Information uncertainty and momentum phenomenon amidst market swings—
Evidence from the Chinese Class A share market

By

Yuan Wu
Southampton Business School
University of Southampton
Southampton SO17 1BJ, UK
Email: yuan.wu@soton.ac.uk
Phone: (44) 2380595923
Fax: (44) 2380593844

Abstract

This paper empirically investigates the effect of information uncertainty on the momentum phenomenon in the Chinese class A share market. We employ seven different factors to gauge the degree of firm-level information uncertainty—firm size, firm age, analysts’ coverage, return volatility, dispersion in analysts’ earnings forecast, trading volume, the quality/strength of corporate governance (free float ratio). We provide evidence that the information uncertainty has an amplifying effect over the momentum premium, and the amplifying effect is more pronounced over time periods following DOWN market state over sample period from January 1996 to December 2010. The robustness of the empirical evidence is warranted by risk adjustment based on the FF3F model and Wang & Xu (2004)’s version of the FF3F model, a sub-period analysis, and a different definition of market states.

The empirical findings can potentially provide an important reference point for international and domestic investors in adjusting investment strategies and portfolio positions in a financial market with volatile market condition such as the Chinese stock market.

November, 2014
1. Introduction
Since the publication of Jegadeesh and Titman (1993)’s seminal work on the momentum phenomenon, the discussions revolving the anomalous effect have been on-going, capturing the attentions of academics and financial industry practitioners. Some found solid empirical evidence showing the existence of the momentum effect around the globe, directly challenging the validity of the Efficient Market Hypothesis (EMH) (Fama, 1965); while others—the efficient market proponents—devoted a great deal of effort in rationalizing the anomalous effect or in finding empirical evidence that fundamentally dismisses the existence of the effect. Numerous research propositions have been put forward, deriving from the empirical evidence of the momentum phenomenon\(^1\). One of the most recent ones is on the impact of firm-level information uncertainty (IU hereafter) over the momentum phenomenon, examined in Jiang et al. (2005) and Zhang (2006). Specifically, they documented a negative relationship between high IU firms and the performance of their shares in the stocks market in the setting of the U.S. stock markets. This study extends their seminal work by investigating on the dynamics of the “interaction effect”\(^2\) amid market swings in the unique setting of the Chinese Class A share market. Besides the prominent position of Chinese economy\(^3\) in the global economy, the decision of focusing on the Chinese stock market is made for some of the unique characteristics of the Chinese stock market offers such as the large proportion of retail investors and the split between tradable shares and non-tradable shares. Against the backdrop of the global economic uncertainty, we employ a set of seven factors—firm size, firm age, return volatility, dispersion in analysts’ earnings forecast, trading volume, and the strength of corporate governance—to proxy for various degree of firm-level information uncertainty and investigate on the interaction between firm-level

---

\(^1\) The momentum phenomenon takes various forms such as price momentum (Jegadeesh and Titman, 1993) and dividend momentum (Asem, 2008).

\(^2\) “Interaction effect” was termed by Jiang et al. (2005) and described the negative relationship between firm-level information uncertainty and price momentum premium.

\(^3\) The Chinese stock market accounted for 40.37% of GDP in the Chinese economy in 2008.
information uncertainty and momentum returns conditional on post-UP and DOWN market states. We find high IU-firms are associated with superior momentum returns, and IU has an amplifying effect over momentum returns. Moreover, the amplifying effect is markedly more pronounced over time periods following DOWN market state. The results are resilient to risk adjustment based on both FF3F model and Wang and Xu (2004)’s FF3F model, a sub-period analysis, and a different definition of market state.

The study extends the group of work represented by Jiang et al. (2005) and Zhang (2006) on the “interaction effect” by including strength of corporate governance as one of the IU proxy factors in gauging the level of firm-level IU and further examining the interaction of the IU and momentum premium amid market turbulences in the Chinese stock market. Additionally, the role of the strength of corporate governance as a risk factor in Wang and Xu(2004)’s FF3F model is empirically investigated in rationalizing the momentum premium under the influence of IU. To our knowledge no previous study empirically investigates the issue in the Chinese Class a share market. The remainder of the paper is organized as follows. Section 2 outlines the relevant literature. The theoretical setup is presented in section 3. Section 4 describes sample dataset and methodology. Section 5 presents the empirical findings out of this study. Section 6 describes the robust test result. Section 7 concludes the study.

2. Literature review

The seminal work of this line of research is carried out by Jiang et al. (2005) in the U.S. stock markets. Differing from the previous information uncertainty (IU)-related studies where researchers traditionally interpret information uncertainty as an indication of information asymmetry, Jiang et al. (2005) hypothesize that information uncertainty represents the difficulty of estimating firms’ value and thereby employ four variables—Firm Age, Return Volatility, Average Daily Turnover, and the Duration of its future cash flows—to proxy for

---

4 The traditional value effect factor is supplanted with a corporate governance factor.
the degree of IU. In their research, Jiang et al. (2005) reason that greater degree of firm-level information uncertainty associated with stocks can potentially accentuate the magnitude of momentum premia under the information uncertainty-investor’s overconfidence-arbitrage costs paradigm. Through analysing the interaction between the IU factor with price momentum, with earnings momentum, and with industry distribution respectively, they find the empirical evidence supporting their hypothesis—the implementation of momentum trading strategies within stocks associated with high IU level significantly improved the momentum premia. From an empirical perspective, Jiang et al. (2005) contend the trading strategy that emphasises the impact of the momentum-related signals on high-IU firms and impact of value-related signals on low-IU firms could strengthen the profitability of portfolio investment. Extending Jiang et al. (2005)’s work, Zhang (2006) takes a slightly different approach to gauge the degree of information uncertainty factor. Building the bedrock of his research hypothesis on the heuristic bias—specifically, overconfidence—as suggested by evidence found in previous behavioural finance studies (Daniel et al., 1998), Zhang (2006) selects a set of factors including firm size, firm age, analyst coverage, dispersion in analyst earnings forecasts, stock volatility, and cash flow volatility attempting to best proxy for the level of information uncertainty associated with companies listed in the U.S. stock market. Forming portfolios based on different information uncertainty proxies, Zhang (2006) finds all the empirical evidence unanimously suggest that higher IU level associated with stocks following good/bad news magnifies the profitability of momentum trading strategies. This indirectly indicates that the momentum effect can be largely attributed to how quick share prices adjust to news to reflect the company’s fundamental value. Specifically, the

5 “The level of information uncertainty is positively correlated with a pervasive form of decision bias (investor overconfidence), and that it is also positively correlated with arbitrage costs (in particular, the prevalence of information cascades)” (Jiang et al, 2005: page 217).

6 Zhang (2006) defines information uncertainty as “ambiguity with respect to the implications of new information for a firm’s value…” (page 105)
momentum premia are noticeably larger among stocks/portfolios associated with high level of information uncertainty.

In addition, the intricate relationship between the strength of corporate governance and the performance of stocks for corresponding firms has been well documented in the literature. Gompers et al. (2003) construct a “Governance Index” using data taken from the Investor Responsibility Research Center (IRRC) and find that “corporate governance is strongly correlated with stock returns during the 1990s” (Gompers et al., 2003: 144). Drobertz et al. (2004) test Gomper et al. (2003)’s hypothesis on the German financial market using a broad corporate governance rating (CGR) to measure corporate quality for the firms and find “better corporate governance is highly correlated with better operating performance, higher stocks returns and higher market valuation” (Drobertz et al., 2004: page 270). In the setting of the Chinese stock market, Wang and Xu (2004) employ use corporate governance—measured by residual free float ratio—to replace the value effect factor of the traditional FF3F model as one of the risk factors in a modified version of Fama and French three factor model and document that corporate governance factor (free float ratio) “significantly increased the explanatory power of the market model” (Wang and Xu, 2004: page 65).

