combined, 40% weight total) and quality factors (CFROI, RNOA and CROCI, 20% weight each for Non-financial stocks). For financials, 40% Volatility, 40% CROAE and 20% RNOA.

Ticker	Name	Sector	Mkt-Cap (US\$ mn)	20D advt (US\$ mn)	Total Score	Volatility Score	Quality Score
3436 JT	SUMCO Corporation	Information Technology	2302.6	51.4	-1.49	-3.00	-0.48
7974 JT	Nintendo Co., Ltd.	Information Technology	29401.8	2937.7	-1.38	-3.00	-0.29
5105 JT	Toyo Tire & Rubber Co., Ltd.	Consumer Discretionary	1343.3	19.0	-1.34	-2.55	-0.54
6472 JT	NTN Corporation	Industrials	1905.8	27.4	-1.31	-2.56	-0.48
8369 JT	Bank of Kyoto, Ltd.	Financials	2618.4	36.3	-1.29	-2.03	-0.79
3086 JT	J.Front Retailing Co., Ltd.	Consumer Discretionary	3117.0	15.4	-1.27	-0.90	-1.51
3099 JT	Isetan Mitsukoshi Holdings Ltd.	Consumer Discretionary	3784.3	24.2	-1.23	-0.64	-1.63
5411 JT	JFE Holdings, Inc.	Materials	8719.0	73.9	-1.15	-1.93	-0.63
6740 JT	Japan Display Inc.	Information Technology	1020.6	10.3	-1.11	-2.77	0.00
5713 JT	Sumitomo Metal Mining Co., Ltd.	Materials	7629.5	61.4	-1.10	-0.99	-1.17
6141 JT	DMG MORI CO., LTD.	Industrials	1352.3	18.5	-1.07	-2.67	0.00
6995 JT	Tokai Rika Co., Ltd.	Consumer Discretionary	1814.2	13.2	-1.04	-1.93	-0.45
8604 JT	Nomura Holdings, Inc.	Financials	17499.5	147.1	-1.04	-1.92	-0.45
6770 JT	Alps Electric Co., Ltd.	Information Technology	4672.2	100.6	-1.01	-3.00	0.31
3941 JT	Rengo Co., Ltd.	Materials	1599.3	14.7	-1.01	-0.17	-1.56
6479 JT	Minebea Co Limited	Industrials	3429.7	66.6	-0.97	-2.96	0.35
4676 JT	Fuji Media Holdings, Inc.	Consumer Discretionary	2847.7	24.1	-0.97	-1.13	-0.86
8273 JT	Izumi Co., Ltd.	Consumer Discretionary	3318.8	10.3	-0.96	0.02	-1.61
7272 JT	Yamaha Motor Co., Ltd.	Consumer Discretionary	6272.4	128.0	-0.96	-1.64	-0.51
7936 JT	Asics Corporation	Consumer Discretionary	3927.7	20.3	-0.96	-1.38	-0.68
4612 JT	NIPPON PAINT HOLDINGS CO.LTD.	Materials	9647.7	26.4	-0.95	-1.80	-0.39
6366 JT	Chiyoda Corp.	Industrials	1883.9	9.5	-0.95	0.26	-1.75
8140 JT	Ryosan Company, Limited	Information Technology	950.8	3.2	-0.94	-1.10	-0.84
8381 JT	San-in Godo Bank Ltd.	Financials	1101.0	3.5	-0.94	-0.96	-0.92
9507 JT	Shikoku Electric Power Company, Incorporated	Utilities	2197.5	9.9	-0.93	0.11	-1.63
8252 JT	Marui Group Co., Ltd.	Consumer Discretionary	3484.1	19.2	-0.92	-0.45	-1.22
7013 JT	IHI Corporation	Industrials	4284.3	73.1	-0.90	-2.26	0.00
6753 JT	Sharp Corporation	Consumer Discretionary	1493.2	16.1	-0.90	-2.25	0.00
2264 JT	Morinaga Milk Industry Co., Ltd.	Consumer Staples	1629.3	12.5	-0.89	-0.09	-1.42
4183 JT	Mitsui Chemicals, Inc.	Materials	4355.8	39.9	-0.89	-1.84	-0.25
6502 JT	Toshiba Corporation	Industrials	11026.4	81.3	-0.89	-2.21	0.00
6474 JT	Nachi-Fujikoshi Corp.	Industrials	850.6	7.1	-0.88	-2.27	0.04
8379 JT	Hiroshima Bank Ltd.	Financials	2372.2	8.7	-0.87	-1.02	-0.77
9508 JT	Kyushu Electric Power Company, Incorporated	Utilities	4236.1	18.3	-0.86	0.14	-1.53
1605 JT	Inpex Corporation	Energy	11723.1	43.6	-0.85	-0.70	-0.95
8354 JT	Fukuoka Financial Group, Inc.	Financials	3395.9	23.3	-0.85	-0.84	-0.86
8382 JT	Chugoku Bank, Limited	Financials	2273.5	6.5	-0.84	-0.87	-0.82
9501 JT	Tokyo Electric Power Company Holdings, Incorporated	Utilities	5610.9	43.1	-0.83	0.06	-1.41
5202 JT	Nippon Sheet Glass Company, Limited	Industrials	713.8	10.4	-0.82	-2.05	0.00
8601 JT	Daiwa Securities Group Inc.	Financials	10062.7	45.6	-0.82	0.33	-1.58
6703 JT	OKI Electric Industry Company, Limited	Information Technology	1173.8	6.7	-0.82	-0.61	-0.95
8309 JT	Sumitomo Mitsui Trust Holdings, Inc.	Financials	13404.4	73.8	-0.80	-0.67	-0.89
9503 JT	Kansai Electric Power Company, Incorporated	Utilities	7967.8	25.1	-0.80	0.22	-1.47
8473 JT	SBI Holdings, Inc.	Financials	2512.0	20.2	-0.79	-0.48	-0.99
7003 JT	Mitsui Engineering & Shipbuilding Co., Ltd	Industrials	1167.0	11.6	-0.76	-0.82	-0.73
9509 JT	Hokkaido Electric Power Company, Incorporated	Utilities	1681.9	9.4	-0.76	0.51	-1.61
8303 JT	Shinsei Bank, Limited	Financials	4104.0	37.0	-0.76	-0.86	-0.70
4188 JT	Mitsubishi Chemical Holdings Corporation	Materials	8351.5	48.0	-0.73	-1.36	-0.31
8327 JT	Nishi-Nippon City Bank, Ltd.	Financials	1647.3	5.0	-0.73	-0.60	-0.81
5334 JT	NGK SPARK PLUG CO., LTD.	Consumer Discretionary	4142.3	34.3	-0.70	-1.61	-0.10

Source: Factset, Bloomberg, Goldman Sachs Global Investment Research

Exhibit 10: Bottom 50 MXAPJ stocks in our “Low Vol High Quality” strategy

Stock selected based on Volatility (1,3 and 12M combined, 40% weight total) and quality factors (CFROI, RNOA and CROCI, 20% weight each for Non-financial stocks). For financials, 40% Volatility, 40% CROAE and 20% RNOA.

