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MOMENTUM STRATEGIES: EVIDENCE FROM PACIFIC BASIN STOCK MARKETS

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Abstract

We investigate the profitability of momentum investment strategy in six Asian stock markets. Unrestricted momentum investment strategies do not yield significant momentum profits. Although we find that a diversified country-neutral strategy generates small but statistically significant returns during 1981–1994, when we control for size and turnover effects we find that the country-neutral profits dissipate. Our evidence suggests that the factors that contribute to the momentum phenomenon in the United States are not prevalent in the Asian markets.

JEL Classifications: G11, G14, G15

I. Introduction

Recent research documents the existence of a momentum effect in stock returns. Stocks that have outperformed (underperformed) the average stock return during several past months tend to perform better (worse) than the average stock over the next months. Using post-1940 data for stocks traded on the New York Stock Exchange (NYSE) and the American Stock Exchange (AMEX), Jegadeesh and Titman (1993) report that a zero-cost momentum strategy of buying past winners and selling past losers generates significant average profits. Rouwenhorst (1998) finds similar evidence for stocks traded on European markets.

However, many studies do not agree in their interpretation of the evidence on price momentum in the U.S. stock market. Jegadeesh and Titman (1993) and

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Chan, Jegadeesh, and Lakonishok (1996) argue that a stock price underreaction to information contained in past stock returns and company earnings results in price momentum. Barberis, Shleifer, and Vishny (1998), Daniel, Hirshleifer, and Subrahmanyam (1998), and Hong and Stein (1999) present theoretical models of investor behavior that suggest price momentum is consistent with biases in the way investors interpret imperfect information. These behavioral models rely on psychological factors, such as representativeness, conservatism, overconfidence, and self-attribution, to explain the momentum profits.

Conrad and Kaul (1998) argue that the profitability of momentum strategy is due to cross-sectional variation in expected returns rather than to predictable time-series variation in security returns. They show that the momentum strategy's average profits reflect the result of buying high-mean-return securities and selling low-mean-return securities. If the differences in the unconditional mean returns can be attributed to variations in expected returns, the momentum profits are due to cross-sectional differences in risk. Moskowitz and Grinblatt (1999) suggest that momentum in industry risk factors explains the profitability of the momentum strategy. Grundy and Martin (2001) argue that stock-specific return components contribute significantly to the profits.

Studies that examine the U.S. data for explanations of the trends and predictable patterns have an important drawback: Lo and MacKinlay (1990) and Foster, Smith, and Whaley (1997) note that these studies can suffer from data-snooping biases. Other financial researchers have tested the momentum strategy with the same data, which makes it difficult to obtain independent evidence.

In this article, we offer out-of-sample evidence on the robustness of momentum trading strategies. We do so by examining stock returns in a group of emerging Asia-Pacific stock markets. We choose these markets because, although there is substantial work that uses data from developed markets, little is known about the predictability of returns in emerging markets. If momentum profits really are due to the slow reaction of prices to information contained in past returns, we should be able to find similar evidence in other markets. We know from prior research that emerging market returns are characterized by low correlation with returns on other emerging markets and with developed markets (Harvey 1995). Therefore, evidence from emerging markets is interesting because it provides a validation test on a sample that is not highly correlated with data used in previous research.

We implement the momentum trading strategies on securities traded on six Asian markets: Hong Kong, Malaysia, Singapore, South Korea, Taiwan, and Thailand. Following Jegadeesh and Titman (1993) and Rouwenhorst (1998), we examine sixteen unrestricted momentum strategies that rank securities based on their past J-month performance ($J = 3$, 6, 9, and 12) and evaluate the returns over the next K-months ($K = 3$, 6, 9, and 12) for our sample period, 1981–1994. We do not find evidence of price momentum. None of the sixteen unrestricted momentum strategies yields significant profits.

Because of the high volatility of momentum returns in these markets, we use a country-neutral (regionally diversified) strategy. For the country-neutral strategy, the average momentum profit is small (0.37% per month) but statistically significant. Our results suggest that country factors are important in the winner-loser security returns in these markets. However, we note that after we control for size and turnover factors, the country-neutral profits are no longer significant.

