UNIVERSITY OF SOUTHAMPTON

FACULTY OF BUSINESS & LAW

School of Management

The momentum premium under the influence of information uncertainty—evidence from the Chinese stock market

By

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Thesis for the degree of Doctor of Philosophy

March 2012

To my parents, Woody and Ling, my partner Leonard, and my dear grandpa, Jishan

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Abstract

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From this study, we find that the momentum premia are universally positive and statistically significant across 16 different momentum trading strategies in the Chinese Class A share market. By defining the time periods following UP and DOWN market states according to prior 12 or 24-month average Chinese Class A share market returns, we show that the momentum premia of different momentum strategies over time periods following UP market state eclipse those found over time periods following DOWN market state in the Chinese Class A share market for the whole sample period from January 1996 to December 2008. Furthermore, by employing 7 different 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 gauge the degree of firm-level information uncertainty, we 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. The results from the sub-period analysis revolving the inception of two Chinese financial market regulatory reforms—1) July 1st, 1999 the implementation of the new P.R.C. security law; 2) July 3rd, 2003 the opening of the Chinese Class A share market to qualified foreign institutional investors (QFII) dismiss the doubt that our findings could be sample time period-specific. Compared with the tradition FF3F model, the Wang & Xu (2004)'s version of the FF3F model, with the value effect factor of the traditional FF3F model supplanted by residual free float ratio (proxy for the quality/strength of firm-specific corporate governance), exhibits more explanatory power over the momentum premia yet still fails to fully rationalize the momentum premia found in this study.

This research fills the gap in the literature and expands the understanding of the momentum premium by offering empirical evidence of the dynamics of the momentum premia amid market swings, the impact of information uncertainty over momentum premia as well as the impact of information uncertainty over momentum premia amid market swings in the context of the Chinese stock market. The results from this study can potentially provide an important reference point for international and domestic investors in adjusting investment strategies and portfolio positions, or fishing for investment diversification opportunities in a financial market with volatile market condition such as the Chinese stock market.

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Declaration of authorship

I, **Yuan Wu**,

declare that the thesis entitled

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and the work presented in the thesis are both my own, and have been generated by me as the result of my own original research. I confirm that:

- this work was done wholly or mainly while in candidature for a research degree at this University;
- where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
- where I have consulted the published work of others, this is always clearly attributed;
- where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
- I have acknowledged all main sources of help;
- where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
- none of this work has been published before submission.

Signed: ……………………………………………………………………..

Date:………………………………………………………………………….

Acknowledgements

It takes an awful lot of patience and an iron will to complete this doctoral research, yet it wouldn't come to fruition without help and support from the people around me. Academically, I am utterly gratefully for the guidance provided by my doctoral research supervisor, Prof. Choudhry, throughout these 3 years. Without him keeping challenging my creative ideas, I wouldn't be able to lay solid theoretical and practical bedrock for my doctoral research; without him always keeping me on track of the research timeline, my doctoral research could easily go astray. Additionally, I would like to thank School of Management, University of Southampton and Prof. Choudhry for offering me a full studentship over the 3 years of my doctoral research, having made my doctoral research possible in the first place.

Beyond academic level, I would like to thank my parents Woody and Ling for their unconditional love, my partner Leonard for his unequivocal love and support throughout and really appreciate consistent care and support from my grandpa, my aunt Jie and my dear cousin Brian. Also, I am thankful for having a group of wonderful colleagues in School of Management, University of Southampton such as Dr. Kling whom offered me a lot of invaluable advice on teaching as well as research, Wendy, Beining, Frank, Meko and Mindy whom offer their friendship whenever I need someone to talk to, especially Beining who also offered me loads of practical advice on the research.

On the research data front, I would like to thank Guotai Junan Securities Co. Ltd. for kindly providing me the relevant data for my analysis through their database provider –Shanghai Wind Information Co. Ltd. Their help is paramount throughout my data collection process.

In the end, I would like to emphasize what I believe in while doing this research, succinctly reflected by a couple of quotes from two greatest minds:

"Any descriptively adequate amount of human decision making must make contact with the actual psychological processes that are involved and that "the neoclassical ambition of avoiding [this] necessity is unreliable."

Herbert Simon, Nobel Prize laureate (1978)

"In science, things should be made as simple as possible, but no simpler."

Albert Einstein, Nobel Prize laureate (1921)

Exeter, October 2011

Yuan Wu

Chapter 1 Introduction

1.1 Research motivation and goals

Ever since the existence of the momentum effect was firstly documented by Jegadeesh and Titman(1993) in their seminal work, it has been one of the most hotly discussed financial market anomalous effects on the stage of academic debating forum and adopted by many professionals in the financial market in their stock picking process or the formation of their portfolio strategy, manifesting the importance of the momentum effect in both academia and financial industry. Over decades, the resilience of the anomalous effect has spawned voluminous research. Some found solid empirical evidence showing the existence of the momentum effect around the globe, while others, especially those 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, directly challenging the validity of the Efficient Market Hypothesis (EMH) (Fama, 1965). Collectively, the above-mentioned bewildingly complex debates lift the profile of the momentum effect as an intellectual idea. Among all the discussants, one of the group attempts to interpret the anomalous effect on the premise of various experimental evidence in the field of psychology, also well-known as the behavioural finance or neuroeconomics—a major inspiration of this research. Despite the warm reception it has received among academics and professionals in the field of finance, the bedrock of the momentum trading mechanism is not that glamorous at all. Simply put, the mechanism can be spelled out as “buying past winners and (short) selling past losers”. In some sense, the contrast between the simplity of the momentum mechanism and the high profile of the momentum phenomenon as an intellectual idea kindles the motivation of carrying out this research.

The Chinese economy has established itself as the engine of world economic growth in recent years. Given that the Chinese stock market has become an increasingly large part of the Chinese economy (40.37% of GDP in 2008[1]), the activities taking place in the Chinese stock market has unequivocally attracted mounting attention from the academic community. What's more, despite being a nascent financial market, the Chinese stock market is largely agreed to be lacking of interrelations with other developed financial markets such as the U.S. and the U.K, offering a good source for international investors fishing for diversification opportunities. Additionally, some of the unique characteristics of the Chinese stock market, such as different market segments (Class A and Class B shares; Shanghai Stock Exchange and Shenzhen Stock Exchange), the split between tradable and non-tradable shares, offer plenty of room for academic discussions.

In the wake of the uncertainty over global stock market we face today, assessment of the impact of information uncertainty on different investment opportunities is paramount to avoid adversity in the financial investing activities, making it an essential element to address amidst volatile market condition. With this in mind, the consideration of the impact of information uncertainty over the momentum premium in this study therefore bears substantial practical value.

This study is not just reinventing the wheels by offering empirical evidence of the existence of the momentum effect in the Chinese stock market. Instead, it explores the dynamics of the momentum premium in the Chinese Class A share market by first providing a comprehensive view of the momentum premia of 16 different

[1] Source: National Bureau of Statistics of China (http://www.stats.gov.cn/english/statisticaldata/yearlydata/)

momentum strategies with different combinations of ranking and holding periods (R=3, 6, 9, 12; H=3, 6, 9, 12) over the entire sample period from January 1996 to December 2008, and then looking into the dynamics of the momentum premia of different momentum trading strategies amid market swings, followed by an investigation on the impact of information uncertainty over the momentum premium in the Chinese Class A share market. The study of the impact of information uncertainty over the momentum premia is further extended by an examination of the impact of information uncertainty over the momentum premia amid market swings. The robustness of the empirical findings is tested through the implementation of a sub-period analysis revolving the inception of two Chinese stock market regulatory reforms—July 1st, 1999 implementation of the new P.R.C. security law and July 9th, 2003 the opening of Chinese Class A share market to qualified foreign institutional investors (QFII) and a risk adjustment process based on both of the traditional FF3F model and Wang & Xu (2004)'s version of the FF3F model, where the value effect factor is supplanted with a strength of corporate governance factor (proxied by the residual free float ratio).

The sample dataset entails monthly stock returns, market capitalization, firm age, return volatility, dispersion in analysts' earnings forecast, trading volume and free float ratio in the Chinese Class A share market over sample time period spanning from January 1996 to December 2008.

From this study, we find that the momentum premia are universally positive and statistically significant across 16 different momentum trading strategies in the Chinese Class A share market. By defining the time periods following UP and DOWN market states according to prior 12 or 24-month average Chinese Class A share market returns, we show that the momentum premia of different momentum strategies over time periods following UP market state eclipse those found over time periods following DOWN market state in the Chinese Class A share market for the whole sample period from January 1996 to December 2008. Furthermore, by employing 7 factors—firm size, firm age, analysts' coverage, return volatility, dispersion in analysts' earnings forecast, trading volume, the strength of corporate governance (free float ratio)—to gauge the degree of information uncertainty, we evidence that the information uncertainty has an amplifying effect over momentum premium and the amplifying effect is more pronounced over time periods following DOWN market state. The results from the sub-period analysis dismiss the doubt that our findings could be sample time period specific. Comparing to the tradition FF3F model, the Wang & Xu (2004)'s version of the FF3F model, with the value effect factor of the traditional FF3F model supplanted by residual free float ratio (proxy for the strength of firm-specific corporate governance), exhibits more explanatory power over the momentum premium yet still fails to fully justify the momentum premium. Succinctly, the research is aimed at expanding the understanding of the momentum phenomenon in the setting of the Chinese stock market through clinching the existence of the momentum phenomenon in the Chinese stock market, examining the dynamics of momentum premia amid market swings, and investigating the impact of information uncertainty over the momentum premia amidst market swings.

1.2 Research questions and thesis outline

During our endeavour in developing this research revolving the main theme—the momentum premia under the influence of the information uncertainty in the Chinese

Class A share market, the questions that keep us intrigued and push us thinking forward are:

1. Are the momentum premia of 16 momentum trading strategies with different combinations of ranking and holding periods (R=3, 6, 9, 12; H=3, 6, 9, 12) (short-to-intermediate time horizon) evident in the Chinese Class A share market over the time period spanning from January 1996 to December 2008?

2. What is the dynamics of the momentum premia of different momentum trading strategies amidst market swings in the Chinese Class A share market?

3. What is the role information uncertainty, proxied by seven different factors (firm size, firm age, analysts' coverage, return volatility, dispersions in analysts' earnings forecast, trading volume as well as the strength of corporate governance), plays in impacting the momentum premia of different momentum trading strategies in the Chinese Class A share market?

4. How does information uncertainty influence the momentum premia of different momentum trading strategies amid market swings in the Chinese Class A share market?

5. In the light of prior studies showing the strength of firm-level corporate governance is capable of either gauging the degree of information uncertainty (Zhang, 2006) or justifying cross-sectional stock returns in the setting of the Chinese stock market (Wang and Xu, 2004), we conjecture whether the dual roles the quality/strength of firm-level corporate governance play can be substantiated with respect to influencing the momentum premia of momentum trading strategies and holding explanatory power over the momentum premia of momentum trading strategies in the Chinese Class A share market context.

To set out details in addressing the questions listed above, the remainder of the thesis is organized as follows:

Chapter 2 Theoretical framework

The bedrock of theoretical framework of this study is laid down in Chapter 2. First and foremost, the momentum phenomenon is explained in great detail in conjunction with the one of the milestones of modern finance—the Efficient Market Hypothesis (EMH)—theoretical basis of some relevant asset pricing models, deployed to rationalize the momentum phenomenon. On top of that, behavioural finance is portrayed as a path to interpret the phenomenon. Subsequently, the building blocks of the testing hypothesis—information uncertainty and corporate governance—are described. In the end, the testing hypotheses are summarized to complete the building of the underlying theoretical foundation of this research.

Chapter 3 A review of current literature

This chapter reviews the literature directly relevant to this research in the order of: 1) the evidence of the momentum phenomenon in developed and nascent financial markets around the globe; 2) the debates revolving the impetus behind the momentum premium; 3) the dynamics of momentum profits under different market states; 4) information uncertainty and the momentum premium; 5) the role of corporate governance.

Chapter 4 Data and methodology

The sample dataset and methodological approaches employed in this study are described in this chapter. With regard to the sample dataset, first a concise overview is given to different aspects of the Chinese stock market including the 4 salient financial market regulatory refroms over its history, the description of the two bourses, twin-share system and the unique ownership structure. Then, the characteristics of market participants in the Chinese stock market will be portrayed. Finally, the specifications of the sample dataset will be summarized.

The methodology section of the chapter starts off with a detailed description of the momentum trading mechanism, and then introduces the procedure to measure the momentum premium over the time periods following UP and DOWN market states. Subsequently, the measurement of firm-specific information uncertainty and the method implemented to quantify the impact of firm-specific information uncertaintyover the momentum phenomenon –two-way sorting momentum strategy—will be discussed in great detail. At the end of this chapter, the risk adjustment analysis and sub-period analysis, devised to test the resilience of momentum premia against risk factors and different types (pre- or post-event) of sample time period, will be described.

Chapter 5-8 Results:

Chapter 5 reports the evidence found on the overall momentum premia of different momentum investing strategies over the whole sample period (Jan. 1996- Dec. 2008) in the Chinese Class A share market and the behaviour of the momentum premia over time periods following UP and DOWN market states in the Chinese Class A share market.

Chapter 6 documents the momentum premium under the influence of information uncertainty in the Chinese Class A share market. The empirical findings of the momentum premium under the influence of information uncertainty over time periods following UP and DOWN market states in the Chinese Class A share market are summarized in **chapter 7**.

Chapter 8 reports the results from two robustness tests: 1) the momentum premium over sub-periods revolving the inception of two financial market regulatory reforms in the Chinese Class A share market; 2) risk-adjusted momentum premia of momentum trading strategies in the Chinese Class A share market based on the traditional FF3F model and Wang and Xu (2004)'s version of the FF3F model.

Chapter 9 Conclusion

This chapter concludes the whole study by first briefly summarizing the findings of the research, then discussing over the practical implications and theoretical contributions to the literature, and eventually rounding out with a brief view of the limitations of this research and future research avenues.

Chapter 2 Theoretical framework

2.1 Introduction

During the course of modern finance theory development in the past three decades, the argument of whether the financial markets are efficient has been arguably one of the most debatable topics in the literature. The market efficiency proponents, represented by Fama (1970) who first proposed the efficiency market hypothesis in his 1970 seminal work, argue that, on average, investors in the financial markets cannot make superior returns over the market portfolio. Subsequently, this school of thought is empirically tested and supported by a spate of asset pricing models such as the CAPM first proposed by Lintner (1965), Treynor(1961, 1962) and Sharpe (1964) and the FF3F model, firstly introduced by Fama and French (1996) etc. Propped by all these efforts to empirically prove the validity of the efficient market hypothesis, the EMH theory became one of the most solid theoretical propositions of the empirical finance research for well over a decade. Yet, in late 1980s, the emerging of a group of financial market anomalies—the value effect (Basu, 1977, Basu, 1983, Ball, 1978), size effect (Banz, 1981, Reinganum, 1981), prior return effect (Jegadeesh and Titman, 1993), calendar effect (Keim, 1983, Reinganum, 1983, Roll, 1983, French, 1980) etc.—cast doubt on the validity of the Efficient Market Hypothesis empirically.

Over the past two decades, scholars have endeavoured to find theoretical or empirical foundation suitable to rationalize the anomalous returns from profiting on the above-mentioned financial market anomalies. So far, their efforts have paid off as to explain a few of these anomalies. For instance, the myth of the value effect was successfully uncovered as Fama and French(1996) claim that their FF3F model can fully explain the extra amount of risk carried by high book-to-market ratio portfolios. Whilst others such as the momentum effect is proved to be very resilient on theoretical level, behavioural finance proponents extended the effort in explaining the anomaly by challenging the theoretical limitions of the EMH. Specifically, they argue that all financial market investors are subject to different levels of cognitive biases, contradicting one of the most important EMH assumptions—all investors in the capital market are homogeneously rational. Consequently, the behavioural finance scholars contend that the momentum effect could be attributed to various forms of human cognitive biases such as overconfidence(Daniel et al., 1998), conservativeness/underreaction to earnings information (Barberis et al., 1998) and investors' overreaction and underreaction(Hong and Stein, 1999).

By and large, information uncertainty can be defined as the inaccuracy associated with the information flows in different contexts. In which case, the inaccuracy can be further decomposed into error if it is known and uncertainty otherwise(Hunter and Goodchild, 1993). In other words, information uncertainty represents ambiguity, doubt and inconsistency embedded in a variety of information, existing in everyday life, capital market and academic research analysis. Neverthless, in this research, information uncertainty is strictly defined as "ambiguity with respect to the implications of new information for a firm's value, which potentially stems from two sources: the volatility of a firm's underlying fundamentals and poor information" (Zhang, 2006: page 105).

Another important concept in firm valuation is corporate governance. Typically, it can be defined as "the way in which suppliers of finance to corporations assure themselves of getting a return on their investment" (Shleifer and Vishny, 1997: Page 737). This research puts corporate governance on the centre stage in part because of its potential importance in the portfolio strategy formation process of investing professionals, the likes of portfolio strategists and fund managers. Implicit in that is global fund managers' demand for better quality of corporate governance and more accountable listed-firms in the setting of the Chinese stock market (Zweig, 2010a). Moreover, thanks to the availability of the free float ratios, we are able to quantify the quality/strength of corporate governance of the listed firms in the Chinese stocks market, signifying the practical value of the study.

In this study, the hypotheses are developed on the belief that the Chinese stock market, being the most important emerging market in the world of capital market, is exceedingly rich in behavioural phenomena due to its unique characteristics—the market is policy-driven, packed with retail investors, swung by speculative trading and retail investors' sentiment. Moreover, the role of corporate governance, being the focal point for most international investors nowadays, is deserved to be rigorously analyzed from the perspective of its relation to the momentum effect under different market conditions. The theoretical building blocks of the hypotheses are buttressed by previous solid theoretical and empirical evidence on the momentum phenomenon in the Chinese stock market (Kang et al., 2002, Naughton et al., 2008), the intricate relationship between information uncertainty and stock returns(Zhang, 2006, Jiang et al., 2005), and relationship between the quality of corporate governance and stock returns in the setting of the Chinese stock market (Wang and Xu, 2004).

The remainder of the chapter is organized around the building blocks of our testing hypotheses. Section 2.2 explores the understanding of the momentum phenomenon and explains the mechanism of the momentum trading strategies. The concepts of behaviour finance, information uncertainty and corporate governance are explained in section 2.3, 2.4 and 2.5 respectively. Section 2.6 wraps out the chapter by listing out all the testing hypotheses.

2.2 The momentum phenomenon

2.2.1 The momentum phenomenon

The momentum phenomenon is a form of the prior return effects, with the other well known as the contrarian phenomenon. Simply put, the superior performance of stocks/portfolios during the prior periods (J months) can be expected to prolong during the subsequent periods; the stocks/portfolios with weak performance in the previous periods are inclined to extend their loss in the subsequent periods. The existence of the momentum phenomenon can be tested by comparing the return of the momentum effect-based trading strategy against that of “buy-and-hold” investing strategy. Jegadeesh and Titman (1993) pioneered to document the effect in their 1993 study. In the study, they ranked all the stocks listed on the NYSE and AMEX over the time horizon from 1965 to 1989 based on their prior i-month (i= 3, 6, 9, 12) average returns. The stocks were subsequently grouped into 10 portfolios based on their ranking. The group consists of stocks with the best past returns is named the “winner” portfolio; the group consists of stocks with the worst past returns is named the “loser” portfolio. The “winner” and “loser” portfolios, being rebalanced monthly, are held for j month (j= 3, 6, 9, 12). To mitigate the issue of biased test statistics caused by overlapping returns, Jegadeesh and Titman design the momentum mechanism in the way that one strategy (j, k) actually represents a combination of different ranking strategies. Further, they adjusted the raw returns of winner and loser portfolios for the market risk factor using the CAPM model, which can be expressed mathematically as,

$$r_{pt} - r_{ft} = \alpha_p + \beta_p (r_{mt} - r_{ft}) + e_{it} \tag{2.1}$$

"Where r_{pt} represents the return on "winner/loser" portfolio, r_{mt} denotes the return on the value-weighted index (proxy for the return of the market portfolio), and r_{ft} is the interest rate on 1-month Treasury Bill" (page 77). The results showed that "the portfolio of past winner achieves significant positive abnormal return when the value-weighted index is used as the benchmark, while the abnormal return of the portfolio of past loser is not statistically significant with this benchmark" (Page 77). The findings from Jegadeesh and Titman (1993)'s work has inspired many researchers in the literature. Over the past couple of decades, swamping amount of empirical evidence was present, confirming the existence of the momentum phenomenon around the globe (their studies are detailed in the literature review chapter). Theoretically, the existence of the momentum phenomenon was challenged by Fama and French (1996), yet they failed to explain the abnormal returns attributed to the momentum effect by using the FF3F model. Moreover, Carhart (1997) examined the returns of mutual funds in the US market over the time horizon of Jan. 1962 to Dec. 1993. In the risk-adjustment process, he extended the FF3F model by adding a Prior-one-year factor[2] (PR1YR) (momentum factor) and claimed that the improved asset pricing model could justify most anomalous effects in the financial market but the persistent underperformance of momentum "loser" portfolios. In addition, the findings from the study clinched the postulate that the momentum effect per se is totally independent of the size and value effect. In other words, the results from his analysis, armed with the momentum-inspired asset pricing model, manifested the

[2] The Prior-one-year factor was constructed by taking the average returns of "the equal-weight average of firms with the highest 30 percent eleven-month returns lagged one month minus the equal-weight average firms with the lowest 30 percent eleven-month returns lagged one month" (Carhart, 1997: 61). "The portfolios include all NYSE, Amex, and Nasdaq stocks and are re-formed monthly" (Carhart, 1997: 61).

enormous debacle in attempt to rationalize the momentum phenomeon using known risk factors from a unique perspective. While hitting the wall on the risk-based explanations, researchers turned to behaviour-based theories/models, motivated by psychological evidence, for help to reconcile the anomalous effect (will be detailed in section 2.3 behavioural finance/investors' sentiment).

2.2.2 The momentum trading strategies

The price momentum mechanism we employ will be consistent with the approach documented in Jegadeesh and Titman(1993)'s seminal work. The details of the momentum investing mechanism will be described in chapter 4—the data and methodology chapter.

2.3 Behavioural finance/ investors' sentiment

Behavioural finance is the study of the influence of psychology on the behaviour of financial practitioners and the subsequent effect on markets. Behavioural finance is of interest because it helps explain why and how markets might be inefficient.

(Sewell, 2007: page 1)

In plain language, the framework of behavioural finance is reliant on the common sense, supported by experimental evidences in the field of psychology, that human beings are fallible in judging reality. This sort of imperfection in people's judgment is also well known as human cognitive biases. The first ever scholarly research on behavioural finance dates back to 1912 and was documented by Selden (1912). He argued that the price movements on the stock exchanges could be greatly attributed to investors' psychological behaviours, yet the modern behavioural finance research has not really flourished until the publication of the articles "Availability: A heuristic for judging frequency and probability" and "Judgement under uncertainty: Heuristics and Biases" by two psychologists—Tversky and Kahneman (1973, 1974). The duo pioneered to introduce three most important psychological evidences—Representativeness, availability and anchoring effect, which later evolved to become the theoretical foundation of numerous behavioural finance theories.

In their 1979 work, Kahneman and Tversky (1979) firstly proposed the prospect theory, standing in contrast with the expected utility theory (Bernoulli, 1954, Von Neumann and Morgenstern, 1944). In the very same article, they experimentally confirmed the fourfold pattern of risk attitudes under the prospect theory: "risk aversion for gains of moderate to high probability and losses of low probability, and risk seeking for gains of low probability and losses of moderate to high probability" (Sewell, 2007: page 2).

The seminal work on using behavioural finance theories to interpret the momentum phenomenon was substantiated by Daniel et al.(1998), Barberis et al.(1998) and Hong and Stein (1999).

Daniel, Hirshileifer, and Subrahmanyam (1998) proposed a behavioural model where investors are assumed to be quasi-rational and overconfident. They argued that because the overconfident investors in the financial market routinely overestimate their forecasting or judging ability coupled with inherent human confirmation bias[3], they tend to emphasize public information signals that confirm their own judgment yet downplay public information signals that contradict their judgment on different securities. Their irrational behaviour gives rise to the overreaction upon different

[3] "Confirmation bias is a cognitive bias whereby one tends to notice and look for information that confirms one's existing beliefs, whilst ignoring anything that contradicts those bliefs. It is type of selective thinking" April 16, 2010 <http://confirmation-bias.behaviouralfinance.net/>.

public information signals, which eventually leads to the momentum phenomenon we observe in the financial market. In other words, Daniel et al. (1998) suggested 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.

In a contemporary study, inspired by psychological evidence such as representativeness bias (Tversky and Kahneman, 1974) and confirmation bias(Gilovich, 1993), Barberis et al.(1998) constructed 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. Furthermore, they assumed that the earnings of the security follow a random walk, which is not revealed to the representative market investor. Instead, he/she believes the dynamics of the asset earnings can be categorized into two types of regimes: 1) the earnings tend to reverse its trend in the prior period (mean-reverting); 2) the earnings tend to maintain its trend in the previous period (trending). The representative investor as human being is subject to cognitive bias. Specifically, when the investor witnesses a mean-reverting earning regime in the previous period, he/she will believe that the earnings will follow suit in the coming period, which is what psychologist/behavioural finance researchers call "confirmation bias". Sometimes, buoyed by the confirmation bias formed in the previous period, the representative investor erroneously believes the dynamics of earnings are in a regime whilst in fact the earnings are following the other alternative regime. These erroneously beliefs in turn give rise to the investor's underreaction to the information about the earnings.

Consequently, Barberis et al.(1998) argued that the momentum phenomenon stems from the investors' underreaction to earnings information in the financial market.

In another one of the most important subsequent studies at the early stage of the literature, Hong and Stein(1999) made their work distinct from two prior seminal work(Daniel et al., 1998, Barberis et al., 1998) mentioned above by building a behavioural theory on the behavioural interaction between two different type of agents as opposed to 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". Of them, "newswatcher" investor tends to forecast based purely on the private information coming in, on the contrary, "momentum trader" make their trading decision based solely on the historic stock price trends regardless of any current and upcoming in-play information signals in the market. Moreover, they also assume that private information signals spread out among all the "newswatchers" over time. Hong and Stein(1999) postulated 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. In another influential study, Du (2002) proposed 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). Drawing on the theoretical framework of the underreaction theory proposed by Hong and Stein (1999) and gradual-information-diffusion theory developed by Hong, Lim and Stein (2000), Du argued that the economic agents with lower confidence underreact to the public information signals, which in turn leads to the lagged incorporation of information to asset prices and eventually results in the momentum phenomenon observed. In other words, he nominates the underconfidence/hesitation of some investors toward decision making as the driving force behind the momentum effect.

In our research, the above-mentioned behavioural finance theories will be employed, by constantly referring back to, to interpret the empirical evidence found on the influence of information uncertainty over the momentum premium from the perspective of human cognitive heuristics such as underreaction, optimism/overconfidence, overreaction etc., inherent with Chinese investors' behaviours.

As to the Chinese stock market or Chinese stocks, many finance practitioners argue that the hotly discussed stock market or stocks share a few similarities with the tech sector/stocks in the "Dot Com bubble" era in the late 1990s. They witnessed that some listed firms outperformed the overall market by solely adding "China" to their trade tickers in the stock market (Zweig, 2010b, Bae and Wang, 2009). Indeed, being one of the biggest and most important emerging markets, the Chinese stock market looks promising to offer rich evidence of financial market anomalous effects triggered by individual investors' cognitive biases—overconfidence, disposition effect etc. (Chuang, 2010, Xu and Lu, 2008). The cognitive biases in the Chinese stock markets can take different forms and "on a different level than people of other culture" (Kim and Nofsinger, 2008: page 1). Against this backdrop, empirical evidence found in the setting of the Chinese stock market bear significant theoretical and practical significance in behavioural finance-related research.

To close out this section, I'd like to re-emphasize the crucial role behavioural finance plays in forming the theoretical basis of our empirical hypotheses by quoting an appraisement on behavioural finance by Shefrin(2000):

Behavioural finance is everywhere that people make financial decisions. Psychology is hard to escape; it touches every corner of the financial landscape, and it's important. Financial practitioners need to understand the impact that psychology has on them and on those around them. Practitioners ignore psychology at their peril. (page 309)

2.4 Information uncertainty

The importance of information has been emphasized in various studies across different disciplines such as clinical nursing (Mills and Sullivan, 1999), neuroscience(Abeles et al., 1994), information management(Li, 1997), supply chain management(Singh, 1996) etc. Needless to say, the role of information in finance market has been widely documented in numerous studies in the finance literature. Among them, Mitchell and Mulherin(1994) proxied the public information using "the number of news announcements reported daily by Dow Jones & Company" (923) and found a direct relationship between public information and market activities (trading volumes and stock returns). Booth and Chua (1996) empirically substantiated the role of investor-borne information costs as an explanation to the tendency of IPO underpricing provoked by ownership dispersion. Furthermore, other researchers (Fleming and Remolona, 1999) showed that the announcements of important public information trigger a "two-stage adjustment process" (1901) in the price formation in the US Treasury market. From a firm-specific perspective, Sjoo and Zhang(2000) postulated that investors normally have more faith in firms with large capitalization in that large-cap firms tend to carry better quality of information. With so many evidences being reported in this line of the literature, it is no wonder that one of the most prolific wall-street finance semi-professionals, Zweig (2010c), suggests that "information is power in the financial market" (page 1).

The vast majority of previous studies have been concentrating on the information flows or information asymmetry(Sjöö and Zhang, 2000) (Hong et al., 2000, Doukas and McKnight, 2005). Differing from the above-mentioned scholarly studies, we choose to focus on the uncertainty character of information. In the context of our research, information uncertainty can be defined as "the ambiguity with respect to the implications of new information for a firm's value, which potentially stems from two sources: the volatility of a firm's underlying fundamentals and poor information" (Zhang, 2006: page 105), to be consistent with the seminal work by Jiang et al. (2005) and Zhang (2006)—the main inspiration of this research. Even though the empirical finding of the interaction between the momentum premia and information uncertainty is scant in the literature, a fair amount of articles have substantiated the intricate relationship between information uncertainty and stock returns. The positive relationship between cross-sectional stock returns and information uncertainty in the stock market was postulated by Wall Street practitioners as well as researchers in the academia(Stivers and Sun, 2009). Hirshleifer (2001) set out a theoretical framework of investors' psychology and asset pricing, under which, information uncertainty factors accentuate investors' cognitive biases, triggering them to down play the fundamentals of stocks in the stock market. Further, Hirshleifer (2001)'s theoretical framework is empirically validated by Daniel et al.(1998, 2001). They showed that the presence of anomalous effects in the financial market was boosted by higher level of information uncertainty. Additionally, Daniel et al. (1998, 2001) argued that their finding can be attributed to the fact that the difficulty of business valuation, imposed by information uncertainty, tends to amplify stock investors' heuristic bias (overconfidence). From other perspective, information uncertainty also was found to encourage risk-taking behaviours in the stock markets, which leads to more frequent trading activities (Brereton, 2009). Besides the positive relationship between information uncertainty and stock returns, a pair of studies (Jiang et al., 2005, Zhang, 2006) first documented the relationship between information uncertainty and the momentum premia. In these two studies, they used different sets of proxies[4] to measure the degree of information uncertainty and show that the degree of information was positively associated with the momentum premia. In other words, greater degree of information uncertainty amplifies the yields from momentum trading. Following Zhang (2006)'s method of proxying information uncertainty levels based on different firms' characteristic variables (firm size, firm age, analyst coverage, volatility, analyst earnings forecasts, cash flow volatility), Kelsey et al.(2010) studied the dynamic of positive and negative momentum effect under Knightian uncertainty in the U.S. stock market and confirmed Zhang (2006)'s finding that the momentum premia tend to be evidently larger under the influence of greater information uncertainty. Further, negative momentum effect (measured by the returns of loser portfolios) was found to play a more dominant and persistent role compared to positive momentum effect (measured by the returns of winner portfolios)

[4] Jiang et al.(2005) use firm age, return volatility, average daily turnover, and the duration of firms' future cash flows to proxy IU. Zhang (2006) employs firm size, firm age, analyst coverage, dispersion in analyst earning forecasts, stock volatility and cash flow volatility to gauge stocks' information uncertainty level.

in determining and amplifying the momentum premium under the influence of information uncertainty.

2.5 Corporate governance

The origin of corporate governance dates back to over 200 years ago, when Adam Smith (1961) succinctly described the prime issue sitting at the heart of corporate governance—"when ownership and control of corporations are not fully coincident, there is potential for conflicts of interest between owners and controllers" (qtd. in Denis and McConnell, 2003: page 1). In view of the theoretical and practical developments revolving the concept, corporate governance has had increasingly entrenched influence over research in different fields such as law, finance etc. as a qualitative factor, associated with board administration, chief executive officer compensation, ownership and firm performance. A good corporate governance practice can be defined as "a culture and a climate of Consistency, Responsibility, Accountability, Fairness, Transparency, and Effectiveness that is Deployed throughout the organization (the 'CRAFTED' principles of governance)"[5]. The quality of the corporate governance is closely related to the success of a corporation as good corporate governance practice enables the corporation to more efficiently yield profits, aligning with the interests of its stakeholders, which is probably the reason why increasingly more portfolio strategiests/fund managers start taking corporate governance into consideration in their stock picking/portfolio selection process. In the corporate governance-finance literature, by constructing an index based on corporate governance quality measurements, scholars found prevailing empirical evidences showing "lower quality of corporate governance practice is associated with consistent lacklustre performance of corporations in the stock market (Gompers et al., 2003, O'Donovan, 2003, Drobetz et al., 2004). Yet most of the studies focused

[5] Arguden, Yilamz. "Measuring the effectiveness of corporate governance." INSEAD: Knowledge: 2 Par. Online. Internet. 01/22/2010. Available: http://knowledge.insead.edu/corporate-governance-effectiveness-100415.cfm

on very mature, developed financial markets, only limited attention was paid on emerging Asian markets in this line of the literature. Of them, Mitton (2002) showed that there is a strong positive relationship between the quality of corporate governance practice and firm's stock price in the stock market in six east Asian countries—Indonesia, Korea, Malaysia, the Philippines and Thailand. His finding was confirmed by Black et al.(2006), who postulated that more stringent corporate practice presages high share returns in emerging markets. In one of the most influential studies to the development of my testing hypotheses, Wang and Xu (2004) took into account the special share ownership structure[6] of the firms listed in the Chinese stock market and used free float ratio ("the ratio of shares in a public company that are freely available to the investing public to total company shares"(page 65)), to proxy for the corporate governance factor, reflecing the quality/strength of corporate governance.

Wang and Xu (2004) witnessed that the residual free float ratio as a risk factor improves the explanatory power of the FF3F model over the cross-sectional stock returns in the Chinese stock market. Extending Wang and Xu (2004)'s study, we employ their calibrated version of the FF3F asset pricing model to rationalize the risks borne by momentum winner and loser portfolios. Yet the role of corporate governance in our research is not limited to be merely one of the risk factors in the risk-adjustment process, it will also be examined as one of information uncertainty proxy variables. On this front, we are particularly inspired by the seminal work on corporate governance and company's share performance in the stock market by

[6] The special share ownership structure refers to the fact that "about two-thirds of total market capitalization is owned by the state" (66), and the majority of the remaining shares are in the hands of retail investors (Wang and Xu, 2004).

Gompers et al. (2003). Specifically, high free flow also means that shareholders have more incentive to exercise their rights, which will in turn give rise to higher quality of corporate governance. In the context of the Chinese stock market, characterised by frequent government intervention, a high free float implies less uncertainty induced by government policies through the government owned non-tradable shares (Gompers et al., 2003, Wang and Xu, 2004). Elsewhere in the literature, researchers found a slew of evidences unanimously showing that firm-level information uncertainty can be reflected by the quality/strength of firm's corporate governance practice. To be specific, more stringent corporate governance practice tends to signal 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). All the above-mentioned empirical and theoretical evidence collectively corroborate my conjecture that corporate governance is a suitable proxy for firm-level information uncertainty.

2.6 Summary/testing hypotheses

To sum up, we list out the testing hypotheses, reflecting the essence of our conjectures, in this section as follow:

Hypothesis 1: *overall the momentum premia of different momentum trading strategies in the Chinese Class A share market are positive and statistically significant over the sample time period from January 1996 to December 2008.*

Hypothesis 2: the *momentum premia of different momentum trading strategies in the Chinese Class A share market are expected to be positive and significant over time periods following UP market state and much weaker and statistically insignificant during time periods following DOWN market state over entire sample* *period (Jan. 1996 to Dec. 2008).*

Hypothesis 3: *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 momentum premium of the (R=6, H=6) momentum strategy, a representative of all the momentum trading strategies, in the Chinese Class A share market. Additionally, the amplifying effect of information uncertainty over momentum premium of the (R=6, H=6) momentum trading strategy is most pronounced over time periods following DOWN market state.*

Hypothesis 4: *In the light of Wang & Xu(2004) 's finding that a factor proxying the quality/strength of corporate governance helps elucidate cross-sectional stock returns, we expect the inclusion of the corporate governance factor, proxied by residual free float ratio, to ameliorate explanatory power of the traditional FF3F asset pricing model.*

Chapter 3 A review of current literature

3.1 Introduction

Momentum phenomenon grabbed researchers and analysts' attention thanks to the detrimental role it plays against the validity of the well-grounded Market Efficiency Hypothesis. Doubtless, the curiosity and vigour of researchers towards the phenomenon have been translated into numerous of academic studies, from which they either proved the significance and resilience of the momentum phenomenon or argued that the phenomenon does not exist in certain financial market in the world or global financial market as a whole. This chapter will cover the relevant and noteworthy evidence from previous studies in the extant literature.

3.2 A panorama of the evidence of the existence of the momentum phenomenon globally

3.2.1 Evidence of the momentum phenomenon in the U.S. and U.K. markets

The phenomenon of short-to-medium horizon return continuation has been extensively documented in the finance literature for years. The earliest evidence of the existence of the effect was reported in Jegadeesh and Titman (1993)'s seminal work, where they studied the performance of stocks trading on the NYSE and AMEX over the period 1965 to 1989. Specifically, they first ranked all the listed-stocks based on their past 3, 6, 9, 12-month returns, then put them into 10 portfolios (the portfolio consists of stocks with highest past returns is labelled as “winner” portfolio; the portfolio consists of stocks with lowest past returns is labelled as “loser” portfolio) based on their past-return ranking, and subsequently held these 10 portfolios for 3, 6, 9, 12 months by going long on “winner” portfolios and going short on “loser” portfolios. Consequently, they find that abnormal returns can be produced by buying "winner" portfolios and selling "loser" portfolios in various formation periods (3, 6, 9, 12 months) and holding the portfolios for various lengths of time (3, 6, 9, 12 months).

Not surprisingly, Jegadeesh and Titman(1993)'s finding became the impetus behind ensuing endeavours to capture the evidence of the existence of the momentum phenomenon in different markets and the cause of the financial market anomaly.

Recent studies reported promising evidence on the existence of the momentum effect in two of the world's most developed financial markets—the U.S. and U.K markets. Chan, Jegadeesh, and Lakonishok (1995) analyzed a sample dataset consists of all stocks listed on the NYSE, Amex, and Nasdaq over the time period from January 1973 through December 1993 and show that the price momentum[7] profit—returns from past winner portfolios minus the returns from past "loser" portfolios—is around 8.8 percentage points on average for the US stock market. Yet, the earnings momentum[8] effect is proved to be slightly less significant over six-month holding period. Intriguingly, the "loser" portfolio consists of stocks with the lowest past earnings exhibit the strongest momentum returns over various holding periods (6-12 months), which is consistent with the information diffusion theory firstly proposed by Hong, Lim and Stein (2000). The theory states that because of lacking of attention from most analysts, information tends to travel slower among stocks with lacklustre earnings performance. Consequently, Chan et al. (1999), contend that the (price and earnings) momentum phenomenon can be attributed to the sluggish response of share prices to share price and company earnings information available

[7] A type of momentum strategy that selects stocks based on their past share price performance(Bird and Whitaker, 2003).
[8] A type of momentum strategy that selects stocks based on their past reported earnings performance(Bird and Whitaker, 2003).

in the financial market.

On the UK market front within the literature, employing a comprehensive UK market share price data taken from the London Share Price Database (LSPD) over the time period January 1977 to December 1996, Liu at al. (1999) document that the momentum effect is positive and significant in the UK financial market. Their results are robust against different methodologies (Lehmann, 1990; Jegadeesh and Titman, 1993), seasonal effects, and data-snooping such as sub-period analysis and bootstrap test etc.

3.2.2 Evidence of the momentum phenomenon in the rest of markets around the globe

Among studies with a focus on the momentum effect across a group of countries, Rouwenhorst(1998) implements the Jegadeesh and Titman(1993)'s approach and performed the test on a sample dataset of a diversified portfolio among 12 European countries[9] over the period 1978 to 1995. The empirical results from his study show that the short-to-medium time horizon momentum returns are consistently positive and significant. Further, Rouwenhorst (1998) confirms the robustness of the results through testing against country and size factors.

Among works pertaining the evidence of the momentum phenomenon in Asian markets, Ramiah et al.(2009) investigate the impact of the special dual-board structure of the Singapore Stock Exchange on the momentum effect for the sample time period 1990 through 2004. They report that the momentum trading generates positive and economically significant abnormal returns for the main board, the

[9] The 12 European countries include Austria (60 firms), Belgium(127), Denmark(60), France(427), Germany(228), Italy(223),the Netherlands(101),Norway(71),Spain(111),Sweden(134), Switzerland(154),and the UK(494)(Rouwenhorst, 1998).

second board, or the combined board in the stock exchange. Yet, the results from a split-board study reveal that the momentum effect is markedly more significant among the smaller companies, which are normally concentrated on the second board of the stock exchange. By studying a dataset includes the returns of all common stocks listed in Hong Kong, Indonesian, Japanese, Korean, Malaysian, Singaporean, Taiwanese, and Thai stock markets over the period January 1996 through February 2000, Chui et al. (2000) report that the momentum returns for a portfolio with stocks diversified among the Asian countries mentioned above except Japan are positive and statistically significant. However, the existence of the momentum effect within individual countries is time frame-dependent for pre- and post-1997 Asian financial crisis.

Nonetheless, the empirical results from other studies in the literature with focus on Asian financial markets cast doubt on the resilience of the momentum effect. Among them, Hameed and Kusnadi (2002) conduct analysis on the stock-listed on six Asian financial markets (Hong Kong, Malaysia, Singapore, South Korea, Taiwan, and Thailand) over the time window spanning from 1979 to 1994[10]. The empirical evidence from their study shows that momentum effect is weak and mostly statistically insignificant among the sample markets. Differing from prior studies on momentum phenomenon in different Asian markets, such as Hameed and Kusnadi(2002) and Chui et al.(2000) who focused on 3-12 months portfolio formation periods, McInish et al. (2008) examine momentum portfolios with formation periods ranging from 1 to 4 weeks and show that the momentum phenomenon in major

[10] The data are collected from the Pacific-Basin Capital Markets (PACAP) Database(Hameed and Kusnadi, 2002).

Asian stock markets[11] is not significant for the time period spanning from 1999 to 2000.

3.2.3 Evidence of the momentum phenomenon in the Chinese stock market

Compared to the comprehensive focuses on other relatively more developed financial markets, the momentum phenomenon in the Chinese stock market only started receiving fair amount of attention in early 2000. The empirical results from these studies have been mixed and confusing mainly because different methods have been implemented on different stock exchanges (Shanghai Stock Exchange and Shenzhen Stock Exchange) over different ranking and holding periods (from very short up to 2 years). Naturally, the results do not normally concur with each other. Yet, the divergence of the findings distracts scholars from further exploring the main driver behind the momentum phenomenon and other factors that might impact the momentum profitability.

By examining a dataset that includes weekly share A[12] stock prices for the period January 1993 to January 2000 taken from Datastream, Kang et al.(2002) document that the momentum returns are positive and statistically significant for intermediate-ranking and holding periods (12, 16, 20 and 26 weeks). Yet, they contemplate that the momentum profits will die off as the Chinese financial market “becomes mature and more transparent in the future” (Kang et al., 2002: 264). Extending the sample time horizon to the period 1995 to 2005, Naughton et al. (2008) focus on the A shares that are listed on the Shanghai Stock Exchange and report that the momentum trading strategies can produce positive and significant abnormal returns.

[11] The major Asian stock markets studied in this research include Japan, Taiwan, Korea, Hong Kong, Malaysia, Thailand, and Singapore.
[12] Share A stocks were only allowed to be traded among local Chinese investors(Kang et al., 2002).

Their empirical results firmly support Kang et al.(2002)'s findings that the momentum effect is prevalent in the Chinese Class A share market. Furthermore, Wang and Chin(2004) employ a sample dataset pertains all share A stocks listed on both the Shanghai Stock Exchange (SHSE) and Shenzhen Stock Exchange (SZSE) and investigate the interaction between volume-based and past return-based momentum approaches. They document that low-volume stocks exhibit considerably positive and robust momentum effect, which is largely in line with theoretical behavioural framework (Barberis et al., 1998, Hong and Stein, 1999, Baker and Stein, 2004), implying that investors' underreaction and slow incorporation of information attribute to the momentum phenomenon.

Yet, other studies with a focus on the Chinese market could not provide compelling evidences to show the existence of the effect. By examining return data[13] of all Share A stocks listed on both of Shanghai Stock Exchange and Shenzhen Stock Exchange over period January, 1994 through December, 2004, He and Tan (2006) follow the methodology outlined in Jegadeesh and Titman(1993)'s seminal work and show that only small number of short-to-intermediate time horizon momentum strategies can produce positive momentum profits and most of them are not statistically significant. Similarly, in Wang (2004) employs the Jegadeesh and Titman(1993)'s approach and finds negative momentum returns over 6-month to 2-year holding and ranking periods, which is expected as numerous previous studies report that the momentum effect exists only in short to intermediate time window.

[13] Data are collected from Chinese Stock Market price and return database (CCER) and Chinese Stock Market exchange database (CSMAR) (He and Tan, 2006).

3.3 Extant explanations to the momentum phenomenon

Whilst some very compelling evidences of the existence of the momentum phenomenon have been documented in numerous of previous studies mentioned above, there is an on-going debate about what is the driving force behind the momentum phenomenon. Researchers have been developing different theories in attempt to explain the cause of the momentum effect without concurrence over years. Overall, the explanations can be divided into two main strands—risk factor-based explanations built on the belief of the validity of weak-form market efficiency and behavioural models-based explanations supported by modern behavioural finance theory.

3.3.1 Risk-based explanations to evidence of the momentum profits

For a quite long period of time in the past decades before the behavioural finance research loomed in the late 1980s, mostly market efficiency proponents in the field believe that the momentum effect is the resultant of some hidden risk factors. Specifically, the risk factors cannot be captured by existing asset pricing models such as the Capital Asset Pricing Model (CAPM) proposed by Sharpe (1964) and Lintner (1965) and the Fama and French Three Factor model (FF3F) and alike. However, the hypothesis that risk factors alone can fully explain the returns from momentum investing keeps being rejected by empirical results from most of momentum effect-focused studies. Of which, in their 1993 seminal work on the momentum phenomenon in the US stock markets, Jegadeesh and Titman (1993) test the resilience of the momentum returns against market risk factor (CAPM), size factor, lead-lag effects, transaction costs, seasonal effect, and sample time horizon. They show that the excess returns from momentum trading cannot be justified by any of the above-mentioned risk factors. To further stretch asset pricing model's capability of capturing risk, Fama and French (1996) propose a multi-risk factor asset pricing model augmented by market risk factor, size factor and book-to-market factor and report that their model is proved to be capable of explaining most of the financial market phenomena, yet fails to rationalize the abnormal momentum returns which is attributed to the lack of fitness of various CAPM model in describing average returns. In regards to the FF3F model's inability to explain the momentum returns, Fama and French (1996) offer three possible explanations: Firstly, they bitterly question if the momentum effect is a resultant of data mining. Secondly, they point out that behavioural-based model, describing human heuristic biases of market participants, might be capable of spelling out the existence of the momentum phenomenon. Finally, they call for a richer asset pricing model in order to capture any hidden risk factors which might drive the momentum effect. It is worth noting that Fama and French (1996)'s suggestions have enormously influenced the direction of subsequent studies in the literature.

Overseeing the literature, the empirical evidence that reject the asset pricing model approach in explaining the momentum effect overwhelm those evidence that support. Specifically, Hon and Tonks (2003) show that the returns yielded from momentum investing cannot be justified by either beta-risk factor or size factor in their extensive study of the momentum effect in the UK stock market. In particular, Kang et al.(2002) follow the methodology proposed by Chan(1988) in constructing time-varying risk models and show that the momentum returns in Chinese market cannot be attributed to the time-varying market risk factor. On the contrary, Wang(2004) find significant evidence to support the argument that the Fama French factors are capable of explaining the momentum phenomenon in Chinese stock market.

3.3.2 Behavioural model-based explanations to the momentum phenomenon

While many market efficiency proponents still believe that the momentum payoffs reflect a compensation for risk, academics in the behavioural finance field make attempts to unveil the perplexing momentum phenomenon in the financial markets by developing different theories based on various forms of behavioural models and human heuristic biases such as overreaction, underreaction, overconfidence, frame-dependence etc. The behavioural finance[14]'s influence upon the explanation to the momentum phenomenon is rooted in Jegadeesh and Titman(1993)'s seminal work, where they conjecture that the momentum effect might be attributed to market investors' underreaction to firm-specific information. Yet they call for "a more sophisticated model of investor behaviour"(Jegadeesh and Titman, 1993: page 90) to advance their conjecture on the driving force of the momentum phenomenon. Responding to Jegadeesh and Titman(1993)'s research, researchers in the field develop various behavioural-model based theories to justify the excess returns from momentum investing. Among them, three major studies have been strikingly convincing:

Intrigued by the psychological evidence on representativeness, availability and anchoring biases along with the prospect theory as documented in a series of Tversky and Kahneman (1973, 1974, 1979)'s scholarly work, Daniel et al.(1998) develop a behavioural model based on investors' overconfidence, self-attribution and argue that investors' overconfidence, triggered by cognitive confirmation bias,

[14] "Behavioural finance is the application of psychology to financial behaviour—the behaviour of practitioners." (Shefrin, 2000: page 3)

contributes to the momentum phenomenon. In a contemporary study, Barberis et al.(1998) construct a one-agent behavioural model based on representativeness and find that the momentum effect can be largely attributed to investors' underreaction towards earnings information in the financial market. Elsewhere in the literature, De Long et al.(1990) and Hong and Stein(1999) set up a behavioural model consists of two types of "boundedly rational" (Hong and Stein, 1999: 2144)—newswatcher and momentum trader and suggest that the underreaction(triggered by availability and anchoring) of newswatcher toward private information signals contributes to the momentum phenomenon.

Furthermore, there are a couple of studies worth mentioning as they empirically support the explanation to the momentum phenomenon firstly proposed by Hong and Stein(1999), which based on the assumption that private information gradually travels across among stock market investors. Employing firm size and residual analyst coverage to proxy for the rate at which private information travels in the financial market, Hong, Lim and Stein (2000) find that: 1) small firms (measured by market capitalization) tend to exhibit markedly more significant momentum phenomenon; 2) momentum investing is significantly profitably among firms are scarcely covered by stock analysts. Taken together, the results from their study are in line with Hong and Stein(1999)'s gradual-information-diffusion hypothesis.

3.4 The dynamics of the momentum premia under different market states

Cooper et al. (2004) categorize the market states by the sign of the average market returns for the preceding 12, 24, or 36 months and apply Jegadeesh and Titman(1993)'s approach on the monthly stock returns data for the US stock market over the period from January 1926 through December 1995. They find empirical evidence supporting the theory proposed by Johnson(2002)—"The momentum premium is procyclical" (Stivers and Sun, 2009) (page 3). In one of the most recent empirical studies on the topic, Stivers and Sun (2009) proxy the market states using cross-sectional stock return dispersion and show that DOWN market state reflected by a high cross-sectional stock return dispersion presages low momentum returns in the subsequent period and UP market state reflected by a low cross-sectional stock return dispersion indicates significantly higher momentum returns in the following period, consistent with the findings by Cooper et al.(2004).

In another contemporary study, using a dataset pertain all stocks listed on Centre for Research in Security Price (CRSP) for the time period spanning from January, 1927 to December, 2005, Asem and Tian (2009) document that the economic and statistical significance of momentum profits change drastically as the market condition[15] swings. Specifically, the momentum profits tend to be more significant when an UP market is followed by a UP market or when a past DOWN market resumes its course for current period compare to the switching-regime market states—past DOWN market followed by an UP market state or vice versa. Comparing to the two mainstream explanations—rational asset pricing models and behavioural theory models—on the momentum phenomenon in the extant literature, the authors find that the results is remarkably consistent with overreaction behavioural theory—stems from investors' overconfidence—firstly proposed by Daniel et al.(1998). Yet, rational asset pricing models—changes in stock returns

[15] In the study, Asem and Tian (2009) define up (down) market based on the sign of the past 12-month lagged return of the CRSP value-weighted index.

autocorrelations—fail to explain the reason why the momentum profits are larger when a past DOWN market is followed by a DOWN market than when a past DOWN market is followed by an UP market instead.

Elsewhere in the literature, analyzing on a share return dataset including all-listed companies in the Taiwan Stock Exchange over January 1981-July 2006 period, Du et al.(2009) implement Jegadeesh and Titman (1993)'s approach yet only focus on the strategy with 6-month ranking and 6-month holding periods and follow the market states categorization approach developed by Cooper et al.(2004). They find dismal momentum payoffs in the Taiwan financial market. Mulling over their failure of finding the existence of the momentum phenomenon, they postulate that the lack of momentum effect in Taiwan financial market is because the positive momentum profits exhibited following UP markets are counterbalanced by the negative momentum returns exhibited following DOWN market state.

3.5 Information uncertainty and the momentum premium

Albeit there are abundant studies focusing on the information uncertainty proxies and empirical evidence of the momentum effect separately in the extant literature, the research debate on confronting the relationship between information uncertainty and the momentum effect in either direct or indirect way is virtually muted.

One of the seminal work on this front is carried out by Jiang et al. (2005). 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 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[16]. Through analyzing 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 that the trading strategy of emphasizing the impact of the momentum-related signals on high-IU firms and impact of value-related signals on low-IU firms could strengthen the

[16] "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).

profitability of portfolio investment. Yet the testing of such strategies is beyond the scope of our research and is a notable future research avenue. Extending Jiang et al. (2005)'s work, Zhang (2006) takes a slightly different approach to gauge the degree of information uncertainty factor. Building the foundation 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 earning forecasts, stock volatility, and cash flow volatility attempting to best proxy for the level of information uncertainty[17] associated with companies listed in the U.S. stock market using the monthly data over the period from January 1983 to December 2001. 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, which 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 momentum premia are noticeably larger among stocks/portfolios associated with high level of information uncertainty. Moreover, he points out that firm size is a reasonable factor to proxy for information uncertainty according to the results, which suggests that the investors' underreaction is more prevalent among small-cap companies.

[17] Zhang (2006) defines information uncertainty as "ambiguity with respect to the implications of new information for a firm's value…". (page 105)

3.6 The role of corporate governance in the research

During the last couple of centuries, as the operation of both public and private corporations grows increasingly transparent, investors have learnt how to play the right card to protect their own rights and in turn optimize their chance of sharing a slice of the success of the corporations. Under this backdrop, corporate governance comes to the spotlight. Shleifer and Vishny define corporate governance as “the ways in which suppliers of finance to corporations assure themselves of getting a return on their investment” (Shleifer and Vishny, 1997: page 737). From business practitioner’s perspective, O’Donovan(2003) describes corporate governance as “an internal system encompassing policies, processes and people, which serves the needs of shareholders and other stakeholders, by directing and controlling management activities with good business savvy, objectivity, accountability and integrity”. Specifically, she points out that corporate governance can precipitate changes in the share price of corporations in the financial market. O’Donovan’s argument is well supported by the evidence found in different capital markets in the literature. Gompers, Ishii and Metrick (2003) take relevant corporate governance data from the Investor Responsibility Research Center (IRRC) and construct a “Governance Index” to gauge the level of corporate governance practice associated with corporations listed on New York Stock Exchange(NYSE), American Stock Exchange (AMEX), and NASDAQ markets. Consequently, they find that “corporate governance is strongly correlated with stock returns during the 1990s” (Gompers et al., 2003: 144). In support of their argument, Gompers et al. (2003) show that longing stocks of firms with stringent corporate governance and shorting stocks of firms with weak corporate governance can outperform market portfolio by 8.5 percent per year.

Among studies in the European financial markets, Drobertz et al. (2004) test Gomper et al. (2003)'s hypothesis on the German financial market by taking a distinct approach. Specifically, in Drobertz et al. (2004)'s research, a broad corporate governance rating (CGR) is constructed by conducting a corporate governance proxies[18] survey among 253 firms listed on NEXMAX 50 (index of growth firms) and SMAX (small-cap stocks). Using the CGR to measure corporate quality for the firms, Drobertz et al. (2004) find that "better corporate governance is highly correlated with better operating performance, higher stocks returns and higher market valuation" (Drobertz et al., 2004: page 270), largely in line with results found in Gomper et al (2003)'s empirical work. Furthermore, they show that the corporate governance index-based investment strategy can yield 12% excess returns over the market portfolio. In a subsequent study, Bauer et al. (2004) test the argument hypothesized by Gomper et al. (2003) on two separate datasets (the U.K. and the European Monetary Union (EMU)) taken from Deminor. They find that in the UK market, the corporate governance index-based investment strategy employed by Gomper et al. (2003) can yield economically significant risk-adjusted return. Nevertheless, in the EMU the returns from the corporate governance index-based investment strategy is much smaller. In line with the difference in the realized investment returns, Bauer et al. (2004) show that the EMU exhibits stronger positive relationship between corporate governance and firm value compared to the UK market. Their finding is consistent with a cross-country corporate governance study conducted by LaPorta et al. (2002), where they compared the relationship between corporate governance

[18] "The 30 corporate governance proxies are divided into five categories: (1) corporate governance commitment, (2) shareholder rights, (3) transparency, (4) management and supervisory board matters, and (5) auditing." (Drobertz et al., 2004: 271)

standards and firm valuation among 27 countries[19]. By analyzing a sample dataset consists of 539 firms from the 27 countries taken from WorldScope database, they show that the quality of corporate governance standards of firm (country) is positively related to the valuation of firms (within the country).

Even though the research effort on the relationship between firm-level corporate governance and share performance of firms in the settting of the Asian markets has been very limited, there are a few good examples. Among them, Mitton(2002) studies the impact of firm-level corporate governance on the firm performance in the financial markets of six countries—Indonesia, Korea, Malaysia, the Philippines and Thailand—whom are worst hit by the 1997 Asian financial crisis. From the perspective of stock price movements, Morck et al. (2000) examine a sample dataset consists of GDP and stock price of 40 emerging and developed countries[20] over 1995 to 1997. The results from cross-sectional regression analysis suggest that more firm-specific information tends to be factored in the stock prices in the financial markets equipped with more stringent rules on legal protection of investors' rights. Taking the research topic to a more specific level, Wang and Xu (2004) look into the inherent relationship between quality/strength of corporate governance and share price by employing corporate governance—measured by residual free float ratio (from regression free float ratio against the logarithm market capitalization of corresponding firms)—supplanting the value effect factor of the traditional FF3F

[19] The 27 countries include Argentina, Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, Japan, Korea, Mexico, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Australia, Canada, Hong Kong, Ireland, Israel, New Zealand, Singapore, United Kingdom, United States.

[20] The 40 emerging and developed countries include Japan, Denmark, Norway, Germany, United States, Austria, Sweden, France, Belgium, Holland, Singapore, Hong Kong, Canada, Finland, Italy, Australia, UK, Ireland, New Zealand, Spain, Taiwan, Portugal, Korea, Greece, Mexico, Chile, Malaysia, Brazil, Czech, South Africa, Turkey, Poland, Thailand, Peru, Columbia, Philippines, Indonesia, China, Pakistan, India. The data are taken from Datastream.

model as one of the risk factors in a modified version of Fama and French three factor model. In their study, Wang and Xu (2004) collect returns (Share A stocks listed on Shanghai and Shenzhen Stock Exchange) and free float ratio data spanning from July 1996 to June 2002 from the China Stock Market and Accounting Research Database. Specifically, they run different time-series regression analysis by replacing price-to-earnings ratio (the value effect factor) with residual free float ratio within the FF3F model in the risk justification (against portfolio returns) process. Based on the results, they document that corporate governance factor (free float ratio) “significantly increased the explanatory power of the market model—from 81 percent to 90 percent” (Wang and Xu, 2004: page 65).

Besides, the quality/strength of firm-level corporate governance is also arguably a suitable proxy for the degree of information uncertainty associated with listed firms, supported by considerable empirical evidences in the literature. 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) examine the topic from a completely different point of view. They study a sample of 197 US listed biotech firms in the healthcare sector over the time period from 1998 to 2004. The results from univariate and multivariate analysis show that poor quality of corporate governance practice (no or less information disclosure) can trigger a higher level of firm-specific information uncertainty.

Chapter 4 Data and methodology

4.1 Data

4.1.1 Introduction

In this section, the specifications of the data used in our research will be described in great detail. Considering the importance of the data is utterly pertinent in understanding the methodological procedures and results of this research, we will lay out this section as follows: first, the history of the emergent Chinese stock market will be briefly reviewed, entailing the four major regulatory reforms from 1996 through 2008, the unique twin-share systems—Class A share and Class B share, as well as the two stock exchanges (Shanghai and Shenzhen). Subsequently, the major characteristics of the market participants in the Chinese stock market will be outlined. Finally, the statistical properties of the data will be presented based on different types of shares, different stock exchanges and different IU proxy variables employed to gauge the degree of firm-specific information uncertainty.

4.1.2 An overview of the Chinese stock market

4.1.2.1 Four major regulatory reforms in the history of the Chinese stock market

Over the relatively brief post-1949 history of Chinese stock market, there has been four notable regulatory reforms to the stock market infrastructure imposed by the central government. The financial market regulatory reforms can be listed as follows:

(1) “Daily price limit regulation which took place in December 16, 1996

(2) Implementation of new People’s Republic of China (P.R.C.) security law on July 1, 1999

(3) Removal of trading restrictions allowing domestic residents to trade B-share stocks on Feb. 20, 2001

(4) Opening A-share markets to foreign investors on July 9, 2003" (Lin and Swanson, 2008: page 50-51)

Overall, the aims of the financial market regulatory reforms are threefold: "(1) to develop new financial institutions and clarify the responsibilities of existing financial institutions; (2) to replace direct administrative economic controls with macroeconomic levers; and (3) to develop efficient financial markets" (Bei et al., 1993: page 149). In addition, the four regulatory reforms each have their own specific purposes. The 1996 regulatory reform that imposed limit on daily trading price is aiming at assuaging the retail investors' speculating behaviours and to maintain the stability of the stock market. The implementation of new People's Republic of China (PRC) securities law that took place in 1999 intends to effectively protect investors' rights associated with their investment decisions and consolidate the architecture of corporate governance for the listed firms. By allowing domestic retail investors to own B shares in 2001 and allowing qualified foreign institutional investors (QFII) to own A shares in 2003, the Chinese central government attempts to liberate Chinese financial market in stride and to mitigate market inefficiency provoked by market segmentation(will be further discussed in section 4.1.2.2 and 4.1.2.3).