Ticker	Name	Sector	Mkt-Cap (US\$ mn)	20D advt (US\$ mn)	Total Score	Volatility Score	Quality Score
283 HK	Goldin Properties Holdings Limited	Financials	2874.4	7.8	-2.21	-3.00	-1.68
037620 KP	Mirae Asset Securities Co., Ltd	Financials	2691.5	10.7	-1.99	-2.13	-1.90
3377 HK	Sino-Ocean Group Holding Ltd.	Financials	3390.7	3.5	-1.73	-1.05	-2.19
005940 KP	NH Investment & Securities Co., Ltd.	Financials	2704.3	14.8	-1.62	-0.56	-2.33
086790 KP	Hana Financial Group Inc.	Financials	7478.5	26.2	-1.50	-2.20	-1.04
HNDL IS	Hindalco Industries Limited	Materials	4607.2	3.7	-1.47	-0.89	-1.86
FMG AT	Fortescue Metals Group Ltd	Materials	11137.3	65.0	-1.44	-3.00	-0.39
FLT AT	Flight Centre Travel Group Limited	Consumer Discretionary	2582.1	10.2	-1.32	-0.18	-2.08
FGV MK	Felda Global Ventures Holdings Bhd.	Consumer Staples	1762.0	8.1	-1.32	-1.75	-1.04
071050 KP	Korea Investment Holdings Co., Ltd.	Financials	2174.7	6.2	-1.30	-0.47	-1.85
6886 HK	Huatai Securities Co., Ltd. Class H	Financials	3661.4	11.2	-1.26	-1.45	-1.12
BANPU TB	Banpu Public Co. Ltd.	Energy	1760.6	42.3	-1.24	-1.30	-1.20
ADRO IJ	PT Adaro Energy Tbk	Energy	2801.5	5.2	-1.22	-2.19	-0.57
009830 KP	Hanwha Chemical Corporation	Materials	3784.7	20.7	-1.21	-0.73	-1.54
NOBL SP	Noble Group Limited	Industrials	1535.9	14.9	-1.20	-3.00	0.00
PGAS IJ	PT Perusahaan Gas Negara (Persero) Tbk Class B	Utilities	6037.3	20.5	-1.16	-2.45	-0.30
EDU UN	New Oriental Education & Technology Group, Inc. Sponsored ADR	Consumer Discretionary	6769.6	60.4	-1.16	-0.45	-1.63
ILU AT	Iluka Resources Limited	Materials	2232.0	12.2	-1.15	-2.18	-0.47
2542 TT	Highwealth Construction Corp.	Financials	1836.4	5.8	-1.15	-1.88	-0.67
2353 TT	Acer Incorporated	Information Technology	1505.8	9.0	-1.11	-1.29	-1.00
NCM AT	Newcrest Mining Limited	Materials	14447.8	68.3	-1.11	-1.88	-0.59
IVL TB	Indorama Ventures Public Co. Ltd.	Materials	4783.4	40.2	-1.11	-2.05	-0.48
3800 HK	GCL-Poly Energy Holdings Limited	Information Technology	2612.2	5.6	-1.07	-1.22	-0.97
MEG PM	Megaworld Corp.	Financials	3703.8	3.9	-1.06	-1.44	-0.82
IBULL IS	Indiabulls Housing Finance Ltd.	Financials	5115.2	3.2	-1.05	-1.23	-0.93
105560 KP	KB Financial Group Inc.	Financials	13038.2	32.0	-1.03	-0.26	-1.55
2380 HK	China Power International Development Ltd	Utilities	3015.6	11.0	-1.01	-1.34	-0.79
2823 TT	China Life Insurance Co. Ltd. (Taiwan)	Financials	2998.6	10.4	-0.98	0.07	-1.68
410 HK	SOHO China Ltd.	Financials	2641.3	3.8	-0.97	-0.31	-1.41
034230 KQ	Paradise Co., Ltd	Consumer Discretionary	1284.2	8.7	-0.97	-1.00	-0.94
SESA IS	Vedanta Limited	Materials	7519.5	4.5	-0.94	-2.35	0.00
SFUN UN	SouFun Holdings Ltd. Sponsored ADR Class A	Information Technology	1707.2	20.8	-0.94	-2.35	0.00
991 HK	Datang International Power Generation Co., Ltd. Class H	Utilities	863.5	4.5	-0.93	-0.88	-0.96
322 HK	Tingyi (Cayman Islands) Holding Corp.	Consumer Staples	5165.0	7.2	-0.92	-0.97	-0.88
135 HK	KunLun Energy Co. Ltd.	Energy	6140.5	7.5	-0.91	0.03	-1.54
2498 TT	HTC Corporation	Information Technology	2652.1	52.5	-0.90	-2.26	0.00
010060 KP	OCI Co., Ltd	Materials	1943.2	22.0	-0.90	-2.25	0.00
371 HK	Beijing Enterprises Water Group Limited	Utilities	5241.4	7.8	-0.90	-0.93	-0.87
AREIT SP	Ascendas Real Estate Investment Trust	Financials	4859.7	22.2	-0.89	0.22	-1.63
101 HK	Hang Lung Properties Limited	Financials	9972.9	12.5	-0.88	-0.31	-1.27
1113 HK	Cheung Kong Property Holdings Limited	Financials	28012.5	43.5	-0.88	-0.50	-1.13
23 HK	Bank of East Asia Ltd.	Financials	11329.4	9.8	-0.88	-0.43	-1.17
007070 KP	GS Retail Co., Ltd.	Consumer Staples	3369.7	11.2	-0.87	-0.43	-1.17
S32 AT	South32 Ltd.	Materials	7991.8	27.5	-0.86	-2.15	0.00
165 HK	China Everbright Limited	Financials	3411.3	6.0	-0.86	-0.69	-0.97
958 HK	Huaneng Renewables Corp. Ltd. Class H	Utilities	1454.1	9.7	-0.86	-1.12	-0.68
011780 KP	Kumho Petrochemical Co., Ltd.	Materials	1710.0	4.2	-0.85	-0.95	-0.79
916 HK	China Longyuan Power Group Corp. Ltd. Class H	Utilities	2902.4	10.4	-0.85	-1.07	-0.71
IPL AT	Incitec Pivot Limited	Materials	3579.4	11.9	-0.83	-1.30	-0.52
12 HK	Henderson Land Development Co. Ltd.	Financials	22018.0	16.5	-0.82	-0.14	-1.28

Source: Factset, Bloomberg, Goldman Sachs Global Investment Research

Decoding “Low Vol”

“Low Vol” anomaly continues both in Japan and Asia Pacific exJ, but not all the time