Additionally, the quality/strength of firm-level corporate governance has been entrenched as a suitable proxy for firm-level IU. Bushman and Smith (2001) empirically explore the interrelation between information uncertainty and corporate governance practices and show that the quality of corporate governance can reflect the level of information uncertainty associated with firms in the corporate markets. Magnan and Xu (2008) show that poor quality of corporate governance practice (no or less information disclosure) can trigger a higher level of firm-specific information uncertainty.

3. Theoretical set-up
As an extension to Jiang et al. (2005) and Zhang (2006)’s seminal work, this study will inherit their definition of firm-level information uncertainty—“the degree to which a firm’s value can be reasonably estimated by even the most knowledgeable investors at reasonable costs” (Jiang et al., 2005: page 185) and “the ambiguity with respect to the implications of new information for a firm’s value” (Zhang, 2006: page 105). According to the theoretical framework of judgmental heuristics, economic agents are inclined to introduce more optimistic bias into their decision making procedure under greater information uncertainty (Armor and Taylor, 1998). With judgments hamstrung by lack of relevant information and the afore-mentioned optimistic bias, investors are predisposed to get involved in evaluative judgmental procedure of information processing (Schwarz, 1990, Armor and Taylor, 1998), characterized by frequent practice of intuitive heuristics such as affective and prototypes heuristics of System 1 (intuitive) of two cognitive systems (Kahneman and Frederick, 2002). The investors’ participation in evaluative judgmental process fosters and heightens the influence of various behavioural biases such as overconfidence (Daniel et al., 1998), conservatism (Barberis et al., 1998), underconfidence (Du, 2002) and underreaction (Hong and Stein, 1999) over the momentum phenomenon. Higher degree of information uncertainty is expected to have an amplifying effect upon momentum returns (Grinblatt et al., 1995, Nofsinger and Sias, 1999, Kurov, 2008).

In the light of various established behavioural theories revolving the momentum phenomenon, we pulled together four contemporary behavioural theory frameworks while exploring the influence of information uncertainty over momentum returns: 1) Daniel et al.(1998) propose a behavioural model where investors are assumed to be quasi-rational and overconfident and suggest that it is the investors’ overreaction driven by human cognitive biases—overconfidence, self-attribution bias and confirmation bias—that leads to the momentum phenomenon observed in the financial market. 2) Inspired by psychological
evidence such as representativeness bias (Tversky and Kahneman, 1974) and confirmation bias (Gilovich, 1993), Barberis et al. (1998) construct a model consists of one representative market investor and one security, where the representative investor’s sentiment directly affects the security’s price in the fictional market. They claim that the momentum phenomenon stems from the investors’ underreaction to earnings information in the financial market.

3) Hong and Stein (1999) extended two prior work (Daniel et al., 1998, Barberis et al., 1998) by building a behavioural theory on the behavioural interaction between two different type of agents as opposed to the focus on the behaviour of one single representative agent employed by Daniel et al. (1998) and Barberis et al. (1998). In Hong and Stein (1999)’s theory, all market investors are assumed to be “boundedly rational” (Hong and Stein, 1999: page 2144), yet can be divided into two distinctive groups—“newswatcher” and “momentum trader”. They subsequently postulate that it is underreaction by “newswatchers” toward private information signals that drives and lies at the heart of the momentum phenomenon in the stock market.

4) Du (2002) proposes a behavioural model on the premise of heterogeneity in investors’ self-confidence. The momentum phenomenon is largely believed to be driven by investors’ underreaction to public information signalling a permanent change in the fundamental value of assets (Hong and Stein, 1999). Du nominates investors hesitation during decision-making process as the driving force behind the momentum phenomenon.

**Proposition 1:** Information uncertainty, proxied by 7 different factors including firm size, firm age, analysts’ coverage, return volatility, dispersion in analysts’ earnings forecast (DISP), trading volume, the quality/strength of corporate governance (free float ratio), amplifies the returns of the (Ranking=6 months, Holding=6 months) momentum strategy in the Chinese Class A share market.

Under the theoretical framework of heuristics and biases tradition (Tversky and Kahneman, 1973), following a market downside movement, the vast majority of Chinese stock market participants (retail investors) (Kang et al., 2002), are inclined to keep on embracing the bearish view concerning the outlook of stock returns (Fisher and Statman, 2002), reflecting
retail investors’ persistent sombre sentiment (Brown and Cliff, 2004, Fisher and Statman, 2000). The negative sentiment of Chinese retail investors heightens their perception of risk (Schwarz, 1990), exacerbated by greater information uncertainty they face, leading to the underreaction toward firm-specific news induced by investors with low confidence (Du, 2002) and consequently resulting in more profound momentum returns among high IU stocks over time periods following DOWN market states. Furthermore, another parallel theory points to the same conjecture: retail investors are pessimistic on the dim outlook of the market during post-down market periods, also being preoccupied by concern over heightened IU, provoking the evaluative judgment process involving frequent practice of intuitive heuristics (Schwarz, 1990) such as affective, availability heuristics of System 1 (intuitive) of two cognitive systems (Kahneman and Frederick, 2002), which requires less cognitive resources (Frederick, 2002). As a result, investors’ decisions are subject to pervasive influence of different behavioural biases such as overconfidence, conservatism, underconfidence, and underreaction, resulting in larger momentum premia during post-market slides (Daniel et al., 1998, Barberis et al., 1998, Du, 2002, Hong and Stein, 1999).

**Proposition 2:** *The amplifying effect of information uncertainty over momentum return of the (R=6, H=6) momentum trading strategy is most pronounced over time periods following DOWN market state.*

On the other hand, the amplifying effect of IU over momentum returns seems to falter over the periods following UP market state. Following market run-ups, systematic judgment information processing strategy (the use of different reflective heuristics such as statistics and abstract heuristics), induced by investors’ awareness of information uncertainty/scarcity, eclipses intuitive/evaluative judgment information processing strategy of investors’ judgment,

---

Elsewhere in the literature, one line of psychological study shows that people tend to appear underconfident in decision making when facing high information uncertainty by misplacing weights on the strength of the evidence upon which the decisions are drawn (Griffin and Tversky, 1992), leading to the underreaction in share price (Du, 2002) and therefore giving rise to increasingly large momentum premia under greater information uncertainty.
driven by investors’ optimistic sentiment (Schwarz, 1990). The overwhelming impact of the implementation of systematic judgment information processing strategy curtails the influence of a series of behavioural biases believed to have triggered the momentum phenomenon.

**Measurement of firm-specific information uncertainty levels**

A few researchers (Zhang, 2006, Jiang et al., 2005) have studied the impact of information uncertainty over the momentum phenomenon yet could not reach a consensus on which is the most appropriate variable/set of variables to proxy for the degree of information uncertainty (Schultz, 2005). The selection of information uncertainty proxy factors is proved difficult as some of the most obvious variables such as firm size (measured market capitalization) and firm age, are highly susceptible to be confounded with other factors. Inspired by Zhang et al. (2006) and Jiang et al. (2005)’s work and prior empirical evidence indicating the intricate relationship between the quality/strength of corporate governance, firm value, and information uncertainty (Wang and Xu, 2004, Gompers et al., 2003, Cai et al., 2006, Magnan and Xu, 2008), we employ a group of seven proxy factors to gauge the degree of firm-level information uncertainty: 1) firm size, measured by the stock’s market capitalization right before the ranking period; 2) firm age, measured by the number of days prior to the ranking period since a stock gets listed or firstly appears in the database; 3) analysts’ coverage, measured by the residual from regressing the number of analysts covering the firm in the year before the ranking period against the market capitalization of the corresponding firm (firm size) to stave off the cofounding effect of the firm size and analysts’ coverage documented by Bhushan (1989), analogous to the procedure employed by Hong, Lin and Stein (2000) and McKnight and Hou (2006); 4) return volatility, measured by the standard deviation of the

---

8. Overconfidence (Daniel et al., 1998), conservatism (Barberis et al., 1998), underconfidence (Du, 2002) and underreaction on investors’ decision making process and in turn undermining the significance of momentum returns.