4.1.2.2 The Shanghai Stock Exchange and the Shenzhen Stock Exchange

The Shanghai Stock Exchange

The city of Shanghai, located by the Yangze River, hosts one of the two stock exchanges in mainland China. As a non-profit membership institution and legal person, the Shanghai Stock Exchange (SHSE) was official established on November 26, 1990 (Han, 2007). Subsequently, the full operation of trading activity started on December 1990. Directly governed by the China Securities Regulatory

Commission (CSRC), the SHSE had grown into an exchange that provides a powerful trading platform for a variety of financial instruments such as Class A shares, Class B shares, investment fund shares, treasury bonds, futures and derivatives etc. By the end of 2009, the SHSE had 1,351 listed securities, 870 listed companies with a total market capitalization of over 18 trillion yuan. Also, it's noteworthy that the over its operation of more than two decades, the SHSE has made a significant effort in developing a set of principles ("legislation, supervision, self-regulation and standardization"[21]) to facilitate numerous Chinese corporations to successfully raise capitals.

The Shenzhen Stock Exchange

Trailing the establishment of the Shanghai stock exchange chronologically, the opening of the stock exchange in Shenzhen on December 1, 1990 was subtly in line with the main open-market economic policies advocated by the Chinese central government in the late 1980s and early 1990s. Similar to the Shanghai stock exchange, the Shenzhen stock Exchange (SZSE) is a self-regulated legal entity under the supervision of China Securities Regulatory Commission (CSRC)[22]. Geographically, the stock exchange is convinently located in the special economic zone—the city of Shenzhen, which is only 30 miles north of Hong Kong. Function-wise, the exchange was initially designed to specialize in stock trading, yet after 20 years in full operation it has become a stock trading platform with fully fledged functions including "providing venue and facility for securities trading, formulating operational rules, arranging securities listing, organizing and supervising securities

[21] The Shanghai Stock Exchange. February 11, 2011 http://www.sse.com.cn/sseportal/en/c01/c01/c01/p996/c15010101_p996.shtml

[22] The Shenzhen Stock Exchange "SZSE Overview" February 20, 2011 < http://www.szse.cn/main/en/aboutsse/sseoverview/ >

trading, offerings membership supervision and oversight of listed companies, managing and publicizing market information and other capacities permitted by CSRC"[23].

For a corporation to get listed on the Shenzhen stock exchange, the issuance of its shares must have been completed, being authorized by the CSRS. Then, the company is required to prepare for a listing announcement based on relevant provisions of the CSRC.

Comparing the two stock exchanges of the Chinese stock market, the difference in terms of geographical location will surely stand out as the most obvious distinction---the Shanghai Stock Exchange is housed in one of the most affluent coastal cities in eastern China, Shanghai, well-known for its economic importance in mainland China, whereas the city of Shenzhen, a Special Economic Zone tailor-designed to facilitate the development of Chinese open-market economic policy and neighbour of Hong Kong, offers home to the Shenzhen Stock Exchange. More importantly, the two stock exchanges follow different paths in expanding over the last decade in terms of the number of listed firms and the value of total market capitalizations as shown in the Table 4.1.

[23] The Shenzhen Stock Exchange "SZSE overview" February 20, 2011 < http://www.szse.cn/main/en/aboutsse/sseoverview/ >

Table 4.1 Number of listed stocks and market capitalization (1996-2008)

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Panel A. Number of listed stocks													
SHSE													
Total	329	422	479	526	614	700	769	834	891	888	896	914	918
SZSE													
Total	270	399	454	504	557	550	551	548	578	586	621	712	782
Panel B. Market capitalization (in billion yuan Renminbi)													
SHSE													
Total	550	931	1071	1475	2709	2828	2582	3052	2632	2334	7211	27118	9763
SZSE													
Total	439	832	890	1192	2124	1590	1300	1268	1107	935	1780	5732	2412

Source: Fact Book the Shanghai Stock Exchange and the Shenzhen Stock Exchange

4.1.2.3 The categorization of shares in the Chinese stock market

4.1.2.3.1 The tradable and non-tradable shares

Prior to the year 2000, for a firm's intention of going public to come to fruition, permission must be obtained from "the local government or/and its affiliated central government ministries" (Han, 2007: page 10), who receive an IPO quota every year from the CSRC. Nevertheless, this government-controlled IPO system considerably undermined the efficiency of the IPO issuance in the Chinese stock market. In response to call for leaner IPO issuance system, starting from the year 2000, the CSRC revamped the IPO issuance procedure into a more market-driven system based on the competitiveness of the firms and the macroeconomic conditions.

In terms of tradability, the shares of listed companies can be put into two major categories: tradable shares and non-tradable shares. Of them, non-tradable shares can be further partitioned into two groups: state shares and legal person shares. The state shares, exactly as its name suggests, are at the hands of central or local governments or by state-designated institutions including SOEs. Legal person[24] shares are the shares that are assigned to "domestic government-controlled financial institutions, or by the foreign partners of a corporatized foreign joint venture" (Han, 2007: page 10-11). Legally, individual investors are not permitted to hold legal person shares. The issuance of non-tradable shares is aiming at tightening the grip over the State-owned enterprises (SOE's) and helping firms finance financial difficulties or projects through reaping the maximum financial benefit from the IPO issuance. Albeit the issuance of the non-tradable shares might sound very organized, it brings in inefficiency to the operational architecture of the Chinese stock market. For instance, less tradable shares can induce a decrease in liquidity and an increase in volatility, opening the door for the potential market unregulated trades such as insider information trading. Besides, large amount of non-tradable shares blunts the power of individual shareholders over the firms' managerial decisions, which to some extent, triggers the surge in volatility as individual investors are less likely to commit to have long investment time horizon.

The other type of shares is tradable shares, which can be freely traded by retail investors and institutional investors subject to the CSRC's trading rules. The amount of tradable and non-tradable shares issued each year on the SHSE and SZSE is shown on Panel A and Panel B of the Table 4.2 respectively. By charting the number of tradable shares as a percentage of the total shares outstanding in both SHSE and SZSE, we witness a steady, consistent upward trend, in terms of percentage of tradable shares, has been running its course over the past decade,

[24] "A 'legal person' is defined as a non-individual legal entity or institution." (Han, 2007: page 11)

while the percentage of tradable shares basically maintained its 1999 level, having experienced some mild fluctuations over time.

Table 4.2 The SHSE and SZSE tradable and non-tradable comparison
Panel A

SHSE tradable and non-tradable comparison (all in 100 million shares)										
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Tradable	494.41	648.99	837.53	992.53	1157.1	1366.58	1561.21	2254.5	3399.3	4916.04
Non-tradable	1085.7	1383.4	2326.9	2735.3	3013.3	3333.97	3461.84	8025.1	10774	10494.4
Total shares	1580.2	2032.4	3164.4	3727.8	4170.4	4700.55	5023.05	10280	14173	15410.4
% of tradable shares	31.29%	31.93%	26.47%	26.62%	27.75%	29.07%	31.08%	21.93%	23.98%	31.90%

Panel B

SZSE tradable and non-tradable comparison (all in 100 millions shares)										
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Trdable	457.93	584.32	643.35	687.4	740.22	822.8	934.29	117.69	1511.2	2023.75
Non-tradable	870.77	996.65	1030.6	1047.8	1087.3	1181.67	1199.36	2258.1	1270.5	1418.11
Total shares	1328.7	1581	1673.9	1735.2	1827.5	2004.47	2133.65	2375.8	2781.7	3441.86
% of tradable shares	34.46%	36.96%	38.43%	39.62%	40.50%	41.05%	43.79%	49.54%	54.33%	58.80%

Source: Fact Book the Shanghai Stock Exchange and the Shenzhen Stock Exchange, China Statistical YearBook of The Securities and Futures 1996-2009

Based on the nature of the tradable shares, the tradable shares can be further divided into Class A shares, Class B shares, overseas listing shares (such as Class H shares) and red chip listing shares.

4.1.2.3.2 Twin-share system: Class A and Class B shares

Under the law and regulations specified in *the Administration of the Issuing and Trading of Shares Tentative Regulations*, *P.R.C. Company Law* and *P.R.C.*

Securities Law, a firm could choose to list their Class A shares or Class B shares or both on either the Shanghai Stock Exchange or the Shenzhen Stock Exchange. Initially, Class A shares' trading activities were confined to domestic investors—Chinese citizens living in mainland China. However, since July 2003, the restriction has been lifted to the extent that thanks to China Securities Regulatory Commission (SRC)'s 2003 reform, qualified foreign institutional investors (QFII) are allowed to engage in Class A shares trading activities. Specifically, "[t]he QFII are defined as overseas fund management firms, insurance companies, securities companies, and other asset management institutions that must be approved by SRC to invest in China's securities market and are granted investment quotas by the State Administration of Foreign Exchange." (Lin and Swanson, 2008: Page 56)

As opposed to Class A shares, prior to February 2001, Class B shares could only be subscribed by foreign investors[25]. Yet, starting from February 2001, domestic investors are allowed to purchase Class B shares on both the SHSE and SZSE using foreign currencies. Specifically, Class B shares are traded on the SHSE in U.S. dollar and are traded on the SZSE in Hong Kong dollar. It is worth noting that despite the 2001 regulatory reform, the domestic ownership of Class B shares is still subject to stringent government control. Besides, the issuance of Class B shares is also controlled by the State council, who decides the allocations of the amount of Class-B share issuing and listing quota.

To summarize the twin-share system in the Chinese stock market, the similarities and differences between Class A and Class B shares will be detailed from vantage

[25] Foreign investors can be defined as "foreign legal and natural persons and other entities, legal and natural persons from Hong Kong, Macau and Taiwan, and Chinese citizens who are residents abroad" (Han, 2007: page 13)

point of trading mechanism, the historical trend of main Class A and B shares indices and fundamental statistics. On the trading mechanism front, the buy and sell orders stay valid for 1 day while “the smallest trading unit is 100 shares” (Xu, 2000: page 83). There are only two types of orders legally allowed in the Chinese stock market: Market orders and limit orders.

4.1.2.4 Summary of listing and trading costs for Class A shares and Class B shares on the SHSE and the SZSE

See Appendix 12.

4.1.2.5 Chinese stock market share ownership structure (2001 Share ownership reform)

Share ownership has intricate relationship with the quality/strength of corporate governance, exhibited as a positive correlation with the performance of a company’s shares in the stock market (as discussed in great detail in section 2.5 corporate governance of the theorerical framework chapter). A general picture of the share ownership on the SHSE and SZSE will be portrayed in this section. By and large, there are five types of shares categorized by different types of owners within Class A shares: State shares, Legal person shares, Individual shares, Employee shares and Foreign institutions shares. Among them, the shares owned by the central government, local governments, or solely state-owned enterprises are called the state shares. “The ultimate owner of state shares is the State Council” (Xu and Wang, 1999: page 79). Even though the state shares are not tradable, the transfer of the state shares among domestic institutions is legal upon CSRC’s approval. The line drawn between the state shares and the legal person shares is the requirement that at least one of the legal person shareholders is non-state owner. Other owners of the legal person shares could be domestic institutions such as non-bank financial institutions[26] as majority of shareholders or SOEs. Deemed capable of hinting the quality/strength of corporate governance, the portion of legal person shares within a listed corporation is found to be positively related to its profitability (Xu and Wang, 1999). Within a listed firm in the Chinese stock market, the right of buying a certain numbers of shares at a considerable discount off their market value is allocated to some of its internal stakeholders such as workers and managers as part of employee benefits package. The shares allocated to employees through the employee benefit scheme are known as employee shares, the flow of which to the secondary market "are registered under the title of the labour union of the company" (Xu, 1999: page 79). Besides, it is worth-noting that upon the exercise their right of buying shares, the employees are only entitled to trade the shares on the secondary market after a holding period (normally ranging from 6 to 12 months) and the successful filing of the listed company with the CSRC. Individual and foreign institutions shares, suggested by their names, are owned by individual investors and foreign institutions respectively. Table 4.3 depicts the changes in share ownership structure over 2001 to 2008 on the SHSE and the SZSE. For the case of share ownership in the SHSE, shown in Panel A, since the 2001 when the domestic investors are allowed to tap into a restricted portion of Class B shares and foreign companies can choose to be listed on the SHSE and SZSE[27], the proportions of state shares, legal person shares and employee shares have shrunk in a consistent pattern apart from a modest surge in the proportion of state shares from 2007 to 2008. On the other hand, the individual shares have been making up increasingly bigger proportion of the total shares. Having experienced some fluctuations, the proportion of shares held by foreign

[26] The non-bank financial institutions include "securities firms, trust and investment companies, finance companies, mutual funds, and insurance companies" (Xu and Wang, 1999: page 79)

[27] The BBC news editorial team. March 14, 2011. < http://news.bbc.co.uk/1/hi/business/1433474.stm >

institutions declined from 0.739% in 2001 to 0.404% in 2008. With regard to ownership picture of the SZSE (shown in Panel B of Table 4), similar general pattern of changes in the proportions of state shares, legal person shares, individual shares, employee shares and foreign institution shares over years is observed. Nonetheless, a characteristic difference in the proportions of state shares, legal personal shares and individual shares between the two stock exchanges is that in 2001, the proportion of state-owned shares (38.41%) was significantly smaller (by 14 percentage points) in the SZSE compared with that in the SHSE (52.99%). Yet, over years, the proportions of state share on the two stock exchanges converge to 45 percentage points at the end of 2008. Sharing the rough changing pattern of the proportions of legal person share in the SHSE and SZSE, at the end of year 2001, the proportion of legal person share on the SZSE (24.20%) was twice as much as that on the SHSE (12.6%). however, it dropped precipitously over the eight year period (2001-2008) to 6.9% in 2008, still more than twice of the proportion of legal person share in the SZSE (2.74%) for the same year. During the same time period (2001-2008), the proportion of individual share on the SZSE surged from 36.7% in 2001 to 45.1% at the end of year 2008 in a steady manner.

Table 4.3 The ownership structure in the SHSE and SZSE (2001-2008)

The ownership structure in the SHSE and SZSE from 2001-2008 (in percentage)

Panel A SHSE

Year	State shares	Legal person	Individuals	Employees	Foreign institutions
2001	52.99	12.6	33.156	0.515	0.739
2002	53.75	11.94	33.277	0.281	0.752
2003	53.77	11.33	33.972	0.155	0.773
2004	52.81	11.36	34.865	0.1	0.865
2005	50.85	11.69	36.565	0.035	0.86
2006	36.12	4.74	58.637	0.017	0.486
2007	37.85	3.36	58.349	0	0.441
2008	45.29	2.74	51.566	0	0.404

Panel B SZSE

Year	State shares	Legal person	Individuals	Employees	Foreign institutions
2001	38.41	24.196	36.07	0.372	0.952
2002	39.6	22.282	36.9	0.255	0.963
2003	40.48	20.537	37.84	0.16	0.983
2004	41.07	20.06	37.76	0.09	1.02
2005	43.77	15.324	39.69	0.13	1.086
2006	49.54	8.774	40.64	0.004	1.042
2007	54.31	4.453	40.2	0	1.037
2008	46.96	6.912	45.1	0	1.028

Source: The Shanghai Stock Exchange and Shenzhen Stock Exchange Fact Book 2001-2008

4.1.3 The Characteristics of the market participants in the Chinese stock market

This section is dedicated to provide an account of the composition of investors in the Chinese stock market and the behavioural characteristics of each different type of investors. Table 4.4 portrays the historical view of changes in the composition of three main types of investors in the Chinese stock market in percentage term. The proportion of each type of investors is estimated by charting the market value of total shares owned by investors in each category every year as a percentage of market value of total tradable shares outstanding in corresponding year.

Table 4.4 Changes in the composition of three main types of investors in the Chinese stock market

Changes in the composition of three main types of investors in the Chinese stock market

Panel A. the SHSE			
	Domestic individual	**Domestic institutional**	**Foreign investors**
2001	71.63%	26.80%	1.57%
2002	72.56%	25.82%	1.63%
2003	73.82%	24.51%	1.67%
2004	74.09%	24.07%	1.83%
2005	74.47%	23.78%	1.75%
2006	91.82%	7.42%	0.76%
2007	93.88%	5.41%	0.71%
2008	94.25%	5.01%	0.74%

Panel B. the SZSE			
	Domestic individual	**Domestic institutional**	**Foreign investors**
2001	59.17%	39.29%	1.55%
2002	61.51%	36.89%	1.59%
2003	63.84%	34.50%	1.65%
2004	64.23%	34.04%	1.73%
2005	70.82%	27.25%	1.93%
2006	80.55%	17.39%	2.07%
2007	87.98%	9.75%	2.27%
2008	85.03%	13.03%	1.94%

Source: The Shanghai Stock Exchange and Shenzhen Stock Exchange Fact Book 2001-2008

As shown in the above table, the proportion of domestic individual investors has been trending up consistently over the time period from 2001 to 2008 in the SHSE and the SZSE, although historically the proportion of individual investors on the SZSE outweighed that in the SHSE. Reverse to the general trend of the proportions of domestic individual investors in both stock exchanges, the proportion of domestic institutional investors has been lurching lower thanks in large part to the regulatory reforms of share ownership took place in 2001 with the proportions of domestic institutional investors in the SHSE trailing those in the SZSE in each corresponding year in general. On one hand, the proportion of foreign investors in the SHSE crawled up from 1.57% in 2001 to 1.75% in 2005, and then dropped to 0.76% in 2006, having been held steady since. On the other, the proportion of foreign investors in the SZSE increased at a steady pace from 1.55% in 2001 to 2.27% in 2007 while dropping a little in the year 2008 to 1.94%.

A detailed description portraying domestic individual investors, domestic foreign investors, and foreign (institutional) investors can be found in Appendix 13.

4.1.4 Sample data specification

4.1.4.1 Data source, time horizon and categories

The data used in this research are kindly provided by Guotai Junan Securities Co. Ltd.[28] (GTJA) through their database provider Shanghai Wind Information Co. Ltd[29]. The sample period adopted for the research is from January 1996 to December 2008, entailing 156 months in total. Given consideration to uniquely segmented Chinese stock market (the SHSE and the SZSE; Class A shares and Class B shares), the sample period is chosen to provide the most comprehensive examination to date of the momentum phenomenon and the impact of information uncertainty on the momentum effect, yet preclude the potential distortions caused by "the fierce volatility and the low quantity" in the first few years of full operation of the stock market (1991-1995) (He and Tan, 2006: page 1810). Specifically, the types of data we use for the analysis in this study can be listed out as follows: (1) The monthly price data[30] of the Chinese Class A shares in the SHSE and the SZSE (excluding dividends and interest); (2) Trading volumes of Chinese Class A shares listed in 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

[28] GTJA. April 6th, 2011. < http://www.gtja.com/ygygtja/gygtja.html >
[29] Wind Financial Database. April 6th, 2011. < http://www.wind.com.cn/en/product/windDB.htm >
[30] Dividends were reinvested automatically.

in opinions between analysts' earnings forecasts (EPS)[31] of the Chinese Class A share market; (9) Monthly China one-year-time deposit rate; (10) Monthly index price data for Shanghai composite, A, B index; (11) Monthly index price data for Shenzhen component, A, B index. The basic statistical characteristics of above-listed data will be detailed in the following section.

4.1.4.2 Basic statistics summary

4.1.4.2.1 The SHSE and SZSE as categorizing criterion

This section illustrates the statistical attributes of monthly share price in the Chinese stock market, further categorized based on the two stock exchanges--- namely, the SHSE and the SZSE. There are currently 1520 and 1288 stocks trading on the SHSE and the SZSE respectively. As stock market indices, in general, reflect the trend of changes in stock prices as a whole[32], we therefore adopt the composite index and component index to portray the statistical characteristics of the monthly share price for stocks trading on two segments of the Chinese stock market--- the SHSE and SZSE. "Constituent stocks in [SHSE] SSE Composite Index include all the Class A shares and Class B shares listed on the SSE. Constituent stocks in [SHSE] SSE New Composite Index consist of all the [SHSE] SSE-listed stocks that have completed the non-tradable share reform." The indices on both the SHSE and SZSE are calculated by:

*Today's index= (total stock market value of all today's index/the total market value of the base day index shares)*base day index*

The "Divisor Adjustment Methodology" is adopted to calibrate both indices.

[31] The data of the difference in analysts' earnings forecasts (EPS) is only available from January, 2000.

[32] How fair the indices as a representation of the changes in prices for all stocks rests on how each constituent of the indices is weighted. For instance, the weights of the index constituents could be determined by trading volume, market capitalization, stock issuance etc.

Specifically, "when changes occur to constituent list or the share structure, or constituents' market value changes due to non-trading factors, the divisor is adjusted to keep the index comparable over time. The formula is:

$$\frac{Adjusted\ market\ cap\ before\ adjustment}{Old\ divisor} = \frac{Adjusted\ market\ cap\ after\ adjustment}{New\ divisor} \quad (4.1)$$

Adjusted market cap after adjustment=adjusted market cap before adjustment + adjusted market cap increased or decreased. The new divisor derived from this formula is used for later index calculation."[33]

Table 4.5 Basic information summary for main indices

Indices	**Price level**	**Base day**	**Base value**	**Sample period**	**# of constituents**
	2008				2008
The SHSE Composite	1820.80	19/12/1990	100	01/1996-12/2008	1184
The SZSE Composite	553.3016	03/04/1991	100	01/1996-12/2008	964

Table 4.6 Statistical attributes of the returns of the SHSE Composite and SZSE Composite indices

Indices	**Mean**	**Variance**	**Skewness**	**Kurtosis**	**Jarque-Bera**
SHSE Composite	0.00331	0.00138	-0.066475 (a)	1.467871(b)	251.834(a)
SZSE Composite	0.00524	0.002018	0.51331 (a)	1.76877(a)	228.426(a)

a---statistically significant at 1% level.
b---statistically significant at 5% level
c---statistically significant at 10% level

As shown in the Table 4.5, the SHSE new Composite was firmly priced at 1,820.80 standardized on the price level reached at the end of year 1990 (100) and included

[33] Shanghai Stock Exchange Factbook 2009. "SSE indices Calculation & Maintenance". April 7, 2011. < http://www.sse.com.cn/sseportal/en_us/ps/sczn/sse_indices_cal_and_main_en.pdf >

1184 securities, regardless of type of shares (Class A or B), listed on the SHSE. Whereas, the SZSE Composite entailed 964 securities (both Class A and B shares) and hit 553.3016 points, using the price level reached in April 3rd, 1991 as the base value (100). Table 4.6 illustrates the statistical characteristics of the returns[34] of the SHSE new Composite and SZSE Composite indices. The stocks listed on the SZSE yielded better average return overall at 0.00524 compared to the stocks listed on the SHSE (0.00331). Yet, the portfolio consists of all the securities listed on the SZSE (0.002018) carries virtually twice as much as the risk associated with the corresponding portfolio in the SHSE (0.0138). The numeric values of the skewness for returns of the SHSE Composite and the SZSE Composite indicate that both of the returns are significantly asymmetrically distributed, with the return of the SHSE Composite skewed to the right (-0.066475) and the return of the SZSE Composite skewed to the left (0.51331). Both of the returns have statistically significant positive kurtosis, demonstrating that comparing to a standard normal distribution, the distributions of the two returns have fatter tails and higher summit levels. Moreover, the Jarque-Bera statistics show that the distributions of the returns of the two composite indices are statistically significantly deviating from the normal distribution.

4.1.4.2.2 Information uncertainty proxy factors

Apart from the monthly share prices for stocks listed in the SHSE and SZSE, we also employ seven different factors (firm size, firm age, return volatility, trading volume, analyst coverage, corporate governance, dispersion in analysts' earnings forecast), reflecting firms' attributes, to gauge the degree of information uncertainty and subsequently examine the impact of information uncertainty over the momentum

[34] The monthly returns of the SHSE and SZSE indices are calculated by taking the logarithm of corresponding price levels.

phenomenon on the grounds that firm attributes provide insight information, guiding investors to make shrewd prediction and in turn to realize above-average amount of capital gains(Lakonishok et al., 1994). Yet, the test is only carried out within the Chinese Class A share market due to liquidity concerns. This section is dedicated to give an overview of the statistical characteristics of the seven information proxy factors for the Chinese Class A shares listed in the SHSE and the SZSE.

Table 4.7 Descriptive statistics of the information uncertainty proxy factors

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[35] 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. The sample period is from January 1996 to December 2008.

Proxy factors	Mean	Variance	Skewness	Kurtosis	Jarque-Bera
Firm size (A Shares)	4,622(billion yuan)	5.536E+25	2.80656(a)	7.80869(a)	519.3667(a)
Firm size (B Shares)	54 (billion yuan)	4.23168E+20	0.14505(a)	-1.31164(a)	851.489(a)
Firm age (A Shares)	1158 days	182591	0.39771(a)	-0.598758(a)	1251.284(a)
Firm age (B Shares)	1236 days	333768	0.08215(a)	-1.64572(a)	852.119(a)
Return volatility (A Shares)	0.38176	2.4187	0.13274(a)	-0.94715(a)	102.813(a)
Return volatility(B Shares)	0.123684	3.7613	0.3618(a)	-1.2791(a)	150.782(a)
Trading volume (A Shares)	31481	1238356812	1.85833(a)	4.284965(a)	1283.159(a)
Trading volume (B Shares)	892	2497969	5.5022(a)	42.61267(a)	982.184(a)
Analyst coverage (A Shares)	4.6591	4.9488	0.4611(a)	-1.65291(a)	232.619(a)

[35] 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.

Corporate governance (A Shares)	0.31157	0.001884	6.0123(a)	36.4105(a)	260.51(a)
Corporate governance (B Shares)	0.31698	0.0003983	-0.25934(a)	6.07530(a)	190.782(a)
Difference in analysts' opinion (A Shares)	0.071514	0.000834	-0.33781(a)	0.8258	155.386(a)

Source: Wind financial database

As described in Table 4.7, the Chinese Class A shares overwhelm the Class B shares in terms of firm size, measured by firm's market capitalization (4,622 billion yuan Vs. 54 billion yuan), yet there is markedly more variations in firm size among the Chinese Class A shares than the Class B shares (variance: 5.536E+25 Vs. 4.23168E+20). The distributions of the firm size of both Class A shares and Class B shares are significantly skewed to the left compared to the normal distribution. Deviating from the shape of the normal distribution, the firm size of the Class A share firms in the SHSE and the SZSE exhibits a distribution with a fatter tail and higher global maximum point; yet on the other hand, the firm size of the Class B shares exhibits a distribution with a lower peak and a thinner tail. Additionally, there is statistically significant evidence at 1% significance level that the distributions of firm size of both Class A and Class B shares do not take the shape of a normal distribution.

In term of firm age (measured by the number of days the stocks have been listed on the SHSE), Share A stocks share a lot of statistical attributes with Share B stocks. For example, they have similar number of average days listed in the SHSE and the SZSE (1158 days Vs. 1236 days); both of them are significantly skewed to the left; they exhibit distributions with fatter tails and higher summit points compared to a normal distribution; the distributions do not follow the shape of a normal distribution.

The only characteristic that sets them apart is that the Chinese Class B shares, on average, have a wider variation in terms of the number of days listed on the SHSE.

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 exhibit, on average, more than three times much volatility, compared with the volatility of the Class B shares (0.38176 Vs. 0.123683). The distributions of the return volatility of both Share A stocks and Share B stocks are significantly skewed to the left and are with fatter tails and higher peaks, meaning neither of those two distributions take the shape of a normal distribution(evidenced by highly statistically significant Jarque-Bera statistics).

On the trading volume (measured by turnover ratio) front, Share A stocks, on average, traded 35 times as frequently as Share B stocks (31481 Vs. 892). The distributions of the trading volume of both Share A and B stocks are characterized by fatter tails and higher maximum points compared to a normal distribution and are significantly skewed to the left.

For analyst coverage (estimated by the number of analysts following the firm in the previous year), data are only available for Share A stocks listed in the SHSE and the SZSE. 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. The statistical distribution of the analyst coverage factor is skew to the left and exhibit lower peak and thinner tail compared to a normal distribution.

In terms of corporate governance factor (estimated by free float ratio), the difference between the Share A and B stocks is that the statistical distribution is significantly skewed to the left for Share A stocks whereas it is significantly skewed to the right for Share B stocks. The free float ratios of both Classes of stocks exhibit distributions with fatter tails and higher peaks.

The data for difference in analysts' earnings forecasts, gauged by the standard deviation of analyst forecasts (semi-annually) scaled by the prior half-year end stock price, is also only available for the Chinese Class A shares listed in the SHSE and the SZSE. On average, the difference between financial analysts' earnings forecasts is 0.071514, which tends to stay in a very narrow range. The statistical distribution of the difference in analysts' earnings forecasts factor is skewed to the right and exhibit a fatter tail and high peak, which surely doesn't resemble a normal distribution (Jarque-Bera statistic: 155.386).

4.2 Methodology

4.2.1 Introduction

Following the detailed account of the sample dataset used in this research, we intend to describe the econometrics procedures along with closely associated economic logic and theories employed to test the hypotheses in this study in this section. As described in the literature review chapter (chapter 3), the studies on the momentum phenomenon methodologically have been closely stuck to the procedure of momentum portfolio formation and calculation of momentum returns suggested by the Jegadeesh and Titman(1993) in their seminal work of the field. Consistent with previous research on the topic and most importantly with the logic behind this research, the Jegadeesh and Titman's momentum approach, arguably be the best starting point to unfold this section, will be described in sub-section 4.2.2. To further explore the topic of the momentum premia of different momentum trading strategies, the subsequent section (sub-section 4.2.3) will be devoted to offer a detailed account of the method that allows us to quantify the difference between the momentum premia found over time periods following UP market state and DOWN market state. Furthermore, sub-section 4.2.4 will illustrate how the firm-specific information uncertainty is measured by different proxy factors. Extending the idea put forth in sub-section 4.2.4, a two-way sorting momentum strategy mechanism based on historical share returns and different information uncertainty proxy factors will be introduced to examine the dynamics of the momentum premium under the influence of information uncertainty in sub-section 4.2.5. Subsequently, the robustness test procedure—sub-period analysis—will be explained in sub-section 4.2.6. In attempt to rationalize the momentum premia by justifying them against risk factors, we will describe the theoretical framework of the tradtional FF3F model (Fama and French, 1996) as well as that of the Wang & Xu's version of the FF3F model, first developed by Wang and Xu(2004), in the last sub-section (4.2.7) of the methodology section.

4.2.2 Momentum trading strategy

Albeit a more complex two-way momentum trading strategy is employed for this research, with different information uncertainty proxy factors being incorporated as additional sorting factors, the theoretical backbone of the more sophisticated methodological approach is fundamentally derived from the original momentum trading strategy, which hinges on the belief of the existence of the momentum phenomenon and first used by Jegadeesh and Titman (1993) in discovering and establishing the momentum phenomenon as one of the landmark financial market anomalies. As the research intends to explore the in-depth dynamics of the momentum phenomenon in the Chinese stock market, Jegadeesh and Titman's procedure is succinct to be implemented as the basic momentum trading strategy to quantify the momentum premiums over the different sample periods, and also for ease of comparison. Consistent with Jegadeesh and Titman (1993)'s approach, zero-cost[36] momentum portfolios will be formed based on different ranking periods (R= 3, 6, 9, 12), and different holding periods (H= 3, 6, 9, 12). Hence, for general momentum trading strategy, there are 16 specific trading strategies in total to be implemented. Namely, (R=3, H=3); (R=3, H=6); (R=3, H=9); (R=3, H=12); (R=6, H=3); (R=6, H=6); (R=6, H=9); (R=6, H=12); (R=9, H=3); (R=9, H=6); (R=9, H=9); (R=9, H=12); (R=12, H=3); (R=12, H=6); (R=12, H=9); (R=12, H=12). The length of ranking period and the length of holding period are chosen in a way rested on the

[36] Zero-cost strategy is employed for brevity and ease of comparison, whilst the estimated trading costs and its implication on the momentum premiums found in this research will be accordingly discussed at the end of this chapter and in results chapter.

methodological procedure employed in a slew of previous prominent studies on the significance of the momentum phenomenon (Rouwenhorst, 1998, McKnight and Hou, 2006, Chou et al., 2007, Huang, 2006) including the seminal work by Jegadeesh and Titman (1993). Furthermore, as described in the literature review chapter, the majority of previous research in the literature finds that the momentum effect, quantified by the momentum premium, is proved to be most pronounced when both of the ranking and holding periods are within short-to-medium time horizon (specifically from 3 to 12 months). Moreover, almost as a convention to this line of research, to mitigate the potential issues induced by “bid-ask bounce” bias[37] 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). In other words, the one-month skipping approach is able to minimize the risk of attenuating the momentum phenomenon, also espoused by one of major inspirations of this research(Zhang, 2006) in exploring the interaction between the momentum effect and information uncertainty. Concisely, the mechanism of the momentum procedure can be described as follows:

First of all, all the stocks listed within in the Chinese Class A share market are ranked based on their J-month average returns in ascending order. Based on which, the ranked stocks, being equally weighted, will be put into five portfolios to form five quintile momentum portfolios. What’s worth noting is that the equally-weighted approach is found to not only result in robust results of momentum premia by

[37] The “big-ask bounce” bias is induced by the difference between the bid and ask price for one trade and either of bid or ask price could be chosen for no particular reason as the transaction price during data collection process (Galariotis et al., 2007).

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)[38]. The quintile momentum portfolio consists of 20% of the stocks with highest ranking, which is titled "winner" portfolio, whereas, the 20% of the stocks with lowest ranking are gathered to form the so-called "loser" portfolio. The following month after the end of ranking period is skipped before taking out a long position on the "winner" portfolio and a short position on the "loser" portfolio. There are two options of the way we maintain the long and short positions during the holding period: Option 1: closely following the procedure suggested by Jegadeesh and Titman by rebalancing the holding of long position on "winner" portfolio and short position on "loser" portfolio on a monthly basis, which will incur higher than expected trading costs[39] and in turn run the risk of deteriorating the significance of the momentum phenomenon in the Chinese stock market. Based on this monthly rebalancing mechanism, for a (R=6, H=6) momentum trading strategy, the momentum premium on January 2000 is determined equally by six different sets of portfolios: (1) "winner" and "loser" portfolios formed based on the ranking for the period from July 1999 to December 1999; (2) "winner" and "loser" portfolios formed based on the ranking for

[38] Gilovich, Griffin and Kahneman, Heuristics and biases: The psychology of intuitive judgment (Cambridge Univ Press, 2002) page 556-557.

[39] 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. On the other hand, for a Class B share transaction, an investor is subject 0.3% of trading value as commission to securities firms, 0.05% of trading value as settlement fee to the depository & Clearing Company and 0.1% of trading value (sell side only) as stamp duty to tax authorities (the SHSE Trading and membership—Trading fee section).

the period from May 1999 to November 1999; (3) “winner” and “loser” portfolios formed based on the ranking for the period from April 1999 to October 1999; (4) “winner” and “loser” portfolios formed based on the ranking for the period from March 1999 to September 1999; (5) “winner” and “loser” portfolios formed based on the ranking for the period from February 1999 to August 1999; (6) “winner” and “loser” portfolios formed based on the ranking for the period from January 1999 to July 1999. More specifically, at the end of the month t=6=R, the long position of the portion of the “winner” portfolio, held through since time t-6, will be closed by selling the portion of the portfolio and a long position will be taken on based on the “winner” portfolio formed on the ranking on stocks’ past 6 months performance since t-5 to fill the 1/6 of the overall “winner” portfolio. The same procedure can be applied to “loser” portfolio. Option 2: implementing a buy-and-hold strategy throughout the holding period, which gives a more practical version of momentum trading strategy as it intends to eschew the potentially costly trading costs in the Chinese stock market. At the end of the holding period, the returns from the “winner” and “loser” portfolios will be converted into equivalent average monthly returns to calculate the momentum premium (Galariotis et al., 2007). In this research, we choose to use the more practical approach—buy-and-hold strategy during the holding period in face of the expensive trading costs in the Chinese stock market.

The momentum premium (R_{W-L}) can be calculated by taking the difference of the average monthly return from the “winner” portfolio (R_W) and that from “loser” portfolio (R_L). Mathematically, it can be expressed as follows:

$$R_{W-L} = R_W - R_L \tag{4.2}$$

The statistical significance of the momentum premium can be tested by using a t-test statistics:

$$\frac{\mu_W - \mu_L}{\sqrt{\frac{\sigma_W^2}{N_W} + \frac{\sigma_L^2}{N_L}}} \tag{4.3}$$

Where μ_W is the mean monthly return from “winner” portfolio, σ_W^2 is the variance of “winner” portfolio, N_W is the number of stocks in the “winner” portfolio and μ_L represents the mean monthly return on “loser” portfolio, σ_L^2 is the variance of “loser” portfolio, and N_L denotes the number of stocks in the “loser” portfolio(Hon and Tonks, 2003). A significant t statistic at either 5% or 10% significance level reflects whether the momentum premium is statistically different from zero and the strength of the momentum effect for different momentum trading strategies.

4.2.3 Test on the dynamics of momentum premium over time periods following UP and DOWN market states

A fair amount of attention has been paid on exploring the interaction between different market states, i.e. post-UP and DOWN market states, and the momentum phenomenon such as Cooper et al.(2004), Du et al. (2009), Huang (2006) and Siganos and Chelly-Steeley (2006), just to name a few. Despite being a relatively emergent financial market, the Chinese stock market experienced booms and busts over its twenty years of development. Naturally, the impact of market swings, triggered by different salient events in the financial market, over the momentum effect deserves to be focused on and examined. In order to do so, a method similar to the one firstly proposed in Cooper et al. (2004) and later on 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 a 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; (2) whether the difference between the momentum premia found over time periods following UP market state and DOWN market state is statistically significant; (3) whether the momentum premia found over time periods following different market states maintain the similar relative pattern across different momentum trading strategies as what was found over the overall sample period (Jan. 1996 – Dec. 2008). 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 research, 12-month average market return is chosen as the main barometer to identify the state of the stock market. Moreover, 24-month average market return is used as an additional market state definition, reassuring the robustness of the results. 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. The Chinese Class B share market is precluded from the analysis on the dynamics of the momentum premia over time periods following UP and DOWN market states due to liquidity and microstructure concerns (Naughton et al., 2008, Wang and Chin, 2004). 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 premia over time periods following UP and DOWN market states will be quantified by regressing the raw momentum returns against an UP state dummy and a DOWN state dummy. Mathematically, it can be expressed as

$$R_{W-L,t} = R_{W-L,UP}UP_t + R_{W-L,DOWN}DOWN_t + e_t \tag{4.4}$$

Where $R_{W-L,t}$ denotes the momentum premium from different momentum trading strategies (for instance, for a trading strategy with 6-month holding period, t represents the time spot at the end of t+6 and $R_{W-L,t}$ represents the monthly average momentum returns for the holding period from t+1 to t+6); UP_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; based on the same logic, $DOWN_t$ 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 $R_{W-L,DOWN}$.

Step 2: The difference of momentum premia over time periods following UP and DOWN market states will be quantified and the statistical significance of the difference will be tested by regress the raw momentum returns against a UP market state dummy factor. Mathematically, it can be shown as:

$$R_{W-L,t} = \alpha + R_{W-L,UP-DOWN}UP_t + e_t \tag{4.5}$$

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

4.2.4. Measurement of firm-specific information uncertainty levels

Within the domain of empirical finance, the impact of information uncertainty over cross-sectional stock returns and other anomalous phenomena in the financial market has been one of the hotly discussed topics. 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 difficult as some of the most obvious options, such as firm size (measured market capitalization) and firm age, are highly susceptible to be confounded with other factors. Inspired by the two seminal work revolving this topic(Zhang, 2006, Jiang et al., 2005) and prior empirical evidence concerning 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 associated with different stocks. Specifically, the seven proxy factors are: firm size, measured by the stock's market capitalization right before the ranking period; firm age, measured by the number of days prior to the ranking period since a stock gets listed or firstly appears in the database; 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[40] documented by Bhushan (1989), analogous to the procedure employed by Hong, Lin and Stein (2000) and McKnight and Hou (2006); return volatility, measured by the standard deviation of the monthly returns of a stock over 6 months prior to the ranking period; 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); trading volume, estimated by the turnover ratio[41] of a stock prior to the ranking period; the quality/strength of corporate governance, measured by free float ratio[42], 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. Collectively, all the plausible proxy factors are employed in a way that the the results from using all the IU proxy factors offer a comparative view of how information uncertainty, proxied by 7 different variables, impacts the momentum premia. The reasons why each individual information uncertainty proxy factor is chosen are explained in rich detail at the beginning of each section of chapter 6.

[40] 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).

[41] 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).

[42] 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).

4.2.5 Two-way sorting momentum strategy

To detect the impact of information uncertainty, gauged by seven different factors as mentioned in the previous section, over the momentum premia, we employ an independent two-way sorting method to form information uncertainty and momentum quintiles. In this study, we only examine the impact of information uncertainty over the momentum premia in the Chinese Class A share market, as opposed to the Chinese Class B share market, generally ignored due to liquidity concerns (Wang, 2004, Kang et al., 2002). For brevity and simplicity to replicate in future research, with respect to the investigation on the impact of information uncertainty on momentum premia, we only focus on the momentum trading strategy with ranking period of 6 months and holding period with ranking period of 6 months. Based on the results of momentum premia of different momentum trading strategies in different segments of the Chinese stock market, the (R=6, H=6) momentum strategy exhibits most resilient and significant momentum phenomenon[43].

The mechanism of the independent two-way sorting procedure was firstly proposed by Lee and Swaminathan (2000), who studied the linkage between past trading volume and momentum premia, and is further popularised by Wang and Chin (2004) and Naughton et al. (2008) in their investigation on the profitability of the momentum investment strategies, sorting based on past trading volumes and past returns, in the Chinese stock market and Jiang et al.(2005) in exploring the interrelationship between information uncertainty and cross-sectional stock returns in the U.S. stock market. Specifically, at the beginning of every month over the entire sample period

[43] Other momentum strategies with different ranking and holding period combinations have also been examined for testing purpose and results found are largely in line with those found by using (R=6, H=6) momentum trading strategy.

from January 1996 to December 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 the 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. Additionally, 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 the information 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. To simplify the notations, the five quintile portfolios partitioned based on stocks' past-return ranking will be denoted by Q1, Q2, Q3, Q4, Q5 respectively in ascending order. In other words, Q1 is the so-called "loser" portfolio and Q5 is the so-called "winner" portfolio. Echoing the way of labelling the past-return quintile portfolios, the quintile portfolios grouped based on the level of information uncertainty ranking are represented by IU1, IU2, IU3, IU4, IU5 respectively in ascending order. IU1 is known as the “low IU” portfolio, consisting of 20% lowest-ranked stocks, whereas IU5 is the same as above-mentioned “high IU” portfolio, entailing top 20% of stocks based on information uncertainty level ranking. Therefore, the “winner-high IU” portfolio can be denoted by Q5-IU5, the “loser-low IU” portfolio by Q1-IU1, the “winner-low IU” portfolio by Q5-IU1 and the “loser-high IU” portfolio by Q1-IU5. Collectively, there are 25 different portfolios being drawn up based on stocks’ past 6-month return and information uncertainty level ranking. 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 avoid provoking microstructure issues (Lehmann, 1990, Jegadeesh, 1990, Galariotis et al., 2007). To realistically minimize transaction costs incurred, a buy-and-hold strategy will be employed during the holding period. The discussion on this front has been detailed in section 4.2.2. Consistent with momentum trading strategy adopted in this research to calculate momentum premia in different segments of the Chinese stock market and following UP and DOWN market states, 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

$$R_{W-L} = R_W - R_L \tag{4.6}$$

And the statistical significance of each momentum return can be verified through a t-test statistics:

$$\frac{\mu_W - \mu_L}{\sqrt{\frac{\sigma_W^2}{N_W} + \frac{\sigma_L^2}{N_L}}} \tag{4.7}$$

Where μ_W is the mean monthly return from “winner” portfolio, σ_W^2 is the variance of “winner” portfolio, N_W is the number of stocks in the “winner” portfolio and μ_L represents the mean monthly return on “loser” portfolio, σ_L^2 is the variance of “loser” portfolio, and N_L denotes the number of stocks in the “loser” portfolio(Hon and Tonks, 2003). A significant t statistic at either 5% or 10% significance level reflects whether the momentum premium is statistically different from zero and in turn the strength of the momentum phenomenon associated with different momentum trading strategies.

4.2.6 Sub-period analysis (robustness test)

Given the relatively short history of the Chinese stock market as described in data section, a conventional back-testing strategy of running the same tests over a period of equivalent length preceding to the whole sample period (01/1996-12/2008 in this case) (Jegadeesh and Titman, 1993) is implausible to establish the robustness of the results of momentum premia in the Chinese Class A share market and the interplay of momentum premia and information uncertainty over time periods following UP and DOWN market states. Instead, we apply a sub-period analysis, equally popular as back-testing strategy among other time-series analysis-oriented studies in the field (Schiereck et al., 1999, Conrad and Kaul, 1998, Lin and Swanson, 2008, Zhang, 2006, Kelsey et al., 2010), by zeroing in on two financial market regulatory reforms of great salience in the development of the Chinese stock market over the last couple of decades—1) the implementation of the new P.R.C. security law on July 1st, 1999; 2) the opening of the Chinese Class A share market to qualified foreign institutional investors (QFII) on July 9th, 2003. In light of the study by Lin and Swanson(2008) whom employed similar procedure to investigate the effect of China's four major reform policies on stock market information transmission, we study how financial market regulatory reforms as such play out in impacting the momentum premia found in different segments of the Chinese stock market and during time periods following UP and DOWN market states. Over the entire sample period (Jan. 1996-Dec. 2008), there were four major financial policy reforms taking place in the Chinese stock market: "(1) daily price-limit regulation—December 16, 1996, (2) implementation of new People's Republic of China (P.R.C.) securities law—July 1, 1999, (3) removal of trading restrictions allowing domestic residents to trade B-share stocks—February 20, 2001, and (4) opening A-share markets to foreign investors—July 9, 2003." (Lin and Swanson, 2008: page 50-51) The detailed descriptions of these policy reforms and their purposes have been detailed in section 4.1.2.1 of the data chapter. Of these aforementioned policy reforms, to the extent that whether the launch of them have a real impact on the operational efficiency and microstructure of the Chinese stock market, only two of the policies—July 1st, 1999: implementation of the new P.R.C. securities law and July 9th, 2003: opening of Class A share market to qualified foreign institutional investors (QFII) –can be deemed as salient events, in the sense that both ameliorate the operational efficiency of the stock market, according to empirical evidence found in Lin and Swanson (2008)'s work. To implement the sub-period analysis, the time period revolving each of two salient events will be split into pre-event period and post-event period. In more detail, for the implementation of the new P.R.C. security law which took place in July 1st, 1999, the pre-event period is defined as the time period from January 1998 to June 1999 and the post-event period is from August 1999 to January 2001. As for the other salient event—the opening of the Chinese Clas A share market to QFII which took place in July 9th, 2003, the pre-event period refers to the period from January 2002 to June 2003, and the post-event period is from August 2003 to January 2005. In brief, the tests of investigation on the dynamics of the momentum premia in different market segments of the Chinese stock market as well as on the influence of information uncertainty over the momentum premia of the (R=6, H=6) momentum trading strategy in the Chinese Class A share market[44] will be run over pre-event periods

[44] The market state-dependent momentum strategies and momentum strategies under the influence of information uncertainty are not performed in sub-period analysis as the shortened testing periods (pre-event, post-event periods) could have drastic impact on the definition of market states (UP and DOWN) (12 or 24 months), distorting the picture of results found earlier on in this study.

and post-event periods of the two salient events to determine the resilience of the results found in chapter 5-7.

4.2.7 Risk adjustment using two versions of the FF3F model (robustness test)

Having explained in the theory chapter that any consistent and significant evidence of any form of financial market anomalies poses immense challenge to the efficient market paradigm first proposed by Fama (1965), we are unequivocally to test the hypothesis that whether the momentum premia, calculated for different research purposes (e.g. testing the existence of the momentum phenomenon in the Chinese Class A share market; examining the dynamics of the momentum premia over time periods following UP and DOWN market states; or investigating the impact of information uncertainty over the momentum premium) amid maket swings, can be fully rationalized by risk factors embedded in existing asset pricing models. Despite that numerous forms of different asset pricing models have been spawned over the last couple of decades in attempt to rationalize different kinds of anomalous financial market phenomena in the empirical finance literature, the Fama and French three factor model (FF3F) and one of its calibrations—Wang & Xu(2004)'s version of the FF3F model—will be implemented in this research for the following reasons: 1) previous studies in the field of the momentum effect unanimously agree that neither the static nor conditional CAPM model is rich enough to explain the risk associated with momentum portfolios; 2) the underlying rationale of some slightly more complicated model, such as the version of the FF3F model developed by Carhart(1997) through including a momentum effect risk factor, bluntly goes against the existence of the momentum effect, designed to intentionally capture the momentum premium as a risk factor; 3) as outlined in the theory chapter, focusing on the Chinese stock market, Wang and Xu(2004) replace the value effect factor of the original Fama and French three factors with the corporate governance factor in justifying cross-sectional stock returns. Partially inspired by Wang and Xu(2004)'s work, this study is aimed at extending the application of Wang and Xu's version of the FF3F model, tempted to unique characteristics of the Chinese stock market, by employing the FF3F model calibrated by the duo to rationalize the momentum premia found in this study. The traditional FF3F model can be expressed mathematically as:

$$R_{(W-L),t} - R_{f,t} = \alpha + \beta\left(R_{m,t} - R_{f,t}\right) + s(SMB_t) + h(HML_t) + e_t \qquad (4.8)$$

Where $R_{(W-L),t}$ is the average monthly momentum returns calculated by taking the difference between the average monthly returns of "winner" portfolios and those of "loser" portfolios; $R_{f,t}$ is the risk-free rate, proxied by the monthly yield of China one-year deposit rate[45]. (As "interest rate is strictly controlled by the central bank (the People's Bank of China), and banks are almost state-owned,… deposit interest rate is virtually risk free." (Wang and Chin, 2004: page 171)); $R_{m,t}$ denotes the average monthly returns of the market portfolio, which is proxied by a self-constructed Class A share Index consisting of all eligible Class A shares listed in the SHSE and SZSE. SMB_t is the difference between the average monthly returns of portfolios consisting of 20% of all eligible stocks with the smallest capitalization and those of portfolios comprising 20% of all eligible stocks with the largest capitalization ranked in June of each year (Fama and French, 1993), to be consistent with approach devised in the majority of the studies in the field, known as the size effect factor. HML_t represents

[45] The China one-year deposit rate is found on Bank of China's official website: July 11, 2011 < http://www.boc.cn/en/bocinfo/ >.

the difference between the average monthly returns of portfolios consisting of 20% of all eligible stocks with the highest book-to-market ratios and those of portfolios comprising 20% of all eligible stocks with the lowest book-to-market ratios, also known as the value effect factor[46]. The calculation of the size effect factor and the value effect factor, which is analogous to the procedure used by Fama and French(1993) can be described as follows: at the end of every June each year, all non-financial stocks in the Chinese Class A share market are ranked based on their past year's market capitalization in descending order. Based on which, the stocks will be grouped into five quintile portfolios. The quintile portfolio consists of 20% highest-ranked stocks with smallest market capitalizations is labelled as "small cap" portfolio, whereas the quintile portfolio consists of 20% lowest ranked stocks is named "large cap" portfolio. The SMB_t is yielded by taking the difference between the average monthly return of equal-weighted "small cap" portfolio and those of equal-weighted "large cap" portfolio at the end of month t. Similar to the computation of the size effect factor (SMB_t), the value effect factor (HML_t) is computed by ranking all the non-financial stocks based on their past year's book-to-market ratios in ascending order and subsequently forming "high book-to-market" portfolio, entailing the 20% highest-ranked stocks, and "low book-to-market" portfolio, comprising the 20% lowest ranked stocks. The HML_t factor is computed by taking the difference between the average monthly return of equal-weighted "high book-to-market" portfolio and those of equal-weighted "low book-to-market" portfolio at the

[46] The author is aware that question of whether the size effect factor and value effect, rooted from the two financial market anomalous effects (Zarowin, 1990; Banz, 1981), are risk factors in the sense of rationality remains ever controversial (Ferson and Harvey, 1999), yet an in-depth debate revolving the matter is beyond the scope of this study. Consequently, consistent with Fama and French (1993)'s theoretical framework, size effect factor and value effect factor are deemed as rational risk factors throughout this research.

end of month t. α represents the portion of the raw momentum premium that cannot be explained by the three risk factors embedded in the FF3F model. i.e. the risk-adjusted momentum returns. β, s, h are the loadings resulted from regressing estimation procedure on the market risk factor, size effect factor and value effect factor respectively. e_t is an error factor, which is independently and identically distributed.

Another version of the FF3F model employed in examining the momentum premia found in this research is Wang and Xu's version of the FF3F model. Their version of the FF3F model supplants the value effect factor HML_t of the traditional FF3F model with the residual free float ratio factor (RFF_HML_t) thanks to some of the unique characteristics of the Chinese stock market—the split between tradable and non-tradable shares enables them to gauge the quality/strength of corporate governance using free float ratio. Mathematically, the model can be written as,

$$R_{(W-L),t} - R_{f,t} = \alpha + \beta\left(R_{m,t} - R_{f,t}\right) + s(SMB_t) + f(RFF\_HML_t) + e_t \quad (4.9)$$

Where all the symbols denote the same elements except the newly-calibrated residual free float ratio factor(RFF_HML_t) , also known as corporate governance factor, which is constructed by ranking all the non-financial stocks at the end of June every year according to their residual free float ratios, estimated from regressing free float ratios against logarithm market capitalization of corresponding firms, in ascending order and forming the "high RFF_HML_t" portfolio, consisting of 20% highest-ranked stocks, as well as the "low RFF_HML_t" portfolio, comprising 20% of lowest-ranked stocks. The corporate governance (RFF_HML_t) factor can be subsequently computed by taking the difference between the monthly average return of the "high RFF_HML_t" portfolio and those of the "low RFF_HML_t" portfolio at the end of month t. f is the loading from the regression estimation procedure on the corporate governance factor (RFF_HML_t). Wang and Xu's FF3F model is aimed at testing the role of corporate governance in explaining cross-sectional stock returns in the Chinese stock market. In this research, we apply their version of FF3F model to rationalize the momentum premia of different momentum trading strategies found in different market segments and during time periods following UP and DOWN market states in the Chinese stock market.

Chapter 5 Momentum premia and momentum premia under post-UP and post-DOWN market states in the Chinese Class A share market

5.1 Introduction

This chapter describes the evidence of the momentum phenomenon in the Chinese Class A share market in section 5.2 and the dynamics of the momentum phenomenon amid market swings in the Chinese Class A share market in section 5.3. The findings portrayed in this chapter well complement the extant evidence of the momentum phenomenon in the Chinese Class A share market by extending the sample horizon and focusing the momentum investing strategies with short-to-intermediate ranking and holding periods, and further documenting the dynamic behaviour of the momentum phenomenon amid market swings, which has yet to be rigorously examined in the setting of the Chinese Class A share market in this line of the literature.

5.2 Overall momentum premia in the Chinese Class A share market

In this section, the momentum premia[47] calculated in Class A share market are presented. Table 5.1, as shown below, reports the findings from the investigation on the overall momentum premia of various momentum trading strategies in the Class A share market for the sample period from January 1996 to December 2008. In total, there are 16 different momentum trading strategies, differed based on different combinations of ranking (R= 3, 6, 9, 12) and holding (H= 3, 6, 9, 12) periods, being

[47] The calculations of the momentum premia follow zero-cost portfolio approach, adopted by most of the studies (Jegadeesh and Titman, 1993; Lee and Swamnathan, 1998; Liu et al, 1999; Wang, 2004 etc.) for consistency unless otherwise stated. An in-depth discussion of momentum premia net trading costs is beyond the scope of this study yet the issue is briefly discussed in the end of the results chapter (Chapter 9).

examined. For each momentum trading strategy, the monthly average returns of the “loser” portfolio (Q1), “winner” portfolio (Q5) and the momentum premium (monthly average return of “winner” portfolio minus that of “loser” portfolio (Q5-Q1)) are listed out in Table 5.1. In addition, the significance of the momentum premia is shown by the sign of asterisk. Every three rows represent the results for a ranking period of certain length R (R=3, 6, 9, 12), and every column represent the results for a holding period of certain length H (H=3, 6, 9, 12). At first glance, as shown in Table 5.1, all momentum premia are positive and statistically significant at at least 10% confidence level. Despite being consistently larger across different momentum trading strategies in magnitude, this result echoes the findings of one of the most recent studies with focus on the Chinese stock market carried out by Naughton et al. (2008), who studied the momentum effect in the Chinese Class A share market for the sample period from 1995 to 2005 and found solid evidence of the momentum premia in the Chinese Class A share market. However, the results found in other major studies on the Chinese Class A share market have been a mixed bag. Of them, Wang (2004) documents much smaller and even negative momentum premia for matching momentum trading strategy over the sample time horizon from July 1994 to December 2000. Analysing stock return data for the sample period from January 1993 to January 2000, Kang et al.(2002) report evidence of significant and positive momentum premia over intermediate lengths of holding and ranking periods (roughly from 4 to 8 months). Taken together, the only possible reason why the results of momentum premia in the same testing ground—Chinese Class A share market—is the different sample time periods over which the studies are carried out, corroborated by the fact that as one of the major emergent financial market immersed with speculative retail investors, the Chinese stock market has been comparatively volatile over its relatively short history. With this in mind, it is more plausible that studies with focus on shorter sample time horizon, for instance, Wang(2004)'s and Kang et al.(2002), could produce disparate results. Comparing to the results found in some of the mature financial markets in the world, the momentum premia found in this study, in terms of both significance level and magnitude, trail behind those found in Chan et al. (1995) from their study on the U.S. stock market over Jan. 1973 to Dec. 1993 (8.8 percentage points on average) and in Liu et al. (1999)'s empirical work on the UK stock market (9 percentage points on average), which is consistent with the empirical evidence found by Koutmos (1997) and Van der Hart (2003) supporting the postulate that the presence of the momentum effect tends to be weaker in emerging financial markets in comparison to mature financial markets. To expands the understanding of the pattern, Chui et al.(2000) nominates more fraudulent asset pricing activities, more likely to take place in less developed financial market due to immature law system to protect investors' rights, as the impetus behind the asymmetry of the momentum effect in emergent and developed stock markets (Koutmos, 1997, van der Hart et al., 2003). Conversely, casting doubt on the pattern—the momentum premia tend to be weaker in the emergent stock markets compared with those found in developed financial markets—described above, evidence found in Jegadeesh and Titman(1993)'s seminal work are falling short slightly, in terms of magnitude, of the momentum premia found here. In addition, even though the momentum premia found in the UK stock market in Hon and Tonks (2003)'s research over an extensive 40-year sample period (1955-1996) are mostly statistically significant and positive, by and large, they tend to be much smaller in terms of magnitude than the results in the Chinese Class A share market found in this study. To properly interpret the observation, one would be hard-pressed not to reach back to some characteristics of the Chinese stock market, resembling an emergent market. Namely, the marked volatility(Selcuk, 2005) and a comparatively high percentage of individual investors (retail investors) as described in data and methodology chapter. Amid more than frequent market swings, the behaviours of the vast amount of retail investors are inevitably subject to different heuristic biases especially so during judgmental process as the judgments and decision of most individuals are fraught with cognitive illusions and distortions (Nisbett et al., 1983) as documented in psychology. Specifically, Asian investors were found to be more over-confident in general compared with Western counterparts (Yates et al., 1998), resulting in the excessive momentum premia observed here in the Chinese stock market under the framework of investors' overconfidence theory developed by Daniel et al. (2001). From a different perspective, one could argue that the difference of momentum premia found in Chinese stock market and other more developed stock markets stems from the persuasive evidence from experimental study showing that on average the Chinese investors, having received considerably less statistics-related education, are less capable of statistics heuristics of cognitive System two (Kahneman and Tversky, 2002) in judgment process(Fong et al., 1986, Nisbett et al., 1983). Consequently, the behaviours of Chinese investors are prone to the influence of overconfidence/over-optimism and underreaction towards firm-specific information, susceptible to take significant part in contributing to the momentum premia documented in the literature (Daniel et al., 1998, Jegadeesh and Titman, 1993, Hong and Stein, 1999). Taken together, one should not be surprised to observe the evidence of momentum premia found here in the Chinese stock market outstrip some of those found more advanced financial markets.

Turning glare back to the Table 5.1, for strategies with 3 months as length of the ranking period, with all the corresponding momentum premia being positive and statistically significant, the momentum premia gradually increase as the holding periods get longer from 3 months to 12 months. On the premise of the overconfidence/overoptimism theory (Daniel et al., 1998), this pattern can be explained by psychology experimental evidence showing that economic agents tend to get less optimistic as the time to reveal their prediction outcomes draws closer (Armor and Taylor, 1998), consequently resulting in the dwindling momentum premia as holding period shortens as observed. Moreover, the pattern holds with approximate uniformity for the momentum trading strategies with 6, 9, 12 months as holding periods (with the exception of the return of the (R=6, H=12) strategy(2.09) slightly trailing that of the (R=6, H=9) strategy (2.17)), closely in line with the pattern of the results reported by Naughton et al.(2008) and echoing voluminous scholarly findings in that field manifesting that the momentum effect is more prevalent for short-to-intermediate time horizons (Jegadeesh and Titman, 1993, Hon and Tonks, 2003, Liu et al., 1999, Naughton et al., 2008).