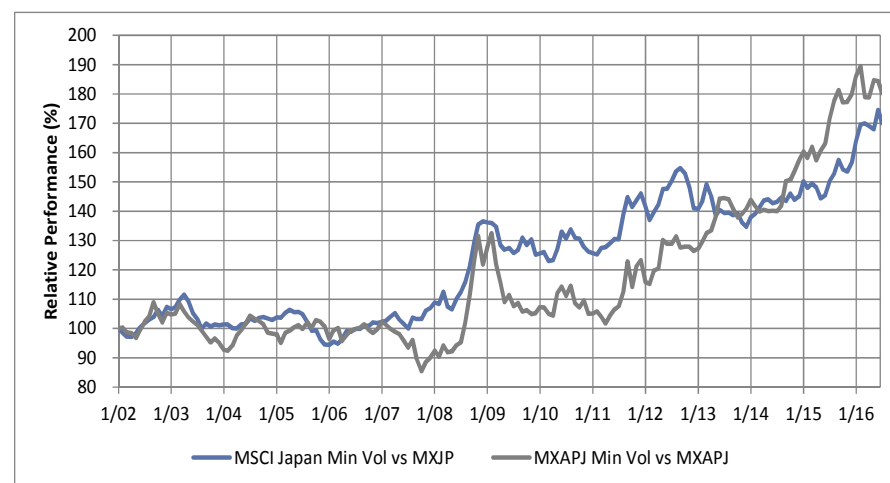
Since 2000, our simple “Low Vol” strategy in Japan outperformed TOPIX by 3X and our “Low Vol” in Asia Pacific ex-J outperformed by 4X over MXAPJ. However a “Low Vol” strategy is not an all-weather proof strategy. “Low Vol” strategies tend to lag during a bull market as it employs stocks with lower beta which unsurprisingly underperform when the market rallies.

“Low Vol” is not a new strategy, but on the back of growing launches of Smart Beta ETFs its attraction in Asia Pacific is increasing. The strategy has been also popular among the pension community. For example, one of Japan’s GPIF smart beta allocations goes to GIVI (Global Intrinsic Value Index). The GIVI is designed to capture low volatility and value anomalies. Also retail investors particularly within the aging population, who need a combination of income, downside protection and capital growth, tend to select smart beta ETFs over traditional passive funds.

- MSCI Japan Min Vol has yielded a total return of 5.4% p.a. vs benchmark of 1.4% p.a., while MXAPJ Min Vol has yielded 10.9% p.a. vs benchmark of 6.3% p.a. since 2002.
- MSCI Japan Min Vol underperformed benchmark in 2003, 2005, 2009, and 2012. MXAPJ Min Vols has underperformed its benchmark in 2003, 2006, 2007, and 2010. Underperformance in 2003, 2005, 2007 and 2009 was as much as -10% vs benchmarks.

Exhibit 11: “Low Vol” shows strong performance post the GFC in 2008

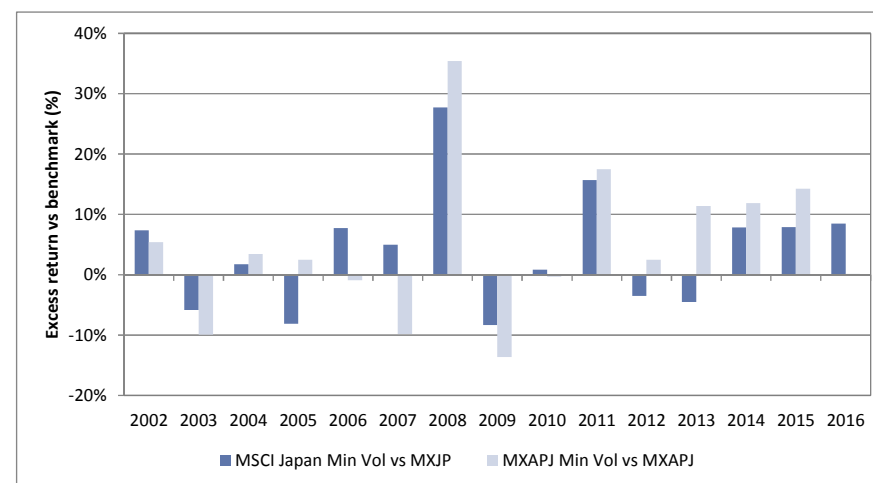
MSCI Minimum Volatility indices vs MSCI Japan and MXAPJ



Source: MSCI

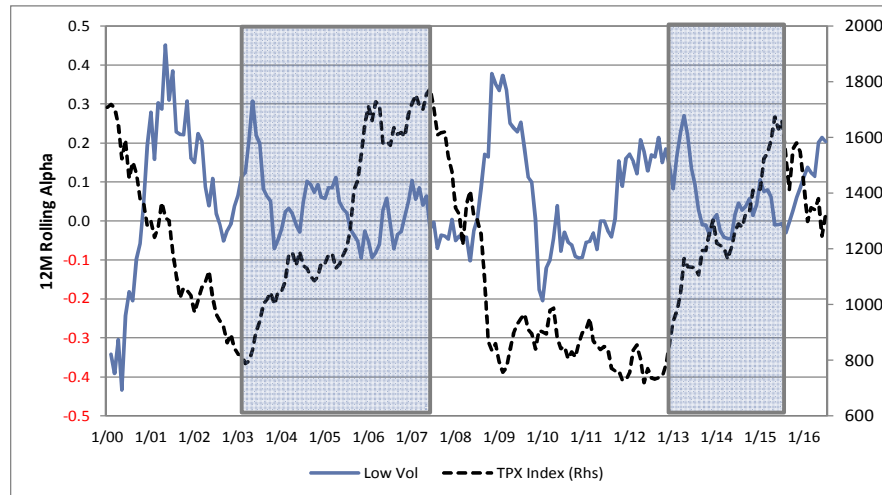
Exhibit 12: “Low Vol” has underperformed benchmarks by as much as 10% in a year

Yearly relative performance



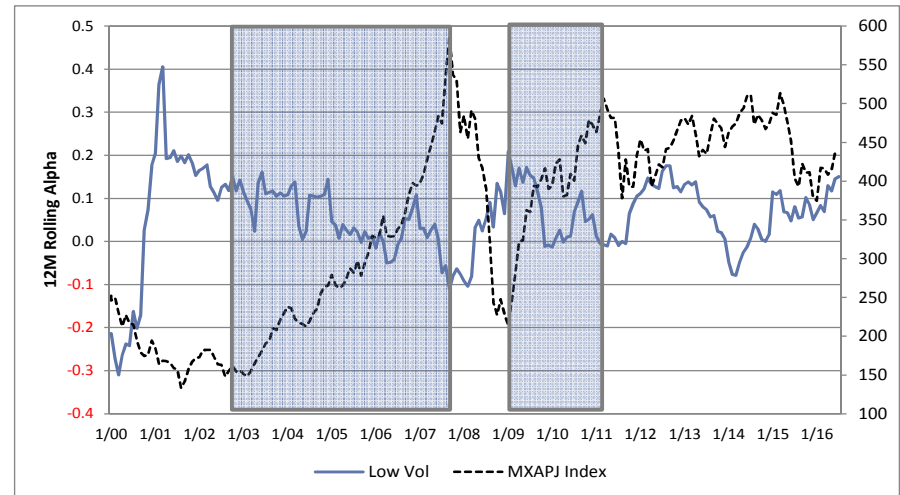
Source: MSCI

Exhibit 13: “Low Vol” underperformed during rallies in Japan
“Low Vol” strategy and TOPIX performance



