The Relationship between Earnings Momentum and Price Momentum in Different Market - The Case of the China Market

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Abstract
This study focuses on the stocks that are listed in A- and H-share markets from January 2000 to December 2009. Following Chan, Jegadeesh and Lakonishok (1996), we test the profitability of price momentum and earnings momentum strategies under different market systems and accounting standards. In addition, we also adopt the method documented by Chordia and Shivakuma (2006) to examine whether earnings momentum and price momentum are related.

The empirical results show that the price momentum effect has a significant and persistent phenomenon in H-share market instead of A-share market. Besides, the earnings momentum strategy would generate a significantly positive return in each market. This implies that the difference of accounting information content between the two markets does not inflect the profitability of earnings momentum strategy. Due to the price momentum strategy have an insignificant return in the A-share market, we only focus on the discussion of relationship between earnings and price momentum in H-shares. From the results, we find that price momentum is captured by the earnings momentum. The predictive power of past returns is subsumed by a strategy that buying the highest earnings surprise portfolio and selling the lowest earnings surprise portfolio.

Keywords: earnings momentum, price momentum, accounting information content

1. Introduction

Efficient capital market assumes that security prices adjust quickly in response to new information available publicly such as earning announcement. This rapid adjustment of prices to new information is predicted on frictionless trading, instantaneous availability of information to all investors, and a similar way of processing this information by all investors from a pricing standpoint. In the real world, however, there are trading costs, delays in transmission, differences in interpretation and evaluation of information. As a result, the process of adjustment to new information is less clear-cut. New information can be described as unexpected information. If everyone expects a company to report $1.00 per share earnings in the next quarter and it indeed reports the $1.00, little new information would be added. No major revision of expectations would be called for. On the other hand, if earnings of $0.5 or $2.00 were reported, this unexpected information would clearly require a revision of probability beliefs about the future.

Many studies have reported evidence that the magnitude of security returns in the post-earnings announcement period is positively related to the magnitude of the unexpected component of the earnings release. Ball and Brown (1968) were the first who cited that firms reporting unexpectedly high earnings subsequently outperformed firms reporting unexpectedly low earnings. Several studies (Foster et al., 1984; Benard and Thomas, 1989) have confirmed the robustness of Ball and Brown’s (1968) findings by using more recent data, and Foster et al. (1984) reported an annualized payoff of 25% from earnings momentum strategies. And Chan, Jegadeesh and Lakonishok (1996) also concluded that past earnings and other earnings-related information all have independent explanatory power for future returns.

The other persistent anomalies that pose challenges to the efficient markets are short-run return continuation, or price momentum, documented by Jegadeesh and Titman (1993). Price momentum refers to the strategy that buys past
winning stocks and sells past losing stocks. It earns abnormal returns persisting for at least one year after the execution of the strategy.

In this paper, we study the price and earnings momentum in the Chinese companies that issue both H-share stocks in Hong Kong and A-share stocks on either the Shanghai Stock Exchange or the Shenzhen Stock Exchange. H-shares are available to both Hong Kong residents and international investors, but A-shares are restricted to mainland Chinese investors. At 2004, the Hang Seng Bank obtained the QFII qualifications and the Hong Kong residents can invest the Chinese mainland A-share stocks through Hang Seng Bank. The “Qualified Foreign Institution Investor (QFII)” is a Chinese program that was launched in 2002 to allow licensed foreign investors to buy and sell yuan-denominated “A” shares in China’s mainland stock exchanges (in Shanghai and Shenzhen). Chinese mainland stock exchanges were previously closed off to foreign investors due to China’s exercise of tight capital controls which restrict the movement of assets in-and-out of the country.

As we mentioned above, the investors in Hong Kong are allowed to buy and sell China’s A-share stocks through Hang Seng Bank after 2004. In order to examine the effect of the QFII policy on price momentum, we split each market into two periods, 2000 to 2004 and 2004 to 2009. Then we conduct price momentum strategy in these two periods for A- and H-share markets to see whether the differences for price momentum phenomenon between these two periods exist or not.