9. The rationale of the cofounding effect is rather trivial: large cap-firms tend to draw more attention from the analysts, thus resulting in a positive correlation between the firm size factor and analysts’ coverage factor (Bhushan, 1989).
monthly returns of a stock over 6 months prior to the ranking period; 5) dispersion of analysts’ opinion on earnings forecast, which is believed to be able to “reflect the information uncertainty each security bears” (Graham, Zweig, 2003: page 238) and is measured by “standard deviation of analysts’ earnings forecasts scaled by prior year-end stock price to mitigate heteroskedasticity” (Zhang, 2006: page 110); 6) trading volume, estimated by the turnover ratio\(^\text{10}\) of a stock prior to the ranking period; 7) the quality/strength of corporate governance, measured by free float ratio\(^\text{11}\), consistent with Wang and Xu(2004)’s method. More explicitly, free float ratio is calculated by taking the ratio between the number of shares in a listed firm that is free to trade among investors and total number of share a company issued.

4. Sample dataset and methodology

4. A. Sample dataset

The data used in this research are kindly provided by Guotai Junan Securities Co. Ltd.\(^\text{12}\) (GTJA) through their database provider Shanghai Wind Information Co. Ltd\(^\text{13}\). The sample period adopted for the research is from January 1996 to December 2010\(^\text{14}\), entailing 180 months in total. The types of data we use for the analysis in this study can be listed out as follows: (1) The monthly price data\(^\text{15}\) of the Chinese Class A shares in the Shanghai Stock Exchange (SHSE hereafter) and the Shenzhen Stock Exchange SZSE (SZSE hereafter) (excluding dividends and interest); (2) Trading volumes of Chinese Class A shares listed in

\(^{10}\)The turnover ratio is calculated by taking the ratio between the number of share changed hands each day and the number of total shares outstanding for the stock at the end of the day (estimated based on quarterly data due to data availability).

\(^{11}\)Free float ratio is defined as “the ratio of shares in a public company that are freely available to the investing public to total company shares” (Wang and Xu, 2004: page 65).


\(^{14}\)The sample dataset is not extended beyond the end of 2008 to eschew result distortion caused by ripple effects of the global financial crisis.

\(^{15}\)Dividends were reinvested automatically.
the SHSE and the SZSE; (3) Turnover ratios of the Chinese Class A shares in the SHSE and the SZSE; (4) the number of tradable shares of the Chinese Class A shares in the SHSE and the SZSE; (5) Monthly market capitalization of the Chinese Class A shares listed in the SHSE and the SZSE; (6) Annual data of the number of days stocks have been listed in the Chinese Class A share market; (7) Annual data on the number of financial analysts following and issuing earnings estimates for Share A stocks in the Chinese Class A share market; (8) Semi-annual data of the difference in opinions between analysts’ earnings forecasts (EPS)\(^{16}\) of the Chinese Class A share market; (9) Monthly China one-year-time deposit rate; (10) Monthly index price data for Shanghai composite, A index; (11) Monthly index price data for Shenzhen component, A index.

Seven different factors\(^{17}\) (firm size, firm age, return volatility, trading volume, analyst coverage, corporate governance, dispersion in analysts’ earnings forecast) are employed to examine the impact of firm-level information uncertainty over the momentum phenomenon. Firm size is the market capitalization (in million yuan) for each listed stock at the end of month \(t\). Firm age is number of days since a stock gets listed or first appears in the database. Return volatility is the standard deviation of monthly returns of each listed stock over 6 months prior to the beginning of the ranking period. Trading volume is estimated by the turnover ratio of each listed stock at the end of month \(t\). Analysts’ coverage is measured by the number of analysts covering the firm in the year prior to the ranking period. Corporate governance is proxied by the free float ratios\(^{18}\) of listed firms prior to the beginning of the ranking period. Dispersion in analysts’ earnings forecast (DISP) is measured by the standard deviation of analysts’ earnings forecasts scaled by prior year-end stock price.

\(^{16}\) The data of the difference in analysts’ earnings forecasts (EPS) is only available from January, 2000.

\(^{17}\) The reasons why these variables are picked as proxy factors is provided in the appendix.

\(^{18}\) Free float ratio is computed by taking the ratio between the number of shares in a listed firm that is free to trade among investors and total number of share a company issued.
Table 1. Descriptive statistics of information uncertainty proxy factors

<table>
<thead>
<tr>
<th>Proxy factors</th>
<th>Mean</th>
<th>Variance</th>
<th>Skewness</th>
<th>Kurtosis</th>
<th>Jarque-Bera</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm size</td>
<td>4,622(billion yuan)</td>
<td>5.536E+25</td>
<td>2.8066(a)</td>
<td>7.8087(a)</td>
<td>519.3667(a)</td>
</tr>
<tr>
<td>Firm age</td>
<td>1158 days</td>
<td>182591</td>
<td>0.39771(a)</td>
<td>-0.598758(a)</td>
<td>1251.284(a)</td>
</tr>
<tr>
<td>Return volatility</td>
<td>0.3818</td>
<td>2.4187</td>
<td>0.1327(a)</td>
<td>-0.9472(a)</td>
<td>102.813(a)</td>
</tr>
<tr>
<td>Trading volume</td>
<td>31481</td>
<td>1238356812</td>
<td>1.85833(a)</td>
<td>4.284965(a)</td>
<td>1283.159(a)</td>
</tr>
<tr>
<td>Analyst coverage</td>
<td>4.6591</td>
<td>4.9488</td>
<td>0.4611(a)</td>
<td>-1.65291(a)</td>
<td>232.619(a)</td>
</tr>
<tr>
<td>Corporate governance</td>
<td>0.3116</td>
<td>0.0019</td>
<td>6.0123(a)</td>
<td>36.4105(a)</td>
<td>260.51(a)</td>
</tr>
<tr>
<td>Difference in analysts’ opinion</td>
<td>0.0715</td>
<td>0.0008</td>
<td>-0.3378(a)</td>
<td>0.8258</td>
<td>155.386(a)</td>
</tr>
</tbody>
</table>

Source: Wind financial database

As shown in Table 1, the average firm size of the Chinese Class A shares, measured by firm’s market capitalization, stands at 4,622 billion yuan. There is markedly variations in firm size among the Chinese Class A shares (variance: 5.536E+25). The distribution of the firm size of both Class A shares is significantly skewed to the left, with a fatter tail and higher global maximum point, compared to the normal distribution. The pattern of the distribution is consistent across four other proxy variables: namely, firm age, return volatility, trading volume, and quality of corporate governance. In term of firm age (measured by the number of days the stocks have been listed on the SHSE/SZSE), Share A stocks have been listed for 1158 days on average. Turning now to return volatility (measured by the standard deviation of monthly market excess returns over the year ending at the end of month t), the Share A stocks had been, on average, fairly volatile (0.38176). On the trading volume (measured by turnover ratio) front, Share A stocks, on average, changed hands as frequent as 31481 times. For analyst coverage (estimated by the number of analysts following the firm in the previous
year), the average number of analysts covering a specific Share A stock is 4, falling in the range between 1 and 6 for the sample data.