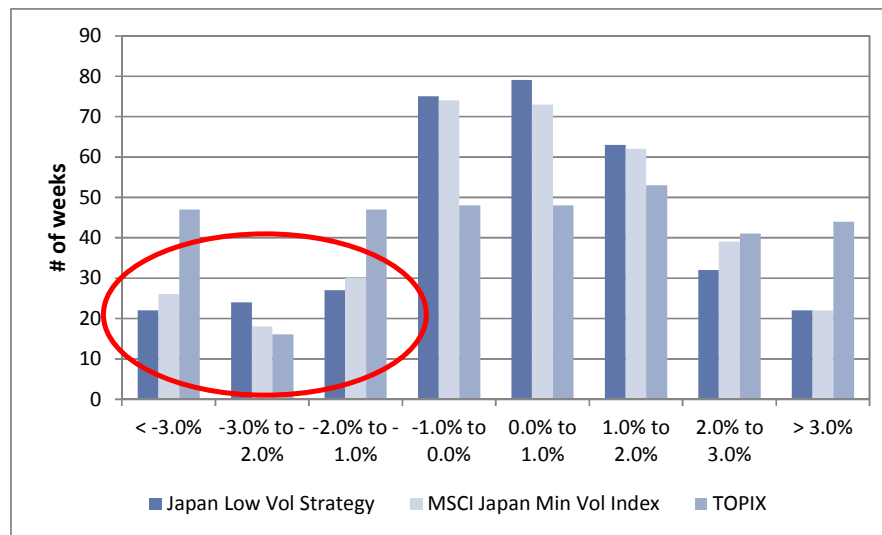
Source: Factset, Goldman Sachs Global Investment Research

Exhibit 14: In Asia Pacific too, “Low Vol” underperformed during rallies
Low Vol” strategy and MXAPJ performance



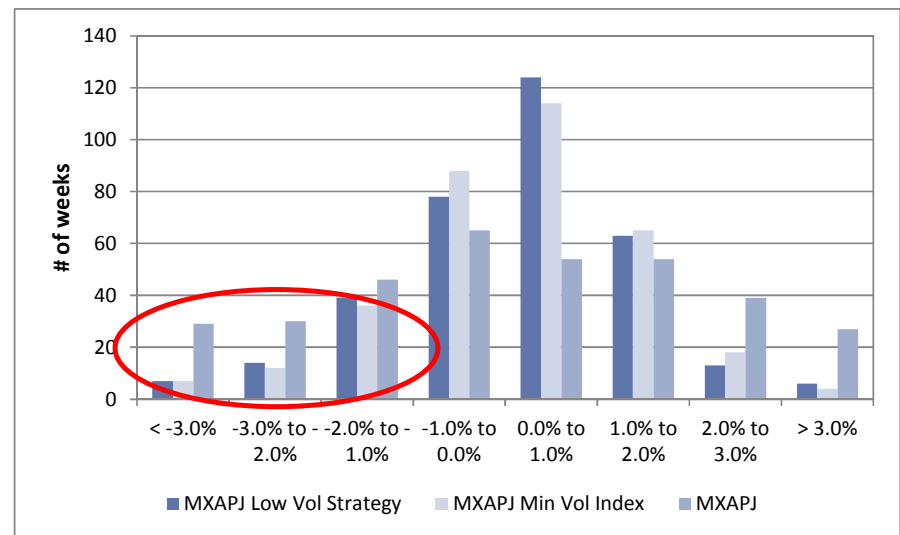
Source: Factset, Goldman Sachs Global Investment Research

Exhibit 15: “Low Vol” has as much drawdown as benchmark (TOPIX)
Distribution of weekly price return



Source: MSCI, Bloomberg, Goldman Sachs Global Investment Research

Exhibit 16: “Low Vol” strategies have much less drawdowns compared with BM in Asia Pacific ex-J
Distribution of weekly price return



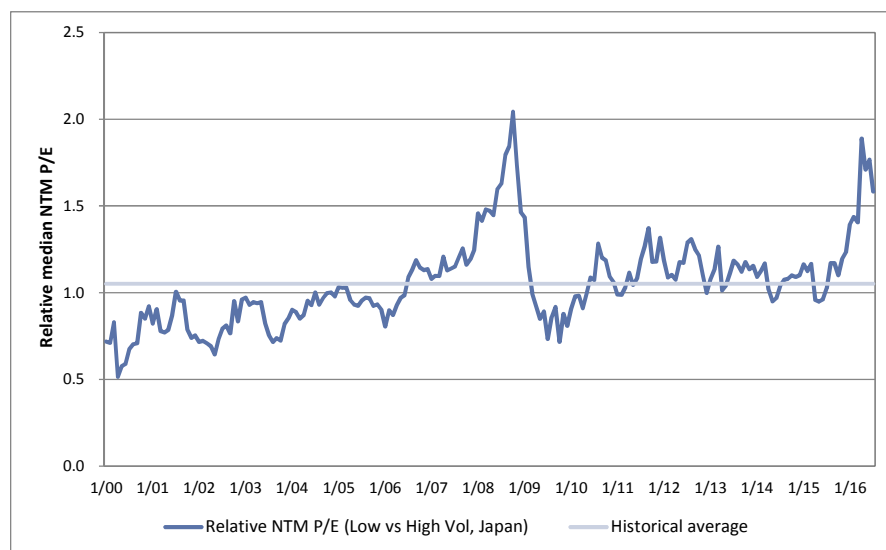
Source: MSCI, Bloomberg, Goldman Sachs Global Investment Research

Sharp rise in valuation premium could trigger a technical reversal

“Low Vol” strategy’s valuations tend to be more expensive than the market. Our “Low Vol” strategy is currently trading 2X above the “High Vol” strategy in Japan. This is the largest premium we have seen since 2008. Meanwhile in Asia Pacific ex-J, our “Low Vol” strategy is only trading 30% above the “High vol” strategy, and it is only 5% above the historical average since 2000. We continue to expect a low rate and low growth market which favor higher yielding defensive and domestic stocks. However, we also expect a short but vigorous technical reversal such as the one we saw in July should the premium continue to widen in Japan. We expect “Low Vol” strategy in Asia Pacific ex-J to continue its performance.

