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Do Earnings Revisions Matter in Asia?

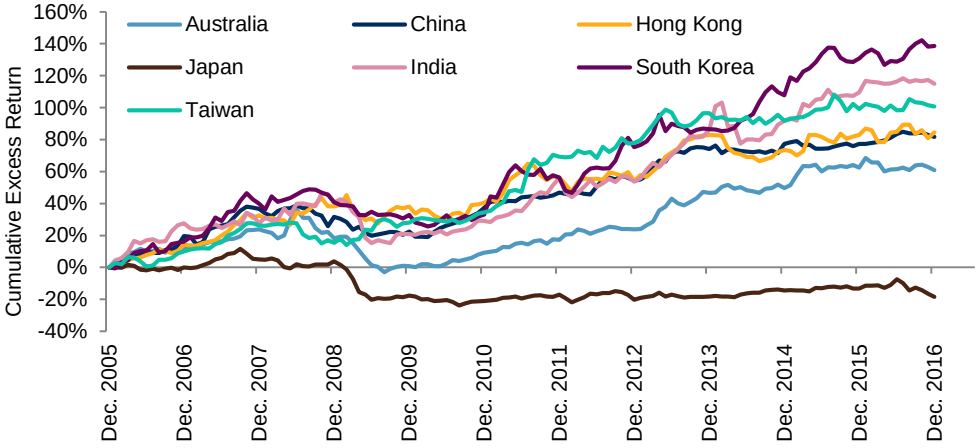
EXECUTIVE SUMMARY

Earnings revision strategies have been regularly used by market participants for predicting stock price return or stock selection. In this research paper, we examined earnings revision strategies across seven Pan Asian markets—Australia, China, Hong Kong, India, Japan, South Korea, and Taiwan—between Dec. 31, 2005, and Dec. 31, 2016.

HIGHLIGHTS

- Stock prices tended to move in the same direction as their earnings revisions in the majority of Pan Asian markets. Earnings revision strategies delivered the most significant excess returns in South Korea, India, and Taiwan, but they did not work in Japan.
- Market participants generally had stronger reactions to the net percentage of upward and downward revisions in earnings estimates rather than the percentage change of the consensus estimate figures.
- Earnings revision strategies tended to generate more alpha in the small-cap universe than in the large-mid-cap universe, although there was no strong sector or size bias.

Exhibit 1: Cumulative Excess Return of the Equal-Weighted Top Quintile EPS Diffusion Portfolios (Versus the Equal-Weighted Universe)



All portfolios shown are hypothetical and back-tested.
Source: S&P Dow Jones Indices LLC, Factset, and Thomson Reuters. Performance based on monthly local currency total return from Dec. 31, 2005, to Dec. 31, 2016. EPS diffusion was computed as the number of upward revisions minus the number of downward revisions of EPS estimates divided by the total number of EPS estimates. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance. Indices used for each region are as follows: S&P Australia BMI, S&P China A BMI, S&P Hong Kong BMI, S&P India BMI, S&P Japan BMI, S&P Korea BMI, and S&P Taiwan BMI.

INTRODUCTION

Factor-based strategies have been commonly used by market participants in the portfolio construction process, and factor-based products have also been experiencing tremendous asset growth in the passive investment industry.[1] Despite the majority of factor-based products tracking single- or multi-factor indices with a concentration in a few common equity factors such as value, quality, dividend, size, volatility, and momentum, research on alternative factors remains important for market participants who seek an alternative source of return drivers for diversification of their existing factor portfolios.

Research on alternative factor strategies remains important for market participants who seek an alternative source of return drivers for diversification of their existing factor portfolios.

Earnings revisions have been regularly used by market participants for predicting stock price returns or stock selection. Empirical research on earnings revision strategies is abundant; most of them focus on the market's reaction to changes in earnings estimates made by analysts or the number of upgrades or downgrades in estimates over short-term periods. However, conclusions about earnings revision strategies have been mixed.

For example, Mixon found earnings revisions in the U.S. caused stock prices to move in the same direction as their estimates. He also suggested combining earnings revisions with other stock selection factors due to the higher turnover of the earnings revision strategy.[2] Hong and Lee found earnings revision strategies delivered significant excess returns in some international markets, and the effectiveness of the strategy was related to information dissemination mechanisms within the market.[3]

Xu found that from 2002 to 2003, earnings revision strategies failed to deliver excess return in the U.S., and this seemed to be caused by market participants' overreactions as a result of over-extrapolating the success of the strategies in earlier periods. However, he also suggested that earnings estimate revisions continued to be serially correlated and remained a possible source for alpha.[4] Feldman, Livnat, and Zhang examined the market's reactions to analyst revisions on earnings estimates, target prices, and stock recommendations in the U.S. and found all three revisions were associated with significant positive excess returns. They concluded that the market reacted significantly stronger to target price and stock recommendation revisions than to earnings estimate revisions; however,

[1] "A Global Guide to Strategic-Beta Exchange-Traded Products," Morningstar Manager Research, September 2017.

[2] Mixon, S., "Earnings Revisions and Portfolio Returns," The Journal of Investing, Fall 2001, Vol. 10, No. 3: pp. 33-42.

[3] Hong, D. and Lee, Charles M.C., and Swaminathan, B., "Earnings Momentum in International Markets," February 2003.

[4] Xu, P, "Why Have Estimate Revision Measures Not Worked in Recent Years?" The Journal of Portfolio Management, Spring 2008, Vol. 34, No. 3: pp. 23-33.

revisions on target price and stock recommendation were far fewer than revisions on earnings estimates.[5]

In this research paper, we aim to explore the efficacy of earnings revision strategies in various Pan Asian equity markets including Australia, China, Hong Kong, India, Japan, South Korea, and Taiwan to shed light on whether earnings revisions can be an alternative source of return drivers for these markets.

METHODOLOGY

Portfolio Construction

Our study was based on the three-month change in the EPS estimate and the three-month diffusion of the EPS estimate.