II. Data

Our sample comprises monthly stock returns on more than 1,000 securities traded on six Asian markets. Our sample period is 1979–1994. We obtain the data from the Pacific-Basin Capital Markets (PACAP) Database, which is compiled by the University of Rhode Island. The countries included in our analysis are: Hong Kong (201 firms), Malaysia (244 firms), Singapore (103 firms), South Korea (309 firms), Taiwan (92 firms), and Thailand (59 firms). For each security, we obtain the monthly return, size, trading volume, and number of days traded in a month. We use all the emerging market data available from PACAP, except for Indonesia, for which the data series starts in 1990. We take the month-end exchange rate information from the PACAP to convert the local currency returns to U.S. dollar (US$) returns.

Table 1, Panel A, summarizes the descriptive statistics for all the sample countries. For local currency return, the average mean return across the six Asian countries is about 2.2% per month. The mean and standard deviation of returns are slightly smaller for returns in US$, but continue to be high relative to most developed markets. Taiwan has the highest average US$ return of 2.25%. Singapore shows the lowest average return, 1.55%. The monthly standard deviations, which are about 10% or more for the six countries, reflect the high volatility of emerging market returns. Bekaert and Harvey (1997) report similar characteristics.

Columns (c) to (e) of Panel A give the statistics for the mean and median firm size, turnover, and number of days traded in a month. We measure firm size as the natural logarithm of the market value of equity for the sample firms (in US$) in each country. The mean firm size is highest in Taiwan and Hong Kong (5.98) and lowest in South Korea (4.71). Columns (d) and (e) of Panel A report two measures of trading activity. We measure turnover as a percentage of the number of shares traded in a month divided by the number of shares outstanding. This measure of turnover is implicitly an equally weighted measure. The mean share turnover shows a large cross-sectional variation across the emerging Asian markets. The maximum turnover is 37% in Taiwan, which is almost fifteen times the average turnover of 2.5% in Singapore. The last statistic is the number of days traded in a month. The number of trading days is similar across all countries, with an average of about nineteen trading days per month.

TABLE 1. Descriptive Statistics of Sample Countries.

Panel A. Descriptive Statistics

Country	No. of Firms	Sample Period	(a) LC Return		(b) US$ Return		(c) Size		(d) Turnover		(e) Days Traded	
			Mean	Std. Dev.	Mean	Std. Dev.	Mean	Median	Mean	Median	Mean	Median
Hong Kong	201	Jan 1980–Dec 1994	0.0232	0.1761	0.0213	0.1614	5.98	5.74	4.41	5.02	17.20	16.45
Malaysia	244	Jan 1979–Dec 1994	0.0249	0.1578	0.0191	0.1405	5.31	5.01	4.34	5.31	21.07	20.41
Singapore	102	Jan 1979–Dec 1994	0.0177	0.1245	0.0155	0.1146	5.43	5.82	2.52	3.11	17.28	16.72
South Korea	309	Jan 1979–Dec 1994	0.0210	0.1420	0.0182	0.0957	4.71	4.35	11.97	10.04	23.45	21.52
Taiwan	92	Jan 1979–Dec 1994	0.0248	0.1828	0.0225	0.1739	5.98	5.77	36.65	42.34	16.89	18.12
Thailand	59	Jan 1979–Dec 1994	0.0218	0.1620	0.0162	0.1196	4.82	5.24	7.86	7.26	17.74	16.84

Panel B. Pairwise Correlation in Monthly Returns

	U.S.	Hong Kong	Malaysia	Singapore	South Korea	Taiwan	Thailand
U.S.	1.00						
Hong Kong	0.29	1.00					
Malaysia	0.31	0.37	1.00				
Singapore	0.44	0.41	0.81	1.00			
South Korea	0.11	0.11	0.07	0.10	1.00		
Taiwan	0.20	0.27	0.22	0.21	0.08	1.00	
Thailand	0.32	0.44	0.38	0.40	0.07	0.35	1.00

Note: The table reports the descriptive statistics for each sample country. The statistics in Panel A include the number of firms in the sample, the sample period, the mean and standard deviation of local currency (LC) and US dollar (US$) return, the mean and median size, turnover, and number of days traded in a month. We measure size as the natural logarithm of the market value of equity in US$. We measure turnover as a percentage of the number of shares traded in a month divided by the number of shares outstanding at the beginning of the month. Panel B presents the pairwise correlation in monthly returns among the six Asian countries and the United States.