Table 5.1 Monthly momentum premia in Class A share market over sample period from January 1996 to December 2008

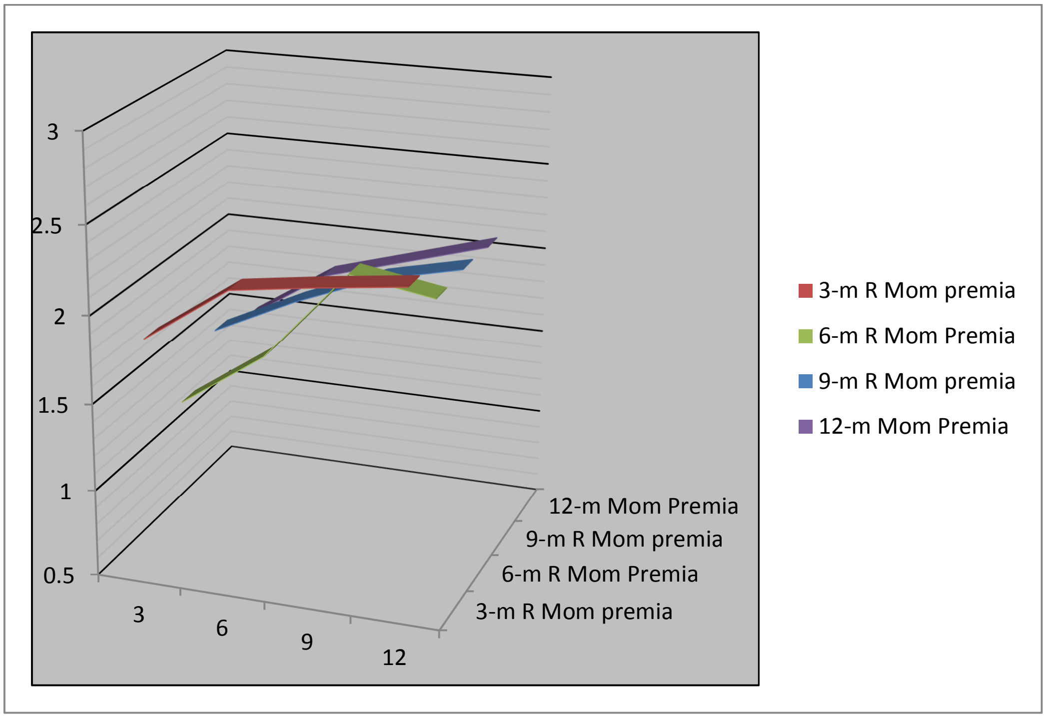
Overall momentum premia (monthly returns) Share A (Jan. 1996 – Dec. 2008)

R months ranking period		H months ranking period							
		H=3		H=6		H=9		H=12	
R=3	Q1	-0.64		-0.72		-0.83		-0.79	
	Q5	1.21		1.46		1.42		1.52	
	Q5-Q1	1.85	*	2.18	**	2.25	**	2.31	*
R=6	Q1	-0.77		-0.89		-0.95		-0.82	
	Q5	0.54		0.75		1.22		1.27	
	Q5-Q1	1.31	**	1.64	**	2.17	*	2.09	**
R=9	Q1	-0.95		-0.72		-0.88		-0.79	
	Q5	0.62		1.08		1.11		1.31	
	Q5-Q1	1.57	**	1.8	**	1.99	**	2.1	**
R=12	Q1	-0.79		-0.74		-0.88		-0.92	
	Q5	0.7		1.06		1.06		1.16	
	Q5-Q1	1.49	*	1.8	**	1.94	**	2.08	**

This table presents the momentum premia (the difference between average monthly returns of "winner" portfolios and those of "loser" portfolios) as well as the average monthly returns of "winner" and "loser" portfolios respectively in the Class A share market for the sample period from Jan. 1996 to Dec. 2008. The momentum portfolio formation procedure is akin to the methodology used by Jegadeesh and Titman(1993). Over the sample period, at the end of each month, all the eligible stocks are ranked in ascending order based on their past R-month (the value of R denotes the number of months used as ranking period for a specific momentum trading strategy. For this study, R= 3, 6, 9, 12) performance. The 20% highest ranked stocks, being equally weighted, form the "winner" portfolio (Q5) and 20% lowest ranked stocks form the "loser" portfolio (Q1). One month is skipped to avoid microstructure issues. The portfolios are then held for H months (H=3, 6, 9, 12) using buy-and-hold strategy to avoid excessive trading costs(Galariotis et al., 2007). Q5-Q1 represents the momentum premium for each momentum trading strategy. The significance of the momentum premia is determined by t statistics for the difference between the returns of "winner" portfolio and those of "loser" portfolio. * symbolizes statistical significance at 10% level. ** symbolizes statistical significance at 5% level. All the numbers are in percentage term.

The pattern of the momentum premia across the mix of 16 momentum strategies is graphed in Figure 5.1, where the holding periods (3, 6, 9, 12) and ranking periods (3, 6, 9, 12) are labelled on the x axis and y axis respectively and z axis measures the momentum premia. Most notably, the momentum trading strategies with 3-month ranking period, represented by the line in burgundy, appear to be most profitable groups among strategies with 4 possible ranking periods (R=3, 6, 9, 12). Moreover, the momentum trading strategy with 3-month ranking period and 12-month holding period produces the global maxium momentum premium of 2.31 per cent among all 16 momentum trading strategies with different combinations of holding and rnaking periods. From a different angle, all momentum trading strategies can be grouped in terms of 4 possible holding periods. Apart from the momentum premia of (R=6, H=9) trading strategy, by and large, the momentum premia, with the lengths of holding period fixed, tend to deteriorate as the ranking periods gets longer from 3 months to 12 months. Based on psychology evidence, as ranking period lengthens, investors generally have access to more historic data upon which they are able to draw a clearer picture to make their bets, translated into more confidence in their predictions (Armor and Taylor, 1998). Riding the wave of overall higher confidence, investors have less traction in disbelieving themselves towards making investment decision, deterring the influence of invesotrs' underconfidence, theorised as the cause of the momentum effect according to Du(2002)'s investors' hesitation model. In summary, in the Chinese Class A share market, the momentum premia are maximized by shortening the ranking period (down to 3 months) and lengthening the holding period (up to 12 months).

Figure 5.1 Overall monthly momentum premia in Class A share market (Jan. 1996 - Dec. 2008)



Notes: The holding periods (3, 6, 9, 12 months) are scaled on the X axis; the ranking periods (3, 6, 9, 12 months) are plotted on the Y axis; the momentum premia are measured on the Z axis. The line in burgundy color represents the changes of momentum premia yielded by the group of momentum trading strategies with 3-month ranking period; the line in apple green reflects the changes of momentum premia yielded by the group of momentum trading strategies with 6-month ranking period; the line in royal blue represents the changes of momentum premia yielded by the group of momentum trading strategies with 9-month ranking period; the line in purple represents the changes of momentum premia yielded by the group of momentum trading strategies with 12-month ranking period.

5.3 Momentum premia under post-UP and DOWN market states

In this section, the momentum premia over time periods following UP and DOWN market states in the Chinese Class A share market[48] will be documented. The market states are initially defined using past 12-month average market return, with market portfolios proxied by relevant market indices (a consolidated Class A share index entails all the Class A shares listed on the SHSE and SZSE), and the past 24-month average market return is employed to define the market states in the back-testing procedure.

To re-stress the definition of market states and have a clearer picture of the market dynamics over the sample period from January 1996 to December 2008, we reiterate the way we define market states—a UP market state is when the prior 12(24)-month average market return is positive, otherwise a DOWN market state and depict the number of UP and DOWN-market months for the Chinese Class A share market (Figure 5.2). The mini-statistics box describes the number of UP and DOWN market months quantitatively. The green-coloured columns represent the number of UP-market months for each calendar year and the red-coloured columns represent the number of DOWN-market months for each calendar year.

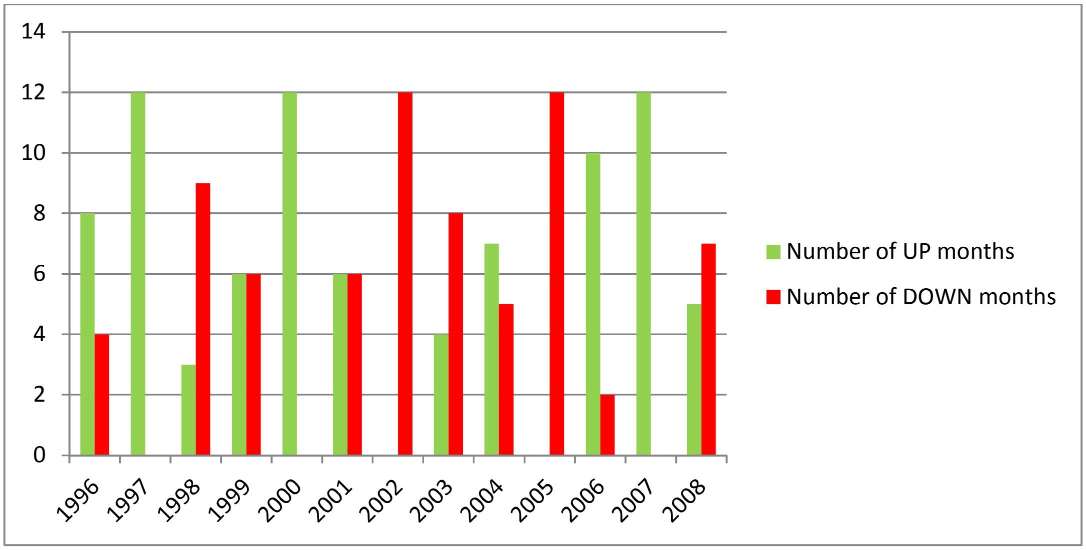
The Chinese Class A share market

Figure 5.2 The number of UP and DOWN-market months over sample period (Jan. 1996- Dec. 2008)

Class A share

	UP	DOWN	Total
N	85	71	156
%	54.49%	45.51%	

[48] The Class B share market is excluded due to liquidity concern.



Notes: this figure illustrates the number of UP-market months and DOWN-market months in each calendar year of the sample period (1996- 2008). For Class A share market, a self-constructed value-weighted Share A Index is used to proxy market portfolio. UP market state is defined as when the prior 12-month average market return is positive, while DOWN market state is defined as when the prior 12-month is negative. The number of UP-market months is represented by green columns, and the number of DOWN-market months is represented by red columns.

In the largest market segment (measured by volumes) of the Chinese stock market—the Class A share market (entailing all the Class A shares listed on the SHSE and the SZSE), the momentum premia of 16 different momentum trading strategies over time peirods following UP and DOWN market states, defined by past 12-month average market return[49], over the whole sample period from January 1996 to December 2008 are summarized in the Table 5.2. Panel A shows the empirical evidence of the momentum premia over time periods following UP market state, and Panel B the empirical evidence of the momentum premia over time periods following DOWN market state. With regard to the momentum premia of 16 different momentum trading strategies over time periods following UP market state in the Chinese Class A share market, all of them are positive and statistically significant at least at 10% significance level. Compared with the evidence of the overall

[49] For this case, the value-weighted average return of SSE (SHSE) A Share Index and SZSE Component A Share Index is used to proxy for the average market return.

momentum premia in the Class A share market as shown in the previous section, the momentum premia realized over time periods following UP market state are all positive and mostly moderately larger in magnitude, paralleling the empirical evidences found by Huang (2006) in an international context, Du et al. (2009) in the scenario of the Taiwanese stock market and Asem and Tian (2009) in the U.S. stock markets. The preceding observation of more pronounced momentum premia over time periods following UP market state can be elucidated by different behavioural theories outlined in the fields of empirical finance and psychology. Specifically, given that the Chinese/Asian investors are found to be more overconfident/ overoptimistic than their Western counterparts(Yates et al., 1998), subsequent to market run-ups, investors' euphoric sentiment stoke their confidence/optimism levels, proved to evoke(Daniel et al., 1998) and amplify the momentum premia (Antoniou et al., 2010) in empirical finance. Furthermore, the pattern can be interpreted using experimental evidence from psychology—investors' confidence got boosted as they emphasize the outcomes confirm their optimistic prediction following positive market swing thanks to confirmatory bias (Block and Harper, 1991, Griffin and Tversky, 1992, Chapman and Johnson, 1999), further fuelling the overreaction of the share prices and in turn resulting in the larger momentum premia observed. This plausibility of this explanation is clinched by the findings by Patel and Bohl (1998) (Du et al., 2009: page 144) showing that the investors in emergent financial markets are predisposed to make investment decisions based on some heuristic biases such representativeness, overconfidence and conservatism. At the other end of the spectrum, investors in buoyant mood are more inclined to rely on the simple intuitive heuristics of System 1 of two cognitive systems (Bless and Schwarz, 1999) and feelings (Schwarz, 1990), reining in the more significant momentum premia through pushing the market price of stocks well over their fundamental values (Daniel et al., 1998) or underreact to firm-specific information (Barberis et al., 1998, Hong and Stein, 1999).

Additionally, the larger momentum premia following UP market state found here also provide direct empirical evidence to challenge the claim theorised by Chui et al.(2000)[50] suggesting that among Asian investors, less heuristic biases, mediated by repressed individualism due to Asian culture, are present in investment decision making, which undermines the significance of the momentum premia in Asian financial markets.

In stark contrast to the momentum premia found over time periods following UP market state described above, a completely different picture is observed for the evidence of the momentum premia over time periods found following DOWN market state, shown in panel B, which are all negative and statistically insignificant. It is unsurprising as this observation is largely in line with the empirical finding by (He and Chen, 2006) in a study on the momentum effect in bear and bull markets in the Chinese stock market. Furthermore, the asymmetry of the momentum premia for the periods following UP market state and those following DOWN market state found in this research qualitatively concur with what was found in other major research on the behaviour of the momentum premia under state dependence in the literature. Namely, Cooper et al. (2004) on the U.S. stock markets, Huang (2006) on a group of international stock markets and Du et al. (2009) on the Taiwan stock market. The virtually muted momentum premia over time periods following DOWN market state

[50] Chui et al. (2000) study financial markets in a group of eight Asian countries including Hong Kong, Indonesia, Japan, Korea, Malaysia, Singapore, Taiwan and Thailand.

can be interpreted by behavioural theories from different perspectives. First, as a by-product of the market downdraft, the gloomy mood of investors tends to prompt systematic processing procedure in the judgemental process(Tiedens and Linton, 2001, Schwarz, 1990), during which the reflective heuristics such as neutral, statistics and abstract heuristics of System 2 of two cognitive system (Kahneman and Frederick, 2002) are employed. The aforementioned systematic processing procedure puts a lid on the occurrence of overreaction of share prices or underreaction toward firm-specific news, triggered by investors' overconfidence/overoptimism(Daniel et al., 1998), underconfidence(Du, 2002) and conservatism (Barberis et al., 1998) and consequently deteriorates the momentum premia over time periods following DOWN market state observed. From a different vantage point, following a market skid, investors grow slightly more confident in expecting the occurrence of a reversal—market run-up—by convincing themselves that the market has found its technical bottom(Shefrin, 2000), therefore undermining the momentum premia based on Du(2002)'s investors' hesitation behavioural model.

The asymmetry of the behaviour of the momentum premia over time periods following UP market state and those over time periods following DOWN market state is quantitatively illustrated in Table 5.3. The t statistics are listed below corresponding differences. As shown in the table, all the differences between the momentum premia over time periods following UP market state and those over time periods following DOWN market state are positive and markedly statistically significant. This empirical evidence strengthens the validity of behavioural theories—overconfidence/overoptimism theory (Daniel et al., 1998, Daniel et al., 2001), conservatism (Barberis et al., 1998), underreaction/gradual-information-diffusion theory (Hong and Stein, 1999, Hong et al., 2000) and investor's underconfident behaviour(Du, 2002)—in explaining the market state-dependent attribute of the momentum premium. As noted in rich detail earlier, following market run-ups, spurred by the surrounding euphoria and inherent tendency of being overconfident evidenced in experimental research of psychology(Yates et al., 1998), Chinese investors are inclined to embrace more optimistic sentiment, eliciting the use of intuitive heuristics of System 1 of two cognitive system in judgmental process. More explicitly, the cognitive heuristics behind the aforementioned behavioural theories—overconfidence/overoptimism theory (Daniel et al., 1998, Daniel et al., 2001), conservatism (Barberis et al., 1998), underreaction/gradual-information-diffusion theory (Hong and Stein, 1999, Hong et al., 2000) and investor's underconfident behaviour(Du, 2002)—all belong to the System 1(intuitive), separately or jointly stoking the noticeably more evident momentum premia observed. The plausibility of which can also explained by intensified herding behaviour of Chinese investors following upside market movements (Tan et al., 2008), cemented by psychology evidence showing that behavioural imitation is most pronounced when economic agents are in buoyant mood state(Hertel et al., 2000), leading to more significant momentum premia of different momentum trading strategies following market run-ups (Grinblatt et al., 1995, Nofsinger and Sias, 1999).

On the other hand, the markedly attenuated momentum premia observed during time periods following market downdraft can be elucidated within the framework of feelings as information (Schwarz, 1990). More explicitly, the investors' sentiment turns more pessimistic following market slumps, prompting "detailed-oriented systematic processing" (Schwarz, 1990: page 545) in judgmental process involving extensive practice of cognitive heuristics of System 2 of two cognitive systems(Kahneman and Frederick, 2002) such as statistics heuristics, abstract heuristics (Tiedens and Linton, 2001). The systematic processing procedure crimps the influence of overconfidence, conservatism and underreaction overs investors, evoked by intuitive heuristics and in turn deteriorates the momentum premia following market down-side movements.

Collectively, the result is consistent with the prediction of our proposition—the momentum premia of different momentum strategies tend to be larger and more significant over time periods following UP market state yet turn dismal over time periods following DOWN market state.

Table 5.2 Monthly momentum premia following UP and DOWN market states in Class A share market over sample period (Jan. 1996- Dec. 2008)

Panel A

Monthly momentum premia Share A Following UP market (12 months) Jan. 1996- Dec. 2008

Ranking periods	Holding periods	H=3		H=6		H=9		H=12	
R=3	Q1	-0.73		-0.83		-0.79		-0.88	
	Q5	1.13		1.44		1.34		1.48	
	Q5-Q1	1.86	*	2.27	**	2.13	**	2.36	**
R=6	Q1	-0.58		-0.64		-0.93		-0.87	
	Q5	0.82		0.91		1.25		1.23	
	Q5-Q1	1.4	*	1.55	*	2.18	**	2.1	*
R=9	Q1	-0.83		-0.71		-0.82		-0.71	
	Q5	1.05		1.27		1.07		1.5	
	Q5-Q1	1.88	*	1.98	**	1.89	*	2.21	**
R=12	Q1	-0.83		-0.74		-0.69		-0.92	
	Q5	0.79		1.16		1.15		1.23	
	Q5-Q1	1.62	*	1.9	**	1.84	*	2.15	**

Panel B

Monthly momentum premia Share A following DOWN market (12 months) Jan. 1996- Dec. 2008

Ranking periods	Holding periods	H=3		H=6		H=9		H=12
R=3	Q1	1.29		1.65		1.51		1.56
	Q5	0.71		0.84		0.62		0.63
	Q5-Q1	-0.58		-0.81		-0.89	*	-0.93
R=6	Q1	1.16		1.37		1.61		1.87
	Q5	0.54		0.62		0.75		0.93
	Q5-Q1	-0.62	*	-0.75	*	-0.86	*	-0.94
R=9	Q1	1.41		1.1		1.53		1.46
	Q5	0.63		0.48		0.74		0.86
	Q5-Q1	-0.78		-0.62	*	-0.79		-0.6
R=12	Q1	0.81		0.8		1.22		1.25
	Q5	0.46		0.38		0.73		0.58
	Q5-Q1	-0.35		-0.42	**	-0.49		-0.67

This table presents the momentum premia (the difference between average monthly returns of “winner” portfolios and those of “loser” portfolios) following UP market state and DOWN market state as well as the average monthly returns of “winner” and “loser” portfolios respectively in the Class A share market for the sample period from Jan. 1996 to Dec. 2008. The momentum portfolio formation procedure is akin to the methodology used by Jegadeesh and Titman(1993). Over the sample period, at the end of each month, all the eligible stocks are ranked in ascending order based on their past R-month (the value of R denotes the number of months used as ranking period for a specific momentum trading strategy. For this study, R= 3, 6, 9, 12) performance. The 20% highest ranked stocks, being equally weighted, form the “winner” portfolio (Q5) and 20% lowest ranked stocks form the “loser” portfolio (Q1). One month is skipped to avoid microstructure issues. The portfolios are then held for H months (H=3, 6, 9, 12) using buy-and-hold strategy to avoid excessive trading costs(Galariotis et al., 2007). Q5-Q1 represents the momentum premium for each momentum trading strategy. The calculation of the momentum premia following UP and DOWN market states is analogous to the one used by Cooper et al. (2004), Huang (2006), Siagnos and Chelley-Steeley(2006) and Du et al.(2009). Mathematically, the procedure can be expressed as $R_{W-L,t} = R_{W-L,UP}UP_t + R_{W-L,DOWN}DOWN_t + e_t$ for ease of comparison. * symbolizes statistical significance at 10% level. ** symbolizes statistical significance at 5% level. All the numbers are in percentage term.

Table 5.3 Equality test results of state-dependent monthly momentum premia (following UP and DOWN market states) in the Class A share market

Class A share market (12 months)

Equality test for UP-DOWN=0

MOM	(3,3)	(3,6)	(3,9)	(3,12)	(6,3)	(6,6)	(6,9)	(6,12)
UP	1.86	2.27	2.13	2.36	1.4	1.55	2.18	2.1
DOWN	-0.58	-0.81	-0.89	-0.93	-0.62	-0.75	-0.86	-0.94
Difference	2.44	3.08	3.02	3.29	2.02	2.3	3.04	3.04
t stats	2.78	3.51	1.96	4.83	3.71	3.44	5.1	3.19

MOM	(9,3)	(9,6)	(9,9)	(9,12)	(12,3)	(12,6)	(12,9)	(12,12)
UP	1.88	1.98	1.89	2.21	1.62	1.9	1.84	2.15
DOWN	-0.78	-0.62	-0.79	-0.6	-0.35	-0.42	-0.49	-0.67
Difference	2.66	2.6	2.68	2.81	1.97	2.32	2.33	2.82
t stats	3.45	2.76	3.88	4.05	1.93	1.55	1.37	1.63

This table reports the difference between the momentum premia following UP and DOWN market states in the Class A share market for 16 different momentum trading strategies. The difference is estimated by regressing the raw momentum premia against an UP dummy variable (UP_t) and an intercept (α) , following the same methodology for equality test used by Cooper et al. (2004) and Du et al. (2009). Mathematically, it can be written as $R_{W-L,t} = \alpha + R_{W-L,UP-DOWN}UP_t + e_t$. The t statistics associated with each difference is listed in the following row.

In order to better visualize the asymmetry of the momentum premia over time periods following UP and DOWN market states, we plot the momentum premia over the time periods following UP market state and corresponding momentum premia during the time periods following DOWN market state for each momentum trading strategy side by side, presented in the Figure 5.3. In the figure, the vertical axis measures momentum premia in percentage form and the horizontal axis indicates 16 momentum trading strategies with different combinations of ranking and holding periods. The blue columns represent the momentum premia realized during periods following UP market state; the red columns represent the momentum premia over time periods following DOWN market state. As noted earlier, the momentum trading strategies, on the whole, appear to produce superior returns over the time periods following UP market state than over the time periods following DOWN market state. The observation is portrayed by the uneven distribution of lengths of the blue columns and the red columns above and below zero horizontal axis, with the lengths of blue columns above the zero axis overwhelming those of corresponding red ones below the zero axis. Turning into each individual momentum trading strategy, the momentum trading strategy with 3-month ranking period and 12-month holding period is exhibiting most noticeable asymmetry between momentum premia of momentum trading strategies conditional on post-UP market state and post-DOWN market state. Intriguingly, the slimmest difference between momentum premia following UP and DOWN market states is observed when employing the strategy with 12-month ranking period and 3-month holding period. To explore the plausibility of the preceding observation, we reach back to how the momentum premia of different momentum trading strategies fluctuate with various combinations of ranking and holding periods summarized in section 5.1, where we find that the momentum premia decline as ranking period lengthens and as holding period shortens. Following the logic, the (R=12, H=3) momentum trading strategy is expected to produce weak or even the weakest momentum premium, which turns out to be the most resilient amid market swings. This find sheds light on the implementation of the momentum strategies in the financial industry under different market states by indicating the most appropriate strategy to employ to insure one's investment interest against adverse development brought by market gyrations.

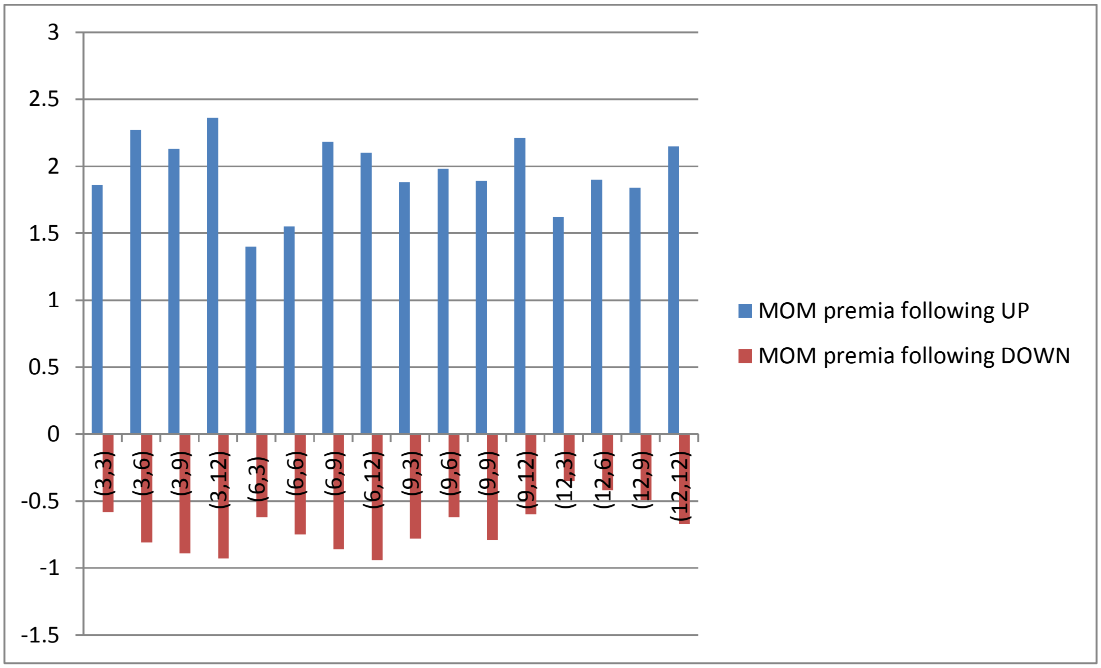
Compared with the finding of asymmetric momentum premia over time periods following UP and DOWN market states by Huang(2006) using a portfolio entailing 17 developed markets[51] (see Appendix 7), the momentum premia following UP and DOWN market states found in this study for the Class A share market exhibit a more dramatic asymmetric pattern across different momentum trading strategies in general. Quite glaringly, it is intriguing to notice that the difference between momentum premia following UP market state and those following DOWN market state is also maximized at the momentum trading strategy with 3-month ranking period and 6-month holding period. Looking through findings of other studies in this line of research, who normally render the spotlight to the performance of the momentum trading strategy with 6-month ranking period and 6-month holding period, the Taiwan stock market exhibit the most significant asymmetric momentum premia following UP and DOWN market states quantitatively of 2.86 per cent (Du et al., 2009), moderately bettering the evidence of the asymmetry found in the Class A

[51] The 17 developed stock markets are located in Australia, Austria, Belgium, Denmark, France, Germany, Hong Kong, Italy, Japan, Netherlands, Norway, Singapore, Spain, Sweden, Switzerland, the UK and the US.

share market(2.3 per cent). In comparison, the evidence of asymmetric momentum premia over time peirods following UP and DOWN market states found in developed financial markets, however, quantitatively lag those in aforementioned two studies with focus on developing financial markets (the Taiwan and Chinese stock markets). Numerically, the differences of the momentum premia (for (R=6, H=6) momentum trading strategy) following UP and DOWN market states of 1.25 per cent for the U.S. stock market over the period from Jan. 1927 to Dec. 2005, 1.12 per cent for the U.S. stock market during the period from 1929 to 1995 and 1.065 per cent in the international context are documented by Asem and Tian (2009), Cooper et al. (2004) and Huang (2006) respectively (all using past 12-month average market returns to defined market states). Of the crop, the only disparate evidence of the asymmetric momentum premia following different market states is evidenced by Siganos and Chelley-Steeley (2006), who investigate the proposition in the setting of the UK stock market and show that the (R=6,H=6) momentum strategy performs better during periods following DOWN market state than does during the periods following UP market states, with the difference calculated at – 1.03 per cent. In view of the evidence of the difference of momentum premia under two different market states found in different stock markets in the world as described above, the cause of the different patterns observed in the UK stock market and other stock markets in the globe seems unlikely to lie within the claim that the inherent cognitive heuristics of the U.K. investors are differentiable from those of their counterparts in emergent stock markets as the empirical evidence found in other developed markets are largely consistent with those obtained in emerging stock markets. In other words, the eminent reason behind the reversed pattern of the momentum premia under different market state could stem from the characteristics of market microstructure. Additionally, the results from this study offer little support for Du et al.(2009)'s conjecture on the reason why the momentum premia fade away—dismal performance of the momentum trading strategies following DOWN market and the fact that there is higher percentage of DOWN-market months (35%) compared with the U.S. markets (16%) (Cooper et al., 2004). There is, as shown in the statistics box of Figure 5.2, over 45 per cent of DOWN-market months in the Chinese Class A share market through the sample period from Jan. 1996 to Dec. 2008, and to be more specific, as Du et al. only focus on the (R=6, H=6) momentum trading strategy, the (R=6, H=6) strategy yields statistically significant negative return at -0.75 per cent (shown on Table 5.3) over time periods following DOWN market state (smaller in magnitude than the negative return (-1.35 per cent) documented in Du et al.'s study). Running contrary to the 0.24 per cent return yielded by the (R=6, H=6) momentum trading strategy in Du et al.(2009)'s research on the Taiwan stock market, the trading strategy manages to eke out a gain of 1.64 per cent over the sample time period in the Chinese share A market. Consequently, the evidence found here shed light on the proposition that the argument of Du et al. (2009), supported by the empirical evidence found in the Taiwan stock market, cannot be applied to other settings (other stock markets).

In order to boost the power of test on the asymmetry between the momentum premia over time periods following UP market state and those during time periods following DOWN market state, we adopt a different market-state definition. Specifically, instead of using prior 12-month average market return to define UP and DOWN market states, prior 24-month average market return is employed: UP market state if the prior 24-month average market return is positive; DOWN market state if the prior 24-month average market return is negative. The testing results, as reported in Appendix 11, are rather similar to what we found using prior-12 month average market return as the definition of market states, asserting the robustness of the empirical evidence reported above. Given that investors' heuristics are insensitive to duration documented in psychology experiments (Kahneman, 2000, Frederick and Kahneman, 1993), the resilience of the test result seems plausible.

Figure 5.3 Comparison between the momentum premia (monthly) over time periods following UP and DOWN market states in the Class A share market



Notes: the column-shaped diagram illustrates the difference of momentum premia during time periods following UP market state and those during periods following DOWN market states in the Class A share market. The vertical axis measures the momentum premia in percentage form; the horizontal axis labels the 16 different momentum trading strategies studied in the form of (R, H), where R denotes ranking period (=3, 6, 9, 12) and H represents holding period (=3, 6, 9, 12). For each momentum trading strategy, the corresponding momentum premium following UP market state is represented by the blue-coloured column, whereas the corresponding momentum premium following DOWN market state is represented by the red-coloured column.

5.4 Summary

In sum, chapter 5 reports and interprets the evidence of the existence of the momentum phenomenon and the evidence of the dynamics of the performance of different momentum trading strategies amid market swings in the Chinese Class A share market. Specifically, we document compelling evidence of the existence of the momentum phenomenon in the Chinese Class A share market. Additionally, the empirical results unanimously indicate that on average, short-to-medium time horizon momentum trading strategies (R=3, 6, 9, 12; H=3, 6, 9, 12) over time periods following UP market state tend to outperform the corresponding momentum trading strateiges over time periods following DOWN market state. As described in rich detail in section 5.2 and 5.3, the overall persuasively more pronounced momentum premia found during periods following market run-ups and comparatively depressed momentum premia found during periods following market sell-offs can be elucidated within the framework of heuristics and bias tradition(Gilovich et al., 2002), prospered over years on different fronts such as economics and sociology, along with three most entrenched behavioural theories developed in the momentum effect literature—namely, the overconfidence theory (Daniel et al., 1998, Daniel et al., 2001), investors' conservatism model (Barberis et al., 1998) and investors' underreaction to firm-specific news model(Hong and Stein, 1999). Moreover, the results obtained by using prior 24-month average market return as market state definition reassure the robustness of the empirical findings recorded in this chapter.

Chapter 6 Momentum premia under the influence of information uncertainty

6.1 Introduction

This chapter documents the results from our investigation on the role of information uncertainty plays in influencing the momentum premium in the context of the Chinese Class A share market. As a convention of this line of research, Chinese Class B shares are excluded from the test due to liquidity or microstructure concerns(Wang, 2004). More specifically, the sample dataset chosen for this part of the study encompass all eligible Class A shares listed in the Shanghai Stock Exchange (SHSE) and the Shenzhen Stock Exchange (SZSE). For brevity and ease of comparison and replication, we only focus on the (R=6, H=6) momentum trading strategy[52], consistent with the choice of a couple of seminal work on information uncertainty and stock returns by Jiang et al. (2005) and McKnight and Hou (2006), in order to zero in on the interplay of the information uncertainty and momentum premium in the context of the Chinese Class A share market. As there isn't a consensus and well-established metric to gauge the level of information uncertainty in the extant literature, seven different factors—(1) Firm size; (2) firm age; (3) analysts' coverage; (4) return volatility; (5) dispersion of analysts' opinion on earnings forecast; (6) trading volume; (7) the strength/quality of corporate governance—are chosen to proxy for the degree of firm-level information uncertainty in the Chinese Class A share market. In view of empirical evidence from existing studies in the field, the underlying motivation of this part of the study is to test the

[52] The evidences from this research, shown in section 5.1 of chapter 5, and from majority of studies on momentum premia suggest that (R=6, H=6) momentum trading strategy is fair representation of the performance of momentum trading strategies with short-to-intermediate term ranking and holding periods.

proposition—whether and how the firm-level information uncertainty, measured by the above-listed seven proxy factors, is influencing the momentum premium of the (R=6, H=6) momentum trading strategy as detailed in the section 2.3 of the theory chapter.

6.2 Firm size

First, the result from our investigation on the impact of firm size, measured by the market capitalization of the listed firms in the Chinese Class A share market, as an information uncertainty (IU thereafter) proxy factor over the momentum premia will be discussed. The conjecture that firm size is capable of proxying the degree of firm-level information uncertainty is blindly obvious in that, compared with listed firms with large capitalization, small-cap firms were found to carry more risk due to less diversified business model, higher leverage levels, and more importantly more obscure information accessibility as suggested by many studies (Chan and Chen, 1991, Hong et al., 2000). The influence of firm size as an IU proxy factor over the momentum premium or simply cross-sectional stock returns have been examined by Zhang (2006) and McKnight and Hou (2006) in the U.S. stock market and the U.K. stock market respectively, where both of them documented evidence showing firm size as an IU proxy is positively correlative with the momentum premium. The results from our test therefore not only offer evidence to support the conjecture of firm size as an IU factor in influencing the momentum premium but also provide an out-of-sample test for the above-noted two studies in the largest emerging financial market in the world—the Chinese stock market.

Table 6.1 presents the average monthly returns of different momentum-IU quintiles and momentum premia (Q5-Q1) of the (R=6, H=6) momentum trading strategy across different information uncertainty levels, resulted from the independent two-way sorting procedure, employed by the majority of studies in the domain(Jiang et al., 2005, Lee and Swaminathan, 2000, Wang and Chin, 2004). From Q1 ("loser" momentum quintile (portfolio)) to Q5 ("winner" momentum quintile (portfolio)), each column represents the average monthly return of the portfolio drawn up based on stocks' prior 6-month returns in ascending order and corresponding t statistics. The column with the title "Q5-Q1" summarizes the returns of momentum portfolios with different levels of IU and the last column lists out the corresponding t statistics. Horizontally, each row presents the average monthly returns of different momentum portfolios associated with the certain degree of firm-level information uncertainty and their corresponding t statistics. As IU level varies from low (IU1) to high (IU5), the momentum portfolios are associated with higher degree of information uncertainty. The momentum premia (Q5-Q1) across five IU levels average out at 1.84 per cent, exceeding the momentum premium of the (R=6, H=6) strategy (1.64 per cent) in the same Class A share market found earlier (shown on Table 5.1), which implies that overall the firm size as an IU proxy factor amplifies the momentum premium of the (R=6, H=6) momentum trading strategy. Looking into different momentum quintiles (Q1, Q2, Q3, Q4, Q5), the average monthly returns of the momentum quintiles are positively correlated with the IU levels. For instance, in the "loser" momentum quintile (Q1), the "loser" portfolio with lowest IU level (largest market capitalization) (IU1) yields negative momentum return of -0.15 per cent. Within the same momentum quintile Q1, it is striking to notice that the "loser" portfolio with highest IU level (firms with smallest market capitalization) produces 0.34 per cent premium. The difference of the returns between the "loser" portfolio with high IU level and the "loser" portfolio with low IU level is 0.49 (t= 1.99). Therefore, the average monthly returns of “loser” portfolio not only tipped steadily forward to the positive territory as the degree of information uncertainty heightens but also grow larger in terms of magnitude. Given the evidence of the impact of the amplifying effect of IU on the momentum premium of the (R=6, H=6) momentum trading strategy described above and the way momentum premium is defined (returns of “winner” portfolio minus those of “loser” portfolio) (Q5-Q1), one would expect that the average monthly returns of “winner” portfolio increase in a more abrupt manner under the influence of increasingly rising level of information uncertainty on theoretical grounds.

As expected, the relationship between the returns of the “winner” momentum quintile (Q5) and the IU levels associated with the momentum quintile portfolios resembles remarkable uniform pattern as what is observed in the “loser” momentum quintile (Q1). More specifically, within the “winner” momentum quintile (Q5), the average monthly returns of the “winner” momentum portfolios increase monotonically from 1.22% to 2.68% as the IU level heightens from IU1 to IU5, resulting in a highly statistically significant difference (IU5-IU1) of 1.46% (t=3.07), cementing our conjecture. The pattern of the evidence just described is largely consistent with what was found by Hong, Lim and Stein (2000) in the U.S. stock markets yet differs from others found in developed financial markets. For example, Zhang (2006) found that the IU levels are negatively associated with the returns of “loser” momentum quintile portfolios yet are positively associated with the returns of “winner” momentum quintile portfolios in the U.S. stock markets and McKnight and Hou (2006) observed no discernible trend of returns of “winner” and “loser” portfolios associated with different levels of information uncertainty in the U.K. stock market. The preceding observation echoes the prediction of an investors underreaction theory/slow information diffusion theory developed by Hong, Lim and Stein (2000), postulating that firm-specific information tends to diffuse in a more sluggish manner for firms with small capitalization, compared with firms with large capitalization, giving rise to more swingeing underreaction to firm-specific news (Hong and Stein, 1999) and in turn leads to the positive relation between the levels of IU (proxied by firm size, in inverse relationship with IU level: e.g. highest IU level is represented by the portfolio consisting of firms with smallest capitalization) and the returns of “loser” momentum quintiles. In the same vein, the positive relationship between IU levels and both “winner” and “loser” portfolios is indicative of prevalent underreaction to private news, evoked by gradual information diffusion(Hong et al., 2000), exhibiting in extreme momentum quintiles (Q5 and Q1) in the Chinese Class A share market.

By focusing on the momentum premia (Q5-Q1) of the momentum portfolios associated with different IU levels, we observe a positive relationship between the IU levels and the momentum premia (Q5-Q1). As shown in the column with title “Q5-Q1” in Table 6.1, all the momentum premia are highly statistically significant and positive and as the IU level goes up, the momentum premia increase gradually and monotonically from 1.37% (t=4.26) at lowest IU level (IU1 firms with largest market capitalization) to 2.34%(t=10.25) at highest IU level (IU5) (firms with smallest market capitalization), resulting in a statistically significant difference of 0.97% (t=4.53). This pattern is tellingly in accord with the finds of studies by Hong, Lim and Stein (2000), McKnight and Hou (2006) and Zhang (2006)— “market participants underreact more to new information for small firms than for large firms” (page 117), in defiance of distinct relationships (either positive or negative) between “loser” portfolio and levels of IU described earlier on, 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 nominated as the impetus behind 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. 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.

More intriguingly, in comparison to the Hong, Lim and Stein (2000)'s research, the results found here differ from their finds in three noteworthy respects: (1) larger positive momentum premia are found in momentum portfolios consisting of small-cap stocks (as shown in Table 6.1), signifying higher IU levels, as opposed to negative momentum returns yielded by momentum portfolios entailing small-cap stocks documented in Hong et al. (2003)'s work; (2) by plotting the momentum premia(on the vertical axis) against the IU levels (on the horizontal axis), as illustrated in Figure 6.1, we observe a non-linear yet upward trending relationship, with momentum portfolio associated with lowest IU scoring minimum momentum premium of 1.37% (t=4.26) and that associated with highest IU yielding maximum momentum premia of 2.34% (t=10.26), differing from “a pronounced, inverted U-Shape” (Hong et al., 2000: page 276) described by Hong, Lim and Stein or “a double inverted U-Shape pattern” (page 232) depicted by McKnight and Hou(2006); (3) The numbers in the last column of the table, titled “Q3-Q1/Q5-Q1”, measure how much of the momentum premia of different momentum portfolios across different levels of IU, in the form of percentage, comes from the difference between the returns of the average performing portfolios and the “loser” portfolios (Q3-Q1). For instance, for the momentum portfolio with highest IU (IU5), only 12.4% of the momentum premia is attributable to Q3-Q1. Therefore, it is only evident in the momentum portfolio with the lowest IU level (IU1) that large part of the momentum premia is attributable to the returns of “loser” portfolio as documented by Hong, Lim and Stein (2000) in the U.S. stock markets and McKnight and Hou (2006) in the U.K. stock market, while the results from other four momentum quintiles with different levels of IU suggest the impact of the returns of “loser” portfolio on the momentum premia is not as significant.

In combination, even though the evidence found here does support the underreaction theory proposed by Hong and Stein (1999), the asymmetry in stock price's reactions to bad and good news is not observed. In view of the distinction from the pattern found in more mature financial markets such as the U.S. and U.K., the logical reason to explain it is bound to lie within the difference between the markets in terms of the composition of market participants, with Chinese stock market boasting a significant proportion of domestic retail investors. They are found to be more prone to heuristics and biases in judgmental process, to chase good news (Yeh and Lee, 2000) and subject to heavy herding behaviour (Tan et al., 2008), which could separately or jointly contribute to the succumbed asymmetry in stocks' underreaction to good and bad news documented here (Nofsinger and Sias, 1999).

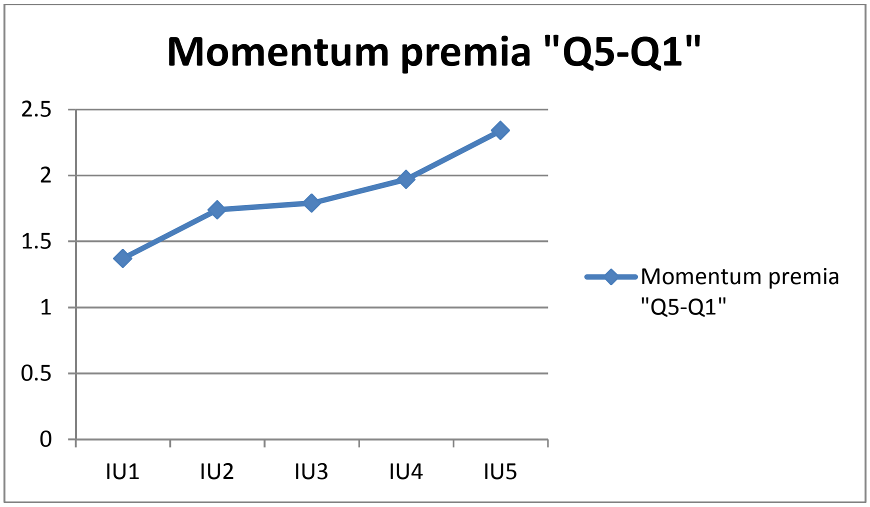
Table 6.1 Average monthly returns of momentum ("winner" minus "loser") portfolio independently sorted based on past returns and firm size (1/MV) as information uncertainty proxy (the (R=6,H=6) momentum trading strategy)

	Momentum Quintile							Q3-Q1/Q5-Q1
	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q5-Q1**	**t-value**	
	Information uncertainty proxy: Firm size (1/MV)							
IU1	-0.15	0.23	0.65	0.89	1.22	1.37	4.26	
t-stats	-1.15	1.87	2.95	1.75	3.99			0.584
IU2	-0.02	0.26	0.53	1.01	1.72	1.74	4.18	
t-stats	-2.53	2.05	2.46	2.99	4.05			0.316
IU3	0.17	0.31	0.59	0.94	1.96	1.79	3.99	
t-stats	1.37	4.28	2.41	3.04	4.18			0.235
IU4	0.26	0.41	0.63	1.17	2.23	1.97	5.93	
t-stats	1.68	2.42	1.52	4.99	5.01			0.188
IU5	0.34	0.51	0.63	1.09	2.68	2.34	10.26	
t-stats	1.84	4.51	2.64	5.55	3.94			0.124
IU5-IU1	0.49	0.28	-0.02	0.2	1.46	0.97		
t-value	1.99	3.16	-0.51	2.97	3.07	4.53		

This table reports the average monthly returns of momentum portfolio (the difference between the average monthly returns of “winner” portfolios and “loser” portfolios at difference information uncertainty levels) grouped following the independent two-way sorting approach based on past 6-month stock returns and firm size as proxy for information uncertainty levels in the consolidated Class A share market consisting of all the eligible Class A stocks listed in the Shanghai Stock Exchange and Shenzhen Stock Exchange over the sample period from January 1996 to December 2008. For the purpose of this research and ease of comparison, the (R=6, H=6) momentum trading strategy is focused on in the investigation on the influence of information uncertainty on the momentum premia (chapter 6) and the influence of information uncertainty on the momentum premia over time periods following UP and DOWN market states (chapter 7). At the beginning of every month, all eligible Class A stocks are ranked first based on their prior 6-month returns in ascending order and subsequently grouped into five quintile momentum portfolios (Q1, Q2, Q3, Q4, Q5) with stocks being equally weighted within in each quintile portfolio. In the same vein, all the eligible stocks are independently sorted based on information uncertainty (IU) levels associated with them, measured by the reciprocal of their market capitalizations (1/MV)[53] at the end of the month proceeding to the ranking period, in ascending order and are put into five equal-sized IU portfolio (IU1, IU2, IU3, IU4, IU5). To be more specific, IU1 can be dubbed as the “low IU” portfolio entailing stocks associated with the lowest IU level, whereas IU5 is named as the “high IU” portfolio consisting of stocks associated with the highest IU level. Subsequently, the intersection of the momentum portfolios (Q1, Q2, Q3, Q4, Q5) and the information uncertainty (IU) portfolios (IU1, IU2, IU3, IU4, IU5) is taken to construct 25 different portfolios as the result of independent two-way sorting approach. Beginning from 1 month (to avoid microstructure issues) subsequent to the end of ranking period of 6 months, the portfolios, following the buy-and-hold strategy to avoid excessive trading costs (Galariotis et al., 2007), are held for 6 months. The momentum premia for momentum portfolios associated with different information uncertainty levels (IU1, IU2, IU3, IU4 and IU5) are calculated by taking the difference of the equal-weighted average returns of “winner” portfolios and those of corresponding “loser” portfolios (Q5-Q1). The significance of the momentum premia is determined by t statistics, shown below each momentum premium, for the difference between the returns of “winner” portfolio and those of “loser” portfolio. All the numbers are in percentage term.

Figure 6.1 Momentum premia and IU levels proxied by the reciprocal of firm size (1/MV)

[53] The reciprocal of the market capitalization is used to be consistent with the seminal work by Zhang (2006) for ease of comparison and illustration in the result table.



Notes: IU level is measured by the reciprocal of firm size. i.e. IU1 represents the portfolio consists of stocks with largest market capitalizations, indicating low IU; IU5 represents the portfolio entails stocks with smallest market capitalizations, indicating higher IU.

6.3 Firm age

The impact of firm age, measured by the reciprocal of the number of days (1/Age) preceding to the 6-month ranking period since a stock gets listed or firstly appears in the database, as an IU proxy factor over the momentum premium is the issue to which we turn next. Firm age is naturally considered a plausible factor to proxy for IU levels as firms with little history in the stock market tend to draw less coverage from analysts and less attention from investors and in turn suffer from information deficit, eliciting information uncertainty associated with their stocks, not to mention that both of the seminal work by Jiang et al. (2005) and Zhang (2006) in the volume nominate and examine firm age as an information uncertainty proxy factor in influencing the momentum premium. Hence, this section provides intriguing comparison between the empirical evidence found here in the Chinese Class A share market and those found by Jiang et al. (2005) and Zhang (2006) in the U.S. stock markets.

Table 6.2, as shown below, presents the average monthly returns of the “winner” and “loser” portfolios and the resulted momentum premia of the (R=6, H=6) momentum strategy at different levels of IU (IU1, IU2, IU3, IU4, IU5) in the Chinese Class A share market over the sample period from January 1996 to December 2008. The IU levels are gauged by the reciprocal of the number of days a stock gets listed or firstly appeared in the database. Hence, when moving from IU1 to IU5, IU levels associated with quintile momentum portfolios gradually increase. Similar to Table 6.1, the “Q5-Q1” column summarizes the momentum premia under different levels of IU. Overall, all the momentum premia are positive and highly statistically significant. Compared with the momentum premia of the (R=6, H=6) trading strategy (1.64%) found earlier in Table 5.1, the momentum premia of the two momentum portfolios with the highest IU levels (IU4 and IU5) are larger, at the amount of 1.88% and 2.3% respectively. However, the momentum premia of the (R=6, H=6) trading strategy across five different IU levels average out at 1.42%, trailing the momentum premium (1.64%) without IU influence in the same market segment. At this point, the evidence suggests that the amplifying effect of the IU over the momentum premia is rather obvious among the high IU-momentum portfolios yet it is not a general feature of all the momentum premia. Within “loser” momentum quintiles (Q1), there exhibits a negative relationship between the IU levels and the average monthly returns of “loser” momentum quintile (portfolio). More illustratively, as the IU level goes up from IU1 consisting of oldest firms to IU5 encompassing youngest firms, the returns of the “loser” portfolio dissipate monotonically from 1.18% to merely 0.12%. Conversely, a positive relationship between the IU levels and the returns of “winner” portfolios is observed. As IU level goes up from IU1 to IU5, the average monthly return of “winner” portfolios climbs from 1.83% up to 2.42%. The above-mentioned finding is very similar to the pattern documented by Zhang (2006) in his investigation on firm age as an information proxy factor in influencing the momentum premia in the U.S. stock market, indicating that the “loser” stocks of younger firms tend to underperform under greater information uncertainty compared with their more mature counterparts, evoking negative momentum; on the other hand, the “winner” stocks of younger firms tend to keep on yielding gratifying profits, inducing positive momentum. Both patterns are consistent with the prediction of the gradual-information diffusion theory developed by Hong, Lim and Stein (2000)—information are most prone to travel slowly among younger firms, not normally receiving much attention in the stock market. With positive momentum and negative momentum exhibiting in “winner” stocks and “loser” stocks respectively, on the theoretical grounds, one would expect to witness larger momentum premium as the degree of information uncertainty gets greater.

Very much as expected, we find that the amplifying effect of the firm age as an IU proxy is more pronounced among momentum portfolios with higher IU levels. To be more specific, the momentum portfolio with lowest IU level (IU1 entails the oldest firms in the stock market) yielded 0.65% premium when applying the (R=6, H=6) momentum strategy, on the other hand, 2.3% of the momentum premium is realized for the portfolio with the highest IU level (IU5 consists of youngest firms). The difference of the momentum premia between the momentum portfolios with the highest IU and the lowest IU is 1.65 (t=4.07). In general, the momentum premium gets larger in monotonic manner as the IU levels goes up from IU1 to IU5, echoing the pattern found in Zhang (2006)’s study, which is in accord with the gradual information diffusion/underreaction theory proposed by Hong, Lim and Stein (2000) and the conservatism theory put forward by Barberis et al. (1998) postulating that investors are predisposed to underreact to private news, failing to promptly update their prior beliefs (Barberis et al., 1998, Hong and Stein, 1999) and eventually giving rise to the momentum premium. From the perspective of behavioural theory, investors tend to make judgment through the lens of optimism under greater information uncertainty (Armor and Taylor, 1998), stoking the volume of trending chasing behaviour among Chinese retail investors (Yeh and Lee, 2000) and subsequently resulting in more pervasive momentum premia (Grinblatt et al., 1995, Nofsinger and Sias, 1999). The preceding evidence also strike a chord with the prediction of Han, Hong and Warachka's cognitive learning theory, theorising that investors learn by updating weights of prior belief, evoking shifting of information weights—momentum premium is larger for portfolio consisting of young firms (2008). The very last row of the table "IU5-IU1" shows overall which momentum quintile is the lynch pin in contributing to the amplified momentum premia. The differential return of "loser" portfolio with highest IU and that with lowest IU comes at -1.06%, whereas the differential return of "winner" portfolio with highest IU and that with lowest IU is 0.59%, suggesting that the lacklustre performance of "loser" momentum quintile portfolios is the driving force behind the larger momentum premium observed here, which is consistent with the find by Jiang et al.(2005). Additionally, the gloomy performance of the stocks of young firms (associated with high IU) is evident in four out of total five momentum quintiles, signified by the negative IU5-IU1 values, paralleling the prediction of gradual information diffusion theory/ underreaction theory by Hong and Stein (1999) as described previously.

Table 6.2 Average monthly returns of momentum ("winner" minus "loser") portfolio independently sorted based on past returns and firm age (1/age) as information uncertainty proxy (the (R=6, H=6) momentum trading strategy)

	Momentum Quintile						
	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q5-Q1**	**t-value**
	Information uncertainty proxy: Firm age (1/Age)						
IU1	1.18	1.17	1.43	1.71	1.83	0.65	3.66
t-stats	1.99	2.05	3.28	3.81	5.99		
IU2	0.88	1.12	1.41	1.83	1.91	1.03	4.25
t-stats	1.58	2.62	2.98	1.55	2.81		
IU3	0.73	1.04	1.63	1.84	1.97	1.24	6.03
t-stats	1.63	1.05	3.27	3.5	5.15		
IU4	0.47	0.73	1.26	1.63	2.35	1.88	8.18
t-stats	1.51	2.99	3.47	3.16	2.99		
IU5	0.12	0.24	1.02	1.53	2.42	2.3	10.62
t-stats	2.18	1.07	2.47	4.05	5.09		
IU5-IU1	-1.06	-0.93	-0.41	-0.18	0.59	1.65	
t-value	-1.99	-1.2	-1.03	-0.18	2.99	4.07	

This table reports the average monthly returns of momentum portfolio (the difference between the average monthly returns of “winner” portfolios and “loser” portfolios at difference information uncertainty levels) grouped following the independent two-way sorting approach based on past 6-month stock returns and firm age as proxy for information uncertainty levels in the consolidated Class A share market consisting of all the eligible Class A stocks listed in the Shanghai Stock Exchange and Shenzhen Stock Exchange over the sample period from January 1996 to December 2008. The methodological approach is described in detail underneath Table 6.1.

6.4 Analysts’ coverage

The interplay of analysts’ coverage as an IU proxy factor and the momentum premium of the (R=6, H=6) momentum trading strategy will be described in this section. More important, it is worth stressing that, to mitigate the cofounding effect evoked by two IU proxy factors—the firm size and analysts’ coverage—found by Bhushan(1989), we follow the approach adopted by Hong, Lim and Stein(2000) and McKnight and Hou (2006), measuring analysts’ coverage in this study by the reciprocal (for ease of illustration) of the residual from regressing the number of analysts covering the firm (by reporting earnings forecasts) in the year preceding to the ranking period against the market capitalization of the corresponding firm(firm size). Analysts' coverage is suitable to proxy for IU levels associated with listed firms in that information, spreading via analysts' research report, tends to diffuse in a substantially slower pace among the listed firms receive less analysts' coverage/attention (Hong and Stein, 1999, Hong et al., 2000), which subsequently kindles the uncertainty about the firm's value (consistent with the definition of IU in this study). Also note that the gradual-information-diffusion (investors' underreaction) model theoretically supports the postulate that the momentum premia are attributable to investors' underreaction, triggered by gradual information diffusion (Hong and Stein, 1999, Hong et al., 2000). Taken together, one would expect that momentum premia are larger for the portfolios consisting of stocks receive low analysts' coverage, indicative of higher degree of information uncertainty, on theoretical grounds.

Table 6.3 reports average monthly returns of momentum quintile portfolios at different IU levels of the (R=6, H=6) momentum trading strategy in the Chinese Class A share market over the sample period from January 1996 to December 2008. Moving from IU1 to IU5, the degree of IU gets more pronounced indicated by portfolios consisting of firms receiving significantly less coverage. Overall, regardless of types of momentum quintiles ("winner" quintile (Q5) or "loser" quintile (Q1) or the momentum portfolio (Q5-Q1)), all of them yield positive and mostly statistically significant returns. Moreover, similar to the pattern of returns of "winner" and "loser" portfolios across different levels of IU observed when using firm age as an IU proxy factor described earlier, on the one hand, the average monthly returns of "loser" momentum portfolios are negatively correlative with the level of IU. Numerically, the average monthly returns of Q1s, stripping out the return of the Q1 associated with

IU2 (0.72%), decline monotonically from 0.68% to 0.24% as the degree of IU goes up from IU1 to IU5, suggesting that among "loser" portfolios, the ones consisting of firms with scant coverage tend to continue to underperform compared with those consisting of firms with extensive coverage. The preceding observation echoes the prediction of the information gradual diffusion theory (Hong et al., 2000)—firm-specific information travels more sluggishly among firms receiving less attention/coverage, inducing underreaction of share price and in turn fostering the negative momentum among "loser" portfolios. On the other hand, the average monthly returns of "winner" portfolios (Q5s) tend to be positively related to the degree of IU. More specifically, the average monthly returns of Q5s steadily march up from 2.59% to 4.02% as the degree of IU gets greater from IU1 to IU5, indicating that among "winner" portfolios, the returns of the ones consisting of firms with sporadic coverage triumph the returns of those entailing firms with broad coverage. Similar to the pattern of negative relation observed between the returns of "loser" portfolios and the degree of IU, the above observation corroborates what the gradual information diffusion theory (Hong et al., 2000) suggests, reasoning that "winner" portfolios consisting of firms with less coverage have the propensity to outperform those encompassing firms with widespread coverage, creating positive momentum, which in turn serves as a traction for the emergence of momentum premium. The above-noted distinct relationships between the returns of "loser" portfolios and the degree of IU and between the returns of "winner" portfolios and the degree of IU are largely in line with the patterns found empirically by Zhang (2006) in the U.S. stock markets and McKnight and Hou (2006) in the U.K. stock market.

"Q5-Q1" column presents the momentum premia of momentum portfolios across different levels of IU. Succinctly, the momentum premia get larger for the momentum portfolios associated with higher level of IU. Among the five momentum portfolios, the momentum premium maxes out at 3.78 per cent (t=13.07) at the highest IU level (IU5), which is highly significant in both statistical and economic sense. The preceding find can be interpreted under the framework of heuristics and biases tradition, developed by Tversky and Kahneman (1973). As under greater uncertainty, investors are more predisposed to be overoptimistic (Armor and Taylor, 1998) in the judgmental process. Investors' over-optimism triggers the practice of intuitive heuristics such as affective heuristics of System 1(intuitive) of two cognitive systems (Kahneman and Frederick, 2002) in processing information(Schwarz, 1990), prone to the influence of different behavioural biases such as overconfidence, conservatism, underconfidence and underreaction. All of which are found to propel the formation of the momentum premium (Daniel et al., 1998, Barberis et al., 1998, Du, 2002, Hong and Stein, 1999). From a different perspective, the more pronounced momentum premium under greater IU could be attributed to the fact that the dominant amount of Chinese retail investors lack of sophisticated statistics education to hone their intuitive heuristics into reflective heuristics such as statistics and abstract heuristics of System 2 (reflective) of two cognitive systems (Kahneman and Frederick, 2002) to assist them in the judgmental procedure (Nisbett et al., 1983). Consequently, their investment decisions are heavily influenced by heuristics biases such as overconfidence, conservatism, underconfidence and underreaction. Coupled with the evidence showing, amidst greater IU, investors are subject to more optimism (Armor and Taylor, 1998), triggering heuristic information processing procedure (Schwarz, 1990)—characterised by the frequent use of intuitive heuristics of System 1(intuitive), one would expect more pronounced momentum premium under the influence of greater information uncertainty .

Additionally, the difference between the momentum premium of momentum portfolio with highest IU level (IU5) and that of momentum portfolio with lowest IU level (IU1) arrives at 1.87% (t=5.03). The differential returns (IU5-IU1) of portfolios with two extreme levels of the IU (IU5 and IU1) of different momentum quintiles are mostly negative (Q1, Q2, Q3 and Q4), suggesting that the portfolios associated with greater degree of IU are driving the larger momentum premia observed here. Across different IU levels, the momentum premia of the (R=6, H=6) momentum strategy average out at 1.91%, exceeding the yield of the same momentum trading strategy unconditional on the information uncertainty (1.64%). In sum, the positive relationship between the momentum premia and the IU levels (negative relationship between the momentum premia and the amount of analysts' coverage firms receive) documented here concurs with the empirical finds by Hong, Lim and Stein (2000) and Zhang (2006) in the U.S. stock markets and McKnight and Hou(2006) in the U.K. stock market, jointly showing support of Hong and Stein (1999)'s gradual-information diffusion (underreaction) theory described in detail earlier.

Table 6.3 Average monthly returns of momentum ("winner" minus "loser") portfolio independetly sorted based on past returns and analysts' coverage as information uncertainty proxy (the (R=6, H=6) momentum trading strategy)

	Momentum Quintile						
	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q5-Q1**	**t-value**
	Information uncertainty proxy: Analyst coverage (1/COV)						
IU1	0.68	1.32	1.71	1.84	2.59	1.91	2.51
t-stats	1.85	2.13	2.99	1.52	4.27		
IU2	0.72	1.31	1.47	1.85	2.79	2.07	3.18
t-stats	2.15	2.27	3.05	1.93	6.16		
IU3	0.53	1.24	1.58	1.79	3.1	2.57	3.09
t-stats	1.62	2.74	3.18	2.16	6.21		
IU4	0.39	1.01	1.35	1.82	3.25	2.86	7.15
t-stats	1.77	2.84	1.51	3.99	5.81		
IU5	0.24	0.82	1.31	1.68	4.02	3.78	13.07
t-stats	1.27	2.84	1.53	2.66	9.81		
IU5-IU1	-0.44	-0.5	-0.4	-0.16	1.43	1.87	
t-value	-0.62	-1.68	-0.13	-0.82	2.64	5.03	

This table reports the average monthly returns of momentum portfolio (the difference between the average monthly returns of “winner” portfolios and “loser” portfolios at difference information uncertainty levels) grouped following the independent two-way sorting approach based on past 6-month stock returns and analysts’ coverage as proxy for information uncertainty levels in the consolidated Class A share market consisting of all the eligible Class A stocks listed in the Shanghai Stock Exchange and Shenzhen Stock Exchange over the sample period from January 1996 to December 2008. The methodological approach is described in detail underneath Table 6.1.