In this research paper, we used the consensus earnings-per-share (EPS) estimates data from the Thomson Reuters Institutional Brokers Estimate System (I/B/E/S) database,[6] and our study was based on the three-month change in the EPS estimate (EPS change) and the three-month diffusion of the EPS estimate (EPS diffusion). The three-month EPS change was calculated as the current median EPS estimate minus the prior three-month median EPS estimate, divided by the absolute value of the prior three-month median EPS estimate. The three-month EPS diffusion was calculated as the sum of the EPS diffusion over the past three months in which the EPS diffusion for each month was computed as the number of upward revisions minus the number of downward revisions of EPS estimates for that month, divided by the total number of EPS estimates. All EPS estimates are measured in the reporting currency of the company.

As companies' fiscal year periods varied, analysis only based on current fiscal year estimate (FY1) leads to inconsistency in the estimate horizon.[7] Therefore, we used time-weighted average EPS change and EPS diffusion in our study to ensure alignment of estimate periods across companies examined in our analysis.[8] In addition, when a company announced its fiscal earnings and switched its fiscal years between the start and the end of the measurement period for the EPS change and EPS diffusion calculations, we made adjustments so that the estimates measured for the current and prior months belonged to the same fiscal year.

For our analysis, we formed equal-weighted top quintile (Q1), bottom quintile (Q5), top median (M1), and bottom median (M2) hypothetical

[5] Feldman, R., Livnat, J., and Zhang, Y., "Analysts' Earnings Forecast, Recommendation and Target Price Revisions," July 11, 2011.

[6] We retrieved the I/B/E/S estimate data from Factset, where historical estimates are adjusted for corporate actions such as stock splits, etc. I/B/E/S estimates data are available on a consolidated and non-consolidated basis, and we used the one that was reported by majority of the analysts in their estimates historically for each period.

[7] Baule, R. and Wilke, H., "On the Profitability of Portfolio Strategies Based on Analyst Consensus EPS Forecasts," Jan. 11, 2017.

[8] We first calculated the three-month EPS change and the three-month EPS diffusion for the current fiscal year (FY1) and the next fiscal year (FY2), respectively. Then, we computed the time-weighted average EPS change and EPS diffusion with the FY1 and FY2 weights in proportion to how much the next 12-month intervals overlapped with the FY1 and FY2 periods.

portfolios for the EPS change and EPS diffusion separately in each examined market. The Q1 and M1 portfolios consisted of stocks with higher values of EPS change and EPS diffusion, respectively, and vice versa for the Q5 and M2 portfolios.[9] We rebalanced the quintile and median portfolios quarterly after the close of the second Friday of March, June, September, and December, with a data reference date as of the Wednesday following the third Friday of February, May, August, and November, respectively.[10]

Sample Universe

Companies domiciled in each market with at least three analyst estimates at the time of rebalancing formed the base universe for the respective market.

Our study included seven Pan Asian equity markets: Australia, China, Hong Kong, India, Japan, South Korea, and Taiwan.[11] Companies domiciled in each market from their respective indices with at least three analyst estimates at the time of rebalancing formed the base universe for the respective market. A higher number of analyst estimates resulted in a higher number of revisions and lower estimate bias from a single analyst. However, the number of companies in the universe dropped as the required number of earnings estimates increased (see Exhibit 2). Including companies with a minimum of three analyst estimates maintained a sufficient number of stocks in the base universe throughout the back-test history.[12]

[9] During the back-tested period, there were times when many stocks had no revisions in their EPS estimates. When large numbers of stocks concurrently have no estimate revisions, it is not possible to divide the universe into distinct quintiles. Therefore, we only formed and studied the Q1, Q5, M1, and M2 portfolios instead of all five distinct quintile portfolios in our quintile analysis. Moreover, quintile and median cutoff values of EPS change and EPS diffusion are zero when there are large numbers of stocks without estimate revisions, leading to an undesirable increase in the number of stocks in the quintile and median portfolios for those periods. Therefore, we excluded stocks with EPS change and EPS diffusion values equal to their respective quintile and median cutoff values when forming the hypothetical portfolios.

[10] I/B/E/S monthly estimate data are measured on the close of the Thursday preceding the third Friday of each month, and they are updated at the latest by the close of the following Tuesday; therefore, we used reference data as of the close of the Wednesday following the third Friday of the month in our hypothetical portfolio formation. To provide a conservative lagging period between the data reference dates and the portfolio rebalancing effective dates for a real-time index or portfolio management, we rebalanced the portfolios after the close of the second Friday of the following month after the estimate data were released.

[11] Indices used for each region are as follows: S&P Australia BMI, S&P China A BMI, S&P Hong Kong BMI, S&P India BMI, S&P Japan BMI, S&P Korea BMI, and S&P Taiwan BMI. The S&P Global BMI is a comprehensive, rules-based index measuring global stock market performance that has been fully float adjusted since its inception in 1989.

[12] See Exhibit 14 in the Appendix for details on the number of stocks with a minimum of three analyst estimates available as of December 2005 and December 2016.

Exhibit 2: Average Percentage of Stocks With a Minimum of Three, Four, and Five Analyst Estimates From Their Respective Indices

MARKET	NUMBER OF ESTIMATES >= 3	NUMBER OF ESTIMATES >= 4	NUMBER OF ESTIMATES >= 5
Australia	77.42	70.31	63.17
China	30.69	23.73	18.39
Hong Kong	47.12	41.67	37.86
India	72.05	66.22	61.65
Japan	43.29	36.03	30.68
South Korea	53.43	48.26	44.20
Taiwan	38.82	31.53	26.22

Source: S&P Dow Jones Indices LLC, Factset, and Thomson Reuters. Data from Dec. 31, 2005, to Dec. 31, 2016. Table is provided for illustrative purposes. Indices used for each region are as follows: S&P Australia BMI, S&P China A BMI, S&P Hong Kong BMI, S&P India BMI, S&P Japan BMI, S&P Korea BMI, and S&P Taiwan BMI.