Table 1, Panel B, reports the return correlation coefficient between each sample country and with the U.S. (NYSE/AMEX equally weighted monthly index) monthly returns. Except for Singapore and Malaysia, the market shows a low level of correlation in stock returns across all markets.[1] The pairwise correlation between the countries ranges between 7% and 44%. Similar to the returns reported by Harvey (1995) and others, the sample countries returns show low contemporaneous correlation with U.S. returns. South Korea appears to have the lowest correlation with all other countries.

III. Momentum Trading Strategy

Our momentum trading strategy is similar to that used in Jegadeesh and Titman (1993) and Rouwenhorst (1998). We construct the relative strength portfolios as follows: At the end of each month, we rank all stocks from the six sample countries in ascending order, based on their past J-month return ($J = 3$, 6, 9, and 12). We then assign the stocks to one of the ten relative strength decile portfolios (1 represents the "loser" portfolio or the one with the lowest past performance and 10 represents the "winner" portfolio or the one with the highest past performance). These portfolios are equally weighted at formation and held for the the next K-months ($K = 3$, 6, 9, and 12). This gives us sixteen combinations of J- and K-months and, hence, sixteen momentum strategies.

Because only monthly returns are available, when the holding period exceeds one month, we create an overlap in the holding-period returns. As a result, we form K-composite portfolios, each of which is initiated one month apart. In each month, we revise $1/K$ of the holdings and the rest are carried over from the previous month. For example, toward the end of month t, the $J = 3$, $K = 3$ portfolio of winners consists of three parts: a position carried over from the investment at the end of month t–3 in the top 10% of firms with the highest past three-month performance as of t–3, and two similar positions resulting from similar investment in month t–2 and t–1, respectively. At the end of month t, we liquidate the first position and replace it with an investment in the stocks that show the highest past three-month performance at time t.

Table 2 presents the monthly average returns of the strategies implemented on all stocks in all sample countries from 1981 to 1994, where we define winners and losers as the top and bottom 10% of past returns. The table shows that for the six-month interval ($J = 6, K = 6$), an equally weighted portfolio formed from stocks in the bottom decile of past six-month performance (loser portfolio) earns 1.91%

[1] The high correlation of 81% between returns in Singapore and Malaysia is due to the historical stock market linkages between the countries and the high level of trading by local investors across both markets.

TABLE 2. Returns of Relative Strength Decile Portfolios in Asian Stock Markets.

Ranking Period (J)	Portfolio	Holding Period (K) 3	6	9	12
3	Winner	0.0231	0.0217	0.0234	0.0221
	Loser	0.0216	0.0205	0.0186	0.0154
	Winner–Loser	0.0014	0.0013	0.0047	0.0067
	(t-statistic)	(0.28)	(0.29)	(1.34)	(1.75)
6	Winner	0.0229	0.0244	0.0243	0.0227
	Loser	0.0213	0.0191	0.0185	0.0147
	Winner–Loser	0.0016	0.0053	0.0058	0.0079
	(t-statistic)	(0.27)	(1.02)	(1.31)	(1.64)
9	Winner	0.0248	0.0249	0.0236	0.0228
	Loser	0.0178	0.0187	0.0189	0.0149
	Winner–Loser	0.0070	0.0062	0.0047	0.0079
	(t-statistic)	(1.18)	(1.18)	(1.01)	(1.44)
12	Winner	0.0249	0.0235	0.0223	0.0225
	Loser	0.0197	0.0204	0.0204	0.0165
	Winner–Loser	0.0052	0.0031	0.0019	0.0060
	(t-statistic)	(0.88)	(0.57)	(0.38)	(0.99)

Note: At the end of each month, we rank into ten relative strength decile portfolios all stocks from six emerging Asian markets in ascending order, based on their past J-month returns. Those with the lowest past performance (bottom 10%) are assigned to the "loser" portfolio, and those with the highest past performance (top 10%) are assigned to the "winner" portfolio. These portfolios are equally weighted at formation and held for the next K-months. The table reports the mean monthly returns on these portfolios from 1981 to 1994. The t-statistic is the mean return divided by its standard error.

