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Investing in hedge funds: Risks, returns and Pitfalls

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Earnings Momentum in International Markets

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Earnings Momentum in International Markets

Abstract

This paper examines the profitability of earnings momentum strategies based on analyst forecast revisions in eleven international equity markets. While analyst forecast revisions exhibit persistence in all countries, the profitability of trading strategies based on these revisions varies. Specifically, earnings momentum yields significant profits in Australia, Canada, France, Germany, Hong Kong, and the United Kingdom, but not in Malaysia, South Korea, Japan, Singapore, or Taiwan. Interestingly, price momentum exists only in those countries where earnings momentum is profitable. In general, markets with high levels of corruption (low investor protection) exhibit weak momentum. Collectively, these findings suggest that the momentum phenomenon is related to information dissemination mechanisms within a country.

1. Introduction

Since the seminal work of Jegadeesh and Titman (JT; 1993), researchers have sought to understand the momentum phenomenon. The empirical fact that the price of recent winners (losers) continue to rise (drop) over intermediate horizons (defined as 3 to 12 month) is puzzling, because it appears to defy even weak-form market efficiency. The academic debate over the source of this phenomenon has also drawn considerable attention from financial practitioners, because the magnitude of this phenomenon seems to imply economically exploitable trading opportunities.

In this study, we investigate the source of the momentum phenomenon using analyst earnings forecasts revisions from eleven international equity markets. Specifically, we investigate whether under-reaction to earnings news is a source of returns continuation in those markets that do exhibit price momentum. Prior studies show that price momentum exists in some international markets, but not in others (e.g., Rouwenhorst (1998), Hameed and Yuanto (2001), Chui, Titman and Wei (2000)). However, the source and nature of this empirical regularity remains a mystery. Our study tests the validity of alternative explanations for price momentum by examining the speed of stock price reaction to earnings news in different markets.

Our empirical design exploits several useful characteristics of analyst forecast revisions. Unlike earnings announcements, individual analyst forecast revisions take place throughout the year. Because of their frequency and timeliness, these revisions have become a vital source of information for many users of corporate financial reports.¹ In international markets, where corporate earnings are often reported on a bi-annual or annual basis, the advantage of the forecast revision signal can be particularly pronounced. Yet, to our knowledge, no study has examined the usefulness of analyst forecast revisions for returns prediction in an international setting.

¹ See Gleason and Lee (2003) for a recent summary of U.S. evidence related to the predictive power of analyst forecast revisions for future returns.

Our primary conjecture is that price momentum and earnings momentum are related. This hypothesis derives from recent behavioral models (e.g. Barberis, Shleifer and Vishny (BSV; 1998) and Daniel, Hirshleifer and Subrahmanyam (DHS; 1998)) in which investors' mistaken beliefs are proposed as a possible explanation of price momentum and post-event price drifts. In these models, stocks (or countries) that feature greater information uncertainty will exhibit greater momentum effects.²

According to these models, both price momentum and earnings momentum are manifestations of similar cognitive biases that plague market participants. Summarizing three such models, Hirshleifer (2001) specifically predicts a linkage between price momentum and post-earnings-announcement drift:

“... Barberis et al. (1998) and Daniel et al. (1998), but not Hong and Stein (1999), further imply that those countries or sets of securities with strongest momentum effects should also have strongest post-earnings-announcement drift.”

A secondary conjecture of our study is that the momentum phenomenon is related to specific institutional features of a country's information dissemination mechanism. Behavioral explanations for momentum invoke investor cognitive biases that lead to over- or under-reaction. However, to the extent that these behavioral biases are universal in nature, they cannot explain the existence of momentum in some markets, and its absence in others. The same criticism applies to risk-based explanations, because extant evidence suggests that risk factors are similar in global markets (e.g., Fama and French (1998), Patel (1998) and Rouwenhorst (1999)), and that differences in country-specific risk cannot explain the existence or absence of price momentum across countries. In this

² In BSV, the *conservatism bias* of the representative investor causes insufficient revision to new public information, leading to market underreaction. This bias is most pronounced when firm value is uncertain, leading to stronger momentum effects. In DHS, underreaction to public signals arises due to investors' *overconfidence* in the validity of their own private signals. Stocks that are more difficult to value tend to generate greater overconfidence among investors, leading to stronger momentum effects. Hong and Stein (HS; 1999) is silent on this issue.

study, we explore institutional features that could lead to sluggish price adjustments to firm-specific news in some markets, but not in others.

Our results show that analyst forecast revisions exhibit persistence in all countries, but that the profitability of trading strategies based on these revisions varies across countries. Specifically, we find that forecast revision strategies yield significant profits in Australia, Canada, France, Germany, Hong Kong, and the United Kingdom, but not in Japan, Korea, Malaysia, Singapore, or Taiwan. In the first six countries, returns to zero-investment strategies based on top and bottom quintile portfolios average close to 1% per month over the next 3 to 6 months. In the second set of five countries, returns to forecast revision strategies are also generally positive, but not economically or statistically significant.

Consistent with the predictions of DHS and BSV, we find that price momentum exists only in those countries where earnings momentum is profitable. In the first six countries (momentum countries), zero-investment price momentum strategies based on top and bottom quintiles average more than 1% per month over the next 3 to 6 months. In the second set of five countries (non-momentum countries), returns to similar price momentum strategies are generally negative. Moreover, in those countries that do exhibit momentum, we find that both price and earnings revision signals have the incremental power to predict future returns – i.e., neither variable is dominated by the other.

These findings provide additional insights into the source of the momentum phenomenon. The one-to-one correspondence between earnings momentum and price momentum across 11 countries suggests that both are related to investor under-reaction to the public disclosure of firm-specific news. However, the incremental nature of the earnings and price signals, in terms of their ability to predict future returns, implies that the information investors under-react to is not entirely captured by either variable. In other words, both earnings revisions and past returns are likely to be imperfect proxies for some underlying construct (e.g., recent firm-specific news of a broad nature).

In further analysis, we explore a number of country-level characteristics that might help to explain the existence of momentum effects in some countries but not in others. Our investigation focuses on measures of investor protection and/or insider trading legislation. Specifically, we propose that the level of investor protection is negatively correlated with momentum effects. In countries where the level of investor protection is low and insiders are free to trade on their information, investors do not need to infer the existence of good/bad news from the actions of others. In these markets, prices quickly reflect the information held by insiders, thus weakening momentum effects.

Our proposition derives in part from several recent studies that explore the effect of information dissemination mechanisms on market behavior. First, Bhattacharya et al. (2000) show that, in Mexico, corporate news announcements are not accompanied by any abnormal returns, return volatility, trading volume, or bid-ask spread movements. They provide evidence suggesting that unrestricted insider trading causes Mexican stock prices to fully incorporate the information before its public release. Second, Chui, Titman and Wei (2000) show that the common law/civil law distinction provides a perfect indicator of whether or not a market exhibited price momentum prior to the 1997 financial crisis in Asia.

These findings suggest that investor protection legislations and laws that curtail insider trading could exacerbate momentum effects. In the parlance of BSV and DHS, these laws could foster an environment of information uncertainty, which in turn leads to stronger momentum effects. We proxy for this construct using four empirical measures: (1) the Efficiency of the Judicial System (JE); (2) the quality of Accounting Standards governing corporate disclosures (AS); (3) the extent of Insider Trading Laws (IL); and (4) the Corruption Perception Index (CPI), a broad measure of the level of perceived corruption within a country.³

³ These variables have appeared in prior studies examining the relation between law and finance. For example JE and AS were developed by La Porta et al. (1998); IL appears in Beny (1999), and Gaillard (1992)); and CPI, which has been used in many studies, is available from www.transparency.org. See Table VIII for a more detailed description of each variable.

The power of these tests is limited, of course, by the fact that our sample features only 11 countries. Nevertheless, we find suggestive evidence that markets with high levels of corruption (low investor protection) generally exhibit weaker momentum effects. The best single explanatory variable for cross-country variations in momentum effect is CPI. This variable is strongly correlated with the profitability of momentum strategies even after controlling for country-level betas.

Collectively, our evidence suggests a link between momentum and information dissemination mechanisms within a country. Specifically, we find that price momentum exists only when earnings momentum strategies are profitable. Moreover, the existence of momentum appears to require institutional constraints that limit the arbitrage actions of more informed traders. When insiders and other informed parties have relatively unrestricted trading privileges, momentum effects are economically insignificant.

The remainder of the paper is organized as follows. Section 2 discusses related prior literature. Section 3 covers data issues. Section 4 presents the empirical results on earnings momentum, price momentum and the relation between the two effects. Section 5 investigates country characteristics that could potentially help explain the existence of momentum in some countries. Section 6 concludes the paper.

2. Related Literature

Two different explanations have been put forward to explain the momentum effect in the literature. One explanation argues that high momentum stocks tend to earn higher future returns because they are fundamentally riskier and thus have higher expected returns (e.g., Conrad and Kaul (1998), Moskowitz and Grinblatt (1999)). However, the weight of the evidence to date appears to suggest that conventional risk factors do not explain the momentum effect (e.g., Fama and French (1996), Grundy and Martin (1998), Jegadeesh and Titman (2002)). The other explanation is based on behavioral theories that predict either investors' under-reaction or over-reaction to fundamental news (e.g., DHS, BSV, and HS). These theories have acquired considerable currency in recent years. However,

they have also been criticized for their ad hoc nature, and inability to generate specific testable hypotheses (e.g., Rubinstein (2000)).