Table 2. Correlation matrix

<table>
<thead>
<tr>
<th></th>
<th>Size</th>
<th>Age</th>
<th>Cov</th>
<th>Volatility</th>
<th>DISP</th>
<th>Volume</th>
<th>CG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>1</td>
<td>0.313</td>
<td>0.422</td>
<td>-0.273</td>
<td>-0.152</td>
<td>-0.351</td>
<td>-0.397</td>
</tr>
<tr>
<td>Age</td>
<td>0.352</td>
<td>1</td>
<td>0.483</td>
<td>-0.316</td>
<td>0.079</td>
<td>-0.195</td>
<td>-0.274</td>
</tr>
<tr>
<td>Cov</td>
<td>0.557</td>
<td>0.459</td>
<td>1</td>
<td>-0.316</td>
<td>0.023</td>
<td>-0.215</td>
<td>-0.521</td>
</tr>
<tr>
<td>Volatility</td>
<td>-0.294</td>
<td>-0.351</td>
<td>-0.338</td>
<td>1</td>
<td>0.031</td>
<td>0.496</td>
<td>-0.305</td>
</tr>
<tr>
<td>DISP</td>
<td>-0.219</td>
<td>0.095</td>
<td>0.051</td>
<td>0.047</td>
<td>1</td>
<td>0.471</td>
<td>0.395</td>
</tr>
<tr>
<td>Volume</td>
<td>-0.374</td>
<td>-0.203</td>
<td>-0.258</td>
<td>0.534</td>
<td>0.634</td>
<td>1</td>
<td>-0.142</td>
</tr>
<tr>
<td>CG</td>
<td>-0.53</td>
<td>-0.296</td>
<td>-0.493</td>
<td>-0.322</td>
<td>0.513</td>
<td>-0.137</td>
<td>1</td>
</tr>
</tbody>
</table>

Pearson correlation coefficients are shown above the diagonal; Spearman correlation coefficients are shown below the diagonal. All correlation coefficients are significant at 1% level.

Table 2 shows the correlations between the seven different information uncertainty proxy factors as measured by Pearson correlation (above the diagonal) and Spearman correlation (below the diagonal). Firm size, firm age, and analysts’ coverage are positively correlated with each other as expected\(^\text{19}\). Given the fairly strong correlations between analysts’ coverage and firm size (Pearson= 0.422; Spearman= 0.557)/firm age (Pearson= 0.483; Spearman= 0.459), the measurement of analysts’ coverage is carefully calibrated (by adopting a residual analysts’ coverage) as detailed in the methodology section below to capture unique characteristics of the information uncertainty proxy. In contrast, the firm size, firm age, and analysts’ coverage are negatively correlated with return volatility, indicating the extra volatility associated with small-cap stocks of relatively young firms with deficient analysts’ coverage. Quite noticeably, the dispersion in analysts’ coverage has very weak correlation with firm size, firm age, analysts’ coverage, and return volatility, asserting the importance of including the variable as part of information uncertainty proxy. However, the dispersion in analysts’ coverage is highly correlated with trading volume and strength/quality.

\(^{19}\) This is also consistent with U.S. evidence documented by Jiang et al. (2005) and Zhang (2006).
of corporate governance, reflecting that more frequently traded stocks tend to be associated with better governed firms with more divided opinion among analysts. Moreover, the strength/quality of corporate governance is moderately negatively correlated with firm size, firm age, return volatility, and dispersion in analysts’ forecasts and weakly negatively correlated with trading volume (Pearson= -0.142; Spearman= -0.137). It’s worth mentioning that the strength/quality of corporate governance factor is strongly negatively correlated to analysts’ coverage (Pearson= -0.521; Spearman= -0.493) and moderately positively correlated to dispersion in analysts’ coverage (Pearson= 0.395; Spearman= 0.513), suggesting that the stocks of more stringently-governed firms tend to receive less coverage from analysts and spur less divided opinions among analysts.

4.B. Methodology
To detect the impact of information uncertainty, gauged by seven different factors (as explained in the following section) over the momentum premia, we employ an independent two-way sorting method\(^{20}\), developed upon Jegadeesh and Titman(1993)’s procedure in quantifying momentum premium, to form information uncertainty and momentum quintiles. The mechanism of the independent two-way sorting procedure has been widely adopted in momentum phenomenon-related studies concerning variables other than past stock returns such as Lee and Swaminathan (2000), Wang and Chin (2004), and Naughton et al. (2008). Additionally, as one of the seminal work by Jiang et al. (2005) regarding the association between the momentum phenomenon and information uncertainty in the U.S. market also followed the mechanism, the results from this research offer a paralleled comparative view on the issue between the U.S. financial market and the Chinese stock market. Specifically, at the beginning of every month over the entire sample period from January 1996 to December

\(^{20}\) Zero-cost strategy is employed for brevity and ease of comparison.
2008, all the eligible Class A share stocks (stocks with a price less than $1 (about 7 yuan) at the portfolio formation date are excluded from the sample), listed on the SHSE and SZSE, will be ranked independently based on two criteria—information uncertainty proxy factor and past returns over 6-month ranking period in ascending order. Based on each ranking, the stocks, bearing equal weights, are put into five different portfolios to form five quintile momentum portfolios. The quintile portfolio consists of 20% highest-ranked stocks based on their past 6-month average returns is titled “winner” portfolio, whereas the quintile portfolio consists of 20% lowest-ranked stocks based on their past 6-month average returns is named “loser” portfolio. The quintile portfolio, comprising 20% highest-ranked stocks according to one of seven information uncertainty proxy factors, is labelled as “high IU portfolio”; the bottom quintile portfolio, consisting of 20% lowest ranked stocks is labelled as “low IU” portfolio. To factor in the interplay of information uncertainty proxy factors and return momentum premia, we form the “winner-high IU” portfolio by taking the intersection of the “winner” portfolio and “high IU” portfolio. Analogously, the intersection of the “loser” portfolio and “low IU” portfolio forms the “loser-low IU” portfolio; the intersection of the “winner” portfolio and “low IU” portfolio forms the “winner-low IU” portfolio; the intersection of the “loser” portfolio and “high IU” portfolio forms the “loser-high IU” portfolio. The quintile portfolios are denoted by Q1, Q2, Q3, Q4, Q5 from “loser” portfolio to “winner” portfolio and IU1, IU2, IU3, IU4, IU5 from low IU portfolio to high IU portfolio. Collectively, there are 25 different portfolios drawn up based on past stocks returns (prior 6 months) and the degree of information uncertainty. All these 25 portfolios will be held for six months after skipping the month subsequent to the end of the 6-month ranking period to

---

The equally-weighted approach is found to not only result in robust results of momentum returns by numerous studies such as Jegadeesh and Titman (1993) and Lee and Swaminathan (2000) but also enable the study to vividly imitate lay people’s investing behaviours, normally biased due to the “1/n heuristic” postulated by Benartzi and Thaler(2001). The plausibility of the postulate is supported by many empirical studies in psychology (Allison and Messick, 1990; Rabin, 1997; Samuelson and Zeckhauser, 1998; Frederick, 2003).
avoid provoking microstructure issues\textsuperscript{22} (Lehmann, 1990, Jegadeesh, 1990, Galariotis et al., 2007). To realistically minimize transaction costs incurred, a buy-and-hold strategy\textsuperscript{23} will be employed during the holding period. The momentum return ($R_{W-L}$) on different information uncertainty levels will be determined by taking the difference of the average monthly return from relevant “winner-IU portfolio” ($R_W$) and that from corresponding “loser-IU” portfolio ($R_L$). Mathematically, it can be written as

$$R_{W-L} = R_W - R_L$$ (1)

4.C. UP and DOWN market states

In order to examine the impact of market swings, triggered by different salient events in the financial market, over the momentum effect, a method similar to the one firstly proposed in Cooper et al. (2004) and later adopted by Du et al.(2009),Siagnos and Chelley-Steeley (2006) and Huang (2006) will be employed. Basically, the methodological procedure is designed in the way to address the questions: (1) whether there is significant difference in terms of magnitude and statistical significance between the momentum premia over time periods following UP market state and those found over time periods following DOWN market state.

In terms of which metric to use in defining post-UP and DOWN market states, the results from previous studies in the literature have shown neither macroeconomic factors such as lagged industrial production growth(Huang, 2006) nor a combination of macro variables (Cooper et al., 2004, Du et al., 2009) nor previous 36-month average market return(Cooper et al., 2004, Huang, 2006) is deemed effective in differentiating market states. Therefore, in this

\textsuperscript{22} To mitigate the potential issues induced by “bid-ask bounce” bias\textsuperscript{22} and return serial correlation(Arena et al., 2008) and to avoid “test statistics based on overlapping returns” (Moskowitz and Grinblatt, 1999: page 1258), a month is skipped between the end of ranking period and the start of holding period(Jegadeesh and Titman, 1993, Galariotis et al., 2007, McKnight and Hou, 2006, Lehmann, 1990).