Our back-tested period was from Dec. 31, 2005, to Dec. 31, 2016,[13] and the performance of all the portfolios and base universes were measured in the local trading currency of their respective markets. Over the entire back-tested period, the equal-weighted base universe had significantly lower beta against the respective equal-weighted indices for all markets except Japan (see Exhibit 3). To eliminate the impact of this bias from our analysis, we compared the risk/return characteristics of the quintile and median portfolios versus their respective base universes instead of their respective indices throughout our analysis. All of the portfolios and base universes were equally weighted and followed the same quarterly rebalancing schedule (after the close of the second Friday of March, June, September, and December).

Over the entire back-tested period, the equal-weighted base universe had lower beta than the respective equal-weighted indices for all markets except Japan.

Exhibit 3: Historical Excess Return and Beta of the Base Universes Versus Their Respective Indices

MARKET	AVERAGE MONTHLY EXCESS RETURNS (%)	BETA
Australia	0.08	0.96**
China	-0.42*	0.88**
Hong Kong	0.22	0.86**
India	0.01	0.96**
Japan	0.04	0.99
South Korea	0.05	0.95**
Taiwan	-0.08	0.93**

All portfolios shown are hypothetical and back-tested. * denotes statistical significance at 5% using one-tailed t-test. ** denotes statistical significance at 1% using one-tailed t-test.
Source: S&P Dow Jones Indices LLC, Factset, and Thomson Reuters. Figures based on monthly local currency total return from Dec. 31, 2005, to Dec. 31, 2016. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance. Indices used for each region are as follows: S&P Australia BMI, S&P China A BMI, S&P Hong Kong BMI, S&P India BMI, S&P Japan BMI, S&P Korea BMI, and S&P Taiwan BMI.

[13] The monthly number of upward and downward revisions of the EPS estimates is not available prior to 2005 from the Thomson Reuters I/B/E/S database.

EFFICACY OF EARNINGS REVISION STRATEGIES IN VARIOUS PAN ASIAN MARKETS

In this section, we examined the efficacy of the earnings revision strategies, the three-month EPS change, and the three-month EPS diffusion in the various Pan Asian markets through the analysis of their top and bottom quintiles and median portfolio historical returns. We evaluated the average monthly excess return and the beta of the quintile and median portfolios versus their respective base universes, and also reviewed the sector and size concentration bias in the portfolios.

Risk and Return

The top quintile and median portfolios of both earnings revision strategies outperformed their respective universes…

Historically, the top quintile and median portfolios of both earnings revision strategies outperformed their respective universes and vice versa for the bottom quintile and median portfolios across all the markets, except Japan (see Exhibit 4). This indicated that stock prices tended to move in the same direction as their earnings revisions in the majority of the Pan Asian markets. The top quintile EPS diffusion portfolios delivered significantly higher average monthly excess return over their respective universes in the majority of the markets in comparison to the top quintile EPS change portfolios. This suggested that market participants had stronger reactions to the net percentage of upward and downward revisions in the EPS estimate rather than the percentage change of the consensus earnings estimate figures.

…and vice versa for the bottom quintile and median portfolios across all the markets, except Japan.

In Japan, the top quintile and median portfolios of both the earnings revision strategies underperformed the universe and excess returns for all the portfolios were insignificant. This showed that pure earnings revision strategies did not generate any return alpha in the Japanese market, historically. In contrast, the top quintile and median portfolios of both of the earnings revision strategies recorded significant excess return historically in South Korea, indicating that market participants in this market reacted strongly to both the net percentage of upward and downward revisions in the EPS estimate and the percentage change of the consensus earnings estimate figures.

Exhibit 4: Average Monthly Excess Return of the Earnings Revision Portfolios Versus Their Respective Universes

MARKET	EPS CHANGE (%)				EPS DIFFUSION (%)			
	Q1	Q5	M1	M2	Q1	Q5	M1	M2
Australia	0.23	-0.69*	0.32**	-0.31**	0.37*	-0.52**	0.23*	-0.22*
China	0.23	-0.20	0.14	-0.10	0.47**	-0.22	0.23*	-0.17
Hong Kong	0.31	-0.65**	0.21*	-0.19*	0.47**	-0.75**	0.31**	-0.29**
India	0.31	-0.42	0.28*	-0.29*	0.52*	-0.40*	0.22*	-0.22*
Japan	-0.12	0.12	-0.07	0.06	-0.16	0.15	-0.05	0.06
South Korea	0.56**	-0.41*	0.24*	-0.24*	0.70**	-0.35*	0.35**	-0.34**
Taiwan	0.26	-0.76**	0.30**	-0.32**	0.57**	-0.82**	0.36**	-0.35**

All portfolios shown are hypothetical and back-tested. * denotes statistical significance at 5% using one-tailed t-test. ** denotes statistical significance at 1% using one-tailed t-test.
Source: S&P Dow Jones Indices LLC, Factset, and Thomson Reuters. Figures based on monthly local currency total return from Dec. 31, 2005, to Dec. 31, 2016. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance. Indices used for each region are as follows: S&P Australia BMI, S&P China A BMI, S&P Hong Kong BMI, S&P India BMI, S&P Japan BMI, S&P Korea BMI, and S&P Taiwan BMI.

Another observation from our analysis, based on return beta, is that the bottom quintile and median portfolios of both earnings revision strategies tended to have more volatile returns than their respective universes for the majority of the Pan Asian markets over the entire back-tested period (see Exhibit 5). This was mainly due to the negative reactions of market participants toward companies with downward estimate revisions. In Australia, Japan, and India, the bottom quintile and median portfolios for both earnings revision strategies had return beta significantly greater than one with respect to their universes, signifying that market participants tended to react more strongly to estimate downgrades in these markets.

Market participants tended to react more strongly to estimate downgrades in Australia, Japan, and India.