The companies that both issued A-shares and H-shares must follow the Mainland China’s mainland accounting standards and Hong Kong accounting standard to compile and disclose two sets of financial reports. Due to the difference of basis of compile and specific accounting method, the accounting information contained by these two sets of financial reports is unlikely the same. Thus, we study the market segmentation by the aspect of the value of accounting earnings information, that is, by comparing the stock price of dual-listed firms in response to earnings information for different accounting standards to obtain earnings momentum phenomenon.

After we investigate the profitability of earnings and price momentum strategies in different markets, we seek a relationship between these two anomalies. Our analysis extends Chordia and Shivakumar (2006), who study the relationship between earnings momentum and price momentum and document that the price momentum anomaly is a manifestation of the earnings momentum anomaly. The results from Chordia and Shivakumar are consistent with the results in Hong et al. (2003) who examine earnings and price momentum in 11 international equity markets and find that price momentum exists only in those countries in which earnings momentum is profitable. The phenomenon has been attributed to a delayed price response to information. Since stock prices are likely to be driven by earnings, we test whether the price momentum and the post-earnings announcement drift phenomena are related in each market. The contribution of this thesis is that we discussed if the relationship between price momentum and earnings momentum would have different phenomenon because of different market system and earnings compile under different accounting standards.

The rest of this paper is organized as follows. The market background, accounting standards and data will be discusses on Section 2. The methodology will be discussed on Section 3. Section 4 will present empirical results on earnings momentum, price momentum, and the relationship between the two effects in the China A-share market and Hong Kong H-share market. Section 5 will conclude the paper.

2. Market Background and Data

2.1 Background of China and Hong Kong Markets

In recent years, Mainland China has seen a dramatic proliferation of economy, and the influence of China’s stock market on Asia stock market has been gradually increasing. The Shanghai and Shenzhen Stock Exchanges were created in November 1990 and April 1991 respectively. A total of 1602 companies issued A-share in these two stock exchanges and by the end of 2009 the total market capitalization reached 24.27 trillion RMB. In addition, China allowed domestic enterprises to enter the overseas markets in 1993, and then permitted the companies that are listed on the Hong Kong Stock Exchange to issue A-shares in Shanghai and Shenzhen. By the end of 2009, there were 61 companies listed in both mainland A-share and Hong Kong H-share markets.

There are two types of securities trade in Mainland China: A-shares for local investors and B-shares for foreign investors. A-shares are domestic shares that are restricted to domestic investors. B-shares are foreign shares that before 2001 were only available to foreign investors. Now Chinese citizens are allowed to trade B-shares if they have the foreign currency required.

In addition, The Hong Kong Stock Exchange (HKSE) was established at the end of the century. In 2009, with its total securities market capitalization at the record sum of US$1,063.9 trillion, the HKSE ranks 8th in market
capitalization in the world. The trading system of the Exchange is an order-driven system. The Hong Kong Exchange securities market operates on two trading platforms – the Main board and the Growth Enterprise Market. Each trading platform has a different set of requirements. The Main board is the market for capital growth by established companies that meet profit requirements. Meanwhile, the Growth Enterprise market provides a fund-raising venue for ‘high growth, high risk’ companies. It promotes the development of technology industries and venture capital investments. H-shares refer to the shares of companies incorporated in mainland China that are traded on the Hong Kong Stock Exchange.

2.2 Accounting Standards in A-H Markets

Financial reporting requirements are quite different in China. Firms listing A shares are required to report under Chinese Accounting Standards, whereas firms with B shares report using International Accounting Standards (IAS), and firms with H shares report under Hong Kong accounting standards or IAS.

There are a few notable differences between Chinese Accounting Standards and IAS. First in valuing assets, the PRC (People’s Republic of China) Accounting Standards requires strict to historical cost, making no provision for mark-to-market or lower-of-cost-or-market. This method has a significant effect on the valuation of inventories. Second, the government stipulates the depreciation rate for capital assets and bad debt allowances for receivables regardless of a firm’s business economics. Third, the Chinese standards do not recognize some of the more complex liabilities, such as contingencies, and lease obligations. Finally, the level of disclosure is often limited. For instance, the related party sales between listed and holding companies do not need to be reported, making sales hard to interpret.