6.5 Return volatility

In view that the role of standard deviation of equity returns as metric of risk has been firmly entrenched in the modern finance research, it comes as no surprise that return volatility, measured by the standard deviation of the returns of stocks over six months prior to the ranking period, is chosen as a proxy factor for information uncertainty. As noted in the theory chapter, consistent with Jiang et al. (2005) and Zhang(2006)’s research, information uncertainty is strictly defined as “the ambiguity with respect to the implications of new information for a firm’s value” (Zhang, 2006: page 105). Simply put, the uncertain characteristic of information, where the definition of information uncertainty and that of risk overlap, is the focal point of this study. Hence, this section is dedicated to describe the results from our investigation on the impact of return volatility as an IU proxy factor over the momentum premium of the (R=6, H=6) momentum trading strategy. Theoretically, high return volatility of a firm's stock in the market can be directly provoked by the high degree of value ambiguity associated with the firm (IU) (Magnan and Xu, 2008), which is found empirically to enhance the momentum premium as documented by Jiang, Lee and Zhang (2005) and subsequently by Zhang (2006) both in the U.S. stock markets. Given the empirical findings in the extant literature, we expect to witness a positive relationship between the degree of IU (proxied by return volatility) and the momentum premium in the Chinese Class A share market.

Table 6.4 reports the average monthly returns of "loser", "winner" and momentum portfolios, formed by sorting stocks independently based on their prior 6-month returns and return volatility, of the (R=6, H=6) momentum trading strategy in the Chinese Class A share market over sample period from January 1996 through December 2008. Moving from IU1 to IU5, the degree of IU associated with different portfolios heightens. At first glance, the average monthly returns of all sorts of portfolios turn out to be positive and highly statistically significant, as shown in Table 6.4. The "Q5-Q1" column summarizes the momentum premia of momentum portfolios at different IU levels, averaging out at 1.3%, lagging behind the momentum premium of the (R=6, H=6) momentum trading strategy unconditional on the IU factor (1.64%). This observation suggests that overall return volatility as an IU proxy factor does not boost the momentum premia, implying a differential impact of different levels of IU over the momentum premium of different momentum portfolio. By looking closely at the average monthly returns of "loser" portfolios and those of "winner" portfolios reported in column Q1 and column Q5 respectively, we find familiar patterns, as noted in the majority of previous sections in chapter 6, that there is a negative relationship between the returns of "loser" portfolios and the IU levels. As IU level goes up from IU1 to IU5, the average monthly returns of "loser" portfolios dissipate from 1.29% to 0.12%. The differential return of "loser" portfolio with highest level of IU and that with lowest level of IU comes at -1.17% (t= -1.48), suggesting that momentum quintiles with constituents associated with high return volatility levels (high IU) tend to underperform those with constituents associated with more subdued return volatility (low IU) the "loser" portfolio consisting of more volatile stocks (higher IU). The preceding observation, similar to most of the previous sections discussed earlier, is consistent with the prediction of the gradual-information-diffusion theory (Hong et al., 2000). With the help of which, the negative relationship between IU level and returns of "loser" portfolios can be elucidated as: firm-specific information travels more languishingly among stocks with higher return volatility or with higher IU levels, prompting investors to underreact towards firm-specific news (Hong and Stein, 1999), and consequently resulting in extended losses for "loser" portfolio, stoking negative momentum.

On the "winner" portfolio front, the average monthly returns of "winner" portfolios edge up from 1.83% to 2.41% as the IU level heightens from IU1 to IU5. Additionally, the differential return of "winner" portfolio with the highest IU (IU5) and that with the lowest IU (IU1) is also substantial yet in an opposite direction (0.58 (t=2.99)), indicating that "winner" portfolio with higher IU tends to outperform "winner" portfolio with lower IU. Similar to the rationale behind the negative relationship between IU level and returns of "loser" portfolios, the positive relationship between IU level and average monthly returns of “winner” portfolios is also in congruent with the gradual-information-diffusion/underreaction theory developed by Hong and Stein (1999) as noted earlier. Furthermore, the above-described patterns, exhibited in returns of “loser” and “winner” portfolios at different levels of IU, are tellingly consistent with those found by Jiang, Lee and Zhang (2005) and Zhang (2006) in the U.S. stocks markets.

Turning back to the “Q5-Q1” column, the momentum premia increase monotonically as the IU level goes up from 0.54% for the momentum portfolio with IU1 to 2.29% for that with IU5, which is in line with our prediction and is consistent with the evidence documented by Jiang et al. (2005) and Zhang (2006). A group of assorted psychology evidence could well serve as theoretical ammunition in attempt to interpret the above-noted positive statistical association between the momentum premia (Q5-Q1) and the degree of information uncertainty. Specifically, under greater information uncertainty, investors are more overoptimistic/overconfident (Armor and Taylor, 1998), a reflection of the behavioural phenomenon that investors tend to underweight the salience of information (Griffin and Tversky, 1992) and in turn fail to promptly update their prior beliefs according to Han et al. (2008)’s cognitive learning theory, resulting in larger momentum premium (Barberis et al., 1998, Hong et al., 2000). On the other end of the spectrum, the intensified herding behaviour of Chinese retail investors, exacerbated by the influence of optimistic bias in judgmental process (Yeh and Lee, 2000), is prone to contribute to more pervasive momentum premium (Grinblatt et al., 1995, Nofsinger and Sias, 1999). Collectively, the empirical evidence of all three studies supports the prediction of the conservatism theory proposed by Barberis et al. (1998) and underreaction theory /

gradual information diffusion theory developed by Hong and Stein (1999) and Hong, Lim and Stein (2000).

Table 6.4 Average monthly returns of momentum ("winner" minus "loser") portfolio independently sorted based on past returns and return volatility as information uncertainty proxy (the (R=6, H=6) momentum trading strategy)

	Momentum Quintile						
	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q5-Q1**	**t-value**
	Information uncertainty proxy: Return volatility (VOL)						
IU1	1.29	1.38	1.42	1.69	1.83	0.54	2.04
t-stats	1.99	2.05	3.15	2.36	2.97		
IU2	1.02	1.31	1.3	1.52	1.86	0.84	2.61
t-stats	1.61	2.06	3.58	2.35	4.04		
IU3	0.93	1.27	1.35	1.43	1.95	1.02	4.06
t-stats	1.51	3.15	2.51	3.02	7.15		
IU4	0.42	1.03	1.17	1.35	2.21	1.79	9.17
t-stats	2.62	1.99	1.25	3.61	9.41		
IU5	0.12	0.7	0.99	1.21	2.41	2.29	11.36
t-stats	2.83	1.82	3.17	3.99	11.15		
IU5-IU1	-1.17	-0.68	-0.43	-0.48	0.58	1.75	
t-value	-1.48	-1.95	-0.74	-0.55	2.99	4.73	

This table reports the average monthly returns of momentum portfolio (the difference between the average monthly returns of “winner” portfolios and “loser” portfolios at difference information uncertainty levels) grouped following the independent two-way sorting approach based on past 6-month stock returns and return volatility as proxy for information uncertainty levels in the consolidated Class A share market consisting of all the eligible Class A stocks listed in the Shanghai Stock Exchange and Shenzhen Stock Exchange over the sample period from January 1996 to December 2008. The methodological approach is described in detail underneath Table 6.1.

6.6 Dispersion in analysts’ earnings forecasts (DISP)

In this section, the role of the dispersion in analysts’ earnings forecasts (DISP hereafter) as an IU proxy factor in impacting the momentum premium of the (R=6, H=6) trading strategy will be discussed based on the empirical evidence found in this study. Reiterating what has been mentioned in the methodology chapter, for ease of comparison, the DISP is measured by the standard deviation of analysts’ earnings forecasts for each month scaled by the prior year-end stock price[54], consistent with the measurement used by Zhang (2006). The 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 through the history of modern finance literature. For instance, back 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 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). According to underreaction explanation for the momentum effect theorised by Daniel et al.(1998) and Hong and Stein (1999) whom proposed that the momentum premium is attributable to investors' sluggish incorporation of fundamental news on stocks elicited by their underreaction, the IU factor, proxied by DISP, should boost the momentum premium on theoretical grounds. For the time being, the existing empirical evidence in attempt to validate the proposition is rather puzzling: one line of evidence supporting the validity of the proposition comes from Zhang(2006) and Han, Hong and Warachka[55] (2008) for the U.S. stocks markets, yet, on the other spectrum, doubt was raised by Dische (2002) armed with empirical results found in the German stock market. In short, the result of this study provides more insight about the validity of the proposition by testing it empirically in an emerging market context.

[54] The standard deviation of analysts' earnings forecast for each month is scaled by the prior year-end stock price to alleviate the noise evoked by heteroskedasticity (Zhang, 2006).

[55] Note that differing from this study where the dispersion in analysts' earnings forecast is employed to gauge information uncertainty, Han, Hong and Warachka (2008)'s work focuses on the interplay of the dispersion in analysts' cashflow forecasts and the momentum premia.

Table 6.5 presents the average monthly returns of “winner”, “loser” and momentum portfolios with different IU levels for the (R=6, H=6) momentum trading strategy in setting of the Chinese Class A share market over the sample period from January 1996 to December 2008. From IU1 to IU5, the DISP associated with “loser”, “winner” or momentum portfolios (W-L) widens, indicating the higher degree of IU. Similar to what we find in the majority of other IU proxy factors discussed earlier, all the returns of “winner”, “loser” and momentum (W-L) portfolios at different IU levels are positive and highly statistically significant. As shown in Table 6.5, the “Q5-Q1” column reports the momentum premia of the (R=6, H=6) momentum trading strategy at different IU levels, which average out at 1.73%, well outstripping the momentum premium of the same (R=6, H=6) trading strategy unconditional on IU proxy factor (1.64%). Turning now to the loser portfolios column, titled “Q1”, we observe that the “loser” portfolio returns are negatively related to the degree of IU. More illustratively, as the IU level associated with “loser” portfolios goes up from IU1 (narrowest DISP) to IU5 (widest DISP), the average monthly returns of “loser” portfolios dwindle from 0.62% to 0.25%, indicating that “loser” portfolios entailing stocks with more consensual earnings forecasts outperform those with more dispersed earnings forecast. This empirical results lends leg of support to the postulate that past loser stocks with high IU is bound to suffer from lacklustre performance than those with lower IU theorised and empirically validated by Diether, Malloy and Scherbina (2002), who documented that small-cap, “loser” stocks with less dispersion in analysts’ earnings forecasts tend to outperform those with higher dispersion in analysts’ earnings forecasts, strikingly echoing the evidence found here among “loser” momentum quintiles across different levels of DISP.

Differing from the pattern exhibited by the “loser” portfolio returns and IU levels in a déjà vu manner, the returns of “winner” portfolio, summarized in column Q5, are found positively related to the IU levels (degree of dispersion in analysts’ earnings forecasts) associated with the portfolios, lending direct empirical support to Sadka and Scherbina (2007)’s empirical find that stocks with higher dispersion in analysts’ earnings forecasts are more inclined to be overpriced. The patterns witnessed within “loser” and “winner” portfolios are in accord with the empirical evidence found by Jiang et al. (2005) and Zhang(2006), supporting the underreaction/gradual-information diffusion theory (Hong and Stein, 1999, Hong et al., 2000) as noted in earlier sections—the sluggish manner information travels among “winner” stocks with widely dispersed earnings forecasts, to a substantial extent, drives the gratifying returns of “winner” stocks with greater information uncertainty (Hong et al., 2000), indicated by the negative return differentials of three out of five momentum quintiles (Q1, Q2, Q3) with two extreme IU levels (IU1 and IU5), portfolio with lowest IU tend to outperform that with highest IU. However, this pattern is reversed for past best-performing “winner” portfolio (Q4 and Q5), where the portfolio with highest IU level yields significantly superior returns compared with that with lowest IU level (Q4: 0.31%, t=2.99 and Q5: 0.56%, t=4.17).

With respect to the momentum premia of the (R=6, H=6) momentum trading strategy across different levels of IU, being reported in column “Q5-Q1”, the pattern of the relationship bewteen momentum premia and IU levels can be described as: the momentum premium surges monotonically from 1.28% (t=2.51) for the momentum portfolio with IU1 to 2.21% (t=15.03) for the momentum portfolio with IU5. The positive relationship between the momentum premia and the degree of IU found here empirically vindicates the validity of the theoretical hypothesis—the momentum portfolios with higher IU are predisposed to outperform those with lower IU, stemming from the overconfidence theory and underreaction theory for explanation to the momentum premia advanced by Daniel et al. (1998, 2001), Hong and Stein (1998) and Hong, Lim and Stein (2000) respectively and supported empirically by results from Jiang et al. (2005) and Zhang (2006).

Table 6.5 Average monthly returns of momentum ("winner" minus "loser") portfolio independently sorted based on past returns and the dispersion in analysts' earnings forecast (DISP) as information uncertainty proxy (the (R=6, H=6) momentum trading strategy)

	Momentum Quintile						
	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q5-Q1**	t-value
Information uncertainty proxy: Analysts' forecast dispersion (DISP)							
IU1	0.62	1.04	1.41	1.53	1.9	1.28	2.51
t-stats	1.99	2.05	3.58	5.05	6.18		
IU2	0.62	1.24	1.41	1.72	2.13	1.51	4.15
t-stats	1.95	2.51	3.99	4.51	6.02		
IU3	0.62	1.29	1.43	1.84	2.29	1.67	12.05
t-stats	3.08	2.95	3.47	5.05	4.99		
IU4	0.48	1.21	1.27	1.64	2.45	1.97	4.66
t-stats	2.01	3.38	5.01	3.08	8.27		
IU5	0.25	0.9	1.35	1.84	2.46	2.21	15.03
t-stats	1.94	2.05	3.85	4.31	15.08		
IU5-IU1	-0.37	-0.14	-0.06	0.31	0.56	0.93	
t-value	-0.69	-0.51	-0.99	2.99	4.17	1.58	

This table reports the average monthly returns of momentum portfolio (the difference between the average monthly returns of “winner” portfolios and “loser” portfolios at difference information uncertainty levels) grouped following the independent two-way sorting approach based on past 6-month stock returns and dispersion in analysts’ earnings forecasts (DISP) as proxy for information uncertainty levels in the consolidated Class A share market consisting of all the eligible Class A stocks listed in the Shanghai Stock Exchange and Shenzhen Stock Exchange over the sample period from January 1996 to December 2008. The methodological approach is described in detail underneath Table 6.1.

6.7 Trading volume

From the perspective of market microstructure, compared with more heavily traded stocks, thinly traded stocks are commonly deemed carrying more risk, signifying higher degree of IU. Consequently, according to the risk and return relationship(Sharpe, 1964) well entrenched in modern finance theory, the thinly traded stocks are expected to produce higher yield than the heavily traded stocks by the virtue of bearing higher risk. The prediction is widely known as liquidity hypothesis, first proposed by (Amihud and Mendelson, 1986) and supported by the empirical evidence documented by Datar, Naik and Radcliffe (1998). The contentious issue revolving the interpretation of the interaction between the trading volumes and stock returns, largely believed to be driven by market dynamics (Blume et al., 1994), was taken further by Conrad, Hameed and Niden (1994) and Lee and Swaminathan (2000). Both of the studies gave the spotlight to the interplay of trading volume and momentum premium yet support two competing theories. Specifically, Conrad, Hameed and Niden (1994) provided empirical evidence supporting the proposition that stocks/portfolios with low trading volume tend to produce larger momentum premium. On the contrary, the manifestation that high trading volumes of stocks/portfolios presage superior momentum premium is supported by the evidence found by Lee and Swaminathan (2000) in the U.S. market context and Chan, Hameed and Tong (2000) in an international context. In view of the enigmatic existing empirical evidence in the literature, through employing trading volume, proxied by the reciprocal of turnover ratio[56], as an IU proxy factor, we intend to

[56] The reciprocal of turnover ratio is used to proxy for trading volume for ease of illustration in the results table. The turnover ratio is the ratio of the number of shares traded each month to the number of shares outstanding at the end of the month, to be consistent with Lee and Swaminathan (2000)'s approach.

provide an out-of-sample testament to the manifestation of the relationship between trading volume and momentum premium spun out by Conrad, Hameed and Niden (1994) and Lee and Swaminathan (2000) in the Chinese Class A share market context. Reliant on the gradual-information-diffusion theory proposed by Hong and Stein (1999) and Hong, Lim and Stein(2000), thinly traded stocks/portfolios, among whom information tends to spread in a more sluggish manner, are expected to yield higher momentum premium.

Table 6.6 reports the average monthly returns of the “winner”, “loser” and momentum (“W-L”) portfolios across 5 different IU levels (IU1-IU5) in the Chinese Class A share market for the sample time horizon from January 1996 to December 2008. Looking into all “loser” portfolios (Q1), we observe a familiar negative relationship between the returns of “loser” portfolios and the IU levels, indicated by the observation that the return of “loser”-high IU portfolio consisting of “loser” stocks with low trading volume (high IU level) trails behind that of “loser”-low IU entailing “loser” stocks with high trading volume (low IU level). The preceding observation, consistent with empirical evidence found by Zhu, Wu and Wang (2004) and Jiang et al.(2005) in the Chinese Class A share market and in the U.S. stock markets respectively, sheds light on the plausibility of Hong and Stein(1999) and Hong, Lim and Stein (2000)’s underreaction theory/information graduation theory. In other words, firm-specific information travels slowly among stocks/portfolios receiving less investor’ attention, prompting underreaction of share price to the information and subsequently resulting in extended skid in terms of share price of “loser” and relatively infrequently traded stocks/portfolios. Nevertheless, the empirical evidence found here differs from the results documented by Lee and Swaminathan (2000) in the U.S. stock market, which could be largely attributed to the pervasive influence of the vast amount of Chinese retail investors, who drive the overall historically higher turnover ratio in the Chinese stock market compared with the average turnover ratio of the U.S. market and normally have shorter investment horizons (Wang and Chin, 2004). The above-noted factors collectively determine that the underreaction of share prices, evoked by investors' overconfidence (Daniel et al., 1998) or gradual information diffusion among high IU stocks (Hong et al., 2000), prevails in the Chinese stock market. Within column Q5, summarizing the average monthly returns of "winner" portfolio, the average monthly returns of "winner" portfolios are positively related to the IU levels, akin to the pattern observed in the majority of the previously-discussed results. Intriguingly, the positive relationship between the average monthly returns of "winner" portfolios and the degree of IU appears to be a general feature across different stock markets as documented in four major studies on the trading volume and momentum premia noted above—Lee and Swaminathan (2000) and Jiang et al. (2005) in the U.S. market; Wang and Chin (2004) and Zhu et al. (2004) in the Chinese Class A share market. In more detail, the "winner" portfolios with higher IU, indicated by low trading volumes, tend to yield superior momentum premia compared with those associated with lower IU, signalled by high trading volumes, which is in accord with Hong and Stein (1999)'s underreaction theory and Hong, Lim and Stein (2000)'s gradual information diffusion theory—the overshoot of the returns of "winner" stocks associated with greater degree of IU, evoked by the underreaction of stock prices, is the resultant of the sluggish manner in which firm-specific news travels among "winner" stocks that are coincidentally thinly traded.

The "Q5-Q1" column reports the momentum premia of the (R=6, H=6) momentum trading strategy across 5 different IU levels. Numerically, the momentum premia increase monotonically from 0.91% (t=1.99) for momentum portfolio with IU1 to 2.27% (t=11.14) for momentum portfolio with IU5. Moreover, the momentum premia across different IU levels average out at 1.36%, lagging behind the momentum premium of the (R=6, H=6) momentum strategy unconditional on IU level in the Chinese Class A share market (1.64%), suggesting that the amplifying effect of IU on the momentum premia is not a general feature across different IU levels, yet the existence of the amplifying effect of IU is proved behind doubt as the momentum premium of the momentum portfolio with highest IU level (IU5) comes in at 2.27%, well outpacing the premium of the (R=6, H=6) momentum strategy unconditional on IU. More pointedly, the difference of average monthly returns between momentum portfolios with two extreme IU levels (IU5-IU1) comes in at 1.36 (t=6.32), suggesting that the momentum effect is more pronounced among stocks with greater information uncertainty, paralleling the empirical evidence by Hou, Peng and Xiong (2008) manifesting high trading volume stocks exhibit more prevalent momentum effect. In view of the empirical evidence in the extant literature, the above-noted evidence aligns with empirical evidence found by Wang and Chin (2004), Zhu et al. (2004) and Jiang et al. (2005) and echoes the prediction of our proposition and underreaction theory (Hong and Stein, 1999) /gradual information diffusion theory (Hong et al., 2000) as described earlier. The evidence of the amplifying effect of information uncertainty over the momentum premium, especially of the momentum portfolios associated with greater degree of IU, can be interpreted from different perspectives reliant on various behavioural theories and psychology evidence. Given the fact that short-selling is still restricted in the Chinese stock market, trading volume/turnover ratio/liquidity is proved to be a barometer indicating the degree of clustering of irrational investors (Baker and Stein, 2004). Therefore, in our case, the high trading volume (large turnover ratio) not only signals less information uncertainty but also hints the high proportion of irrational investors in the stock market, whose behaviours are subject to the influence of overconfidence and optimism bias, blunting the momentum premium according to Du (2002)'s traders' underconfidence behavioural model. Based on which, the plausibility of the positive relationship between level of information uncertainty and momentum premium is further clinched as empirical evidence from Statman, Thorley and Vorkink (2006) shows that high trading volume (low 1/turnover ratio; less IU) is indicative of high level of investors' overconfidence, depressing the influence of investors' underconfidence toward decision making and therefore undermining the significance of momentum premium (Du, 2002).

Table 6.6 Average monthly returns of momentum ("winner" minus "loser") portfolio independently sorted based on past returns and trading volume as information uncertainty proxy (the (R=6, H=6) momentum trading strategy)

	Momentum Quintile						
	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q5-Q1**	**t-value**
	Information uncertainty proxy: Volume(1/Turnover ratio)						
IU1	1.04	1.36	1.68	1.73	1.95	0.91	1.99
t-stats	3.05	2.99	2.63	3.91	4.15		
IU2	0.85	1.03	1.38	1.62	1.84	0.99	5.39
t-stats	2.88	3.08	4.99	2.18	7.62		
IU3	0.48	0.63	0.92	1.16	2.16	1.68	4.38
t-stats	1.99	4.05	3.18	4.08	4.55		
IU4	0.23	0.7	0.85	1.31	2.35	2.12	7.15
t-stats	2	2.63	3.11	4.82	6.99		
IU5	-0.03	0.41	0.64	0.83	2.24	2.27	11.14
t-stats	-0.25	2.58	3.05	3.88	10.29		
IU5-IU1	-1.07	-0.95	-1.04	-0.9	0.29	1.36	
t-value	-1.26	-0.83	-1.03	-0.97	2.99	6.32	

This table reports the average monthly returns of momentum portfolio (the difference between the average monthly returns of "winner" portfolios and "loser" portfolios at difference information uncertainty levels) grouped following the independent two-way sorting approach based on past 6-

month stock returns and trading volume as proxy for information uncertainty levels in the consolidated Class A share market consisting of all the eligible Class A stocks listed in the Shanghai Stock Exchange and Shenzhen Stock Exchange over the sample period from January 1996 to December 2008. The methodological approach is described in detail underneath Table 6.1.

6.8 Corporate governance

Since the 1980s, in view of a strong wave of fanatic M&A activities taking place in the financial market, academics and practitioners has paid increasingly more attention on analyzing the informational value of the strength of corporate governance of a listed firm as shareholder rights get restricted to fend off potential “proxy fight and hostile takeovers” (Gompers et al., 2003: page 108). Over recent years, the line of research revolving corporate governance has been branched out into different sub streams such as the concentration of share ownership and equity prices (Gompers et al., 2003), corporate governance and information efficiency (Cai et al., 2006) and the role of corporate governance in foreign investments (Das, 2008) etc. In this study, we employ the strength of corporate governance as a yardstick in measuring information uncertainty, which has been hinted in a growing body of research recently. Specifically, a slew of studies (Bushman and Smith, 2001, Cai et al., 2006, Gillan et al., 2006, Raheja, 2009, Das, 2008, Magnan and Xu, 2008) provide empirical evidence supporting the postulate that more stringent corporate governance practice is indicative of lower level of information uncertainty. Yet, to our knowledge, no one has yet to investigate the interplay of the strength of corporate governance, as an IU proxy factor, and the momentum premium, which characteristically sets this research apart from other existing studies in the field and provides a novel contribution to the literature. Furthermore, the strength of corporate governance of the listed firms in the Chinese Class A share market is measured by free float ratios ("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)) of all eligible stocks prior to the end of the ranking period. The underlying logic is that a higher free float ratio (higher percentage of tradable shares), reflecting the capability of shareholders in flexing their muscles and having their say, indicates less uncertainty revolving the stock elicited by government policies imposed through the government-owned non-tradable shares (Wang and Xu, 2004). Turning now to the linkage between the corporate governance as an IU proxy factor and momentum premium, Gompers, Ishii and Metrick (2003) found an investing strategy akin to Jegadeesh and Titman(1993)'s momentum mechanism—buying stocks with strongest shareholder rights and selling stocks with weakest shareholder rights—could produce abnormal returns in the U.S. stock markets. In light of the above-noted empirical evidence, combined with the general proposition of relationship between IU and momentum premium in this research, we conjecture that the strength of corporate governance as an IU proxy factor has pronounced amplifying effect on the momentum premium in the setting of the Chinese Class A share market. Table 6.7 reports average monthly returns of momentum quintiles (Q1, Q2, Q3, Q4, Q5) and momentum portfolios (Q5-Q1) across different levels of IU (IU1-IU5) in the Chinese Class A share market for the sample time period from January 1996 to December 2008. Familiarly, the "Q5-Q1" column presents the momentum premia of the (R=6, H=6) momentum trading strategy under the impact of different IU levels. The momentum premium monotonically increases as the degree of IU gets greater from IU1 to IU5, suggesting a positive relationship between the IU and momentum premium, corroborating our conjecture derived based on existing theoretical postulates and empirical evidence in the literature. What's more, the amplifying effect of IU is tellingly evident as not only the average momentum premia across all IU levels (2.15%) but also the momentum premia under all IU levels, ranging from 1.84% for IU1 to 3.99% for IU5, significantly exceed the momentum premium of the (R=6, H=6) momentum trading strategy unconditional on IU proxy factor (1.64%). The amplifying effect of IU on the momentum premium can be explained with experimental evidence from psychology: spurred by greater information uncertainty facing, investors are more inclined to be optimistic (Armor and Taylor, 1998), eliciting heuristic processing procedure(Schwarz, 1990) involving the use of a series of intuitive heuristics such as affective heuristics of System 1 (intuitive) of two cognitive systems (Kahneman and Frederick, 2002). The heuristics processing procedure in human judgmental process is susceptible to strengthen the influence of various behavioural biases such as overconfidence, conservatism, underconfidence and underreaction over the momentum premium (Daniel et al., 1998, Barberis et al., 1998, Du, 2002, Hong and Stein, 1999), exhibiting as the amplified momentum premia observed under the influence of IU.

By focusing on the “Q1” column (“loser” portfolio), we observe a negative relationship between the average monthly returns of “loser” portfolios and IU and the differential return of “loser” portfolio with high IU (IU5) (weak shareholder rights) and that with low IU (IU1) (strong shareholder rights) is recorded at -0.37%, supporting the postulate that “weak shareholder rights caused poor performance” (Gompers et al., 2003: page 145) with out-of-sample empirical evidence found in the Chinese Class A share market context, firmly in line with the empirical finding that the cross-sectional stock returns are positively related to residual free float ratios[57] documented by Wang and Xu (2004) also in the Chinese Class A share market. Succinctly, the pattern manifests that “loser” portfolios consisting of stocks associated with more limited shareholder rights (greatest IU) tend to underperform those consisting of stocks of more democratic firms (less IU), echoing the prediction of underreaction/ gradual information diffusion theory (Hong and Stein, 1999, Hong et al., 2000). Specifically, skimpy communication between firms of high IU “loser” stocks and stock market participants, a reflection of limited shareholder rights (weak corporate governance), hinders the efficiency of the way share prices react toward the firm-specific information, triggering a further loss for high IU “loser” stocks (Hong et al., 2000).

On the contrary, a positive relationship between IU and average monthly returns of “winner” portfolios is found in Column Q5, where the average monthly returns of “winner” portfolios climb up from 2.73% for IU1 to 4.51% for IU5. The superior performance of “winner” portfolios with higher IU is clinched by the differential return of the “winner” portfolio with highest IU and that with lowest IU, recorded at 1.78% (t=5.03).

[57] Residual free float ratios are arrived by regressing free float ratios against logarithm market capitalizations of corresponding firms.

Table 6.7 Average monthly returns of momentum ("winner" minus "loser") portfolio independently sorted based on past returns and the strength of corporate governance as information uncertainty proxy (the (R=6, H=6) momentum trading strategy)

	Momentum Quintile						
	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q5-Q1**	**t-value**
Information uncertainty proxy: Corporate governance (proxied by 1/free float ratio)							
IU1	0.89	1.35	1.79	2.15	2.73	1.84	3.03
t-stats	3.81	3.55	4.15	2.99	5.05		
IU2	0.92	1.05	1.53	1.98	3.12	2.2	4.82
t-stats	3.05	2.95	4.01	5.62	5.05		
IU3	0.73	0.94	1.41	1.93	3.25	2.52	3.55
t-stats	2.84	2.61	2.99	2.05	7.18		
IU4	0.84	1.06	1.38	1.82	3.35	2.51	6.92
t-stats	3.59	2.18	2.03	4.28	6.04		
IU5	0.52	0.84	1.32	1.74	4.51	3.99	11.36
t-stats	1.96	3.18	5.08	3.48	10.04		
IU5-IU1	-0.37	-0.51	-0.47	-0.41	1.78	2.15	
t-value	-0.03	-0.38	-0.17	-0.2	5.03	4.55	

This table reports the average monthly returns of momentum portfolio (the difference between the average monthly returns of "winner" portfolios and "loser" portfolios at difference information uncertainty levels) grouped following the independent two-way sorting approach based on past 6-month stock returns and the strength of corporate governance as proxy for information uncertainty levels in the consolidated Class A share market consisting of all the eligible Class A stocks listed in the Shanghai Stock Exchange and Shenzhen Stock Exchange over the sample period from January 1996 to December 2008. The methodological approach is described in detail underneath Table 6.1.

6.9 Summary

To close out this section, we describe the main findings on the momentum premium under the influence of information uncertainty by summarizing the general features and differences of the impact of seven different information uncertainty proxy factors over the returns of momentum quintiles and momentum portfolios (Q5-Q1). Across the seven sections of this chapter categorized by the use of seven different 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 sections. 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 the empirical evidence found by Zhang (2006) in his seminal work in the field, corroborating the prediction reliant on investors’ underreaction theory and gradual information diffusion theory developed Hong and Stein (1999) and Hong, Lim and Stein (2000) 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.

Chapter 7 Momentum premia under the influence of information uncertainty over time periods following UP and DOWN market states

7.1 Introduction

In section 5.3 of chapter 5, we document that the momentum premia of different momentum trading strategies are asymmetrically presented over time periods following UP and DOWN market states, with the premia being significantly more pronounced quantitatively during time following UP market state than those found during time following DOWN market state. Following the spirit and in the glow of 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 and extend the discussion on the interaction between the momentum premium and information uncertainty in Chapter 6 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. Coherent with Chapter 5, we only focus on the Chinese Class A share market, with Class B shares being disregarded due to liquidity concern, and the momentum premium of the (R=6, H=6) trading strategy for the same reasons detailed in the last few sections. Additionally, the market states are defined in the same manner as they were in Chapter 5—a time period is defined as post-UP (DOWN) market state when the prior 12(24)-month average monthly return of market portfolio, proxied by a consolidated Chinese Share A Index encompassing all the Class A shares listed in the Shanghai Stock Exchange and the Shenzhen Stock Exchange, is positive (negative). By the same vein of thinking of using prior 24-month market average return as additional definition of market states discussed in section 5.3 of chapter 5, the same method is also implemented in this section to boost the power of the test and foster our findings from this section, which is elaborated on at the end of this section. Overall, this chapter will be organized in the same sequence of 7 different information uncertainty proxy factors as discussed in chapter 6 (Firm size, firm age, analysts' coverage, return volatility, dispersion in analysts' earnings forecast, trading volume and the strength/quality of corporate governance).

7.2 Firm size

This section outlines the results from the investigation of using firm size, measured by the market capitalizations of stocks ahead of the ranking period, as an IU proxy factor in influencing the momentum premium of the (R=6, H=6) momentum trading strategy during the time periods following UP and DOWN market states in the Chinese share A market. Firm size is deemed as a suitable candidate to proxy the information uncertainty levels associated with listed firms for the reason detailed in Chapter 6 and the theory chapter.

Table 7.1 presents the average monthly returns of momentum quintiles and momentum portfolio premia of the (R=6, H=6) strategy across 5 different IU levels (IU1, IU2, IU3, IU4, IU5), by which order the degree of information uncertainty increasingly heightens, during the time periods following UP market state (as shown in Panel A) and DOWN market state (as summarized in Panel B) in the Chinese

Class A share market over the whole sample period from January 1996 to December 2008. At first glance, the momentum premia across different IU levels, shown in "Q5-Q1" column, are positive and statistically significant for both case scenarios. Furthermore, in staggering contrast to the asymmetric pattern between the momentum premium of the momentum strategy unconditional on IU factor over periods following UP market state and that over time periods following DOWN market state, we observe that, by comparing Panel A and B, the average momentum-IU (firm size) premia (Q5-Q1) over the periods following UP market state (1.148%) trails those found over the periods following DOWN market state (1.522%). The above-described asymmetric influence of information uncertainty over the momentum premia over time periods over UP and DOWN market states is analyzed and explained further in the remaining part of this section.

Looking into the momentum quintiles, within "loser" portfolios (Q1), there is a positive relationship between the average monthly returns of Q1 and information uncertainty in both of Panel A and Panel B. Numerically, the returns of "loser" portfolio increase monotonically from -0.32% to 0.24% as the degree of IU gets greater from IU1 to IU5 in Panel A and from 0.65% to 1.5% in Panel B. The same positive relationship is also observed within "winner" portfolio for both case scenarios, shown in Panel A and Panel B. As IU level goes up from IU1 to IU5, the average monthly returns of "winner" portfolio creep up monotonically from 0.71% to 1.52% in Panel A and from 1.86% to 3.18% in Panel B. The 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 is consistent with the patterns recorded for momentum-IU (firm size) quintiles unconditional on market states. Overall, the results described above 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 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 large-cap “loser” and small-cap “winner” stocks.

Table 7.1 Momentum premia (monthly returns) under IU (proxied by firm size) following UP and DOWN market states (12 months) (R=6, H=6) in the Chinese Class A share market (Jan. 1996- Dec. 2008)

Panel A.	Monthly returns of momentum quintiles and momentum premia Following UP market state (12 months)						
	Momentum Quintile						
	Q1	Q2	Q3	Q4	Q5	Q5-Q1	t-value
	Information uncertainty proxy: Firm size (1/MV)						
IU1	-0.32	0.13	0.45	0.68	0.71	1.03	1.79
t-stats	-0.78	1.55	0.78	1.13	1.54		
IU2	-0.25	0.15	0.41	0.75	0.85	1.1	2.55
t-stats	-1.05	0.94	1.18	2.01	2.11		
IU3	0.02	0.17	0.39	0.83	1.18	1.16	1.89
t-stats	0.88	1.83	0.94	1.49	1.89		
IU4	0.18	0.22	0.43	0.97	1.35	1.17	2.11
t-stats	1.18	1.5	0.58	1.89	2.36		
IU5	0.24	0.31	0.33	0.92	1.52	1.28	2.51
t-stats	1.06	2.5	1.58	2.57	1.99		
IU5-IU1	0.56	0.18	-0.12	0.24	0.81	0.25	
t-value	1.85	1.99	-1.01	3.11	2.51	2.03	

Panel B.	Monthly returns of momentum quintiles and momentum premia Following DOWN market state (12 months)						
	Momentum Quintile						
	Q1	Q2	Q3	Q4	Q5	Q5-Q1	t-value
	Information uncertainty proxy: Firm size (1/MV)						
IU1	0.65	1.24	1.16	1.38	1.86	1.21	5.32
t-stats	2.19	5.91	3.21	4.19	5.89		
IU2	0.82	1.47	1.28	1.52	2.37	1.55	10.1
t-stats	3.16	3.71	1.99	5	7.55		
IU3	1.21	1.55	1.34	1.73	2.79	1.58	9.74
t-stats	4.81	3.5	4.6	6.37	12.03		
IU4	1.43	1.73	1.51	1.96	3.02	1.59	12.5
t-stats	4.5	4.88	7.29	4.58	9.31		
IU5	1.5	1.88	1.66	2.01	3.18	1.68	15.05
t-stats	3.99	6.5	8.99	6.5	10.99		
IU5-IU1	0.85	0.64	0.5	0.63	1.32	0.47	
t-value	6.88	4.75	5.16	4.88	8.64	1.55	

This table presents the average monthly returns of momentum quintiles and momentum premia under the influence of different levels of IU over time periods following UP and DOWN market states, as shown in Panel A and Panel B respectively, in the Chinese Class A share market for the sample period spanning from January 1996 to December 2008. The UP and DOWN market states are defined by prior 12-month average market return, with a consolidated Chinese Share A index being employed as a proxy for market portfolio. For simplicity and ease of comparison, the (R=6, H=6) momentum trading strategy is focused on in the investigation on the influence of information uncertainty on the momentum premia over time periods following UP and DOWN market states. The portfolios are formed based on independent two-way sorting mechanism, described in rich detail in the methodology chapter and in chapter 6. Simply put, all the eligible stocks are ranked based on their prior 6-month returns and firm size, measured by the reciprocal of their market capitalization (1/MV) prior to the ranking period purely for ease of illustration, independently into 5 quintiles for each factor. Taking the intersections of these 10 quintiles gives rise to 25 momentum-IU portfolios in total, with every stock being equally weighted within every portfolio. After skipping a month, all the resulted portfolios are held for 6 months following the buy-and-hold strategy to curb trading costs from the perspective of practicality. The momentum premia (Q5-Q1) is determined by the difference between the average monthly return of “winner” portfolio (Q5) and that of “loser” portfolio (Q1), the significance of which is indicated by corresponding t statistics. The calculation of the momentum premia under influence of IU over the periods following UP and DOWN market states is akin to Cooper et al.(2006), Huang(2006) Siagnos and Chelley-Steeley(20060 and Du et al. (2009)’s approach. Mathematically, the procedure can be expressed as $R_{W-L,t} = R_{W-L,UP}UP_t + R_{W-L,DOWN}DOWN_t + e_t$. All the numbers in the table are in percentage term.

Through running an equality test analogous to Cooper et al. (2004) and Huang (2006)’s approach, we are able to quantify how the momentum premia across 5 different IU levels over the periods following UP market state differ from the those corresponding ones over the period following DOWN market state, as shown in Table 7.2 and more vividly illustrated in Figure 7.1. In Table 7.2, the differences for all IU levels are negative and statistically positive, cementing the asymmetry between momentum premia over periods following UP market state and those over periods following DOWN market state, with the former lagging the latter, as opposed to the reversed version witnessed in section 5.2 of chapter 5 concerning the momentum trading strategies unconditional on the information uncertainty. Furthermore, the asymmetry of momentum premia between the two case scenarios is depicted in Figure 7.1, where the momentum premia of the (R=6, H=6) momentum trading strategy for the periods following UP market state is represented by red columns and those for the periods following DOWN market state by blue columns.

The vertical axis measures the momentum premia in percentage term and the horizontal axis labels the five different information uncertainty levels examined. 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, empirically supporting our conjecture for this section--- 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, formed reliant on the finds from empirical and theoretical studies by Kelsey et al. (2010) and Hong, Lim and Stein (2000) in the field of finance and experimental studies by Gilovich et al. (2002) in the domain of psychology. Visually, the above-noted pattern is strikingly distinct from the pattern of the momentum premia of momentum trading strategies unconditional on information uncertainty in the Chinese Class A share market over the periods following UP market state and DOWN market state demonstrated in Figure 5.3, in which all the 16 momentum trading strategies produce significant superior returns over the time periods following UP market state compared with over the time periods following DOWN market state, with the momentum premia of momentum strategies unconditional on IU following UP market state being positive and statistically and economically significant yet those following DOWN market state tipping into negative territory. Naturally, the questions is raised about the reason why there exists such a staggering dichotomy in the asymmetric patterns of the momentum premia following UP and DOWN market states between our analysis of the momentum strategies and of the momentum strategies conditional on the IU. Despite of the odds of impact from other confounding factors, within the scope of our research, the disparate results documented here is, to a substantial extent, the resultant of the influence of information uncertainty, proxied by firm size in this case. 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. With firm size being the yardsticks in measuring information uncertainty, the asymmetric pattern of the momentum premia over the time periods following UP market state and those over the time periods following DOWN market state can be most appropriately interpreted by a investors' underconfidence behavioural model proposed by Du (2002) (also cited by Siganos and Chelley-Steeley (2006)), whom claim that it is the traders' hesitation, largely driven by underconfidence of part of investors, in the investment decision making process, prompting an underreaction to information about stocks in the market that contributes to the larger momentum premia under the influence of information uncertainty over periods post market slides.

Taking the interpretation on a deeper level, under the theoretical framework of heuristics and biases tradition (Tversky and Kahneman, 1973), following a market downside movement, the Chinese retail investors, historically the vast majority of Chinese stock market participants (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 premia among high IU stocks over time periods following DOWN market states. 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. The underconfidence of some Chinese retail investors is further reinforced by their negative sentiment on the heels of market slide (Schwarz, 1990), consequently triggering the asymmetrically larger momentum premia found over time periods following market downdraft. Furthermore, from the perspective of the way in which investors process information, the larger momentum premia following DOWN market state can be explained as follows: subsequent to downside market movement, retail investors are pessimistic on the dim outlook of the market, 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). These theories, collectively, elucidate the reason why the amplifying effect of IU over momentum premium is reinforced over time periods following DOWN market state.

On the other hand, the amplifying effect of IU over momentum premium seems to falter over the periods following UP market state. The interpretation of the preceding observation is established under the framework of confirmation bias/representativeness heuristics (Tversky and Kahneman, 1974, Kahneman et al., 1982). More explicitly, following market run-ups, systematic judgment information processing strategy involving the use of different reflective heuristics such as statistics and abstract heuristics, induced by investors' awareness of information uncertainty/scarcity (Schwarz, 1990), overwhelms intuitive/evaluative judgment information processing strategy of investors' judgment, driven by investors' optimistic sentiment (Schwarz, 1990), curtailing the influence of a series of behavioural biases such as 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 premia. Additionally, spurred by the buoyant mood following market upside movement, Chinese retail investors with low confidence, subject to self-attribution bias(Daniel et al., 2001) and confirmation/representativeness heuristics (Tversky and Kahneman, 1974), are predisposed to place more weight on prior evidence confirms their expectation and less weight on evidence contradicts their expectation (Kahneman et al., 1982), resulting in the overreaction of share price and hence abysmal momentum premia over the periods following market run-ups on the premise of Du (2002)'s investors' underreaction behavioural model.

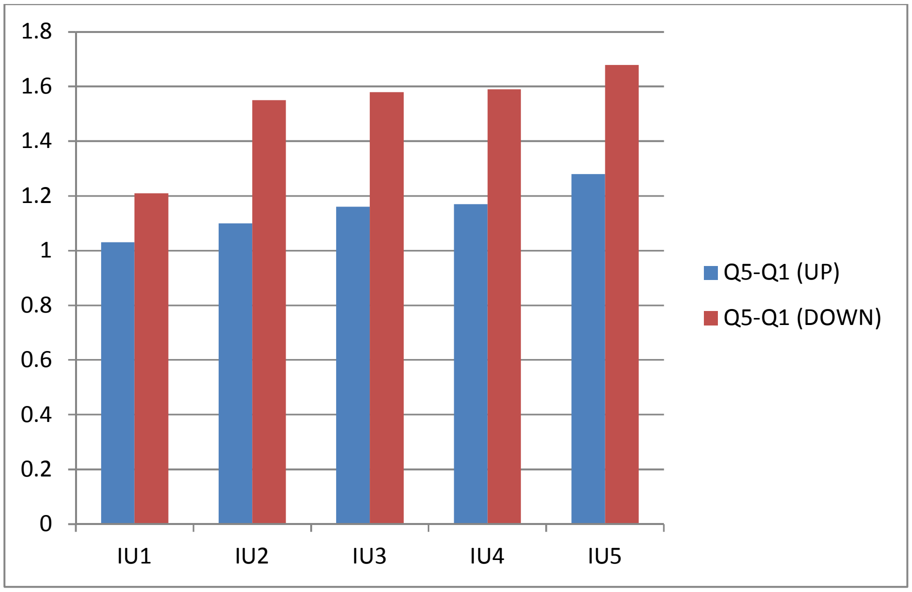
Collectively, various behavioural finance theories in conjunction with the experimental evidence in psychology explain the asymmetric pattern of momentum premium of the (R=6, H=6) strategy conditional on IU (firm size) over time periods following different market states observed, echoing our conjecture derived from the gradual information-diffusion hypothesis advanced by Hong, Lim and Stein (2000) as discussed in detail earlier on.

Table 7.2 Equality test results of state-dependent momentum-IU (firm size) premia (following UP and DOWN market states) in the Chinese Class A share market (R=6, H=6)

Equality test (MOM and IU (1/MV))(12 months) UP-DOWN=0						
	IU1	IU2	IU3	IU4	IU5	IU5-IU1
Q5-Q1 (UP)	1.03	1.1	1.16	1.17	1.28	0.25
Q5-Q1(DOWN)	1.21	1.55	1.58	1.59	1.68	0.47
Difference	-0.18	-0.45	-0.42	-0.42	-0.4	
t stats	-1.59	-2.04	-1.37	-1.73	-1.25	
Overall	1.37	1.74	1.79	1.97	2.34	0.97

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 (UP_t) and an intercept (α), following the same methodology for equality test used by Cooper et al. (2004) and Du et al. (2009). Mathematically, it can be written as $R_{W-L,t} = \alpha + R_{W-L,UP-DOWN}UP_t + e_t$. The t statistics associated with each difference is listed in the row below.

Figure 7.1 Comparison between the momentum-IU (firm size) premia of the (R=6, H=6) strategy over the time period following UP and DOWN market states in the Chinese Class A share market (Jan. 1996- Dec. 2008)



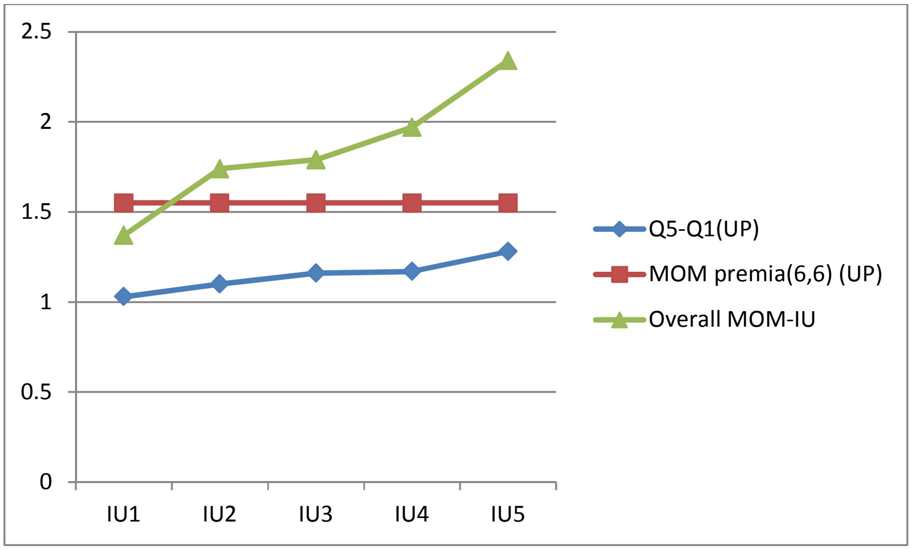
Notes: The column-shaped diagram illustrates the difference of momentum-IU premia of the (R=6, H=6) momentum trading strategy over time periods following UP and DOWN market states in the Chinese Class A share market for the sample time period. The vertical axis measures the momentum-IU premia in percentage form; the horizontal axis labels the 5 different levels of IU, with IU1 representing the lowest level and IU5 the highest level. For each IU level, the corresponding momentum premium following UP market state is demonstrated by the blue-coloured column, whereas that following DOWN market state is indicated by the red-coloured column.

Figure 7.2 and 7.3 demonstrate the fluctuations of the momentum premia of the (R=6, H=6) trading strategy, conditional on both IU and market states, as IU level varies during the periods following UP and DOWN market states in the Chinese Class A share market in comparison with the momentum premia of the (R=6, H=6) strategy conditional only on market states and the momentum premia of the (R=6, H=6) strategy conditional only on IU by plotting the momentum premia produced by three different types of conditional (R=6, H=6) momentum strategy on two different diagrams categorized by different conditions of market state. The blue line represents the momentum premia of the (R=6, H=6) momentum strategy conditional on both IU and market state (over periods following UP market state in Figure 7.2 and over periods following DOWN market state in Figure 7.3); the red line charts the momentum premia of the (R=6, H=6) momentum strategy conditional on market state; the green line represents the momentum premia of the (R=6, H=6) momentum strategy conditional on IU. For the testing periods following UP market state (illustrated in Figure 7.2), even though the momentum premia of the (R=6, H=6) trading strategy conditional on 4 of total five IU levels for overall same period exceed the momentum premium of (R=6, H=6) strategy unconditional on IU, the same trading strategy conditional on IU and UP market state consistently fares worse than the other two case scenarios depicted in the figure across all IU levels. This picture portrays the evidence that the information uncertainty does boost the momentum premia for the overall sample period, yet the amplifying effect actually languishes and reverses its course for the testing periods following UP market state. Unequivocally, the question is raised about the reason why post-UP market state condition seems to damp the amplifying effect of the IU on the momentum premia comprehensively. This observation can be interpreted based on the experimental evidence of investors' optimism documented by Armor and Taylor (2002) in the domain of psychology. Being more specific, buoyed by the euphoria from the previous market run-up and more optimistic sentiment, investors may well take advantage of extra cognitive resources for the time being and practice more deliberate heuristics[58] in making investment decision, effectively keeping a lid on triggering extended underreaction of share prices and in turn attenuating the momentum premia (Kahneman and Frederick, Frederick, 2002) during post-UP market state periods, reflected by the languished amplifying effect of IU over the momentum premia.

[58] More deliberate heuristics include neutral, statistics, abstract, sets processing assessment in judgment, which all belong to the System 2(Reflective) of the two Cognitive systems proposed by Kahneman and Frederick (2002)(page 51).

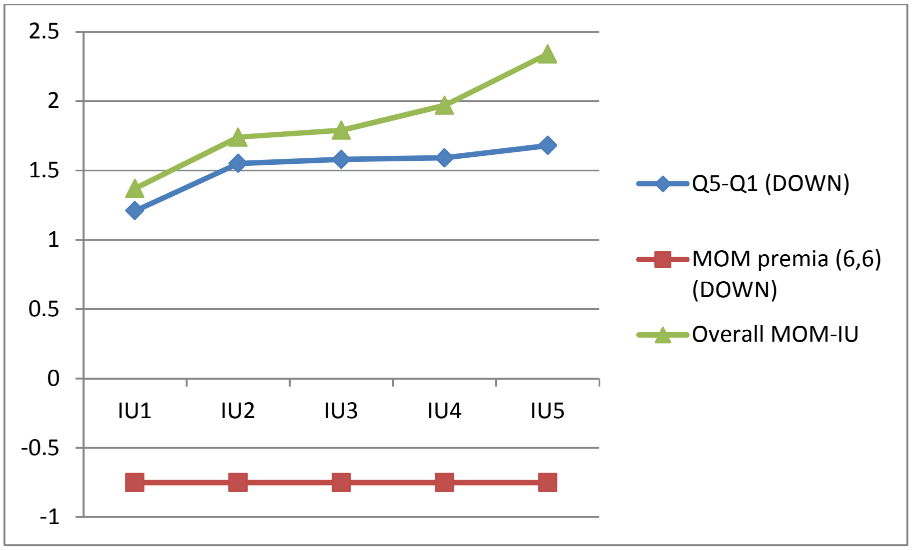
In comparison to what was just described in Figure 7.3, a strikingly different picture is observed with regard to the results for the time periods following DOWN market state. Specifically, both sets of the momentum premia of the (R=6, H=6) trading strategy conditional on IU and DOWN market state and those conditional only on IU outstrip the momentum yield of the same trading strategy conditional only on DOWN market state across all IU levels. In other words, the amplifying effect of IU over the momentum premia is maximized for the scenario when the (R=6, H=6) momentum strategy is applied conditional only on IU, and also sustains for the scenario when the (R=6, H=6) momentum trading strategy is employed conditional on both IU and post-DOWN market state. Hinging on the above-noted evidence and in view of the depressed momentum premia of the (R=6, H=6) strategy unconditional on IU over the testing time periods following DOWN market state, we conjecture that the amplifying effect of IU over the momentum premium is, to a markedly large extent, driven by the impact of IU over the momentum premia over time periods following DOWN market state. This theorising is in line with the gradual information-diffusion theory developed by Hong, Lim and Stein (2000) and the traders' underconfidence behavioural model developed by Du (2002), receiving further support from psychology research by Griffin and Tversky (2002) as described in great detail earlier in this section in explaining why the amplifying of IU over momentum premium is not only present but also enhanced over the periods following market downside movements.

Figure 7.2 Comparison: momentum-IU (firm size) premia over periods following UP market state, momentum premia of the (R=6, H=6) strategy conditional on post-UP market state, overall momentum-IU(firm size) premia in the Chinese A market (Jan. 1996-Dec. 2008)



Notes: This figure demonstrates the difference among momentum-IU premia over periods following UP market state, momentum premia of the (R=6, H=6) momentum strategy conditional on post-UP market state, overall momentum-IU premia in the Chinese Class A share market. The vertical axis measures the returns in percentage form. The blue line represents the fluctuations in the momentum premia across different levels of IU over the periods following UP market state; the red line illustrates the premium of (R=6, H=6) momentum strategy unconditional on IU and market states; the green line represents the changes of momentum premia across different IU levels unconditional on market states.

Figure 7.3 Comparison: momentum-IU (firm size) premia over periods following DOWN market state, momentum premia of the (R=6, H=6) strategy conditional on post-DOWN market state, overall momentum-IU (firm size) premia in the Chinese Class A market (01/96-12/08)



Notes: This figure demonstrates the difference among momentum-IU premia over periods following DOWN market state, momentum premia of the (R=6, H=6) momentum strategy conditional on post-DOWN market state, overall momentum-IU premia in the Chinese Class A share market. The vertical axis measures the returns in percentage form. The blue line represents the fluctuations in the momentum premia across different levels of IU over the periods following DOWN market state; the red line illustrates the premium of (R=6, H=6) momentum strategy unconditional on IU and market states; the green line represents the changes of momentum premia across different IU levels unconditional on market states.

Inspired by the behavioural model portraying the way three types of investors---uncertainty neutral arbitragers, uncertainty averse traders and momentum traders—behave in contributing to the momentum phenomenon proposed by (Kelsey et al., 2010), Figure 7.4 depicts the fluctuations of asymmetry of positive momentum[59] (returns of "winner" portfolios) and negative momentum (returns of "loser" portfolios) in contributing to the momentum premia of the (R=6, H=6) momentum strategy across 5 five different levels of information uncertainty. The vertical axis measures the sum of positive momentum and negative momentum in percentage term; the horizontal axis labels different levels of information uncertainty. The blue line indicates the changes of the sum of positive momentum and negative momentum across 5 IU levels for the time periods following UP market state, and the red line

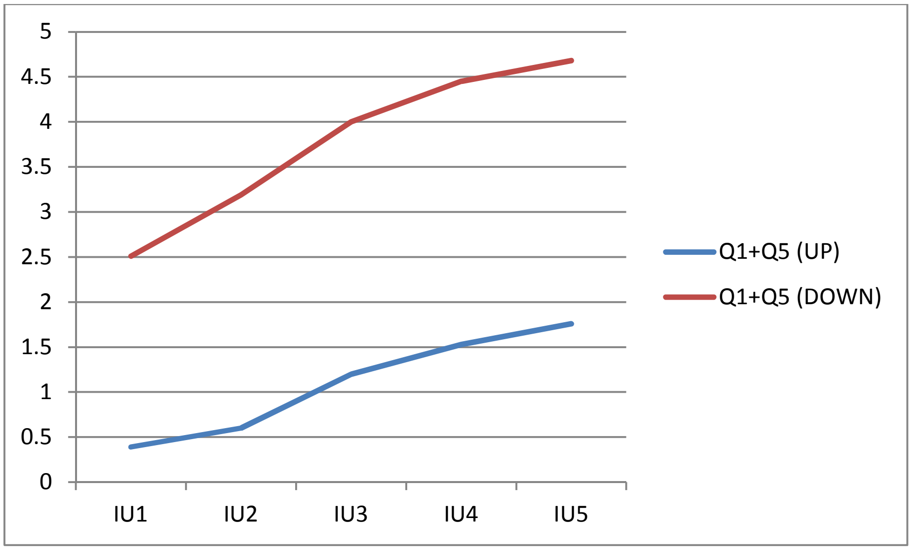
[59] The way positive and negative momentums are termed is consistent with Kelsey, Kozhan and Pang (2010) for ease of comparison and avoiding any confusion.

illustrates the changes of the sum of positive and negative momentums at different IU levels for the time periods following DOWN market state. From the statistics box above the figure, it is noticeable that regardless of market state conditions, the sum of positive momentum and negative momentum of the momentum portfolio with the highest IU level (IU5) far exceeds that with lowest IU level (IU1). Specifically, the difference (IU5-IU1) is more staggering for the testing periods following DOWN market state, with the sum of positive and negative momentum of momentum portfolio at IU5 outpacing that at IU1 by 2.17%, than that for the testing periods following UP market state (1.37%), implying that the effect of positive momentum overwhelms the effect of negative momentum in contributing to the momentum premia. In addition, we find that momentum portfolios associated with higher IU tend to have higher sum of positive and negative momentum, demonstrated by positively-sloped red and blue lines despite both being non-linear. In sum, it is evident that aside from market state conditions, the divide of the effects of positive momentum and negative momentum grows wider as information uncertainty level heightens, with positive momentum being the driving force. The evidence found here parallels the hypothesis and empirical evidence documented by Kelsey et al. (2010) to the extent that high IU amplifies the asymmetry of positive and negative momentum effects, and in turn boost the momentum premia in the U.S. stock markets yet contradicts their find by showing that positive momentum (“winner” portfolio), instead of negative momentum (“loser” portfolio) as suggested by Kelsey et al. in the U.S. stock market, is the driving force behind the momentum premia in the Chinese share A market, and asymmetry between positive and negative momentum and the prompted momentum premia are more pronounced for the testing periods following

DOWN market state, illustrated by the red line being higher above the blue line in Figure 7.4. Overall, the evidence seen here is in line with the prediction of gradual information-diffusion theory by (Hong, Lim and Stein, 2000), underreaction theory (Hong and Stein, 1999) and traders' underconfidence behavioural model (Du, 2002).

Figure 7.4 Asymmetry of positive momentum (Q5) and negative momentum (Q1) over the time periods following UP and DOWN market states in the Chinese Class A share market (Jan. 1996- Dec. 2008) (firm size)

	UP market		
	Q1	Q5	Q1+Q5
IU1	-0.32	0.71	0.39
IU2	-0.25	0.85	0.6
IU3	0.02	1.18	1.2
IU4	0.18	1.35	1.53
IU5	0.24	1.52	1.76
IU5-IU1			1.37
	DOWN market		
	Q1	Q5	Q1+Q5
IU1	0.65	1.86	2.51
IU2	0.82	2.37	3.19
IU3	1.21	2.79	4
IU4	1.43	3.02	4.45
IU5	1.5	3.18	4.68
IU5-IU1			2.17



Notes: The statistics box above the figure summarizes positive momentum (Q5) and negative momentum (Q1) for testing periods following UP and DOWN market states. This figure depicts the difference of the asymmetry of positive momentum (Q5) and negative momentum (Q1) over the time periods following UP market state, plotted as the blue line, and DOWN market state, graphed as the red line in the Chinese Class A share market over Jan. 1996 to Dec. 2008.The vertical axis measures 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 level of information uncertainty. The upward sloped lines suggest that regardless of market states, 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.

7.3 Firm age

This section summarizes and interprets the results from the investigation on the momentum premium of the (R=6, H=6) momentum trading strategy conditional on IU, proxied by firm age (measured by the number of days prior to the ranking period since eligible stocks first get listed or first appear in the database) in the Chinese Class A share market over the time periods following UP and DOWN market state over the whole sample period from January 1996 to December 2008.

Table 7.3 reports the average monthly returns of momentum quintiles and momentum premia of the (R=6, H=6) trading strategy across 5 different IU levels for the time periods following UP market state, shown in Panel A, and for the time periods following DOWN market state as presented in Panel B. By focusing on the Q5-Q1 columns of two panels, we observe that the momentum premia across different IU levels stay positive and statistically significant under both market state conditions, yet coherent with the pattern witnessed in the previous section, the momentum premia of the (R=6, H=6) trading strategy conditional on IU tend to be consistently more pronounced over the time periods following DOWN market state than over the time periods following UP market state, contrary to the pattern of the momentum premia conditional solely on market state conditions. More specifically, the momentum premia of the (R=6, H=6) strategy conditional on firm age as IU proxy factor over the periods following UP market state average out at 0.76%, only about half of the momentum premium of the (R=6, H=6) strategy unconditional on IU under the same market state condition (1.55%). On the post-DOWN market state condition front, the momentum premia across different levels of IU average out at 1.83%, in stark contrast with the negative return (-0.75%) of momentum portfolio realized for the (R=6, H=6) trading strategy unconditional on IU. The observed asymmetric pattern of momentum premia conditional on both IU and market states supports our hypothesis, largely in line with the predictions of gradual-information-diffusion theory by Hong et al. (2000) in finance research and evidence of the determinants of investor's confidence by Griffin and Tversky (2002) in psychology as explained in detail in the previous section and in summary at the end of this section.

In view of the performance of different momentum quintiles, within "loser" portfolios (Q1), contrary to positive relationship between returns of "loser" portfolios and IU observed in the previous section, the returns of "loser" portfolio here lurch lower in a monotonic fashion as IU level heightens under both market state scenarios, consistent with the pattern found when the (R=6, H=6) momentum trading strategy conditional on IU yet unconditional on market states was implemented. This find most certainly doesn't conform to the risk-return relationship structured by (Sharpe, 1964) yet is in accord with the empirical evidence documented by Zhang (2006)—the momentum premium is propped up by investors' overconfidence when facing higher degree of IU as theorised by Daniel et al. (1998). On the other hand, the returns of "winner" portfolio appear to be positively related to the IU levels, paralleling the pattern documented for the momentum premia of the (R=6, H=6) trading strategy solely conditional on IU, which can be interpreted by the gradual-information-diffusion theory developed by Hong, Lim and Stein (2000) as detailed in previous section.