Exhibit 5: Beta of the Earnings Revision Portfolios Versus Their Respective Universes

MARKET	EPS CHANGE				EPS DIFFUSION			
	Q1	Q5	M1	M2	Q1	Q5	M1	M2
Australia	0.95	1.32**	0.90**	1.10**	0.95	1.18**	0.94**	1.07**
China	1.02	1.07**	0.98	1.03**	1.00	1.03	0.99	1.00
Hong Kong	1.07**	1.13**	0.99	1.00	0.95*	0.99	0.99	1.01
India	0.92**	1.26**	0.89**	1.11**	0.83**	1.16**	0.90**	1.09**
Japan	1.01	1.15**	0.95**	1.05**	0.94*	1.08**	0.96**	1.04*
South Korea	1.08*	1.07*	0.97	1.03	1.01	0.94	1.02	0.98
Taiwan	1.05*	1.05*	0.99	1.00	1.04	0.97	1.01	0.98

All portfolios shown are hypothetical portfolios. * denotes statistical significance at 5% using one-tailed t-test. ** denotes statistical significance at 1% using one-tailed t-test.
Source: S&P Dow Jones Indices LLC, Factset, and Thomson Reuters. Figures based on monthly local currency total return from Dec. 31, 2005, to Dec. 31, 2016. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance. Indices used for each region are as follows: S&P Australia BMI, S&P China A BMI, S&P Hong Kong BMI, S&P India BMI, S&P Japan BMI, S&P Korea BMI, and S&P Taiwan BMI.

Sector and Size Composition

Selecting stocks by earnings revision strategies did not result in strong sector bias in most Asian markets.

Pronounced size and sector biases are observed in some factor strategies, such as value and low volatility, and could be dominant drivers for factor performance. For the earnings revision strategies examined, we found that the historical sector composition of the top and bottom median portfolios were highly correlated with that of their respective universes across the majority of the Pan Asian markets (see Exhibit 6).[14] Even for the top and bottom quintile portfolios, average correlation of their historical sector weighting with their respective universes was higher than 70% for all markets except India. These observations implied that selecting stocks by earnings revision strategies did not result in strong sector bias, and that the excess return was unlikely to be dominated by sector allocation bias in the majority of the Pan Asian markets.

Sector bias that resulted from earnings revision strategies was higher in India than in other markets. The correlation of sector composition of the top and bottom quintile portfolios with the universe was lower than 70% for majority of the studied periods.[15]

Exhibit 6: Average Sector Weight Correlation Between the Earnings Revision Portfolios and Their Respective Universes

MARKET	EPS CHANGE (%)				EPS DIFFUSION (%)			
	Q1	Q5	M1	M2	Q1	Q5	M1	M2
Australia	74.26	72.41	88.40	91.68	74.44	77.43	88.61	90.62
China	86.02	83.94	93.50	95.48	85.01	85.17	93.86	93.13
Hong Kong	81.43	85.00	92.51	94.14	80.33	85.43	92.13	93.58
India	59.28	67.96	84.19	86.08	62.73	71.06	84.55	86.17
Japan	90.77	89.61	96.50	96.77	90.32	91.09	96.33	96.46
South Korea	79.94	79.97	92.70	93.46	81.65	82.05	93.71	93.98
Taiwan	95.98	96.69	98.30	98.77	95.38	96.85	98.10	98.67

All portfolios shown are hypothetical portfolios.
Source: S&P Dow Jones Indices LLC, Factset, and Thomson Reuters. Data from Dec. 31, 2005, to Dec. 31, 2016. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance. Indices used for each region are as follows: S&P Australia BMI, S&P China A BMI, S&P Hong Kong BMI, S&P India BMI, S&P Japan BMI, S&P Korea BMI, and S&P Taiwan BMI.

On average, more than one-half of the stocks in the back-tested universe were small-cap stocks, and the weighting of small-cap stocks in the quintile and median earnings revision portfolios broadly aligned with those in their respective universes (see Exhibit 7). We did not find that stock selection based on earnings revision strategies resulted in a strong bias to either

[14] The average sector weight correlation was calculated in two steps. First, the correlation of the sector weights of portfolios versus their respective base universes was calculated for each month historically. Then, historical month-end correlations were averaged over the entire back-tested period.

[15] See Exhibit 15 in the Appendix for the percentage of months when the correlation was greater than 70% in the back-tested period.

large-mid-cap or small-cap stocks, thus size bias was not an important driver of excess returns for the earnings revision strategies.

Exhibit 7: Average Weighting of Small-Cap Stocks in the Earnings Revision Portfolios and Their Respective Universes

MARKET	UNIVERSE	EPS CHANGE (%)				EPS DIFFUSION (%)			
		Q1	Q5	M1	M2	Q1	Q5	M1	M2
Australia	74.54	79.45	81.56	74.11	74.76	75.90	71.41	76.05	72.69
China	26.34	28.03	26.54	25.25	25.28	25.69	24.15	24.94	24.06
Hong Kong	54.15	56.48	65.63	50.53	57.45	50.73	59.48	50.36	56.91
India	58.63	60.38	69.61	55.53	61.35	55.82	60.01	57.26	59.60
Japan	51.79	54.57	55.70	51.05	51.94	50.92	53.60	51.06	51.71
South Korea	65.28	68.17	69.32	64.35	65.79	65.85	62.05	65.96	64.15
Taiwan	44.12	44.09	39.52	42.38	39.41	41.99	35.82	43.64	37.91

All portfolios shown are hypothetical portfolios.
Source: S&P Dow Jones Indices LLC, Factset, and Thomson Reuters. Data from Dec. 31, 2005, to Dec. 31, 2016. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance. Indices used for each region are as follows: S&P Australia BMI, S&P China A BMI, S&P Hong Kong BMI, S&P India BMI, S&P Japan BMI, S&P Korea BMI, and S&P Taiwan BMI.

In general, earnings revision strategies generated positive return spread between the top and bottom quintile and median portfolios, as well as higher return beta in the bottom quintile and median portfolios for the majority of the Pan Asian markets. This indicates that market participants in the majority of the Pan Asian markets have historically rewarded the stocks with strong earnings revisions and penalized those with poor earnings revisions. Moreover, the sector and size allocation bias are unlikely to be the dominant factors of excess return of the earnings revision strategies.

