The Many Faces of Japanese Style Portfolios

Introduction

The Japanese say you have three faces. The first face, you show to the world. The second face, you show to your close friends and family. The third face, you never show anyone. It is the truest reflection of who you are. The process of constructing a factor portfolio takes you through all three faces in reverse until you find the one you can show to the world.

In this second paper[1] in a series looking at portfolio construction methodologies for designing style factor portfolios in the Asia-Pacific region, we focus on the Japanese market. We construct three active, long-only factor portfolios on the following five style factors from our Japan fundamental medium horizon risk model (AXJP4 – MH): Dividend Yield, Momentum, Growth, Profitability, and Value. We then compare each variant to both the raw factor returns from our model (which are derived from a long-short, dollar-neutral factor mimicking portfolio (FMP) on the model's estimation universe), and a long-only variant of that FMP optimized against our investment universe, the FTSE Japan All Caps[2] index ("the benchmark").

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[1] The first paper, "An Aussie Sense of Style" can be found here.
[2] The reason for doing this is that the raw factor returns are estimated from factor mimicking portfolios constructed off the model's estimation universe which may differ from our investment universe.

We first reconstruct a long-short, dollar-neutral FMP based on our investment universe. This is our '*third face*' portfolio and we do not present it to the world[3]. It is built only for the purpose of creating our '*second face*' portfolio. We then take the same strategy but impose a long-only constraint to construct our long-only FMP portfolio (LO-FMP) which we show close friends and family, in order to compare it with our three active variants below and select a '*first face*' portfolio, to show to the world.

The three active strategies are long-only and fully invested, with the objective of maximizing active exposure to the target style factor subject to a 3% tracking error target relative to our benchmark, which doubles as our investable universe. Portfolios are rebalanced monthly, at month-end, from December 30th 2016 through to December 31st 2017. There are no constraints other than those mentioned below to differentiate between our three active strategies. With no liquidity or turnover constraints, these portfolios are also not always investable, but in this way, we avoid the issues of path dependency.

The three version of our Active Style portfolios will differ along these sets of constraints:

- The "Unconstrained" variant, as the name suggests, does not constrain non-target styles or industries, thereby allowing the optimizer to maximize the exposure to the target style factor by going long or short other styles or industries as it sees fit, subject to the Active Risk budget.
- The "No Style" variant constrains active exposure to all non-target style factors, but does not constrain industry exposures.
- The "No Style/No Ind." variant constrains active exposures to both non-target styles as well as industries.

We run a daily factor-based performance attribution[4] using Axioma's Portfolio Analytics on each variant of the five style factor portfolios, go through an analysis of the impact of constraints on their ability to capture as much of the target style factor premium as possible and discuss the costs implicit with their respective set of constraints.

As a side note on the No Style and the No Style / No Ind. variants, because we are constraining the factor block of the model so much, the strategies may end up with the majority of the risk budget showing up as specific risk/return. Although not desirable in a factor portfolio, this is inevitable by construction and we draw the reader's attention to the white paper "Turning Negative into Nothing: An explanation of adjusted factor-based performance attribution" by our research team[5] for further insights into why that is and what can be done about it.

In the interest of space (and editorial design), we present the exact same set of tables and charts for each of the five style portfolios mentioned above, number each one in the same order, and collate them under five respective appendices at the end of the document. In our analysis I will refer to the appendix name and chart number when citing values (e.g. "see Momentum - Figure 1"). All figures are sourced from Axioma unless specifically stated.

Each table and chart in the appendixes will include the following strategies as well as the target factor return for each: (note that the Budget Constraint means "fully invested")

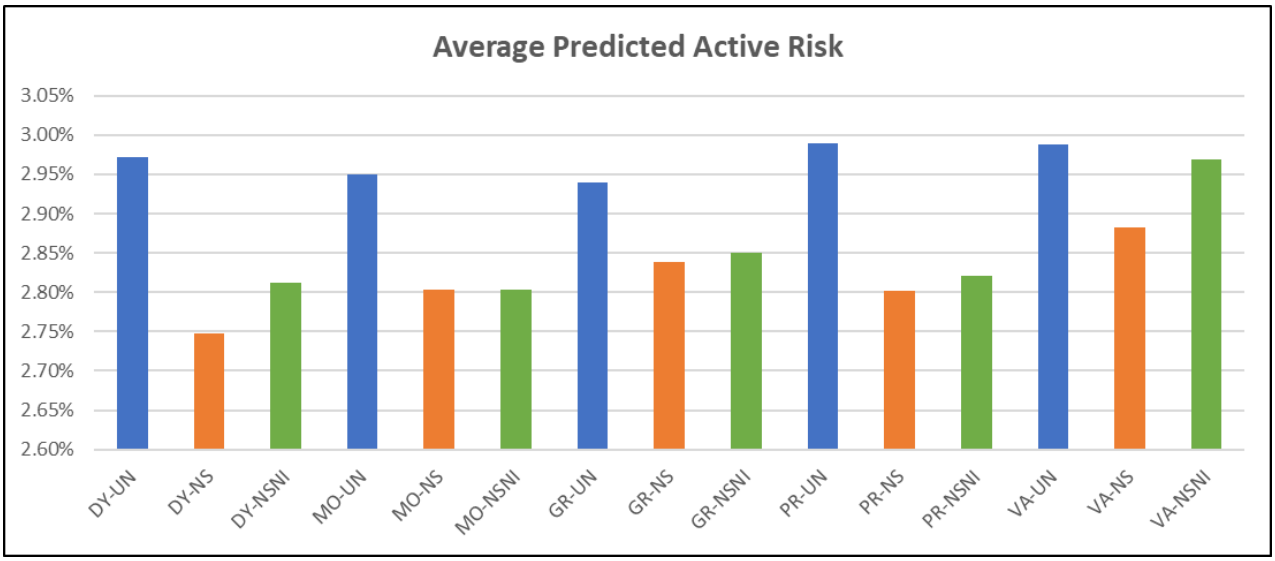
[3] Note that these FMPs are available in our model data files, but they are not represented as investible portfolio.
[4] Note that returns are before any transactions costs.
[5] This paper can be found here.

Strategy Name	Objective Function	Constraints	Inv. Universe
Target Factor	N/A	N/A	AXJP4-MH
LO-FMP (-LO)	Min TE to FMP	Budget	FTSE Japan All Caps
Unconstrained (-UN)	Max Exp. To Target Factor	3% TE, Budget	FTSE Japan All Caps
No Style (-NS)	Max Exp. To Target Factor	3% TE, Budget,Style	FTSE Japan All Caps
No Style/No Ind (-NSNI)	Max Exp. To Target Factor	3% TE, Budget,Style,Industry	FTSE Japan All Caps

Note that the LO-FMP strategy does not have an explicit active risk constraint. It is optimized against the LS-FMP as benchmark with an objective to minimize tracking error. The Active Risk reported in Figure 5 in each appendix is the active risk of the optimal solution tracking the LS-FMP portfolio, to the benchmark, for comparability purposes with the other strategies.

Summary of Findings

In each of the style factors in this study, the Unconstrained strategy consistently delivered the highest exposure to our target factor. Letting the optimizer do what it does best, without constraining it, also gave us the highest contribution to active risk from the Style factor block and limited the contribution from specific risk by holding more names in the portfolio and being more diversified. Additionally, in terms of risk budgeting, the Unconstrained portfolios maximized our ex-ante risk budget the most, with a predicted active risk closest to our 3% target in each of the cases (see chart below). It should be noted that 2017 saw a very (by historical standards) low volatility environment during which it was difficult to hit your active risk target. Add to that the fact that we are specifically targeting fundamental style factors which tend to be less volatile that their more technical counterparts (i.e. Volatility, Momentum, Size, etc.), and it is easy to understand why none of the strategies reached their full risk budget. Momentum came the closest and was in fact over the 3% budget on a realized basis during some of the months.



Note: The Unconstrained variants are in blue. On the X-axis, the first two letters represent the first two letters of the Style factor and the rest of the letters are abbreviations of the variant (e.g. MO-UN means Momentum factor, Unconstrained variant, etc.)

Despite being unconstrained and taking on more active risk than its counterparts, the Unconstrained variant was also the most diversified in terms of the number of names held in the portfolio across all our strategies (see table below).

# of Stocks	No Style	No Style/No Ind.	Unconstrained
Dividend Yield (DY-)	90	71	96
Growth (GR-)	73	69	107
Momentum (MO-)	125	125	158
Profitability (PR-)	81	68	111
Value (VA-)	90	71	194

Value

By construction, each of the four strategies has an additional constraint from the previous one targeting a specific segment of the factor covariance matrix used in the optimization. It is therefore not surprising to see that as the number of systematic constraints increases, the contribution to active risk of the Style factors decreases, and in turn, the contribution from stock specific risk increases. Value – Figure 1 shows how sensitive to constraints the Value style premium can be, namely they pushed a lot of the risk budget into stock specific risk. Style risk went from being 67% of the risk budget in the LO-FMP strategy, and 61% in the Unconstrained, to 32% in the No Style, dropping to just 12% in the No Style / No Ind. one. All in favour of specific risk.

As with momentum, constraints did not hamper the optimizer's ability to gain exposure to the value factor. The performance attribution table in Value – Figure 5 shows the No Style / No Ind. Variant with the lowest exposure to Value, still at a healthy 0.68. Both the Unconstrained and the No Style variant achieved exposures above 1.0! Both variants leveraged the factor covariance matrix by making large directional bets on factors negatively correlated to each other. Unfortunately for them, this leverage did not pay off in terms of performance and they experience a larger drawdown than either the No Style / No Ind. Variant (unable to bet on non-target factors), or the LO-FMP. Additionally, it would seem that these large active bets were more risk-minimizing in nature as neither reached the full risk budget of 3% - the No Style / No Ind. Variant did.