and the corresponding winner portfolio earns 2.44%. A zero-cost relative strength portfolio, which we construct by buying the past winner and selling the past loser (winner–loser), gives a positive excess return of 0.53% per month. The correlation between the winner and loser portfolios is 0.49. We obtain the highest average return of 0.79% per month (or 9.48% per year) for a twelve-month holding period ($K = 12$), which we form by ranking the stocks on past six- and nine-month performance ($J = 6$ and 9). However, all sixteen strategies yield statistically insignificant returns.

To check for robustness of the results, we perform several modifications to the portfolio-formation methods. Our unreported results show that the average returns to buying the top 30% of stocks and shorting the bottom 30% of stocks are generally similar to that reported for the decile portfolios across all sixteen strategies. The results are qualitatively unchanged if we implement the momentum strategy with a one-month lag (to alleviate any bid-ask effects). Even when we exclude the extreme 5% of the ranking-period returns, all strategies yield insignificant momentum profits. We also do not find significant influence of any month on momentum profits—the insignificant momentum profits are not due to seasonal behavior (price reversals) in any month. Hence, the results are robust to the

TABLE 3. Descriptive Statistics for Returns of Decile Portfolios.

Prior Return Decile	Mean Return	Median Return	Standard Deviation	Average Size
Loser	0.0191	0.0117	0.0700	4.61
2	0.0176	0.0113	0.0529	4.88
3	0.0169	0.0113	0.0478	4.96
4	0.0166	0.0126	0.0424	5.15
5	0.0183	0.0150	0.0449	5.22
6	0.0194	0.0178	0.0443	5.41
7	0.0202	0.0201	0.0471	5.19
8	0.0207	0.0209	0.0496	5.14
9	0.0225	0.0216	0.0560	5.11
Winner	0.0244	0.0269	0.0670	5.02
Winner–Loser	0.0053		0.0693	
(*t*-statistic)	(1.02)			

Note: At the end of each month, we rank all stocks in ascending order, based on their past six-month returns. Those with the lowest past performance are assigned to the "loser" portfolio, and those with the highest past performance are assigned to the "winner" portfolio. These portfolios are equally weighted at formation and held for the next six months. The table reports the mean monthly buy-and-hold return and standard deviation of the ten decile portfolios from 1981 to 1994. The *t*-statistic is the mean return divided by its standard error. We calculate average size as the average natural logarithm of the market value of equity of the stocks in the portfolio, in U.S. dollars.

bid-ask bounce effect, return outliers, calendar effects, and portfolio formation methods.[2]

Our results so far suggest that price momentum is not a pervasive phenomenon. To closely examine the pattern of medium term price movements in the Asian markets, we concentrate on a particular momentum strategy. Jegadeesh and Titman (1993), Rouwenhorst (1998), and others construct a similar six-month strategy. Table 3 reports higher mean (and median) returns for securities with better past performance (i.e., deciles 7 to 10). However, all the decile portfolios also have high standard deviations. As noted by Rouwenhorst (1999), the standard deviation of returns in emerging markets is large. We see that even for the combined portfolio of winner–loser, the standard deviation of returns is 6.9%. Other factors could affect expected returns and mask the momentum profits. For instance, the high volatility in the momentum profits could be due to country effects that make it difficult to detect statistical significance. If country factors are important, one way to improve the signal-to-noise properties in the returns is to take advantage of the low cross-country correlations in returns and form portfolios that are diversified across countries.

[2]Results are available from the authors on request.

IV. Momentum Strategies and Country, Size, and Turnover Effects

To the extent that the winner minus loser portfolio is driven by country effects, we can achieve lower return volatility by forming an international (or regional) portfolio that invests equally across all markets. Heston and Rouwenhorst (1994), for example, show that international diversification stems largely from geographical diversification. Thus, we can consider a momentum strategy that is fully invested in all six countries in the sample.