Performance of Earnings Revision Strategies in Up, Down, and Neutral Markets

Market participants tended to penalize stocks with poor earnings revisions more when the market was in a downward trend.

Cyclicality generally exists in single-factor strategies that exhibit different performance characteristics under various market conditions. To investigate how earnings revision strategies behave during different market trends, we examined the performance of top and bottom quintile EPS change and EPS diffusion portfolios when the market was in upward, downward, and neutral price trends. We defined the market trend for each market based on its respective float-weighted index, with periods of monthly return greater than 1% representing up markets, periods of monthly return less than -1% representing down markets, and the rest of the periods representing neutral markets (see Exhibit 8).

Historically, the top quintile EPS diffusion portfolio outperformed its respective universe across various market trends in the majority of Asian markets, and the opposite held true for the bottom quintile portfolio. The observation was similar for the quintile portfolios based on EPS change.

We noticed that market participants tended to penalize stocks with poor earnings revisions more when the market was in a downward trend, as the bottom quintile portfolios underperformed the universe most significantly during the downward trends.

In Japan and India, bottom quintile EPS change portfolios outperformed their respective universes with significant excess return during upward market trends. This indicates that market participants in these markets tended to disregard earnings downgrades when the market was bullish.

Market participants in Japan and India tended to disregard earnings downgrades when the market was bullish.

Exhibit 8: Average Monthly Excess Returns of the Earnings Revision Portfolios Versus Their Respective Universes in Different Market Trends

MARKET	TREND	NUMBER OF MONTHS	EPS CHANGE (%)		EPS DIFFUSION (%)	
			Q1	Q5	Q1	Q5
Australia	Up	69	0.34	-0.06	0.42	-0.13
	Neutral	17	-0.07	-1.16*	0.42	-0.37
	Down	46	0.19	-1.47**	0.27	-1.17**
China	Up	78	0.34	0.26	0.38	-0.10
	Neutral	7	-0.40	-0.51	0.02	0.28
	Down	47	0.15	-0.91**	0.69**	-0.50*
Hong Kong	Up	69	0.78**	-0.36	0.51*	-1.01**
	Neutral	25	0.45	-0.60*	0.52*	-0.13
	Down	38	-0.62	-1.21**	0.35	-0.68*
India	Up	70	0.11	0.75*	-0.09	0.24
	Neutral	18	0.19	-0.96*	0.63*	-0.69
	Down	44	0.67**	-2.07**	1.44**	-1.30**
Japan	Up	58	0.04	0.76*	-0.27	0.45
	Neutral	28	-0.33	0.03	-0.42	0.24
	Down	46	-0.19	-0.62*	0.15	-0.28
South Korea	Up	64	0.81*	0.31	0.54	-0.46
	Neutral	23	0.63*	-1.16*	1.03*	-0.07
	Down	45	0.17	-1.06**	0.76**	-0.35
Taiwan	Up	68	0.55*	-0.57*	0.88**	-0.99**
	Neutral	23	0.44	-0.79*	0.51	-0.69*
	Down	41	-0.32	-1.05**	0.08	-0.62*

All portfolios shown are hypothetical portfolios. * denotes statistical significance at 5% using one-tailed t-test. ** denotes statistical significance at 1% using one-tailed t-test.
Source: S&P Dow Jones Indices LLC, Factset, and Thomson Reuters. Figures based on monthly local currency total return from Dec. 31, 2005, to Dec. 31, 2016. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance. Indices used for each region are as follows: S&P Australia BMI, S&P China A BMI, S&P Hong Kong BMI, S&P India BMI, S&P Japan BMI, S&P Korea BMI, and S&P Taiwan BMI.

EFFICACY OF EARNINGS REVISION STRATEGIES ON SECTOR-NEUTRAL, LARGE-MID-CAP, AND SMALL-CAP UNIVERSES

Performance of Sector-Neutral Portfolios

To investigate further if the returns generated from earnings revision strategies were free from any sector impact, we examined the performance of both earnings revision strategies with sector-neutral stock selection. We selected stocks based on the EPS change and EPS diffusion rankings within their respective GICS sectors to form the sector-neutral EPS change and EPS diffusion quintile and median portfolios, respectively. All of the portfolios and the universes were equally weighted in the analysis.

With sector-neutral stock selection, the earnings revision strategies remained efficacious in the majority of Asian markets.

Historically, the sector-neutral top quintile and median portfolios for both earnings revision strategies delivered positive average monthly excess returns compared with their respective universes in all of the markets except Japan (see Exhibit 9), and the opposite held true for the sector-neutral bottom quintile and median portfolios. We also noticed that the excess returns generated by the sector-neutral top quintile and median EPS diffusion portfolios were more significant than those for the EPS change portfolios for the majority of the markets. These observations aligned with those in the earlier section and further confirmed that the efficacy of earnings revision strategies in these markets was free from sector allocation bias.

Although some sector bias was observed in the earnings revision portfolios for India in the previous section, the significant excess returns generated by sector-neutral portfolios indicate that sector allocation bias was not the dominant driver of the alpha generated in the non-sector-neutral portfolios shown in the earlier section. However, in Japan, neither of the two earnings revision strategies delivered excess return versus their respective universes.