\textsuperscript{23} The monthly rebalancing strategy used by Jegadeesh and Titman (1993) is not used in this study to avoid the incurring of excessive trading costs (for a Class A share transaction, an investors is obliged to pay 0.3% of trading value as commission to securities firms and 0.1% of trading value as transfer fee to the Depository & Clearing Company. In addition, a sell-side investor is also required to pay 0.1% of trading value as stamp duty to the tax authorities).
research, 12-month average market return is chosen as the main barometer to identify the
state of the stock market. The returns of a self-constructed share A composite index entails
all the Class A shares listed on the SHSE and SZSE, weighted by their market capitalization,
will be used to proxy for the average market return of all Class A shares. Methodologically,
two main steps are implemented for the analysis in studying the dynamics of the momentum
premia over time periods following UP and DOWN market states in aforementioned three
different segments:
Step 1: the momentum returns conditional on post-UP and DOWN market states are
quantified by regressing the raw momentum returns on an UP state dummy and a DOWN
state dummy. Mathematically, it can be expressed as

\[ R_{W-L,t} = R_{W-L,UP}U_{P,t} + R_{W-L,DOWN}D_{OWN,t} + e_{t} \] (3)

Where \( R_{W-L,t} \) denotes the momentum premium from different momentum trading strategies;
\( U_{P,t} \) is equal to 1 if it is a UP market state (average market return for the previous 12 or 24
months is positive: \( R_{market,t-1,t-k} > 0 \), where k=12 or 24) and is 0 otherwise; \( D_{OWN,t} \) is
equal to 1 if it is a DOWN market state (average market return for the previous 12 or 24
months is negative: \( R_{market,t-1,t-k} < 0 \), where k=12 or 24) and is zero otherwise. The
average momentum return following the UP market state is denoted by \( R_{W-L,UP} \), and the
average momentum return following the DOWN market state is symbolized by \( R_{W-L,DOWN} \).

\[ \text{24-month average market return is used as an additional market state definition, reassuring the robustness of}
\text{the results. These results are available on request.} \]
Step 2: The difference of momentum returns conditional on post- UP and DOWN market states is quantified by regressing the raw momentum returns on a UP market state dummy factor. Mathematically, it can be shown as:

\[ R_{W-L,t} = \alpha + R_{W-L,UP-DOWN}UP_t + e_t \]  

(4)

Where \( R_{W-L,UP-DOWN} \) represents the difference of momentum premia following two different market states (Du et al., 2009).

5. Empirical results

5. A. Information uncertainty and the price momentum phenomenon

In view of empirical evidence from existing studies in the field, the underlying motivation of this study is to test the proposition—whether and how the firm-level information uncertainty, measured by the above-listed seven proxy factors, is influencing the momentum premium of the (Ranking=6, Holding=6) momentum trading strategy. In sum, among the results categorized by the use of seven IU proxy factors, we generally observe negative relationship between the average monthly returns of “loser” momentum quintile and the degree of information uncertainty in all but the scenario when firm size is employed to yardstick the strength of information uncertainty. As to the average monthly returns of “winner” momentum quintiles, they are found to have positive statistical association with the levels of information uncertainty unanimously in all seven scenarios. The general patterns—negative relation between IU and the returns of “loser” momentum quintiles and positive relation between IU and the returns of “winner” momentum quintiles—are consistent with empirical evidence found by Zhang (2006) in one of the seminal work in the field, corroborating the prediction reliant on investors’ underreaction theory and gradual information diffusion theory developed by Hong and Stein (1999) and Hong et al. (2000)

25 The result tables are available upon request.
respectively. Specifically, both of the above-noted behavioural theories nominate investors’ underreaction, evoked by the languish manner firm-specific information concerning low IU “loser” stocks and high IU “winner” stocks travels among investors, as the impetus behind the momentum premium.

Rather intriguingly, differed from other scenarios, the result from the case where firm size is used to gauge the strength of information uncertainty shows a positive statistical association between IU and the returns of “loser” momentum quintile. The result can be elucidated by the conjecture that the momentum phenomenon is the resultant of the ultimate effect of different human cognitive biases, determined by the trade-off between the impact of investors’ underconfidence theorised by Du (2002) and that of underreaction (Hong et al., 2000) elicited by investors’ optimism under greater IU (Armor and Taylor, 1998) towards “loser” stocks.

On the momentum premium (Q5-Q1) front, the results across all seven proxy factors compellingly show that momentum premia soar as the degree of information uncertainty heightens. In other words, greater information uncertainty provides a boost to the salience of momentum premium. This find is consistent with proposition 1 stating that the information uncertainty has an amplifying effect over the momentum premium. The finding is also supported by a multitude of behavioural theories and experimental evidence in psychology: under the framework of heuristics and biases tradition, “people also appear to be more optimistically biased under condition of greater uncertainty” (Armor and Taylor, 1998: page 338 Gilovich et al., 2002). In buoyant mood, spurred by the optimism/confidence sentiment, investors are more inclined to practice a “top-down, heuristics strategy of information processing” on the premise of “preexisting general knowledge structure” (Schwarz, 1990: page 542) in judgmental process. During the procedure, investors frequently implement intuitive heuristics such as affective, and prototypes heuristics of System 1(intuitive) of two cognitive systems (Kahneman and Frederick, 2002), subsequently eliciting the behavioural
biases such as overconfidence, conservatism, underconfidence and underreaction that are
nominate as the impetus behind the momentum premium (Daniel et al., 1998, Barberis et al.,
1998, Du, 2002, Hong and Stein, 1999) in the literature. Following this logic, as the salience
of information uncertainty heightens, the momentum premia are expected to get propped up
gradually, which is line with the proposition of our hypotheses.

Figure 1 graphically illustrate the role of positive and negative momentums take in
determining the overall momentum and the asymmetry of positive momentum and negative
momentum, with each line representing a scenario when a certain factor out of total 7
factors listed above is used to proxy for IU levels. Apparently, there are two striking
discernible graphical patterns exhibiting in the figure. Of them, the lines representing the
asymmetry of positive momentum and negative momentum when firm size, analysts’
coverage and the strength of corporate governance are used as IU proxy trend up; those
representing the asymmetry of positive momentum and negative momentum when the rest
four factors (firm age, return volatility, dispersion in analysts’ earnings forecast and trading
volume) are used as IU proxy are downward trending. At first glance, the two contrasting
patterns seemingly tell different stories. Yet, one would be hard-pressed not to notice that the
upward-trending lines are associated with positive IU5-1U1 (of Q1+Q5), indicating the
dominance of positive momentum and the downward-trending lines are associated with
negative IU5-1U1, reflecting the dominance of negative momentum. Taken together, all the

---

26 From a different angle, following the spirit of feelings-as-information theoretical framework, as noted earlier, investors can be rather optimistic under the influence of greater information uncertainty (Armor and Taylor, 1998) and the fact that the vast amount of Chinese domestic retail investors lack of statistics knowledge to override the intuitive heuristics such as affective heuristics (Nisbett et al., 1983), working jointly to give rise to more frequent practice of evaluative judgments (heuristics strategy of information processing) (Schwarz, 1990), reflected by the increasingly larger momentum premia as the degree of firm-level information uncertainty heightens.

27 The asymmetry of positive momentum and negative momentum is measured by the sum of returns of “winner” portfolio and those of “loser” portfolio under each level of information uncertainty for different case scenarios, akin to Kelsey et al. (2010)’s approach.

28 IU5-1U1 represents the difference in aggregated returns on “winner” and “loser” portfolios associated with two extreme levels of information uncertainty.
lines, representing the asymmetry of positive momentum and negative momentum, show that the asymmetry becomes more prevalent as information uncertainty level heightens, consistent with Kelsey et al. (2010)’s finding in the U.S. stock markets. Furthermore, different IU proxy factors appear to take a profound role in determining the dominant momentum effect (either positive or negative) in evoking momentum premium under the influence of information uncertainty, making it wide open for future debate in the field given that there is no consensus on the best way to gauge the degree of information uncertainty.