2.3 Data

We use stock prices, earnings, market capitalization and book value for all firms that are issued both A- and H-shares on the HKSE and SHSE (or SZSE). The sample includes 51 companies and the sample period begins in January 2000, and extends to December 2009.

As for Fama-French three factors, RM, SMB and HML are formed as follows. At the end of June of each year \(t\) (2000-2009), cross-listed stocks are allocated to two groups (small or big) based on their June market equity (stock price times share outstanding). The sample stocks are allocated in an independent way to three book-to-market equity (B/M) groups (low, medium or high) based on the breakpoints for the bottom 30%, middle 40%, and top 30% of the values of book-to-market equity for the sample stocks. Six size-B/M portfolios (S/L, S/M, S/H, B/L, B/M, B/H) are defined as the intersections of the two size and the three B/M groups. SMB is the difference, each month, between the average of the returns on the three small-stock portfolios (S/L, S/M, S/H) and the average of the returns on the three big-stock portfolios (B/L, B/M, B/H). HML is the difference between the average of the returns on the two high-B/M portfolios (S/H and B/H) and the average of the returns on the two low-B/M portfolios (S/L and B/L). The market return RM is the return on the ShangHai and Shenzhen A-share index and the Hang Seng H-share Index. All the information we use is obtained from the Taiwan Economic Journal (TEJ).

3. Methodology

In order to find out whether the earnings momentum exist in A-share and H-share stock markets under different accounting standards, we first create earnings portfolios that capture the post-earnings announcement drift phenomenon. For each month, we sort firms into trisection based on their SUE from the most recent earnings announcement. After the formation of portfolios, then the positions are held for the six-month holding period, \(t\) through \(t+5\). SUE is a measure of the informational content of the quarterly earnings and are calculated as follows:

The standardized unexpected earnings (SUE) for month \(t = E_{iq} - E_{iq-4} / \sigma_{iq}\), where \(E_{iq}\) is the most recently announced earnings, \(E_{iq-4}\) is the earnings announced four quarters ago and \(\sigma_{iq}\) is the standard deviation of \((E_{iq}-E_{iq-4})\) over the prior eight quarters. We implement this sort for each month using the same methodology as Chan et al. (1996). The difference in returns between the highest and the lowest SUE portfolio is the \(P3-P1\); we refer to this portfolio as the portfolio PMN to denote that the difference between extreme SUE portfolios represent positive minus negative earnings changes.

Next, as we mention above, the two anomalies that we focus on in this study are the price momentum and earnings momentum anomalies. Since the Hong Kong investors have been able to invest A-shares since 2004, we split the time period into two periods to observe momentum phenomenon. The approach that we using to capture price momentum is the same as above; we form three price momentum portfolios based on the past six month returns. Thus, for each month \(t\), we rank our sample stocks with returns for month \(t-6\) through \(t-1\) into trisection based on their formation period, \(t-6\) through \(t-1\). The positions are held for the following six-month period, \(t+5\). The
difference in returns between highest and lowest past-return portfolio, P3-P1, we refer to as the zero-investment portfolio WML, to signify that winner minus loser.

After examining the existence of price momentum or earnings momentum in A- and H-share stock markets, we conducted our tests separately in A-share and H-share market; this is similar to Chordia and Shivakumar (2006) by extending the Fama-French three-factor model to include either earnings- or price momentum–based zero investment portfolios, i.e., PMN or WML, and then observe the ability of this model to explain payoffs to the other momentum strategy. Since Fama and French (1996) point that their three-factor model can not capture momentum except for the CAPM-related anomalies, the question then is whether adding PMN or WML to Fama-French model can break through the limitation.