The evidence from international markets has only elevated the debate. For instance, Rouwenhorst (1998) documents price momentum in eleven of the twelve European stock markets. In contrast, several other studies find that momentum strategies are not consistently profitable in certain emerging markets and Pacific basin markets. Hameed and Yuanto (2001) find that none of the six Asian countries in their sample exhibits price momentum, although a diversified country-neutral strategy generates small but statistically significant returns. Similarly, Chui, Titman and Wei (2000) find that individually, in eight Asian markets, a zero-investment momentum strategy is statistically profitable only in Hong Kong, although it is profitable when implemented simultaneously on the seven stock markets outside Japan. The fact that momentum exists in some countries but not in others is problematic for both behavioral and risk-based explanations.

In this study, we attempt to shed light on the debate by examining the profitability of earnings revision strategies in international settings. Research in the U.S. has documented market under-reaction to various types of earnings-related information (e.g., Givoly and Lakonishok (1979), Bernard and Thomas (1990)). Comparing the profitability of various momentum strategies, Chan, Jegadeesh, and Lakonishok (1996) conclude that past earnings surprises, analyst forecast revisions, and past stock returns, all have independent explanatory power for future returns. They speculate that the earnings momentum effect is caused by the market's under-reaction to short-term earnings information, while the price momentum effect is due to the market's under-reaction to a broader set of information. Our study extends this analysis to international markets, and examines the correspondence between price and earnings momentum under various institutional settings.

3. Data and Sample Description

Our sample includes firms from eleven markets: Australia, Hong Kong, Japan, Korea, Malaysia, Singapore, Taiwan, Canada, France, Germany, and the United Kingdom.

Stock prices and market capitalization datasets are obtained from Datastream. Analyst earnings forecasts data is obtained from the I/B/E/S International Summary file. The sample period begins in January 1987, the first month for which I/B/E/S provides data on analyst forecasts on international firms, and extends to December 2001.

To be included in this analysis, companies must be listed on a major exchange(s) in its home country – i.e., we exclude cross-listed foreign stocks. It must also be in both the Datastream and I/B/E/S databases. To allow for a reasonable number of firms for cross-sectional analysis, we only include countries with at least 200 stocks that meet our stock selection criteria as of December 2001.

Our country characteristic data comes from several sources. The Corruption Perception Index (CPI) is obtained from transparency international (www.transparency.org). This variable is a poll of polls from independent institutions. It reflects the perceptions of business people, academics, and country analysts on the degree of corruption in government and public administration. Our measure of the severity of insider trading laws is derived from Beny (1999). Other country characteristics such as the efficiency of the judicial system and accounting standards are obtained from La Porta et al. (1998).

Previous studies have noted that the quality of international stock market data, especially in the emerging markets, is not as good as the U.S. data. We also faced this problem in both Datastream and I/B/E/S data. In almost all the countries in our sample, we found cases of monthly return exceeding 20,000 percent, and one-year-ahead earnings (FY1) forecasts that are greater than 50 times of the current stock prices. To resolve these issues, we exclude firms whose market capitalization or price is below the 5th percentile of all the stocks within each country in each month. We also assign as missing, any value below the 1 percentile and above the 99 percentile of the return distribution in each month for each country. This simple filtering process allows us to weed out all suspicious stock return and earnings forecast revision numbers. This procedure also helps alleviate potential illiquidity problems associated with low-priced or extremely small stocks.

Table I reports descriptive statistics for each country during our sample period. The first two columns report statistics for Datastream firms; the next two columns report statistics for I/B/E/S firms; columns 5 and 6 report statistics associated with firms that are in both data sets. For each country, we report the average number of qualifying firms in each month (# of firms), as well as the average of median market capitalizations in each month in billions of US dollars (MV). Start Date is the first month in which we begin to implement earnings and price momentum strategies in each country. The last four columns report local currency returns, expressed as percentage per month, between the starting date and December 2001. EW Mean and VW Mean refer to the average equal-weighted and value-weighted returns, respectively.

Table I shows that over 75% of the Datastream firms are also included in I/B/E/S.⁴ Because I/B/E/S adds a company to their database only if there is at least one analyst making a forecast on the company, our final sample tends to include the bigger firms in each country. There are more firms toward the end of our sample period for both Datastream and I/B/E/S. Across the 11 countries, Japan had the largest average number of qualifying firms each month (812), and Singapore had the fewest (112). Korean firms had the lowest median market capitalization (290 million U. S. dollars), and Japanese firms had the highest median market capitalization (3.02 billion U. S. dollars).

All returns are reported in local currency⁵ because we only study momentum effect within each market. During our sample period, Hong Kong has the highest value-weighted returns (average of 1.17 percent per month), and Japan had the lowest (-0.02 percent per month). Average monthly returns for Taiwan, Korea, and Hong Kong exhibit the highest volatility, and average monthly returns for Canada, the U. K., and Australia, were least volatile.

⁴ Specifically, Datastream contains 8,720 firms, of which 6,765 also appears in I/B/E/S.

⁵ The data on I/B/E/S are in French Franc for France and Deutsche Mark for Germany prior to January 1999. We convert these data to Euro using the exchange rates from I/B/E/S.

4. Earnings Momentum, Price Momentum and Forecast Revision

4.1. Earnings Momentum and Future Forecast Revisions

4.1.1. Methodology

Our earnings momentum strategy is implemented for each country individually. From July 1987 to June 2001⁶, we rank stocks within each country on the basis of the change in their consensus one-year-ahead (FY1) earnings forecast at the end of each month, scaled by price. If analyst estimates are not revised in a given month, the earnings forecast revision from month t to $t-1$ is zero for that stock. We compute the cumulative price-deflated revision in analyst earnings forecasts over recent months ($REV_{i,t}$) as a measure of earnings momentum.

We implement two sets of earnings momentum strategies with different ranking periods. In the first set of strategies, we rank stocks based on their past 3 month forecast revisions, while in the second set of strategies we rank stocks based on their past 6 month revisions. For purposes of illustration, we use the second set to describe our strategy details and report results from both sets of strategies in Table II.

The forecast revision over the past 6 months for firm i in month t is defined as:

$$REV_{i,t} = \sum_{j=0}^5 \frac{rev_{i,t-j}}{p_{i,t-j-1}}$$

where $rev_{i,t}$ is the change in analyst earnings forecasts in month t for firm i .

In most months, $rev_{i,t}$ is defined as firm i 's mean *FYI* earnings estimate in month t minus its mean *FYI* estimate in month $t-1$. However, in the month when a firm announces its fiscal earnings, analysts' earnings forecasts switch to the new fiscal years after the

⁶ The earnings momentum strategy starts from September 1989 in Korea and from December 1989 in Taiwan. The starting date for these two countries are later than the other countries because we also require that there be at least 30 stocks in the extreme quintile portfolios, and there were too few observations in the first 2-3 years in these two countries.

announcement, and the *FYI* estimates in two consecutive months could be forecasts for two different fiscal years. We make several adjustments to ensure that the change in earnings forecast is the difference between two consecutive forecasts for the same fiscal year. Suppose a firm announces its earnings in month t . If the announcement date is before the date when I/B/E/S compiles the mean estimate in that month, $rev_{i,t}$ is defined as its mean *FYI* estimate in month t minus its mean *FY2* estimate in month $t-1$. On the other hand, if the announcement occurs after I/B/E/S compiles the mean estimate in that month, then $rev_{i,t}$ is still defined as the difference between month t and $t-1$'s mean *FYI* estimates, but $rev_{i,t+1}$ is defined as the mean *FYI* estimate in month $t+1$ minus the mean *FY2* estimate in month t .

As a robustness check, we also used a second definition of forecast revision, defined as the difference in *FYI* earnings estimate at month t and month $t-6$, scaled by stock price at the end of month t :

$$REV_{i,t} = \frac{FY1_{i,t} - FY1_{i,t-6}}{P_{i,t}}$$

Again we made the necessary adjustments if the fiscal year switches between month $t-6$ and t . The results using this alternative definition are essentially the same as those using the first definition. So for brevity, we just report results using the first definition.

Researchers have also used two other measures of earnings surprises: the most recent standardized unexpected earnings (SUE) and the cumulative abnormal stock return around the most recent earnings announcement date (ABR). We focus on past earnings estimate revisions for a number of reasons. First, the use of data related to past earnings announcements (SUE or ABR) is problematic in international settings, where firms typically report earnings on an *annual* basis.⁷ Therefore, if we rank stocks on the basis of their most recent SUE or ABR, the information on earnings surprise could be quite stale.

⁷ Quarterly earnings data are available in Canada. Semi-annual earnings data are available in Japan.

Second, the expectation model for annual earnings is extremely noisy. Time series models for expected earnings using annual data have little power. Moreover, model parameters are difficult to estimate given our relatively short sample period. Finally, even though analyst forecasts may be collectively biased, an upward or downward revision in a specific firm's consensus estimate should still convey information about a firm's improving (deteriorating) fundamentals. Indeed, Chan et al. (1996) find that in the U.S., momentum profit based on revision in analyst forecasts (9.7% over the first year after portfolio formation) is higher than those based on SUE (7.5%) or ABR (8.3%).⁸

After the stocks are ranked, they are assigned to one of five quintile portfolios in each month. The bottom quintile portfolio contains stocks with the most unfavorable earnings forecast revisions, while the top quintile portfolios are the stocks with most favorable revisions. Our trading strategy is implemented as in Jegadeesh and Titman (1993): we construct overlapping portfolios and compute equal weighted returns for each portfolio in each month. For instance, for a holding period of six months, the portfolio with the most favorable revisions in a given month (E5) consists of six overlapping portfolios from the previous six ranking months. Returns for the E5 portfolio is the simple average return of the six portfolios formed in each of the past six months. If a stock's return is missing during the holding period, we replace it with the corresponding value-weighted market return. The earnings momentum portfolio is the zero-investment portfolio that buys the most favorable revision portfolio and sells the least favorable revision portfolio (E5-E1) in each month.