Figure 1 Asymmetry of positive momentum (Q5) and negative momentum (Q1) in the Chinese Class A share market (Jan. 1996- Dec. 2008) (firm size, firm age, analysts’ coverage, DISP, return volatility, trading volume, corporate governance) ((R=6, H=6) momentum)

Notes: This figure depicts the difference of the asymmetry of positive momentum (Q5) and negative momentum (Q1) for the entire sample period from Jan. 1996 to Dec. 2008, graphed as the lines in different colours according to different IU proxy factors, in the Chinese Class A share market. The vertical axis measures the asymmetry (the sum of positive momentum (returns of “winner” portfolio) and negative momentum (returns of “loser” portfolio)) under each level of IU; the horizontal axis labels 5 different levels of information uncertainty. The upward sloped lines suggest that the positive momentum (Q5) or the returns of “winner” portfolios tend to overwhelm the negative momentum (Q1) or the returns of “loser” portfolios in contributing to the momentum premia as IU level increases; the downward sloping lines imply that the asymmetry, largely driven by negative momentum, widens as the IU level goes up.

5. B. Information uncertainty and the price momentum phenomenon amidst market swings
Following the empirical evidence of the asymmetry found in other financial markets by Cooper et al. (2004) in the U.S. stock markets, Huang (2006) in the international stock market context and Du et al. (2009) in the Taiwan stock market, we endeavour to look into the importance of market state on influencing the phenomena in the financial markets. In addition, we extend the discussion on the interaction between the momentum premium and information uncertainty by drawing together and interpret the findings from our investigation on the interplay of the momentum premium and information uncertainty conditional on two market states—post-UP and post-DOWN market states under the aegis of heuristics and biases tradition (Tversky and Kahneman, 1974) and a set of behavioural finance theories. Across seven different IU proxy factors, we find evidence unanimously showing that the (R=6, H=6) momentum trading strategy conditional on IU and post-DOWN market state significantly outperform that conditional on IU and post-UP market state and that conditional solely on IU, paralleling the prediction of our proposition 2.

We find positive association between returns of “winner” and “loser” portfolios and the degree of information uncertainty over the time periods following UP and DOWN market states. Overall, the results confirm the empirical finding documented by Hong, Lim and Stein (2000) and thereby lend support to their gradual-information diffusion theory, contending that the momentum premia is partly attributable to the fact that news travels in a sluggish manner. For instance, among small-cap firms associated with relatively greater information uncertainty. More pointedly, regardless of prior market condition, facing IU, investors, buoyed by exaggerated influence of optimism bias (Armor and Taylor, 1998), are more likely to follow the grain (Yeh and Lee, 2000), prompting further momentum of changes in share price of “loser” and “winner” stocks on the heels of market swings, which is especially obvious among some of the high IU stocks such as large-cap “loser” and small-cap “winner” stocks and consequently corroborates the predictions based on proposition 1.
Rather convincingly, the (R=6, H=6) momentum trading strategy over the periods following DOWN market state consistently outperforms the same strategy over time periods following UP market state across all the IU levels (results table 3 of the equality test for firm size is shown for illustration purpose). The empirical evidence empirically supports the proposition 2—the amplifying effect of IU over the momentum premium is expected to be more pronounced during the time following DOWN market state as the salience of IU is accentuated when investors grow jittery (Kelsey et al. (2010), Hong, Lim and Stein (2000) and Gilovich et al. (2002)). In other words, the empirical evidence suggests the amplifying effect of information uncertainty over momentum premium is enhanced for the momentum premium found over periods following market skid.

Table 3

<table>
<thead>
<tr>
<th>Equality test (MOM and IU (1/MV))(12 months)</th>
<th>UP-DOWN=0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q5-Q1 (UP)</td>
<td>IU1 1.03</td>
</tr>
<tr>
<td></td>
<td>IU2 1.1</td>
</tr>
<tr>
<td></td>
<td>IU3 1.16</td>
</tr>
<tr>
<td></td>
<td>IU4 1.17</td>
</tr>
<tr>
<td></td>
<td>IU5 1.28</td>
</tr>
<tr>
<td></td>
<td>IU5-IU1 0.25</td>
</tr>
<tr>
<td>Q5-Q1(DOWN)</td>
<td>1.21 I2</td>
</tr>
<tr>
<td></td>
<td>1.55 I2</td>
</tr>
<tr>
<td></td>
<td>1.58 I2</td>
</tr>
<tr>
<td></td>
<td>1.59 I2</td>
</tr>
<tr>
<td></td>
<td>1.68 I2</td>
</tr>
<tr>
<td>Difference</td>
<td>-0.18 I2</td>
</tr>
<tr>
<td></td>
<td>-0.45 I2</td>
</tr>
<tr>
<td></td>
<td>-0.42 I2</td>
</tr>
<tr>
<td></td>
<td>-0.42 I2</td>
</tr>
<tr>
<td></td>
<td>-0.4 I2</td>
</tr>
<tr>
<td>t stats</td>
<td>-1.59 I2</td>
</tr>
<tr>
<td></td>
<td>-2.04 I2</td>
</tr>
<tr>
<td></td>
<td>-1.37 I2</td>
</tr>
<tr>
<td></td>
<td>-1.73 I2</td>
</tr>
<tr>
<td></td>
<td>-1.25 I2</td>
</tr>
<tr>
<td>Overall</td>
<td>1.37 I2</td>
</tr>
<tr>
<td></td>
<td>1.74 I2</td>
</tr>
<tr>
<td></td>
<td>1.79 I2</td>
</tr>
<tr>
<td></td>
<td>1.97 I2</td>
</tr>
<tr>
<td></td>
<td>2.34 I2</td>
</tr>
<tr>
<td></td>
<td>0.97 I2</td>
</tr>
</tbody>
</table>

This table reports the difference between the momentum premia of the (R=6, H=6) momentum trading strategy conditional on different level of information uncertainty in the Chinese Class A share market for the sample period from Jan. 1996 to Dec. 2008. The difference is estimated by regressing the raw momentum-IU premia against an UP dummy variable (\(UPT\)) and an intercept (\(\alpha\)), following the same methodology for equality test used by Cooper et al. (2004) and Du et al. (2009). Mathematically, it can be written as \(R_{W-L,t} = \alpha + R_{W-L,UP-DOWN}UPT + \epsilon_t\). The t statistics associated with each difference is listed in the row below.

What’s worth mentioning is that the amplifying effect of IU reaches its max when the strength of corporate governance is used as a proxy for IU. This is evidenced by the observation that even during the time subsequent to market run-ups, the momentum premia of the (R=6, H=6) momentum strategy, propelled by the amplifying effect of IU, better or tie with those of the strategies under either IU condition or post-UP market state condition across 5 IU levels. From the vantage point of practitioners, this unusual interaction of the quality of
corporate governance as IU proxy factor and momentum premia during time periods following stock market run-ups, in the setting of the Chinese stock market, offers a wondrous opportunity for both international and domestic investors to diversify their investment strategy amidst fierce market swings.

6. Robustness test

6. A. sub-period analysis

In the light of the claim that business cycles are attributable to the momentum phenomenon (Antoniou et al., 2007), A sub-period analysis, is employed as the bedrock of the back-testing strategy revolving two of the salient financial reforming events: 1) the implementation of the new P.R.C. security law on July 1\textsuperscript{st}, 1999; 2) the opening of the Chinese Class A share market to qualified foreign institutional investors (QFII) on July 9\textsuperscript{th}, 2003, to the extent that they evidently ameliorated the operational efficiency of the Chinese stock market as documented by Lin and Swanson (2008). Specifically, the time periods revolving the aforementioned two salient financial market regulatory reforms are split into pre-event periods and post-event periods—the implementation of the new P.R.C. securities law (July 1\textsuperscript{st}, 1999): pre-event period (Jan. 1998- June 1999) and post-event period (Aug. 1999- Jan. 2001); the opening of Chinese Class A share market to qualified foreign institutional investors (QFII) (July 9\textsuperscript{th}, 2003): pre-event period (Jan. 2002- June 2003) and post-event period (Aug. 2003- January 2005).