Exhibit 9: Average Monthly Excess Return of the Sector-Neutral Earnings Revision Portfolios Versus Their Respective Universes

MARKET	EPS CHANGE (%)				EPS DIFFUSION (%)			
	Q1	Q5	M1	M2	Q1	Q5	M1	M2
Australia	0.33**	-0.62**	0.30**	-0.26**	0.35**	-0.51**	0.28**	-0.25**
China	0.37**	-0.05	0.11	-0.10	0.55**	-0.21	0.22**	-0.19*
Hong Kong	0.24	-0.58**	0.15	-0.19*	0.49**	-0.53**	0.28**	-0.25**
India	0.30*	-0.38*	0.21*	-0.19*	0.47**	-0.24	0.26**	-0.23**
Japan	-0.12	0.18	-0.05	0.04	-0.10	0.12	-0.05	0.06
South Korea	0.36*	-0.29	0.17*	-0.18*	0.61**	-0.20	0.18*	-0.19*
Taiwan	0.29*	-0.62**	0.26**	-0.28**	0.55**	-0.73**	0.30**	-0.29**

All portfolios shown are hypothetical portfolios. * denotes statistical significance at 5% using one-tailed t-test. ** denotes statistical significance at 1% using one-tailed t-test.
Source: S&P Dow Jones Indices LLC, Factset, and Thomson Reuters. Figures based on monthly local currency total return from Dec. 31, 2005, to Dec. 31, 2016. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance. Indices used for each region are as follows: S&P Australia BMI, S&P China A BMI, S&P Hong Kong BMI, S&P India BMI, S&P Japan BMI, S&P Korea BMI, and S&P Taiwan BMI.

Performance of Large-Mid-Cap and Small-Cap Portfolios

In this section, we examined the performance of earnings revision strategies in the large-mid-cap and small-cap universes, respectively. Due to fewer stocks in the universe in each market segment, we only created the top and bottom median portfolios for each earnings revisions strategy, following the same portfolio construction process as described in the methodology section.

Historically, apart from Japan, the top median portfolios of both of the earnings revision strategies outperformed their respective large-mid-cap and small-cap universes, and the opposite held true for their respective bottom median portfolios (see Exhibit 10). However, excess returns recorded by the top and bottom median portfolios for the large-mid-cap universes were less significant than those recorded for the small-cap universes in the majority of markets, except Taiwan, where the opposite was observed.

The earnings revision strategies tended to generate more alpha in the small-cap universe than the large-mid-cap universe.

The results showed that the earnings revision strategies tended to generate more alpha in the small-cap universe than the large-mid-cap universe, even though no small-cap bias was observed in the earnings revision portfolios, as previously mentioned.

Exhibit 10: Average Monthly Excess Return of the Large-Mid-Cap and Small-Cap Earnings Revision Portfolios Versus Their Respective Universes

MARKET	LARGE-MID-CAP UNIVERSE				SMALL-CAP UNIVERSE			
	EPS CHANGE (%)		EPS DIFFUSION (%)		EPS CHANGE (%)		EPS DIFFUSION (%)	
	M1	M2	M1	M2	M1	M2	M1	M2
Australia	0.08	-0.07	0.00	0.00	0.37**	-0.35**	0.30**	-0.29*
China[16]	0.12	-0.09	0.29**	-0.16	0.08	-0.26	0.18	-0.35*
Hong Kong	0.18	-0.17	0.25*	-0.27*	0.31*	-0.33*	0.38**	-0.37**
India	0.25*	-0.26*	0.11	-0.11	0.32*	-0.32*	0.36*	-0.36**
Japan	-0.13	0.14	-0.14	0.14	-0.05	0.02	-0.03	0.02
South Korea	0.11	-0.13	0.20	-0.18	0.22	-0.24*	0.37**	-0.34**
Taiwan	0.37**	-0.34**	0.45**	-0.40**	0.23*	-0.23*	0.26*	-0.33**

All portfolios shown are hypothetical portfolios. * denotes statistical significance at 5% using one-tailed t-test. ** denotes statistical significance at 1% using one-tailed t-test.
Source: S&P Dow Jones Indices LLC, Factset, and Thomson Reuters. Figures based on monthly local currency total return from Dec. 31, 2005, to Dec. 31, 2016. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance. Indices used for each region are as follows: S&P Australia BMI, S&P China A BMI, S&P Hong Kong BMI, S&P India BMI, S&P Japan BMI, S&P Korea BMI, and S&P Taiwan BMI.

[16] There were fewer than 10 stocks with a number of available estimates greater than or equal to three in the small-cap universe for the China market in 2006.

POTENTIAL CHALLENGES IN THE APPLICATIONS OF THE EARNINGS REVISION STRATEGIES

Turnover

Similar to momentum strategies, signals from EPS diffusion and EPS change rotated rapidly from one rebalancing period to the other, which resulted in high turnover in the quintile portfolios. Over the entire back-tested period, the quarterly rebalanced top quintile EPS diffusion portfolio recorded an average annualized turnover range from 257% to 290%, while those for the EPS change had an average annualized turnover rate between 263% and 308% across different markets. The high turnover poses challenges for the implementation of earnings revision strategies.

Implementing earnings revision strategy in combination with other fundamental factors to lower the portfolio turnover may be more practical than implementing it as a single-factor strategy.

Relaxing the portfolio inclusion threshold from top quintile to top median is a potential way to lower the portfolio turnover of earnings revision strategies. The excess return for the top median earnings revision portfolios remained significant, though less pronounced, than their respective top quintile portfolios (see Exhibit 4). By increasing the portfolio inclusion threshold from top quintile to top median, the portfolio turnover was moderately lowered to a range between 172% and 244%. This turnover range was still quite high and would result in high replication costs (see Exhibit 11). Therefore implementing an earnings revision strategy in combination with other fundamental factors such as value or quality in order to lower the portfolio turnover may be more practical than implementing it as a single-factor strategy.

Exhibit 11: Average Annual Turnover (One-Way) of the Earnings Revision Portfolios

MARKET	EPS CHANGE		EPS DIFFUSION	
	Q1	M1	Q1	M1
Australia	276.43	179.90	266.50	180.34
China	307.79	240.51	290.40	243.61
Hong Kong	284.66	188.93	274.72	183.50
India	263.17	173.85	256.90	173.69
Japan	269.26	176.31	261.24	171.97
South Korea	266.48	177.35	260.89	185.12
Taiwan	280.30	199.68	274.49	202.39

All portfolios shown are hypothetical and back-tested.
Source: S&P Dow Jones Indices LLC, Factset, and Thomson Reuters. Data from Dec. 31, 2005, to Dec. 31, 2016. Table is provided for illustrative purposes and reflects hypothetical historical performance. Indices used for each region are as follows: S&P Australia BMI, S&P China A BMI, S&P Hong Kong BMI, S&P India BMI, S&P Japan BMI, S&P Korea BMI, and S&P Taiwan BMI.