Our strategy differs slightly from Jegadeesh and Titman (1993) in one respect. After ranking stocks according to their past returns, JT skip one month before buying stocks to avoid bid-ask spread and stock price reversal in the very short term. We do not skip one month here for two reasons. First, we rank stocks based on their earnings and not past returns information, so our signal is not subject to the no bid-ask spread problem. Second,

⁸ Concerned with noise in the revision measure, particularly among low coverage firms, we also performed the same analysis using only stocks that have at least two analysts providing forecasts. However, the results are essentially the same as the results using the whole sample. For brevity, we only report the results using the whole sample.

almost all earnings consensus estimates are available between the 10th and the 20th day of the month, so we have already skipped about a half-month when we start holding positions at the beginning of next month.

4. 1. 2. Earnings Momentum Strategy Returns

Table II summarizes the average monthly returns on these long-short portfolios formed from July 1987 to June 2001. Panel A reports results based on past three month earnings revisions and holding period of 1, 3 and 6 months. Panel B reports results based on past six month revisions.

These results show that an earnings momentum strategy is not consistently profitable across all markets. Six countries (Australia, Canada, France, Germany, Hong Kong, and United Kingdom (UK); Earnings Momentum Countries, hereafter) exhibit positive profits that are statistically significant. For example, in the UK, with a holding period of six months, the portfolio with most favorable forecast revisions in the past six month (E5) earns 1.11% per month and the portfolio with least favorable revisions (E1) earns 0.15% per month. The difference between E5 and E1 is 0.96% per month (t value = 5.22). More importantly, the difference in average monthly returns between E5 and E1 is significantly positive in all combinations of ranking period (3 or 6 months) and holding period (1, 3 or 6 months).

In the other five countries (Japan, Korea, Malaysia, Singapore, Taiwan; Non-Earnings Momentum Countries, hereafter), we find no statistically reliable evidence of earnings momentum. Strategies based on past 3-month forecast revisions generate positive returns over most holding periods. However, none of these returns are statistically significant. Among these countries, Singapore exhibits the strongest earnings momentum effect. But even in Singapore, the average returns to the revision-based strategy are less than half of those experienced in the earnings momentum countries.

Among all countries, momentum profits decrease with the length of the holding period. For example, with a 6-month ranking period in Australia, the momentum strategy profits

(t-stat) are 1.30 (4.02), 1.18(3.98), 0.92 (3.60) for holding periods of 1, 3, and 6 months, respectively. Apparently return continuation is strongest during the first 3 months after portfolio formation. As the holding period increases, the continuation weakens, and can even turn into return reversals. For instance, with a 6-month ranking period in Taiwan, the profit is positive (0.06) for a 1-month holding period, but turns negative if the holding period increases to 3 or 6 month (-0.15 and -0.17).

To summarize, two salient facts emerge from this table: first, six countries show strong earnings momentum while five other countries do not. Second, among all countries, earnings momentum is most pronounced in the first 1 to 3 months, and becomes weaker as the holding period increases.

4. 1. 3. Relationship between Current and Future Revisions

It has been well documented in the U.S. that analyst forecast revisions exhibit persistence over time. For example, Gleason and Lee (2003) show that after an upward (downward) revision, other analysts are more likely to issue further upward (downward) revisions. They also find that the market continues to be surprised in the three-day event windows around these subsequent forecast revisions. On average, short-window event returns are predictable for up to the next six revisions (even after excluding all revisions that occur within two days of each other). They attribute this post-revision price drift to investors' failure to fully incorporate the implications of current forecast revisions for future revisions. As a result, the market continues to be surprised in the same direction as later analysts revise their forecasts.

In Table III, we explore the persistence of forecast revisions in each country. Table values represent the cumulative earnings forecast revisions over the next three (J=3) or six (J=6) months after portfolio formation, expressed as a percentage of price. As in Table 2, we report results for portfolios with the most favorable revisions (E5), portfolios with the least favorable revisions (E1), and the middle portfolios (E3). Panel A results are for portfolios formed on the past three-months (K=3), and Panel B results are for

portfolios formed on the past six months ($K=6$) of forecast revisions. We also compute the difference between E5 and E1.

Because table values represent cumulative price-deflated revisions over three or six months, and portfolios are formed monthly, these observations overlap. The time series of revisions for these portfolios are autocorrelated up to five lags for six-month cumulative revisions, and up to two lags for three-month cumulative revisions. Therefore, we compute t-statistics using Newey-West asymptotically consistent standard errors.

The average revisions on these portfolios are almost always negative. This is consistent with the fact that analyst forecasts tend to be initially over-optimistic, and are subsequently revised downward. More important are the results reported in the E5-E1 column, which are reliably positive for all countries. These results show that, in all 11 countries, stocks with the most favorable recent revisions continue to experience more favorable revisions over the next three to six months.

Consider UK as an example: in earnings momentum strategy based on past six month forecast revision, the E1 portfolio continue to have very unfavorable revision over the next six month after portfolio formation (-2.95%), while the average forecast revision on E5 portfolio is nearly zero (-0.13%). So the difference in earnings surprises between E5 and E1 is 2.82% (t statistics = 4.25) over the next six months. If this difference is not fully anticipated at the time of portfolio formation, investors will experience subsequent surprises in the same direction resulting, in returns continuation.

It is somewhat more surprising to observe a strong pattern of revision persistence in non-earnings momentum countries. Korea is an extreme example. Table II results show that earnings momentum strategies based on past six month revisions yield negative returns in Korea for holding periods of 1, 3 and 6 months. Yet Table III shows that the average cumulative forecast revision of E5-E1 is reliably positive in the three and six months after portfolio formation. The evidence suggests that the pattern of gradual information-

diffusion is observed among analysts in all countries even though return continuation is observed among only some countries.

Across the 11 countries, the strength of the revision continuation appears to be related to the magnitude of earnings momentum profits. The difference in future revisions between E5 and E1 is much larger for the six earnings momentum countries than for the five non-earnings momentum countries. Also, among the non-earnings momentum countries, those with positive earnings momentum profits (Japan, Malaysia, and Singapore) have stronger revision continuation than the countries with negative earnings momentum profits (Korea, Taiwan). So at least part of the earnings momentum profits is perhaps attributable to the strength of revision continuation and the contemporaneous price reaction.

Two conditions are necessary for mispricing to occur: (1) systematic noise trading, and (2) constrained arbitrage. Prior research suggests that persistence in analyst forecast revisions could arise from their tendency to herd,⁹ the sequential nature of individual revisions,¹⁰ or their general reluctance to provide negative information.¹¹ But revision persistence alone would not lead to returns continuation if investors are aware of analysts' tendencies, and can fully accommodate them in establishing prices. The fact that they are successful in doing so in some countries, and not in others, suggests that certain arbitrage forces are operating more effectively in some countries than in others. We explore this issue in more detail in later sections.

4.2 Price Momentum

In the previous subsection, we document that some markets adjust slowly to earnings information conveyed in analyst forecast revisions (earnings momentum), but that similar sluggish price adjustment does not exist in other markets. If the sluggish price adjustment to earnings news is driven by a country's market characteristics, we should

⁹ See Trueman (1994), Welch (2000).

¹⁰ Gleason and Lee (2003).

¹¹ See Miller (1977), McNichols and O'Brien (1997), and Scherbina (2001).

observe slow price adjustment not only to forecast revisions, but also to other types of firm-specific information.

In this section, we study price momentum effect in our sample countries. We are particularly interested in investigating whether price momentum is more pronounced in markets where stock prices under-react to earnings information. In other words, we investigate whether prices also adjust sluggishly to a broader set of firm-specific information in the markets where earnings momentum strategies are profitable. We also study the behavior of analyst revisions during the process of price adjustment to this broad set of new information.

4. 2. 1. Price Momentum and Its Relationship with Earnings Momentum

As a first step, we implement the standard K-1-J price momentum strategy as in Jegadeesh and Titman (1993). Similar to our earnings momentum strategies, the price momentum strategies are based on past three- and six-month ($K=3$ or 6) returns and we consider holding periods of one, three and six months ($J=3$ or 6). Table IV reports the average monthly returns for the past loser portfolio (P1), middle portfolio (P3), winner portfolio (P5), and the zero-investment, winner-loser (P5-P1) portfolio.

Consistent with prior research, we find statistically significant profits to price momentum strategies in Australia, Canada, France, Germany, Hong Kong and the UK. In these countries, the average return of the momentum portfolio (P5-P1) is statistically significant for almost all combinations of ranking period and holding period.¹² Interestingly, these are also precisely the countries that exhibit earnings momentum. Comparing the magnitude of price momentum profits and earnings momentum profits, we find that price momentum is stronger than earnings momentum in each of the six countries. Consistent with previous studies, we also find little or no return continuation in Japan, Korea, Malaysia, Singapore and Taiwan. The price momentum profits in these countries is either insignificant or negative for all combination of (K, J). Again consistent with our conjecture, these countries also exhibit no earnings momentum.