In view of theoretical lead from Jegadeesh and Titman (1993) and practical lead from Conrad and Kaul (1998), Schiereck et al. (1999), Zhang (2006), Lin and Swanson (2008) and Kelsey et al. (2010), the underlying motivation of the design of the back-testing strategy is twofold: first, the results of the back-testing strategy reassure that the results of the study are not time period-specific. Second, given the intricate relationship between trading volume, stock
returns, and investors’ sentiment (heuristics and biases tradition) (Fisher and Statman, 2000, Brown and Cliff, 2004, Statman et al., 2006), the resilience and pattern of results yielded over time periods revolving two financial market reforming events, when information uncertainty mounts (Schwarz, 1990), could directly vindicate the plausibility of our interpretation of the asymmetric pattern of momentum premia over time periods following UP and DOWN market states under the theoretical framework of heuristics and biases tradition.

Table 4 reports the momentum premia under the influence of information uncertainty during time periods revolving two salient events—the implementation of new P.R.C. security law and the opening of Chinese Class A share market to qualified foreign institutional investors (QFII). As shown in Table 4, overall, the momentum premia are positive and statistically significant at 5% significance level over pre- and post-event periods of both events across different level of information uncertainty. As the pattern of results of the impact of IU over momentum premia, with seven different factors used in gauging the level of information uncertainty, is very consistent, we only spell out the explanation to the results when firm size (1/MV) is employed as information uncertainty proxy for brevity (the rest of results (other 6 factors as IU proxy) can be present upon request). Compared with the momentum premia under the influence of information uncertainty for the entire sample period from January 1996 to December 2008, the amplifying effect of information uncertainty is evidently present, with the amplifying effect being more noticeable over pre-event periods of both events and less pronounced over post-event periods. Specifically, over different sub-periods, the momentum premium increases monotonically as the level of information uncertainty heightens. The deteriorated impact of information uncertainty over momentum premium during post-event periods is attributable to the improvement in operational efficiency elicited

29 the presence of momentum premia is expected to be less evident over pre-event period of an event whose inception received cheerful response from the stock market. On the contrary, the momentum premia are expected to be relatively more pronounced over post-event period of an event whose inception receiving lukewarm or even unfavourable response from the stock market.
by the inception of the two financial market policy reforms (Gilson and Kraakman, 1984, Pena, 1995) or a drop in return volatility induced by the implementation of the financial market reforms (Chen et al., 2006). Further, the fall in return volatility is also indicative of a lowered level of ambiguity in the intrinsic values of listed firms in the stock market (Magnan and Xu, 2008), underpinning investors’ confidence level and consequently depressing the momentum premia during time periods subsequent to the inception of stock market policy reforms (Du, 2002). Collectively, the above-described sub-period results reinforce the robustness of the results, underscoring that our findings are not time period specific.

Table 4: Momentum premia (monthly returns) under the influence of IU (firm size) over different sub-periods revolving two salient financial market regulatory reforms in the Chinese Class A share market

<table>
<thead>
<tr>
<th>Monthly momentum returns for portfolios with different levels of information uncertainty</th>
<th>Different information uncertainty (IU) levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time period</td>
<td>IU1</td>
</tr>
<tr>
<td>Whole sample period</td>
<td>1.37</td>
</tr>
<tr>
<td>Jan. 1996- Dec. 2008</td>
<td>**</td>
</tr>
<tr>
<td>Event 1</td>
<td>The implementation of the P.R.C. security law</td>
</tr>
<tr>
<td>Pre-event</td>
<td>1.56</td>
</tr>
<tr>
<td>Jan. 1998- July 1999</td>
<td>**</td>
</tr>
<tr>
<td>Post-event</td>
<td>1.14</td>
</tr>
<tr>
<td>Aug. 1999- Jan. 2001</td>
<td>**</td>
</tr>
<tr>
<td>Event 2</td>
<td>Openings to qualified foreign institutional investors (QFII)</td>
</tr>
<tr>
<td>Pre-event</td>
<td>1.48</td>
</tr>
<tr>
<td>Jan. 2002- July 2003</td>
<td>**</td>
</tr>
<tr>
<td>Post-event</td>
<td>1.32</td>
</tr>
<tr>
<td>Aug. 2003- Jan. 2005</td>
<td>**</td>
</tr>
</tbody>
</table>

This table reports the momentum premia of the (R=6, H=6) momentum trading strategy under the influence of five different levels of information uncertainty over sub-periods (pre-event, post-event periods) revolving two salient events—the implementations of two financial market reforms: 1) the launch of the P.R.C. security law in July, 1999; 2) the openings of Class A shares to qualified foreign institutional investors (QFII) in the Chinese Class A share market. The Chinese Class A share market here refers to a consolidated Class A share market consisting of all the eligible Class A stocks listed in the Shanghai Stock Exchange and Shenzhen Stock Exchange. The significance of the momentum premia is indicated by asterisk(s)—*: the significance at 10% significance level; **: the significance at 5% significance level. All the numbers are in percentage term.
6. B. Risk adjustment by two versions of the FF3F models

We test the resilience of the momentum premia of the momentum trading strategy by means of the Fama and French three factor (FF3F) model (Fama and French, 1993) with ranking and holding periods being 6 months under post-UP or DOWN market state on the premise of the explanatory power of three risk factors—market risk factor \( (R_{m,t} - R_{f,t}) \), firm size effect factor \( (SMB_t) \) and value effect factor \( (HML_t) \), embedded in the FF3F model. To further expand the understanding of explanatory power of corporate governance over stock returns documented by Wang and Xu (2004) in the unique setting of the Chinese stock market, we extend the reach of their version of the FF3F model by adjusting the raw momentum premia of different momentum trading strategies. According to Wang & Xu(2004)’s version of the FF3F model, augmented by three risk factors—market risk factor \( (R_{m,t} - R_{f,t}) \), firm size effect factor \( (SMB_t) \) and the residual free float ratio\(^\text{32}\) (the strength of corporate governance factor) \( (RFF_HML_t) \). In other word, the third risk factor—value effect factor—of the traditional FF3F model is supplanted by the residual free float ratio factor, aimed to reflect the quality of firm-level corporate governance.

By implementing risk adjustment analysis, we find that overall Wang & Xu (2004)’s version of the FF3F model is superior in justifying the momentum premia of different momentum trading strategies, the momentum strategies conditional on market states as well as the \((R=6, H=6)\) trading strategy conditional on 7 different IU proxy factors. Notwithstanding, the risk factors—market risk factor, firm size effect factor, value effect factor, and the residual free float ratio (strength of corporate governance)—included in two versions of the FF3F model.

\(^{30}\) The results of risk adjustment are available upon request.

\(^{31}\) The question of whether firm size effect factor and value effect factor should be categorized as risk factors remains debatable (Ferson and Harvey, 1999) in the literature.

\(^{32}\) Consistent with Wang and Xu(2004)’s approach, the residual free float ratios are estimated by regressing free float ratios against logarithm market capitalization of corresponding firms at the end of June every year.
are still yet to fully explain the momentum premia of momentum trading strategies under the influence of information uncertainty.\(^{33}\)

7. Conclusion

The paper expands the understanding of the momentum phenomenon in the setting of the Chinese stock market by investigating the impact of the information uncertainty over the momentum premium amid market swings. In view that the Chinese stock market is still a prime sourcing location for international investors’ portfolio strategy formation and diversification (Phylaktis and Ravazzolo, 2005), the understanding of the momentum phenomenon and especially its behaviour amid market swings and under the influence of information uncertainty is essential for global investors to promptly adjust their investment strategies and portfolio positions amid volatile market condition. Given that there is not a consensus view on the measurement of firm-level information uncertainty in the extant literature, this research expands the understanding of the interaction between firm-level information uncertainty and the momentum premium in the setting of the Chinese capital market by implementing a methodology derived from Jiang et al. (2005) and Zhang (2006)’s methodological approaches. Specifically, taking advantage of the unique characteristic of the Chinese stock market—a split between tradable and non-tradable shares, we include the quality/strength of corporate governance as an IU proxy. Additionally, to our best knowledge, the investigation on the interaction of the momentum premium and firm-level information uncertainty amid different market states has never been carried out in the existing literature.