The model we extend from Fama-French by including an additional factor, PMN and under this model, the expected excess return on a portfolio is explained by the sensitivity of its return to the Fama-French factors and PMN.

\[
E(R_i) - R_F = b_i \cdot [E(R_M) - R_F] + s_i \cdot E(SMB) + h_i \cdot E(HML) + p_i \cdot E(PMN),
\]

where \( E(R_M) - R_F, E(SMB), E(HML), \) and \( E(PMN) \) are expected premia and the factor loadings are the slopes in the time-series regression

\[
R_i - R_F = \alpha_i + b_i \cdot (R_M - R_F) + s_i \cdot SMB + h_i \cdot HML + p_i \cdot PMN + e_i
\]

(2)

After the regression, then we carry out a joint test on the intercepts in the portfolio regressions using the Gibbons et al. (1989) (GRS) statistic, and test the null hypothesis that estimated intercepts are equal to zero across all portfolios. The null hypothesis of the GRS test statistic, \( W \), is

\[
H_0: \alpha_i = 0 \quad \forall i
\]

which should not be rejected if the factors completely explain excess returns. The GRS test statistic (W) has better small sample properties than the Wald, Lagrange Multiplier, and Likelihood ratio tests (Gibbons, 1989). Specifically, it is less likely to falsely reject the null (intercepts are all zero).

Let \( N \) represent the number of equations (assets, portfolios) estimated, \( T \) the number of observations per asset, and \( K \) the number of factors in the model. The statistic is calculated as follows:

\[
W = \left(1 + \bar{f}^\top \bar{\Omega}^{-1} \bar{f}\right)^{-1} \bar{b}_0^\top \Sigma^{-1} \bar{b}_0
\]

where,
1. \( \bar{f} \) is a \( K \times 1 \) vector of the factor portfolio’s sample means.
2. \( \bar{\Omega} \) is an unbiased estimate of the factor portfolios’ covariance matrix.
3. \( \bar{b}_0 \) is \( N \times 1 \) vector of estimated intercepts.
4. \( \Sigma \) is an unbiased estimate of the residual covariance matrix.

To compute the F-statistic:

\[
\left( \frac{T}{N} \right) \left( \frac{T-N-K}{T-K-1} \right) W \sim F(N,T-N-K)
\]

This value refers to a central F distribution, and this is the technique employed by Fama and French (1993).

4. Empirical Results

To test whether the price momentum exists in A-share and H-share before and after 2004, we form the price momentum portfolios based on past returns. The results are present in Table 1 and Table 2. The t statistics are reported in parentheses. In Table 1, the difference in returns for A-share between the highest and the lowest past-return portfolios, WML, is an insignificant 0.48% before 2004 but a statistically and economically significant negative 0.83% after 2004. This result means that the price momentum does not exist in A-shares before 2004, and after 2004 the Hong Kong investors who trade A-shares based on the momentum strategies would earn negative payoffs. In Table 2, the payoff in the zero-investment portfolio, WML, is a statistically significant 0.51% before and 0.73% after 2004 for H-shares. The result from Table 2 shows that no matter what the trade permission to A-shares, the price momentum strategies earns positive returns over the entire sample period.
Table 1. The descriptive statistics of A-share for price momentum

| momentum portfolios | Loser       | Winner     | WML        |
|---------------------|-------------|------------|------------|
| Before 2004.7       | -0.22(-0.54)| 0.26(0.70) | 0.48(1.45) |
| After 2004.7        | 3.45(3.53***)| 2.62(2.71***)| -0.83(-2.41***)|

Table 2. The descriptive statistics of H-share for price momentum

| momentum portfolios | Loser       | Winner     | WML        |
|---------------------|-------------|------------|------------|
| Before 2004.7       | 3.59(4.22***)| 4.11(5.04***)| 0.51(1.94*) |
| After 2004.7        | 2.78(3.09***)| 3.51(3.74***)| 0.73(2.29**) |

*, **, *** respectively represent the value is significant at 10%, 5% and 1% level.

Table 3 presents the returns on the SUE portfolios. The difference in returns between extreme SUE portfolios, PMN, is a statistically and economically significant 3.67% per month for A-shares and 1.65% for H-shares. From the results, it seems that investors who implement the earnings momentum strategies are more profitable than price momentum strategies for A-H shares. Even though there are differences in the accounting standards between A- and H-shares, the earnings momentum earns a significant payoff on the six month holding period.