¹² The only exception is in Hong Kong when $K = 3, J = 1, 3$ and $K = 6, J = 1$.

Our findings thus far support the prediction by Hirsleifer (2001) – countries with the strongest price momentum effects also have the strongest earnings momentum effects.

It is possible that price momentum strategies are not profitable because return continuation happens mostly in the first month after portfolio formation. Our price-based strategies skip one month in between ranking and holding periods, and would not capture this effect. To investigate this possibility, we implement a strategy based on prior one month return and hold the stocks for one month immediately after ranking (i.e. 1-0-1 strategy). The results are reported in panel C of Table IV. Not surprisingly, we still find positive profit for the six momentum countries. However, momentum profit is strikingly negative in the five non-momentum countries. Thus we find no evidence of underreaction in these markets even over short horizons.

4. 2. 2. Future Forecast Revisions for Price Momentum Portfolios

Table V examines analyst forecast revisions during the holding period for various price momentum portfolios. This evidence addresses an important distinction between risk-based and mispricing-based explanations. If price momentum arises because investors do not fully understand the implications of past returns for future earnings news, we should observe a systematic relation between past returns and future analyst forecast revisions. Specifically, recent winners (losers) should display more (less) favorable forecast revisions over the next 3 to 6 months. Risk-based explanations, which assert that price momentum effects are due to cross-sectional risk differences, would make no such prediction.

Table V shows that analysts tend to revise earnings forecasts for past winners more favorably than for past losers in every country. We find a strong, monotonically increasing, pattern in the revisions from P1 to P5, and highly significant t-statistics for the P5-P1 portfolio in all eleven markets. Our evidence shows that the tendency for analyst forecast revisions to lag current returns is universal. However, as Table IV shows, this slow adjustment by analysts does not necessary lead to slow adjustment of prices. In the

five markets without price momentum, revision continuation exists, but prices seem not to exhibit such slow adjustment.

Van Dijk and Huibers (2002) study price momentum effects in the European markets. They find positive price momentum and revision continuation in those markets, and they conclude that the momentum effect is caused by analyst underreaction to new earnings information. However, our findings show that analyst underreaction is at most a necessary, but certainly not a sufficient condition, for price underreaction. Apparently arbitrage forces operate more effectively in some markets than in others.

4.3 Two-way Classifications based on Earnings and Price Momentum

An important unresolved issue is whether forecast revisions and past returns both have incremental ability to predict returns in international markets. If the price and earnings momentum are identical phenomena, perhaps we should not be surprised to find a one-to-one correspondence across different markets. On the other hand, U. S. evidence suggests that they are both under-reactions to correlated, but not identical, types of firm-specific information. We address this issue by examining earnings momentum while controlling for past returns, and by examining price momentum while controlling for past earnings forecast revisions.

At the end of each month, we rank stocks on the basis of their past six-month returns and assign them to one of the three equally-numbered price portfolios (P1, P2 and P3). We then independently rank the stocks based on their past six-month forecast revisions and assign them to one of the three equally-numbered earnings portfolios (E1, E2 and E3). Following these rankings, each stock belongs to one of nine portfolios. We consider standard K-1-J momentum strategies with holding periods of three and six months.

Table VI reports average monthly return for each of the nine portfolios. Returns to each strategy controlling for the other is also reported (see P3-P1 or E3-E1). The results indicate that in all six countries where both earnings momentum and price momentum are present, one effect is not subsumed by the other. This table shows that holding constant

price momentum (e.g. just consider stocks in the winner (P3) portfolios), stocks with favorable revisions in the past outperform stocks with unfavorable revisions (E3-E1 is positive), and the difference is significant in most cases. The opposite case is also true; when we hold past revisions at a certain level, recent winners outperform recent losers (P3-P1 is positive). For example, consider a 6-1-6 strategy in UK. Holding past forecast revisions fixed, past winners outperform past losers by 0.99 percent per month. On the other hand, holding past returns fixed, the portfolios with past favorable revisions outperform portfolios with unfavorable revisions by 0.51 percent per month.

These findings suggest that both momentum effects represent underreaction to similar, but not identical, types of information. We also observe that in all six momentum countries, price momentum profits while keeping past revisions fixed are greater than earnings momentum profits with fixed past returns. This is consistent with the univariate results in the previous two sections, reconfirming that underreaction to a broad set of information (conveyed by past returns) is stronger than underreaction to specific information such as earnings (conveyed by past forecast revisions).

Another interesting aspect of our findings is that in the five non-momentum countries, neither price momentum conditional on past revisions nor earnings momentum conditional on past returns is significant in most cases. We only observe significant positive earnings momentum profits in Japan and Singapore when the stocks in the winner portfolios are considered. Earlier, we showed that unconditionally, neither price momentum nor earnings momentum is significant in these countries. Combined with the results of these conditional momentum strategies, we conclude that underreaction to information is relatively weak or does not exist in these five countries.

As an alternative test, we also conduct Fama-MacBeth (1973) cross-sectional regressions for each country. Each ranking month, we regress the 6-month buy-and-hold return for each stock on its past six-month forecast revision, past six-month return, and firm size. To account for possible nonlinearities in the regression equations and to facilitate comparison between coefficients, we express each explanatory variable in terms of its

ordinal ranking and scale it cross-sectionally to $[0, 1]$. We run regressions on three models for each country individually.

Table VII reports the time-series averages of the slope coefficients, and their autocorrelation-adjusted t -statistics¹³. The regression results confirm our findings from the two-way classification momentum strategies. In the six momentum countries, taken individually or together, both past returns and past revisions have explanatory power for the future six-month return. The coefficients for past returns are larger than those for past revisions, consistent with the observation that price momentum strategies are more profitable than earnings momentum. In the five non-momentum countries, none of the coefficients on past revisions and past returns is significantly positive, indicating that stock prices do not underreact to information conveyed in analysts' forecast revisions or past returns.

5. Investor Protection and Momentum Effects

Our earlier results indicate that information diffusion and price adjustment processes operate quite differently across these 11 countries. While analysts respond sluggishly to recent firm-specific news in all markets, stock prices do not. Indeed, stock prices in some countries adjust quickly and in an unbiased manner to emerging news while those in other countries do not. In this section, we explore a number of institutional differences among these markets to explain why prices respond differently to information.

Our investigation focuses on aspects of the information dissemination mechanism within a country that could either hinder or enhance the market's ability to incorporate firm-specific news. Specifically, we are interested in factors that could potentially constrain informational arbitrage. As a starting point, we examine the amount of latitude given to insiders (or, conversely, the degree of protection provided to outside shareholders) within a country's regulatory system.

¹³ The t -statistics are adjusted up to 5 lags because the six month return in each monthly regression is measured over 5 overlapping intervals.

In markets where investors are poorly protected, it is quite likely that prices are established largely by corporate insiders. In such markets, corporate announcements have little or no information content (e.g., Bhattacharya et al. (2000)), and analysts have less incentive to invest in the acquisition of private information (Bushman et al. (2003)). At the same time, it is quite possible that in these markets arbitrage forces are better able to eliminate momentum effects.

We use several empirical measures to attempt to capture this underlying construct, described in Table VIII. Our primary proxy is the Corruption Perception Index (CPI), compiled by Transparency International. Corruption is the result of a combination of incomplete laws and poor law enforcement, and CPI captures this construct by integrating results from more than 12 different polls. Prior studies indicate that this variable is a useful proxy for the general level of corruption within a country (e.g., Lee and Ng (2002)). A high value for CPI indicates *low* levels of corruption or *high* levels of investor protection.

The CPI also has the advantage of being more available over our sample period. We also collected data for the efficiency of the judicial system (JE), and the quality of accounting standards from La Porta et al. (1998) (AS), and on insider trading laws from Beny (1999) (IL) (higher values for all three variables suggest higher judicial efficiency, stronger accounting standards and insider trading laws). However, these variables are either averages over a certain period or values measured at a point of time. In contrast, we have annual CPI data for each country from 1995-2001, and multi-year averages between 1988 and 1992. This data allow us to perform Fama-MacBeth regressions and improve the power of our tests.

Panel A in Table IX presents descriptive statistics for these country characteristic variables. Table values represent the average for each country over the sample period. The first two columns report average monthly returns to a winner-loser portfolio in each country, based on six-month estimation and six-month holding periods ($J=6$, $K=6$). The other columns report country characteristic variables. The first row of Panel B reports a

cross-sectional regression of CPI on the other three explanatory variables. As expected, the three variables (JS, AS, and IL) are highly positively correlated with CPI – over 80% of the variation in the level of corruption is explained by the three variables suggesting that stronger judicial efficiency, accounting standards, and insider trading laws are associated with lower levels of corruption.

The remaining rows in Panel B report cross-sectional regressions of earnings momentum profits (EMOM) and price momentum profits (PMOM) on various country characteristics. Individually, judicial efficiency (JE), accounting standards (AS), and Corruption (CPI) each have some ability to explain momentum effects. Insider trading laws (IL) do not appear correlated with the magnitude of these profits.¹⁴ The strongest relation is observed between CPI and momentum profits. This holds for both earnings and price momentum.