Liquidity

The overall concentration of small-cap stocks tends to be higher in an equal-weighted portfolio than in a market-cap-weighted portfolio. On average, more than one-half of the stocks in the back-tested universe were small-cap stocks (see Exhibit 7). Since small-cap stocks are usually less

liquid, it may take much more time to complete the trade of an equal-weighted portfolio than a market-cap-weighted portfolio. Therefore, weighting methods with less deviation from market-cap weights may be more desirable for portfolio managers with large assets under management.

To improve liquidity of the earnings revision portfolios, we tilted the weight of the stocks away from the less liquid smaller stocks to larger stocks. We constructed the top and bottom quintile and median portfolios for both earnings revision strategies following the same methodology as described earlier, but we weighted all the portfolios and universes by the stocks' float-adjusted market capitalization rather than equally weighting them.

When the earnings revision portfolios were weighted by float market cap, only the EPS change quintile portfolios delivered excess returns in the same direction as the earnings revision signals for the majority of the markets (except Japan). The relationship did not hold for the rest of the portfolios in many markets (see Exhibit 12). Moreover, the excess returns from the portfolios were much less pronounced and became insignificant.

This implied that the market-cap effect disrupted the signals from earnings revisions when the portfolios were weighted by market cap. An alternative weighting method to strengthen the earnings revision signals would be essential in order to capture the alpha of the earnings revision strategies. Alternative weighting for earnings revision strategies is a topic to be further researched for the specific market and portfolio asset size, depending on stock liquidity, replication cost, and performance bias in the large-mid-cap versus small-cap stocks.

An alternative weighting method to strengthen the earnings revision signals would be essential in order to capture the alpha of the earnings revision strategies.

Exhibit 12: Average Monthly Excess Return of the Float-Cap-Weighted Earnings Revision Portfolios Versus Their Respective Float-Cap-Weighted Universes

MARKET	EPS CHANGE (%)				EPS DIFFUSION (%)			
	Q1	Q5	M1	M2	Q1	Q5	M1	M2
Australia	0.10	-0.62	0.10	-0.19	0.14	-0.23	-0.01	-0.07
China	0.07	-0.09	0.01	0.05	0.32	-0.27	0.25*	-0.25
Hong Kong	0.08	-0.60*	0.00	-0.03	0.16	-0.67**	0.14	-0.19
India	0.49*	-0.30	0.16	-0.16	0.26	0.29	-0.06	0.08
Japan	-0.29	0.13	-0.14	0.09	-0.23	0.08	-0.14	0.08
South Korea	0.24	-0.17	-0.10	0.04	0.06	0.06	-0.03	-0.06
Taiwan	0.24	-1.07**	0.26**	-0.36**	0.46*	-0.66**	0.27**	-0.31**

All portfolios shown are hypothetical portfolios. * denotes statistical significance at 5% using one-tailed t-test. ** denotes statistical significance at 1% using one-tailed t-test.
Source: S&P Dow Jones Indices LLC, Factset, and Thomson Reuters. Figures based on monthly local currency total return from Dec. 31, 2005, to Dec. 31, 2016. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance. Indices used for each region are as follows: S&P Australia BMI, S&P China A BMI, S&P Hong Kong BMI, S&P India BMI, S&P Japan BMI, S&P Korea BMI, and S&P Taiwan BMI.

CONCLUSION

Earnings revision strategies have been regularly used by market participants for predicting stock price return or stock selection. In this research paper, we examined earnings revision strategies across seven Pan Asian markets: Australia, China, Hong Kong, India, Japan, South Korea, and Taiwan. Our study was based on signals from companies' three-month change in EPS estimates and three-month diffusion of EPS estimates between Dec. 31, 2005, and Dec. 31, 2016.

The earnings revision strategies delivered the most pronounced and significant excess return in South Korea, India, and Taiwan…

The results suggested that stock prices tended to move in the same direction as their earnings revisions in the majority of the Pan Asian markets. The earnings revision strategies delivered the most pronounced and significant excess return in South Korea, India, and Taiwan, but they did not work in Japan. Market participants generally had stronger reactions to the net percentage of upward and downward revisions in the earnings estimates rather than the percentage change of the consensus earnings estimate figures. Companies with poor earnings revisions tended to have more volatile returns, as market participants reacted negatively to companies with downward revisions in estimates. We also noticed that market participants tended to penalize stocks with poor earnings revisions more when the market was in a downward trend.