As with the Momentum strategies, there was broad agreement between the No Style and Unconstrained strategies when it comes to sector allocation, with the only disagreement being with Consumer Staples, and IT. Value – figure 3 shows both strategies with a large over-weight in Finance, and an under-weight in Industrials and Consumer Discretionary. Overall, both were under-weight cyclical sectors and over-weight defensive ones (in sharp contrast to the Momentum strategies).

Interestingly, Value in Japan had a negative year (relative to the norm) in 2017, and despite a positive performance in Q3, ended the year in negative territory. All variants captured a similar factor return from their Value exposure, but large negative specific returns, and very different industry returns meant that all variants had active returns that were much less positively correlated with their target factor than their Momentum peers (see Value – Figure 6). So, while constraints did not translate in a low Value factor exposure, they did translate into very different portfolios. The unconstrained variant was able to

turn a negative Value return into a positive overall Style return by also taking large underweight positions in Size, Profitability, Liquidity, and Leverage.

In summary, when it comes to harvesting Value in Japan, don't be greedy. While a less constrained strategy might give you higher target-factor exposure, it will come at a large performance cost as the methodology adds noise to the portfolio. A more constrained strategy will yield sufficient target-factor exposure and more accurately mimic its returns. Value favours the humble.

Dividend Yield

Dividend Yield has had a strong and consistent upward trend in Japan, especially since the BOJ's move to negative interest rates in early 2016. In 2017 alone, that factor premium '*yielded*'[6] 210 bps of return to investors. It was therefore a profitable tilt to have in your active strategy. All of our Dividend Yield strategy variants were able to get a strong exposure to the factor despite the long-only constraint, but again, all saw that return erased by sharply negative stock specific returns. Sector bets, of which they were really only three (see below), also detracted from return (see Dividend Yield – Figure 5).

In terms of sector allocation, besides a small disagreement on Energy stocks, the two strategies with sector bets were consistent and had the same three dominant bets. An over-weight on Finance and IT, and an under-weight on Industrials. As with Profitability, in aggregate the small sector allocation differences resulted in a large difference of opinion along economic themes. The Unconstrained variant was mildly bearish about Defensive sectors and mildly warm to Cyclical ones, while the No Style variant had a strong opinion that Dividend Yield was to be found in the Defensive sectors and away from the Cyclical ones, taking large active bets in both directions. Sadly, neither paid off (see Dividend Yield – Figure 2 & 3).

All strategy variants did a good job tracking the factor return during most of the year, but this positive relationship turned sharply negative in Q4. For the full year, the No Style variant had the strongest relationship to the target factor with a positive correlation of 0.43. Overall, all three of our active variants had pretty similar returns with correlations ranging from 0.59 to 0.78 but all deviated strongly from Dividend Yield and the benchmark after September (see Dividend Yield – Figure 4 & 6).

2017 was a bull market year for Japan, and Dividend Yield strategies, because of their negative exposure to Growth, Volatility, and Momentum, tend to underperform in up-markets. We see all these contributing negatively to the Unconstrained variant's active returns in 2017. Additionally, the large bet on Finance and against Industrials, at a time when the market was betting on strong economic recovery, hurt both variants without any sector constraints.

In summary, constraints do not seem to hurt a strategy's ability to gain exposure to the Dividend Yield factor and they may prevent some of the non-target systematic bets a blind search for this premium might entail. Dividend Yield is an income strategy and not a market timing one, so it will probably benefit from being as market sensitivity neutral as possible. A compromise might be to lower the active risk budget to ensure that the optimal portfolio does not deviate from the benchmark too much and protects the investors against cyclical market moves.

[6] Pun intended

Profitability

Profitability has never been a strong contender in Japan where margins have historically been razor-thin. In 2017, however, the Profitability factor ended the year in positive territory, thanks to a strong second half (see Profitability – Figure 4). It's significance in a risk model is one of the lowest in terms of explanatory power, and as we've seen in these back-tests, despite being able to load quite significantly on this factor (see Profitability – Figure 5), all variants of our Profitability factor portfolios had more than 50% of their active risk explained by Stock Specific sources. The Style factor block's contribution to active risk ranged from a high of 45% for the LO-FMP strategy, to just 12% in the No Style / No Ind. one (see Profitability – Figure 1). Interestingly, Profitability – Figure 2 shows that with the exception of the No Style / No Ind. Variant, all other strategies had their active returns driven by their Style returns and had de minimis stock specific returns.

In terms of Sector allocation, while there were only three sectors (Finance, Telecom, and Utilities) on which the Unconstrained and the No Style strategies (the only two with Sector bets), had opposite views, in aggregate their conviction on the other sectors differed enough to result in opposite thematic views on where profitability is to be found. The Unconstrained variant was (very) under-weight Defensive sectors and over-weight Cyclical ones, while the No Style variant took the opposite view (see Profitability – Figure 3). Judging by their performance attribution in Profitability – Figure 5, the Unconstrained variant was more handsomely rewarded for its convictions than the No Style one.

Profitability – Figures 4 & 6 show that without taking industry bets, it is hard to match the target factor return with a long-only constraint. The No Style / No Ind. variant's returns have no correlation to the Profitability factor returns, meanwhile the three strategies which allow sector bets (LO-FMP, Unconstrained, and No Style) all have above .90 correlation to each other, and between 0.65 to 0.85 correlation with the Profitability factor.

None of the Profitability strategy variants were able to reach their active risk budget despite very high target-factor loadings. The Unconstrained again came the closest by being able to complement its sector thematic bets with positive exposures to Dividend Yield, Earnings Yield, Growth, and negative exposures to Value and Size.

In summary, getting exposure to the profitability factor in Japan is not hard, even with a long-only constraint, but one has to reinforce this bet with some sector allocations in order to track the target factor. Not much separates the Unconstrained from the No Style variants, but not being able to support the conviction on Profitability with other style exposures (albeit much smaller in strength) will mean more significant sector bets which may detract from active returns. Perhaps a good compromise would be to relax the constraint on non-target styles to -0.2-to-+0.2 instead of zero. Profitability favours the balanced mind.

Growth

Much like Profitability, Growth has not been a winning factor bet in the last two decades in Japan. Not so in 2017. In fact, Growth outperformed Value, the market's darling for the past 20 plus years! Here again the long-only constraint did not seem to impact our ability to gain a large exposure to the Growth factor; even the No Style / No Ind. variant managed to get a 0.81 exposure (see Growth – Figure 5). But, as we have seen with other fundamental style factors like Profitability, and Value (to some extent), these have a weaker explanatory power than some of the technical factors like Momentum, Volatility, and Size. Stock specific risk contributed between 54% for the Unconstrained variant to 84% for the No Style / No Ind. one, while aggregate Style risk varied between 38% to a low of 16% respectively (see Growth – Figure 1).

The bet on Growth was reinforced with an almost unanimous bet on Sectors (IT was the exception), and economic theme with both strategies choosing to under-weight Defensive sectors and over-weight cyclical ones (see Growth – Figure 3). While the bet on Growth paid off, in accordance with the factor return, the bets on sectors detracted slightly form active return, but the big killer for all strategies was a strongly negative stock specific return. So, although Growth had a positive performance in Japan in 2017, none of our strategy variants ended the year in positive territory. The one that came the closest was the LO-FMP which was on track until the end of November. Ironically, the core benchmark had a 0.84 correlation with the Growth factor, while all other variants had a weak relationship with the target factor, with the Unconstrained variant clocking a strongly negative relationship with a correlation of -0.68 to the Growth factor (see Growth – Figure 6).

The blame for this lack of representation cannot be laid on the Long-only constraint, for the LO-FMP portfolio had a positive correlation of 0.67 to the Growth factor. Instead we have to blame stock specific risk. The LO-FMP portfolio had far less stock specific risk than our three active strategies and as such suffered far less detraction from its Growth style factor bet than the others. The Unconstrained variant once again held the most number of names in its portfolio but still suffered the most negative contribution to active return from stock specific return, so this does not seem to be a problem one can diversify away.

In summary, exposure to Growth is not (much) impacted by the long-only constraint. When constraints are added, however, they drive stock selection towards individual companies with large stock specific returns which can be very negative at times (e.g. 2017). Perhaps a good compromise is to use an Unconstrained strategy with regards to factors, but add a reasonably tight asset bound constraint to prevent the optimizer from taking on too much stock specific risk. Alternatively, one could target specific risk directly in the objective function by limiting its maximum contribution to total active risk.

Momentum

In the case of our Momentum strategy, Style risk was 73% of the active risk budget in the LO-FMP strategy, 61% in the Unconstrained strategy, 49% in the No Style strategy, and 41% in the No Style/No Ind. strategy. Conversely, specific risk as a percentage of active risk increased from 25%, to 30%, to 37%, and to 59% respectively (see Momentum – Figure 1).

The performance attribution in Momentum – Figure 5 shows that in terms of target factor exposure, all strategies were able to achieve a very healthy amount. The LO-FMP strategy's average exposure to the Momentum style factor during 2017 was 0.85 versus a 1.0 for a pure L/S FMP. So, the cost of the long-only constraint can be said to have been 15 bps of target factor exposure. The unconstrained variant achieved the highest exposure (0.92) to Momentum by being able to *go short* Exchange Rate Sensitivity, Growth, Size, and Value, while *going long* Volatility, Earnings Yield, and Leverage. By contrast, the No Style variant took larger industry factor bets but was still '*only*' able to reach an exposure to Momentum of 0.80. The No Style/No Ind. variant could only achieve an exposure of 0.71, being denied the opportunity to use either styles or industry bets. Overall, it would seem that getting exposure to Momentum in Japan is not particularly impacted by the long-only constraint.

Momentum – Figure 3 contrasts the sector allocations between the only two variants allowed to use sector bets to gain momentum exposure. The only disagreement between the Unconstrained and No Style strategies at the sector level was on the Industrials and Utilities sector. The Unconstrained variant had a slight under-weight in both and the No Style variant a slight over-weight. In terms of economic theme, both agreed that the best way to harvest Momentum in 2017 was by sharply under-weighing Defensive sectors and over-weighing Cyclical ones.