In Panel C, we conduct Fama-MacBeth cross-sectional regressions of annual momentum profits on CPI and country beta, estimated with respect to the value-weighted world market index. To the extent that corruption is a proxy for country-level risk, the insertion of beta in this regression should eliminate the relation observed in Panel B. However, our results show that country betas are negatively correlated with momentum profits. More importantly, the explanatory power of CPI for momentum is robust to the inclusion of country beta in this regression.

In summary, our findings suggest that country-level corruption is correlated with the profitability of momentum strategies in world markets. These results need to be interpreted with caution, as we have only 11 observations. Nevertheless, they do suggest a link between the profitability of momentum strategies and information dissemination mechanisms within a country.

¹⁴ We are not sure whether this result is due to the low power of these regressions, or the imprecision of this measure. Bushman et al. (2003) and others note that it might be the enforcement of insider laws rather than their existence that have a bearing on the way markets function within a country.

5. Summary and Discussion

The momentum phenomenon has generated much interest among both academics and practitioners. In recent years, researchers have looked to evidence from foreign markets to either confirm or reject the patterns observed in U. S. markets. Yet the international evidence has only elevated the debate. To date, this research has documented price momentum effects in most US and European markets, but not in most Asian and other emerging markets. At first blush, the success of momentum strategies in some countries but not others does not appear to be consistent with either risk-based or behavioral-based explanations.

In this paper, we investigate a related phenomenon in an international setting. We find that earnings momentum strategies, implemented using analyst forecast revisions, are not consistently profitable in the global markets. More importantly, consistent with the predictions of some behavioral models, we document a one-to-one correspondence between earnings momentum countries and price momentum countries. We also find that analyst underreaction to past information is a common phenomenon around the world. However, this behavior does not necessarily lead to momentum in stock returns. Using level of corruption as a proxy, we identify the level of investor protection as an important country characteristic that is highly correlated with both earnings and price momentum effects.

Our evidence appears most consistent with a behavioral model in which arbitrage costs vary across markets. In noise trader models, two conditions are necessary for mispricing to occur: (1) systematic noise trading, and (2) constrained arbitrage. Our evidence suggests that analysts underreact to past information in all countries. However, this effect alone would not lead to returns continuation if enough informed investors are aware of analysts' tendencies, and can fully accommodate them in establishing prices. The fact that they are successful in doing so in some countries, and not in others, suggest that certain arbitrage forces are operating more effectively in some countries than in others.

Our evidence suggests that the effectiveness with which arbitrage forces operate within a country is captured, in some measure, by its investor protection and accounting laws. Specifically, in countries with stringent investor protection laws (i.e. lower levels of corruption), momentum profits are generally higher. In countries with lax laws (i.e. higher levels of corruption), momentum profits are negligible.

Our evidence is limited by the nature of the data, and is by no means conclusive. We only have information on eleven countries, and there are many other potential market characteristics that could help explain the momentum effects. For example, cultural and institutional differences across Asian and European countries might offer a competing explanation. As data becomes more available, we hope that future researchers will expand our analysis to explore these and other possible explanations.

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Table I
Summary Statistics, January 1987 - December 2001

This table reports the average number of firms, the starting date, the average return and standard deviation of the return for each country included in the study. The data are obtained from two sources: Stock prices, market capitalization, book to market, volume data are obtained from Datastream. Analyst earnings forecasts data are obtained from the I/B/E/S International Summary file. To be included in our sample, a stock should have coverage on both Datastream and the I/B/E/S. The study only includes the countries with at least 200 stocks that qualify our stock selection criteria in December 2001. There are eleven countries included in our sample. Within each country, we exclude firms whose market capitalization is below 5% of all stocks available on Datastream in each month. We also exclude stocks whose return is below the 1 percentile or above 99% percentile of the return distribution in each month. The average number of firms for each country (**# of firms**) is the mean of the number of qualifying firms in each month from the starting date to December 2001. **MV** is the average of the median market capitalization in each month in billions of US dollars. **Start Date** is the date when we begin to implement earnings and price momentum strategies in each country. Returns are reported in local currency and are expressed as percentage per month between the starting date and December 2001. The last four columns give the average monthly equal-weighted (**EW Mean**) and value-weighted (**VW Mean**) returns and standard deviation (**Stdev**) using only the stocks that qualify all selection criteria for each country.

Country	Datastream		I/B/E/S		All Criteria		Start Date	Return in Local Currency			
	# of firms	MV	# of firms	MV	# of firms	MV		EW Mean	Stdev	VW Mean	Stdev
Australia	272	0.62	156	1.12	151	1.13	8707	0.37	4.82	0.73	5.16
Canada	387	0.49	253	0.72	242	0.72	8707	0.54	4.50	0.75	4.02
France	325	1.32	249	1.75	232	1.75	8707	0.73	5.61	0.94	5.76
Germany	379	1.27	270	1.70	268	1.70	8707	0.22	5.12	0.76	5.53
Hong Kong	291	0.68	164	1.21	160	1.21	8707	0.71	10.11	1.17	9.37
UK	689	1.45	534	1.82	532	1.82	8707	0.54	5.01	0.65	4.66
Japan	1748	1.60	814	3.02	812	3.02	8707	0.04	7.08	-0.02	6.02
Korea	508	0.19	348	0.29	347	0.29	8909	0.71	10.25	0.57	10.11
Malaysia	305	0.30	166	0.47	166	0.47	8707	1.00	11.07	0.76	9.26
Singapore	169	0.43	113	0.59	112	0.59	8707	0.63	9.73	0.37	7.14
Taiwan	312	0.83	232	1.01	228	1.01	8912	0.40	11.14	0.26	11.05

The total number of firms at the intersection of Datastream and IBES is 6765. Datastream alone has 8720 firms.

Table II
Profitability of Earnings Momentum Strategies

At the end of each month from July 1987 to December 2000, stocks in each country are ranked on the basis of their past change in consensus analyst earnings forecasts, which is measured by cumulative price-deflated revisions in the past three(six) months. Stocks are then assigned to five quintile portfolios and equal weighted returns are computed for each portfolio. The bottom 20% is assigned as the E1 portfolio and the top 20% as the E5 portfolio. The trading strategy J-P-K is implemented as Jegadeesh and Titman (1993): we construct overlapping portfolios. In each month, the portfolio with most favorable (unfavorable) past revisions is an overlapping portfolio that consists of E5(E1) portfolios in the previous K ranking months. Returns for the favorable (unfavorable) overlapping portfolios are the simple average of the returns of the six E5(E1) portfolios. If a stock's return is missing during the holding period, we replace it with the corresponding value-weighted market return. The earnings momentum portfolio (E5-E1) is the zero-cost portfolio that buys the favorable revision portfolio and sells the unfavorable revision portfolio (E5-E1) in each month. Panel A reports the results for strategies based on past three month forecast revision. Panel B reports the results for strategies based on past six month forecast revision. The returns are in respective *local currencies*.

Country	Holding Period, J	Panel A: Earnings Momentum Based on Past 3-Month Forecast Revision					Panel B: Earnings Momentum Based on Past 6-Month Forecast Revision				
		E1	E3	E5	E5-E1	t-stat	E1	E3	E5	E5-E1	t-stat
Australia	1	-0.53	0.13	0.85	1.39	4.74	-0.44	0.51	0.86	1.30	4.02
	3	-0.37	0.27	0.87	1.25	4.92	-0.36	0.52	0.82	1.18	3.98
	6	-0.24	0.26	0.78	1.03	4.68	-0.15	0.46	0.77	0.92	3.60
Canada	1	-0.42	0.78	1.38	1.80	6.72	-0.39	0.69	1.33	1.72	6.33
	3	-0.19	0.68	1.22	1.41	5.92	-0.06	0.67	1.22	1.27	4.79
	6	0.03	0.66	1.06	1.03	4.73	0.19	0.57	1.01	0.82	3.20
France	1	0.12	0.77	1.22	1.10	4.61	0.06	0.92	1.31	1.25	5.24
	3	0.23	0.81	1.17	0.95	4.98	0.11	0.87	1.20	1.09	5.44
	6	0.26	0.75	1.15	0.90	6.19	0.21	0.77	1.13	0.92	5.33
Germany	1	-0.24	0.28	0.71	0.95	4.88	-0.30	0.31	0.77	1.07	4.85
	3	-0.21	0.32	0.69	0.90	5.54	-0.29	0.23	0.68	0.96	4.87
	6	-0.17	0.32	0.60	0.77	5.02	-0.19	0.27	0.59	0.78	4.31
Hong Kong	1	0.15	0.71	1.19	1.04	3.62	0.13	0.93	1.15	1.02	3.08
	3	0.26	0.86	1.08	0.81	2.92	0.30	0.87	1.07	0.77	2.43
	6	0.40	0.75	1.01	0.61	2.45	0.36	0.68	1.01	0.65	2.28
UK	1	-0.19	0.60	1.14	1.33	7.25	-0.08	0.48	1.20	1.28	6.36
	3	-0.03	0.50	1.08	1.11	6.60	0.04	0.42	1.13	1.09	5.70
	6	0.09	0.44	1.02	0.93	6.00	0.15	0.39	1.11	0.96	5.22
Japan	1	0.04	-0.07	0.23	0.18	1.13	0.05	-0.04	0.33	0.28	1.65
	3	0.06	-0.05	0.26	0.20	1.36	0.08	-0.04	0.28	0.21	1.28
	6	0.10	-0.08	0.26	0.16	1.26	0.13	-0.06	0.20	0.07	0.50
Korea	1	0.57	0.53	0.92	0.35	1.22	1.08	0.23	0.98	-0.10	-0.30
	3	0.64	0.71	0.84	0.21	0.87	1.10	0.36	0.91	-0.20	-0.61
	6	0.82	0.57	0.73	-0.09	-0.36	1.12	0.46	0.74	-0.38	-1.18
Malaysia	1	0.76	1.09	1.26	0.49	1.36	0.84	1.04	1.30	0.46	1.15
	3	0.71	1.14	1.13	0.43	1.44	0.94	1.01	1.14	0.20	0.57
	6	0.87	1.04	1.03	0.15	0.58	1.03	0.96	1.05	0.03	0.08
Singapore	1	0.21	0.82	0.82	0.61	1.83	0.46	0.60	1.04	0.58	1.70
	3	0.34	0.76	0.79	0.44	1.67	0.46	0.75	0.87	0.41	1.31
	6	0.46	0.60	0.81	0.35	1.51	0.51	0.60	0.92	0.40	1.44
Taiwan	1	0.46	0.42	0.73	0.27	0.82	0.20	0.62	0.26	0.06	0.16
	3	0.52	0.48	0.71	0.18	0.60	0.47	0.48	0.32	-0.15	-0.46
	6	0.50	0.55	0.63	0.13	0.52	0.54	0.37	0.37	-0.17	-0.66