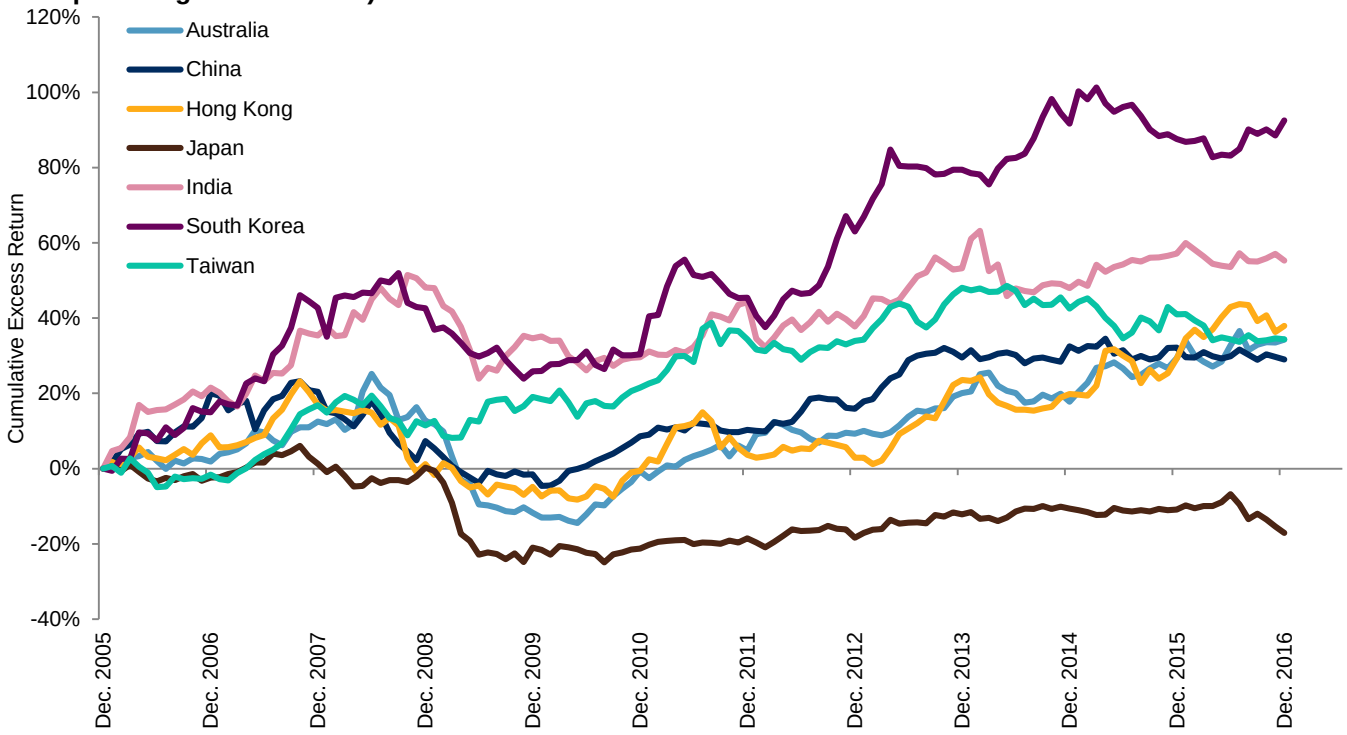
…but they did not work in Japan.

Based on our earnings revision quintile portfolios, selecting stocks by earnings revision strategies in Pan Asian markets did not result in a strong sector or size bias in the portfolios, and therefore, the excess returns from earnings revision strategies were not likely dominated by sector or size allocation bias. Our further analysis of the sector-neutral top quintile and median earnings revision portfolios confirmed the efficacy of earnings revision strategies in the Pan Asian markets to be free from sector allocation bias. However, excess returns for the large-mid-cap and small-cap median earnings revision portfolios indicated that the earnings revision strategies tended to generate more alpha in the small-cap than the large-mid-cap universe.

Similar to momentum strategies, earnings revision strategies had high portfolio turnover. Implementing this strategy in combination with other fundamental factors to lower the turnover may be more practical than implementing it as a single-factor strategy. We also found that excess returns from the portfolios became much less pronounced and lost significance when the portfolios were weighted by market cap. An alternative weighting method to strengthen the earnings revision signals would be essential in order to capture the alpha of the earnings revision strategies.

APPENDIX

Exhibit 13: Cumulative Excess Return of the Equal-Weighted Top Quintile EPS Change Portfolios (Versus the Equal-Weighted Universe)



All portfolios shown are hypothetical and back-tested.
Source: S&P Dow Jones Indices LLC, Factset, and Thomson Reuters. Performance based on monthly local currency total return from Dec. 31, 2005, to Dec. 31, 2016. EPS change was computed as change in the EPS estimate divided by the absolute value of prior EPS estimate. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance. Indices used for each region are as follows: S&P Australia BMI, S&P China A BMI, S&P Hong Kong BMI, S&P India BMI, S&P Japan BMI, S&P Korea BMI, and S&P Taiwan BMI.

Exhibit 14: Number of Stocks With a Minimum of Three Analyst Estimates From Their Respective Indices

MARKET	DECEMBER 2005		DECEMBER 2016	
	INDEX	NUMBER OF ESTIMATES >= 3	INDEX	NUMBER OF ESTIMATES >= 3
Australia	293	175	343	276
China	348	62	2347	888
Hong Kong	164	104	301	103
India	148	98	429	338
Japan	1705	621	1653	674
South Korea	286	178	779	338
Taiwan	384	139	585	255

All portfolios shown are hypothetical and back-tested.
Source: S&P Dow Jones Indices LLC, Factset, and Thomson Reuters. Data from Dec. 31, 2005, to Dec. 31, 2016. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance. Indices used for each region are as follows: S&P Australia BMI, S&P China A BMI, S&P Hong Kong BMI, S&P India BMI, S&P Japan BMI, S&P Korea BMI, and S&P Taiwan BMI.

Exhibit 15: Percentage of Months When the Sector Weight Correlation Between the Earnings Revision Portfolios and Their Respective Universes Was Greater Than 70%

MARKET	EPS CHANGE (%)				EPS DIFFUSION (%)			
	Q1	Q5	M1	M2	Q1	Q5	M1	M2
Australia	67.36	65.28	97.92	100.00	65.97	74.31	98.61	100.00
China	92.36	89.58	93.75	100.00	92.36	86.81	97.92	97.92
Hong Kong	83.33	93.75	98.61	100.00	80.56	97.92	97.92	100.00
India	43.06	50.00	90.28	95.83	46.53	56.25	91.67	93.06
Japan	97.92	97.92	100.00	100.00	95.83	99.31	100.00	100.00
South Korea	82.64	90.28	100.00	100.00	88.19	86.11	100.00	100.00
Taiwan	97.92	100.00	100.00	100.00	97.92	100.00	100.00	100.00

All portfolios shown are hypothetical portfolios.
Source: S&P Dow Jones Indices LLC, Factset, and Thomson Reuters. Data from Dec. 31, 2005, to Dec. 31, 2016. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance. Indices used for each region are as follows: S&P Australia BMI, S&P China A BMI, S&P Hong Kong BMI, S&P India BMI, S&P Japan BMI, S&P Korea BMI, and S&P Taiwan BMI.

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