Table 3. Monthly returns on SUE portfolios

| SUE portfolios | Loser       | Winner     | PMN        |
|----------------|-------------|------------|------------|
| A-share        | 1.79(2.63***)| 5.46(4.67***)| 3.67(5.56***)|
| H-share        | 2.77(3.29***)| 4.42(2.49***)| 1.652.57***( )|

*, **, *** respectively represent the value is significant at 10%, 5% and 1% level.

Since the price momentum does not exist in A-shares, we only discuss the relationship between earnings and price momentum in H-shares. We regress the returns of each momentum portfolio on the Fama-French model as the result from Fama and French (1996) asset pricing tests for the price momentum anomaly, and calculate the GRS statistic. The results are presented in Table 4, Panel A. We find that the intercepts increase monotonically from 1.69% for the loser portfolio to 2.74% for the winner portfolio. Therefore, even after controlling for Fama-French three factors, a strategy of buying winners and selling losers generates a payoff of 1.05% per month. The GRS test statistic is highly significant (p-value<0.001), and hence we reject the null hypothesis that the Fama-French model is well specified for momentum portfolios.

From Panel B of Table 4, we observe that the estimated intercept increases from 0.97% for the loser portfolio to 1.72% for the winner portfolio, suggesting that the price momentum strategy generates a positive payoff after controlling for the portfolios’ exposure to PMN. The GRS statistic is insignificant and therefore we can reject the null hypothesis, meaning that the three-factor model augmented by PMN can explain the returns to the momentum portfolios and capture the past returns on future returns.

In Panel C and Panel D we test the ability of Fama-French and Carhart model to explain returns across SUE portfolios. The results reported in Panel C of Table 4 show that the estimated intercepts increase monotonically from a low of 1.96% to a high 3.58% per month and the GRS statistic is highly significant, suggesting that the Fama-French (1993) model does not capture the impact of earnings surprises on returns. In Panel D, the estimated intercepts increase monotonically from 1.52% to the highest 2.73%. This means that after controlling for price momentum, the earnings momentum strategy would generate a significant payoff of 1.21% per month. Our results are consistent with Chordia and Shivakumar (2006), who also examined the relationship between the two anomalies and find that although earnings momentum captures the price momentum effect, the converse is not true.
### Table 4. Time-series regression in H-share market

#### Panel A: momentum portfolios-three factors model

|         | Loser        | Middle       | Winner       |
|---------|--------------|--------------|--------------|
| INTERCEPT  | 1.69(3.25)  | 2.03(3.88)  | 2.74(4.80)  |
| MKT     | 0.24(2.93)  | 0.25(2.92)  | 0.26(2.97)  |
| SMB     | 0.26(1.22)  | 0.28(1.20)  | 0.36(1.54)  |
| HML     | 0.35(0.61)  | 0.36(0.94)  | -0.03(-0.05)|
| Adj-R²(%) | 14.9        | 14.7        | 14.6        |

GRS test statistic: 10.95  
GRS(p-value): 0.000

#### Panel B: momentum portfolios- four factors model with PMN

|         | Loser        | Middle       | Winner       |
|---------|--------------|--------------|--------------|
| INTERCEPT  | 0.97(1.51)  | 1.11(1.82)  | 1.72(2.60)  |
| MKT     | 0.23(2.78)  | 0.25(3.02)  | 0.27(3.13)  |
| SMB     | 0.28(1.22)  | 0.23(1.07)  | 0.35(1.47)  |
| HML     | 0.37(0.59)  | 0.61(1.00)  | 0.20(0.31)  |
| PMN     | 0.51(2.45)  | 0.65(3.24)  | 0.76(3.52)  |
| Adj-R²(%) | 19.9        | 26.2        | 26.8        |

GRS test statistic: 3.86  
GRS(p-value): 0.012

#### Panel C: SUE portfolios-three factors model

|         | Loser        | Middle       | Winner       |
|---------|--------------|--------------|--------------|
| INTERCEPT  | 1.96(3.39)  | 1.97(3.64)  | 3.58(5.31)  |
| MKT     | 0.28(3.19)  | 0.29(3.34)  | 0.33(3.22)  |
| SMB     | 0.31(1.30)  | 0.10(0.46)  | 0.23(0.81)  |
| HML     | 0.50(0.75)  | 0.66(1.06)  | 0.73(0.94)  |
| Adj-R²(%) | 18.8        | 14.4        | 15.8        |