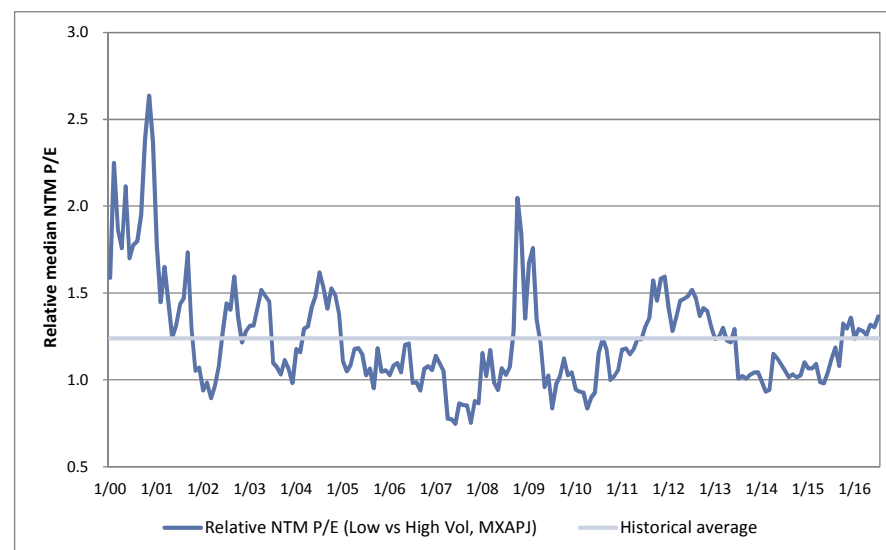
- Valuation of low volatility strategy has been on a rise since July 2015 in Japan, and reaching the highest point since 2008.
- Valuation contraction from September 2008 lasted for 9 to 10 months in Japan and Asia Pacific ex-J.
- In Asia Pacific ex-J, “Low Vol” strategy’s valuation premium is still 35% below recent high in 2008.

Exhibit 17: “Low Vol” stocks are trading close to peak in 2008
12M forward P/E of “Low Vol” and “High Vol” strategy in Japan



Source: Factset, Goldman Sachs Global Investment Research

Exhibit 18: “Low Vol” stocks are trading at historical average
12M forward P/E of “Low Vol” and “High Vol” strategy in Asia Pacific ex-J



Source: Factset, Goldman Sachs Global Investment Research

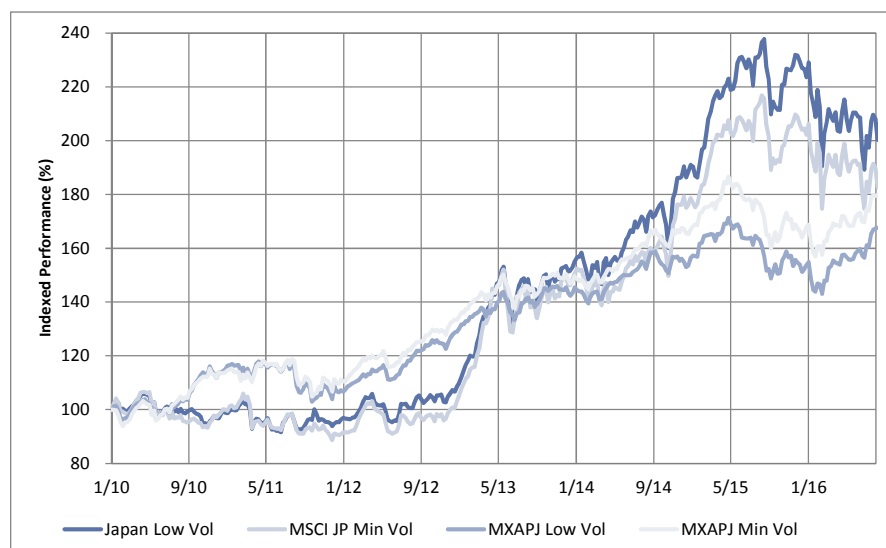
Not all are created equal, but many “Low Vols” stocks tend to correlate to each other

“Low Vol” type of strategies tends to perform similarly even though portfolio construction methods and holdings may differ. By construction and nature of the strategy, “Low Vol” stocks tend to be correlated among themselves. Therefore “Low Vol” strategies tend to face sharp drawdowns when there is a strong reversal.

Different construction methods exist for “Low Vol” strategies, but performance tends to have high correlation

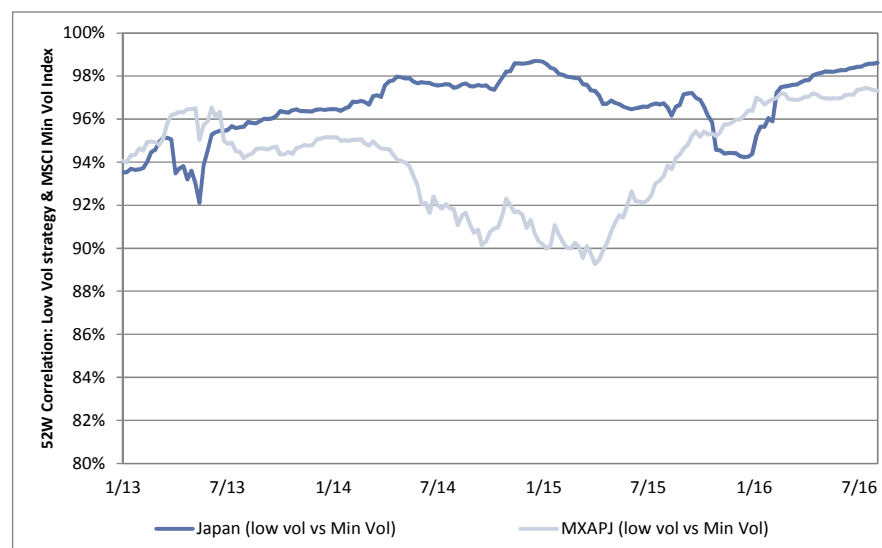
“Low Vol” strategies have two main construction methods, 1) simple factor portfolio approach and 2) optimization model approach. Quite obviously not all “Low Vol” strategies hold the same stocks. A simple “Low Vol” strategy selects stocks based on realized stock price volatility, and allocates more weights to stocks with lower volatility. On the other hand, indices such as MSCI Minimum Volatility index family, builds an index using a risk optimizer and aims to build a portfolio with the lowest forecast volatility. The former tend to be more concentrated in terms of sectors than the optimized approach. The latter tend to construct stocks that offer greatest diversification as a portfolio as well. This means the stocks in the portfolio tend to have less correlation to the benchmark. Having low correlation to the index means stocks with large stock-specific factors, and perhaps more importantly stocks less influenced by macro factors. Possessing stocks that are highly correlated in a portfolio is a double-edged sword. The negative side is that a significant sell-off of a few “Low Vol” stocks could cause ripple effects and trigger subsequently bigger selling due to high stock-to-stock correlation. With high correlation among “Low Vol” types of strategies, it could also have a split-over effect to similar strategies such as minimum volatility. This can be a problem for short-term investors with any “Low Vol” exposure as those funds tend to have a tighter risk constraint for drawdowns, and they may be forced to unwind positions.