Country-Neutral Relative Strength Strategies

There are two sources that could produce return continuation in international stock returns: country momentum and firm-specific momentum. Persistence in country-specific performance might tilt the winner and loser portfolio weights to countries with strong and weak performance, respectively. For example, if stocks in Malaysia (Taiwan) are experiencing a boom (bear) market, their returns will be greater (lower) compared with the returns of stocks from the other markets. Hence, the resulting winner (loser) portfolio will be concentrated in Malaysian (Taiwanese) stocks. This strategy is associated with a portfolio that is poorly diversified across countries.

A recent study by Chan, Hameed, and Tong (2000) presents evidence of country momentum. Our results so far suggest that because of the high volatility in these emerging markets, country momentum could be difficult to detect. However, firm-specific momentum in performance could be more easily seen in a portfolio that is geographically well diversified.

We form country-neutral relative strength portfolios by ranking stocks in ascending order, based on their past six-month performance relative only to stocks from the same market. The resulting winner and loser decile portfolios have equal country weights and therefore are country neutral.

Table 4, Panel A, presents the mean return and corresponding *t*-statistic for the country-neutral relative strength portfolio and the individual countries. The standard deviation of the momentum return shows a large drop from 6.9% to 2.2%, indicating a strong diversification effect. In fact, we can attribute this sharp drop to the high correlation of 91% between winner and loser portfolio returns.[3] The primary effect of equally weighting the sample countries is the reduction in the volatility of the relative strength strategy.[4] After accounting for country

[3] The number of securities in the portfolio is the same for the unrestricted and country-neutral portfolios, that is, an average of seventy-one securities in each winner and loser portfolio from 1981 to 1994.

[4] We also examine the influence of exchange rate movements on profits. We use local currency returns to estimate the momentum profits and find similar results (a significant profit of 0.30% for the country-neutral strategy). The insignificant influence of exchange rate changes is consistent with the results in Chan, Hameed, and Tong (2000).

TABLE 4. Returns of Country-Neutral Relative Strength Portfolios.

Portfolio	Mean	Std. Dev.	*t*-statistic
Panel A. 1981–1994			
Asian—All stocks (country neutral)	0.0037	0.0216	2.30
By country:			
Hong Kong	0.0021	0.0412	0.65
Malaysia	0.0019	0.0443	0.58
Singapore	0.0051	0.0458	1.50
South Korea	0.0041	0.0482	1.15
Taiwan	0.0061	0.0750	1.09
Thailand	0.0022	0.0460	0.72
Panel B. 1989–1994			
Asian—All stocks (country neutral)	0.0026	0.0217	1.03
By country:			
Hong Kong	0.0068	0.0311	1.87
Malaysia	0.0000	0.0498	0.01
Singapore	0.0048	0.0497	0.82
South Korea	0.0010	0.0520	0.16
Taiwan	0.0042	0.0773	0.46
Thailand	−0.0010	0.0427	−0.20

Note: At the end of each month, we rank all stocks in ascending order, based on their past six-month returns, relative to other stocks in the same country. Those with the lowest past performance are assigned to the "loser" portfolio, and those with the highest past performance are assigned to the "winner" portfolio. These portfolios are equally weighted at formation and held for the next six months. The monthly average return and standard deviation of the zero-cost (winner–Loser) internationally diversified relative strength portfolios are for the sample periods 1981–1994 (Panel A) and 1989–1994 (Panel B). The *t*-statistic is the mean return divided by its standard error.

composition, the mean return of the zero-cost portfolio is a statistically significant 0.37% per month. However, the profit is lower than the 0.53% reported for the unrestricted strategy. These profits are also much lower than those documented for more developed markets.

Table 4, Panel A, also reports the excess returns to the winner–loser portfolios by individual countries. The average excess returns figure is positive for each of the six sample countries, with the highest in Taiwan (0.6%) and the lowest in Malaysia (0.19%). However, not all the excess returns are significantly different from zero, and as expected, their standard deviations are more than twice that of the country-neutral momentum strategy.

The momentum returns reported in Panel A suggest that a large portion of the risk of the unrestricted momentum strategy can be attributed to country-specific factors. These factors are diversified internationally in the country-neutral strategy. This finding reinforces the view that it is difficult to find significant price momentum in individual emerging stock markets (see Rouwenhorst 1999).