Table III
Analyst Forecast Revisions for Earnings Momentum Portfolios

This table reports cumulative price-deflated earnings forecast revision for earnings portfolios over the next three (J=3) or six (J=6) months after portfolio formation. Table values represent cumulative forecast revisions, expressed as a percentage of price on portfolio formation date. The earnings portfolios are formed either based on past 3-month revision (Panel A) or past 6-month revision (Panel B). E5 (E1) portfolios consist of firms that have experienced the most (least) favorable revisions in the recent past. E3 is the middle portfolio. The Newey-West adjusted t-statistics for the difference between E1 and E5 portfolios are provided. The revisions are in respective *local currencies*.

Country	J	Panel A: Portfolios Formed Based on Past 3-Month Forecast Revision					Panel B: Portfolios Formed Based on Past 6-Month Forecast Revision				
		E1	E3	E5	E5-E1	t-stat	E1	E3	E5	E5-E1	t-stat
Australia	3	-1.41	-0.23	-0.09	1.32	8.71	-1.35	-0.18	-0.19	1.16	6.47
	6	-2.59	-0.47	-0.43	2.17	7.90	-2.40	-0.33	-0.57	1.83	4.47
Canada	3	-2.56	-0.37	-0.21	2.35	5.27	-2.50	-0.38	-0.18	2.33	3.69
	6	-4.83	-0.68	-0.67	4.15	4.16	-4.90	-0.77	-0.53	4.37	3.22
France	3	-1.13	-0.22	-0.12	1.01	3.73	-1.18	-0.21	-0.14	1.04	4.27
	6	-2.22	-0.51	-0.29	1.93	4.16	-2.36	-0.45	-0.34	2.02	4.13
Germany	3	-1.20	-0.19	-0.18	1.02	4.23	-1.24	-0.14	-0.16	1.08	3.21
	6	-2.38	-0.44	-0.36	2.01	3.64	-2.49	-0.39	-0.41	2.08	2.02
Hong Kong	3	-1.64	-0.34	0.05	1.68	4.95	-1.70	-0.30	0.04	1.74	3.94
	6	-3.27	-0.70	-0.15	3.12	5.20	-3.32	-0.65	-0.09	3.22	4.49
UK	3	-1.45	-0.21	-0.08	1.37	3.17	-1.56	-0.17	-0.02	1.54	3.32
	6	-2.83	-0.46	-0.24	2.59	4.00	-2.95	-0.41	-0.13	2.82	4.25
Japan	3	-0.72	-0.23	-0.11	0.61	3.44	-0.78	-0.21	-0.09	0.69	3.36
	6	-1.42	-0.50	-0.28	1.14	2.57	-1.46	-0.42	-0.26	1.20	2.73
Korea	3	-1.02	-0.26	-0.16	0.86	2.31	-1.00	-0.29	-0.32	0.68	2.09
	6	-1.80	-0.61	-0.59	1.22	2.47	-1.88	-0.71	-0.73	1.16	2.30
Malaysia	3	-0.76	-0.21	0.00	0.76	2.15	-0.76	-0.22	0.02	0.77	2.15
	6	-1.47	-0.36	-0.14	1.34	2.40	-1.48	-0.39	-0.01	1.46	3.13
Singapore	3	-0.84	-0.16	-0.13	0.71	3.94	-0.81	-0.16	-0.11	0.70	2.82
	6	-1.69	-0.37	-0.36	1.33	3.77	-1.64	-0.34	-0.26	1.38	3.51
Taiwan	3	-0.46	-0.16	-0.16	0.31	2.83	-0.48	-0.13	-0.25	0.24	1.84
	6	-0.89	-0.35	-0.43	0.47	2.25	-0.97	-0.38	-0.52	0.45	1.82

Table IV
Profitability of Price Momentum Strategies

At the end of each month from July 1987 to December 2000, stocks in each country are ranked on the basis of their return in the past three (six) months. Stocks are then assigned to five quintile portfolios and equal weighted returns are computed for each portfolio. The bottom 20% is assigned as the P1 portfolio and the top 20% as the P5 portfolio. The trading strategy J-P-K is implemented as Jegadeesh and Titman (1993): we construct overlapping portfolios. In each month, the portfolio with past winners (losers) is an overlapping portfolio that consists of P5 (P1) portfolios in the previous K ranking months. Returns for the winner (loser) overlapping portfolios are the simple average of the returns of the six P5 (P1) portfolios. If a stock's return is missing during the holding period, we replace it with the corresponding value-weighted market return. The price momentum portfolio (P5-P1) is the zero-cost portfolio that buys the winner portfolio and sells the loser portfolio (P5-P1) in each month. Panel A reports the results for strategies based on past three month return. Panel B reports the results for strategies based on past six month return. The t-statistics are for the return of momentum portfolios (P5-P1). The returns are in respective *local currencies*.

Country	Holding Period, J	Panel A: Price Momentum Based on Past 3-Month Returns					Panel B: Price Momentum Based on Past 6-Month Returns				
		P1	P3	P5	P5-P1	t-stat	P1	P3	P5	P5-P1	t-stat
Australia	1	-1.01	0.37	1.33	2.34	6.26	-1.03	0.47	1.49	2.52	6.14
	3	-0.89	0.53	1.22	2.11	5.92	-0.93	0.49	1.40	2.32	6.08
	6	-0.70	0.49	1.18	1.88	5.96	-0.69	0.42	1.22	1.91	5.53
Canada	1	-0.63	0.62	1.54	2.17	6.01	-0.56	0.64	1.51	2.07	5.61
	3	-0.38	0.69	1.32	1.71	5.72	-0.49	0.65	1.38	1.87	5.67
	6	-0.23	0.65	1.25	1.48	6.13	-0.39	0.64	1.39	1.77	6.12
France	1	0.16	0.67	1.43	1.27	2.77	-0.06	0.75	1.58	1.64	3.79
	3	0.00	0.74	1.33	1.33	3.55	-0.04	0.74	1.42	1.46	3.79
	6	0.07	0.77	1.27	1.20	4.36	0.02	0.78	1.35	1.33	4.45
Germany	1	-0.28	0.31	0.66	0.94	2.26	-0.36	0.12	0.71	1.07	2.38
	3	-0.28	0.31	0.61	0.88	2.44	-0.40	0.34	0.64	1.03	2.57
	6	-0.25	0.33	0.49	0.75	2.60	-0.31	0.33	0.61	0.92	2.75
Hong Kong	1	0.04	0.97	0.88	0.83	1.48	0.03	0.91	1.05	1.02	1.89
	3	0.13	0.95	0.89	0.75	1.60	-0.03	0.90	1.08	1.11	2.31
	6	0.10	0.92	1.07	0.96	2.99	0.09	0.94	1.08	0.98	2.38
UK	1	-0.22	0.65	1.12	1.34	4.12	-0.35	0.57	1.38	1.73	5.08
	3	-0.24	0.66	1.08	1.32	4.45	-0.41	0.58	1.35	1.75	5.73
	6	-0.18	0.62	1.08	1.26	5.50	-0.30	0.59	1.24	1.54	5.85
Japan	1	-0.05	0.13	-0.06	-0.01	-0.03	0.09	0.03	-0.03	-0.12	-0.27
	3	-0.04	0.06	-0.02	0.02	0.06	0.02	0.07	-0.06	-0.08	-0.22
	6	0.00	0.08	-0.08	-0.08	-0.29	-0.01	0.10	-0.04	-0.03	-0.09
Korea	1	0.86	0.52	0.42	-0.44	-0.74	1.05	0.56	0.29	-0.76	-1.05
	3	0.56	0.65	0.50	-0.06	-0.10	0.86	0.72	0.31	-0.56	-0.86
	6	0.63	0.64	0.40	-0.22	-0.51	0.92	0.78	0.25	-0.67	-1.12
Malaysia	1	1.36	0.99	0.83	-0.53	-0.85	0.83	1.09	0.94	0.10	0.16
	3	1.24	0.93	0.87	-0.36	-0.68	0.85	1.03	1.07	0.22	0.36
	6	0.92	0.99	1.09	0.17	0.40	0.76	1.06	1.08	0.32	0.61
Singapore	1	0.78	0.51	0.55	-0.23	-0.41	0.51	0.68	0.76	0.25	0.43
	3	0.64	0.54	0.62	-0.02	-0.05	0.40	0.59	0.70	0.31	0.61
	6	0.46	0.65	0.69	0.23	0.66	0.41	0.75	0.56	0.15	0.35
Taiwan	1	1.05	0.54	0.25	-0.80	-1.25	0.73	0.37	0.01	-0.73	-1.06
	3	0.74	0.57	0.52	-0.22	-0.42	0.66	0.42	0.10	-0.56	-0.89
	6	0.73	0.64	0.48	-0.25	-0.59	0.52	0.37	0.31	-0.21	-0.39
Panel C: 1-0-1 Strategy											
	P1	P3	P5	P5-P1	t-stat		P1	P3	P5	P5-P1	t-stat
Canada	-0.25	0.62	1.08	1.33	3.94	Japan	0.19	0.09	-0.28	-0.47	-1.33
France	0.32	0.82	0.98	0.66	1.84	Korea	1.08	0.88	0.33	-0.75	-1.49
Germany	-0.08	0.21	0.25	0.32	1.09	Malaysia	1.01	1.00	0.81	-0.20	-0.38
UK	0.12	0.65	0.74	0.61	2.35	Singapore	0.75	0.31	0.73	-0.02	-0.04
Australia	-0.28	0.89	0.5	0.78	2.26	Taiwan	0.64	0.76	0.25	-0.39	-0.67
Hong Kong	0.04	1.05	0.89	0.85	2.07						