Exhibit 19: Low Vol and Min Vol perform similarly
Indexed price performance of low vol and min vol strategies



Source: MSCI, Factset, Goldman Sachs Global Investment Research

Exhibit 20: “Low Vol” strategies are correlated
Rolling 52W correlation



Source: Goldman Sachs Global Investment Research

Large sector skew is a problem, but it changes over time

“Low Vol” tends to have large sector skew. Consumer staples, Healthcare and Industrials are the largest sectors in Japan currently and they account for 63% of total (of the strategy) compared with 35% in MXJP. In MXAPJ Telecom, IT and Financials account for 70% compared with 60% in MXAPJ. However sector weights could vary significantly over time.

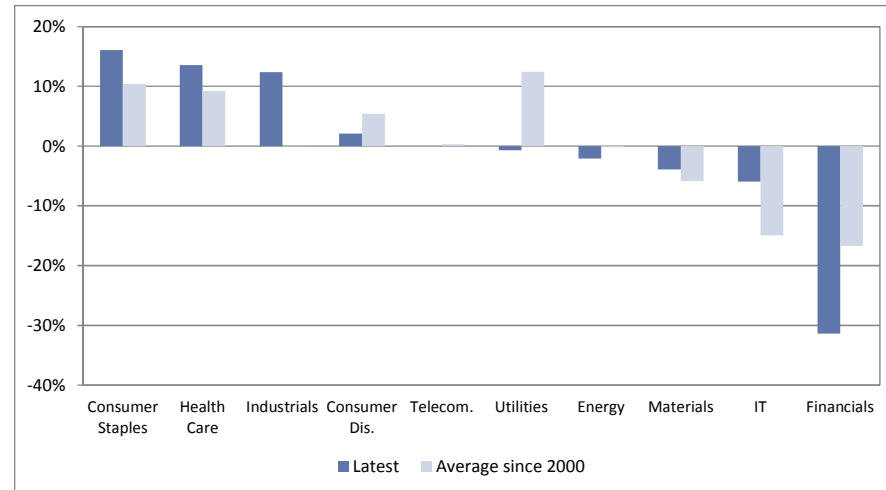
We have previously explored the idea of “Low Vol” from an idiosyncratic risk perspective. We covered the “Low Vol” anomaly where stocks with low idiosyncratic volatility outperformed TOPIX⁵. In the report, we highlighted that the strategy can have a large sector bias. Our Australian strategy team has also looked at the “Low Vol” strategy in “Are Minimum Volatility ETFs making ‘safe’ stocks risky? (June 20, 2016). Our simple “Low Vol” sector allocation varied significantly over time. Our “Low Vol” strategy had Utilities on average 30% prior to the Tohoku earthquake in Japan, but currently it is less than 5%. In Asia Pacific ex-J, we observe a larger swing. We had more financials stocks and less IT stocks in the “Low Vol” strategy in the past making significant difference in weights between low vol and high vol strategies (Exhibit 10).

- Many stocks from Consumer staples, Healthcare and Industrials sectors are assigned to “Low Vol” in Japan, totaling 63% of the portfolio vs 35% in MXJP.
- In Asia Pacific ex-J, Telecom, IT and Financials stocks are “Low Vol” totaling 70% of the portfolio compared with 60% in MXAPJ.
- Sector weights can vary significantly, what’s low vol today may not be tomorrow.
- Consumer staples and Healthcare sectors have increased by 10 and 7 percentage points respectively since the GFC in Japan.
- Financials weight halved over the past 2 years in Asia Pacific ex-J, meanwhile telecom and IT sectors have doubled.

⁵ Japan Quantitative Strategy, “Idiosyncratic risk for stock-pickers’ market ahead”, November 10, 2011.

Exhibit 21: “Low Vol” overweighs Consumer Staples, Healthcare and Industrials, well above the historical average in Japan...

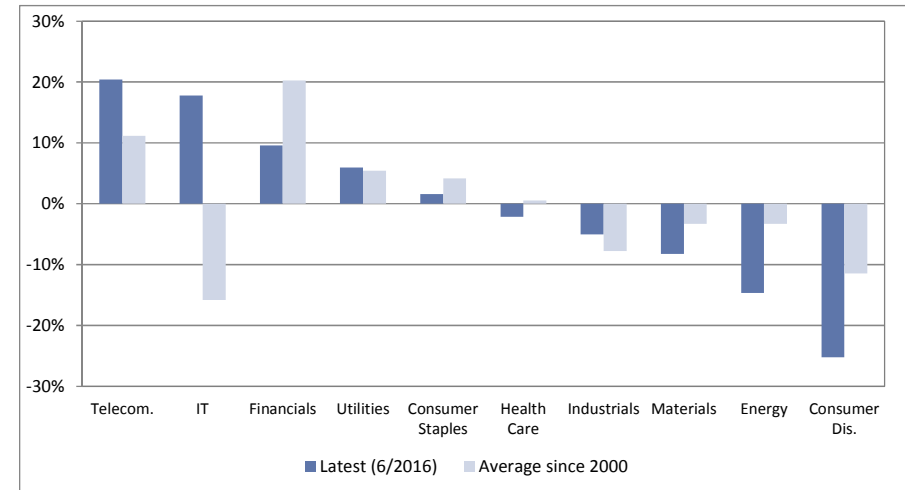
Weights difference between low vol and high vol strategy, latest=7/2016



Source: Goldman Sachs Global Investment Research.

Exhibit 22: “Low vol” overweighs Telecom, IT and Financials underweights Consumer discretionary, Energy, and Materials

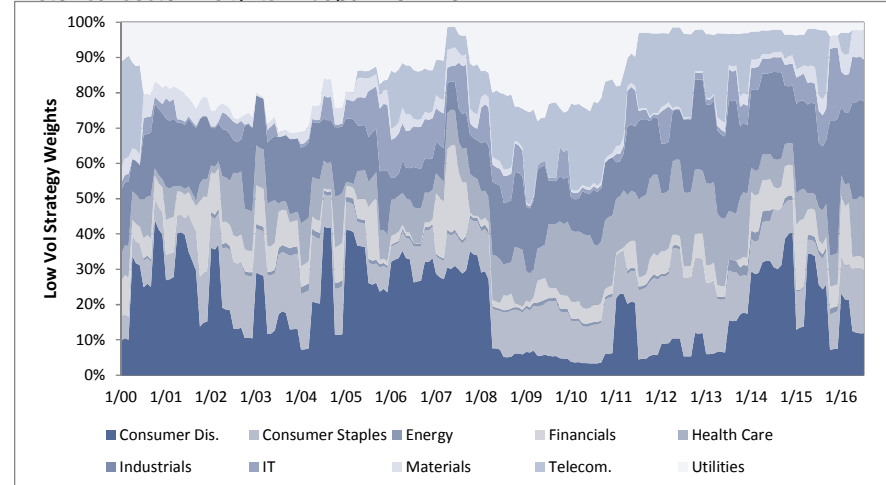
Weights difference between low vol and high vol strategy, latest=7/2016



Source: Goldman Sachs Global Investment Research.