GRS test statistic: 14.25  
GRS(p-value): 0.000

#### Panel D: SUE portfolios- four factors Carhart model

|         | Loser        | Middle       | Winner       |
|---------|--------------|--------------|--------------|
| INTERCEPT  | 1.52(2.35)  | 1.57(2.59)  | 2.73(3.70)  |
| MKT     | 0.26(2.95)  | 0.28(3.11)  | 0.30(2.90)  |
| SMB     | 0.29(1.23)  | 0.09(0.39)  | 0.19(0.71)  |
| HML     | 0.54(0.82)  | 0.70(1.13)  | 0.81(1.08)  |
| WML     | 0.37(1.44)  | 0.34(1.40)  | 0.72(2.46)  |
| Adj-R²(%) | 19.8        | 15.4        | 20.7        |

GRS test statistic: 7.05  
GRS(p-value): 0.000

The above results are based on the momentum strategies that hold portfolios for six months following the portfolio formation period. However, Jegadeesh and Titman (1993) find that the momentum returns are significantly positive at least for one year after the formation month. In Table 5, the payoffs of different portfolios in A-shares are significant in only one portfolio (12, 12) (Note 1). And the results are consistent with our early findings that when
the limitation of investment barrier was eliminated after the year 2004, the price momentum portfolios would earn a negative payoff under a different formation and holding period.

Table 5. Monthly returns on momentum portfolios in A-shares

| Formation Period | Before 2004/7 (A-Share) | 3        | 6        | 12       | 24       |
|------------------|--------------------------|----------|----------|----------|----------|
| 3                | Loser                    | 0.45(0.75) | 0.24(0.64) | -0.12(-0.60) | -0.26(-1.79) |
|                  | Winner                   | 0.09(0.16) | 0.22(0.55) | -0.08(-0.33) | -0.33(-2.04) |
|                  | WML                      | -0.4(-0.90) | -0.02(-0.06) | 0.04(0.21) | -0.06(-0.70) |
| 6                | Loser                    | -0.2(-0.30) | -0.22(-0.54) | -0.46(-2.27) | -0.28(-1.99) |
|                  | Winner                   | 0.25(0.43) | 0.26(0.70) | -0.19(-0.89) | -0.26(-1.26) |
|                  | WML                      | 0.39(0.92) | 0.48(1.45) | 0.27(1.54) | 0.02(0.15) |
| 12               | Loser                    | -0.1(-0.10) | -0.19(-0.42) | -0.49(-2.24) | -0.16(-0.85) |
|                  | Winner                   | 0.31(0.46) | 0.36(0.83) | -0.04(-0.15) | -0.24(-0.94) |
|                  | WML                      | 0.36(0.75) | 0.55(1.51) | 0.45(2.03**) | -0.09(-0.45) |
| 24               | Loser                    | 0.2(0.27) | 0.55(1.11) | 0.18(0.86) | 0.93(6.98) |
|                  | Winner                   | 1.07(1.39) | 1.22(2.75) | 0.67(2.49) | 0.74(2.95) |
|                  | WML                      | 0.86(1.43) | 0.67(1.60) | 0.49(1.55) | -0.19(-1.15) |
| After 2004/7 (A-Share) | 3        | 6        | 12       | 24       |
| 3                | Loser                    | 2.94(2.55) | 3.06(3.15) | 3.14(4.01) | 3.79(7.43) |
|                  | Winner                   | 2.59(2.43) | 2.41(2.62) | 2.81(3.31) | 3.45(6.41) |
|                  | WML                      | -0.35(-0.48) | -0.64(-1.73*) | -0.33(-1.23) | -0.34(-2.04**) |
| 6                | Loser                    | 3.45(3.00) | 3.45(3.53) | 3.67(4.66) | 4.07(7.24) |
|                  | Winner                   | 2.28(2.20) | 2.62(2.71) | 2.94(3.19) | 3.45(6.10) |
|                  | WML                      | -1.17(-1.95*) | -0.83(-2.41**) | -0.72(-2.45**) | -0.62(-3.95***)
| 12               | Loser                    | 4.46(3.90) | 4.37(4.34) | 4.08(4.48) | 3.85(5.88) |
|                  | Winner                   | 3.31(2.73) | 3.42(2.94) | 3.43(3.25) | 3.36(5.57) |
|                  | WML                      | -1.15(-2.11**) | -0.96(-2.48**) | -0.64(-2.19**) | -0.49(-3.78***)
| 24               | Loser                    | 4.55(3.01) | 4.36(3.20) | 3.16(2.58) | 1.24(2.74) |
|                  | Winner                   | 2.42(1.54) | 2.55(1.68) | 2.05(1.51) | 1.04(2.08) |