The momentum risk premium performed well in Japan throughout 2017 (contrary to the norm), and all four variants handsomely outperformed the core benchmark with most of the outperformance being driven by their active momentum exposure (see Momentum – Figures 2 & 4). The unconstrained variant, having the highest exposure to momentum, outperformed the most by far. The LO-FMP strategy came in second, followed by the No Style, and the No Style / No Ind. Variants. In line with their Momentum exposure rankings.

Momentum – Figure 6 shows the correlation of daily returns of all four variants with each other as well as with the momentum factor return and the benchmark. All variants have returns that are quite similar to each other, the momentum factor, and the benchmark. Interestingly, the No Style / No Ind. Variant, which is given the least leeway to deviate from the benchmark, has the lowest correlation to benchmark returns. In contrast, of the three active variants, the Unconstrained one has returns that are the most positively correlated with the benchmark despite having the highest active risk (ex-ante & ex-post).

In summary, when it comes to capturing the momentum risk premium in Japan, investors can target both factor exposure and factor purity together at very minimal cost. If maximizing the performance of the strategy based on Momentum's expected return is the goal, then an Unconstrained portfolio construction gives you the most leverage to achieve that goal.

Conclusion

When it comes to constructing factor portfolios, like any other portfolio really, designers need to decide upfront on their investment goal, and understand the implications of various portfolio construction methodologies (i.e. constraints) on their ability to reach them. Typical goals include maximizing target factor exposure, or maximizing target factor purity in the portfolio, or maximizing out-performance over a core (or representative style) benchmark in the case of a directional investment strategy. Constraints used in the portfolio construction process will often put these goals at odds with one another and a compromise will need to be made. But before this decision can be taken, and explained to investors, it must be understood.

Depending on the factor premium you are targeting, the optimizer may need to be kept on a tight leash, or set free to do what it does best. This cannot be known a-priori and will depend on the nature of each factor premium. Starting from the 'third face' long-short factor-mimicking portfolio, gradually add constraints as you build your 'second face' portfolios to ensure you select the right 'first face' portfolio to show the world. Identify and analyze the impact of each additional constraint on the next 'face' and ensure you have constructed a portfolio that conforms to your investment goals and investor's expectations.

In an upcoming paper we will put our three active variants on all five style factors through a series of historical and factor stress tests to better understand the downside risk implications of each portfolio construction methodology. Are all three variants affected similarly by the same stress situation, or is one measurably different in how it is being affected? Now that we know which one performed best in a back-test, can we confirm this choice in a stress situation? Does one methodology bring more or less downside risk than the others, or are they pretty much all the same when it comes to stress events? Now that I've shown my face to the world, can I avoid a loss?