Exhibit 23: Utilities and Consumer discretionary used to be the main “Low Vol” stocks, but changed over time.

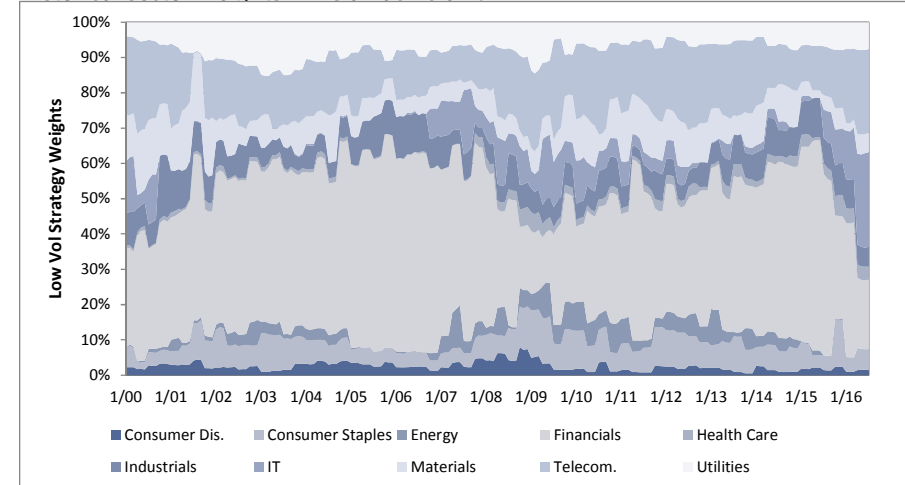
Historical sector weights in Japan Low Vol



Source: Goldman Sachs Global Investment Research.

Exhibit 24: Telecom and IT stocks are the major “Low Vol” stocks in Asia Pacific ex-J

Historical sector weights in Asia Pacific ex-J



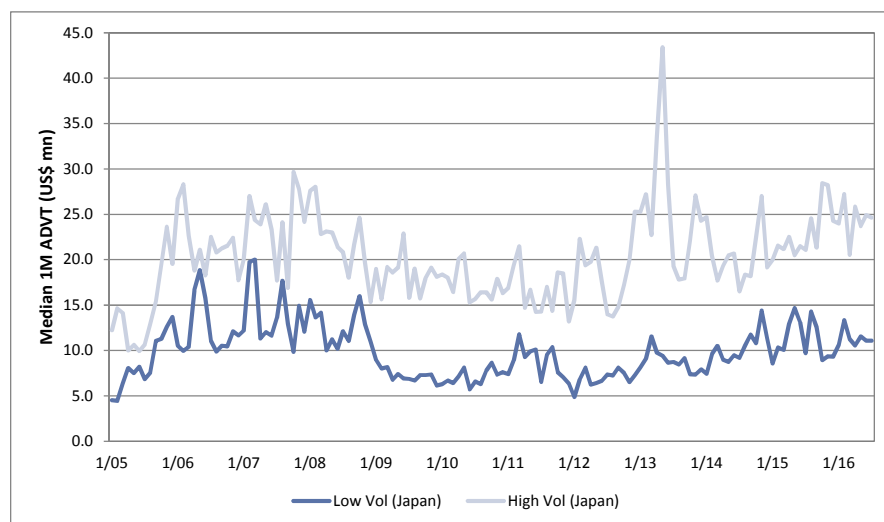
Historical sector weights in Asia Pacific ex-J

Liquidity and turnover are the key measures for crowding. We see risk in Japanese “Low Vol”

We see liquidity is a bigger problem in Japanese “Low Vol” strategy. Japanese “Low Vol” stocks trades only half of values defined by average daily value traded compared with stocks in the “High Vol” strategy. We also see a significant decline in portfolio turnover for both “Low” and “High” vol strategies in Japan. This indicates that stocks in both strategies remain in the same strategy. This also implies that stocks are likely to be crowded. This is one of the reasons why drawdown of “Low Vol” strategy tends to be larger in Japan. Meanwhile in Asia Pacific ex-J, our “Low Vol” trades as much as the “High Vol” strategy. We also see no sign of crowding in terms of portfolio turnover for “Low” or “High” vol strategies in Asia Pacific ex-J.

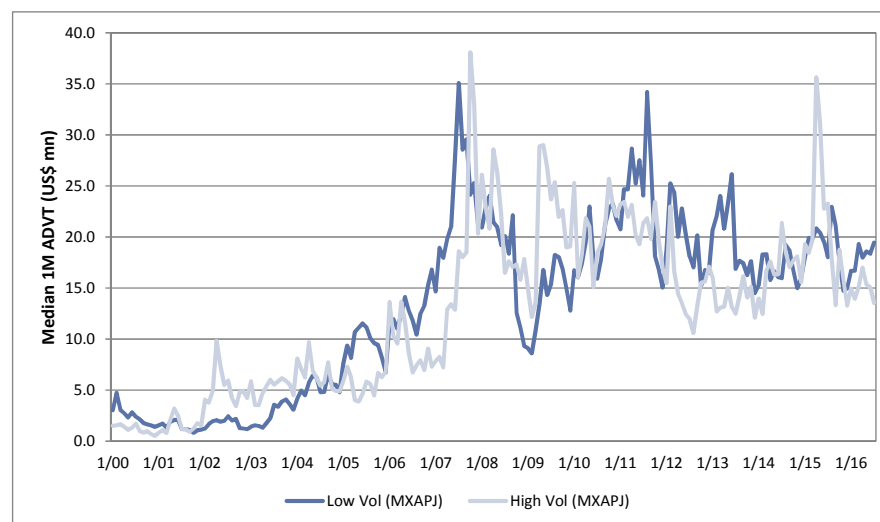
- Liquidity of Japanese “Low Vol” stocks is half of “High Vol” stocks.
- Portfolio turnover of Japanese “Low Vol” strategy has been on decline, indicating high concentration in low and high vol stocks.
- “Low Vol” stocks in Asia Pacific ex-J trade as much as “High Vol” stocks.
- We see no significant pick up or decline in portfolio turnover for “High/Low Vol” strategies in Asia Pacific ex-J.