*, **, *** respectively represent the value is significant at 10%, 5% and 1% level.

In Table 6, there are statistically significant payoffs in all portfolios except the portfolio formed by using the prior 24 months. This suggests that formed portfolios based on past 24 month returns and held for 3, 6, 12, 24 months would not earn a positive return in H-shares. However, the payoffs of all portfolios in A- and H-shares are highly significant as we show in Tables 7 and 8. The results suggest that the profitability of earnings momentum strategy is higher than price momentum in each market.
Table 6. Monthly returns on momentum portfolios in H-shares

| Formation Period | Holding Period | 3      | 6      | 12     | 24     |
|------------------|----------------|--------|--------|--------|--------|
|                  | 3              | 4.19(3.19) | 4.27(5.13) | 4.29(7.43) | 3.38(11.15) |
|                  | 6              | 3.96(3.10) | 4.11(5.04) | 3.87(6.40) | 3.14(10.05) |
|                  | 12             | 3.89(3.05) | 3.70(4.20) | 3.45(5.06) | 3.24(8.43)  |
|                  | 24             | 3.82(2.94) | 4.57(4.46) | 4.305.64  | 3.53(17.15) |
|                  | 3              | 4.19(3.19) | 4.27(5.13) | 4.29(7.43) | 3.38(11.15) |
|                  | 6              | 3.96(3.10) | 4.11(5.04) | 3.87(6.40) | 3.14(10.05) |
|                  | 12             | 3.89(3.05) | 3.70(4.20) | 3.45(5.06) | 3.24(8.43)  |
|                  | 24             | 3.82(2.94) | 4.57(4.46) | 4.305.64  | 3.53(17.15) |
|                  | 3              | 4.19(3.19) | 4.27(5.13) | 4.29(7.43) | 3.38(11.15) |
|                  | 6              | 3.96(3.10) | 4.11(5.04) | 3.87(6.40) | 3.14(10.05) |
|                  | 12             | 3.89(3.05) | 3.70(4.20) | 3.45(5.06) | 3.24(8.43)  |
|                  | 24             | 3.82(2.94) | 4.57(4.46) | 4.305.64  | 3.53(17.15) |

*, **, *** respectively represent the value is significant at 10%, 5% and 1% level.
Table 7. Monthly returns on SUE portfolios in A-shares

| Holding Period | Low   | High   | H-L (PMN) |
|----------------|-------|--------|-----------|
| 3 months       | 2.02  | 4.75   | 2.74      |
| t-stat         | 2.40**| 3.96***| 3.93***   |
| 6 months       | 1.79  | 5.46   | 3.67      |
| t-stat         | 2.63***| 4.67***| 5.56***   |
| 12 months      | 1.92  | 5.10   | 3.18      |
| t-stat         | 3.00***| 4.81***| 5.26***   |
| 24 months      | 1.84  | 3.00   | 1.16      |
| t-stat         | 4.41***| 7.06***| 8.68***   |

Table 8. Monthly returns on SUE portfolios in H-shares

| Holding period | Low   | High   | H-L (PMN) |
|----------------|-------|--------|-----------|
| 3 months       | 2.56  | 4.42   | 1.86      |
| t-stat         | 3.27***| 4.75***| 4.52***   |
| 6 months       | 2.77  | 4.42   | 1.65      |
| t-stat         | 3.29***| 2.49**  | 2.57***   |
| 12 months      | 2.75  | 3.91   | 1.16      |
| t-stat         | 5.89***| 6.88***| 5.51***   |
| 24 months      | 2.65  | 3.38   | 0.73      |
| t-stat         | 10.00***| 12.57***| 4.38***   |

*, **, *** respectively represent the value is significant at 10%, 5% and 1% level.