Table 7.3 Momentum premia (monthly returns) under IU(firm age) during time periods following UP and DOWN market states (12 months) (R=6, H=6) in the Chinese Class A market (Jan. 1996-Dec. 2008)

Panel A.	**Monthly returns of momentum quintiles and momentum premia Following Up market state (12 months)**						
	Momentum Quintile						
	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q5-Q1**	**t-value**
	Information uncertainty proxy: Firm age (1/Age)						
IU1	0.47	0.66	0.81	0.95	0.93	0.46	1.04
t-stats	1.08	0.66	1.05	1.81	1.83		
IU2	0.35	0.59	1.02	0.89	0.89	0.54	1.12
t-stats	0.57	1.05	0.85	0.68	0.91		
IU3	0.25	0.37	0.75	1.04	0.88	0.63	0.99
t-stats	0.48	0.31	0.99	1.03	1.02		
IU4	0.16	0.21	0.51	0.89	1.04	0.88	2.01
t-stats	0.79	0.73	1.01	0.81	0.77		
IU5	-0.11	0.05	0.47	0.81	1.18	1.29	1.85
t-stats	-1.05	0.36	1.5	1.19	1.15		
IU5-IU1	-0.58	-0.61	-0.34	-0.14	0.25	0.83	
t-value	-2.1	-0.92	-0.72	-0.87	1.57	2.05	

Panel B.	Monthly returns of momentum quintiles and momentum premia Following DOWN market state (12 months)						
	Momentum Quintile						
	Q1	Q2	Q3	Q4	Q5	Q5-Q1	t-value
	Information uncertainty proxy: Firm age (1/Age)						
IU1	3.08	2.86	1.46	2.47	3.49	0.41	5.83
t-stats	5.01	3.48	4.9	6.91	10.19		
IU2	1.83	1.79	1.55	2.17	2.87	1.04	9.1
t-stats	4.85	4.15	5.93	7.44	8.81		
IU3	1.28	1.48	1.61	1.99	2.56	1.28	10.35
t-stats	3.25	3.19	4.01	5.36	7.91		
IU4	0.96	1.36	1.59	1.8	4.18	3.22	11.1
t-stats	2.99	4.51	5.88	4.14	6.54		
IU5	0.72	1.25	1.21	1.75	3.92	3.2	13.52
t-stats	3.12	6.19	6.71	5.81	3.29		
IU5-IU1	-2.36	-1.61	-0.25	-0.72	0.43	2.79	
t-value	-5.28	-3.09	-4.91	-4.33	9.81	2.95	

This table presents the average monthly returns of momentum quintiles and momentum premia under the influence of different levels of IU over time periods following UP and DOWN market states, as shown in Panel A and Panel B respectively, in the Chinese Class A share market for the sample period spanning from January 1996 to December 2008. The UP and DOWN market states are defined by prior 12-month average market return, with a consolidated Chinese Share A index being employed as a proxy for market portfolio. The methodological approach is described underneath Table 7.1.

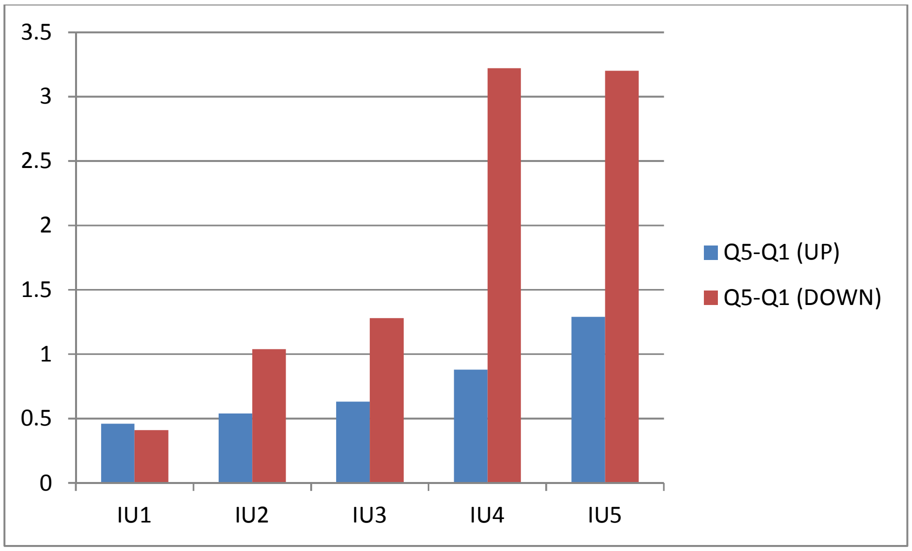
Similar to the previous section, the difference between the momentum premia of the (R=6, H=6) trading strategy conditional on IU, measured by firm age, over time periods following two market states across 5 different information uncertainty levels is quantified and reported in Table 7.4 and is further depicted in Figure 7.5. This empirical results stay firmly in line with the prediction of our hypothesis—the amplifying effect of IU over the momentum premia is further exacerbated over the time periods following DOWN market state, which makes perfect sense as in face of high IU, investors' judgment is inevitably fraught with more cognitive distortions and illusions such as underreaction (Hong and Stein, 1999) and investors' underconfidence (Du, 2002). Furthermore, the asymmetric amplifying effect of IU on the momentum premia over time periods following two market states is demonstratively more evident in Figure 7.5. Consistent with the observation in previous section, over the time periods following DOWN market state, instead of being south of break-even for the (R=6, H=6) strategy unconditional on IU as shown in Figure 5.3, the momentum premia of the (R=6, H=6) strategy conditional on IU and post-DOWN market state dwarf those conditional on IU and post-UP market state at 4 out of total five IU levels. It is also worth noting that the asymmetry grows wider as IU level edges up, providing further empirical support to our prediction hinges on the theoretical frameworks by Hong and Stein (1999) and Du (2002) in behavioural finance and evidence of human heuristics in psychology (Gilovich et al., 2002). More importantly, by brushing off any doubts on whether the pattern of differential returns documented when using firm size as IU proxy factor is a singled-out coincidence, the pattern found here lends support to clinch the proposition claimed in the previous section that the information uncertainty is the lynch pin in resulting in the distinct asymmetric pattern of the differential momentum premia of the (R=6, H=6) strategy conditional on the degree of IU over periods following two different market states.

Table 7.4 Equality test results of state-dependent momentum-IU (firm age) premia following UP and DOWN market states in the Chinese Class A market (R=6, H=6)

Equality test (MOM and IU (1/Age))(12 months)						
			UP-DOWN=0			
	IU1	IU2	IU3	IU4	IU5	IU5-IU1
Q5-Q1 (UP)	0.46	0.54	0.63	0.88	1.29	0.83
Q5-Q1(DOWN)	0.41	1.04	1.28	3.22	3.2	2.79
Difference	0.05	-0.5	-0.65	-2.34	-1.91	
t stats	0.26	-1.58	-2.93	-2.55	-3.11	
Overall	0.65	1.03	1.24	1.88	2.3	1.65

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 (UP_t) and an intercept (α), following the same methodology for equality test used by Cooper et al. (2004) and Du et al. (2009). Mathematically, it can be written as $R_{W-L,t} = \alpha + R_{W-L,UP-DOWN}UP_t + e_t$. The t statistics associated with each difference is listed in the row below.

Figure 7.5 Comparison between the momentum-IU(firm age) premia of the (R=6, H=6) strategy over time periods following UP and DOWN states in the Chinese Class A market (Jan. 1996- Dec. 2008)

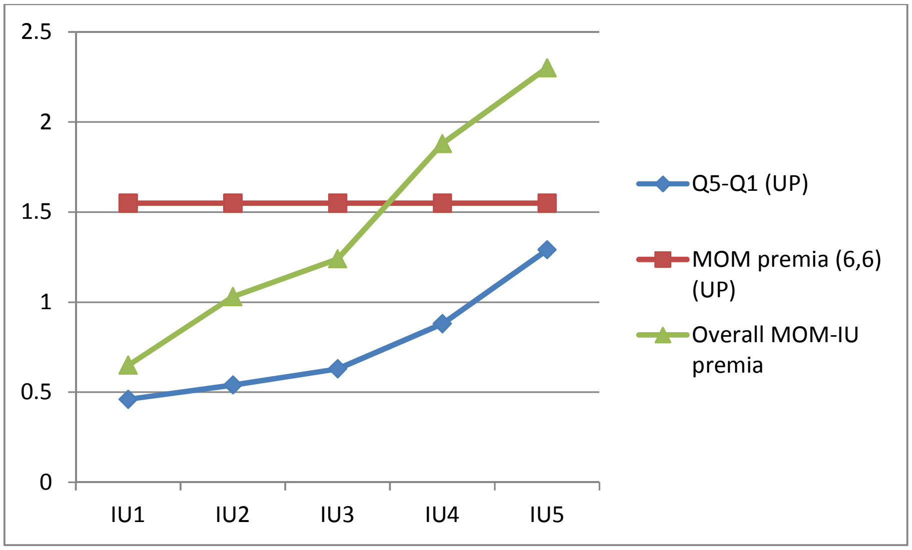


Notes: The column-shaped diagram illustrates the difference of momentum-IU premia of the (R=6, H=6) momentum trading strategy over time periods following UP and DOWN market states in the Chinese Class A share market for the sample time period. The vertical axis measures the momentum-IU premia in percentage form; the horizontal axis labels the 5 different levels of IU, with IU1 representing the lowest level and IU5 the highest level. For each IU level, the corresponding momentum premium following UP market state is demonstrated by the blue-coloured column, whereas that following DOWN market state is indicated by the red-coloured column.

Figure 7.6 and 7.7 graphically illustrate the comparison of the momentum premia of the (R=6, H=6) trading strategy conditional on different factors (IU, market states and both IU and market states). For the momentum premia over the time periods following UP market state, as shown in Figure 7.6, the amplifying effect of the IU unconditional on market states (green line) is rather subdued for the lowest three IU levels and become increasingly more pronounced from IU4 to IU5 on a dime. In contrast, the momentum premia of the (R=6, H=6) strategy conditional on IU and UP market state appear to be rather immune to the amplifying effect of the IU, supposed to be effective on theoretical grounds, for all IU levels. The dampened amplifying effect of the IU can be elucidated by human heuristics when facing information uncertainty in the post-UP market state periods, during which investors are more likely to exercise more systematic processing approaches, encompassed in System 2 (reflective) of the two cognitive systems proposed by Kahneman and Frederick (2002). With more statistical heuristics overriding intuitive heuristics, the weakening of the momentum premia is inevitable.

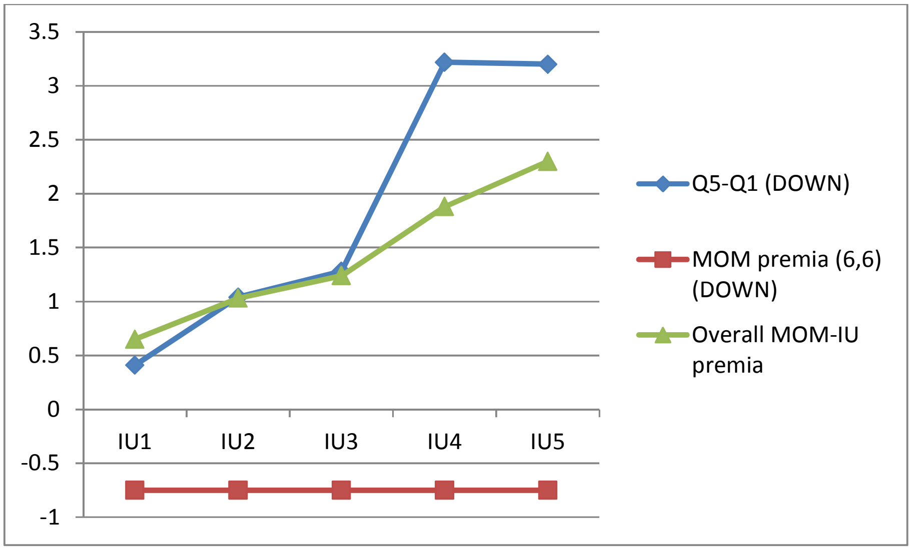
On the other hand, the amplifying effect of the IU appears to be evidently prevalent over the momentum premia of both of the (R=6, H=6) strategy conditional on IU and that conditional on IU and post-DOWN market state. More impressively, the momentum premia of the trading strategy conditional on IU and DOWN market state shoot up, far outpacing those of the trading strategy conditional only on IU at the two highest IU levels—IU4 and IU5, implying that the amplifying effect of the IU over the momentum premium is maximized over the time periods following DOWN market state. The claim is theoretically supported by the gradual-information-diffusion model by Hong, Lim and Stein (2000) and investors' underconfidence behavioural model by Du (2002).

Figure 7.6 Comparison: momentum-IU (firm age) premia over periods following UP market state, momentum premium of the (R=6, H=6) strategy conditional on post-UP market sate, overall mom-IU (firm age) premia in the Chinese Class A market (Jan. 96- Dec.08)



Notes: This figure demonstrates the difference among momentum-IU premia over periods following UP market state, momentum premia of the (R=6, H=6) momentum strategy conditional on post-UP market state, overall momentum-IU premia in the Chinese Class A share market. The vertical axis measures the returns in percentage form. The blue line represents the fluctuations in the momentum premia across different levels of IU over the periods following UP market state; the red line illustrates the premium of (R=6, H=6) momentum strategy unconditional on IU and market states; the green line represents the changes of momentum premia across different IU levels unconditional on market states.

Figure 7.7 Comparison: momentum-IU (firm age) premia over periods following DOWN market state, momentum premia of the (R=6, H=6) strategy conditional on post-DOWN market state, overall momentum-IU (firm age) premia in the Chinese Class A market (Jan.96- Dec.08)

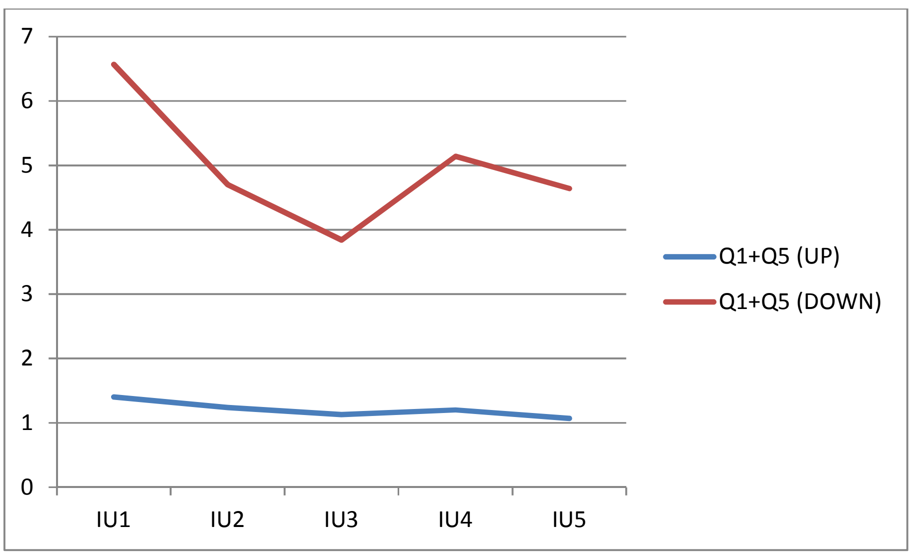


Notes: This figure demonstrates the difference among momentum-IU premia over periods following DOWN market state, momentum premia of the (R=6, H=6) momentum strategy conditional on post-DOWN market state, overall momentum-IU premia in the Chinese Class A share market. The vertical axis measures the returns in percentage form. The blue line represents the fluctuations in the momentum premia across different levels of IU over the periods following DOWN market state; the red line illustrates the premium of (R=6, H=6) momentum strategy unconditional on IU and market states; the green line represents the changes of momentum premia across different IU levels unconditional on market states.

Following the spirit of Kelsey et al. (2010) who look into the asymmetric effects of positive momentum (Q1) and negative momentum (Q5) on the momentum premia under uncertainty, Figure 7.8 aims at demonstrating how the impact of positive momentum differs from that of negative momentum under uncertainty over the time periods following UP and DOWN market states. Looking into the statistics box above the figure, under both market state conditions, the differences of the sum of positive and negative momentum between IU5 and IU1 (IU5-IU1) are negative, implying that negative momentum is the driving force behind the momentum premia, contradicting the evidence showing positive momentum is driving momentum premia when firm size is employed to gauge IU levels discussed earlier yet paralleling the evidence found in the U.S stock markets by Kelsey et al. (2010). In addition, the dominant role negative momentum plays in contributing to the momentum premia is more evident over the time periods following DOWN market state than those over the time periods following UP market state, demonstrated by smaller magnitude of the sum (-0.33%) for post-UP market state condition than (-1.93%) for post-DOWN market state condition. Moreover, as shown in the figure, the fact that both lines are downward-sloped suggests that the asymmetric effects of positive and negative momentums on the momentum premium, with negative momentum being the dominant force, increase as the degree of IU gets greater, consistent with the evidence documented by Kelsey et al. (2010) in the U.S. stock markets. The observation that the red line (the sum of positive and negative momentum for periods following DOWN market state) is well above the blue line (the sum of positive and negative momentum over periods following UP market state) and the blue line is roughly flatter than red line supports our hypothesis that the amplifying effect of IU prevails in a more significant manner over time periods following DOWN market state, which is in line with the prediction of gradual-information-diffusion theory (Hong et al., 2000), underreaction theory(Hong and Stein, 1999) and traders' underconfidence behavioural model (Du, 2002) as described earlier.

Figure 7.8 Asymmetry of positive momentum (Q5) and negative momentum (Q1) over periods following UP and DOWN market states in the Chinese Class A share market (Jan. 1996- Dec. 2008) (firm age)

	Q1	Q5	Q1+Q5
UP market			
IU1	0.47	0.93	1.4
IU2	0.35	0.89	1.24
IU3	0.25	0.88	1.13
IU4	0.16	1.04	1.2
IU5	-0.11	1.18	1.07
IU5-IU1			-0.33
DOWN market			
	Q1	Q5	Q1+Q5
IU1	3.08	3.49	6.57
IU2	1.83	2.87	4.7
IU3	1.28	2.56	3.84
IU4	0.96	4.18	5.14
IU5	0.72	3.92	4.64
IU5-IU1			-1.93



Notes: The statistics box above the figure summarizes positive momentum (Q5) and negative momentum (Q1) for testing periods following UP and DOWN market states. This figure depicts the difference of the asymmetry of positive momentum (Q5) and negative momentum (Q1) over the time periods following UP market state, plotted as the blue line, and DOWN market state, graphed as the red line in the Chinese Class A share market over Jan. 1996 to Dec. 2008.The vertical axis measures 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 level of information uncertainty. The upward sloped lines suggest that regardless of market states, 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.

7.4 Analysts’ coverage

Table 7.5 reports average monthly returns of momentum quintiles and momentum premia of the (R=6, H=6) momentum trading strategy conditional on IU, proxied by analysts’ coverage being measured by the residual from regressing the number of analysts covering the firm (by reporting earnings forecasts) in the year prior to the ranking period against the market capitalization of the corresponding firm (1/COV), over time periods following UP market state (Panel A) and DOWN market state (Panel B) in the Chinese Class A share market over the sample period from January 1996 to December 2008. Firstly looking into the Q5-Q1 columns of both panels, the momentum premia across different IU levels, regardless of market state condition, are found positive and statistically significant. In Panel A, the momentum premia of the (R=6, H=6) trading strategy conditional on IU and post-UP market state average out at 2.23% across all IU levels, well outstripping the 1.55% yield of the ((R=6, H=6) momentum trading strategy conditional solely on post-UP market state. Yet a more dramatic picture is witnessed in Panel B, where the average momentum premia of the (R=6, H=6) strategy conditional on IU and post-DOWN market state (3.25%) triumphs the momentum premium of the same strategy conditional only on post DOWN market state (-0.75%). Besides, the average momentum premia of the (R=6, H=6) trading strategy conditional on IU and both post-UP and DOWN market states exceed the average momentum premia of the same strategy conditional solely on IU (1.91%), indicating that the amplifying effect of the IU over the momentum premia is evidently present under both market state conditions. i.e. periods following UP market state and those following DOWN market state. Futhermore, coherent with our proposition, the amplifying effect of IU is more considerable on the momentum premia of the (R=6, H=6) strategy for the periods following DOWN market state. This observation is evidenced by the average momentum premia conditional on IU and post-DOWN market state (3.25%) bettering those conditional on IU and post-UP market state (2.23%), as opposed to the difference of momentum premia of the (R=6, H=6) strategy conditional on two market states unconditional on IU, with the strategy yielding superior returns over periods following UP market state. In sum, the preceding evidence is supported by studies in finance domain such as underreaction theory(Hong and Stein, 1999) and the gradual-information-diffusion theory (Hong et al., 2000), as well as in the field of psychology such as the determinants of confidence (Griffin and Tversky, 2002).

Within “loser” portfolio return column (Q1) of Panel A, there is not a clear relationship observed between average monthly returns of “loser” momentum quintiles and IU levels. However, the returns of “loser” portfolios decline monotonically as IU level raises in Panel B, consistent with Zhang (2006)’s finding and supported by investors’ overreaction theory by Daniel et al. (1998). On the other hand, the returns of “winner” momentum quintiles are found to be positively related to the IU levels in both panels, concurring with the prediction of gradual-information-diffusion theory(Hong et al., 2000), coupled with the proposition of investors’ optimism heuristics under uncertainty—investors illusion of possessing better prediction ability gets exaggerated when being optimistic in face of uncertainty(Dunning et al., 2002). In other words, the overreaction prompted by the exaggerated illusion extends the upward trend of “winner” stocks/portfolios.

Table 7.5 Momentum premia (monthly returns) under IU (proxied by analysts' coverage) during periods following UP and DOWN market states (12 months) ((R=6, H=6) momentum trading strategy) in the Chinese Class A market (01/96-12/08)

Panel A. Monthly returns of momentum quintiles and momentum premia Following UP market state (12 months)							
	Momentum Quintile						
	Q1	Q2	Q3	Q4	Q5	Q5-Q1	t-value
	Information uncertainty proxy: Analyst coverage (1/COV)						
IU1	-0.25	-0.12	1.65	1.68	1.76	2.01	1.01
t-stats	-1.08	-1.55	1.47	0.87	2.5		
IU2	-0.43	-0.03	1.29	1.59	1.6	2.03	0.86
t-stats	-1.46	-2.05	1.69	0.37	1.86		
IU3	-0.33	0.14	1.22	1.48	2.03	2.36	1.21
t-stats	-0.05	1.45	2.01	1.35	0.98		
IU4	-0.25	0.21	1.17	1.39	2.1	2.35	2.06
t-stats	-0.85	1.08	0.95	2.1	1.28		
IU5	-0.14	0.33	1.02	1.25	2.24	2.38	3.09
t-stats	-0.47	1.84	1.27	1.16	2.28		
IU5-IU1	0.11	0.45	-0.63	-0.43	0.48	0.37	
t-value	1.22	1.52	-0.47	-0.96	1.06	1.94	

Panel B. Monthly eturns of momentum quintiles and momentum premia Following DOWN market state (12 months)							
	Momentum Quintile						
	Q1	Q2	Q3	Q4	Q5	Q5-Q1	t-value
	Information uncertainty proxy: Analyst coverage (1/COV)						
IU1	1.57	2.65	1.77	2.1	4.05	2.48	4.91
t-stats	3.62	2.99	3.28	3.64	5.28		
IU2	1.49	2.31	2.57	3.04	4.16	2.67	5.72
t-stats	5.88	3.5	2.91	4.77	7.39		
IU3	1.31	3.01	1.65	2.82	5.03	3.72	4.98
t-stats	4.18	2.85	3.17	5.1	6.15		
IU4	1.15	1.73	1.43	3.01	5.16	4.01	8.54
t-stats	3.18	3.17	2.57	6.36	8.39		
IU5	1.02	1.65	1.28	3.49	5.15	4.13	18.4
t-stats	5.09	4.72	3.08	4.81	14		
IU5-IU1	-0.55	-1	-0.49	1.39	1.1	1.65	
t-value	-2.06	-1.02	-0.43	-0.89	3.18	3.06	

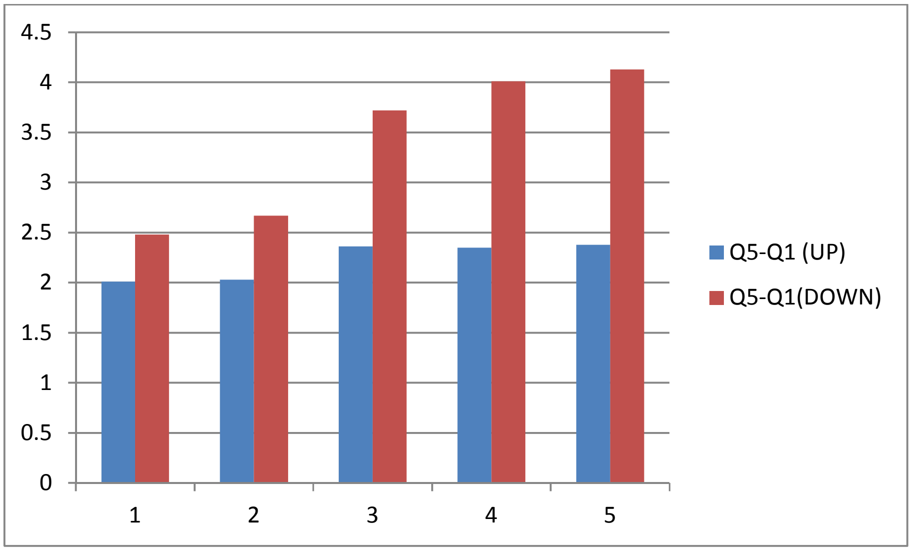
This table presents the average monthly returns of momentum quintiles and momentum premia under the influence of different levels of IU over time periods following UP and DOWN market states, as shown in Panel A and Panel B respectively, in the Chinese Class A share market for the sample period spanning from January 1996 to December 2008. The UP and DOWN market states are defined by prior 12-month average market return, with a consolidated Chinese Share A index being employed as a proxy for market portfolio. The methodological approach is described underneath Table 7.1.

Table 7.6 Equality test results of state-dependent momentum-IU (analysts' coverage) premia (folowing UP and DOWN market states) in the Chinese Class A market (R=6, H=6)

Equality test (MOM and IU (1/COV))(12 months)						
UP-DOWN=0						
	IU1	IU2	IU3	IU4	IU5	IU5-IU1
Q5-Q1 (UP)	2.01	2.03	2.36	2.35	2.38	0.37
Q5-Q1(DOWN)	2.48	2.67	3.72	4.01	4.13	1.65
Difference	-0.47	-0.64	-1.36	-1.66	-1.75	
t stats	-2.39	-1.95	-3.04	-2.05	-1.74	
Overall	1.91	2.07	2.57	2.86	3.78	1.87

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 (UP_t) and an intercept (α), following the same methodology for equality test used by Cooper et al. (2004) and Du et al. (2009). Mathematically, it can be written as $R_{W-L,t} = \alpha + R_{W-L,UP-DOWN}UP_t + e_t$. The t statistics associated with each difference is listed in the row below.

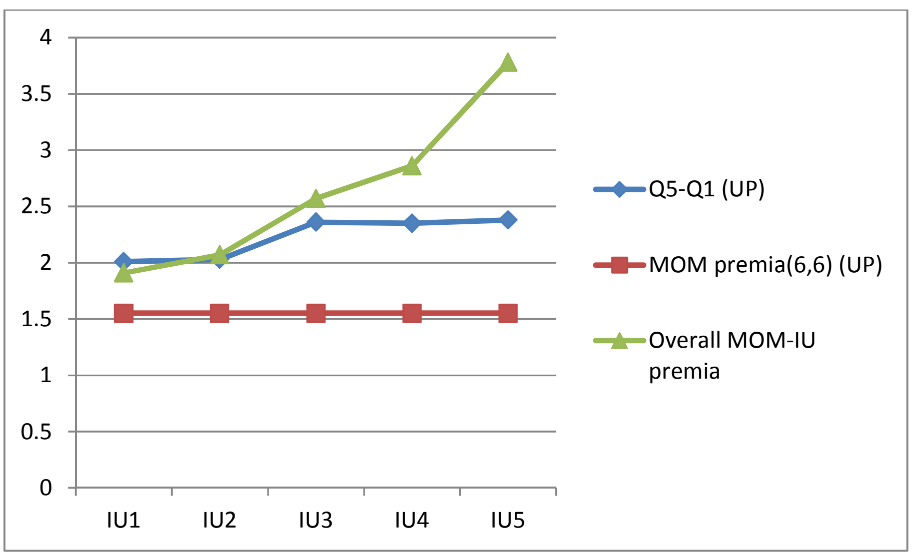
Figure 7.9 Comparison between the momentum-IU (analysts' coverage) premia of the (R=6, H=6) strategy over periods following UP and DOWN market states in the Chinese Class A market (Jan. 1996- Dec. 2008)



Notes: The column-shaped diagram illustrates the difference of momentum-IU premia of the (R=6, H=6) momentum trading strategy over time periods following UP and DOWN market states in the Chinese Class A share market for the sample time period. The vertical axis measures the momentum-IU premia in percentage form; the horizontal axis labels the 5 different levels of IU, with IU1 representing the lowest level and IU5 the highest level. For each IU level, the corresponding momentum premium following UP market state is demonstrated by the blue-coloured column, whereas that following DOWN market state is indicated by the red-coloured column.

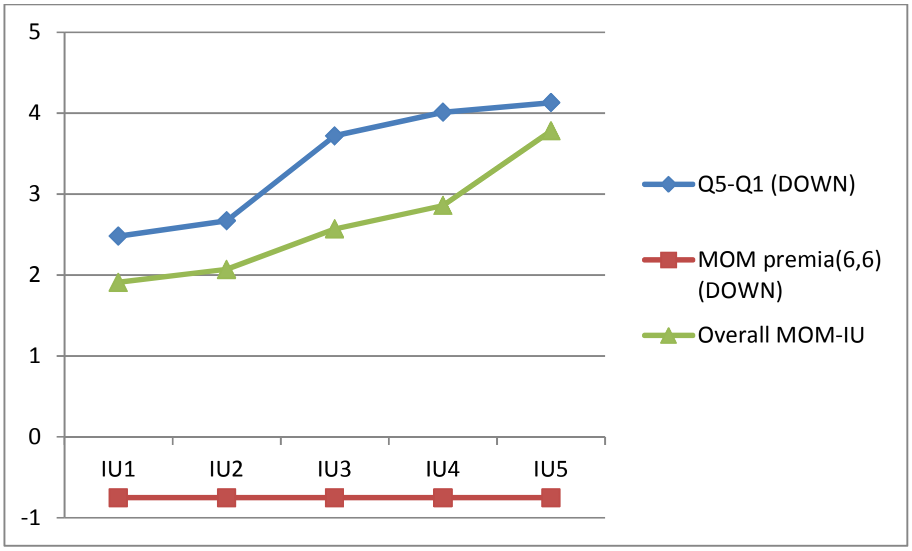
Figure 7.10 and 7.11 portrays the comparison between the momentum premia of the (R=6, H=6) trading strategy conditional on IU, market state conditions and IU and market state conditions jointly in the Chinese Class A share market for the whole sample period. In Figure 7.10, at every IU level, both the blue line and green line are well above the red line, suggesting that the amplifying effect of IU over the momentum premia is present regardless of market state condition. Nevertheless, aside from the lowest IU level (IU1), it appears that the post-UP market condition crimps the amplifying effect of IU over the momentum premia, which can be interpreted by the two cognitive systems in judgmental process proposed by Kahneman and Frederick (2002) as we alluded to in the previous section. Specifically, having sufficient cognitive resources on the heel of market run-ups, investors are more likely to deploy more deliberated, sophisticated heuristics in honing their investment decision, susceptible to weaken the momentum premia. Most noticeably, the amplifying effect of IU over momentum premia strengthens for the time periods following DOWN market state as the blue line stays well above the green line, which dominates the red line at every IU level. This evidence supports the prediction of our hypothesis, theoretically reliant on gradual-information-diffusion theory (Hong et al., 2000), investors' underconfidence behavioural model (Du, 2002) and evidence of human heuristics described by Griffin and Tversky (2002), which is elaborated in summary at the end of the section.

Figure 7.10 Comparison: momentum-IU (analysts' coverage) premia over periods following UP market state, momentum premia of the (R=6, H=6) strategy conditional on post-UP market state, overall momentum-IU (analysts' coverage) premia in the Chinese Class A market (Jan.1996- Dec. 2008)



Notes: This figure demonstrates the difference among momentum-IU premia over periods following UP market state, momentum premia of the (R=6, H=6) momentum strategy conditional on post-UP market state, overall momentum-IU premia in the Chinese Class A share market. The vertical axis measures the returns in percentage form. The blue line represents the fluctuations in the momentum premia across different levels of IU over the periods following UP market state; the red line illustrates the premium of (R=6, H=6) momentum strategy unconditional on IU and market states; the green line represents the changes of momentum premia across different IU levels unconditional on market states.

Figure 7.11 Comparison: momentum-IU (analysts' coverage) premia over periods following DOWN market state, momentum premia of the (R=6, H=6) strategy conditional DOWN market state, momentum premia o fthe (R=6, H=6) strategy conditional on post-DOWN market state, overall momentum-IU premia in the Chinese Class A share market (Jan.1996- Dec. 2008)

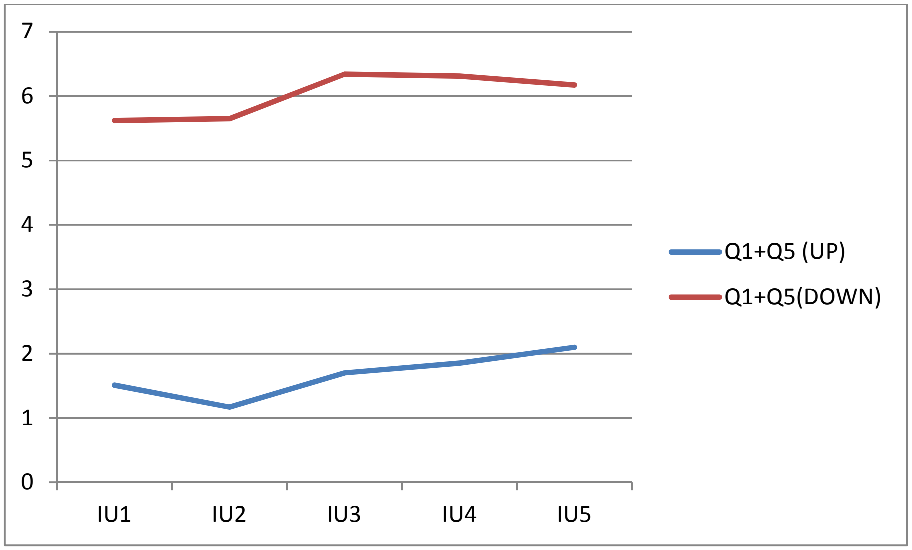


Notes: This figure demonstrates the difference among momentum-IU premia over periods following DOWN market state, momentum premia of the (R=6, H=6) momentum strategy conditional on post-DOWN market state, overall momentum-IU premia in the Chinese Class A share market. The vertical axis measures the returns in percentage form. The blue line represents the fluctuations in the momentum premia across different levels of IU over the periods following DOWN market state; the red line illustrates the premium of (R=6, H=6) momentum strategy unconditional on IU and market states; the green line represents the changes of momentum premia across different IU levels unconditional on market states.

Figure 7.12 illustrates the interaction of positive momentum and negative momentum in contributing to the momentum premia. From the statistics box above the figure, the differences of the sum of positive and negative momentum (Q1+Q5) between at IU5 and at IU1 are both positive, suggesting that the momentum premia are largely driven by positive momentum. This finding supports the evidence described when firm size is used as yardstick to measure the degree of IU, nonetheless contradicts Kelsey et al. (2010)'s finding in the U.S. stock markets and the results arrived at when using firm age as IU proxy factor accounted earlier—both suggest that negative momentum is playing a deciding role in contributing to the momentum premia. The positivity of IU5-IU1 of the sum of positive and negative momentums is further portrayed by two slightly up-ward sloped lines in the figure, with the red line being above the blue line, which provides empirical support to the prediction of our hypothesis that the information uncertainty boosts the momentum premia especially so over the periods following DOWN market state, in accord with Kelsey et al. (2010)'s postulate. The growing asymmetry of positive and negative momentums in face of higher information uncertainty, more obvious in post-DOWN market state, can be arguably attributed to investors' underreaction to firm-specific news (Hong and Stein, 1999) or their hesitation toward investment decision making (Du, 2002).

Figure 7.12 Asymmetry of positive momentum (Q5) and negative momoentum (Q1) over periods following UP and DOWN market states in the Chinese Class A share market (Jan. 1996- Dec. 2008) (analysts' coverage)

	UP market state		
	Q1	Q5	Q1+Q5
IU1	-0.25	1.76	1.51
IU2	-0.43	1.6	1.17
IU3	-0.33	2.03	1.7
IU4	-0.25	2.1	1.85
IU5	-0.14	2.24	2.1
IU5-IU1			0.59
	DOWN market state		
	Q1	Q5	Q1+Q5
IU1	1.57	4.05	5.62
IU2	1.49	4.16	5.65
IU3	1.31	5.03	6.34
IU4	1.15	5.16	6.31
IU5	1.02	5.15	6.17
IU5-IU1			0.55



Notes: The statistics box above the figure summarizes positive momentum (Q5) and negative momentum (Q1) for testing periods following UP and DOWN market states. This figure depicts the difference of the asymmetry of positive momentum (Q5) and negative momentum (Q1) over the time periods following UP market state, plotted as the blue line, and DOWN market state, graphed as the red line in the Chinese Class A share market over Jan. 1996 to Dec. 2008.The vertical axis measures 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 level of information uncertainty. The upward sloped lines suggest that regardless of market states, 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.

7.5 Return volatility

Table 7.7 reports the average monthly returns of momentum quintiles and momentum premia of the (R=6, H=6) trading strategy conditional on IU, proxied by return volatility (measured by the standard deviation of monthly returns of eligible stocks over 6 months prior to the ranking period), over the time periods following UP market state in Panel A and following DOWN market state in Panel B in the Chinese Class A share market for the whole sample period from January 1996 to December 2008. The momentum premia across 5 different IU levels for two market state conditions, summarized in Q5-Q1 columns of Panel A and Panel B, are all positive and statistically significant. Under post-UP market state condition, the average momentum premium (0.76%) of the (R=6, H=6) momentum trading strategy across different degrees of IU trails that of the same trading strategy unconditional on IU (1.55%). On the other hand, the momentum premia of the (R=6, H=6) trading strategy conditional on IU over the time periods following DOWN market state, averaging out at 1.97%, overwhelm that of the same strategy unconditional on IU. Collectively, the post-UP market state condition appears to curb the amplifying effect of IU over the momentum premia in general whereas post-DOWN market state condition enhances the amplifying effect of IU, firmly in line with the findings observed when firm size, firm age, analysts' coverage were employed as IU proxy factor. This preceding evidence can be interpreted by Du (2002)'s investors' underconfidence behavioural model in conjunction with experimental evidence of confirmation bias (Rabin, 1998)/ representativeness heuristics (Tversky and Kahneman, 1974) from the domain of psychology.

Within the two extreme momentum quintiles (Q1 and Q5), we find that for both market conditions (Panel A and B), the returns of "loser" quintiles are negatively related to the IU levels, whereas the returns of "winner" quintiles are positively related to the IU levels. This observation is consistent with Jiang et al. (2005) and Zhang (2006)'s findings in the U.S. stock market, supported by the theoretical framework of investor's underreaction explanation to the momentum effect proposed by Hong and Stein (1999) and the gradual-information-diffusion theory (Hong, Lim and Stein, 2000) as alluded to in the previous sections of this chapter.

Table 7.7 Momentum premia (monthly returns) under IU (return volatility) over periods following UP and DOWN market states (12 months) (R=6, H=6) in the Chinese Class A share market (Jan. 1996- Dec. 2008)

Panel A.	**Monthly returns of momentum quintiles and momentum premia Following UP market state (12 months)**						
	Momentum Quintile						
	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q5-Q1**	**t-value**
	Information uncertainty proxy: Return volatility (VOL)						
IU1	0.89	0.94	0.96	1.02	1.15	0.26	0.83
t-stats	0.45	0.66	1.48	0.82	1.29		
IU2	0.74	0.81	0.8	0.93	1.21	0.47	1.08
t-stats	0.09	1.09	1.16	0.99	1.4		
IU3	0.61	0.75	0.79	0.86	1.32	0.71	2.01
t-stats	0.16	1.37	1.08	1.31	0.94		
IU4	0.34	0.47	0.63	0.73	1.3	0.96	3.48
t-stats	0.3	0.96	0.34	1.2	1.72		
IU5	-0.06	0.29	0.41	0.61	1.35	1.41	2.39
t-stats	-0.07	0.27	1.08	2.01	0.86		
IU5-IU1	-0.95	-0.65	-0.55	-0.41	0.2	1.15	
t-value	-1.05	-1.06	-0.75	-0.91	-1.76	1.82	

Panel B.	**Monthly returns of momentum quintiles and momentum premia Following DOWN market state (12 months)**						
	Momentum Quintile						
	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q5-Q1**	**t-value**
	Information uncertainty proxy: Return volatility (VOL)						
IU1	2.23	2.41	2.05	2.73	3.48	1.25	5.19
t-stats	4.1	3.18	6.71	5.18	5.16		
IU2	1.84	1.99	1.95	2.68	3.49	1.65	7.38
t-stats	5.99	4.04	4.52	4.46	6.71		
IU3	1.67	1.73	1.84	2.47	3.55	1.88	6.11
t-stats	3.28	5.99	8.29	6.77	8.44		
IU4	1.33	1.48	1.55	2.16	3.57	2.24	10.89
t-stats	5.19	3.18	3.81	5.39	10.09		
IU5	1.2	1.36	1.43	1.84	4.03	2.83	8.15
t-stats	4.47	4.03	4.38	8.6	14.01		
IU5-IU1	-1.03	-1.05	-0.62	-0.89	0.55	1.58	
t-value	-3.81	-3.91	-4.01	-4.33	4.81	3.05	

This table presents the average monthly returns of momentum quintiles and momentum premia under the influence of different levels of IU over time periods following UP and DOWN market states, as shown in Panel A and Panel B respectively, in the Chinese Class A share market for the sample period spanning from January 1996 to December 2008. The UP and DOWN market states are defined by prior 12-month average market return, with a consolidated Chinese Share A index being employed as a proxy for market portfolio.The methodological approach is described underneath Table 7.1.

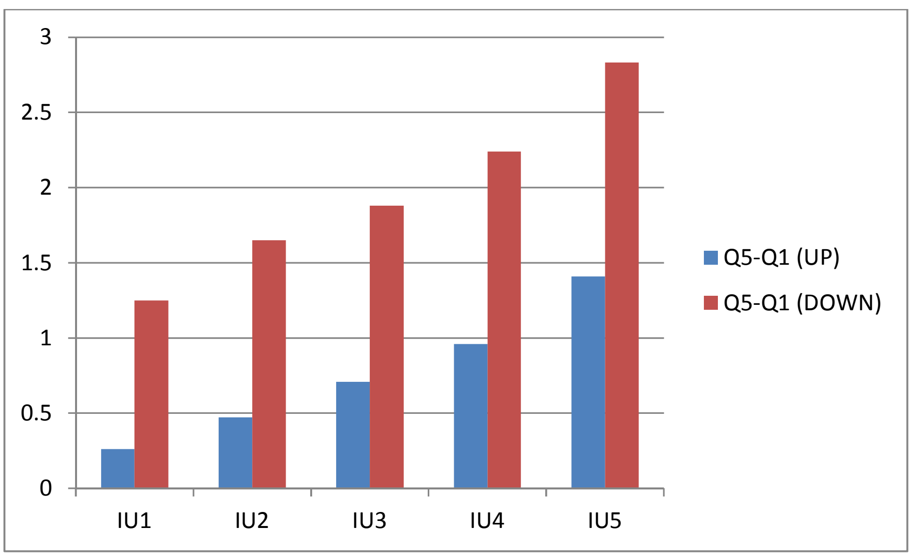
Table 7.8 summarizes the differences of the momentum premia of the (R=6, H=6) trading strategy conditional on IU over time periods following UP and DOWN market states for the whole sample period from January 1996 to December 2008, subsequently illustrated in Figure 7.13. Echoing the asymmetric pattern observed in the previous sections, we find that the differential returns of the momentum premia under two types of market conditions are consistently negative and statistically significant, implying that with the influence of IU, the (R=6, H=6) momentum trading strategy conditional on post-DOWN market state outperforms that conditional on post-UP market state. This observation is plausible as investors are more inclined to underreact facing information uncertainty over time periods following DOWN market state, propelled by abundant psychological evidence (Gilovich et al., 2002) and theories in empirical finance (Hong and Stein, 1999, Kelsey et al., 2010). As shown in Figure 7.13, the aforementioned asymmetry of the momentum premia under two market conditions is steadily growing larger as IU level heightens, highlighting the crucial role of IU proxy factor plays as an amplifier in boosting momentum premia over the periods following DOWN market state.

Table 7.8 Equality test results of state-dependent momentum-IU (return volatility) premia following UP and DOWN market states in the Chinese A market (R=6, H=6)

Equality test (MOM and IU (VOL))(12 months) UP-DOWN=0						
	IU1	IU2	IU3	IU4	IU5	IU5-IU1
Q5-Q1 (UP)	0.26	0.47	0.71	0.96	1.41	1.15
Q5-Q1(DOWN)	1.25	1.65	1.88	2.24	2.83	1.58
Difference	-0.99	-1.18	-1.17	-1.28	-1.42	
t stats	-1.85	-2.48	-3.99	-2.38	-1.93	
Overall	0.54	0.84	1.02	1.79	2.29	1.75

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 (UP_t) and an intercept (α), following the same methodology for equality test used by Cooper et al. (2004) and Du et al. (2009). Mathematically, it can be written as $R_{W-L,t} = \alpha + R_{W-L,UP-DOWN} UP_t + e_t$. The t statistics associated with each difference is listed in the row below.

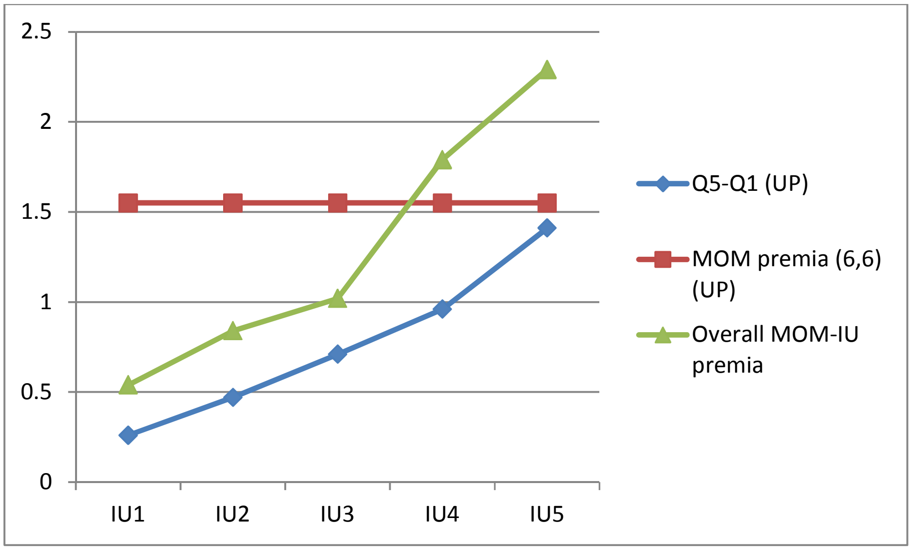
Figure 7.13 Comparison between the momentum-IU (return volatility) premia of the (R=6, H=6) strategy over periods following UP and DOWN market states in the Chinese Class A share market (Jan. 1996- Dec. 2008)



Notes: The column-shaped diagram illustrates the difference of momentum-IU premia of the (R=6, H=6) momentum trading strategy over time periods following UP and DOWN market states in the Chinese Class A share market for the sample time period. The vertical axis measures the momentum-IU premia in percentage form; the horizontal axis labels the 5 different levels of IU, with IU1 representing the lowest level and IU5 the highest level. For each IU level, the corresponding momentum premium following UP market state is demonstrated by the blue-coloured column, whereas that following DOWN market state is indicated by the red-coloured column.

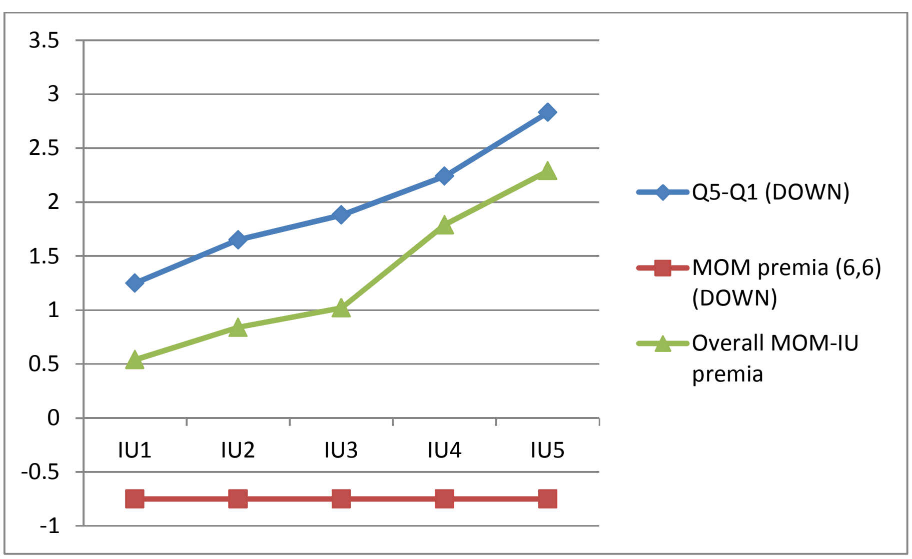
Figure 7.14 and 7.15 illustrate the comparison between the performance of three different types of conditional (R=6, H=6) momentum trading strategy (IU, market states and both IU and market states). As shown in Figure 7.14, the observation that an upward sloping green line intercepts the straight red line suggests that the amplifying effect of IU over the momentum premia is evident at two highest levels of IU. Additionally, similar to the pattern observed in the previous sections, the post-UP market condition appears to dampen the amplifying effect of IU over the momentum premia (every point on the blue line falls below that on the red line and the green line). Conversely, the amplifying effect of IU over the momentum premia has been strikingly obvious over time periods following DOWN market state as demonstrated in Figure 7.15, cementing the prediction of our hypothesis, supported by Hong and Stein (1998)'s underreaction theory and Du (2002)'s traders' hesitation behavioural model.

Figure 7.14 Comparison: momentum-IU (return volatility) premia following UP market state, momentum premia of the (R=6, H=6) strategy conditional on post-UP market state, overall momentum-IU premia in the Chinese Class A share market (01/96-12/08)



Notes: This figure demonstrates the difference among momentum-IU premia over periods following UP market state, momentum premia of the (R=6, H=6) momentum strategy conditional on post-UP market state, overall momentum-IU premia in the Chinese Class A share market. The vertical axis measures the returns in percentage form. The blue line represents the fluctuations in the momentum premia across different levels of IU over the periods following UP market state; the red line illustrates the premium of (R=6, H=6) momentum strategy unconditional on IU and market states; the green line represents the changes of momentum premia across different IU levels unconditional on market states.

Figure 7.15 Comparison: momentum-IU (return volatilty) premia following DOWN market state, momentum premia of the (R=6, H=6) strategy conditonal on post-DOWN market state, overall momentum-IU (return volatility) premia in the Chinese Class A share market (Jan. 1996-Dec. 2008)



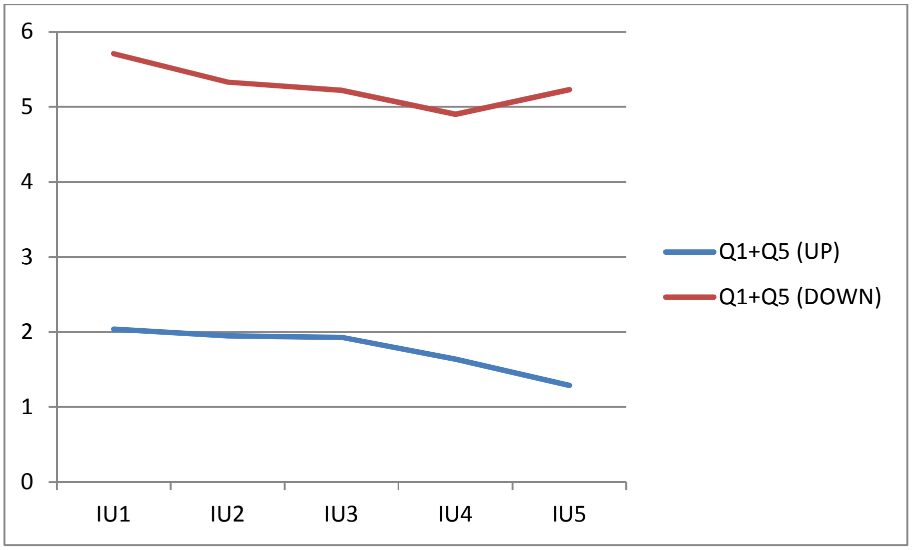
Notes: This figure demonstrates the difference among momentum-IU premia over periods following

DOWN market state, momentum premia of the (R=6, H=6) momentum strategy conditional on post-DOWN market state, overall momentum-IU premia in the Chinese Class A share market. The vertical axis measures the returns in percentage form. The blue line represents the fluctuations in the momentum premia across different levels of IU over the periods following DOWN market state; the red line illustrates the premium of (R=6, H=6) momentum strategy unconditional on IU and market states; the green line represents the changes of momentum premia across different IU levels unconditional on market states.

The asymmetry of positive momentum (Q5) and negative momentum (Q1) is graphically demonstrated in Figure 7.16. According to the statistics box above the figure, with difference of Q1+Q5 between highest level IU case scenario (IU5) and lowest IU case scenario (IU1) conditional on post-UP market state (-0.75%) edging that conditional on post-DOWN market state (-0.48%), IU5-IU1 are negative for both case scenarios, suggesting that the negative momentum prevails positive momentum in contributing to the momentum premia when return volatility is used to gauge the degree of IU. Furthermore, the fact that the red line is well above the blue line and both of them are downward sloped in the diagram suggests that the asymmetry of the positive and negative momentums widens as IU level goes up, with negative momentum being the dominant force and the asymmetry is more considerable over periods following DOWN market state than that over periods following UP market state, resembling the evidence described earlier when using firm age as an IU proxy factor and consistent with the find by Kelsey et al. (2010) in the U.S. stock markets comprehensively, yet contradicting the results from using firm size and analysts' coverage as IU proxy factors. All are in line with the prediction of underreaction theory (Hong and Stein, 1999) and investors' hesitation behavioural model (Du, 2002).

Figure 7.16 Asymmetry of positive momentum (Q5) and negative momentum (Q1) following UP and DOWN market states in the Chinese Class A share market (Jan. 1996- Dec. 2008) (return volatility)

	UP market state		
	Q1	Q5	Q1+Q5
IU1	0.89	1.15	2.04
IU2	0.74	1.21	1.95
IU3	0.61	1.32	1.93
IU4	0.34	1.3	1.64
IU5	-0.06	1.35	1.29
IU5-IU1			-0.75
	DOWN market state		
	Q1	Q5	Q1+Q5
IU1	2.23	3.48	5.71
IU2	1.84	3.49	5.33
IU3	1.67	3.55	5.22
IU4	1.33	3.57	4.9
IU5	1.2	4.03	5.23
IU5-IU1			-0.48



Notes: The statistics box above the figure summarizes positive momentum (Q5) and negative momentum (Q1) for testing periods following UP and DOWN market states. This figure depicts the difference of the asymmetry of positive momentum (Q5) and negative momentum (Q1) over the time periods following UP market state, plotted as the blue line, and DOWN market state, graphed as the red line in the Chinese Class A share market over Jan. 1996 to Dec. 2008.The vertical axis measures 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 level of information uncertainty. The upward sloped lines suggest that regardless of market states, 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.

7.6 Dispersion in analysts’ earnings forecast (DISP)

Table 7.9 reports the average monthly returns of momentum quintiles and momentum premia of the (R=6, H=6) trading strategy conditional on IU, proxied by the dispersion in analysts’ earnings forecast (DISP) (measured by standard deviation of analysts’ earnings forecasts for each month scaled by prior year-end stock price prior to the ranking period), over time periods following UP market state (Panel A) and DOWN market state (Panel B) in the Chinese Class A share market over the whole sample period (Jan. 1996- Dec. 2008).

Focusing on the Q5-Q1 columns, summarizing the momentum premia at different IU levels, the momentum premia across different levels of IU in both Panel A and Panel B are positive and highly statistically significant. As what one would expect based on the prediction of our hypothesis, the momentum premia of the (R=6, H=6) trading strategy under the influence of different levels of information uncertainty during periods following DOWN market state average out at 1.72%, outstripping the average momentum premium during periods following UP market state (1.53%). More important, the average momentum premium of the (R=6, H=6) trading strategy conditional solely on IU (DISP) betters both average momentum premium of the momentum trading strategy conditional on IU (DISP) over time periods following UP and DOWN market states. Taken together, the preceding observations suggest that the amplifying effect of IU over the momentum premia could be, to a substantial extent, attributable to its impact over the momentum premia over periods following DOWN market state, supported by investors' underconfidence theory by Du (2002) and judgmental heuristics evidence from the field of psychology (Gilovich et al., 2002), described in more detail in summary at the end of the section.

Consistent with what's observed in the previous sections, the average monthly returns of "loser" momentum quintiles are negatively related to IU levels, while the average monthly returns of "winner" momentum quintiles are positively related to IU levels, both in a monotonic manner, strengthening the overall robustness of the results of our study by brushing off the potential critics that the patterns of the amplifying effect of IU over momentum quintiles are IU proxy factor-specific.

Table 7.9 Momentum premia (monthly returns) under IU (dispersion in analysts' earnings forecast (DISP) following UP and DOWN market states (12 months) (R=6, H=6) in the Chinese Class A share market (Jan. 1996-Dec. 2008)

Panel A. Monthly returns of momentum quintiles and momentum premia Following UP market state (12 months)							
	Momentum Quintile						
	Q1	Q2	Q3	Q4	Q5	Q5-Q1	t-value
	Information uncertainty proxy: Analysts' forecast dispersion (DISP)						
IU1	1.76	2.26	2.29	2.51	2.82	1.06	6.18
t-stats	4.01	5.07	5.83	7.18	14		
IU2	1.55	2.05	1.94	2.43	2.88	1.33	8.43
t-stats	5	6.19	7.15	9.05	10.62		
IU3	1.39	1.85	1.83	2.31	2.9	1.51	10.95
t-stats	3.99	3.57	8.93	8.51	9.84		
IU4	1.15	1.59	1.67	2.04	2.92	1.77	6.18
t-stats	9.15	8.22	5.47	9.37	10.01		
IU5	1.04	1.66	1.52	2.35	3.01	1.97	13.27
t-stats	7.02	5.61	8.09	7.48	13.29		
IU5-IU1	-0.72	-0.6	-0.77	-0.16	0.19	0.91	
t-value	-4.01	-2.96	-4.29	-4.08	-5.81	1.68	

Panel B. Monthly eturns of momentum quintiles and momentum premia Following DOWN market state (12 months)							
	Momentum Quintile						
	Q1	Q2	Q3	Q4	Q5	Q5-Q1	t-value
	Information uncertainty proxy: Analysts' forecast dispersion (DISP)						
IU1	0.23	0.47	1.1	1.13	1.38	1.15	1.37
t-stats	0.75	1.03	1.4	2.16	3.09		
IU2	0.14	0.58	0.85	1.25	1.69	1.55	2.06
t-stats	0.35	1.15	2.13	1.4	2.19		
IU3	0.06	0.39	0.73	1.16	1.85	1.79	3.99
t-stats	1.06	2.61	1.62	1.05	3.1		
IU4	0.02	0.5	0.82	0.94	1.99	1.97	1.78
t-stats	0.99	1.54	2.1	1.51	2.99		
IU5	0.03	0.38	0.79	0.98	2.15	2.12	3.43
t-stats	1.58	1.05	1.96	2.01	5.41		
IU5-IU1	-0.2	-0.09	-0.31	-0.15	0.77	0.97	
t-value	-0.81	-0.61	-2.03	-1.57	3.09	2.39	

This table presents the average monthly returns of momentum quintiles and momentum premia under the influence of different levels of IU over time periods following UP and DOWN market states, as shown in Panel A and Panel B respectively, in the Chinese Class A share market for the sample period spanning from January 1996 to December 2008. The UP and DOWN market states are defined by prior 12-month average market return, with a consolidated Chinese Share A index being employed as a proxy for market portfolio. The methodological approach is described in detail underneath Table 7.1.

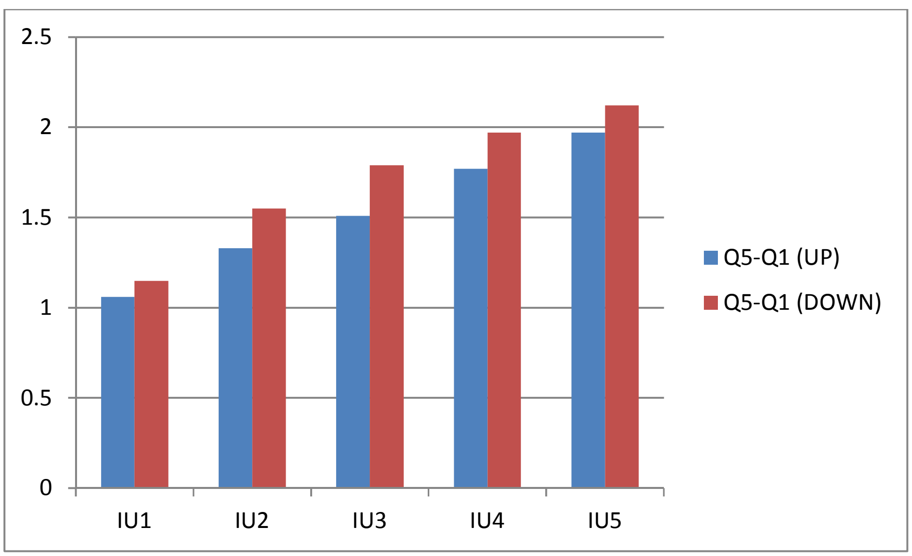
The differential average monthly returns of the (R=6, H=6) momentum trading strategy conditional on IU (DISP) under two different market conditions (post-UP and DOWN market states) are presented in Table 7.10 and are graphically illustrated in Figure 7.17. We observe a quite familiar picture, with the trading strategy over the periods following DOWN market state consistently outperforming that under the reversed market condition across all 5 IU levels. Apart from being congruent with the results from other sections that the general trend of the relationship between the asymmetry of the performance of the (R=6, H=6) momentum trading strategy under post-UP and DOWN market states conditions and IU levels is positive, what's worth nothing is that the asymmetry across different IU levels, in general, appears less significant when DISP is employed as IU proxy, illustrated in Figure 7.17. The only probable explanation to this observation is that the IU proxy factor use here, DISP, stems from best estimates of investing professionals, who are more likely to practice deliberate statistics heuristics of System 2 (reflective) of the two cognitive systems (Kahneman and Frederick, 2002) in face of IU amid market swings thanks to the more sophisticated and systematic statistics training they received compared with domestic retail investors, pointed out in an experimental psychology study by Nisbett, Krantz, Jepson and Kunda (1983). Succinctly, it is the influence of increasingly more rational behaviours of investing professionals embedded in one of the sorting factors or the IU proxy factor that narrows the asymmetry of the momentum premia of the (R=6, H=6) momentum trading strategy conditional on IU over time periods following UP and DOWN market states.