Emerging markets have undergone some regulatory changes over the last two decades. During the first half of our sample period, there were restrictions on foreign investments in some of the sample countries, such as South Korea and Taiwan. However, since the late 1980s, international investors have been allowed greater access to emerging stock markets, and foreign equity ownership has been relaxed (see Bekaert and Harvey 1997).

We examine the evidence on relative strength portfolio returns for the last six-year subperiod, 1989–1994. Although the choice of 1989 as the starting year is arbitrary, we note that most markets in our sample liberalized foreign equity participation in 1989.

We report the post-1989 results in Panel B of Table 4.[5] Implementing a country-neutral strategy over this subperiod reduces the average momentum return to 0.26% and it is no longer significant. Hence, there is insufficient evidence on the price momentum phenomenon in the post-1989 period when the Asian markets were less segmented.

Comparison of Asian and U.S. Momentum Strategies

One of our goals is to provide out-of-sample evidence on the profitability of U.S. momentum strategies. In this section we evaluate the extent to which the country-neutral momentum profits in the Asian markets are similar to, or independent of, the U.S. findings.

To provide a relevant benchmark, we compare the results for the U.S. momentum portfolios over the same periods.[6] For the 1981–1994 period, we find a statistically significant 1.22% momentum profit, which supports the findings in Jegadeesh and Titman (1993). Although the Asian and U.S. benchmarks produce statistically significant momentum profits, there is low correlation in their momentum returns. The sample correlation between the U.S. and Asian momentum returns is an insignificant 0.09, indicating that the Asian data provide independent evidence on momentum strategy. We also find an insignificant profit for the U.S. data over 1989–1994. The average U.S. momentum return for 1989–1994 is 0.97%, with a *t*-statistic of 1.32. The evidence points to nonstationarity in momentum returns over time, across both the U.S. and Asian markets. The evidence is especially strong in the later part of the sample period.

[5] The returns to implementing an unrestricted relative-strength strategy in the later subperiod are similar to those in the whole period. The average relative-strength portfolio return in Panel A ranges from −0.89% (for the $J = 12$, $K = 12$ strategy) to 0.37% (for the $J = 6$, $K = 6$ strategy). Again, none of the sixteen strategies yields significant momentum returns.

[6] We are grateful to Geert Rouwenhorst for providing the six-month U.S. momentum (winner–loser) portfolio returns using all NYSE and AMEX firms (also see Rouwenhorst, 1998, for details).

There are similarities in the evidence on momentum profits. However, a direct comparison of the evidence from U.S. and Asian markets is inherently difficult because there are differences in several dimensions, such as number of securities traded, size, turnover, and return characteristics. Some of these differences make it more difficult to detect momentum profits in the Asian markets. One implication of our findings is that the risk factors that drive price momentum may not be the same in these markets.

Size and Relative Strength Strategies

Fama and French (1996), among many others, show that firm size is an important factor that affects expected returns. Hong, Lim, and Stein (2000) find that the momentum effect in the U.S. securities is strongest in small firms and declines sharply as market capitalization increases. Hong, Lim, and Stein argue that firm-specific information, especially negative information, circulates only gradually through the investing public. If price momentum results from gradual information flow, there should be relatively stronger profits in those stocks for which information gets out slowly, that is, small stocks.

To examine whether the small firm price momentum holds in Asian markets, we consider a size-country-neutral strategy. We construct the size-country-neutral portfolios by first ranking all the stocks in the six countries into three size groups: small (lowest 30%), medium (middle 40%), and large (highest 30%). We measure firm size by the market value of equity in US$. This measure produces eighteen size-country groups. Stocks in each of the eighteen groups are further ranked according to their past six-month performance.

Table 5 shows that the average zero-cost portfolio return to the six-month strategy that is size-country neutral is insignificant at 0.19%. Among the size-sorted country-neutral portfolios, we find a higher average profit (and standard deviation) of 0.46% for the smallest firms, which is marginally significant. Our findings support those of Hong, Lim, and Stein (2000) and suggest there are significant (noncountry) sources of noise in the returns of small firms, which increase the volatility of momentum profits. Overall, momentum profits reported for all three size portfolios are not significant at conventional levels.