Value Appendix

Figure 1 – Percent of Active Risk

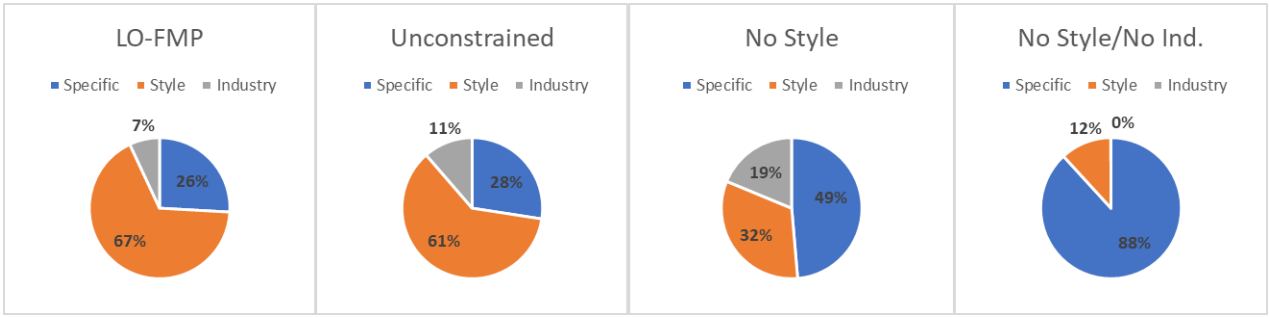


Figure 2 –Active Return

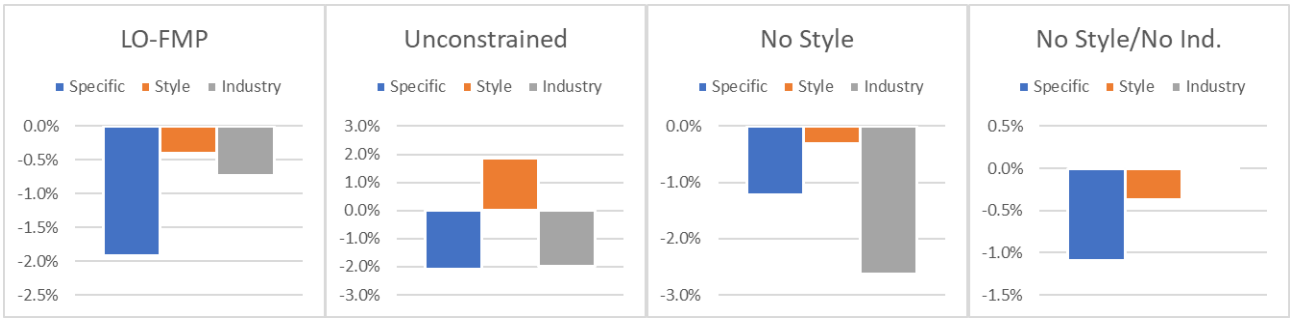


Figure 3 – Sector Allocation

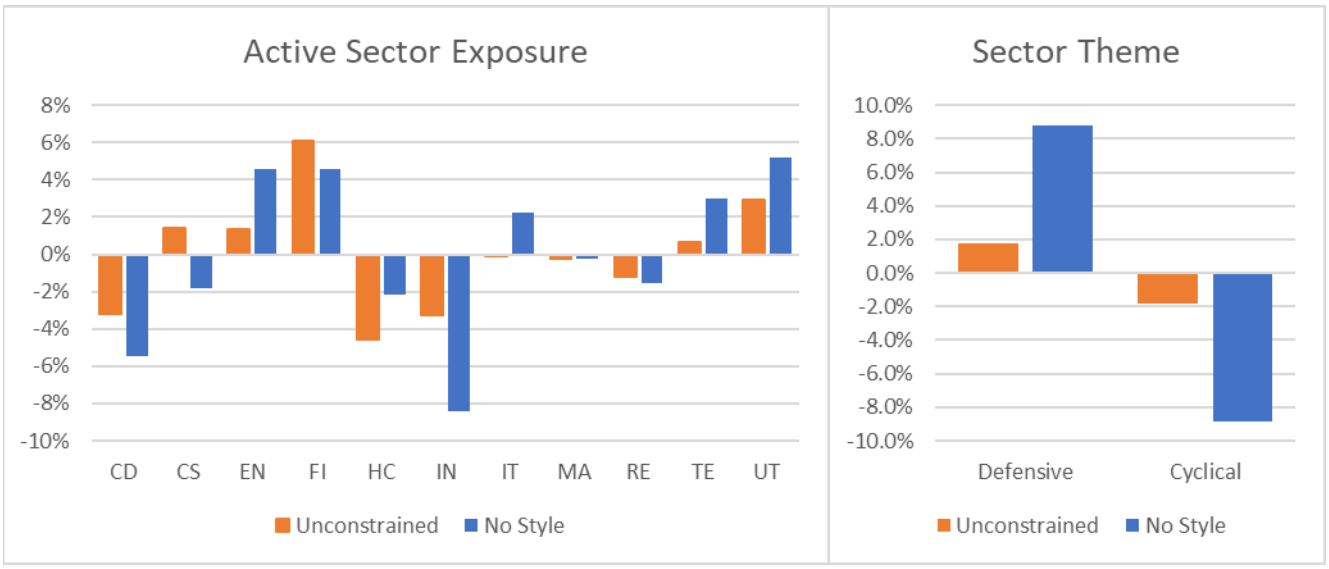


Figure 4 – Cumulative Active Returns

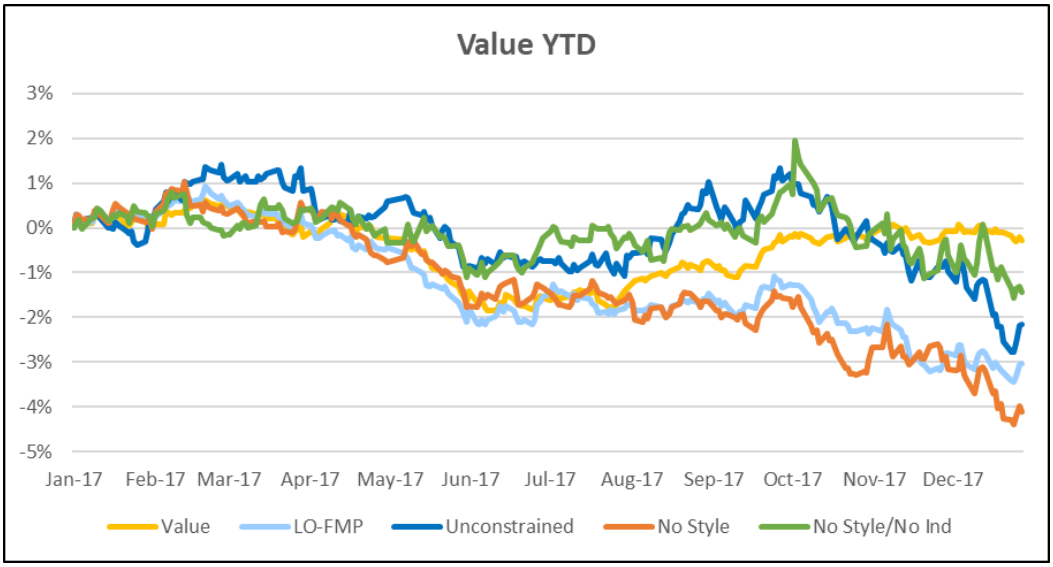


Figure 5 – Performance Attribution

	LO-FMP			Unconstrained			No Style			No Style/No Ind.		
Source of Return	**Risk**	**Exposure**	**Return**	**Risk**	**Exposure**	**Return**	**Risk**	**Exposure**	**Return**	**Risk**	**Exposure**	**Return**
Portfolio	11.33%		18.94%	11.06%		19.82%	11.01%		17.85%	11.02%		20.54%
Benchmark	10.95%		21.97%	10.95%		21.97%	10.95%		21.97%	10.95%		21.97%
Active	**1.82%**		**-3.03%**	**2.75%**		**-2.15%**	**2.25%**		**-4.12%**	**3.01%**		**-1.43%**
Specific Return	0.98%		-1.91%	1.64%		-2.07%	1.85%		-1.21%	2.81%		-1.10%
Factor Contribution	1.76%		-1.12%	2.44%		-0.08%	1.78%		-2.91%	1.02%		-0.33%
Style	**1.57%**		**-0.40%**	**2.46%**		**1.87%**	**1.52%**		**-0.31%**	**1.03%**		**-0.37%**
Dividend Yield	0.07%	0.07	0.19%	0.07%	-0.03	-0.06%	0.01%	0.00	-0.01%	0.02%	0.01	0.00%
Earnings Yield	0.04%	0.02	0.07%	0.10%	0.06	0.14%	0.03%	0.00	0.03%	0.03%	-0.01	0.01%
Exchange Rate Sensitivity	0.14%	-0.11	-0.09%	0.04%	-0.02	-0.02%	0.01%	0.00	0.02%	0.01%	0.00	0.02%
Growth	0.17%	-0.13	-0.15%	0.19%	-0.15	-0.14%	0.06%	-0.02	-0.12%	0.04%	-0.01	-0.09%
Leverage	0.05%	0.04	-0.02%	0.28%	-0.26	-0.01%	0.01%	0.00	0.01%	0.01%	0.00	0.00%
Liquidity	0.24%	-0.12	0.06%	0.62%	-0.31	0.10%	0.03%	0.00	0.01%	0.06%	0.01	-0.06%
Market Sensitivity	0.20%	0.08	-0.02%	0.28%	-0.09	0.06%	0.04%	0.00	-0.03%	0.03%	0.00	-0.04%
Medium-Term Momentum	0.27%	-0.09	-0.43%	0.14%	0.00	0.01%	0.03%	0.00	-0.03%	0.04%	-0.01	-0.05%
MidCap	0.09%	-0.04	-0.01%	0.24%	-0.10	0.00%	0.02%	-0.01	0.01%	0.01%	0.00	0.00%
Profitability	0.20%	-0.15	-0.27%	0.49%	-0.38	-0.64%	0.03%	-0.01	0.00%	0.03%	0.00	0.01%
Size	0.40%	-0.09	0.56%	1.85%	-0.44	2.84%	0.01%	0.00	0.02%	0.02%	0.00	0.01%
Value	**1.35%**	**0.92**	**-0.13%**	**2.30%**	**1.56**	**-0.38%**	**1.51%**	**1.03**	**-0.22%**	**1.01%**	**0.68**	**-0.19%**
Volatility	0.16%	-0.05	-0.15%	0.07%	0.01	-0.02%	0.03%	0.00	0.00%	0.03%	0.00	0.01%
Sectors	**0.51%**		**-0.73%**	**1.06%**		**-1.98%**	**1.15%**		**-2.62%**	**0.06%**		**0.03%**

Figure 6 – Correlation matrix of daily returns

	Value	***LS-FMP***	***LO-FMP***	***Unconstrained***	***No Style***	***No Style/No Ind***
LS-FMP	0.25					
LO-FMP	0.49	0.65				
Unconstrained	0.43	0.86	0.75			
No Style	0.32	0.56	0.96	0.69		
No Style/No Ind	0.41	0.70	0.61	0.76	0.53	
FTSE Japan	-0.06	-0.55	-0.84	-0.58	-0.92	-0.41