Table 7.10 Equality test results of state-dependent momentum-IU (DISP) premia (following UP and DOWN market states) in the Chinese Class A share market (R=6, H=6)

Equality test (MOM and IU (DISP))(12 months)						
	UP-DOWN=0					
	IU1	IU2	IU3	IU4	IU5	IU5-IU1
Q5-Q1 (UP)	1.06	1.33	1.51	1.77	1.97	0.91
Q5-Q1(DOWN)	1.15	1.55	1.79	1.97	2.12	0.97
Difference	-0.09	-0.22	-0.28	-0.2	-0.15	
t stats	-1.48	-2.03	-1.59	-1.33	-1.84	
Overall	1.28	1.51	1.67	1.97	2.21	0.93

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 (UP_t) and an intercept (α), following the same methodology for equality test used by Cooper et al. (2004) and Du et al. (2009). Mathematically, it can be written as $R_{W-L,t} = \alpha + R_{W-L,UP-DOWN}UP_t + e_t$. The t statistics associated with each difference is listed in the row below.

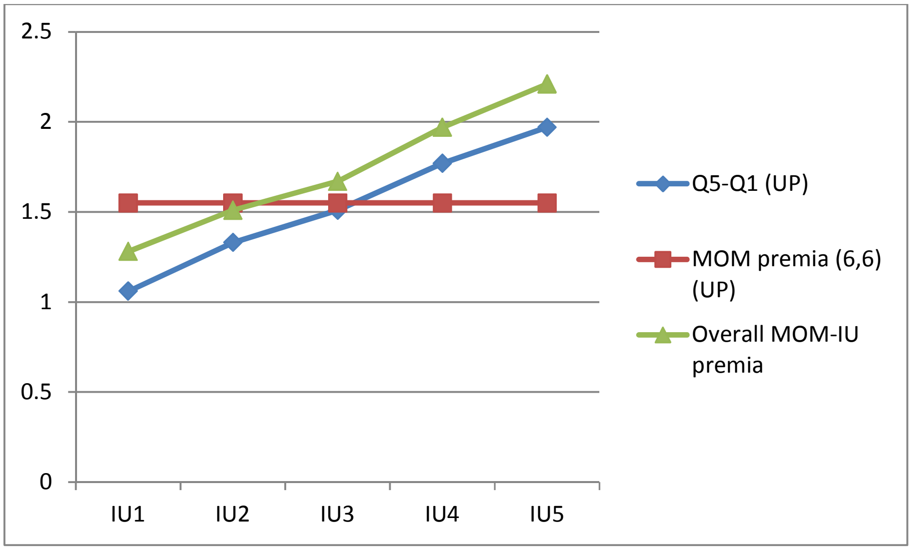
Figure 7.17 Comparison between the momentum-IU (DISP) premia of the (R=6, H=6) strategy over periods following UP and DOWN market states in the Chinese Class A market (Jan. 1996- Dec. 2008)



Notes: The column-shaped diagram illustrates the difference of momentum-IU premia of the (R=6, H=6) momentum trading strategy over time periods following UP and DOWN market states in the Chinese Class A share market for the sample time period. The vertical axis measures the momentum-IU premia in percentage form; the horizontal axis labels the 5 different levels of IU, with IU1 representing the lowest level and IU5 the highest level. For each IU level, the corresponding momentum premium following UP market state is demonstrated by the blue-coloured column, whereas that following DOWN market state is indicated by the red-coloured column.

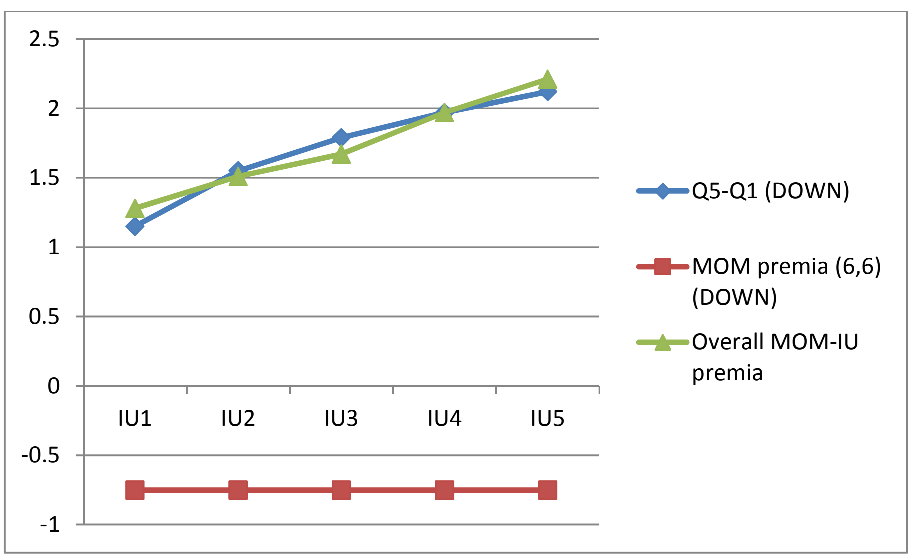
Figure 7.18 and 7.19 depict the comparison of the momentum premia of three conditional (R=6, H=6) momentum trading strategies categorized on conditioning factors IU, market states, and both IU and market states over the whole sample period from January 1996 to December 2008. In Figure 7.18, both of the momentum premia of the strategy conditional on IU and those of the strategy conditional on IU and post-UP market state exceed the momentum premia of the strategy conditional only on post-UP market state at two highest IU levels (IU4 and IU5), yet the performance of the (R=6, H=6) trading strategy conditional on both IU and post-UP market state trails that of the strategy conditional only on IU, echoing our findings in previous sections. It is not surprising, according to the prediction of our hypothesis, that both of the (R=6, H=6) strategy conditional on IU and post-DOWN market state and that conditional on IU fare much better than the strategy conditional only on post-DOWN market state, with the performance of the former two strategies neck-and-neck. The afore-described observations, in combination, imply and reinforce that the amplifying effect of IU over momentum premia is more pronounced over time periods following DOWN market state, paralleling the prediction of underreaction theory (Hong and Stein,1999) and investors' underconfidence behavioural model (Du, 2002).

Figure 7.18 Comparison: momentum-IU(DISP) premia over periods following UP market state, momentum premi of the (R=6, H=6) strategy conditional on post-UP market state, overall mom-IU (DISP) premia in Chinese Class A share market (01/1996-12/2008)



Notes: This figure demonstrates the difference among momentum-IU premia over periods following UP market state, momentum premia of the (R=6, H=6) momentum strategy conditional on post-UP market state, overall momentum-IU premia in the Chinese Class A share market. The vertical axis measures the returns in percentage form. The blue line represents the fluctuations in the momentum premia across different levels of IU over the periods following UP market state; the red line illustrates the premium of (R=6, H=6) momentum strategy unconditional on IU and market states; the green line represents the changes of momentum premia across different IU levels unconditional on market states.

Figure 7.19 Comparison: momentum-IU(DISP) premia over periods following DOWN market state, momentum premia of the 9R=6, H=6) strategy conditonal on post-DOWN market state, overall momentum-IU (DISP) premia in the Chinese Class A share market (01/1996-12/2008)

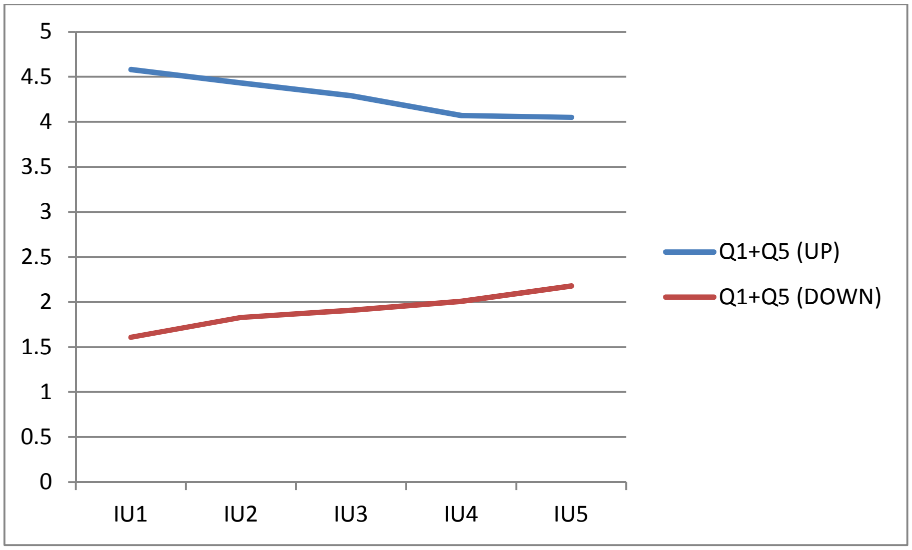


Notes: This figure demonstrates the difference among momentum-IU premia over periods following DOWN market state, momentum premia of the (R=6, H=6) momentum strategy conditional on post-DOWN market state, overall momentum-IU premia in the Chinese Class A share market. The vertical axis measures the returns in percentage form. The blue line represents the fluctuations in the momentum premia across different levels of IU over the periods following DOWN market state; the red line illustrates the premium of (R=6, H=6) momentum strategy unconditional on IU and market states; the green line represents the changes of momentum premia across different IU levels unconditional on market states.

The asymmetry of positive momentum (Q5) and negative momentum (Q1) over time periods following UP and DOWN market states is graphed in Figure 7.20. As shown in the statistics box above the figure, it's intriguing to find that negative momentum is the dominant force in contributing to the momentum premia over post-UP market condition (IU5-IU1 of Q1+Q5 is negative) while positive momentum dominates negative momentum over post-DOWN market condition, differentiating from the findings in other sections. This observation could be argued as the resultant of employing DISP, being one of the sorting factors in deriving the momentum-IU quintiles, as yardstick in measuring IU due to the judgmental heuristics investing professionals apply in their assessment of investing opportunities as described earlier (Nisbett et al., 1983). With the blue line well above the red line, the downward sloping blue line and upward sloping red line jointly confirms the prediction of our hypothesis that the amplifying effect of IU tends to be more pervasive under the influence of greater degree of IU and over time periods following DOWN market state, supported by underreaction theory (Hong and Stein, 1998) and investors' underconfidence behavioural model (Du, 2002).

Figure 7.20 Asymmetry of positive momentum (Q5) and negative momentum (Q1) over peirods following UP and DOWN market states in the Chinese Class A share market (01/1996-12/2008)

UP market state			
	Q1	Q5	Q1+Q5
IU1	1.76	2.82	4.58
IU2	1.55	2.88	4.43
IU3	1.39	2.9	4.29
IU4	1.15	2.92	4.07
IU5	1.04	3.01	4.05
IU5-IU1			-0.53
DOWN market state			
	Q1	Q5	Q1+Q5
IU1	0.23	1.38	1.61
IU2	0.14	1.69	1.83
IU3	0.06	1.85	1.91
IU4	0.02	1.99	2.01
IU5	0.03	2.15	2.18
IU5-IU1			0.57



Notes: The statistics box above the figure summarizes positive momentum (Q5) and negative momentum (Q1) for testing periods following UP and DOWN market states. This figure depicts the difference of the asymmetry of positive momentum (Q5) and negative momentum (Q1) over the time periods following UP market state, plotted as the blue line, and DOWN market state, graphed as the red line in the Chinese Class A share market over Jan. 1996 to Dec. 2008.The vertical axis measures 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 level of information uncertainty. The upward sloped lines suggest that regardless of market states, 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.

7.7 Trading volume

Table 7.11 presents the average monthly returns of momentum quintiles and the premia of the conditional (R=6, H=6) momentum trading strategy on IU and post-UP and DOWN market states, in which trading volume (measured by monthly turnover ratios of the eligible stock prior to the ranking period) is used as an IU proxy, in the Chinese Class A share market for the entire sample period (Jan. 1996- Dec. 2008). The momentum premia are reported in the Q5-Q1 column of Panel A for post-UP market condition and that of Panel B for post-DOWN market condition. The average momentum premia of the trading strategy over periods following UP market state (0.87%) lag that over period following DOWN market state (1.99%), reiterating the observations documented in the previous sections—the amplifying effect of IU on the momentum is especially pronounced over periods following DOWN market state, supported by investors' overconfidence theory (Daniel et al., 1998).

Within "loser" and "winner" quintiles, consistent with the observations of the momentum premia of the (R=6, H=6) trading strategy conditional only on IU and the empirical findings by Zhu et al. (2004) and Jiang et al. (2005) in the Chinese stock market and the U.S. stock market respectively, there is a negative relationship between the returns of "loser" momentum quintiles (Q1) and IU levels and a positive relationship between the returns of "winner" momentum quintiles (Q5) and IU levels, paralleling the empirical evidence found by Lee and Swaminathan (2000) in the U.S. stock markets. The preceding observation is in line with the prediction of the gradual-information-diffusion theory (Hong, Lim and Stein, 2000).

Table 7.11 Momentum premia (monthly returns) under IU (trading volume) over periods following UP and DOWN market states (12 months) (R=6, H=6) in the Chinese Class A share market (Jan. 1996- Dec. 2008)

Panel A.	**Monthly returns of momentum quintiles and momentum premia Following UP market state (12 months)**						
	Momentum Quintile						
	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q5-Q1**	**t-value**
	Information uncertainty proxy: Volume(1/Turnover ratio)						
IU1	0.49	0.63	0.77	0.91	0.97	0.48	1.84
t-stats	0.81	1.41	0.95	0.37	1.83		
IU2	0.38	0.58	0.63	0.75	1.02	0.64	2.01
t-stats	0.45	0.84	1.15	1.07	2.82		
IU3	0.21	0.44	0.56	0.69	1.1	0.89	1.03
t-stats	1.01	0.73	0.74	2.17	1.64		
IU4	0.09	0.28	0.42	0.53	1.17	1.08	2.41
t-stats	0.83	0.93	1.08	1.5	3.21		
IU5	-0.05	0.19	0.35	0.43	1.23	1.28	3.15
t-stats	-0.83	1.01	0.63	2.12	2.12		
IU5-IU1	-0.54	-0.44	-0.42	-0.48	0.26	0.8	
t-value	-0.85	-1.01	-0.73	-0.89	2.51	2.03	

Panel B.	Monthly returns of momentum quintiles and momentum premia Following DOWN market state (12 months) Momentum Quintile						
	Q1	Q2	Q3	Q4	Q5	Q5-Q1	t-value
	Information uncertainty proxy: Volume(1/Turnover ratio)						
IU1	1.56	1.96	1.88	2.64	3.05	1.49	12.1
t-stats	6.09	7.05	6.71	13.41	9.51		
IU2	1.4	1.73	1.75	2.35	3.08	1.68	8.61
t-stats	8.18	5.19	8.36	8.15	10.77		
IU3	1.23	1.58	1.6	2.17	3.14	1.91	9.25
t-stats	10.85	10.08	10.2	6.68	8.26		
IU4	1.07	1.42	1.49	2.09	3.2	2.13	7.35
t-stats	8.17	7.1	6.36	8.72	9.61		
IU5	0.62	1.18	1.31	1.89	3.36	2.74	15.07
t-stats	3.79	5.42	7.01	10.52	15.1		
IU5-IU1	-0.94	-0.78	-0.57	-0.75	0.31	1.25	
t-value	-3.06	-4.02	-2.64	-5.05	6.41	3.01	

This table presents the average monthly returns of momentum quintiles and momentum premia under the influence of different levels of IU over time periods following UP and DOWN market states, as shown in Panel A and Panel B respectively, in the Chinese Class A share market for the sample period spanning from January 1996 to December 2008. The UP and DOWN market states are defined by prior 12-month average market return, with a consolidated Chinese Share A index being employed as a proxy for market portfolio. The methodological approach is described in detail underneath Table 7.1.

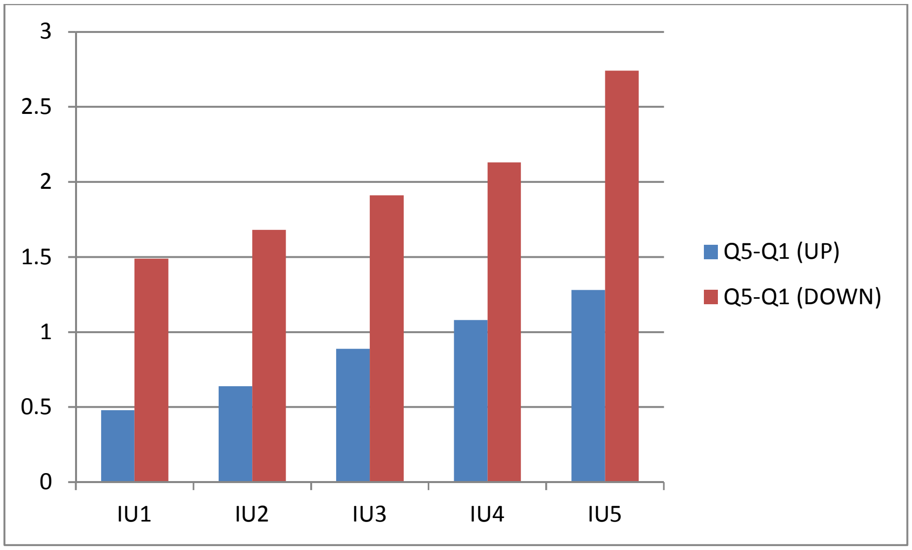
The differences between the performance of the (R=6, H=6) trading strategy over time periods following UP market state and DOWN market state under the influence of different levels of IU are quantified in Table 7.12 and graphically illustrated in Figure 7.21. Almost like a general feature of results among different IU proxy factors, across all 5 information uncertainty levels, the (R=6, H=6) momentum trading strategy conditional on post-DOWN market state evidently outperforms that conditional on post-UP market state, manifested by the observation that all the differences (UP-DOWN) are negative and highly statistically significant. The preceding evidence is more vividly depicted in Figure 7.21, where the momentum premia of the trading strategy over periods following DOWN market state (red columns) dwarf those over periods following UP market state (blue columns), implying that the amplifying effect of IU on the momentum premia is asymmetric, with the (R=6, H=6) momentum trading strategy conditional on IU (trading volume) over time periods following DOWN market state yielding significantly superior premia across different IU levels. This claim can be interpreted under the theoretical framework of underreaction theory (Hong and Stein, 1998) and investors' underconfidence behavioural model (Du, 2002).

Table 7.12 Equality test results of state-depdendent momentum-IU (trading volume) premia (following UP and DOWN market states) in the Chinese Class A share market (R=6, H=6)

Equality test (MOM and IU (Volume))(12 months) UP-DOWN=0						
	IU1	IU2	IU3	IU4	IU5	IU5-IU1
Q5-Q1 (UP)	0.48	0.64	0.89	1.08	1.28	0.8
Q5-Q1(DOWN)	1.49	1.68	1.91	2.13	2.74	1.25
Difference	-1.01	-1.04	-1.02	-1.05	-1.46	
t stats	-3.01	-2.99	-1.83	-2.06	-2.55	
Overall	0.91	0.99	1.68	2.12	2.27	1.36

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 (UP_t) and an intercept (α), following the same methodology for equality test used by Cooper et al. (2004) and Du et al. (2009). Mathematically, it can be written as $R_{W-L,t} = \alpha + R_{W-L,UP-DOWN} UP_t + e_t$. The t statistics associated with each difference is listed in the row below.

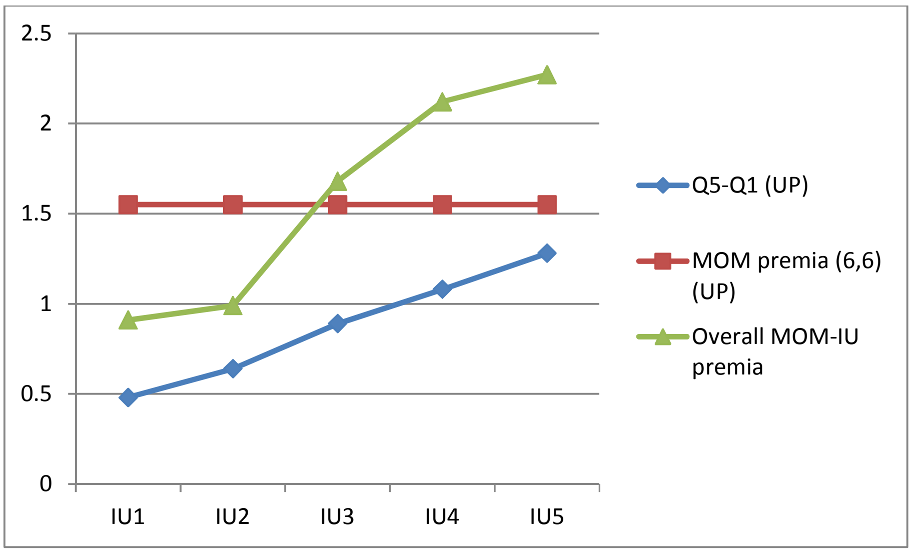
Figure 7.21 Comparison between the momentum-IU(trading volume) premia of the (R=6, H=6) strategy over periods following UP and DOWN market states in the Chinese Class A share market (Jan. 1996- Dec. 2008)



Notes: The column-shaped diagram illustrates the difference of momentum-IU premia of the (R=6, H=6) momentum trading strategy over time periods following UP and DOWN market states in the Chinese Class A share market for the sample time period. The vertical axis measures the momentum-IU premia in percentage form; the horizontal axis labels the 5 different levels of IU, with IU1 representing the lowest level and IU5 the highest level. For each IU level, the corresponding momentum premium following UP market state is demonstrated by the blue-coloured column, whereas that following DOWN market state is indicated by the red-coloured column.

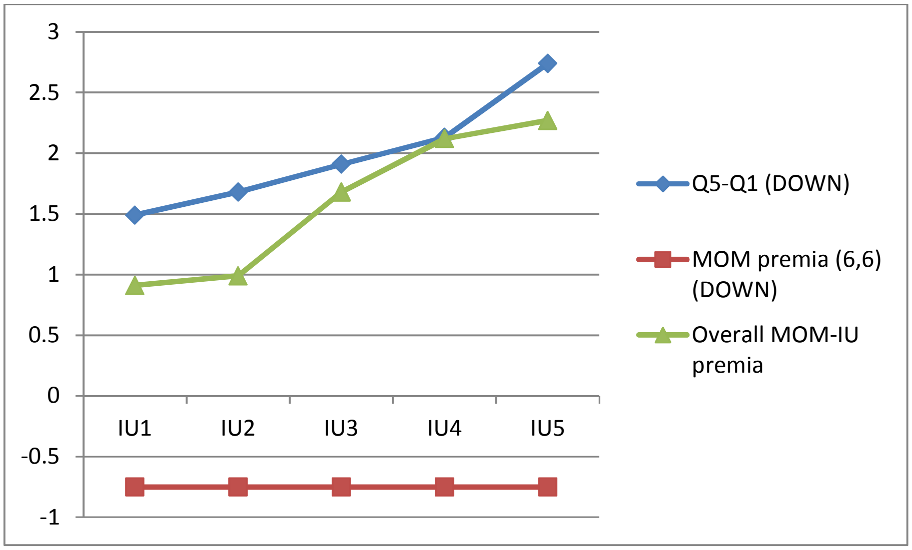
As shown in Figure 7.22 and 7.23, illustrating the fluctuations of the momentum premia of the (R=6, H=6) trading strategy conditional on both IU and market states as IU level varies in comparison with that of the trading strategy conditional solely on IU, along with that of the trading strategy conditional on market states, the amplifying effect of the IU is only evident at the highest three IU levels for the trading strategy conditional solely on IU yet is quite subdued for the trading strategy conditional on both IU and post-UP market condition. On the other hand, also quite consistent with findings described in previous sections, the amplifying effect of IU over the momentum premia is enhanced over time periods following DOWN market state. Collectively, both patterns strike remarkable uniformity with the observations in prior 5 sections when other variables are used as IU proxy, which all can be interpreted by the investors' underreaction theory (Hong and Stein, 2002) and traders' hesitation behavioural model (Du, 2002), coupled with some compelling experimental evidence from the field of psychology (Griffin and Tversky, 2002).

Figure 7.22 Comparison: momentum-IU (trading volume) premia over periods following UP market state, momentum premia of the (R=6, H=6) strategy conditional on post-UP market state, overall momentum-IU (trading volume) premia in the Chinese Class A share market (01/96-12/08)



Notes: This figure demonstrates the difference among momentum-IU premia over periods following UP market state, momentum premia of the (R=6, H=6) momentum strategy conditional on post-UP market state, overall momentum-IU premia in the Chinese Class A share market. The vertical axis measures the returns in percentage form. The blue line represents the fluctuations in the momentum premia across different levels of IU over the periods following UP market state; the red line illustrates the premium of (R=6, H=6) momentum strategy unconditional on IU and market states; the green line represents the changes of momentum premia across different IU levels unconditional on market states.

Figure 7.23 Comparison: momentum-IU (trading volume) premia over periods following DOWN market state, momentum premia of the (R=6, H=6) strategy conditional on post-DOWN market state, overall mom-IU premia in the Chinese A share market (01/1996-12/2008)

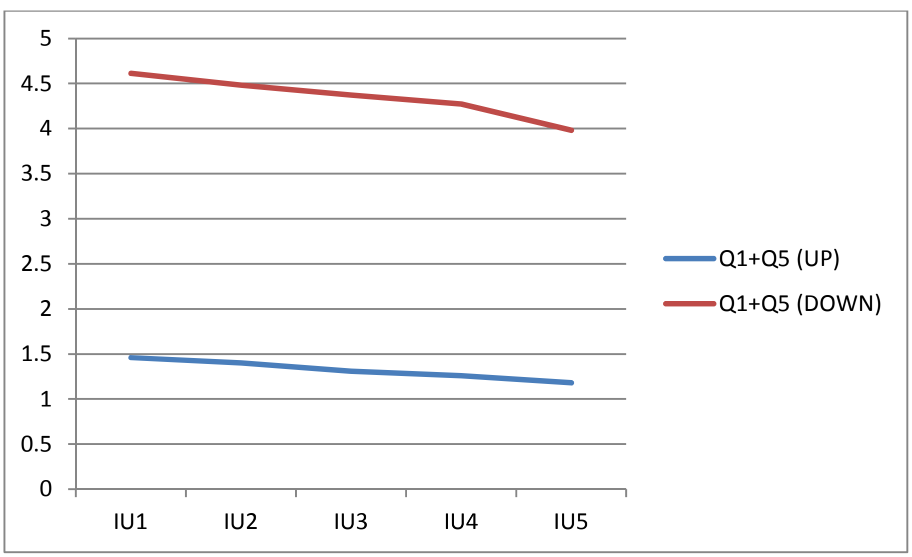


Notes: This figure demonstrates the difference among momentum-IU premia over periods following DOWN market state, momentum premia of the (R=6, H=6) momentum strategy conditional on post-DOWN market state, overall momentum-IU premia in the Chinese Class A share market. The vertical axis measures the returns in percentage form. The blue line represents the fluctuations in the momentum premia across different levels of IU over the periods following DOWN market state; the red line illustrates the premium of (R=6, H=6) momentum strategy unconditional on IU and market states; the green line represents the changes of momentum premia across different IU levels unconditional on market states.

Figure 7.24 presents the empirical evidence of the asymmetry of positive and negative momentums in contributing to the momentum premia under the influence of IU (trading volume) and post-UP and DOWN market states. In the statistics box above the figure, both of the differences (IU5-IU1) of the sum of positive and negative momentum are negative, suggesting that negative momentum is the largely driving the momentum premia. According to the figure, the red line is above the blue line and both of them are downward sloping, implying that the asymmetry is more significant at higher IU levels over periods following DOWN market state, which is consistent with the finding by Kelsey et al. (2010) in the U.S. stock market and can be interpreted based on the underreaction theory (Hong and Stein, 1998) and traders' hesitation behavioural model (Du, 2002).

Figure 7.24 Asymmetry of positive momentum (Q5) and negative momoentum (Q1) over periods following UP and DOWN market states in the Chinese Class A share market (Jan. 1996- Dec. 2008) (trading volume)

	UP market state		
	Q1	Q5	Q1+Q5
IU1	0.49	0.97	1.46
IU2	0.38	1.02	1.4
IU3	0.21	1.1	1.31
IU4	0.09	1.17	1.26
IU5	-0.05	1.23	1.18
IU5-IU1			-0.28
	DOWN market state		
	Q1	Q5	Q1+Q5
IU1	1.56	3.05	4.61
IU2	1.4	3.08	4.48
IU3	1.23	3.14	4.37
IU4	1.07	3.2	4.27
IU5	0.62	3.36	3.98
IU5-IU1			-0.63



Notes: The statistics box above the figure summarizes positive momentum (Q5) and negative momentum (Q1) for testing periods following UP and DOWN market states. This figure depicts the difference of the asymmetry of positive momentum (Q5) and negative momentum (Q1) over the time periods following UP market state, plotted as the blue line, and DOWN market state, graphed as the red line in the Chinese Class A share market over Jan. 1996 to Dec. 2008.The vertical axis measures 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 level of information uncertainty. The upward sloped lines suggest that regardless of market states, 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.

7.8 Corporate governance

Table 7.13 reports the average monthly returns of momentum quintiles and momentum premia of the (R=6, H=6) momentum trading strategy conditional on IU, proxied by the quality of corporate governance (measured by free float ratios of eligible stocks prior to the ranking period), over time periods following UP (Panel A) and DOWN (Panel B) market states in the Chinese Class A share market over the entire sample period from January 1996 to December 2008. Across all five IU levels, all the momentum premia, summarized in Q5-Q1 columns of Panel A and Panel B, are positive and highly statistically significant. Both the average momentum premium over post-UP market state (2.69%) and that over post-DOWN market state (3.56%) exceed the average momentum premium of the momentum strategy conditional solely on IU (2.61%), suggesting that the amplifying effect of the IU over the momentum premia is present under both market state conditions and the influence of IU. Firmly in line with the observations described in previous six sections, the amplifying effect of the IU appears to be considerably more significant over the momentum premia found during time periods following DOWN market state. As noted earlier, the observation can be interpreted based on underreaction theory (Hong and Stein) and evidence of human heuristics from studies in the domain of psychology (Gilovich et al., 2002).

Unsurprisingly, within Q1 and Q5 columns of both panels, we witness that there is a negative relationship between the average monthly returns of "loser" momentum quintiles and IU levels and a positive relationship between the returns of "winner" momentum quintiles and IU levels, consistent with the findings in previous sections.

Table 7.13 Momentum premia (monthly returns) under IU(corporate governance) during periods following UP and DOWN market states (12 months) (R=6, H=6) in the Chinese Class A share market (Jan. 1996- Dec. 2008)

Panel A.	**Monthly returns of momentum quintiles and momentum premia Following UP market state (12 months)**						
	Momentum Quintile						
	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q5-Q1**	**t-value**
	Information uncertainty proxy: Corporate governance (proxied by 1/free float ratio)						
IU1	1.05	1.16	1.83	2.21	3.03	1.98	3.05
t-stats	2.53	2.88	3.99	2.81	3.01		
IU2	0.94	1.02	1.58	2.49	3.08	2.14	5.15
t-stats	1.85	1.83	2.51	3.15	4.62		
IU3	0.82	0.82	1.73	1.93	3.41	2.59	7.36
t-stats	3.01	3.55	1.99	2.75	5.99		
IU4	0.61	0.74	1.59	1.78	3.6	2.99	6.5
t-stats	2.83	2.84	2.83	3.02	6.31		
IU5	0.51	0.7	1.43	1.59	4.25	3.74	8.77
t-stats	3.14	1.95	3.49	3.25	10.5		
IU5-IU1	-0.54	-0.46	-0.4	-0.62	1.22	1.76	
t-value	-1.99	-2.04	-1.52	-1.57	5.88	3.47	

Panel B.	Monthly returns of momentum quintiles and momentum premia Following DOWN market state (12 months) Momentum Quintile						
	Q1	Q2	Q3	Q4	Q5	Q5-Q1	t-value
	Information uncertainty proxy: Corporate governance (proxied by 1/free float ratio)						
IU1	1.02	1.35	1.78	2.25	3.48	2.46	4.1
t-stats	2.81	2.85	4.16	3.17	5.18		
IU2	0.93	1.3	1.59	2.14	3.8	2.87	6.19
t-stats	3.36	3.51	3.55	3.25	7.66		
IU3	0.88	1.18	1.48	2.08	4.15	3.27	8.93
t-stats	2.17	3.91	2.07	4.5	9.12		
IU4	0.79	1.16	1.48	1.72	4.96	4.17	7.61
t-stats	1.64	3.05	3.05	2.16	7.51		
IU5	0.68	1.09	1.36	1.75	5.69	5.01	9.37
t-stats	3.99	2.99	2.81	5.55	10.38		
IU5-IU1	-0.34	-0.26	-0.42	-0.5	2.21	2.55	
t-value	-1.25	-1.84	-1.37	-1.93	6.27	5.02	

This table presents the average monthly returns of momentum quintiles and momentum premia under the influence of different levels of IU over time periods following UP and DOWN market states, as shown in Panel A and Panel B respectively, in the Chinese Class A share market for the sample period spanning from January 1996 to December 2008. The UP and DOWN market states are defined by prior 12-month average market return, with a consolidated Chinese Share A index being employed as a proxy for market portfolio. The methodological approach is described in detail underneath Table 7.1.

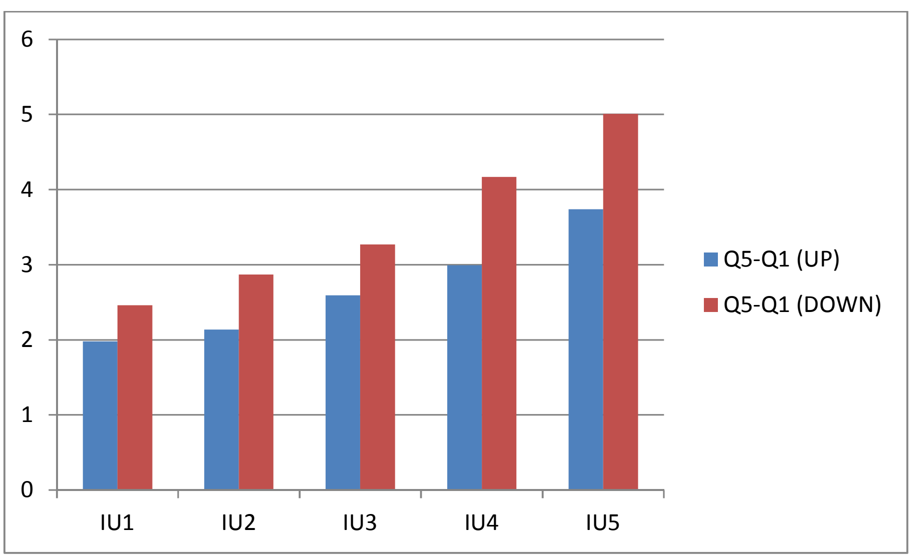
Table 7.14 reports quantitatively how the performance of the (R=6, H=6) trading strategy conditional on IU over time periods following DOWN market state differs from that over time periods following UP market state. Across all the IU levels, the differences (UP-DOWN) are consistently negative and highly statistically significant, providing empirical evidence in supporting the prediction of our hypothesis—the amplifying effect of IU over momentum premia is exacerbated during time periods following DOWN market state. Further, the preceding evidence is more visually illustrated in Figure 7.25, in which the differential returns of the (R=6, H=6) momentum trading strategy under post-UP and DOWN market states steadily get larger as the degree of IU heightens, consistent with our proposition and also with what one would expect on theoretical grounds based on underreaction theory (Hong and Stein, 1998) and investors' underconfidence behavioural model (Du, 2002).

Table 7.14 Equality test results of state-dependent momentum-IU (corporate governance) premia (following UP and DOWN market states) in the Chinese Class A share market (R=6, H=6)

Equality test (MOM and IU (corporate governance))(12 months) UP-DOWN=0						
	IU1	IU2	IU3	IU4	IU5	IU5-IU1
Q5-Q1 (UP)	1.98	2.14	2.59	2.99	3.74	1.76
Q5-Q1(DOWN)	2.46	2.87	3.27	4.17	5.01	2.55
Difference	-0.48	-0.73	-0.68	-1.18	-1.27	
t stats	-1.94	-2.68	-1.59	-2.07	-3.15	
Overall	1.84	2.2	2.52	2.51	3.99	2.15

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 (UP_t) and an intercept (α), following the same methodology for equality test used by Cooper et al. (2004) and Du et al. (2009). Mathematically, it can be written as $R_{W-L,t} = \alpha + R_{W-L,UP-DOWN}UP_t + e_t$. The t statistics associated with each difference is listed in the row below.

Figure 7.25 Comparison between the momentum-IU (corporate governance) premia of the (R=6, H=6) strategy over the time periods following UP and DOWN market states in the Chinese Class A share market (Jan. 1996- Dec. 2000)

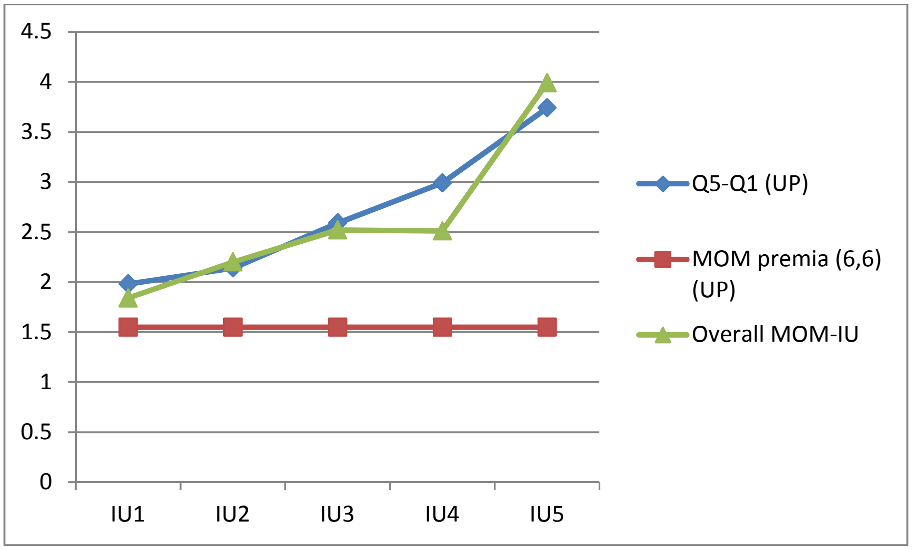


Notes: The column-shaped diagram illustrates the difference of momentum-IU premia of the (R=6, H=6) momentum trading strategy over time periods following UP and DOWN market states in the Chinese Class A share market for the sample time period. The vertical axis measures the momentum-

IU premia in percentage form; the horizontal axis labels the 5 different levels of IU, with IU1 representing the lowest level and IU5 the highest level. For each IU level, the corresponding momentum premium following UP market state is demonstrated by the blue-coloured column, whereas that following DOWN market state is indicated by the red-coloured column.

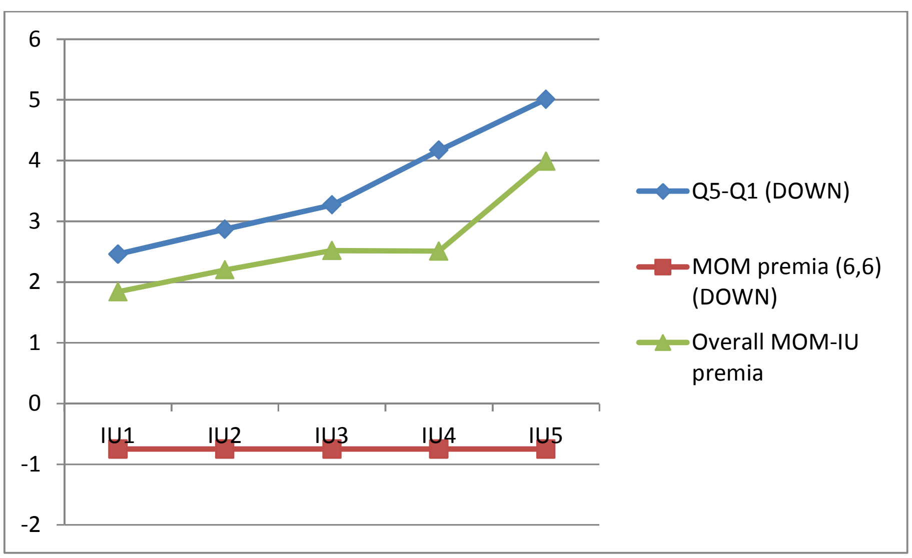
Figure 7.26 and 7.27 depict the comparison between the momentum premia of the (R=6, H=6) trading strategies conditional on different factors (IU (quality of corporate governance), market states, and both IU (quality of corporate governance) and market states) over the entire sample period (Jan. 1996- Dec. 2008). Differing from previous 6 sections, the amplifying effect of IU over the momentum premia is not only evident during time periods following DOWN market state, but also present over the periods following UP market state as the post-UP market state condition does not seem to crimp the amplifying effect of IU to a degree as substantial as the scenarios when other variables are employed as IU proxy. From the perspective of practicality, this piece of empirical evidence is of prime importance as it highlights the role of quality of corporate governance plays as an IU proxy factor and more importantly the lynch pin in boosting momentum premia regardless of market state conditions in the Chinese Class A share market context. In other words, investors can promptly consider using the strength of corporate governance to gauge existing information uncertainty and accordingly adjust their investing decision to best protect their investment against adversity elicited by swingeing market movements in the setting of the Chinese stock market.

Figure 7.26 Comparison: momentum-IU (corporate governance) premia over periods following UP market state, momentum premia of the (R=6, H=6) strategy conditional on post-UP market state, overall momentum-IU (corporate governance) premia in the Chinese Class A share market (Jan.1996- Dec. 2008)



Notes: This figure demonstrates the difference among momentum-IU premia over periods following UP market state, momentum premia of the (R=6, H=6) momentum strategy conditional on post-UP market state, overall momentum-IU premia in the Chinese Class A share market. The vertical axis measures the returns in percentage form. The blue line represents the fluctuations in the momentum premia across different levels of IU over the periods following UP market state; the red line illustrates the premium of (R=6, H=6) momentum strategy unconditional on IU and market states; the green line represents the changes of momentum premia across different IU levels unconditional on market states.

Figure 7.27 Comparison: momentum-IU(corporate governance) premia over periods following DOWN market state, momentum premia of the (R=6, H=6) strategy conditional on post-DOWN market state, overall momentum-IU premia in the Chinese Class A share market (01/96-12/08)



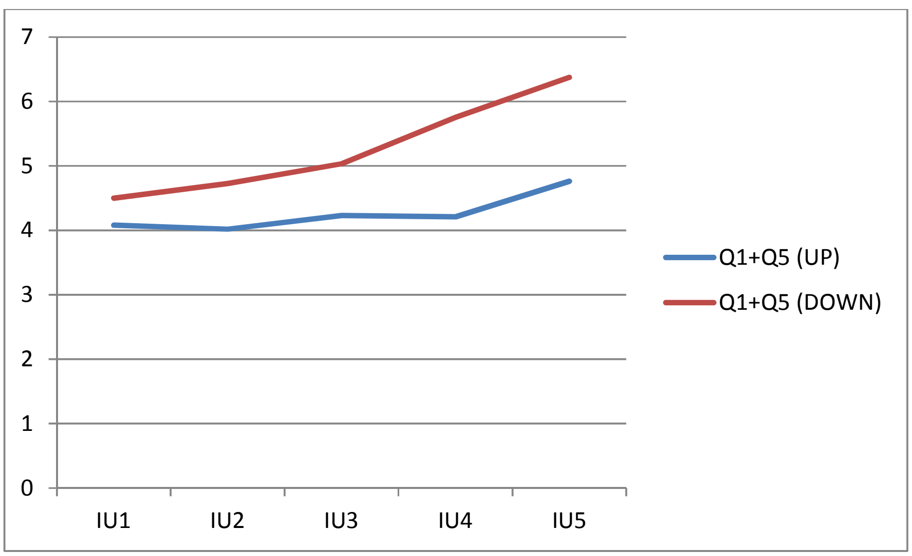
Notes: This figure demonstrates the difference among momentum-IU premia over periods following

DOWN market state, momentum premia of the (R=6, H=6) momentum strategy conditional on post-DOWN market state, overall momentum-IU premia in the Chinese Class A share market. The vertical axis measures the returns in percentage form. The blue line represents the fluctuations in the momentum premia across different levels of IU over the periods following DOWN market state; the red line illustrates the premium of (R=6, H=6) momentum strategy unconditional on IU and market states; the green line represents the changes of momentum premia across different IU levels unconditional on market states.

Figure 7.28 describes the asymmetry of positive momentum and negative momentum over time periods following UP and DOWN market states. Different from previous sections, both differences (IU5-IU1) of the sum of positive and negative momentums are positive, suggesting that when the strength of corporate governance is used as IU proxy, the positive momentum is the driving force behind the momentum premia, consistent with our finding when using firm size as IU proxy in the very first section. Furthermore, the asymmetry between positive and negative momentum is still more significant over the post-DOWN market condition and under the influence of greater degree of IU, as indicated by the observation that the red line is above the blue line and both are upward sloping. This finding is line with the prediction of our hypothesis, supported by the underreaction theory by Hong and Stein (1998) and investors' underconfidence behavioural model (Du, 2002).

Figure 7.28 Asymmetry of positive momentum (Q5) and negative momentum (Q1) over periods following UP and DOWn market states in the Chinese Class A share market (Jan. 1996- Dec. 2008) (Corporate governance)

	Q1	Q5	Q1+Q5
UP market state			
IU1	1.05	3.03	4.08
IU2	0.94	3.08	4.02
IU3	0.82	3.41	4.23
IU4	0.61	3.6	4.21
IU5	0.51	4.25	4.76
IU5-IU1			0.68
DOWN market state	Q1	Q5	Q1+Q5
IU1	1.02	3.48	4.5
IU2	0.93	3.8	4.73
IU3	0.88	4.15	5.03
IU4	0.79	4.96	5.75
IU5	0.68	5.69	6.37
IU5-IU1			1.87



Notes: The statistics box above the figure summarizes positive momentum (Q5) and negative momentum (Q1) for testing periods following UP and DOWN market states. This figure depicts the difference of the asymmetry of positive momentum (Q5) and negative momentum (Q1) over the time periods following UP market state, plotted as the blue line, and DOWN market state, graphed as the red line in the Chinese Class A share market over Jan. 1996 to Dec. 2008.The vertical axis measures 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 level of information uncertainty. The upward sloped lines suggest that regardless of market states, 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.

7.9 Prior 24-month market average return as market state definition

Analogous to the approach employed in section 5.3 of chapter 5, 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 in the previous 7 sections. 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 (please see Appendix 8 for details).

7.10 Summary

Subsequent to chapter 6, where information uncertainty is reported to have an amplifying effect over momentum premia, the core finding lies at the heart of this section is the asymmetric presence of the amplifying effect of information uncertainty over momentum premia of the (R=6, H=6) momentum trading strategy during time periods following UP and DOWN market states. Specifically, across 7 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, indicating that the amplifying effect of IU over the momentum premium is exacerbated during time periods following DOWN market state. On the premise of some behavioural explanations—such as Du (2002)'s investors' underconfidence behavioural model and Hong, Lim and Stein (2000)'s gradual information diffusion theory—to the momentum premium, the observation can be interpreted from different angles under the aegis of various human cognitive heuristics as explained in rich detail in section 7.2-7.8 of this chapter.

Chapter 8 Robustness tests

8.1 Introduction

To further boost the power of the tests employed, we run two analyses—1) sub-period analysis; 2) risk-adjustment procedure—to check the robustness of the empirical findings reported in chapter 5, chapter 6, and chapter 7. Section 8.2 describes the results from the sub-period analysis and section 8.3 documents the results from risk-adjugment procedure.

8.2 Results from sub-period analysis (robustness test 1)

As described in rich detail in section 4.2.7 of data and methodology chapter, considering the relatively short full operational history of the Chinese stock market (only started running full operations in 1991) compared with other developed financial markets, we do not have the luxury to run the tests on a sample dataset spanning over the length of time period comparable to the length of the main entire sample period (Jan. 1996- Dec. 2008) as back-testing strategy, used by Jegadeesh and Titman (1993) in their seminal work of the field[60]. Alternatively, a sub-period analysis, adopted by a spate of studies in the literature (Conrad and Kaul, 1998, Schiereck et al., 1999, Zhang, 2006, Lin and Swanson, 2008, Kelsey et al., 2010), is employed as the bedrock of the back-testing strategy in the study through turning our sights on two of the salient financial reforming events[61]--1) the implementation of the new P.R.C. security law on July 1st, 1999; 2) the opening of the Chinese Class A

[60] Jegadeesh and Titman (1993) employed stock returns for the period over 1965 to 1989 as the main entire sample dataset and stock returns for the period over 1927 to 1964 as the time period of their back-testing strategy.

[61] The four major financial market reforming events took place over the entire sample are detailed in section 4.1.2.1 of Data and methodology chapter.

share market to qualified foreign institutional investors (QFII) on July 9th, 2003, to the extent that they evidently ameliorated the operational efficiency of the Chinese stock market as documented by Lin and Swanson (2008). Specifically, as described in data and methodology chapter, 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 1st, 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 9th, 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) as evidenced in chapter 5-7, 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. Theoretically, our surmise, from the perspective of the linkage among stock returns, investors' sentiment and momentum premium, is that overall positive stock market returns, reflecting favourable response of investors towards the occurrence of the event, are indicative of investors' optimistic sentiment in the near future (De Bondt, 1993, Fisher and Statman, 2000, Brown and Cliff, 2004), sapping the investors' underconfidence and freeing up their cognitive resources. Both of the underconfidence among a group of investors (Du, 2002) and insufficient cognitive resources (Frederick, 2002) are nominated as main culprits provoking the momentum premia through triggering underconfident investors' delayed update of priors in view of more confident investors' behaviours (Du, 2002), fuelled by representativeness heuristics (Tversky and Kahneman, 1974) from the view of behavioural theorists and via prompting the frequent practice of intuitive heuristics such as affective and representative heuristics of System 1(intuitive) of two cognitive systems (Kahneman and Frederick, 2002) from the vantage point of experimental evidence from psychology respectively. As a result, 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.

Table 8.1, shown below, reports the momentum premia of momentum trading strategies with different combinations of ranking period (R= 3, 6, 9, 12) and holding period (H=3, 6, 9, 12) over time periods revolving the inception of two salient events –pre-event and post-event periods—in comparison with the momentum premia of corresponding momentum trading strategies over the entire sample period spanning from Jan. 1996 to Dec. 2008. At first glance, all the momentum premia stay positive and statistically significant over pre- and post-event periods of both events. Additionally, there are a couple of fairly striking observations worth noting: 1) for both event 1 and 2, the momentum premia of 16 different momentum trading strategies evidenced over pre-event periods unanimously eclipse those of corresponding momentum trading strategies realized during post-event periods; 2) on average, the momentum premia of 16 different momentum trading strategies yielded over pre-event period of event 2 are slightly larger than those of matching momentum trading strategies found during pre-event period of event 1 and this pattern remains evident for the momentum premia of corresponding momentum trading strategies resulted over the post-event periods of two events, with the momentum premia found over post-event period of event 2 trumping those yielded over post-event period of event 1.

A unified interpretation of the observation of the asymmetry in terms of the momentum premia over pre- and post-event periods for both events can be spelled out as: in face of uncertainty prior to the implementation of new P.R.C security law, stoked by anxiety, investors' perception of risk heightens (Schwarz, 1990), exacerbating the underconfident investors' confident investors'-behaviour-chasing behaviour through delaying update on their prior beliefs. As a result, the momentum premia found over pre-event periods of both events overwhelm those yielded over post-event periods. This asymmetric pattern can further be elucidated from the perspective of the impact of the inception of event 1(the implementation of new P.R.C. security law) and event 2 (the openings of Chinese Class A share market to qualified foreign institutional investors (QFII) over the operational efficiency of the Chinese stock market. Specifically, the deteriorated momentum premia over post-event periods imply the improvement in the operational efficiency of the Chinese stock market (Gilson and Kraakman, 1984, Pena, 1995), which seems plausible considering that the common grounds between the two events is the aim of ameliorating the operational efficiency of the Chinese stock market (Lin and Swanson, 2008).

The second observation is that on average, the momentum premia of 16 different momentum trading strategies over pre- and post-event 2 periods outstrip those of matching strategies over corresponding time periods of event 1. Simply put, the momentum premia found over more recent time periods (revolving the inception of event 2) comprehensively beat those realized over time periods of more distant past (revolving the inception of event 1), in corroboration of empirical evidence from a barrage of major studies in the literature such as Jegadeesh and Titman (1993), Conrad and Kaul (1998), Schiereck et al. (1999) and Zhang (2006) all showing that momentum premium tends to creep up over time. Intriguingly, under the theoretical framework of heuristics and biases tradition, one would expect that as Chinese stock market participants hone their statistics skills over time and in turn become more capable of processing information with systematic heuristics such as statistics reasoning heuristic (Nisbett et al., 1983), prompting a deterioration of momentum premia, casting doubt on the plausibility of this finding. However, one cannot be oblivious of the fact that increasingly more novice Chinese retail investors, plagued with scarce access to different forms of investment products despite holding considerable amount of capital as saving (Kang et al., 2002), have started participating in the Chinese Class A share market over years. These novice Chinese retail investors are subject to intuitive information processing strategy (Nisbett et al.,

1983) and the influence of different intuitive heuristics such as affective and representative heuristics of System 1(intuitive) of two cognitive systems (Kahneman and Frederick, 2002), prone to provoke momentum premia (Daniel et al., 1998; Barberis et al., 1998; Du, 2002; Hong and Stein, 1999), vindicating the plausibility of the empirical evidence found in this study. The implementation of new P.R.C. security law and the opening of Chinese Class A share market to qualified foreign institutional investors (QFII) received contrasting receptions, with the former receiving favourable market response and the latter negative market response. The more pervasive momentum premia of different momentum trading strategies are observed over periods revolving event 2, which is in line with the empirical evidence documented by Kelsey et al.(2010) manifesting that the unfavourable market response reflects investors' worry over bleak or uncertain outlook of the stock market, consequently leading to more pronounced momentum premia through their hesitation, prompted by underconfidence, toward investment decision making process (Du, 2002). The above-noted evidence adds leg of support to our conjecture and corroborates our finding in chapter 7—the amplifying effect of information uncertainty over the momentum premia is intensified over time periods following DOWN market state—and its interpretation in the sense that the information uncertainty, embedded in the coming implementation of stock market regulatory reforms, kindles investors' anxiety over the outlook of stock market and heightens their perception of risk (Schwarz, 1990). With this logic in mind, It is plausible that market participants get more jittery when the implementation of stock market regulatory reform receives unfavourable response, underpinning the impact of underconfidence over investors' judgmental process and therefore giving a boost to the momentum premia over pre- and post-event periods of the event receiving negative stock market response (Du, 2002).

Table 8.1 Monthly momentum premia over different sub-periods in the Chinese Class A share market

Monthly momentum premia for Class A shares																
	(R, H) where R is the length of the ranking period and H is the length of the holding period															
	Trading strategies															
Time periods	**(3,3)**	**(3,6)**	**(3,9)**	**(3,12)**	**(6,3)**	**(6,6)**	**(6,9)**	**(6,12)**	**(9,3)**	**(9,6)**	**(9,9)**	**(9,12)**	**(12,3)**	**(12,6)**	**(12,9)**	**(12,12)**
Whole sample period	1.85	2.18	2.25	2.31	1.31	1.64	2.17	2.09	1.57	1.8	1.99	2.1	1.49	1.8	1.94	2.08
(Jan. 1996- Dec. 2008)	*	**	**	*	**	**	*	**	**	**	**	**	*	**	**	**
Event 1	**The implementation of the P.R.C. security law**															
Pre-event	2.33	2.57	2.35	2.68	1.96	2.14	2.63	2.73	2.42	2.35	2.62	2.58	3.06	2.37	2.26	2.34
(Jan. 1998- July 1999)	*	**	**	*	**	**	**	**	**	**	**	*	**	**	*	*
Post-event	1.52	1.83	1.79	1.85	1.28	1.05	1.38	1.46	1.04	0.86	1.62	1.74	1.15	1.36	1.62	1.73
(Aug. 1999- Jan. 2001)	*	*	**	*	**	*	**	**	*	**	**	**	*	*	**	*
Event 2	**Openings to Qualified foreign institutional investors (QFII)**															
Pre-event	2.52	2.94	2.71	3.15	2.19	2.35	2.81	2.74	2.18	2.37	2.56	2.93	2.05	2.51	2.47	2.85
(Jan. 2002- July 2003)	**	*	**	**	*	**	**	**	**	**	**	**	*	**	**	**
Post-event	1.68	2.12	2.2	2.19	1.3	1.57	1.89	1.95	1.44	1.63	1.92	1.96	1.38	1.75	1.86	1.94
(Aug. 2003- Jan. 2005)	*	*	*	**	*	*	**	**	**	*	**	*	*	**	*	*

Notes: this table presents the momentum premia (Q5-Q1) of six different momentum trading strategies in the Chinese Class A share market (all the eligible Class A shares listed in the SHSE and SZSE) over the entire sample period from Jan. 1996 to Dec. 2008 and the time periods (pre-event and post-event periods) around the point when two salient financial market policy reforms---the implementation of the P.R.C. security law in July, 1999 and the openings of share A market to qualified foreign institutional investors (QFII) in July, 2003--- took place. The momentum portfolio formation procedure is akin to the approach first used by Jegadeesh and Titman (1993). Over each specific time period, at the end of each month, all the eligible share A stocks are ranked in ascending order based on their past R-month (the value R denotes the number of months used as ranking period for a specific momentum trading strategy. R=3, 6, 9, 12) performance. The 20% highest ranked stocks, being equally weighted, form the "winner" portfolio (Q5) and 20% lowest ranked stocks form the "loser" portfolio (Q1). One month is skipped to avoid microstructure issues. The portfolios are then held for H months (H= 3, 6, 9, 12) following a buy-and-old approach to avoid excessive trading costs (Galariotis et al., 2007). The momentum premium for each trading strategy is calculated by taking the difference of the average monthly return of "winner" portfolio and that of corresponding "loser" portfolio. The significance is each momentum premium is labelled by "*" or "**": "*" symbolizes statistical significance at 10% level. "**" symbolizes statistical significance at 5% level. All the numbers are in percentage term.

The sub-period analysis is also run on the momentum premia of the (R=6, H=6) momentum trading strategy under the influence of information uncertainty in the Chinese Class A share market. 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 (firm size, firm age, analysts' coverage, return volatility, dispersion in analysts' earnings forecasts, trading volume and the strength of corporate governance) 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 referred to Appendix 9). Table 8.2 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). 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, documented in chapter 6 and 7, 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, consistent with the pattern reported in chapter 6 and 7. Akin to our explanation in earlier on regarding the results of sub-period analysis for basic momentum trading strategies, the deteriorated impact of information uncertainty over momentum premium during post-event periods is attributable to the improvement in operational efficiency elicited 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 described from chapter 5 to chapter 7, underscoring that our findings are not time period specific.

Table 8.2 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

Monthly momentum returns for portfolios with different levels of information uncertainty Information uncertainty is proxied by the firm size (1/market capitalization) (6,6) as the typical momentum strategy					
	Different information uncertainty (IU) levels				
Time period	**IU1**	**IU2**	**IU3**	**IU4**	**IU5**
Whole sample period Jan. 1996- Dec. 2008	1.37 **	1.74 **	1.79 **	1.97 **	2.34 **
Event 1	**The implementation of the P.R.C. security law**				
Pre-event Jan. 1998- July 1999	1.56 **	1.85 **	1.93 **	2.18 **	2.53 **
Post-event Aug. 1999- Jan. 2001	1.14 **	1.35 **	1.4 **	1.52 **	1.75 **
Event 2	**Openings to qualified foreign institutional investors (QFII)**				
Pre-event Jan. 2002- July 2003	1.48 **	1.82 **	1.93 **	2.05 **	2.61 **
Post-event Aug. 2003- Jan. 2005	1.32 **	1.69 **	1.75 **	1.89 **	2.31 **

This table reports the momentum premia of the (R=6, H=6) momentum trading strategy (the difference between the average monthly returns of "winner" portfolios and those of "loser" portfolios) 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 in comparison with the momentum premia of the (R=6, H=6) trading strategy conditional on information uncertainty over the whole sample period (Jan. 1996- Dec. 2008) in the same market segment. Consistent with the definition of Chinese Class A share market noted from chapter 5-7, 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. For ease of comparison and the main focus of this research—the investigation on the influence of information uncertainty, the (R=6, H=6) momentum trading strategy is employed as a representative of 16 momentum trading strategies with different combinations of ranking and holding periods (R=3, 6, 9, 12; H=3, 6, 9, 12), analogous to the approach adopted for chapter 6--- investigation on the interplay of information uncertainty and momentum premia and chapter 7--- investigation on the interplay of information uncertainty and momentum premia over periods following UP and DOWN market states. The methodological approach is described in detail underneath Table 5.6 and 5.13. The significance of the momentum premia is indicated by asterisk(s), shown below each momentum premium, for the difference between the returns of "winner" portfolio and those of "loser" portfolio—one asterisk symbols the significance of the momentum premium at 10% significance level; two asterisks symbol the significance of the momentum premium at 5% significance level. All the numbers are in percentage term.

8.3 Risk adjustment for momentum premia (robustness test 2)

Given the landmark status of the Fama & French three factor (FF3F) model in the stage of financial market efficiency debate of modern finance domain and the inability of traditional CAPM or conditional CAPM models in justifying most of anomalous effects in the financial markets, one would be hard-pressed to relinquish the opportunity to test the resilience of the momentum premia of various momentum trading strategies with different combinations of ranking (R=3, 6, 9, 12) and holding periods (H=3, 6, 9, 12) or armed with different conditions such as 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[62] (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[63] (the strength of corporate governance factor) (RFF_HML_t). In other word, the third risk factor—value

[62] The question of whether firm size effect factor and value effect factor should be categorized as risk factors remains debatable (Ferson and Harvey, 1999) yet an in-depth discussion would sidetrack the main direction of the research as discussed in data and methodology chapter and is beyond the scope of this study.

[63] 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.

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, in the Wang & Xu(2004)'s version of the FF3F model.