Table V
Analyst Forecast Revisions for Price Momentum Portfolios

This table reports cumulative price-deflated earnings forecast revision for price momentum portfolios over the next six month after portfolio formation. The price momentum portfolios are formed either based on past 3-month return or past 6-month return. The Newey-West t-statistics for the difference between P1 and P5 portfolios. The revisions are in respective *local currencies*.

Country	J	Panel A: Portfolios Formed Based on Past 3-Month Returns					Panel B: Portfolios Formed Based on Past 6-Month Returns				
		P1	P3	P5	P5-P1	t-stat	P1	P3	P5	P5-P1	t-stat
Australia	3	-1.63	-0.20	-0.01	1.61	6.26	-1.66	-0.18	0.07	1.72	5.76
	6	-2.87	-0.42	-0.16	2.70	5.62	-3.07	-0.38	0.02	3.09	6.07
Canada	3	-2.65	-0.49	0.18	2.83	7.23	-2.76	-0.44	0.35	3.11	6.86
	6	-4.87	-1.00	0.00	4.87	6.77	-5.08	-1.01	0.32	5.39	5.47
France	3	-1.35	-0.24	0.10	1.46	9.36	-1.44	-0.25	0.20	1.64	8.60
	6	-2.47	-0.59	0.01	2.48	9.01	-2.60	-0.63	0.19	2.78	8.39
Germany	3	-1.06	-0.29	-0.05	1.01	1.97	-1.31	-0.22	0.04	1.35	2.14
	6	-2.17	-0.66	-0.19	1.99	2.10	-2.66	-0.47	-0.02	2.65	3.12
Hong Kong	3	-1.42	-0.51	0.16	1.58	7.06	-1.83	-0.42	0.30	2.13	8.11
	6	-2.91	-1.08	0.17	3.07	7.95	-3.37	-0.98	0.38	3.75	7.12
UK	3	-1.45	-0.22	-0.06	1.39	6.74	-1.66	-0.19	0.07	1.73	6.01
	6	-2.74	-0.50	-0.22	2.52	6.60	-3.09	-0.48	-0.01	3.08	6.30
Japan	3	-0.65	-0.26	-0.08	0.57	4.07	-0.75	-0.27	-0.02	0.72	3.52
	6	-1.25	-0.55	-0.21	1.04	3.46	-1.35	-0.56	-0.12	1.23	2.74
Korea	3	-1.19	-0.40	0.30	1.49	2.65	-1.46	-0.48	0.32	1.78	2.68
	6	-2.25	-0.87	0.32	2.58	2.50	-2.71	-0.87	0.44	3.15	2.92
Malaysia	3	-0.65	-0.28	0.03	0.68	3.81	-0.63	-0.30	0.10	0.73	2.38
	6	-1.22	-0.59	-0.04	1.17	3.99	-1.25	-0.68	0.17	1.42	2.89
Singapore	3	-0.76	-0.25	-0.06	0.69	6.03	-0.83	-0.27	0.00	0.82	4.86
	6	-1.40	-0.56	-0.27	1.13	5.77	-1.61	-0.57	-0.11	1.50	4.49
Taiwan	3	-0.51	-0.24	-0.01	0.50	6.86	-0.60	-0.26	0.10	0.70	7.05
	6	-1.10	-0.52	-0.03	1.06	6.80	-1.24	-0.59	0.12	1.36	6.99

Table VI
Two-way Classification based on earnings and price momentum

At the end of each month from July 1987 to December 2000, all stocks within each country are ranked on the basis of their past six-month return and assigned to three equally-sized price portfolios (P1, P2 and P3). All stocks are then independently ranked by their past six-month forecast revision and assigned to three equally-sized earnings portfolios (E1, E2 and E3). After these procedures, each stock belongs to one of nine portfolios. We consider standard K-P-J momentum strategies with holding period of three and six month. Panel A reports the results for holding period of three months and Panel B reports the results for holding period of six months. The returns for individual countries are in their respective local currencies. The combined results, *all momentum countries*, and *all non-momentum countries* are in U.S. dollar returns.

Country	Portfolio	Panel A: 6-1-3					Panel B: 6-1-6				
		P1	P2	P3	P3-P1	t-stat	P1	P2	P3	P3-P1	t-stat
Australia	E1	-0.87	0.20	0.99	1.86	4.82	-0.56	0.23	0.90	1.45	4.22
	E2	-0.17	0.49	0.98	1.15	3.57	-0.13	0.41	0.87	1.00	3.57
	E3	-0.44	0.75	1.43	1.87	5.95	-0.34	0.71	1.28	1.62	5.62
	E3-E1	0.44	0.55	0.44			0.21	0.48	0.38		
	t-value	1.45	2.35	1.49			0.79	2.44	1.54		
Canada	E1	-0.47	0.12	1.18	1.65	4.60	-0.25	0.38	1.22	1.47	4.84
	E2	-0.05	0.62	1.07	1.12	4.35	-0.18	0.56	1.11	1.30	6.71
	E3	0.27	0.82	1.34	1.07	3.07	0.11	0.77	1.20	1.09	3.81
	E3-E1	0.74	0.70	0.15			0.36	0.39	-0.02		
	t-value	2.41	3.28	0.50			1.41	2.04	-0.09		
France	E1	-0.06	0.27	0.84	0.89	2.53	-0.02	0.48	0.96	0.98	3.37
	E2	0.39	0.84	1.32	0.93	2.73	0.29	0.80	1.17	0.88	3.46
	E3	0.38	1.11	1.48	1.10	3.55	0.44	1.07	1.37	0.93	3.54
	E3-E1	0.43	0.84	0.64			0.46	0.59	0.41		
	t-value	1.69	3.80	3.23			1.99	3.33	2.12		
Germany	E1	-0.55	-0.02	0.27	0.82	2.10	-0.44	0.00	0.27	0.71	2.22
	E2	-0.09	0.39	0.43	0.52	1.47	-0.10	0.41	0.48	0.59	2.07
	E3	0.22	0.52	0.83	0.62	1.72	0.14	0.44	0.78	0.64	2.23
	E3-E1	0.77	0.54	0.57			0.58	0.45	0.51		
	t-value	3.45	3.28	3.00			3.00	3.16	3.13		
Hong Kong	E1	-0.10	0.64	0.70	0.80	1.72	0.08	0.64	0.65	0.57	1.45
	E2	0.51	1.20	0.77	0.27	0.57	0.33	1.05	0.90	0.56	1.54
	E3	0.23	0.79	1.70	1.46	3.50	0.30	1.00	1.47	1.17	3.26
	E3-E1	0.34	0.15	1.00			0.22	0.36	0.82		
	t-value	0.91	0.44	2.63			0.77	1.21	2.52		
UK	E1	-0.28	0.27	0.88	1.15	4.64	-0.16	0.33	0.89	1.05	4.85
	E2	-0.23	0.62	0.93	1.16	4.41	-0.17	0.56	0.82	0.99	4.48
	E3	0.35	0.86	1.44	1.09	4.22	0.41	0.84	1.33	0.92	4.14
	E3-E1	0.63	0.59	0.57			0.57	0.51	0.44		
	t-value	3.16	3.78	3.32			3.18	3.68	2.72		
Japan	E1	0.12	0.03	-0.11	-0.24	-0.81	0.12	0.11	-0.05	-0.18	-0.71
	E2	0.01	-0.04	-0.11	-0.12	-0.36	-0.07	-0.02	-0.05	0.02	0.07
	E3	0.07	0.19	0.19	0.12	0.37	0.01	0.17	0.13	0.12	0.43
	E3-E1	-0.05	0.16	0.30			-0.11	0.06	0.18		
	t-value	-0.29	1.22	2.21			-0.70	0.51	1.43		
Korea	E1	0.91	1.09	0.52	-0.40	-0.71	1.10	1.11	0.57	-0.53	-1.05
	E2	0.59	0.41	0.45	-0.13	-0.26	0.67	0.51	0.26	-0.42	-0.94
	E3	1.06	0.80	0.54	-0.52	-0.99	0.88	0.79	0.47	-0.40	-0.84
	E3-E1	0.15	-0.30	0.02			-0.22	-0.33	-0.10		
	t-value	0.55	-1.05	0.08			-0.85	-1.30	-0.36		
Malaysia	E1	1.02	1.20	0.67	-0.36	-0.68	0.97	1.23	0.97	-0.01	-0.01
	E2	0.72	0.99	1.24	0.51	1.00	0.71	1.02	1.06	0.35	0.78
	E3	0.91	1.07	1.19	0.28	0.54	0.80	1.05	1.21	0.41	0.85
	E3-E1	-0.11	-0.14	0.52			-0.18	-0.18	0.24		
	t-value	-0.32	-0.40	1.76			-0.54	-0.58	0.74		

Table VI Continued on the next page.