Dividend Yield Appendix

Figure 1 – Percent of Active Risk

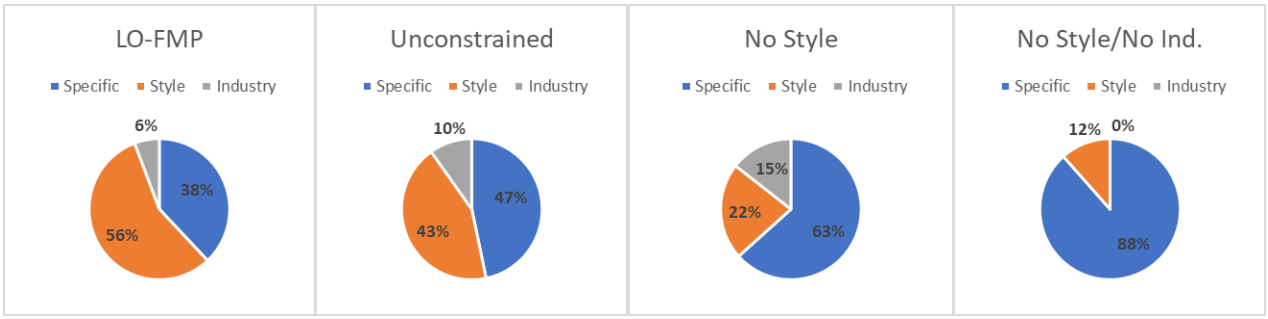


Figure 2 – Active Return

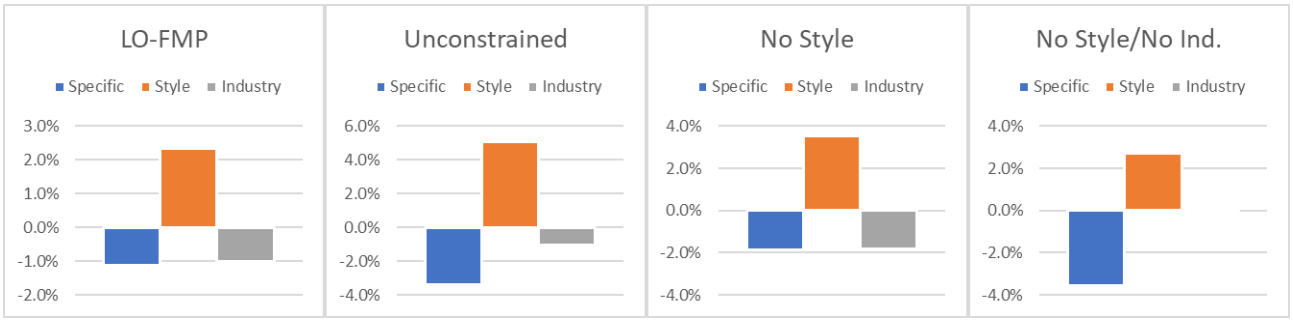


Figure 3 – Sector Allocation

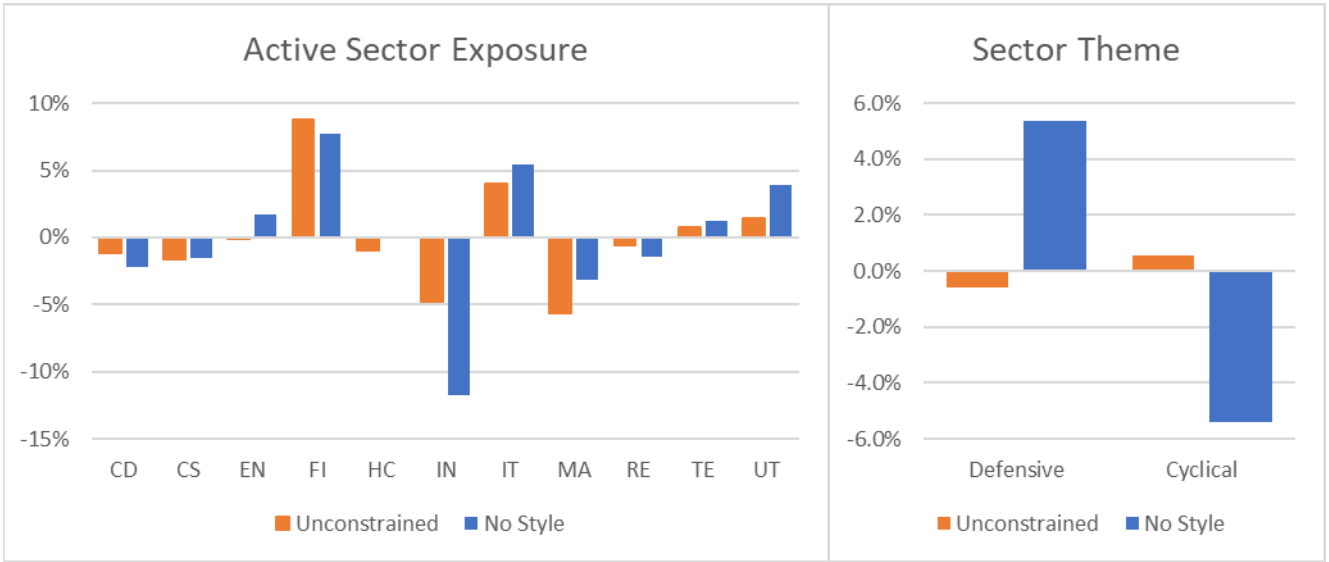


Figure 4 – Cumulative Active Returns

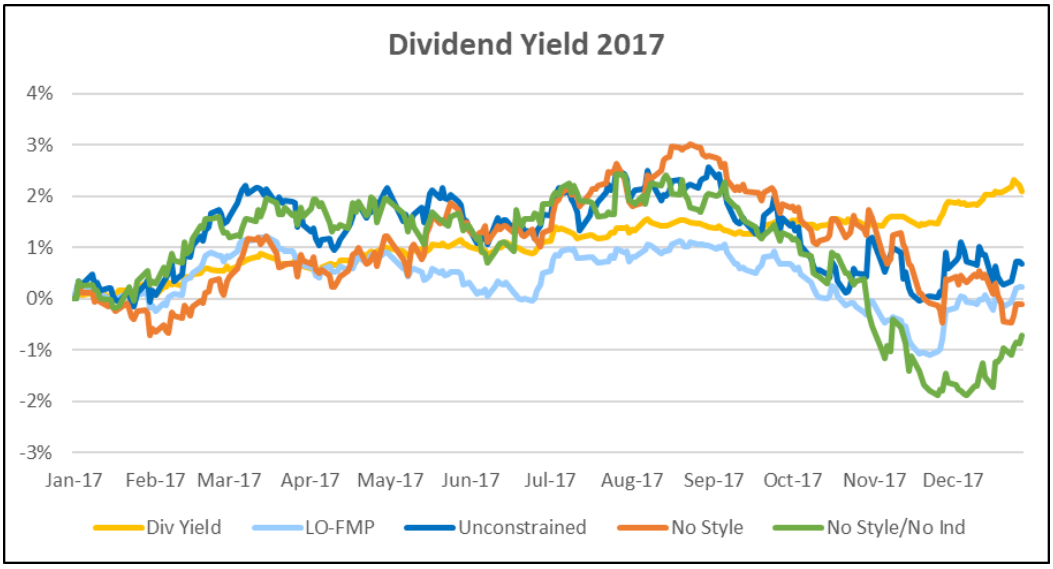


Figure 5 – Performance Attribution

	LO-FMP			Unconstrained			No Style			No Style/No Ind.		
Source of Return	**Risk**	**Exposure**	**Return**	**Risk**	**Exposure**	**Return**	**Risk**	**Exposure**	**Return**	**Risk**	**Exposure**	**Return**
Portfolio	10.83%		22.19%	10.28%		22.65%	10.72%		21.87%	10.88%		21.26%
Benchmark	10.95%		21.97%	10.95%		21.97%	10.95%		21.97%	10.95%		21.97%
Active	**1.60%**		**0.22%**	**2.95%**		**0.68%**	**2.73%**		**-0.11%**	**2.84%**		**-0.71%**
Specific Return	0.89%		-1.12%	1.97%		-3.39%	2.09%		-1.87%	2.65%		-3.58%
Factor Contribution	1.23%		1.35%	2.10%		4.07%	1.51%		1.77%	0.96%		2.86%
Style	**1.09%**		**2.34%**	**1.90%**		**5.10%**	**1.23%**		**3.56%**	**0.96%**		**2.72%**
Dividend Yield	**0.93%**	**1.05**	**2.67%**	**1.65%**	**1.87**	**4.69%**	**1.24%**	**1.41**	**3.55%**	**0.95%**	**1.08**	**2.72%**
Earnings Yield	0.10%	0.07	0.10%	0.28%	0.20	0.16%	0.01%	0.00	0.01%	0.01%	0.00	0.00%
Exchange Rate Sensitivity	0.09%	-0.07	-0.06%	0.05%	0.00	0.01%	0.01%	0.00	0.00%	0.01%	0.00	0.02%
Growth	0.12%	-0.10	-0.09%	0.27%	-0.22	-0.05%	0.02%	0.00	-0.02%	0.02%	-0.01	-0.01%
Leverage	0.02%	0.01	-0.01%	0.07%	-0.05	-0.01%	0.01%	0.00	-0.01%	0.01%	0.00	-0.01%
Liquidity	0.06%	-0.03	0.02%	0.08%	-0.02	0.01%	0.02%	0.00	-0.01%	0.01%	0.00	-0.01%
Market Sensitivity	0.06%	0.02	-0.05%	0.28%	-0.10	-0.02%	0.03%	0.00	0.01%	0.03%	0.00	0.00%
Medium-Term Momentum	0.22%	-0.08	-0.41%	0.29%	-0.12	-0.61%	0.05%	0.00	-0.03%	0.06%	0.00	-0.01%
MidCap	0.08%	-0.04	0.02%	0.34%	-0.15	0.06%	0.06%	-0.02	0.01%	0.01%	0.00	0.01%
Profitability	0.06%	-0.05	-0.08%	0.18%	0.12	0.23%	0.04%	0.01	0.01%	0.02%	0.00	0.00%
Size	0.34%	-0.08	0.45%	0.73%	-0.17	1.04%	0.02%	0.00	0.03%	0.02%	0.00	0.02%
Value	0.18%	0.12	-0.05%	0.16%	0.09	0.03%	0.01%	0.00	0.04%	0.01%	0.00	0.02%
Volatility	0.24%	-0.08	-0.16%	0.65%	-0.22	-0.44%	0.03%	0.00	-0.04%	0.03%	0.00	-0.03%
Sectors	**0.35%**		**-1.01%**	**0.90%**		**-1.05%**	**1.00%**		**-1.81%**	**0.03%**		**0.12%**

Figure 6 – Correlation matrix of daily returns

	Div Yield	***LS-FMP***	***LO-FMP***	***Unconstrained***	***No Style***	***No Style/No Ind***
LS-FMP	0.70					
LO-FMP	-0.11	0.49				
Unconstrained	0.14	0.63	0.86			
No Style	0.43	0.84	0.56	0.74		
No Style/No Ind	-0.29	0.36	0.84	0.78	0.59	
FTSE Japan	0.85	0.33	-0.53	-0.32	0.06	-0.67