In the next section, we test the robustness of the relationship between earnings and price momentum by extending the length of the holding period to three, 12 and 24-months. And we also use prior three, 12-month returns to sort stocks into momentum portfolios. Table 9 presents the robustness tests. This table reports the results from the regression of WML (PMN) on the Fama-French factors and PMN (WML), using WML and PMN values obtained from varying the length of the formation period or holding period. Of the 12 regressions of WML on Fama-French and PMN that were conducted, the intercepts are significantly positive at 5% level in only two of the regressions. The magnitude of the intercept is only 0.28 and 0.33. Therefore, the coefficients on PMN are always significant in these regressions. Contrary to the results from the regression of WML, intercepts from the regression of PMN on Fama-French and WML are always significantly positive in all 12 regressions for H-shares. These findings confirm the robustness of our earlier results that the earnings momentum captures the price momentum, and the converse is not true.

Table 9. Robustness test for time-series regressions in H-shares

| Dependent variable=WML | Formation period | Holding period |
|-------------------------|-----------------|----------------|
|                         | 3 mon           | 6 mon          | 12 mon         | 24 mon         |
| INTERCEPT               | -0.33(-0.90)    | -0.25(-0.90)   | 0.28(2.10**)   | 0.07(0.47)     |
| MKT                     | -0.02(-0.32)    | -0.04(-1.16)   | -0.02(-0.70)   | 0.02(0.75)     |
| SMB                     | 0.04(0.29)      | 0.03(0.38)     | -0.08(-1.20)   | 0.02(0.39)     |
### HML and PMN Returns

|                | 6 mon         | 12 mon        |                |                |                |
|----------------|---------------|---------------|----------------|----------------|----------------|
|                | INTERCEPT     |               | INTERCEPT      |               | INTERCEPT      |
|                | 0.70(1.22)    | 0.76(1.45)    | -0.34(-0.84)   | -0.50(-1.42)   | -0.62(-1.34)   |
|                 | 0.07(1.56)    | 0.04(1.10)    | 0.02(-0.32)    | -0.08(-0.79)   | 0.006(0.07)    |
|                 | 0.00(0.03)    | 0.07(0.71)    | -0.12(-0.29)   | 0.00(0.00)     | 0.17(0.66)     |
|                 | 0.06(0.19)    | -0.17(-0.62)  | 0.00(0.00)     | 0.17(0.66)     | 0.37(1.82)     |
|                 | 0.29(3.86***)| 0.25(2.81***)| 0.42(4.26***  | 0.47(4.10***   | 0.56(4.57***   |
|                 |               |               | 0.49(4.46***  |                | 0.35(3.87***   |
|                |               |               |                |                | 0.69(5.53***   |

### 5. Conclusions

In this paper, three of these findings are worth summarizing: (1) the price momentum strategies do not earn a significant return before 2004 and generates a negative payoff after that year in the Chinese mainland A-share market. In the Hong Kong H-share market, the strategies are that buying winners and selling losers would always provide a statistically significant positive return in pre- and post-2004. Thus, the limitation of trading in the two markets indeed has an influence on the earnings momentum and price momentum. (2) The other robust and persistent anomaly, earnings momentum, or the post-earnings announcement drift always exist in the cross-listing firms. Although the standards and earnings information content are different in A-H markets, the profitability of earnings momentum strategies are significantly positive. (3) After the discussion of the two anomalies, we ask whether the two are related.
A zero-investment portfolio (PMN) captures the price momentum phenomenon in the tests. Our findings are in line with the results of the previous study (Chordia and Shivakumar, 2006) that price momentum is primarily subsumed by earnings momentum and that price momentum is merely a manifestation of earnings momentum.

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Note

Note 1. The first number in the parentheses is the formation period, and second is the holding period.