Table VI Continued..

Country	Portfolio	Panel A: 6-1-3					Panel B: 6-1-6				
		P1	P2	P3	P3-P1	t-stat	P1	P2	P3	P3-P1	t-stat
Singapore	E1	0.43	0.77	0.16	-0.27	-0.56	0.52	0.74	0.23	-0.28	-0.71
	E2	0.58	0.78	0.55	-0.03	-0.07	0.44	0.72	0.43	-0.01	-0.02
	E3	0.56	0.89	0.95	0.39	0.94	0.68	0.97	0.93	0.25	0.65
	E3-E1	0.13	0.12	0.80			0.16	0.23	0.70		
	t-value	0.36	0.44	2.61			0.55	0.99	2.41		
Taiwan	E1	0.49	0.55	0.12	-0.37	-0.76	0.55	0.61	0.20	-0.35	-0.84
	E2	0.83	0.55	0.21	-0.62	-1.02	0.50	0.42	0.36	-0.14	-0.30
	E3	0.36	0.31	0.21	-0.15	-0.28	0.35	0.30	0.32	-0.03	-0.05
	E3-E1	-0.13	-0.24	0.09			-0.20	-0.31	0.12		
	t-value	-0.40	-0.61	0.33			-0.81	-1.33	0.48		
All Momentum Countries	E1	-0.35	0.27	0.94	1.29	5.31	-0.19	0.37	0.95	1.14	5.46
	E2	-0.04	0.54	0.86	0.91	3.67	-0.10	0.52	0.81	0.92	4.45
	E3	0.05	0.82	1.39	1.34	4.93	0.06	0.77	1.29	1.23	5.84
	E3-E1	0.40	0.56	0.45			0.25	0.40	0.35		
	t-value	2.63	5.09	3.28			2.04	4.01	2.92		
All Non-Momentum Countries	E1	0.96	0.31	0.00	-0.96	-2.01	0.91	0.40	0.18	-0.73	-1.78
	E2	0.47	0.04	-0.04	-0.51	-1.26	0.30	0.09	0.10	-0.20	-0.55
	E3	0.75	0.39	0.36	-0.39	-0.82	0.57	0.32	0.35	-0.23	-0.56
	E3-E1	-0.21	0.08	0.36			-0.34	-0.07	0.16		
	t-value	-1.02	0.48	1.61			-1.86	-0.48	0.72		

Table VII
Fama-MacBeth Cross-Sectional Regressions

In each month from July 1987 to December 2000, we estimate cross-sectional regressions of individual stock's buy-and-hold return over the next six months on size; prior six month forecast revision and prior six month return. Each explanatory variable is scaled to [0,1] according to its ordinal ranking. The reported coefficients are the time series means of coefficients from regressions in each month. The t-statistics are computed using Newey-West standard error of the means.

	size	t-stat	past Rev	t-stat	past Ret	t-stat
Australia	3.02	1.32	8.19	5.14		
	0.95	0.45			14.64	4.38
	0.68	0.34	3.91	2.38	13.19	4.02
Canada	-1.04	-0.44	8.22	3.59		
	-2.24	-1.14			13.40	5.26
	-2.71	-1.38	3.79	1.85	11.94	5.19
France	3.17	1.29	7.41	4.61		
	2.43	1.10			9.51	3.27
	2.10	0.94	4.87	3.90	8.23	2.93
Germany	4.48	1.89	5.58	4.88		
	3.42	1.80			5.74	1.93
	3.01	1.59	4.76	4.01	4.52	1.47
Hong Kong	3.61	1.09	5.29	2.35		
	1.61	0.49			9.00	3.74
	1.16	0.36	3.56	1.88	8.23	3.42
UK	1.79	0.89	7.94	8.21		
	1.31	0.76			11.50	7.15
	0.97	0.57	4.80	4.85	9.85	5.69
Japan	-1.51	-0.67	1.42	0.66		
	-0.64	-0.28			-1.91	-0.94
	-0.61	-0.26	2.16	1.03	-2.42	-1.19
Korea	-10.64	-2.70	-1.18	-0.52		
	-10.72	-2.45			-1.93	-0.97
	-10.72	-2.41	-0.52	-0.24	-1.74	-0.92
Malaysia	-4.03	-1.27	2.52	0.82		
	-2.69	-0.83			3.20	1.13
	-3.33	-1.03	2.35	0.88	2.23	0.82
Singapore	-2.80	-1.03	3.26	1.57		
	-2.49	-1.03			2.34	0.79
	-2.73	-1.13	2.72	1.24	1.63	0.56
Taiwan	0.03	0.01	-1.16	-0.70		
	0.49	0.17			-2.75	-0.68
	0.89	0.30	-0.50	-0.33	-1.49	-0.40

Table VIII. Country Characteristics Variables Definitions

Variables	Definition	Source
Corruption Perception Index (CPI)	Ranks countries in terms of the degree to which corruption is perceived to exist among public officials and politicians. Average between 1988-1992, 1995-2001. Scale from 0 to 10; with lower scores implying higher levels of corruption.	Transparency International www.transparency.org
Efficiency of Judicial System (JE)	Assessment of the 'efficiency and integrity of the legal environment as it affects business, particularly foreign firms'. Average between 1980-1983. Scale from 0 to 10; with lower scores, lower efficiency level.	La Porta et al.(1998) from Business International Corp.
Accounting Standard (AS)	Index created by examining and rating companies 1990 annual reports on their inclusion or omission of 90 items. These items fall into seven categories (general information, income statements, balance sheets, funds flow statement, accounting standards, stock data, and special items).	International accounting and auditing trends, Center for International Financial Analysis and Research (La Porta et al.(1998))
Insider Laws (IL)	Five variables for insiders laws: (1) 1 if tippees are legally considered to be secondary insiders; (2) 1 if an insider is held liable for tipping third parties and encouraging them to trade (3) 1 if violation of the insider trading law is a criminal offense (4) 1 if the law grants 'injured' investors a private right of action (5) 1 if monetary penalties are proportional to insiders' trading profits Add up (1) to (5)	Beny (1999) from International Insider Dealing (Mark Stamp and Carson Welsh, eds. 1996); Insider Trading: the Laws of Europe, the United States, and Japan (Emmanuel Gaillard, ed. 1992).

Table IX
Corruption and Momentum

Panel A reports average momentum profits (for the J=6, K=6 strategy where J and K represent holding period and ranking period respectively) over the sample period and the average corruption characteristics defined in Table VIII. Panel B reports cross-sectional regressions of average momentum profits on various corruption characteristics. Panel C reports Fama-MacBeth regressions of annual momentum profits on CPI and annual country beta estimated with respect to the value-weighted world market index.

Panel A: Average Momentum Profits and Country Characteristics						
	Earnings Momentum	Price Momentum	Judicial Efficiency (JE)	Accounting Standard (AS)	Insider Laws (IL)	Corruption: CPI Average (1988-2001)
Canada	0.82	1.77	9.25	74	5	9.05
France	0.92	1.33	8.00	69	3	6.85
Germany	0.78	0.92	9.00	62	3	7.96
U.K.	0.96	1.54	10.00	78	3	8.47
Australia	0.92	1.91	10.00	75	4	8.58
Hong Kong	0.65	0.98	10.00	69	3	7.42
Japan	0.07	-0.03	10.00	65	2	6.64
Korea	-0.38	-0.67	6.00	62	5	4.16
Malaysia	0.03	0.32	9.00	46	3	5.11
Singapore	0.40	0.15	10.00	78	4	9.05
Taiwan	-0.17	-0.21	6.75	65	4	5.32

Panel B: Cross-Sectional Regressions of Momentum on Corruption Characteristics					
Dependent Variable	JE	AS	IL	CPI	Adj.Rsq.
CPI	0.83 (3.69)	0.08 (2.57)	0.39 (1.21)		0.81
EMOM	0.21 (2.35)				0.31
EMOM		0.03 (2.11)			0.25
EMOM			-0.09 (-0.51)		-0.08
EMOM				0.24 (4.38)	0.64
PMOM	0.34 (2.03)				0.24
PMOM		0.04 (1.67)			0.15
PMOM			-0.03 (-0.11)		-0.11
PMOM				0.38 (3.29)	0.50

Panel C: Fama-MacBeth cross-sectional regressions of annual momentum profits on CPI and country beta		
	CPI	Beta
EMOM	0.24 (2.91)	-0.71 (-1.64)
PMOM	0.29 (2.86)	-1.26 (-2.04)