Exhibit 25: “Low Vol” stocks trade significantly less than “High Vol” stocks
Median ADVT



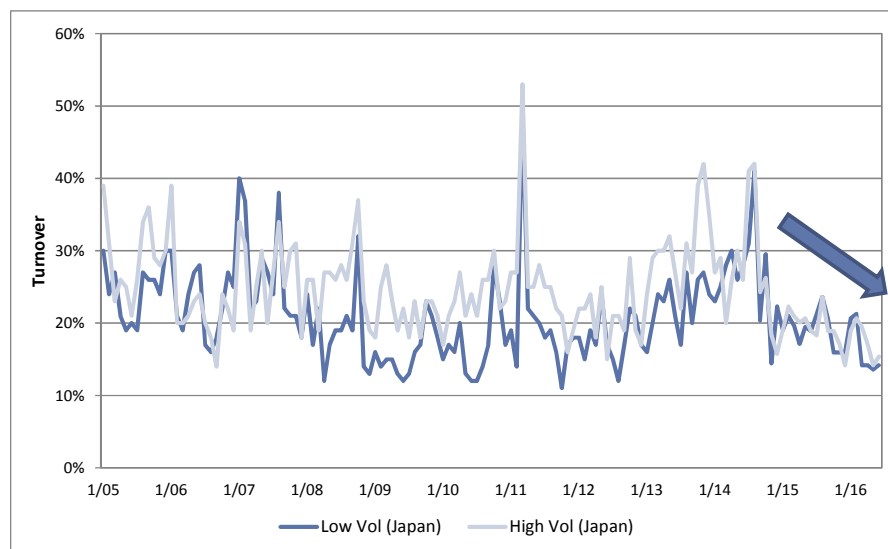
Source: Factset, Goldman Sachs Global Investment Research

Exhibit 26: No significant difference in liquidity in Asia Pacific ex-J
Median ADVT



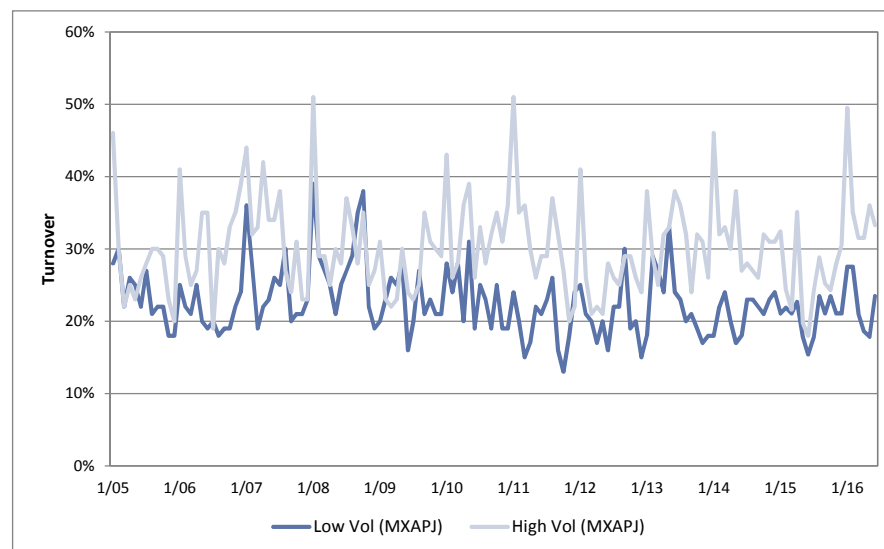
Source: Factset, Goldman Sachs Global Investment Research

Exhibit 27: Lowering turnover indicates crowding
Monthly rebalanced low and high vol strategy in Japan



Source: Factset, Goldman Sachs Global Investment Research

Exhibit 28: Turnover has been stable in low vol, pick up in high vol
Monthly rebalanced low and high vol strategy in Asia Pacific ex-J



Source: Factset, Goldman Sachs Global Investment Research

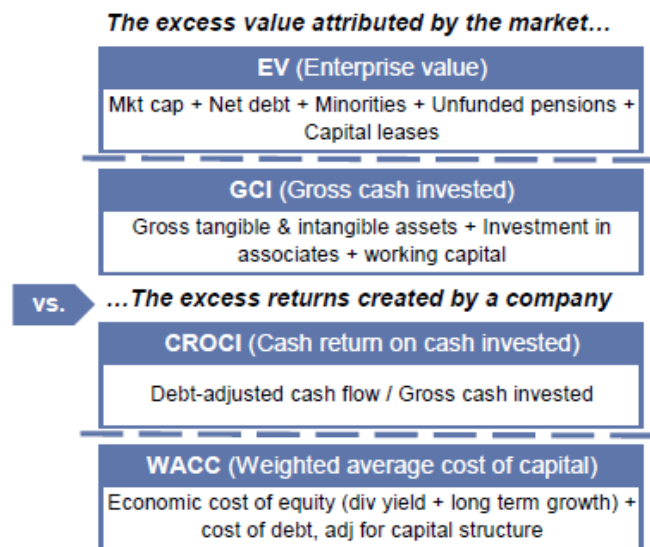
Appendix: Director's Cut

This is referenced from Asia: Introducing Director's Cut by Tactical Research Group⁶.

Director's Cut focuses on the key drivers of valuation and performance across the market using a cash returns-based valuation methodology. Focusing on cash rather than earnings eliminates in effect most of the distortions caused by different accounting techniques and captures the major financial elements of a company's performance.

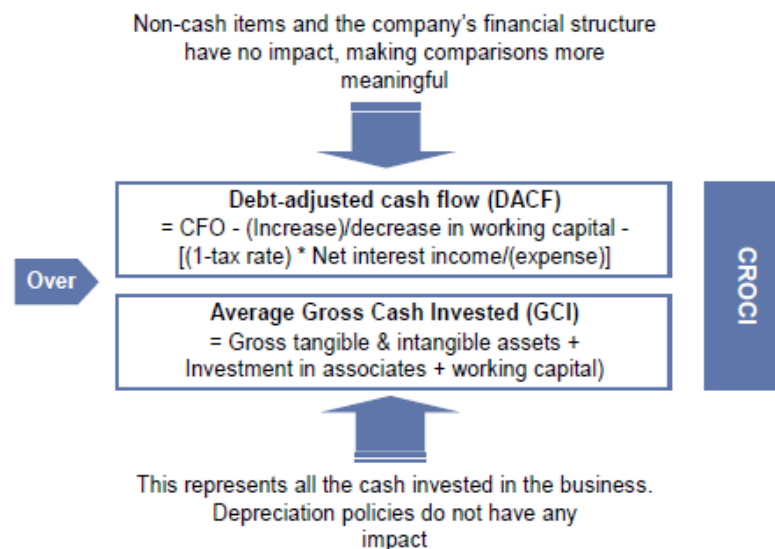
Director's Cut includes the following components in the equation: (1) the amount of cash invested in the business (GCI) – independent of depreciation and amortization policies; (2) economic return on cash invested (CROCI) – adjusted for exceptional and non-cash items as well as the company's financial structure; (3) capital structure; and (4) cost of capital. **The Director's Cut framework compares the market valuation of gross cash invested (EV/GCI) with the excess value created (CROCI/WACC).**

The Director's Cut methodology: Comparing the excess value attributed by the market and the excess value created by a company



Source: Goldman Sachs Global Investment Research.

By focusing on cash rather than earnings, CROCI is less distorted by accounting techniques



Source: Goldman Sachs Global Investment Research.

⁶ Tactical Research: Asia: Introducing Director's Cut – Returns matter more than growth – August 7, 2009

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Disclosure Appendix

Reg AC

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Goldman Sachs Investment Research global Equity coverage universe

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