Profitability Appendix

Figure 1 – Percent of Active Risk

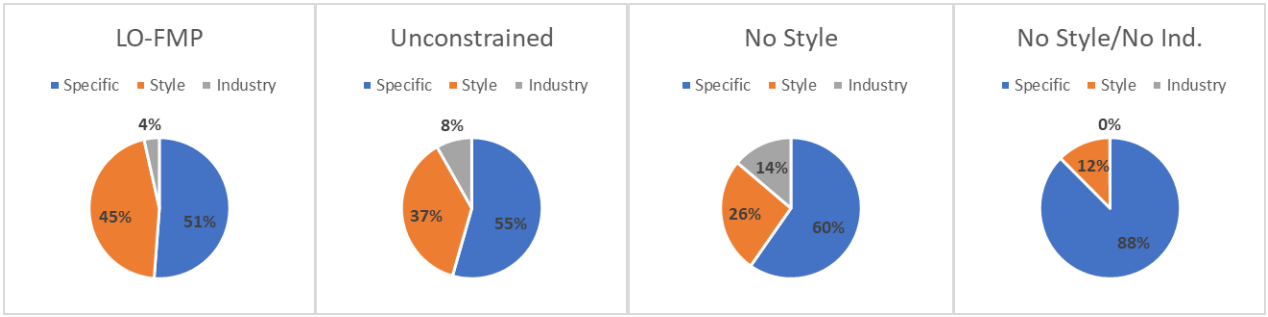


Figure 2 – Percent of Active Return

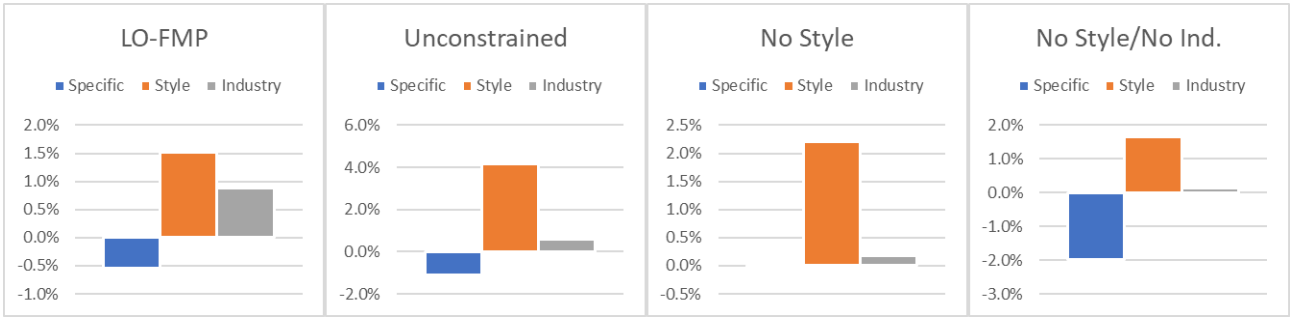


Figure 3 – Sector Allocation

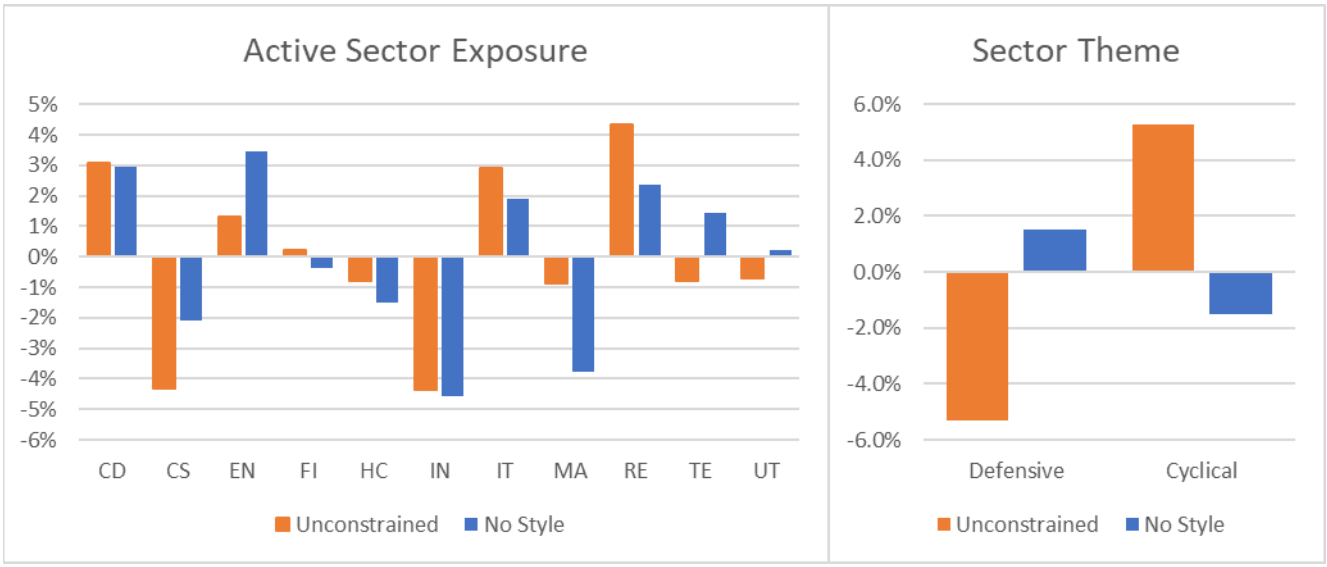


Figure 4 – Cumulative Active Returns

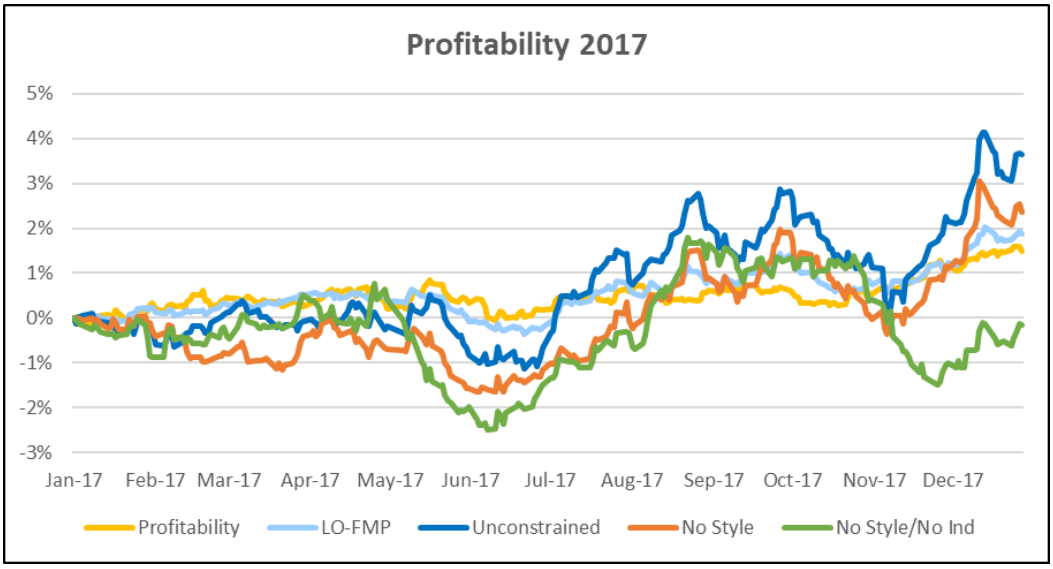


Figure 5 – Performance Attribution

	LO-FMP			Unconstrained			No Style			No Style/No Ind.		
Source of Return	**Risk**	**Exposure**	**Return**	**Risk**	**Exposure**	**Return**	**Risk**	**Exposure**	**Return**	**Risk**	**Exposure**	**Return**
Portfolio	10.75%		23.85%	10.77%		25.60%	10.86%		24.34%	11.19%		21.80%
Benchmark	10.95%		21.97%	10.95%		21.97%	10.95%		21.97%	10.95%		21.97%
Active	**1.19%**		**1.88%**	**2.73%**		**3.63%**	**2.47%**		**2.37%**	**2.65%**		**-0.17%**
Specific Return	1.03%		-0.54%	2.12%		-1.12%	2.12%		-0.02%	2.71%		-1.98%
Factor Contribution	0.98%		2.42%	1.91%		4.76%	1.67%		2.39%	1.02%		1.82%
Style	**0.96%**		**1.52%**	**1.76%**		**4.17%**	**1.41%**		**2.20%**	**1.02%**		**1.66%**
Dividend Yield	0.05%	-0.04	-0.06%	0.25%	0.26	0.71%	0.01%	0.00	-0.01%	0.02%	0.00	-0.01%
Earnings Yield	0.13%	-0.08	-0.11%	0.32%	0.21	0.27%	0.02%	0.00	0.01%	0.01%	0.00	-0.01%
Exchange Rate Sensitivity	0.05%	0.04	0.03%	0.04%	0.01	0.00%	0.02%	0.01	0.00%	0.01%	0.00	0.01%
Growth	0.06%	0.04	0.06%	0.24%	0.19	0.24%	0.02%	0.00	0.03%	0.02%	0.00	0.03%
Leverage	0.08%	-0.07	0.01%	0.11%	-0.09	0.10%	0.01%	0.00	-0.01%	0.01%	0.00	0.00%
Liquidity	0.04%	-0.02	0.02%	0.17%	0.08	-0.07%	0.01%	0.00	0.01%	0.02%	0.00	0.04%
Market Sensitivity	0.12%	-0.05	0.00%	0.12%	-0.03	-0.09%	0.06%	-0.02	0.02%	0.03%	0.00	0.02%
Medium-Term Momentum	0.07%	-0.02	-0.09%	0.28%	-0.11	-0.52%	0.06%	0.00	0.01%	0.03%	0.00	0.06%
MidCap	0.07%	-0.03	-0.02%	0.06%	-0.01	-0.05%	0.07%	-0.03	-0.01%	0.01%	0.00	0.00%
Profitability	**0.86%**	**0.68**	**1.25%**	**1.69%**	**1.32**	**2.46%**	**1.41%**	**1.11**	**2.06%**	**1.03%**	**0.80**	**1.47%**
Size	0.23%	-0.05	0.33%	0.59%	-0.14	0.74%	0.03%	0.00	0.03%	0.01%	0.00	0.03%
Value	0.06%	-0.04	0.07%	0.28%	-0.18	0.21%	0.01%	0.00	0.02%	0.01%	0.00	0.01%
Volatility	0.04%	0.01	0.03%	0.21%	0.05	0.17%	0.03%	0.01	0.03%	0.02%	0.00	0.01%
Sectors	**0.27%**		**0.88%**	**0.83%**		**0.57%**	**1.02%**		**0.17%**	**0.06%**		**0.14%**

Figure 6 – Correlation matrix of daily returns

	Profitability	***LS-FMP***	***LO-FMP***	***Unconstrained***	***No Style***	***No Style/No Ind***
LS-FMP	0.30					
LO-FMP	0.85	0.46				
Unconstrained	0.73	0.54	0.94			
No Style	0.65	0.36	0.90	0.94		
No Style/No Ind	0.04	0.33	0.44	0.51	0.56	
FTSE Japan	0.68	0.17	0.71	0.70	0.64	0.07