\(^{33}\) To boost the power of our test and underscore the robustness of the findings in this study, we also run the tests to investigate the dynamics of the momentum premia under influence of IU over time periods following two different market states—UP and DOWN, with the market states defined by prior 24-month market average return, differing from prior 12-month market average return used to defined market states. Overall, the results from the above-mentioned test strikingly resemble the patterns of the results found when prior 12-month is used as market state definition, corroborating the finding that the amplifying of IU over momentum premia is particularly pronounced over time periods following DOWN market state yet dampened over time periods following UP market state across all IU proxy factors but the quality of corporate governance (results can be present upon request).
The results from this study fill the gap in the literature by providing evidence on how different market states (UP and DOWN) impact the influence of firm-level information uncertainty over the momentum premium.

Consistent with the testing hypotheses, by employing seven factors—firm size, firm age, analysts’ coverage, return volatility, dispersion in analysts’ earnings forecast, trading volume, the quality/strength of corporate governance (free float ratio)—to proxy for the degree of firm-specific information uncertainty (IU), we find that the average monthly returns of “loser” momentum quintiles tend to be negatively related to IU levels, yet the average monthly returns of “winner” momentum quintiles are positively associated with IU levels. This is in accord with the prediction of our hypotheses and corroborated by the underreaction theory and gradual information diffusion theory (Hong and Stein, 1999, Hong et al., 2000). More importantly, we find that momentum premia of the (R=6, H=6) momentum trading strategy are universally positively related to information uncertainty when 7 different variables are used to proxy for the degree of IU, suggesting that information uncertainty evidently amplifies the momentum premia across different IU levels. From the perspective of human cognitive biases, in face of greater information uncertainty, investors are inclined to introduce more optimistic biases into their judgmental processes (Armor and Taylor, 1998), a prompt for extensive practice of intuitive heuristics such as affective, representativeness heuristics of System 1(intuitive) of two cognitive system (Kahneman and Frederick, 2002), coupled with insufficient amount of statistics knowledge among Chinese retail investors (Kang et al., 2002), resulting in soaring momentum premia under the influence of information uncertainty. In addition, we find that the amplifying effect of information uncertainty over the momentum premium is further exacerbated over time periods following DOWN market state (defined by negative prior-12 or 24-month average market returns), yet is blunted over time periods following UP market state. The exacerbated amplifying effect of information uncertainty over
momentum premium found in the former scenario could be attributed to two different cognitive processes: First, the bearish sentiment in the time periods following market downside movements (Brown and Cliff, 2004) and heightened level of information uncertainty sap the confidence of underconfident investors, resulting in the enhanced amplifying effect of information uncertainty over the momentum premia over the periods following DOWN market state in the Chinese Class A share market according to Du (2002)’s investors’ underconfidence behavioural model. Secondly, on the heels of market downdraft, investors have scarce cognitive resources, eliciting the evaluative (intuitive) information processing strategy (Frederick, 2002) involving frequent practice of intuitive heuristics such as affective and representativeness of System 1(intuitive) of two cognitive systems (Kahneman and Frederick, 2002), boosting the momentum premia.

By putting the results through a sub-period analysis revolving the inception of two financial market regulatory reforms—1) July 1st, 1999: the implementation of the new P.R.C. security law; 2) July 9th, 2003: the opening of Chinese Class A share market to qualified foreign institutional investors (QFII), we find that the evidence remains largely intact. In the risk adjustment process, we supplant the value effect factor \(HML_t\) with the residual free float ratio (proxy of the quality/strength of corporate governance) \(RFF\_HML_t\) as a risk factor and show that the explanatory power of the traditional FF3F over momentum premia in the Chinese Class A share market is improved. This result corroborates Wang & Xu (2004)’s postulate that the inclusion of the quality/strength of corporate governance (the residual free float ratio) as a risk factor in asset pricing improves the explanatory power of the FF3F model over cross-sectional stock returns in the setting of the Chinese stock market.

As briefly mentioned in the paper that different IU proxy factors are capable of shifting the power of positive (winner portfolio) and negative (loser portfolio) momentums, the question on the reasons behind the observation is open to discussions in future studies.
References


DAS, P. 2008. The Role of Corporate Governance in Foreign Investments.


**Appendix**

**Variables:**

**Firm size** is capable of capturing the degree of firm-level information uncertainty as many prior studies empirically evidenced that compared with firms with large capitalization, small-cap firms tend to carry more risk due to some associated characteristics such as less diversified business model, higher leverage levels, and more obscure information accessibility (Chan and Chen, 1991, Hong et al., 2000, Zhang, 2006, McKnight and Hou, 2006).

**Firm age** can be considered a plausible information uncertainty proxy factor in that firms with little history in the stock market tend to draw less coverage analysts and attract less attention from investors and in turn are more likely to suffer from information deficit, eliciting information uncertainty associated with their stocks (Jiang et al., 2005, Zhang, 2006).

**Analysts’ coverage (residual analysts’ coverage)** is deemed a potential information uncertainty proxy as Hong and Stein (1999) and Hong et al. (2000) empirically affirmed the validity of the testing hypothesis stating that information, spreading via analysts’ research report, tends to diffuse in a substantially slower pace among firms receiving insufficient analysts’ coverage/attention. This analysts’ coverage/attention deficiency kindles the uncertainty surrounding the value of firms, echoing the definition of information uncertainty in this research.

**Return volatility** has firmly entrenched in modern finance research as metric of risk. The definition of risk and that of information uncertainty overlap on the uncertain characteristic of information, forming the rationale behind the choice of using return volatility to gauge different levels of information uncertainty. Additionally, different scholarly work has theoretically and empirically established positive association between the return volatility of...
a firm’s stock in the financial market and the degree of value ambiguity associated with the firm (Jiang et al., 2005, Zhang, 2006, Magnan and Xu, 2008).

**Dispersion in analysts’ earnings forecasts (DISP)**, signalling the divergence of analysts’ opinion on the stocks’ intrinsic value (Diether et al., 2002, Dische, 2002), as an IU proxy factor is theoretically and empirically supported by a torrent of diverse studies in the modern finance literature. Specifically, in 1977, Miller (1977) established the theoretical linkage between divergence of opinion and uncertainty. In the time since, the DISP is widely employed as a proxy for uncertainty or divergence of opinion and has been empirically studied in conjunction with cross-sectional stock returns (Diether et al., 2002), earnings momentum premium (Dische, 2002, Jegadeesh et al., 2004) and price momentum premium (Jegadeesh et al., 2004, Zhang, 2006).

**Trading volume** is proposed to be one of the potential information uncertainty proxy factors mainly reliant on the empirical evidences of the liquidity hypothesis (Amihud and Mendelson, 1986, Datar et al., 1998) showing that compared with more heavily traded stocks, thinly traded stocks tend to carry more risk, and consequently signify higher degree of information uncertainty.

**Strength/quality of firm-level corporate governance** is chosen in the light of a growing body of research showing that more stringent corporate governance practice is indicative of lower level of information uncertainty (Bushman and Smith, 2001, Cai et al., 2006, Gillan et al., 2006, Raheja, 2009, Das, 2008, Magnan and Xu, 2008). More importantly, no scholarly work has shed light on the impact of firm-level corporate governance as information uncertainty proxy over cross-sectional stock returns, which is the focal point of this research.