For completeness, we control for the size effect and report the excess returns for each country. The size-neutral strategy shows significant excess returns for only one of the six countries (Taiwan).

Turnover and Relative Strength Strategies

Several recent studies indicate that investors are particularly interested in trading volume (turnover), and that volume might influence the behavior of return momentum. Lee and Swaminathan (2000) suggest that turnover might indicate the level of investor interest in a stock. For example, the low-turnover losers are likely

TABLE 5. Returns Size-Country-Neutral Relative Strength Portfolios.

Portfolio	Mean	Std. Dev.	*t*-statistic
All stocks (size and country neutral)	0.0019	0.0170	1.53
Size-neutral country portfolios:			
Hong Kong	0.0011	0.0537	0.26
Malaysia	0.0006	0.0311	0.25
Singapore	−0.0012	0.0356	−0.45
South Korea	0.0014	0.0236	0.80
Taiwan	0.0084	0.0515	2.19
Thailand	0.0010	0.0438	0.76
Country-neutral size portfolios:			
Small	0.0046	0.0326	1.89
Medium	0.0015	0.0217	0.95
Large	−0.0003	0.0239	−0.19

Note: At the end of each month, we rank all stocks in ascending order, based on their past six-month returns, relative to other stocks in the same size-country group. Those with the lowest past performance are assigned to the "loser" portfolio, and those with the highest past performance are assigned to the "winner" portfolio. These portfolios are equally weighted at formation and held for the next six months. The monthly average return and standard deviation of the zero-cost (winner–loser) internationally diversified relative strength portfolios are for the sample period 1981–1994. We assign the stocks of each country into size groups relative to other stocks in the same country. "Small" corresponds to the bottom 30%, "medium" to the middle 40%, and "large" to the largest 30%. The *t*-statistic is the mean return divided by its standard error.

to be at the bottom of their "life cycle" and a price reversal is likely, whereas the high-turnover losers may have plenty of negative price momentum. Chan, Hameed, and Tong (2000) show that the momentum profits are higher for a portfolio of countries with higher lagged trading volume than for a portfolio of countries with lower lagged trading volume. These studies suggest that higher trading volume accentuates the return-continuation effect.

We use turnover-country-neutral strategies to examine the role of stock turnover on price momentum in our sample countries. We define turnover as the ratio of monthly trading volume divided by the number of shares outstanding. To account for differences in country-specific turnover characteristics (such as institutional design), we rank securities within each country by turnover. For each country, we rank the top (bottom) 30% of securities into high- (low-) turnover groups. The middle 40% of securities represent the medium-turnover group. This procedure generates eighteen momentum (winner–loser) decile portfolios sorted by country and turnover.

Table 6, Panel A, shows the return on zero-cost relative strength portfolio strategy applied to the high- and low-turnover groups in each country. The low-turnover securities in all six countries do not show price momentum. However, we find significant momentum profits for high-turnover portfolios in two of the six countries, Malaysia and South Korea. Although this appears to indicate that high turnover significantly accentuates price momentum in Malaysia and South

TABLE 6. Returns of Turnover-Sorted and Turnover-Country-Neutral Relative Strength Portfolios.