Growth Appendix

Figure 1 – Percent of Active Risk

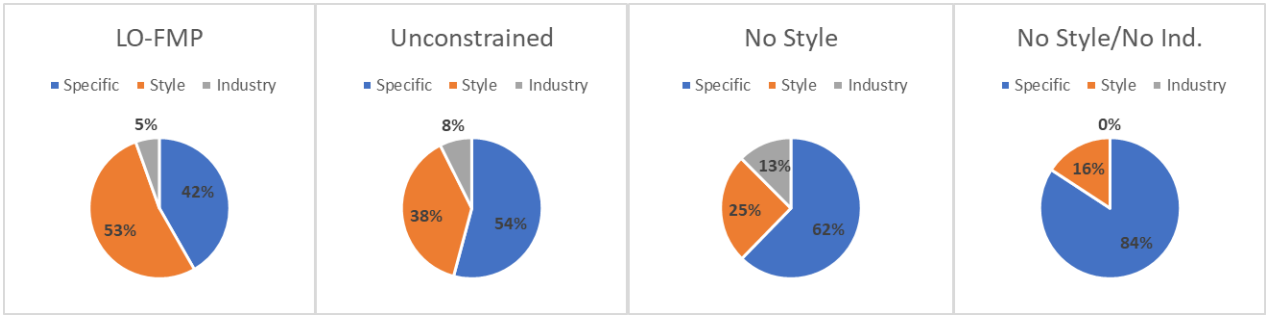


Figure 2 – Percent of Active Return

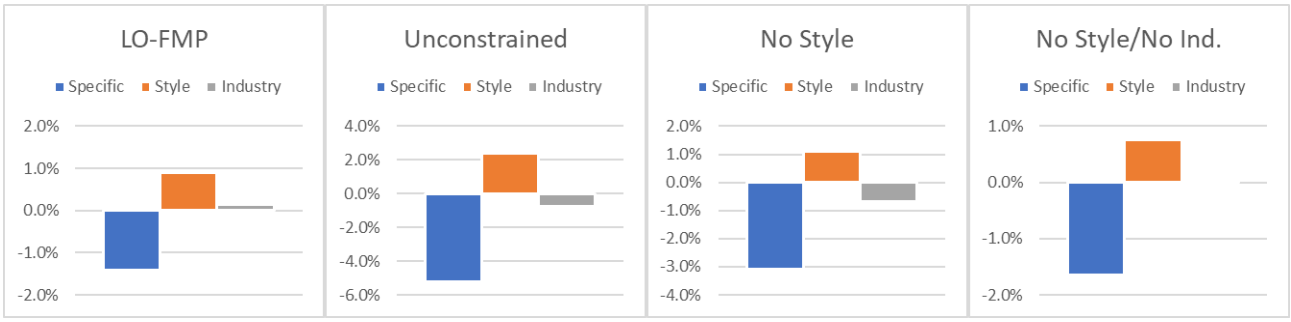


Figure 3 – Sector Allocation

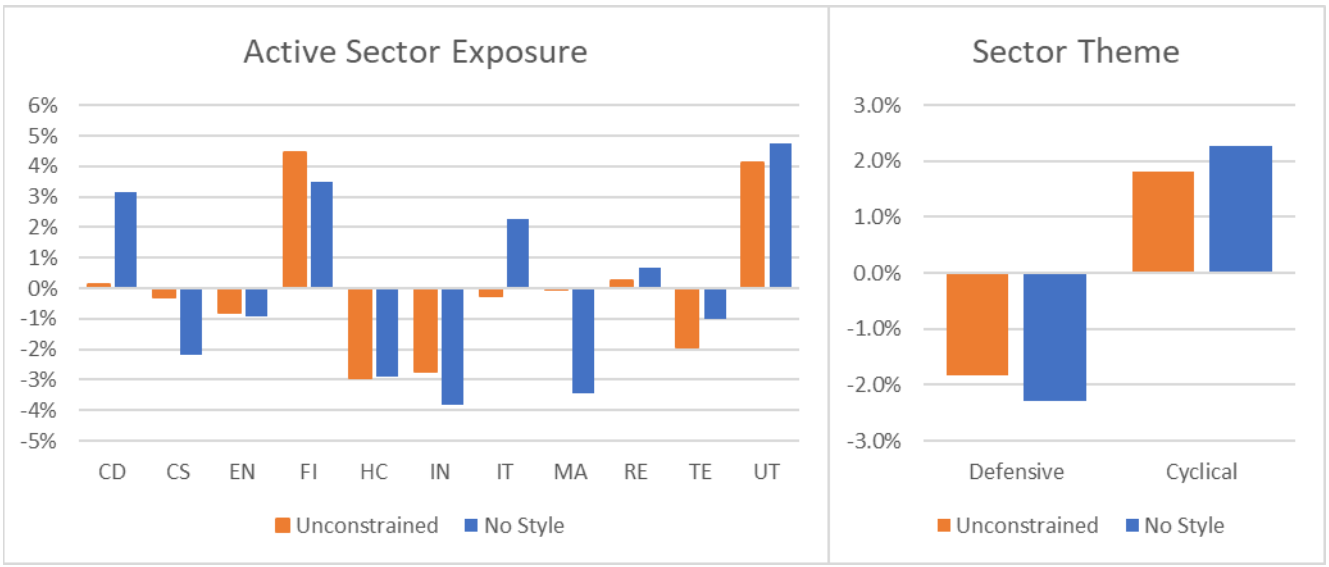


Figure 4 – Cumulative Active Returns

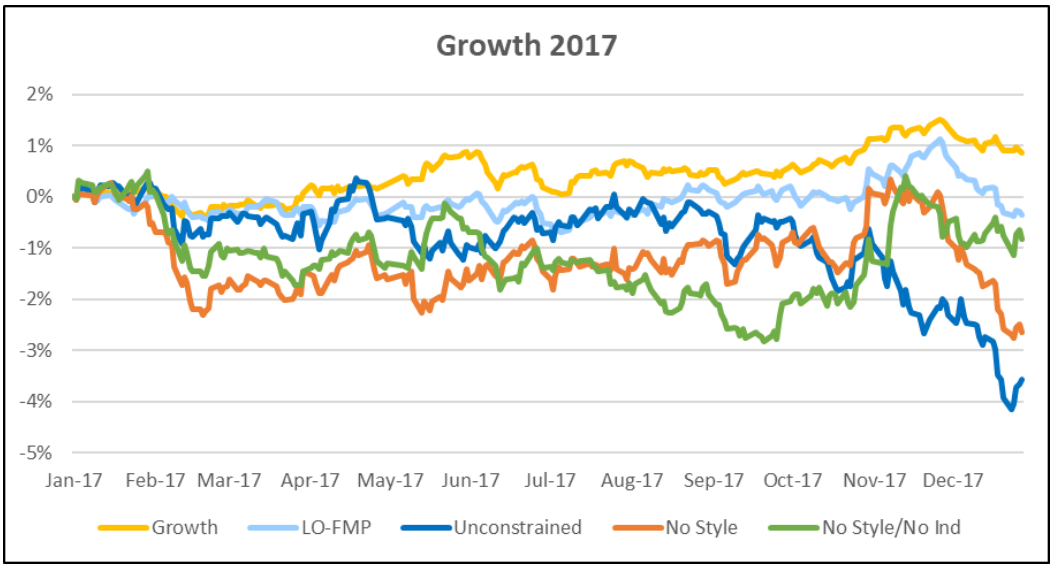


Figure 5 – Performance Attribution

	LO-FMP			Unconstrained			No Style			No Style/No Ind.		
Source of Return	**Risk**	**Exposure**	**Return**	**Risk**	**Exposure**	**Return**	**Risk**	**Exposure**	**Return**	**Risk**	**Exposure**	**Return**
Portfolio	11.19%		21.62%	11.32%		18.39%	11.39%		19.32%	11.19%		21.14%
Benchmark	10.95%		21.97%	10.95%		21.97%	10.95%		21.97%	10.95%		21.97%
Active	**1.39%**		**-0.36%**	**2.65%**		**-3.58%**	**2.69%**		**-2.65%**	**2.54%**		**-0.83%**
Specific Return	0.97%		-1.40%	2.12%		-5.22%	2.14%		-3.09%	2.33%		-1.65%
Factor Contribution	1.20%		1.05%	1.90%		1.64%	1.72%		0.44%	1.01%		0.82%
Style	**1.09%**		**0.89%**	**1.79%**		**2.41%**	**1.36%**		**1.10%**	**1.01%**		**0.75%**
Dividend Yield	0.15%	-0.17	-0.41%	0.19%	-0.21	-0.46%	0.02%	0.00	0.02%	0.02%	0.00	0.01%
Earnings Yield	0.12%	-0.08	-0.09%	0.30%	0.21	0.34%	0.04%	-0.01	0.04%	0.04%	-0.01	0.03%
Exchange Rate Sensitivity	0.08%	0.07	0.03%	0.06%	0.04	-0.02%	0.01%	0.00	-0.01%	0.01%	0.00	-0.02%
Growth	**0.86%**	**0.71**	**0.76%**	**1.59%**	**1.31**	**1.22%**	**1.34%**	**1.10**	**1.05%**	**0.99%**	**0.81**	**0.74%**
Leverage	0.10%	-0.09	-0.01%	0.08%	-0.07	0.02%	0.01%	0.00	0.00%	0.01%	0.00	0.00%
Liquidity	0.07%	-0.04	0.02%	0.09%	-0.04	-0.02%	0.01%	0.00	0.03%	0.01%	0.00	0.00%
Market Sensitivity	0.06%	0.02	-0.01%	0.07%	-0.01	-0.07%	0.04%	0.00	-0.04%	0.03%	0.00	0.02%
Medium-Term Momentum	0.04%	0.00	0.01%	0.32%	-0.13	-0.58%	0.05%	0.00	0.04%	0.04%	0.00	-0.02%
MidCap	0.07%	-0.03	0.00%	0.07%	0.02	0.02%	0.04%	-0.01	0.00%	0.01%	0.00	0.01%
Profitability	0.12%	0.10	0.16%	0.18%	0.13	0.21%	0.04%	-0.01	-0.02%	0.04%	0.00	-0.01%
Size	0.23%	-0.05	0.36%	0.94%	-0.22	1.50%	0.01%	0.00	0.00%	0.01%	0.00	0.00%
Value	0.06%	-0.04	-0.01%	0.18%	0.11	0.00%	0.02%	0.00	0.00%	0.01%	0.00	0.02%
Volatility	0.15%	0.05	0.09%	0.29%	0.08	0.26%	0.04%	0.00	-0.01%	0.04%	0.00	-0.03%
Sectors	**0.35%**		**0.14%**	**0.79%**		**-0.79%**	**0.96%**		**-0.69%**	**0.03%**		**0.05%**

Figure 6 – Correlation matrix of daily returns

	Growth	***LS-FMP***	***LO-FMP***	***Unconstrained***	***No Style***	***No Style/No Ind***
LS-FMP	0.27					
LO-FMP	0.67	-0.06				
Unconstrained	-0.68	-0.11	-0.36			
No Style	0.26	-0.28	0.62	0.25		
No Style/No Ind	0.10	-0.77	0.25	-0.09	0.37	
FTSE Japan	0.84	0.33	0.56	-0.81	0.12	-0.08