That said, the importance of the risk adjustment procedure is certainly not limited to check the resilience of the momentum premia of different momentum trading strategies against rational risk factors per se, but also to address the doubt cast on the explanatory power of the Wang and Xu(2004)'s version of FF3F model by Wang and Di Iorio (2007) whom evidenced the significant explanatory power of the value effect factor over cross-sectional stock returns in the Chinese stock market, consequently fostering the role of the quality of corporate governance plays in asset pricing in the setting of the Chinese stock market. In light of Wang and Xu (2004)'s empirical finding (described in detail in the literature review chapter), we conjecture that the supplantation of the value effect factor of the traditional FF3F model with the residual free float ratio as the proxy variable for the quality of corporate governance factor enhances the explanatory power of the asset pricing model (FF3F) over momentum premia of various momentum trading strategies.

Table 8.3 reports the momentum premia of momentum trading strategies with different combinations of ranking and holding periods (R= 3, 6, 9, 12; H=3, 6, 9, 12) adjusted for risk based on the traditional FF3F model in the Chinese Class A share market for the entire sample period from January 1996 through December 2008. By and large, the majority of the momentum premia becomes relatively smaller in terms of magnitude yet still manage to stay statistically significant after being justified against the market risk factor ($R_{m,t} - R_{f,t}$), the firm size effect factor (SMB_t), and the value effect factor (HML_t), entailed in the traditional FF3F model. Table 8.4 presents the momentum premia of momentum trading strategies with different combinations of ranking and holding periods (R=3, 6, 9, 12; H=3, 6, 9, 12) after being adjusted for three risk factors entailed in Wang and Xu (2004)'s version of the FF3F model, which replaces the value effect factor (HML_t) of the traditional FF3F model with the residual free float ratio factor (RFF_HML_t), an proxy for the quality of firm-level corporate governance) in the Chinese Class A share market for the whole sample period spanning from January 1996 to December 2008. Compared with the raw momentum premia of different momentum strategies in the Chinese Class A share market presented in Table 5.1 and the risk-adjusted momentum premia of momentum trading strategies based on the traditional FF3F model, reported in Table 8.3, the risk-adjusted momentum premia of corresponding momentum trading strategies hinged on Wang and Xu(2004)'s version of the FF3F model are universally drastically smaller in magnitude and mostly muted in terms of significance, indicating that Wang and Xu (2004)'s version of the FF3F model, with the value effect factor (HML_t) replaced with the residual free float ratio factor (RFF_HML_t) (the strength of corporate governance), is apparently superior to the traditional version of the FF3F model in justifying the risks embedded in the momentum portfolios in the setting of the Chinese stock market. Futhermore, the preceding finding is clinched by the values of the adjusted R^2 resulted from two risk adjustment procedures based on traditional FF3F and on Wang and Xu (2004)'s version of the FF3F respectively, with average adjusted R^2 for the latter scenario (0.56) overwhelming that for the former scenario (0.26), suggesting Wang and Xu(2004)'s version of the FF3F model is more capable of capturing and justifying the momentum premia in the Chinese Class A share market. In spite of the finding of evidently superior explanatory power of Wang and Xu (2004)'s version of the FF3F model over the momentum premia in the Chinese Class A share market, the momentum premia of different momentum trading strategies are still yet to be fully justified by two different forms of the FF3F model, tempted to the setting of the Chinese stock market, with a vision for rationalizing financial market anomalous effects. The preceding observation underpins the resilience of our finding described in chapter 5.

The estimated coefficients (factor loadings) for the two risk adjustment procedures are presented in Table 8.5 and 8.6. First turning our glance to the estimated coefficient of market risk factor (β) , the estimated coefficients of market risk factor—resulted from the risk adjustment approach based on Wang and Xu(2004)'s version of the FF3F model as reported in Table 8.6—of different momentum trading strategies in the Chinese Class A share market are uniformly positive and highly statistically significant, contrary to the observation that the estimated coefficients of market risk factors of corresponding momentum trading strategies from the risk adjustment procedure hinged on traditional FF3F model being much smaller in terms of magnitude (sometimes even turning negative) coupled with subdued statistical significance. In sum, the preceding observation with respect to the estimated coefficient of market risk factor(β) suggests that the inclusion of the residual free float ratio strengthens the explanatory power of the market risk factor over the momentum premia of different momentum trading strategies in the Chinese Class A share market. Comparing the estimated coefficients of firm size effect factor (s) from the risk adjustment processes based on two versions of FF3F model, we find that overall the estimated coefficients of firm size effect factor from the risk adjustment procedure based on Wang and Xu (2004)'s version of the FF3F model are slightly larger in magnitude and considerably more significant compared with those from the procedure based on traditional FF3F model, reflecting that the replacement of the value effect factor with the residual free float ratio in Wang and Xu's version of the FF3F model enhances the ability of firm size effect factor (SMB_t) in justifying the momentum premia of different momentum trading strategies in the Chinese Class A share market. The preceding evidence shed light on Wang and Xu (2004)'s finding, manifesting that the supplantation of the traditional value effect factor with the residual free float ratio factor (RFF_HML_t) –an proxy for the quality of firm-level corporate governance in the Chinese stock market setting— "helps reduces the noise in the SMB variable" (page 75). Finally, the estimated coefficients of the value effect factor (h) from the risk adjustment process based on traditional FF3F model average out at 0.0304, strikingly trailing behind those from the risk adjustment procedure hinged on Wang and Xu(2004)'s version of the FF3F model (0.7288) at high statistical significance level, providing compelling empirical evidence in supporting our conjecture that the inclusion of the residual free float ratio (RFF_HML_t) is the driving force behind the enhanced explanatory power of Wang and Xu(2004)'s version of the FF3F model over the momentum premia of different momentum trading strategies in the Chinese Class A share market. Collectively, the results found here lend added leg of support to Wang and Xu (2004)'s finding that in the setting of the Chinese Class A share market, the explanatory power of the traditional FF3F model over cross-sectional stock returns/momentum premia is boosted through supplanting the value effect factor with the residual free float ratio (proxy for the quality/strength of firm-level corporate governance). From the perspective of estimated coefficients of different risk factors, namely market risk factor (β), firm size effect factor (s), and the residual free float ratio factor (strength of corporate governance) (f), the empirical finding that the estimated coefficients of three risk factors are all positive, markedly statistically significant and generally larger than the corresponding estimated coefficients of the three risk factors entailed in the traditional FF3F model in magnitude implies that the superior explanatory power of risk factors entailed in Wang & Xu (2004)'s version of the FF3F model over the momentum premia yielded in the Chinese Class A share market. The proceding finding is also corroborated by a swingeing drop in both magnitude and significance of the risk-adjusted momentum premia when Wang & Xu (2004)'s version of the FF3F model is employed to rationalize the momentum premia found in the Chinese Class A share market.

Table 8.3 Risk-adjusted momentum premia (monthly returns) in the Chinese Class A share market based on the FF3F model (Jan. 1996- Dec. 2008)

Risk-adjusted momentum premia (monthly returns) in the Chinese Class A share market Entire sample period Jan. 1996- Dec. 2008 Risk adjusted based on FF3F model								
	Q5-Q1							
	H=3		**H=6**		**H=9**		**H=12**	
R=3	1.24		1.51	*	1.55	**	1.75	**
Adjusted R^2	0.15		0.19		0.24		0.23	
R=6	0.83	*	1.07	*	1.63	*	1.42	**
Adjusted R^2	0.18		0.23		0.27		0.31	
R=9	0.92	*	1.03	**	1.26	*	1.68	*
Adjusted R^2	0.22		0.2		0.31		0.32	
R=12	1.01	*	1.35	*	1.4	*	1.85	
Adjusted R^2	0.27		0.26		0.33		0.37	

This table reports the risk-adjusted momentum premia of 16 different momentum trading strategies with different combination of ranking periods (R=3, 6, 9, 12) and holding periods (H=3, 6, 9, 12) in the Chinese Class A share market (all eligible Class A shares listed in the SHSE and SZSE) for the entire sample period from Jan. 1996 to Dec. 2008. In light of the structure of FF3F model, the risk-adjusted momentum premia are calculated by regressing corresponding raw momentum of different momentum trading strategies, reported in Table 1, against three risk factors, namely market risk factor $(R_{m,t} - R_{f,t})$, firm size effect factor(SMB_t), and value effect factor (HML_t). Mathematically, it can be expressed as $R_{(W-L),t} - R_{f,t} = \alpha + \beta\left(R_{m,t} - R_{f,t}\right) + s(SMB_t) + h(HML_t) + e_t$. $R_{(W-L),t}$ is the momentum premia calculated by taking the difference between the average monthly returns of "winner" portfolios and those of "loser" portfolios; $R_{f,t}$ is the risk-free rate, proxied by monthly yield of the China on-year time deposit rate; $R_{m,t}$ denotes the average monthly return of the market portfolio, estimated by the average monthly return of a consolidated value-weighted Chinese Class A share index, entailing all the eligible Class A shares listed in the SHSE and SZSE; SMB_t is the difference between the average monthly returns of portfolios consisting of 20% of all the eligible Class A shares with the smallest capitalization and those of portfolios comprising 20% of all eligible Class A shares with the largest capitalization ranked in June of each year, also known as the size effect (firm size) factor; HML_t represents the difference between the average monthly returns of portfolios consisting of 20% of all eligible Class A shares with the highest book-to-market ratios and those of portfolios with 20% of all eligible Class A shares with the lowest book-to-market ratios, dubbed as the value effect factor. α represents the portion of the raw momentum premium that cannot be justified by the three aforementioned risk factors encompassed in the FF3F model. β, s, h are the factor loadings (coefficients) from regressing estimation procedure on the market risk factor $\left(R_{m,t} - R_{f,t}\right)$, size effect factor(SMB_t), and value effect factor (HML_t) respectively, specifying the explanatory power of each risk factor over the raw momentum premia. e_t is an error factor, which is independently and identically distributed. The adjusted R^2 is specified for the risk-adjusted momentum premium of each momentum trading strategy, indicating the percentage of variation in raw momentum premia can be jointly explained by the three risk factors, taking into account the number of regressors (risk factors).

The number of asterisk(s) indicates the statistical significance of the risk-adjusted momentum premia, with one asterisk showing that the relevant risk-adjusted momentum premium is statistically significant at 10% level while two showing the relevant risk-adjusted momentum premium is statistically significant at 5% level. All the risk-adjusted momentum premia are present in percentage term.

Table 8.4 Risk-adjusted momentum premia (monthly returns) in the Chinese Class A share market based on Wang & Xu(2004)'s version of the FF3F model (Jan. 1996-Dec. 2008)

Risk-adjusted momentum premia (monthly returns) in the Chinese Class A share market Entire sample period from Jan. 1996 to Dec. 2008 Risk adjusted based on Wang & Xu (2004)'s FF3F Q5-Q1				
	H=3	**H=6**	**H=9**	**H=12**
R=3	0.24	0.42	0.46	0.58
Adjusted R^2	0.42	0.46	0.53	0.6
R=6	0.15	0.28	0.39 *	0.51
Adjusted R^2	0.43	0.51	0.55	0.59
R=9	0.09	0.13 *	0.25	0.46
Adjusted R^2	0.47	0.59	0.62	0.74
R=12	-0.06	0.12	0.2	0.63 *
Adjusted R^2	0.56	0.58	0.65	0.72

This table reports the risk-adjusted momentum premia of 16 different momentum trading strategies with different combination of ranking periods (R=3, 6, 9, 12) and holding periods (H=3, 6, 9, 12) in the Chinese Class A share market (all eligible Class A shares listed in the SHSE and SZSE) for the entire sample period from Jan. 1996 to Dec. 2008. In light of the structure of Wang & Xu (2004)'s version of the FF3F model, the risk-adjusted momentum premia are calculated by regressing corresponding raw momentum of different momentum trading strategies, reported in Table 1, against three risk factors, namely market risk factor $(R_{m,t} - R_{f,t})$, firm size effect factor(SMB_t), and residual free float ratio factor (RFF_HML_t) . Mathematically, it can be expressed as $R_{(W-L),t} - R_{f,t} = \alpha + \beta(R_{m,t} - R_{f,t}) + s(SMB_t) + f(RFF\_HML_t) + e_t$. $R_{(W-L),t}$ is the momentum premia calculated by taking the difference between the average monthly returns of "winner" portfolios and those of "loser" portfolios; $R_{f,t}$ is the risk-free rate, proxied by monthly yield of the China one-year time deposit rate; $R_{m,t}$ denotes the average monthly return of the market portfolio, estimated by the average monthly return of a consolidated value-weighted Chinese Class A share index, entailing all the eligible Class A shares listed in the SHSE and SZSE; SMB_t is the difference between the average monthly returns of portfolios consisting of 20% of all the eligible Class A shares with the smallest capitalization and those of portfolios comprising 20% of all eligible Class A shares with the largest capitalization ranked in June of each year, also known as the size effect (firm size) factor; RFF_HML_t represents the difference between the average monthly returns of portfolios consisting of 20% of all eligible Class A shares with the highest residual free float ratios—resulted from regressing free float ratios against log market capitalizations of corresponding firms—and those of portfolios with 20% of all eligible Class A shares with the lowest free float ratios, known as the strength of corporate governance factor at different time points. α represents the portion of the raw momentum premium that cannot be justified by the three aforementioned risk factors entailed in the Wang & Xu (2004)'s version of the FF3F model. β, s, f are the factor loadings (coefficients) from regressing estimation procedure on the market risk factor $\left(R_{m,t} - R_{f,t}\right)$, size effect factor(SMB_t), and the strength of corporate governance (RFF_HML_t) respectively, specifying the explanatory power of each risk factor over the raw momentum premia. e_t is an error factor, which is independently and identically distributed. The adjusted R^2 is specified for the risk-adjusted momentum premium of each momentum trading strategy, indicating the percentage of variation in raw momentum premia can be jointly explained by the three risk factors, taking into account the number of regressors (risk factors). The number of asterisk(s) indicates the statistical significance of the risk-adjusted momentum premia, with one asterisk showing that the relevant risk-adjusted momentum premium is statistically significant at 10% level while two showing the relevant risk-adjusted momentum premium is statistically significant at 5% level. All the risk-adjusted momentum premia are present in percentage term.

Table 8.5 Factor loadings from the risk adjustment for 16 momentum trading strategies in the Chinese Class A share market based on the FF3F model (Jan. 1996- Dec. 2008)

	Factor loadings based on the FF3F model															
	Momentum trading strategies (R, H)															
	(3,3)	**(3,6)**	**(3,9)**	**(3,12)**	**(6,3)**	**(6,6)**	**(6,9)**	**(6,12)**	**(9,3)**	**(9,6)**	**(9,9)**	**(9,12)**	**(12,3)**	**(12,6)**	**(12,9)**	**(12,12)**
β	-0.003	0.015	0.008	-0.012	0.023	0.01	0.031	0.029	0.025	-0.015	0.042	0.037	0.044	0.028	0.019	0.02
t(β)	-1.54	2.63	1.05	3.06	1.99	1.82	0.79	1.27	2.05	-0.04	1.37	1.91	2.58	2.11	1.25	2.04
s	0.18	0.24	0.28	0.31	0.3	0.53	0.37	0.41	0.27	0.16	0.38	0.47	0.51	0.55	0.48	0.39
t(s)	1.06	2.15	2.09	1.99	2.02	1.52	1.73	2.38	2.17	1.83	2.06	3.11	2.58	1.99	2.04	2.51
h	0.029	0.015	-0.005	0.029	0.036	0.041	0.037	0.052	0.041	0.029	0.036	0.022	0.035	0.016	0.04	0.034
t(h)	1.03	1.5	-0.28	1.37	1.93	2.04	1.84	1.27	1.55	1.92	1.73	1.52	1.07	2.02	1.73	1.88

This table presents the factor loadings results from the risk adjustment process of the raw momentum premia of 16 different momentum trading strategies in the Chinese Class A share market based on the FF3F model. The risk adjustment process can be mathematically expressed as: $R_{(W-L),t} - R_{f,t} = \alpha + \beta(R_{m,t} - R_{f,t}) + s(SMB_t) + h(HML_t) + e_t$. $R_{(W-L),t}$ is the momentum premia calculated by taking the difference between the average monthly returns of "winner" portfolios and those of "loser" portfolios; $R_{f,t}$ is the risk-free rate, proxied by monthly yield of the China one-year time deposit rate; $R_{m,t}$ denotes the average monthly return of the market portfolio, estimated by the average monthly return of a consolidated value-weighted Chinese Class A share index, entailing all the eligible Class A shares listed in the SHSE and SZSE; SMB_t is the difference between the average monthly returns of portfolios consisting of 20% of all the eligible Class A shares with the smallest capitalization and those of portfolios comprising 20% of all eligible Class A shares with the largest capitalization ranked in June of each year, also known as the size effect (firm size) factor; HML_t represents the difference between the average monthly returns of portfolios consisting of 20% of all eligible Class A shares with the highest book-to-market ratios and those of portfolios with 20% of all eligible Class A shares with the lowest book-to-market ratios, dubbed as the value effect factor. α represents the portion of the raw momentum premium that cannot be justified by the three aforementioned risk factors entailed in the FF3F model. β, s, h are the factor loadings (coefficients) from regressing estimation procedure on the market risk factor $(R_{m,t} - R_{f,t})$, size effect factor(SMB_t), and value effect factor (HML_t) respectively, specifying the explanatory power of each risk factor over the raw momentum premia. e_t is an error factor, which is independently and identically distributed. The t statistics of corresponding estimated coefficients (loading factors) are listed in the row below.

Table 8.6 Factor loadings from the risk adjustment for 16 momentum trading strategies in the Chinese Class A share market based on Wang & Xu(2004)'s version of the FF3f model (Jan. 1996- Dec. 2008)

Factor loadings based on Wang Xu(2004)'s version of the FF3F model																
	Momentum trading strategies (R, H)															
	(3,3)	(3,6)	(3,9)	(3,12)	(6,3)	(6,6)	(6,9)	(6,12)	(9,3)	(9,6)	(9,9)	(9,12)	(12,3)	(12,6)	(12,9)	(12,12)
β	0.036	0.038	0.027	0.041	0.055	0.049	0.035	0.028	0.047	0.052	0.044	0.039	0.03	0.048	0.052	0.053
t(β)	2.99	3.04	3.18	2.58	2.05	3.16	3.37	3.05	3.28	3.37	2.19	3.06	4.15	2.85	3.06	2.19
s	0.31	0.44	0.39	0.27	0.51	0.47	0.34	0.29	0.51	0.58	0.43	0.37	0.42	0.5	0.51	0.59
t(s)	2.99	3.51	3.28	4.05	5.07	3.79	4.06	3.82	4.16	3.07	4.11	3.07	4.16	5.25	4.13	3.94
f	0.72	0.67	0.59	0.81	0.74	0.61	0.73	0.8	0.77	0.69	0.84	0.87	0.72	0.63	0.59	0.88
t(f)	3.45	4.99	6.03	4.39	5.07	6.15	3.92	4.02	5.15	6.33	5.29	4.31	5.01	3.49	5.28	6.01

This table presents the factor loadings results from the risk adjustment process of the raw momentum premia of 16 different momentum trading strategies in the Chinese Class A share market based on Wang & Xu(2004)'s version of the FF3F model. The risk adjustment process can be mathematically expressed as: $R_{(W-L),t} - R_{f,t} = \alpha + \beta(R_{m,t} - R_{f,t}) + s(SMB_t) + f(RFF\_HML_t) + e_t$. RFF_HML_t represents the difference between the average monthly returns of portfolios consisting of 20% of all eligible Class A shares with the highest residual free float ratios—resulted from regressing free float ratios against log market capitalizations of corresponding firms—and those of portfolios with 20% of all eligible Class A shares with the lowest free float ratios, known as the strength of corporate governance factor at different time points. α represents the portion of the raw momentum premium that cannot be justified by the three aforementioned risk factors embedded in the Wang & Xu (2004)'s version of the FF3F model. β, s, f are the factor loadings (coefficients) from regressing estimation procedure on the market risk factor $(R_{m,t} - R_{f,t})$, size effect factor(SMB_t), and the strength of corporate governance (RFF_HML_t) respectively, specifying the explanatory power of each risk factor over the raw momentum premia. e_t is an error factor, which is independently and identically distributed. The t statistics of corresponding estimated coefficients (loading factors) are listed in the row below.

Additionally, we also adjusted the raw momentum premia of different momentum trading strategies over time periods following UP market state (defined by positive prior 12-month average market return), presented in Panel A of Table 5.2, in the Chinese Class A share market for different risk factors entailed in either traditional FF3F model or Wang & Xu (2004)'s version of the FF3F model. Conversely, it's worth noting that the risk adjustment analysis is not performed for the raw momentum premia of different momentum strategies conditional on post-DOWN market state, reported in Panel B of Table 5.2, in that the momentum returns yielded over time periods following DOWN market state appear to be negative across most of the momentum trading strategies, revealing subdued momentum premia of the momentum strategies with post-DOWN market state condition without having been adjusted for risk factors. Naturally, the raw momentum premia of different trading strategies found in the Chinese Class A share market over periods following UP market state are zeroed in on. The risk-adjusted momentum premia of 16 momentum trading strategies with different combinations of ranking and holding periods (R=3, 6, 9, 12; H=3, 6, 9, 12) over time periods following UP market state in the Chinese Class A share market based on traditional FF3F model and Wang & Xu (2004)'s version of FF3F model are reported in Table 8.7 and 8.8 respectively. Apparently, the pattern of the results is somewhat similar to what was described earlier on with respect to the risk-adjusted momentum premia of momentum trading strategies unconditional on market states—Wang & Xu(2004)'s version of the FF3F model exhibits superior ability in rationalizing the momentum premia of different momentum strategies over time periods following UP market state.

Table 8.7 Risk-adjusted momentum premia (monthly returns) in the Chinese Class A share market over time periods following UP market state based on the FF3F model (Jan. 1996- Dec. 2008)

Risk-adjusted momentum premia (monthly returns) Class A share market following UP market state (12 months) Entire sample period Jan. 1996- Dec. 2008 Risk adjusted based on FF3F model Q5-Q1								
	H=3		H=6		H=9		H=12	
R=3	1.03	*	1.53	*	1.47	*	1.89	*
Adjusted R^2	0.21		0.25		0.33		0.3	
R=6	0.87	*	1.02		1.68	**	1.54	*
Adjusted R^2	0.24		0.28		0.35		0.29	
R=9	1.15		1.25	**	1.05	*	1.47	*
Adjusted R^2	0.27		0.3		0.38		0.35	
R=12	0.61		1.16	*	1.23	*	1.65	
Adjusted R^2	0.31		0.37		0.43		0.45	

This table reports the risk-adjusted momentum premia of 16 different momentum trading strategies with different combination of ranking periods (R=3, 6, 9, 12) and holding periods (H=3, 6, 9, 12) in the Chinese Class A share market (all eligible Class A shares listed in the SHSE and SZSE) over the time periods following UP market state (defined by positive prior 12 month average market return) for the entire sample period from Jan. 1996 to Dec. 2008. In light of the structure of FF3F model, the risk-adjusted momentum premia are calculated by regressing corresponding raw momentum of different momentum trading strategies, reported in the Panel A of Table 5, against three risk factors, namely market risk factor $(R_{m,t} - R_{f,t})$, firm size effect factor(SMB_t), and value effect factor (HML_t). Mathematically, it can be expressed as $R_{(W-L),t} - R_{f,t} = \alpha + \beta\left(R_{m,t} - R_{f,t}\right) + s(SMB_t) + h(HML_t) + e_t$. The adjusted R^2 is specified for the risk-adjusted momentum premium of each momentum trading strategy, indicating the percentage of variation in raw momentum premia can be jointly explained by the three risk factors, taking into account the number of regressors (risk factors). The number of asterisk(s) indicates the statistical significance of the risk-adjusted momentum premia, with one asterisk showing that the relevant risk-adjusted momentum premium is statistically significant at 10% level while two showing the relevant risk-adjusted momentum premium is statistically significant at 5% level. All the risk-adjusted momentum premia are present in percentage term.

Table 8.8 Risk-adjusted momentum premia (monthly returns) in the Chinese Class A share market over the time periods following UP market state based on Wang & Xu (2004)'s version of the FF3F model (Jan. 1996- Dec. 2008)

Risk-adjusted momentum premia (monthly returns) Chinese Class A share market following UP market state (12 months)

Entire sample period from Jan. 1996 to Dec. 2008

Risk adjusted based on Wang & Xu (2004)'s version of the FF3F model

Q5-Q1

	H=3	H=6		H=9		H=12	
R=3	0.88	1.01		0.95	*	1.12	
Adjusted R^2	0.41	0.44		0.4		0.53	
R=6	0.45	0.83		1.26	**	0.96	
Adjusted R^2	0.46	0.52		0.57		0.62	
R=9	0.49	0.77	*	0.81	*	1.08	*
Adjusted R^2	0.49	0.55		0.56		0.62	
R=12	0.35	0.94		1.07	*	1.24	
Adjusted R^2	0.53	0.55		0.51		0.6	

This table reports the risk-adjusted momentum premia of 16 different momentum trading strategies with different combination of ranking periods (R=3, 6, 9, 12) and holding periods (H=3, 6, 9, 12) in the Chinese Class A share market (all eligible Class A shares listed in the SHSE and SZSE) for the entire sample period from Jan. 1996 to Dec. 2008 over the time periods following UP market state (defined by positive prior 12-month market average return). In light of the structure of Wang & Xu (2004)'s version of the FF3F model, the risk-adjusted momentum premia are calculated by regressing corresponding raw momentum of different momentum trading strategies, reported in the Panel A of Table 5, against three risk factors, namely market risk factor $(R_{m,t} - R_{f,t})$, firm size effect factor(SMB_t), and residual free float ratio factor (RFF_HML_t) . Mathematically, it can be expressed as $R_{(W-L),t} - R_{f,t} = \alpha + \beta(R_{m,t} - R_{f,t}) + s(SMB_t) + f(RFF\_HML_t) + e_t$. The adjusted R^2 is specified for the risk-adjusted momentum premium of each momentum trading strategy, indicating the percentage of variation in raw momentum premia can be jointly explained by the three risk factors, taking into account the number of regressors (risk factors). The number of asterisk(s) indicates the statistical significance of the risk-adjusted momentum premia, with one asterisk showing that the relevant risk-adjusted momentum premium is statistically significant at 10% level while two showing the relevant risk-adjusted momentum premium is statistically significant at 5% level. All the risk-adjusted momentum premia are present in percentage term.

Table 8.9 summarizes the risk-adjusted momentum premia of the (R=6, H=6) momentum trading strategy conditional on 7 different IU proxy factors (firm size, firm age, analysts' coverage, return volatility, dispersion in analysts' earnings forecast, trading volume, the strength of corporate governance) in the Chinese Class A share market over the entire sample period from January 1996 to December 2008. The amplifying effect of information uncertainty over the momentum premia is still evident. Nevertheless, compared with the results of raw momentum premia of the (R=6, H=6) momentum trading strategy at different levels of information uncertainty, proxied by the aforementioned 7 factors, reported in chapter 6, the pattern of the risk-adjusted momentum premia based on traditional FF3F model and Wang & Xu (2004)'s version of the FF3F model is commensurate with the one observed earlier on in the section. Specifically, the Wang & Xu (2004)'s version of the FF3F model is more capable of justifying the momentum premia of the (R=6, H=6) momentum trading strategy conditional on IU across different IU proxy factors, reinforcing the validity of our conjecture that Wang & Xu (2004)'s approach of including the strength of corporate governance enhances the explanatory power of the FF3F model over the momentum premia.

Table 8.9 Risk-adjusted momentum premia (monthly returns) of the (R=6, H=6) momentum trading strategy under the influence of information uncertainty (firm size, firm age, analysts' coverage, return volatility, dispersion in analysts' earnings forecast, trading volume and the strength of corporate governance(free float ratio)) in the Chinese Class A share market over the entire sample period from Jan. 1996 to Dec. 2008 based on the traditional FF3F model and Wang & Xu (2004)'s version of the FF3F model

Risk-adjusted momentum premia (monthly returns) of the (R=6, H=6) momentum strategy conditional on IU proxies Chinese Class A share market						
		Q5-Q1				
		IU1	IU2	IU3	IU4	IU5
Firm size	FF3F	1.18	0.85	0.99	0.83	0.98
	t value	3.51	4.82	3.07	4.99	5.5
	WXFF3F	0.75	0.49	0.42	0.5	0.65
	t value	2.01	1.59	1.3	2.18	2.55
Firm age	FF3F	0.68	0.39	0.46	0.35	0.96
	t value	3.99	5.16	3.01	6.13	4.04
	WXFF3F	0.31	0.18	0.2	0.13	0.46
	t value	1.09	0.62	2.11	1.37	2.08
Coverage	FF3F	1.89	2.01	2.47	1.86	2.05
	t value	2.55	1.84	3.08	4.55	7.91
	WXFF3F	1.17	1.64	1.81	1.39	1.66
	t value	1.99	2.04	2.14	1.05	2.28
VOL	FF3F	0.29	0.25	0.22	0.31	0.69
	t value	2.15	3.01	3.85	6.17	5.18
	WXFF3F	0.05	0.18	0.14	0.2	0.37
	t value	0.24	1.03	2.18	2.51	1.99
DISP	FF3F	1.05	1.13	1.2	1.18	1.29
	t value	8.91	10.5	15.05	7.22	10.51
	WXFF3F	0.23	0.46	0.5	0.49	0.61
	t value	1.09	0.83	3.01	2.95	4.05
Volume	FF3F	0.65	0.52	0.49	0.55	0.69
	t value	3.91	4.03	5.99	5.68	5.09
	WXFF3F	0.31	0.27	0.19	0.44	0.5
	t value	0.11	1.55	1.08	2.31	1.85
Governance	FF3F	1.68	1.75	2.37	2.6	3.81
	t value	4.01	6.85	9.42	8.84	15.5
	WXFF3F	0.57	1.05	1.29	1.88	2.09
	t value	1.05	2.86	3.59	2.68	3.92

This table reports the risk-adjusted momentum premia of the (R=6, H=6) momentum trading strategy conditional on 7 different IU proxy factors (firm size, firm age, analysts' coverage, return volatility, dispersion in analysts' earnings forecast, trading volume and the strength of corporate governance) in the Chinese Class A share market for the entire sample period from Jan. 1996 to Dec. 2008 based on two versions of the FF3F models—the traditional FF3F model: $R_{(W-L),t} - R_{f,t} = \alpha + \beta(R_{m,t} - R_{f,t}) + s(SMB_t) + h(HML_t) + e_t$ and Wang & Xu(2004)'s version of the FF3F model: $R_{(W-L),t} - R_{f,t} = \alpha + \beta(R_{m,t} - R_{f,t}) + s(SMB_t) + f(RFF\_HML_t) + e_t$. The specifications of both models are described in rich detail in Data and methodology chapter and earlier on in this section. Succinctly, in the Wang & Xu(2004)'s version of the FF3F model, the residual free float ratio, resulted from regressing free float ratio against logarithm market capitalization of corresponding firm, is included as the third risk factor instead of the value effect factor of the traditional FF3F model. The risk-adjusted momentum premia are present in percentage term.

Taken together, 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 are still yet to fully explain the momentum premia of momentum trading strategies examined in this study.

8.4 Summary

This chapter reports the results from two robustness tests. In section 8.2, through running a sub-period analysis, we show that the momentum premia of momentum trading strategies examined remain positive and exhibit strong statistical significance over the time periods revolving 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) in the Chinese stock market, indicating that the empirical findings of pervasive momentum premium in this study is not sample period-specific. In section 8.3, we adjust the raw momentum premia of different momentum strategies for the risk factors—market risk factor, firm size effect factor, value effect factor, residual free float ratio (strength of corporate governance) entailed in traditional FF3F model and Wang & Xu (2004)'s version of the FF3F model and show that consistent with our conjecture, Wang & Xu's version of the FF3F model, replacing the value effect factor with the residual free float ratio factor (the quality/strength of corporate governance), is superior in justifying the momentum premia than the traditional FF3F model yet both asset pricing models fail to fully rationalize the anomalous effect in the setting of the Chinese Class A share market.

Chapter 9 Conclusion

9.1 Concluding remarks

The underlying motivation of the research is not limited to the investigation on the existence of the momentum premia of different momentum trading strategies with ranking and holding periods (both range between short-to-intermediate time horizon) in the Chinese Class A share market per se but also to scrutinise the dynamics of the momentum premia of momentum trading strategies under post-UP and DOWN market states conditions in the Chinese Class A share market. Further, we expand the understanding of the momentum phenomenon in the setting of the Chinese stock market by studying the impact of the information uncertainty over the momentum premia of different momentum trading strategies as well as the impact of the information uncertainty over the momentum premia during time periods following UP and DOWN market states. More explicitly, we test our conjectures through comparing the empirical findings we arrived at in this research against a set of hypotheses theorized to succinctly reflect the essence of our conjectures as described in section 2.6 Summary/testing hypotheses of chapter 2 theoretical framework.

Responding to the four testing hypotheses, we find that the momentum premia are universally positive and statistically significant across 16 different momentum trading strategies with different combinations of ranking and holding periods (R= 3, 6, 9, 12; J=3, 6, 9, 12) in the Chinese Class A share market. The result differs from other previous studies on the topic for the reasons such as different frequency of the dataset (Wu, 2004), sample time horizons (Kang et al., 2002), market segments(Naughton et al., 2008) chosen to focus on. The observation that the momentum premia found here in the Chinese Class A share market are more pervasive than those found in more developed financial markets such as the U.S. (Jegadeesh and Titman, 1993) and the U.K. (Hon and Tonks, 2003) markets, which can be attributed to the evidence showing that Asian/Chinese investors are predisposed to practice evaluative information processing, overly reliant on intuitive heuristics such as affective and representativeness heuristics of System 1(intuitive) of two cognitive systems (Kahneman and Frederick, 2002) and excessive overconfidence (Yates et al., 1998), consequently leading to the more pronounced momentum premia across different momentum strategies in the Chinese Class A share market (Daniel et al., 2001, Barberis et al., 1998, Du, 2002, Hong and Stein, 1999). Among different momentum investing strategies, the momentum premia gradually increase as the holding period lengthens from 3 months to 12 months, yet deteriorate as the ranking period extends from 3 months to 12 months, plausible based on the investors' overconfidence theory by Daniel et al. (1998) and investors' underconfidence theory by Du (2002) respectively. Specifically, subdued momentum premia for trading strategies with longer ranking and shorter holding periods are driven by investors' sour mood as the time to release their prediction outcomes draws nearer, triggering the detailed-oriented, systematic information processing strategy involving frequent practice of reflective heuristics of System 2 (reflective) of two cognitive systems (Kahneman and Frederick, 2002) (Schwarz, 1990) and the sanguine confidence level of investors as longer ranking periods renders them access to more information, prompting more decisive and timely decision making of even underconfidence investors, jointly depressing the momentum premia.

By defining the time periods following UP and DOWN market states based on the prior-12 or 24-month average Chinese Class A share market returns, we show that the momentum premia of different momentum strategies over time periods following UP market state outstrip those over time periods following DOWN market state in the Chinese Class A share market for the entire sample period from January 1996 to December 2008. Investors' optimism/overconfidence on the heels of market run-ups is deemed as the driving force behind the observation. Specifically, investors misplace weights on the strength of the information (Griffin and Tversky, 1992) and rely heavily on intuitive heuristics such as affective heuristics of System 1(intuitive) of two cognitive systems (Kahneman and Frederick, 2002), elicited by their optimism and overconfidence, subsequently giving a boost to the momentum premia. In addition, the surge in herding activities among Chinese investors post-market upside movements could also substantiate the momentum premia over time periods following DOWN market state.

By employing 7 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, 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, in accord with the prediction of our hypothese 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. The preceding evidence can be interpreted as: 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. The evidence can also be interpreted as the resultant of more intensive herding behaviours among Chinese investors in face of information uncertainty (Yeh and Lee, 2000, Grinblatt et al., 1995, Nofsinger and Sias, 1999) and is consistent with the prediction of the underreaciton theory (Hong and Stein, 1999) and gradual information diffusion theory (Hong et al., 2000). Taking the investigation on the impact of information uncertainty over momentum premia a step further, we split the whole sample period into time periods following UP and DOWN market states and find that the amplifying effect of information uncertainty over the momentum premia is further exacerbated over time periods following DOWN market state, yet is blunted over time periods following UP market state. The exacerbated amplifying effect of information uncertainty over momentum premia could be the resultant of two different 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 of the (R=6, H=6) momentum trading strategy 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 (Daniel et al., 1998, Barberis et al., 1998, Du, 2002, Hong and Stein, 1999). Akin to the finding mentioned earlier, a dichotomy on which (positive or negative) momentum is driving asymmetry between positive and negative momentum and in turn momentum premium is still evidently present, corroborating the postulate that the impetus behind the asymmetry between positive and negative momentums and main driving force behind the momentum premia are IU proxy factor-specific. On this front, the quality/strength of corporate governance as IU proxy in amplifying the momentum premia stands out as the amplifying effect does not diminish even over time periods following UP market state, countering the evidence that the amplifying effect of information uncertainty, proxied by the rest of IU proxy factors, turn dismal over time periods following UP market state.

Through applying 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 overall the momentum premia of different momentum strategies in the Chinese Class A share market are resilient and not sample period-specific. The considerably larger momentum premia found over pre-event periods compared with those found over post-event periods is the resultant of heightened perception of risk, elicited by greater information uncertainty ahead of regulatory reforms (Schwarz, 1990), exacerbating the underconfidence of investors, amplifying the momentum premia (Du, 2002). Conversely, the dampened momentum premia over post-event periods reflect the amelioration in terms of operational efficiency of the Chinese stock market, kindled by the inception of financial market regulatory reforms. Moreover, the momentum premia of 16 different momentum trading strategies over pre- and post- event 2 periods eclipse those of matching strategies over corresponding time periods of event 1, indicating the influx of novice Chinese retail investors, who are lacking of sufficient amount of statistics knowledge, invoking more intuitive information processing strategy with the practice of intuitive heuristics of System 1(intuitive) of two cognitive systems (Kahneman and Frederick, 2002, Nisbett et al., 1983), inflating the momentum premia (Daniel et al., 1998, Barberis et al., 1998, Du, 2002, Hong and Stein, 1999).

By supplanting 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, we show that the explanatory power of the traditional FF3F over momentum premia in the Chinese Class A share market is improved, corroborating 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. Nevertheless, neither the traditional FF3F model nor Wang & Xu (2004)'s version of the FF3F model can fully rationalize the momentum premia of different momentum trading strategies in the Chinese Class A share market.

9.2 Contributions to the literature and practical implications

The findings of this study, summarized in previous section, contribute to the literature in various ways and bear significant practical implications in view of the current volatile financial market around the globe.

All told, the theoretical contributions of this study to the literature are five-fold:

First, we examine the existence of the momentum premia of 16 different momentum trading strategies with different combinations of ranking and holding periods (R=3, 6, 9, 12; H=3, 6, 9, 12) in the Chinese Class A share market over the sample period spanning from January 1996 to December 2008. The investigation per se is not ground-breaking yet the results from the investigation complement those found in previous studies with respect to the existence of momentum premium in the Chinese stock market, where the frequency of data, sample time horizon, or the time horizon of the momentum trading strategies (e.g. intermediate-to-long horizon: 12-24 months) chosen differ from the specifications of the data and momentum investing strategies selection of this study, and therefore offer a unique view of the existence of momentum premium in the setting of the Chinese stock market.

Secondly, this research investigates the dynamics of the momentum premia of different momentum investing strategies (short-to-intermediate time horizon) amidst market swings in the Chinese Class A stock market, expanding the empirical evidence from previous studies by Cooper et al. (2004), Siganos and Chelley-Steeley (2006), Huang (2006) and Du et al. (2009) concerning the U.S. stock market, U.K. stock market, an international context (excluding the Chinese stock market) and Taiwan stock market respectively, and consequently filling the gap in the extant literature. Moreover, given that most of studies in the domain such as Asem and Tian (2009) and Du et al. (2009) zeroing in on the behaviour of the momentum premium of the (R=6, H=6) momentum investing strategy in the U.S. and Taiwan stock markets respectively, this research also offer a comprehensive view of the behaviour of the momentum premia of all 16 momentum investing strategies in the Chinese Class A share market.

Then, in view that study concerning the influence of information uncertainty has become increasingly entrenched in the research domain of social sciences and finance, inspired by the seminal research on this front by Jiang et al. (2005) and Zhang (2006) both with focus on the U.S. stock market, we study the influence of information uncertainty over the momentum premium of the (R=6, H=6) momentum trading strategy (as a representative of all 16 momentum investing strategies) in the Chinese Class A share market. Although many IU proxy factors employed in this study such as firm size and firm age have been espoused as IU proxy in Jiang et al. (2005) and Zhang (2006)'s methodological approach, we not only implement the methodology in the unique setting of the Chinese stock market, which has yet to be done in the extant literature per se, but also include the quality/strength of corporate governance as an IU proxy, tempted to the unique characteristic of the Chinese stock market—a split between tradable and non-tradable shares, which makes the gauge of the strength of corporate governance possible through free float ratio—in the light of intricate relationship between information uncertainty and corporate governance documented in the literature (Magnan and Xu, 2008). Collectively, the findings from this research expand the understanding of the measurement of firm-level information uncertainty given that there is not a consensus view on the matter in the extant literature.

Extending the study on the impact of information uncertainty over the momentum premium of momentum investing strategy further, we explore the behaviour of the momentum premium of the (R=6, H=6) momentum trading strategy amid market swings in the Chinese Class A share market. To our knowledge, this has never been done by anyone in any financial markets in the existing literature, let alone in the setting of the Chinese stock market.

Last but certainly not the least, following the spirit of Wang & Xu (2004) whom postulate that the quality/strength of corporate governance possesses explanatory power over cross-sectional stock return in the Chinese stock market, the quality/strength of corporate governance is also espoused as a risk factor, supplanting the value effect factor of the traditional FF3F model, to justify the evidence of momentum premia of different momentum trading strategies found in this research, stressing the importance of the quality/strength of corporate governance in asset pricing literature in the context of the Chinese stock market and filling the gap in the existing literature.

On the practical implication front, previous empirical evidences demonstrate the practicality of technical trading strategies in emerging stock markets (Bessembinder and Chan, 1998) and that the Chinese stock market is still lacking of interrelation with other developed markets even after the implementation of many financial market regulatory reforms, aimed at strengthening its tie with other developed financial markets around the globe (Lin and Swanson, 2008). Both of these two aforementioned characteristics of the Chinese stock market imply that the Chinese stock market is still a prime sourcing location for international investors' portfolio strategy formation and diversification (Phylaktis and Ravazzolo, 2005). Therefore, 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.

As the dual role of corporate governance is explored in gauging the degree of firm-level information uncertainty and in rationalizing the momentum premium in this research, analysts and fund managers might be able to make better use of the relevant information in assessing the plausibility of investing in the Chinese stock market or including Chinese stocks as part of their portfolio strategies. Also, considering the intricate relationship between stock returns and the quality/strength of corporate governance of corresponding list firms, the findings of this research might be of interest to Chinese policy makers in regulating the proportion of non-tradable shares within listed firms in the Chinese financial market.

9.3 Limitations and future research avenues

The findings of this research should be viewed with a couple of caveats:

1) the transaction costs associated with momentum investing is not addressed in this research. With transactions costs for Class A shares and Class B shares currently standing at 0.119% and 0.058% respectively, a large chunk of the momentum premia will surely be eaten away, blunting the practicality of the implementation of the momentum trading strategy on its own in the setting of the Chinese stock market. However, as transaction costs have been increasingly cut down by the authorities to underpin the healthy liquidity level of the stock market over recent years, the implementation of the momentum trading strategy as part of a mix of portfolio strategies appears rather promising.

2) short-selling activities are currently not legalized in the Chinese stock market. The constraint of short selling makes shorting losers, essential part of the momentum trading, practically impossible. Nevertheless, given that the Chinese stock market has been increasingly embracing practice aligned with international standard and a market openness policy in the recent decade, the relaxation of the constraint of short selling is just a matter of time.

Seeing that the disposition effect can have considerable impact over investors' behaviours from neroeconomics point of view, it would be intriguing to look into how the disposition effect plays out in affecting the amplifying effect of information uncertainty over the momentum premium. Furthermore, an investigation on why different information proxy factor is capable of shifting the power of positive and negative momentum in determining the momentum premium under the conditions of post-UP and post-DOWN market states could be another promising future research avenue.

Appendices

Appendix 1. The current constituents of the Shanghai Composite Index

For detailed list of the constituents, please refer to
http://www.sse.com.cn/sseportal/index/en/singleIndex/000001/const/index_const_list_en_1.shtml?code=000001&type=2

Appendix 2. The current constituents of the Shenzhen Composite Index

For detailed list of the constituents, please refer to
http://www.szse.cn/main/en/marketdata/Indiceslist/#

Appendix 3. The current constituents of the Shanghai Stock Exchange (SHSE) A Share Index

For detailed list of the constituents, please refer to
http://www.sse.com.cn/sseportal/index/en/singleIndex/000002/const/index_const_list_en_1.shtml?code=000002&type=2

Appendix 4. The current constituents of the Shanghai Stock Exchange (SSE) B Share Index

For detailed list of the constituents, please refer to
http://www.sse.com.cn/sseportal/index/en/singleIndex/000003/const/index_const_list_en_1.shtml?code=000003&type=2

Appendix 5. The current constituents of the Shenzhen Stock Exchange (SZSE) A Share Index

For detailed list of the constituents, please refer to
http://www.szse.cn/main/en/marketdata/Indiceslist/#

Appendix 6. The current constituents of the Shenzhen Stock Exchange (SZSE) B Share Index

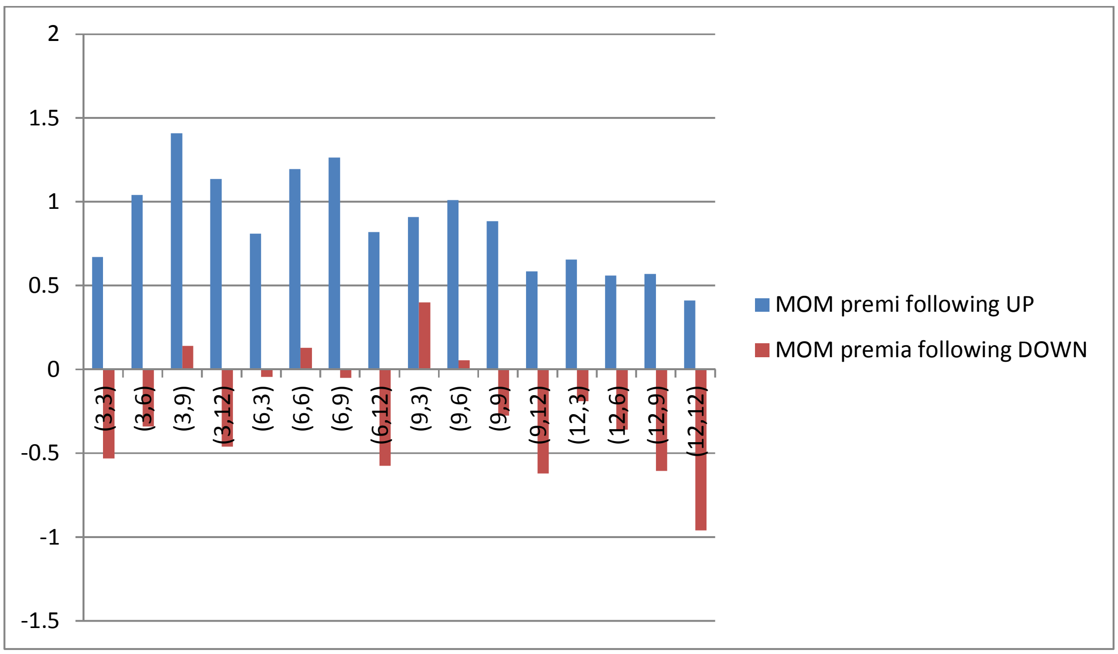
For detailed list of the constituents, please refer to
http://www.szse.cn/main/en/marketdata/Indiceslist/#

Appendix 7. Huang (2006)'s results of asymmetric momentum premia following UP and DOWN market states

	(3,3)	(3,6)	(3,9)	(3,12)	(6,3)	(6,6)	(6,9)	(6,12)
UP	0.67	1.04	1.41	1.135	0.81	1.195	1.265	0.82
DOWN	-0.53	-0.34	0.14	-0.46	-0.045	0.13	-0.05	-0.575
Difference	1.2	1.38	1.27	1.595	0.855	1.065	1.315	1.395

	(9,3)	(9,6)	(9,9)	(9,12)	(12,3)	(12,6)	(12,9)	(12,12)
UP	0.91	1.01	0.885	0.585	0.655	0.56	0.57	0.41
DOWN	0.4	0.055	-0.275	-0.62	-0.19	-0.36	-0.605	-0.96
Difference	0.51	0.955	1.16	1.205	0.845	0.92	1.175	1.37

Source: Huang (2006): page 442



Appendix 8. Results of analysis on the behaviours of momentum premia under the influence of information uncertainty over time periods following UP and DOWN market states (defined by prior 24-month average market return)

Firm size as IU proxy

Table 1. Momentum premia (monthly returns) under the influence of IU (proxied by firm size) during the time periods following UP and DOWN market states (24 months) (the (R=6, H=6) momentum trading strategy) in the Chinese Class A share market (Jan. 1996- Dec. 2008)

Panel A	Monthly returns of momentum quintiles and momentum premia Following UP market state (24 months) Momentum Quintile						
	Q1	Q2	Q3	Q4	Q5	Q5-Q1	t-value
	Information uncertainty proxy: Firm size (1/MV)						
IU1	-0.26	0.15	0.6	0.77	0.72	0.98	2.95
t-stats	-0.51	1.09	1.82	2.99	1.41		
IU2	-0.15	0.14	0.39	0.82	1.05	1.2	3.09
t-stats	-0.62	1.47	1.85	2.24	2.56		
IU3	0.03	0.24	0.43	0.73	1.28	1.25	4.06
t-stats	0.31	2.03	1.46	1.03	2.72		
IU4	0.12	0.36	0.54	0.93	1.41	1.29	3.09
t-stats	0.78	1.08	1.27	2.32	3.1		
IU5	0.22	0.37	0.48	1.25	1.58	1.36	5.01
t-stats	0.72	1.93	1.28	3.4	4.08		
IU5-IU1	0.48	0.22	-0.12	0.48	0.86	0.38	
t-value	0.61	0.94	-0.16	1.85	3.04	2.05	

Panel B.	Monthly returns of momentum quintiles and momentum premia Following DOWN market state Momentum Quintile						
	Q1	Q2	Q3	Q4	Q5	Q5-Q1	t-value
	Information uncertainty proxy: Firm size (1/MV)						
IU1	0.69	1.21	1.04	1.12	1.95	1.26	4.15
t-stats	1.27	5.05	3.94	3.1	1.99		
IU2	0.74	1.38	1.17	1.47	2.55	1.81	8.58
t-stats	2.75	5.14	3.81	2.09	5.17		
IU3	0.92	1.42	1.19	1.53	2.78	1.86	10.5
t-stats	3.91	2.05	2.14	3.35	6.77		
IU4	1.12	1.13	1.26	1.73	3.21	2.09	10.69
t-stats	1.69	3.04	5.28	3.99	7.49		
IU5	1.24	1.65	1.39	1.84	3.57	2.33	10.62
t-stats	2.14	3.62	4.37	2.81	7.73		
IU5-IU1	0.55	0.44	0.35	0.72	1.62	1.07	
t-value	2.06	1.85	2.03	1.58	4.17	2.51	

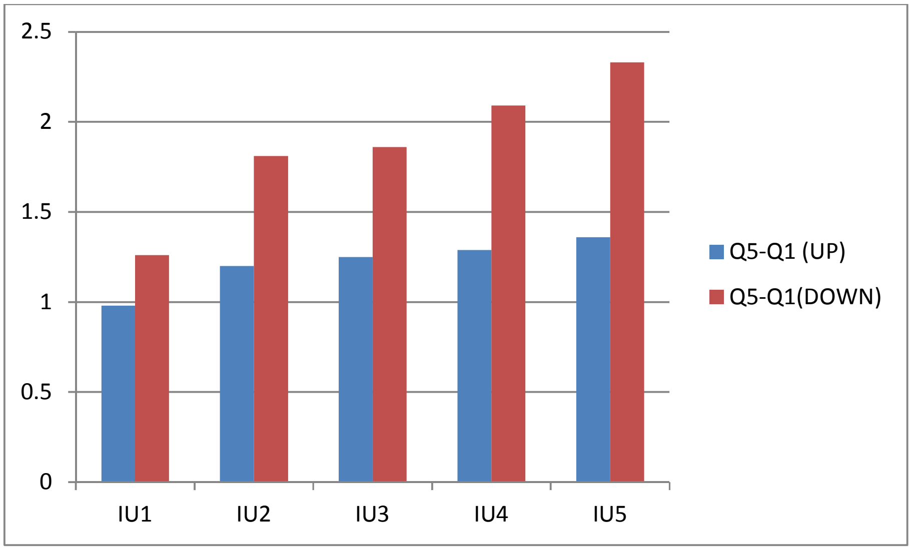
This table presents the average monthly returns of momentum quintiles and momentum premia under the influence of different levels of IU over time periods following UP and DOWN market states, as shown in Panel A and Panel B respectively, in the Chinese Class A share market for the sample period spanning from January 1996 to December 2008. The UP and DOWN market states are defined by prior 24-month average market return, with a consolidated Chinese Share A index being employed as a proxy for market portfolio. For simplicity and ease of comparison, the (R=6, H=6) momentum trading strategy is focused on in the investigation on the influence of information uncertainty on the momentum premia over time periods following UP and DOWN market states. The portfolios are formed based on independent two-way sorting mechanism, described in rich detail in the methodology chapter and in chapter 6. Simply put, all the eligible stocks are ranked based on their prior 6-month returns and firm size, measured by the reciprocal of their market capitalization (1/MV) prior to the ranking period purely for ease of illustration, independently into 5 quintiles for each factor. Taking the intersections of these 10 quintiles gives rise to 25 momentum-IU portfolios in total, with every stock being equally weighted within every portfolio. After skipping a month, all the resulted portfolios are held for 6 months following the buy-and-hold strategy to curb trading costs from the perspective of practicality. The momentum premia (Q5-Q1) is determined by the difference between the average monthly return of "winner" portfolio (Q5) and that of "loser" portfolio (Q1), the significance of which is indicated by corresponding t statistics. The calculation of the momentum premia under influence of IU over the periods following UP and DOWN market states is akin to Cooper et al.(2006), Huang(2006) Siagnos and Chelley-Steeley(20060 and Du et al. (2009)'s approach. Mathematically, the procedure can be expressed as $R_{W-L,t} = R_{W-L,UP}UP_t + R_{W-L,DOWN}DOWN_t + e_t$. All the numbers in the table are in percentage term.

Table 2. Equality test results of state-dependent momentum-IU (firm size) premia (following UP and DOWN market states) in the Chinese Class A share market (the (R=6, H=6) momentum trading strategy)

Equality test (MOM and IU (1/MV))(24 months)						
			UP-DOWN=0			
	IU1	IU2	IU3	IU4	IU5	IU5-IU1
Q5-Q1 (UP)	0.98	1.2	1.25	1.29	1.36	0.38
Q5-Q1(DOWN)	1.26	1.81	1.86	2.09	2.33	1.07
Difference	-0.28	-0.61	-0.61	-0.8	-0.97	
t stats	-2.03	-1.84	-2.38	-1.98	-2.01	
Overall	1.34	1.77	1.66	1.78	2.4	1.06

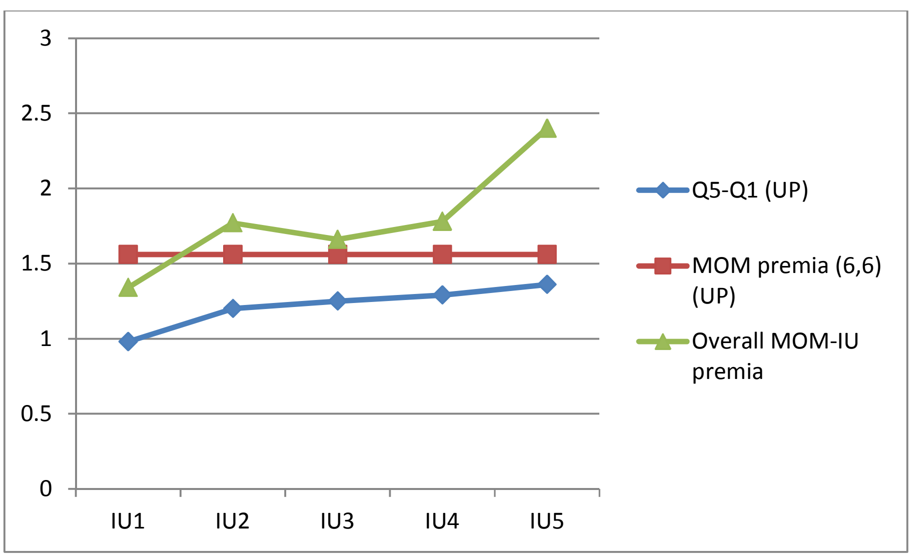
This table reports the difference between the momentum premia of the (R=6, H=6) momentum trading strategy conditional on different level of information uncertainty in the Chinese Class A share market for the sample period from Jan. 1996 to Dec. 2008. The difference is estimated by regressing the raw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

Figure 1. Comparison between the momentum-IU (firm size) premia of the (R=6, H=6) strategy over the time periods following UP and DOWN market states in the Chinese Class A share market (Jan. 1996- Dec. 2008) (prior 24-month average market return as market state definition)



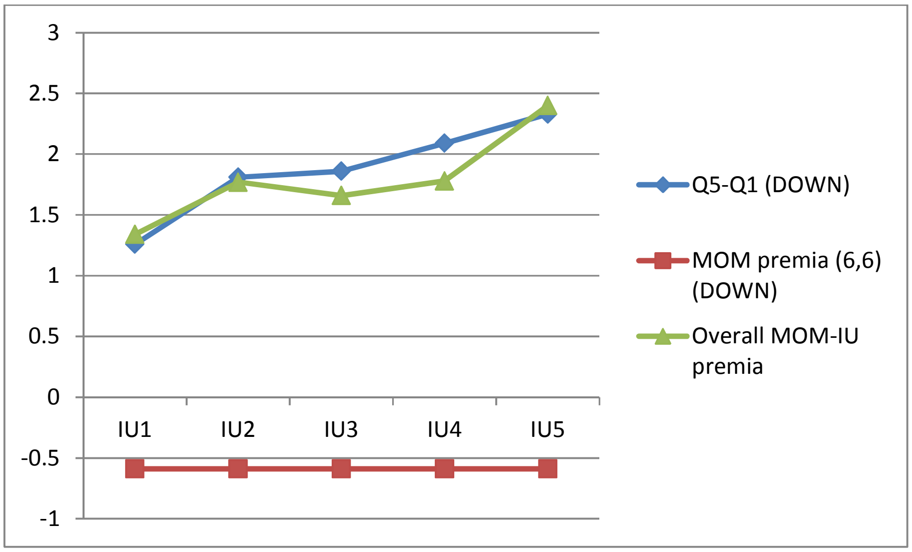
Notes: The column-shaped diagram illustrates the difference of momentum-IU premia of the (R=6, H=6) momentum trading strategy over time periods following UP and DOWN market states in the Chinese Class A share market for the sample time period. The vertical axis measures the momentum-IU premia in percentage form; the horizontal axis labels the 5 different levels of IU, with IU1 representing the lowest level and IU5 the highest level. For each IU level, the corresponding momentum premium following UP market state is demonstrated by the blue-coloured column, whereas that following DOWN market state is indicated by the red-coloured column.

Figure 2. Comparison: momentum-IU (firm size) premia over periods following UP market state, momentum premia of the (R=6, H=6) strategy conditional on post-UP market state, overall momentum-IU (firm size) premia in the Chinese Class A share market (Jan.1996- Dec. 2008) (24 months)



Notes: This figure demonstrates the difference among momentum-IU premia over periods following UP market state, momentum premia of the (R=6, H=6) momentum strategy conditional on post-UP market state, overall momentum-IU premia in the Chinese Class A share market. The vertical axis measures the returns in percentage form. The blue line represents the fluctuations in the momentum premia across different levels of IU over the periods following UP market state; the red line illustrates the premium of (R=6, H=6) momentum strategy unconditional on IU and market states; the green line represents the changes of momentum premia across different IU levels unconditional on market states.

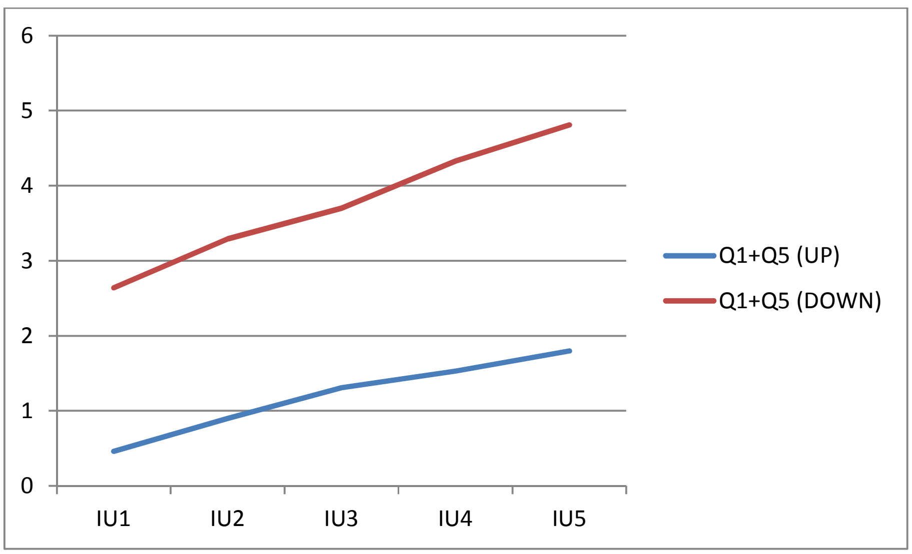
Figure 3. Comparison: momentum-IU (firm size) premia over periods following DOWN market state, momentum premia of the (R=6, H=6) strategy conditional on post-DOWN market state, overall momentum-IU (firm size) premia in the Chinese Class A share market (Jan.1996- Dec. 2008)



Notes: This figure demonstrates the difference among momentum-IU premia over periods following DOWN market state, momentum premia of the (R=6, H=6) momentum strategy conditional on post-DOWN market state, overall momentum-IU premia in the Chinese Class A share market. The vertical axis measures the returns in percentage form. The blue line represents the fluctuations in the momentum premia across different levels of IU over the periods following DOWN market state; the red line illustrates the premium of (R=6, H=6) momentum strategy unconditional on IU and market states; the green line represents the changes of momentum premia across different IU levels unconditional on market states.