Panel A. Breakdown of Turnover Portfolios by Country

Portfolio		Winner	Loser	Winner–Loser
Hong Kong	High turnover	0.0123	0.0105	0.0019
	(*t*-statistic)	(1.88)	(1.40)	(0.32)
	Low turnover	0.0136	0.0106	0.0030
	(*t*-statistic)	(1.98)	(1.41)	(0.54)
Malaysia	High turnover	0.0329	0.0175	0.0154
	(*t*-statistic)	(3.69)	(2.35)	(4.04)
	Low turnover	0.0012	0.0007	0.0005
	(*t*-statistic)	(0.40)	(0.23)	(0.24)
Singapore	High turnover	0.0169	0.0107	0.0062
	(*t*-statistic)	(2.65)	(1.63)	(1.75)
	Low turnover	0.0081	0.0125	−0.0044
	(*t*-statistic)	(2.12)	(2.67)	(−1.06)
Thailand	High turnover	0.0138	0.0238	−0.0100
	(*t*-statistic)	(2.79)	(2.54)	(−1.11)
	Low turnover	0.0134	0.0040	0.0091
	(*t*-statistic)	(1.32)	(0.54)	(1.09)
Taiwan	High turnover	0.0170	0.0222	−0.0052
	(*t*-statistic)	(1.82)	(2.05)	(−1.00)
	Low turnover	0.0131	0.0040	0.0091
	(*t*-statistic)	(1.32)	(0.54)	(1.09)
South Korea	High turnover	0.0299	0.0218	0.0081
	(*t*-statistic)	(4.38)	(3.50)	(2.46)
	Low turnover	−0.0019	0.0003	−0.0023
	(*t*-statistic)	(−0.57)	(0.08)	(−0.78)

Panel B. Country-Neutral Turnover Portfolios

Portfolio	Mean	Std. Dev.	*t*-statistic
Low	0.0006	0.0294	0.28
Medium	0.0004	0.0195	0.29
High	0.0029	0.0316	1.25
All stocks (turnover and country neutral)	0.0011	0.0181	0.82

Note: At the end of each month, we rank all stocks in ascending order, based on their past six-month returns, relative to turnover-country group (Panel A). "Low" corresponds to the bottom 30%, "medium" to the middle 40%, and "high" to the largest 30%. Those with the lowest past performance are assigned to the "loser" portfolio, and those with the highest past performance are assigned to the "winner" portfolio. These portfolios are equally weighted at formation and held for the next six months. Panel A gives the breakdown of monthly average return for the winner, loser and the winner–loser portfolios for the high- and low-turnover groups within each country (*t*-statistics in parentheses) for the sample period 1981–1994. Panel B reports the internationally diversified (country-neutral) relative strength portfolio by turnover group.

Korea (with significant average profits of 1.54% and 0.81%), we do not find any systematic effect of turnover on price momentum in the other four countries.

Moreover, after equally weighting each turnover group in every country (country-neutral portfolio), we do not find significant profits. Although forming

country-neutral portfolios helps achieve lower volatility through diversification, it also reduces the significance of the price momentum. The return to the winner–loser portfolio for the highest turnover group is 0.29% and is statistically insignificant (see Panel B). Hence, the average return-continuation effect in the high-turnover securities does not hold across all countries.

Significant momentum profits are limited on taking bigger bets on high-turnover securities in Malaysia and South Korea. The turnover-country-neutral relative strength return, obtained by taking the average profits across all eighteen turnover-country portfolios, yields an insignificant 0.11%. Hence, incorporating a turnover variable to segment the securities does not alter our initial finding that price momentum is not a common phenomenon in Asian markets.

V. Conclusions

We use a sample of six emerging Asian stock markets to examine the presence of momentum in prices of past winners and losers. Unlike studies of the U.S. and European markets, we find little evidence to support the prevalence of price momentum in the Asian markets. When we apply unrestricted momentum trading strategies, which consist of long positions on past winners and short positions on past losers, across six Asian stock markets over various holding periods ranging from three to twelve months, our strategies consistently produce insignificant profits.

When we spread the portfolio weights to achieve a country-neutral (regionally diversified) portfolio, we significantly reduce the momentum portfolio volatility. The country-neutral momentum portfolio yields a small, but statistically significant, average positive return of 0.37% per month over a six-month holding period. These results underscore the influence of country factors on momentum profits in these highly volatile markets. However, additional analyses show that when we control for size and turnover effects, the country-neutral profits dissipate. Although we find some evidence of momentum in high-turnover securities, these profits are not significant across all markets. The Asian momentum returns are uncorrelated with the evidence reported in the United States.

Overall, we do not find strong evidence for price momentum in Asian stock markets. Because the evidence is independent of the U.S. data, it suggests that the existing explanations for momentum profits may not hold across all markets. For instance, if momentum returns in the United States are due to underreaction to information contained in past prices, we do not find the same behavioral phenomenon in the Asian markets. If momentum profits are due to differences in risk, our findings suggest that the risk factors that drive price momentum differ across markets.

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