Momentum Appendix

Figure 1 – Percent of Active Risk

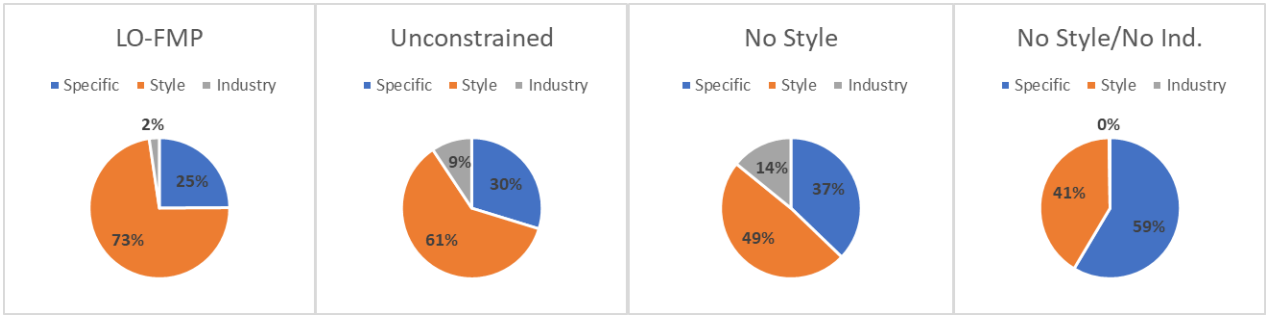


Figure 2 – Active Return

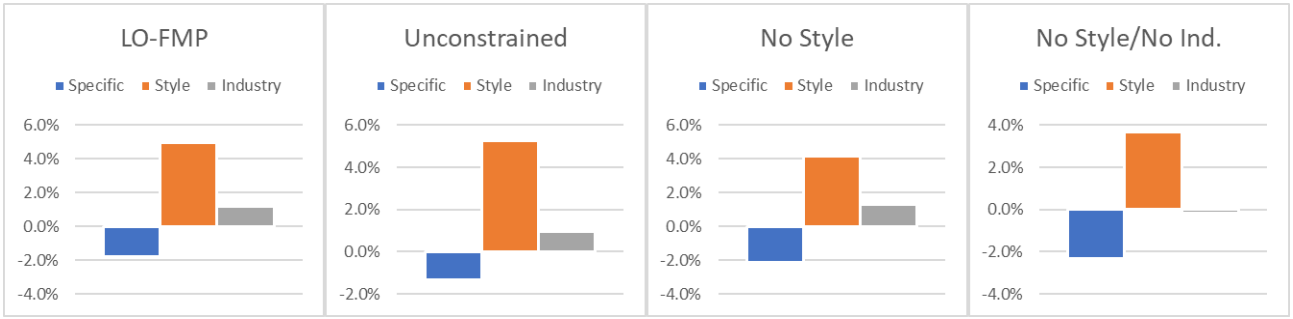


Figure 3 – Sector Allocation

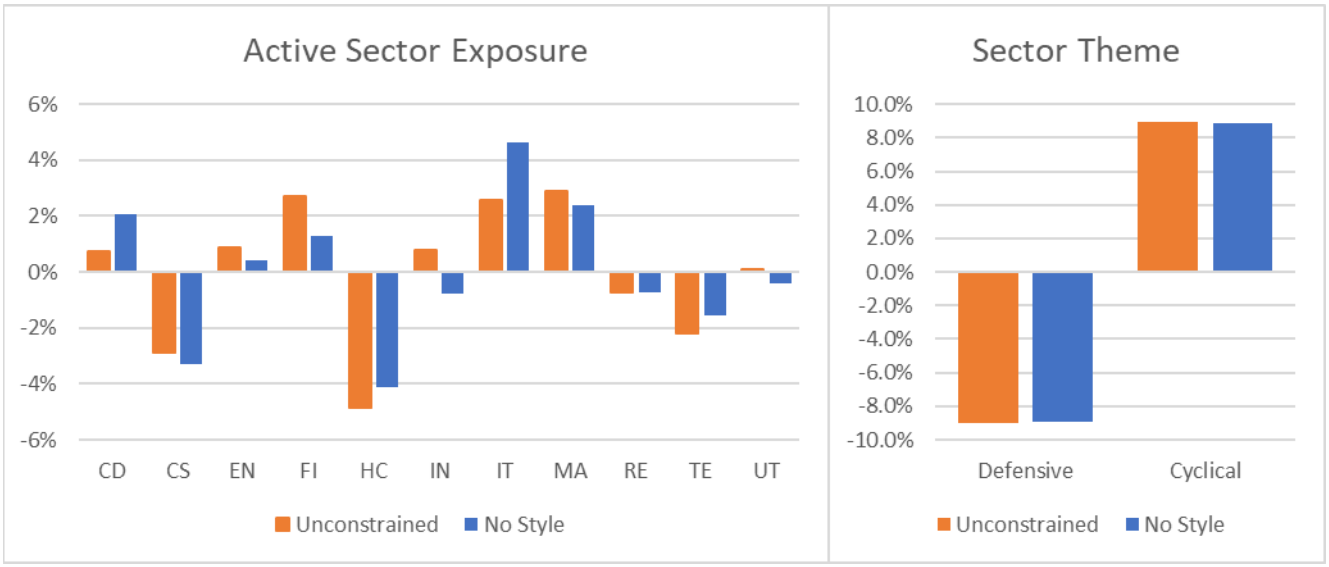
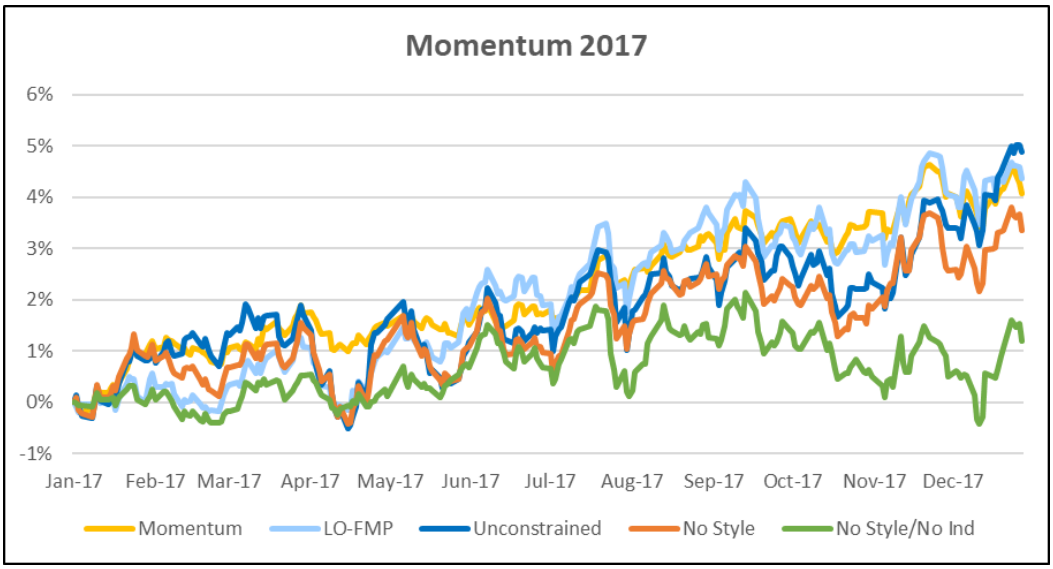


Figure 4 – Cumulative Active Returns



Note that FTSE Japan All Cap uses the right axis for return

Figure 5 – Performance Attribution

	LO-FMP			Unconstrained			No Style			No Style/No Ind.		
Source of Return	**Risk**	**Exposure**	**Return**	**Risk**	**Exposure**	**Return**	**Risk**	**Exposure**	**Return**	**Risk**	**Exposure**	**Return**
Portfolio	11.44%		26.34%	12.11%		26.85%	11.62%		25.32%	11.18%		23.17%
Benchmark	10.95%		21.97%	10.95%		21.97%	10.95%		21.97%	10.95%		21.97%
Active	**3.19%**		**4.37%**	**3.61%**		**4.88%**	**3.16%**		**3.35%**	**2.90%**		**1.19%**
Specific Return	1.51%		-1.80%	1.77%		-1.36%	1.74%		-2.13%	2.12%		-2.31%
Factor Contribution	2.73%		6.17%	2.90%		6.23%	2.43%		5.48%	1.77%		3.51%
Style	**2.58%**		**4.95%**	**2.54%**		**5.27%**	**1.99%**		**4.13%**	**1.77%**		**3.67%**
Dividend Yield	0.23%	-0.26	-0.70%	0.06%	0.04	0.09%	0.01%	0.00	0.00%	0.01%	0.00	0.01%
Earnings Yield	0.15%	-0.10	-0.19%	0.21%	0.14	0.19%	0.03%	0.00	-0.02%	0.03%	0.00	-0.02%
Exchange Rate Sensitivity	0.14%	0.11	0.09%	0.13%	-0.10	-0.10%	0.02%	0.01	0.01%	0.01%	0.00	0.02%
Growth	0.13%	0.09	0.10%	0.13%	-0.10	-0.11%	0.04%	0.01	0.06%	0.03%	0.01	0.02%
Leverage	0.12%	-0.10	0.00%	0.15%	0.14	-0.07%	0.01%	0.00	0.02%	0.01%	0.00	0.02%
Liquidity	0.05%	0.01	0.06%	0.18%	0.09	0.06%	0.03%	0.00	0.05%	0.04%	0.01	0.05%
Market Sensitivity	0.22%	-0.08	0.04%	0.11%	0.04	0.01%	0.04%	-0.01	-0.01%	0.04%	0.00	0.02%
Medium-Term Momentum	**2.07%**	**0.85**	**4.23%**	**2.28%**	**0.92**	**4.51%**	**1.96%**	**0.80**	**3.96%**	**1.77%**	**0.71**	**3.48%**
MidCap	0.04%	-0.01	-0.02%	0.04%	0.00	-0.04%	0.05%	-0.02	-0.03%	0.02%	0.00	-0.01%
Profitability	0.06%	0.03	0.03%	0.16%	-0.11	-0.26%	0.02%	0.00	0.00%	0.02%	0.00	-0.01%
Size	0.56%	-0.13	0.89%	0.41%	-0.09	0.50%	0.02%	0.00	0.04%	0.02%	0.00	0.04%
Value	0.15%	-0.10	0.07%	0.18%	0.11	0.03%	0.02%	0.00	-0.01%	0.02%	0.00	0.00%
Volatility	0.49%	0.16	0.37%	0.61%	0.19	0.45%	0.09%	0.01	0.06%	0.10%	0.01	0.05%
Sectors	**0.46%**		**1.18%**	**0.99%**		**0.94%**	**1.07%**		**1.31%**	**0.13%**		**-0.19%**

Figure 6 – Correlation matrix of daily returns

	Momentum	*LS-FMP*	*LO-FMP*	*Unconstrained*	*No Style*	*No Style/No Ind*
LS-FMP	0.94					
LO-FMP	0.95	0.96				
Unconstrained	0.89	0.87	0.91			
No Style	0.91	0.89	0.95	0.96		
No Style/No Ind	0.62	0.73	0.76	0.65	0.74	
FTSE Japan	0.88	0.80	0.85	0.83	0.79	0.40