Figure 4. Asymmetry of positive momentum (Q5) and negative momentum (Q1) over the time periods following UP and DOWN market states in the Chinese Class A share market (Jan. 1996 – Dec. 2008) (firm size) (24 months)

	Q1	Q5	Q1+Q5
UP market			
IU1	-0.26	0.72	0.46
IU2	-0.15	1.05	0.9
IU3	0.03	1.28	1.31
IU4	0.12	1.41	1.53
IU5	0.22	1.58	1.8
IU5-IU1			1.34
DOWN market			
	Q1	Q5	Q1+Q5
IU1	0.69	1.95	2.64
IU2	0.74	2.55	3.29
IU3	0.92	2.78	3.7
IU4	1.12	3.21	4.33
IU5	1.24	3.57	4.81
IU5-IU1			2.17



Notes: The statistics box above the figure summarizes positive momentum (Q5) and negative momentum (Q1) for testing periods following UP and DOWN market states. This figure depicts the difference of the asymmetry of positive momentum (Q5) and negative momentum (Q1) over the time periods following UP market state, plotted as the blue line, and DOWN market state, graphed as the red line in the Chinese Class A share market over Jan. 1996 to Dec. 2008.The vertical axis measures 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 level of information uncertainty. The upward sloped lines suggest that regardless of market states, 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.

Firm age as IU proxy

Table 3. Momentum premia (monthly returns) under IU (proxied by firm age) during the time periods following UP and DOWN market states (24 months) (the (R=6, H=6) momentum trading strategy) in the Chinese Class A share market (Jan. 1996- Dec. 2008)

Panel A.	**Monthly returns of momentum quintiles and momentum premia Following UP market state (24 months) Momentum Quintile**						
	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q5-Q1**	**t-value**
	Information uncertainty proxy: Firm age (1/Age)						
IU1	0.64	0.81	1.05	1.37	1.25	0.61	2.16
t-stats	1.48	1.39	2.05	1.99	2.51		
IU2	0.43	0.62	1.25	1.2	1.07	0.64	0.99
t-stats	0.64	0.93	1.04	1.72	0.63		
IU3	0.51	0.64	0.97	1.26	1.21	0.7	1.55
t-stats	0.74	0.59	1.28	1.89	2.06		
IU4	0.31	0.45	0.5	0.75	1.27	0.96	1.83
t-stats	0.88	1.04	0.85	1.05	0.94		
IU5	0.12	0.24	0.45	0.92	1.32	1.2	2.05
t-stats	0.47	0.83	1.28	0.95	1.26		
IU5-IU1	-0.52	-0.57	-0.6	-0.45	0.07	0.59	
t-value	-0.64	-1.49	-0.58	-0.22	1.04	3.03	

Panel B.	**Monthly returns of momentum quintiles and momentum premia Following DOWN market state (24 months) Momentum Quintile**						
	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q5-Q1**	**t-value**
	Information uncertainty proxy: Firm age (1/Age)						
IU1	1.93	2.58	1.65	2.5	2.31	0.38	7.1
t-stats	4.06	2.95	6.01	3.95	5.51		
IU2	1.62	1.82	1.64	2.03	2.62	1	12.58
t-stats	5.4	3.28	5.46	8.93	10.27		
IU3	1.17	1.34	1.6	2	2.53	1.36	15.5
t-stats	4.02	2.94	5.39	7.16	8.09		
IU4	0.78	1.25	1.47	1.66	4.05	3.27	8.96
t-stats	3.01	6.62	3.27	5.99	10.3		
IU5	0.49	1.17	1.06	1.69	4.29	3.8	10.66
t-stats	2.16	3.61	9.45	6.7	5.51		
IU5-IU1	-1.44	-1.41	-0.59	-0.81	1.98	3.42	
t-value	-1.98	-0.41	-1.37	-0.72	4.55	2.88	

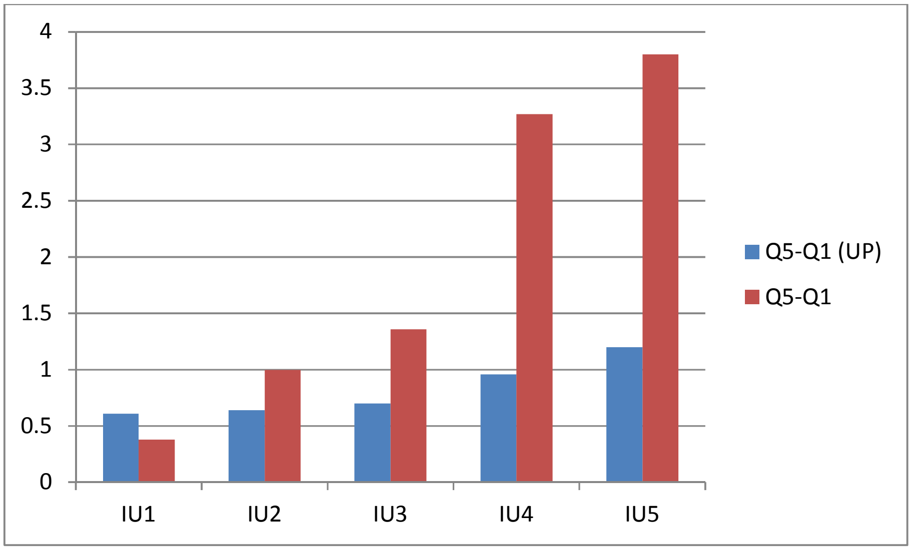
This table presents the average monthly returns of momentum quintiles and momentum premia under the influence of different levels of IU over time periods following UP and DOWN market states, as shown in Panel A and Panel B respectively, in the Chinese Class A share market for the sample period spanning from January 1996 to December 2008. The UP and DOWN market states are defined by prior 24-month average market return, with a consolidated Chinese Share A index being employed as a proxy for market portfolio. The methodological approach is described in detail underneath Table 1.

Table 4. Equality test results of state-dependent momentum-IU (firm age) premia (following UP and DOWN market states) in the Chinese Class A share market (the (R=6, H=6) momentum trading strategy) (24 months)

Equality test (MOM and IU (1/Age))(24 months)						
			UP-DOWN=0			
	IU1	IU2	IU3	IU4	IU5	IU5-IU1
Q5-Q1 (UP)	0.61	0.64	0.7	0.96	1.2	0.59
Q5-Q1(DOWN)	0.38	1	1.36	3.27	3.8	3.42
Difference	0.23	-0.36	-0.66	-2.31	-2.6	
t stats	1.03	-2.58	-1.48	-3.05	-4.22	
Overall	0.59	1.04	1.24	1.94	2.42	1.83

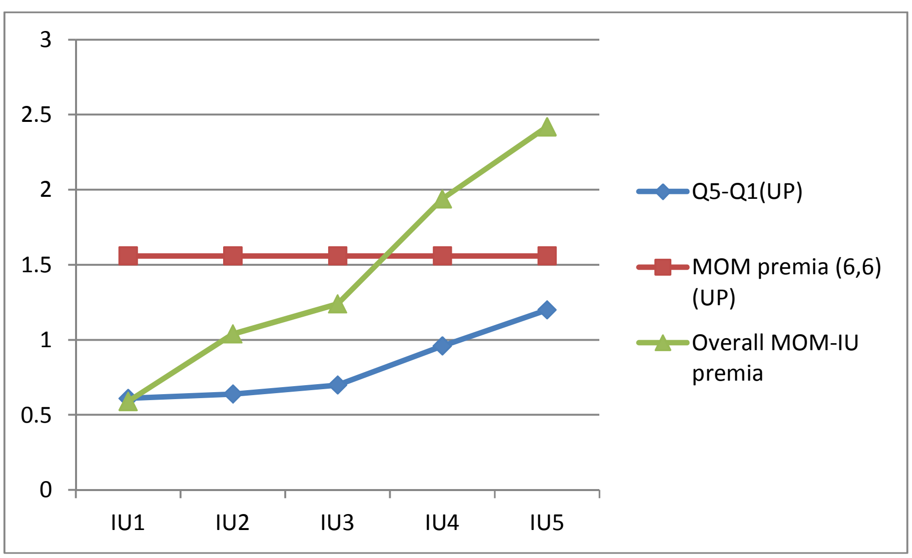
This table reports the difference between the momentum premia of the (R=6, H=6) momentum trading strategy conditional on different level of information uncertainty in the Chinese Class A share market for the sample period from Jan. 1996 to Dec. 2008. The difference is estimated by regressing the raw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

Figure 5. Comparison between the momentum-IU (firm age) premia of the (R=6, H=6) strategy over the time periods following UP and DOWN market states in the Chinese Class A share market (Jan. 1996- Dec. 2008) (24 months)



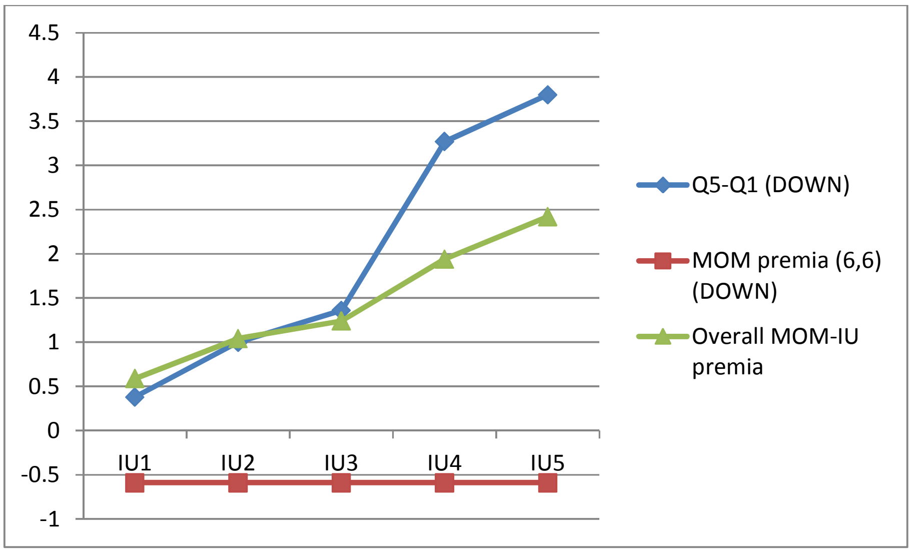
Notes: The column-shaped diagram illustrates the difference of momentum-IU premia of the (R=6, H=6) momentum trading strategy over time periods following UP and DOWN market states in the Chinese Class A share market for the sample time period. The vertical axis measures the momentum-IU premia in percentage form; the horizontal axis labels the 5 different levels of IU, with IU1 representing the lowest level and IU5 the highest level. For each IU level, the corresponding momentum premium following UP market state is demonstrated by the blue-coloured column, whereas that following DOWN market state is indicated by the red-coloured column.

Figure 6. Comparison: momentum-IU (firm age) premia over periods following UP market state, momentum premia of the (R=6, H=6) strategy conditional on post-UP market state, overall momentum-IU (firm age) premia in the Chinese Class A share market (Jan.1996- Dec. 2008)



Notes: This figure demonstrates the difference among momentum-IU premia over periods following UP market state, momentum premia of the (R=6, H=6) momentum strategy conditional on post-UP market state, overall momentum-IU premia in the Chinese Class A share market. The vertical axis measures the returns in percentage form. The blue line represents the fluctuations in the momentum premia across different levels of IU over the periods following UP market state; the red line illustrates the premium of (R=6, H=6) momentum strategy unconditional on IU and market states; the green line represents the changes of momentum premia across different IU levels unconditional on market states.

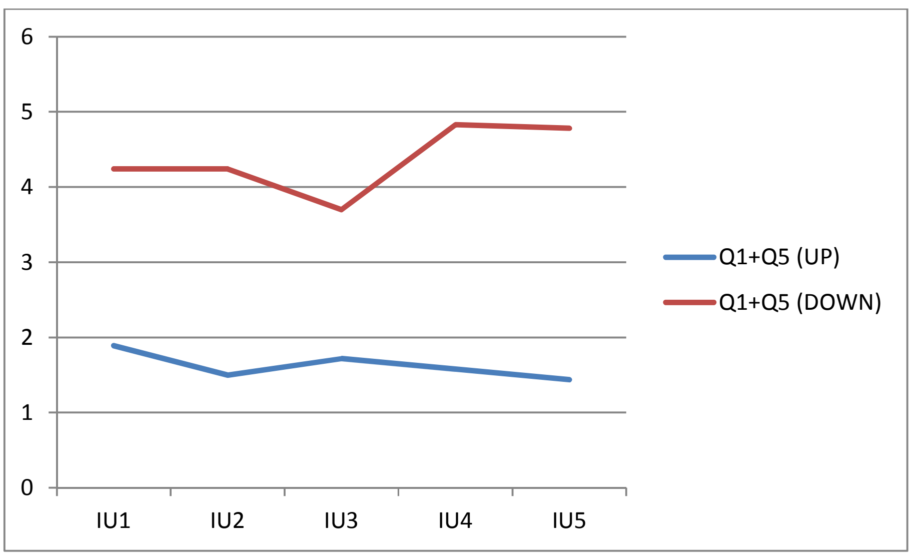
Figure 7. Comparison: momentum-IU (firm age) premia over periods following DOWN market state, momentum premia of the (R=6, H=6) strategy conditional on post-DOWN market state, overall momentum-IU (firm age) premia in the Chinese Class A share market (Jan.1996- Dec. 2008) (24 months)



Notes: This figure demonstrates the difference among momentum-IU premia over periods following DOWN market state, momentum premia of the (R=6, H=6) momentum strategy conditional on post-DOWN market state, overall momentum-IU premia in the Chinese Class A share market. The vertical axis measures the returns in percentage form. The blue line represents the fluctuations in the momentum premia across different levels of IU over the periods following DOWN market state; the red line illustrates the premium of (R=6, H=6) momentum strategy unconditional on IU and market states; the green line represents the changes of momentum premia across different IU levels unconditional on market states.

Figure 8. Asymmetry of positive momentum (Q5) and negative momentum (Q1) over the time periods following UP and DOWN market states in the Chinese Class A share market (Jan. 1996 – Dec. 2008) (firm age)

	Q1	Q5	Q1+Q5
UP market			
IU1	0.64	1.25	1.89
IU2	0.43	1.07	1.5
IU3	0.51	1.21	1.72
IU4	0.31	1.27	1.58
IU5	0.12	1.32	1.44
IU5-IU1			-0.45
DOWN market	Q1	Q5	Q1+Q5
IU1	1.93	2.31	4.24
IU2	1.62	2.62	4.24
IU3	1.17	2.53	3.7
IU4	0.78	4.05	4.83
IU5	0.49	4.29	4.78
IU5-IU1			0.54



Notes: The statistics box above the figure summarizes positive momentum (Q5) and negative momentum (Q1) for testing periods following UP and DOWN market states. This figure depicts the difference of the asymmetry of positive momentum (Q5) and negative momentum (Q1) over the time periods following UP market state, plotted as the blue line, and DOWN market state, graphed as the red line in the Chinese Class A share market over Jan. 1996 to Dec. 2008.The vertical axis measures 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 level of information uncertainty. The upward sloped lines suggest that regardless of market states, 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.

Analysts’ coverage as IU proxy

Table 5. Momentum premia (monthly returns) under IU (proxied by analysts’ coverage (1/COV)) during the time periods following UP and DOWN market states (24 months) (the (R=6, H=6) momentum trading strategy) in the Chinese Class A share market (Jan. 1996- Dec. 2008)

Panel A.	**Monthly returns of momentum quintiles and momentum premia Following UP market state (24 months) Momentum Quintile**						
	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q5-Q1**	**t-value**
	Information uncertainty proxy: Analyst coverage (1/COV)						
IU1	-0.19	-0.1	1.88	1.95	2.03	2.22	3.84
t-stats	-1.84	-1.5	2.17	1.95	4.2		
IU2	-0.24	0.42	1.57	1.8	1.95	2.19	2.5
t-stats	-1.13	1.99	2.71	2.35	4.57		
IU3	-0.16	1.27	1.45	1.84	2.14	2.3	5.06
t-stats	-0.83	2.17	1.52	2.04	3.44		
IU4	-0.12	0.47	1.07	1.55	2.23	2.35	3.41
t-stats	-0.62	1.84	2.09	3.55	2.96		
IU5	-0.07	0.53	1.48	1.72	2.29	2.36	7.1
t-stats	-0.31	1.52	2.81	3.16	4.05		
IU5-IU1	0.12	0.63	-0.4	-0.23	0.26	0.14	
t-value	1.44	0.97	-0.49	-0.28	1.53	2.18	
Panel B.	**Monthly returns of momentum quintiles and momentum premia Following DOWN market state (24 months) Momentum Quintile**						
	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q5-Q1**	**t-value**
	Information uncertainty proxy: Analyst coverage (1/COV)						
IU1	1.43	2.38	1.61	1.97	3.2	1.77	6.51
t-stats	2.51	3.04	2.13	3.59	4.99		
IU2	1.37	2.15	1.55	2.45	3.39	2.02	8.68
t-stats	8.16	4.53	3.29	5.04	6.97		
IU3	1.19	2.86	1.83	2.65	3.84	2.65	8.04
t-stats	2.17	1.83	2.96	4.18	5.95		
IU4	1.06	1.69	1.24	2.85	3.87	2.81	5.3
t-stats	2.16	3.74	1.84	3.28	2.95		
IU5	1.08	1.47	1.39	3.02	4.53	3.45	10.76
t-stats	4.16	5.47	2.04	3.27	10.3		
IU5-IU1	-0.35	-0.91	-0.22	1.05	1.33	1.68	
t-value	-0.99	-1.57	-1.36	2.05	5.9	3.55	

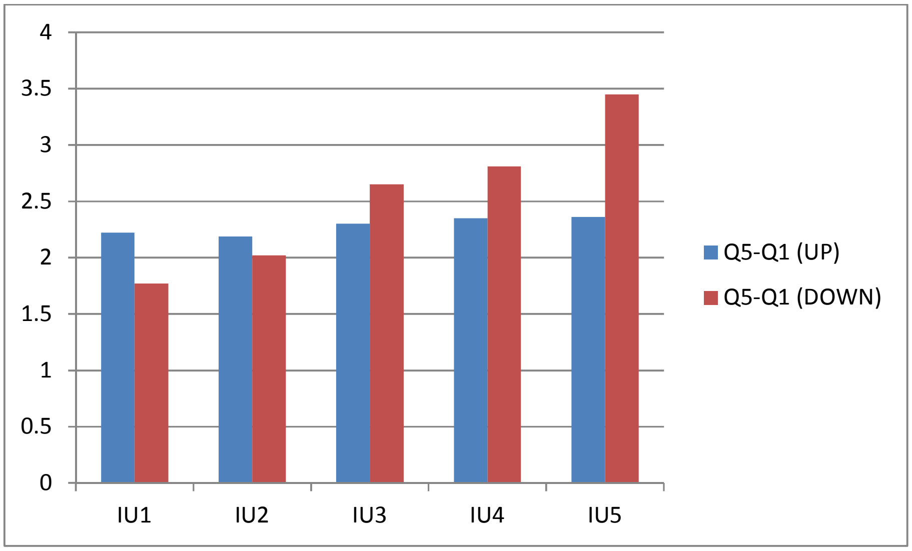
This table presents the average monthly returns of momentum quintiles and momentum premia under the influence of different levels of IU over time periods following UP and DOWN market states, as shown in Panel A and Panel B respectively, in the Chinese Class A share market for the sample period spanning from January 1996 to December 2008. The UP and DOWN market states are defined by prior 24-month average market return, with a consolidated Chinese Share A index being employed as a proxy for market portfolio. The methodological approach is described in detail underneath Table 1.

Table 6. Equality test results of state-dependent momentum-IU (analysts' coverage) premia (following UP and DOWN market states) in the Chinese Class A share market (the (R=6, H=6) momentum trading strategy) (24 months)

Equality test (MOM and IU (1/COV))(24 months)						
UP-DOWN=0						
	IU1	IU2	IU3	IU4	IU5	IU5-IU1
Q5-Q1 (UP)	2.22	2.19	2.3	2.35	2.36	0.14
Q5-Q1(DOWN)	1.77	2.02	2.65	2.81	3.45	1.68
Difference	0.45	0.17	-0.35	-0.46	-1.09	
t stats	0.06	1.03	-2.07	-3.55	-2.94	
Overall	1.87	2.15	2.66	2.94	3.95	2.08

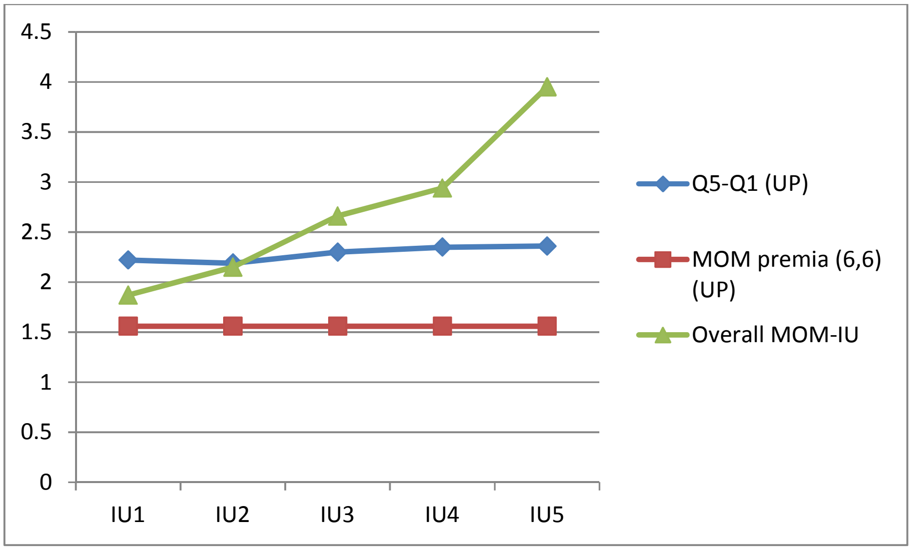
This table reports the difference between the momentum premia of the (R=6, H=6) momentum trading strategy conditional on different level of information uncertainty in the Chinese Class A share market for the sample period from Jan. 1996 to Dec. 2008. The difference is estimated by regressing the raw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

Figure 9. Comparison between the momentum-IU (analysts' coverage) premia of the (R=6, H=6) strategy over the time periods following UP and DOWN market states in the Chinese Class A share market (Jan. 1996- Dec. 2008) (24 months)



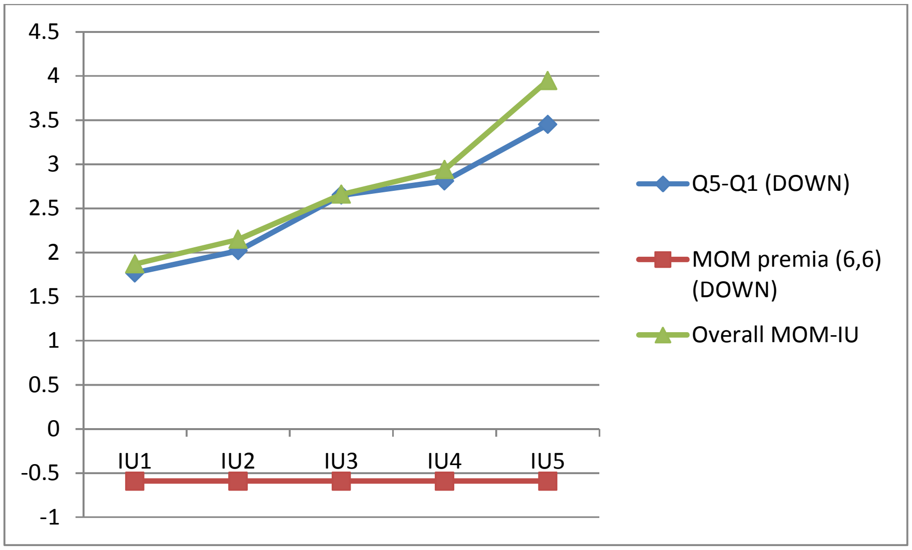
Notes: The column-shaped diagram illustrates the difference of momentum-IU premia of the (R=6, H=6) momentum trading strategy over time periods following UP and DOWN market states in the Chinese Class A share market for the sample time period. The vertical axis measures the momentum-IU premia in percentage form; the horizontal axis labels the 5 different levels of IU, with IU1 representing the lowest level and IU5 the highest level. For each IU level, the corresponding momentum premium following UP market state is demonstrated by the blue-coloured column, whereas that following DOWN market state is indicated by the red-coloured column.

Figure 10. Comparison: momentum-IU (analysts' coverage) premia over periods following UP market state, momentum premia of the (R=6, H=6) strategy conditional on post-UP market state, overall momentum-IU (analysts' coverage) premia in the Chinese Class A share market (Jan.1996- Dec. 2008)



Notes: This figure demonstrates the difference among momentum-IU premia over periods following UP market state, momentum premia of the (R=6, H=6) momentum strategy conditional on post-UP market state, overall momentum-IU premia in the Chinese Class A share market. The vertical axis measures the returns in percentage form. The blue line represents the fluctuations in the momentum premia across different levels of IU over the periods following UP market state; the red line illustrates the premium of (R=6, H=6) momentum strategy unconditional on IU and market states; the green line represents the changes of momentum premia across different IU levels unconditional on market states.

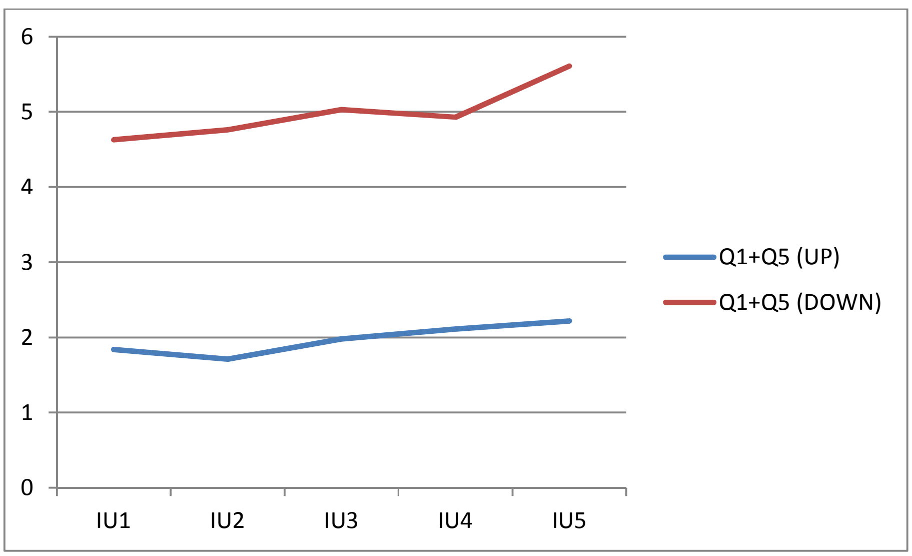
Figure 11. Comparison: momentum-IU (analysts' coverage) premia over periods following DOWN market state, momentum premia of the (R=6, H=6) strategy conditional on post-DOWN market state, overall momentum-IU (analysts' coverage) premia in the Chinese Class A share market (Jan.1996- Dec. 2008) (24 months)



Notes: This figure demonstrates the difference among momentum-IU premia over periods following DOWN market state, momentum premia of the (R=6, H=6) momentum strategy conditional on post-DOWN market state, overall momentum-IU premia in the Chinese Class A share market. The vertical axis measures the returns in percentage form. The blue line represents the fluctuations in the momentum premia across different levels of IU over the periods following DOWN market state; the red line illustrates the premium of (R=6, H=6) momentum strategy unconditional on IU and market states; the green line represents the changes of momentum premia across different IU levels unconditional on market states.

Figure 12. Asymmetry of positive momentum (Q5) and negative momentum (Q1) over the time periods following UP and DOWN market states in the Chinese Class A share market (Jan. 1996 – Dec. 2008) (analysts' coverage)

	UP market		
	Q1	Q5	Q1+Q5
IU1	-0.19	2.03	1.84
IU2	-0.24	1.95	1.71
IU3	-0.16	2.14	1.98
IU4	-0.12	2.23	2.11
IU5	-0.07	2.29	2.22
IU5-IU1			0.38
	DOWN market		
	Q1	Q5	Q1+Q5
IU1	1.43	3.2	4.63
IU2	1.37	3.39	4.76
IU3	1.19	3.84	5.03
IU4	1.06	3.87	4.93
IU5	1.08	4.53	5.61
IU5-IU1			0.98



Notes: The statistics box above the figure summarizes positive momentum (Q5) and negative momentum (Q1) for testing periods following UP and DOWN market states. This figure depicts the difference of the asymmetry of positive momentum (Q5) and negative momentum (Q1) over the time periods following UP market state, plotted as the blue line, and DOWN market state, graphed as the red line in the Chinese Class A share market over Jan. 1996 to Dec. 2008.The vertical axis measures 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 level of information uncertainty. The upward sloped lines suggest that regardless of market states, 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.

Return volatility as IU proxy

Table 7. Momentum premia (monthly returns) under IU (proxied by return volatility (VOL)) during the time periods following UP and DOWN market states (24 months) (the (R=6, H=6) momentum trading strategy) in the Chinese Class A share market (Jan. 1996- Dec. 2008)

Panel A.	Monthly returns of momentum quintiles and momentum premia Following UP market state (24 months)						
	Momentum Quintile						
	Q1	Q2	Q3	Q4	Q5	Q5-Q1	t-value
	Information uncertainty proxy: Return volatility (VOL)						
IU1	0.91	1	1.05	1.08	1.18	0.27	1.53
t-stats	0.62	0.79	1.52	0.94	2.29		
IU2	0.79	0.85	0.93	1.05	1.24	0.45	2.18
t-stats	0.68	2.07	3.05	2.07	3.05		
IU3	0.59	0.8	0.92	0.96	1.28	0.69	2.01
t-stats	0.38	1.86	1.54	1.48	1.13		
IU4	0.41	0.53	0.7	0.62	1.32	0.91	5.38
t-stats	0.64	1.99	3.4	2.18	3.07		
IU5	0.08	0.38	0.44	0.72	1.35	1.27	2.74
t-stats	1.48	0.97	2.99	1.58	1.36		
IU5-IU1	-0.83	-0.62	-0.61	-0.36	0.17	1	
t-value	-0.22	-0.41	-0.15	-0.94	1.27	2.93	
Panel B.	**Monthly returns of momentum quintiles and momentum premia Following DOWN market state (24 months)**						
	Momentum Quintile						
	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q5-Q1**	**t-value**
	Information uncertainty proxy: Return volatility (VOL)						
IU1	2.09	2.32	1.95	2.56	3.54	1.45	8.93
t-stats	5.99	4.81	2.58	3.91	4.82		
IU2	1.86	1.89	1.9	2.55	3.48	1.62	9.05
t-stats	6.05	4.37	8.13	5.45	7.18		
IU3	1.59	1.78	1.95	2.38	3.62	2.03	8.04
t-stats	2.05	10.49	6.81	3.29	4.27		
IU4	1.25	1.48	1.5	2.07	3.7	2.45	12.15
t-stats	4.18	5.36	5.16	3.3	8.93		
IU5	1.05	1.4	1.49	1.75	3.75	2.7	8.22
t-stats	5.04	3.03	5.18	6.83	10.75		
IU5-IU1	-1.04	-0.92	-0.46	-0.81	0.21	1.25	
t-value	-0.52	-4.99	-0.96	-2.86	0.59	2.36	

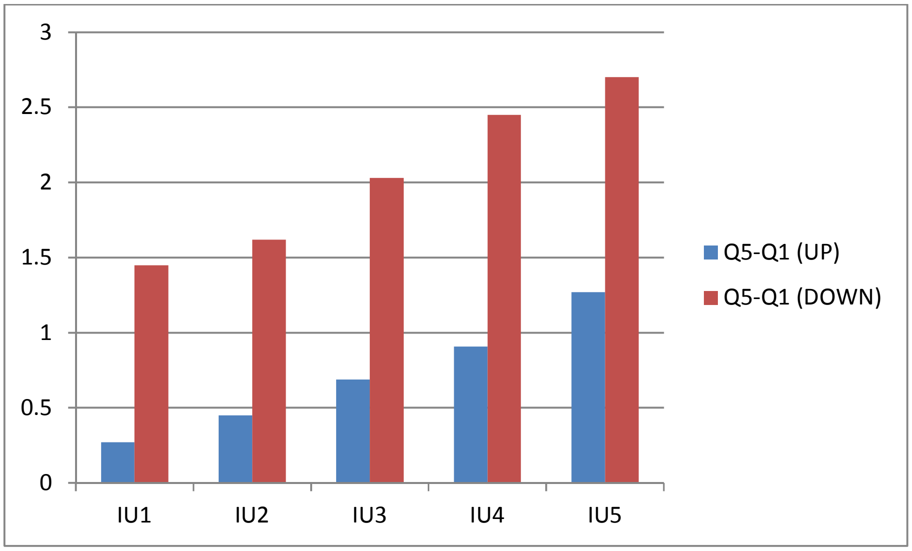
This table presents the average monthly returns of momentum quintiles and momentum premia under the influence of different levels of IU over time periods following UP and DOWN market states, as shown in Panel A and Panel B respectively, in the Chinese Class A share market for the sample period spanning from January 1996 to December 2008. The UP and DOWN market states are defined by prior 24-month average market return, with a consolidated Chinese Share A index being employed as a proxy for market portfolio. The methodological approach is described in detail underneath Table 1.

Table 8. Equality test results of state-dependent momentum-IU (return volatility) premia (following UP and DOWN market states) in the Chinese Class A share market (the (R=6, H=6) momentum trading strategy) (24 months)

Equality test (MOM and IU (VOL))(24 months) UP-DOWN=0						
	IU1	IU2	IU3	IU4	IU5	IU5-IU1
Q5-Q1 (UP)	0.27	0.45	0.69	0.91	1.27	1
Q5-Q1(DOWN)	1.45	1.62	2.03	2.45	2.7	1.25
Difference	-1.18	-1.17	-1.34	-1.54	-1.43	
t stats	-3.02	-2.58	-4.25	-2.82	-3.26	
Overall	0.56	0.85	1.01	1.84	2.26	1.7

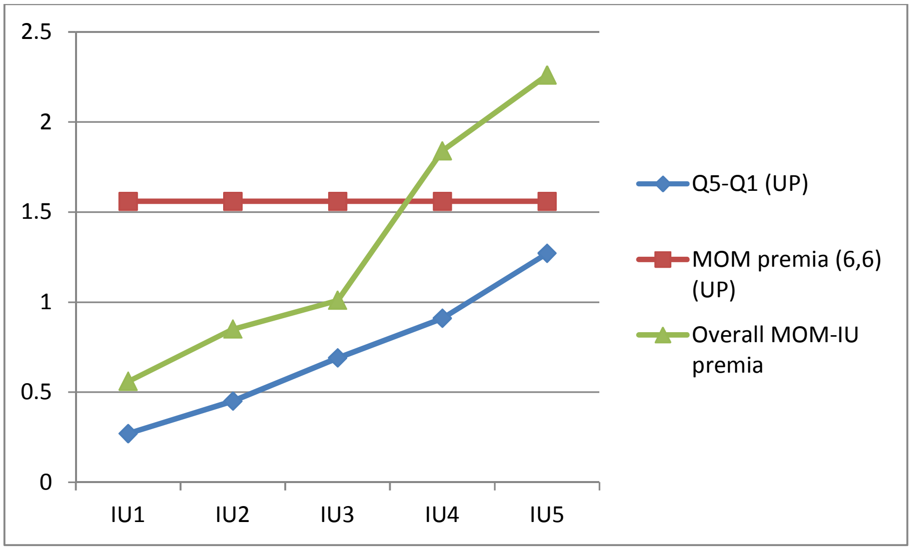
This table reports the difference between the momentum premia of the (R=6, H=6) momentum trading strategy conditional on different level of information uncertainty in the Chinese Class A share market for the sample period from Jan. 1996 to Dec. 2008. The difference is estimated by regressing the raw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

Figure 13. Comparison between the momentum-IU (return volatility) premia of the (R=6, H=6) strategy over the time periods following UP and DOWN market states in the Chinese Class A share market (Jan. 1996- Dec. 2008) (24 months)



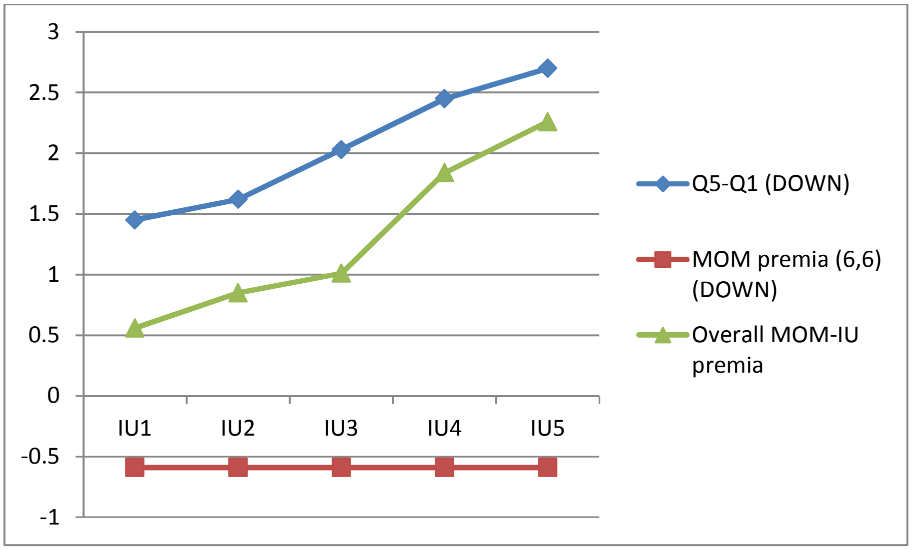
Notes: The column-shaped diagram illustrates the difference of momentum-IU premia of the (R=6, H=6) momentum trading strategy over time periods following UP and DOWN market states in the Chinese Class A share market for the sample time period. The vertical axis measures the momentum-IU premia in percentage form; the horizontal axis labels the 5 different levels of IU, with IU1 representing the lowest level and IU5 the highest level. For each IU level, the corresponding momentum premium following UP market state is demonstrated by the blue-coloured column, whereas that following DOWN market state is indicated by the red-coloured column.

Figure 14. Comparison: momentum-IU (return volatility) premia over periods following UP market state, momentum premia of the (R=6, H=6) strategy conditional on post-UP market state, overall momentum-IU (return volatility) premia in the Chinese Class A share market (Jan.1996- Dec. 2008)



Notes: This figure demonstrates the difference among momentum-IU premia over periods following UP market state, momentum premia of the (R=6, H=6) momentum strategy conditional on post-UP market state, overall momentum-IU premia in the Chinese Class A share market. The vertical axis measures the returns in percentage form. The blue line represents the fluctuations in the momentum premia across different levels of IU over the periods following UP market state; the red line illustrates the premium of (R=6, H=6) momentum strategy unconditional on IU and market states; the green line represents the changes of momentum premia across different IU levels unconditional on market states.

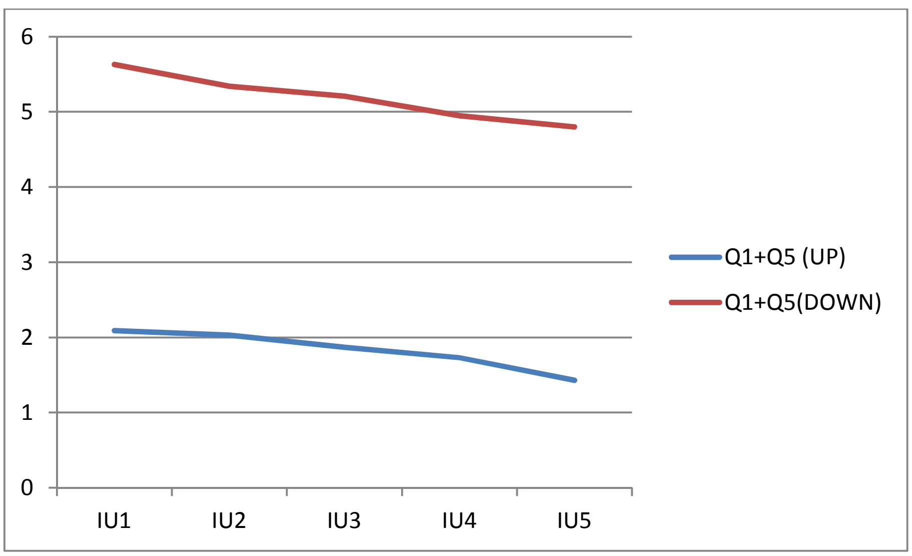
Figure 15. Comparison: momentum-IU (return volatility) premia over periods following DOWN market state, momentum premia of the (R=6, H=6) strategy conditional on post-DOWN market state, overall momentum-IU (return volatility) premia in the Chinese Class A share market (Jan.1996- Dec. 2008) (24 months)



Notes: This figure demonstrates the difference among momentum-IU premia over periods following DOWN market state, momentum premia of the (R=6, H=6) momentum strategy conditional on post-DOWN market state, overall momentum-IU premia in the Chinese Class A share market. The vertical axis measures the returns in percentage form. The blue line represents the fluctuations in the momentum premia across different levels of IU over the periods following DOWN market state; the red line illustrates the premium of (R=6, H=6) momentum strategy unconditional on IU and market states; the green line represents the changes of momentum premia across different IU levels unconditional on market states.

Figure 16. Asymmetry of positive momentum (Q5) and negative momentum (Q1) over the time periods following UP and DOWN market states in the Chinese Class A share market (Jan. 1996 – Dec. 2008) (return volatility)

	UP market		
	Q1	Q5	Q1+Q5
IU1	0.91	1.18	2.09
IU2	0.79	1.24	2.03
IU3	0.59	1.28	1.87
IU4	0.41	1.32	1.73
IU5	0.08	1.35	1.43
IU5-IU1			-0.66
	DOWN market		
	Q1	Q5	Q1+Q5
IU1	2.09	3.54	5.63
IU2	1.86	3.48	5.34
IU3	1.59	3.62	5.21
IU4	1.25	3.7	4.95
IU5	1.05	3.75	4.8
IU5-IU1			-0.83



Notes: The statistics box above the figure summarizes positive momentum (Q5) and negative momentum (Q1) for testing periods following UP and DOWN market states. This figure depicts the difference of the asymmetry of positive momentum (Q5) and negative momentum (Q1) over the time periods following UP market state, plotted as the blue line, and DOWN market state, graphed as the red line in the Chinese Class A share market over Jan. 1996 to Dec. 2008.The vertical axis measures 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 level of information uncertainty. The upward sloped lines suggest that regardless of market states, 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.

Dispersion in analysts' earnings forecast (DISP) as IU proxy

Table 9. Momentum premia (monthly returns) under IU (proxied by dispersion in analysts' earnings forecast (DISP)) during the time periods following UP and DOWN market states (24 months) (the (R=6, H=6) momentum trading strategy) in the Chinese Class A share market (Jan. 1996- Dec. 2008)

Panel A.	Monthly returns of momentum quintiles and momentum premia Following UP market state (24 months) Momentum Quintile						
	Q1	Q2	Q3	Q4	Q5	Q5-Q1	t-value
	Information uncertainty proxy: Analysts' forecast dispersion (DISP)						
IU1	0.16	0.34	0.87	1.12	1.42	1.26	3.04
t-stats	1.99	2.08	2.16	4.81	2.58		
IU2	0.04	0.38	0.92	1.14	1.4	1.36	5.41
t-stats	1.06	1.99	3.5	2.64	4.08		
IU3	-0.05	0.44	0.85	1.06	1.7	1.75	6.97
t-stats	2.05	4.33	2.95	3.18	4.88		
IU4	-0.26	0.69	1.04	1.21	1.75	2.01	5.06
t-stats	1.85	2.94	3.48	2.97	3.04		
IU5	-0.24	0.18	0.58	0.94	1.85	2.09	10.5
t-stats	2.05	4.18	1.04	6.72	5.15		
IU5-IU1	-0.4	-0.16	-0.29	-0.18	0.43	0.83	
t-value	-1.37	-0.89	-1.45	-0.83	1.27	1.99	
Panel B.	**Monthly returns of momentum quintiles and momentum premia Following DOWN market state (24 months) Momentum Quintile**						
	Q1	Q2	Q3	Q4	Q5	Q5-Q1	t-value
	Information uncertainty proxy: Analysts' forecast dispersion (DISP)						
IU1	1.65	2.15	2.55	2.6	3.06	1.41	3.18
t-stats	3.08	6.17	3.84	9.01	10.54		
IU2	1.6	2.12	2.01	2.52	3.04	1.44	9.5
t-stats	3.19	4.05	8.01	10.55	8.44		
IU3	1.32	1.9	1.81	2.4	3.1	1.78	15.77
t-stats	5.05	4.1	10.9	6.71	10.5		
IU4	1.06	1.8	1.75	2.06	3.13	2.07	7.46
t-stats	6.18	4.91	9.88	10.35	6.82		
IU5	0.87	1.85	1.64	1.88	3.19	2.32	9.59
t-stats	2.85	6.49	5.82	9.15	10.77		
IU5-IU1	-0.78	-0.3	-0.91	-0.72	0.13	0.91	
t-value	-0.68	-0.88	-2.98	-2.58	3.16	1.85	

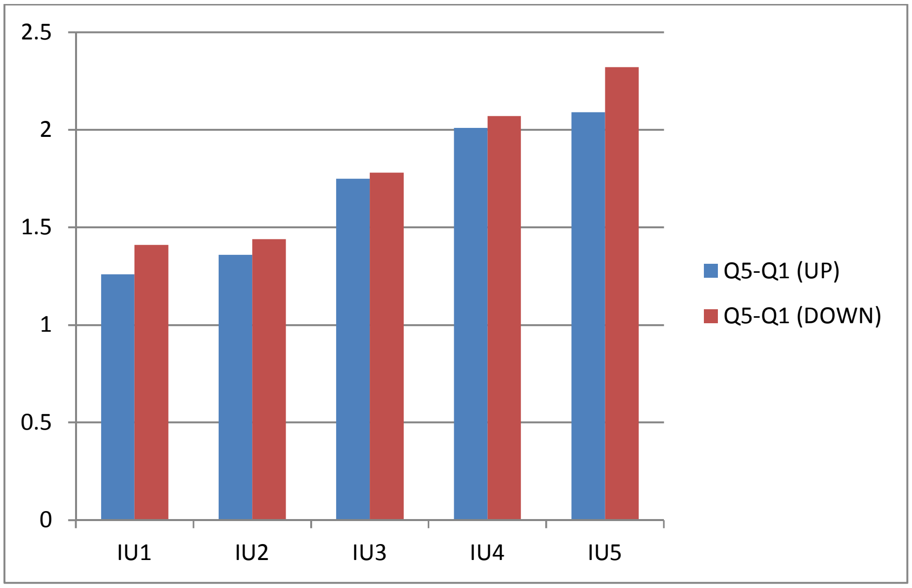
This table presents the average monthly returns of momentum quintiles and momentum premia under the influence of different levels of IU over time periods following UP and DOWN market states, as shown in Panel A and Panel B respectively, in the Chinese Class A share market for the sample period spanning from January 1996 to December 2008. The UP and DOWN market states are defined by prior 24-month average market return, with a consolidated Chinese Share A index being employed as a proxy for market portfolio. The methodological approach is described in detail underneath Table 1.

Table 10. Equality test results of state-dependent momentum-IU (DISP) premia (following UP and DOWN market states) in the Chinese Class A share market (the (R=6, H=6) momentum trading strategy) (24 months)

Equality test (MOM and IU (DISP))(24 months)						
			UP-DOWN=0			
	IU1	IU2	IU3	IU4	IU5	IU5-IU1
Q5-Q1 (UP)	1.26	1.36	1.75	2.01	2.09	0.83
Q5-Q1(DOWN)	1.41	1.44	1.78	2.07	2.32	0.91
Difference	-0.15	-0.08	-0.03	-0.06	-0.23	
t stats	-1.83	-2.05	-1.72	-2.05	-2.27	
Overall	1.28	1.51	1.69	1.95	2.21	0.93

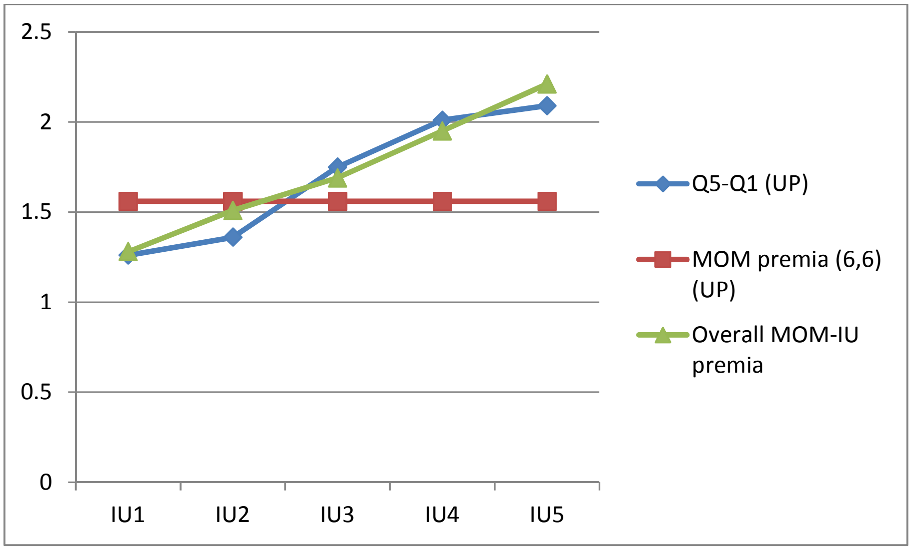
This table reports the difference between the momentum premia of the (R=6, H=6) momentum trading strategy conditional on different level of information uncertainty in the Chinese Class A share market for the sample period from Jan. 1996 to Dec. 2008. The difference is estimated by regressing the raw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

Figure 17. Comparison between the momentum-IU (DISP) premia of the (R=6, H=6) strategy over the time periods following UP and DOWN market states in the Chinese Class A share market (Jan. 1996- Dec. 2008) (24 months)



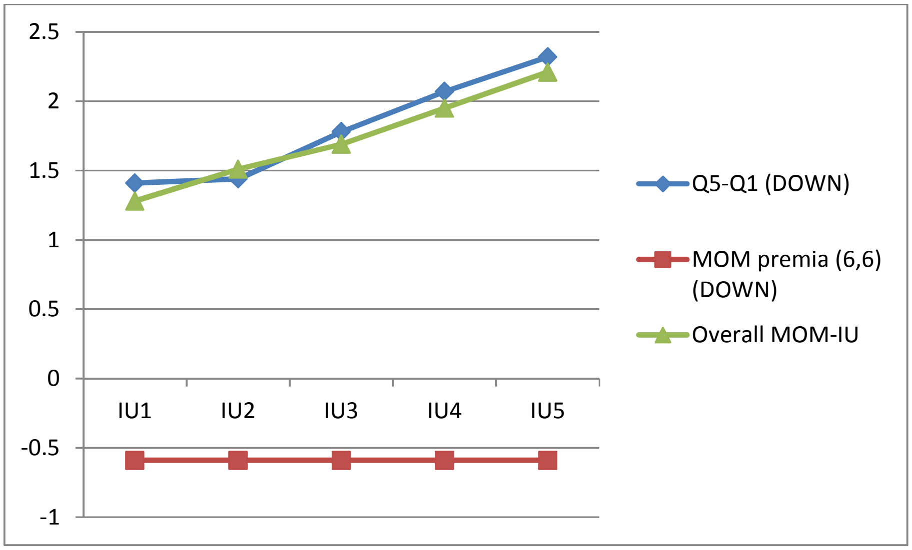
Notes: The column-shaped diagram illustrates the difference of momentum-IU premia of the (R=6, H=6) momentum trading strategy over time periods following UP and DOWN market states in the Chinese Class A share market for the sample time period. The vertical axis measures the momentum-IU premia in percentage form; the horizontal axis labels the 5 different levels of IU, with IU1 representing the lowest level and IU5 the highest level. For each IU level, the corresponding momentum premium following UP market state is demonstrated by the blue-coloured column, whereas that following DOWN market state is indicated by the red-coloured column.

Figure 18. Comparison: momentum-IU (DISP) premia over periods following UP market state, momentum premia of the (R=6, H=6) strategy conditional on post-UP market state, overall momentum-IU (DISP) premia in the Chinese Class A share market (Jan.1996- Dec. 2008) (24 months)



Notes: This figure demonstrates the difference among momentum-IU premia over periods following UP market state, momentum premia of the (R=6, H=6) momentum strategy conditional on post-UP market state, overall momentum-IU premia in the Chinese Class A share market. The vertical axis measures the returns in percentage form. The blue line represents the fluctuations in the momentum premia across different levels of IU over the periods following UP market state; the red line illustrates the premium of (R=6, H=6) momentum strategy unconditional on IU and market states; the green line represents the changes of momentum premia across different IU levels unconditional on market states.

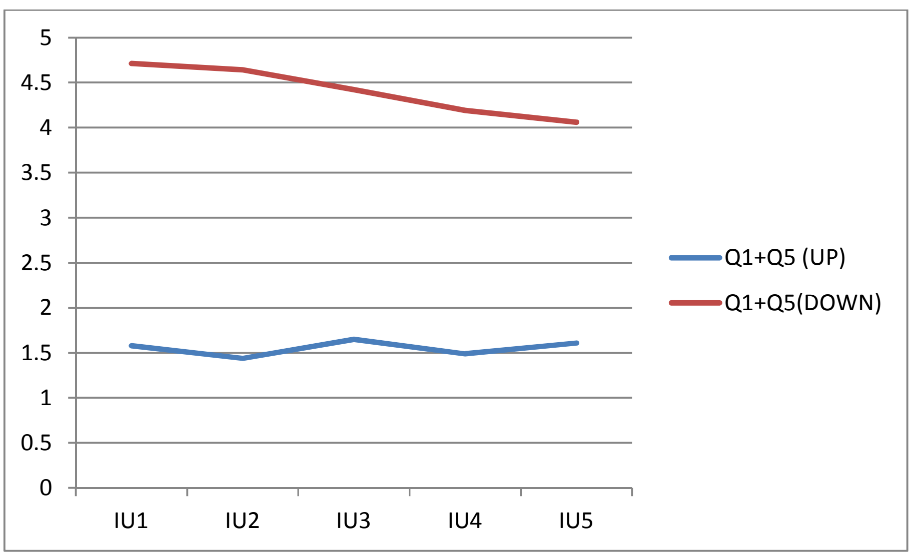
Figure 19. Comparison: momentum-IU (DISP) premia over periods following DOWN market state, momentum premia of the (R=6, H=6) strategy conditional on post-DOWN market state, overall momentum-IU (DISP) premia in the Chinese Class A share market (Jan.1996- Dec. 2008) (24 months)



Notes: This figure demonstrates the difference among momentum-IU premia over periods following DOWN market state, momentum premia of the (R=6, H=6) momentum strategy conditional on post-DOWN market state, overall momentum-IU premia in the Chinese Class A share market. The vertical axis measures the returns in percentage form. The blue line represents the fluctuations in the momentum premia across different levels of IU over the periods following DOWN market state; the red line illustrates the premium of (R=6, H=6) momentum strategy unconditional on IU and market states; the green line represents the changes of momentum premia across different IU levels unconditional on market states.

Figure 20. Asymmetry of positive momentum (Q5) and negative momentum (Q1) over the time periods following UP and DOWN market states in the Chinese Class A share market (Jan. 1996 – Dec. 2008) (DISP) (24 months)

	UP market		
	Q1	Q5	Q1+Q5
IU1	0.16	1.42	1.58
IU2	0.04	1.4	1.44
IU3	-0.05	1.7	1.65
IU4	-0.26	1.75	1.49
IU5	-0.24	1.85	1.61
IU5-IU1			0.03
	DOWN market		
	Q1	Q5	Q1+Q5
IU1	1.65	3.06	4.71
IU2	1.6	3.04	4.64
IU3	1.32	3.1	4.42
IU4	1.06	3.13	4.19
IU5	0.87	3.19	4.06
IU5-IU1			-0.65



Notes: The statistics box above the figure summarizes positive momentum (Q5) and negative momentum (Q1) for testing periods following UP and DOWN market states. This figure depicts the difference of the asymmetry of positive momentum (Q5) and negative momentum (Q1) over the time periods following UP market state, plotted as the blue line, and DOWN market state, graphed as the red line in the Chinese Class A share market over Jan. 1996 to Dec. 2008.The vertical axis measures 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 level of information uncertainty. The upward sloped lines suggest that regardless of market states, 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.

Trading volume as IU proxy

Table 11. Momentum premia (monthly returns) under IU (proxied by trading volume (1/turnover ratio)) during the time periods following UP and DOWN market states (24 months) (the (R=6, H=6) momentum trading strategy) in the Chinese Class A share market (Jan. 1996- Dec. 2008)

Panel A.	Monthly returns of momentum quintiles and momentum premia Following UP market state (24 months)						
	Momentum Quintile						
	Q1	Q2	Q3	Q4	Q5	Q5-Q1	t-value
	Information uncertainty proxy: Volume(1/Turnover ratio)						
IU1	0.48	0.7	0.79	1.01	1.03	0.55	3.07
t-stats	1.03	2.44	1.08	2.19	3.18		
IU2	0.32	0.62	0.7	0.83	1.05	0.73	4.05
t-stats	0.87	1.03	1.45	1.63	2.61		
IU3	0.18	0.46	0.59	0.73	1.12	0.94	3.64
t-stats	2.08	1.48	2.07	1.69	2.38		
IU4	0.07	0.36	0.45	0.49	1.18	1.11	6.09
t-stats	1.04	0.84	1.29	1.55	4.39		
IU5	-0.09	0.21	0.4	0.47	1.25	1.34	5.84
t-stats	-0.28	0.91	1.72	5	3.25		
IU5-IU1	-0.57	-0.49	-0.39	-0.54	0.22	0.79	
t-value	-0.44	-1.07	-0.69	-1.04	1.52	2.05	
Panel B.	**Monthly return of momentum quintiles and momentum premia Following DOWN market state (24 months)**						
	Momentum Quintile						
	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q5-Q1**	**t-value**
	Information uncertainty proxy: Volume(1/Turnover ratio)						
IU1	1.54	1.9	1.85	2.57	3.02	1.48	10.2
t-stats	3.08	4.25	5.15	6.19	5.07		
IU2	1.42	1.71	1.82	2.28	3.01	1.59	10.4
t-stats	8.18	6.2	10.19	6.52	8.17		
IU3	1.3	1.64	1.69	2.13	3.1	1.8	12.54
t-stats	5.03	7.13	5.25	7.07	10.9		
IU4	1.29	1.5	1.43	2.04	3.14	1.85	10.15
t-stats	3.99	4.5	2.81	6.19	5.47		
IU5	0.94	1.05	1.28	1.79	3.19	2.25	10.2
t-stats	5.16	8.13	4.18	5.61	7.82		
IU5-IU1	-0.6	-0.85	-0.57	-0.78	0.17	0.77	
t-value	-0.49	-1.27	-1.93	-0.93	2.84	1.59	

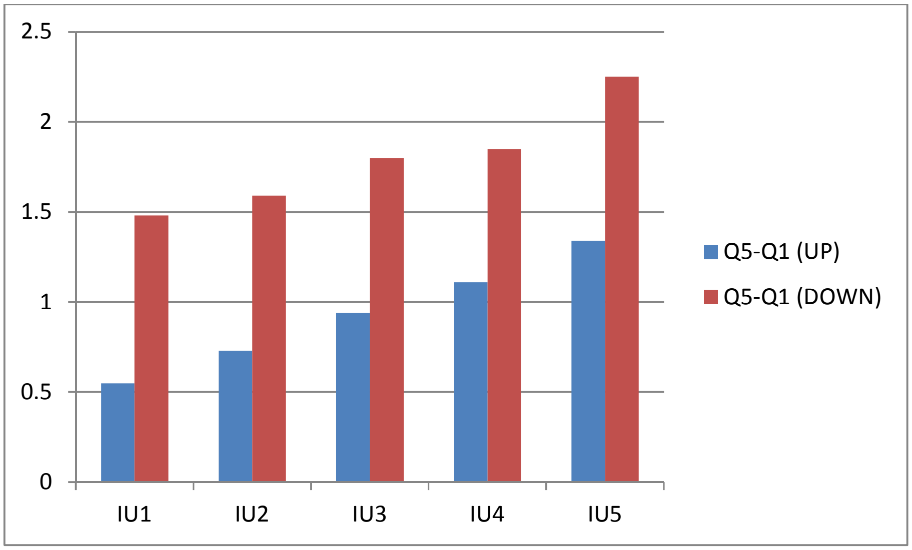
This table presents the average monthly returns of momentum quintiles and momentum premia under the influence of different levels of IU over time periods following UP and DOWN market states, as shown in Panel A and Panel B respectively, in the Chinese Class A share market for the sample period spanning from January 1996 to December 2008. The UP and DOWN market states are defined by prior 24-month average market return, with a consolidated Chinese Share A index being employed as a proxy for market portfolio. The methodological approach is described in detail underneath Table 1.

Table 12. Equality test results of state-dependent momentum-IU (trading volume) premia (following UP and DOWN market states) in the Chinese Class A share market (the (R=6, H=6) momentum trading strategy) (24 months)

Equality test (MOM and IU (trading volume))(24 months)						
	UP-DOWN=0					
	IU1	IU2	IU3	IU4	IU5	IU5-IU1
Q5-Q1 (UP)	0.55	0.73	0.94	1.11	1.34	0.79
Q5-Q1(DOWN)	1.48	1.59	1.8	1.85	2.25	0.77
Difference	-0.93	-0.86	-0.86	-0.74	-0.91	
t stats	-2.96	-1.99	-3.04	-2.72	-2.81	
Overall	0.9	1.02	1.59	2.12	2.19	1.29

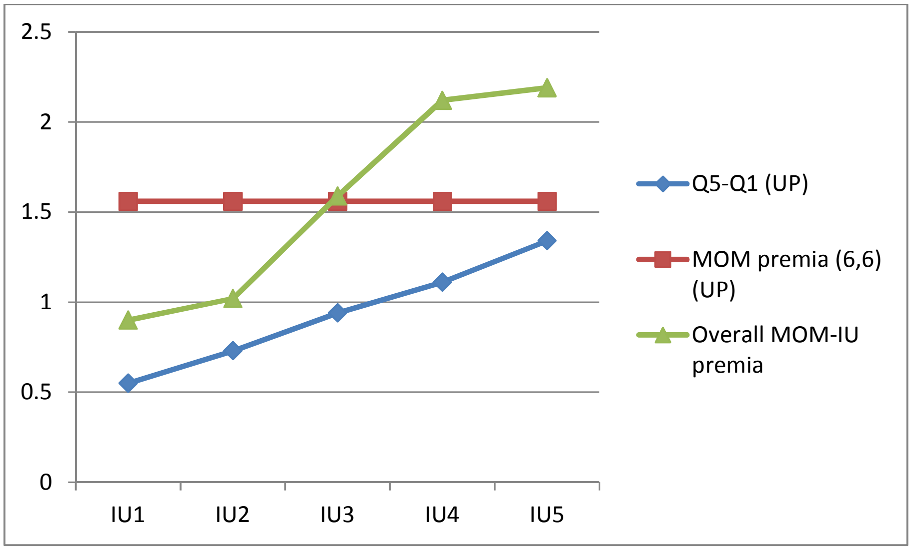
This table reports the difference between the momentum premia of the (R=6, H=6) momentum trading strategy conditional on different level of information uncertainty in the Chinese Class A share market for the sample period from Jan. 1996 to Dec. 2008. The difference is estimated by regressing the raw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

Figure 21. Comparison between the momentum-IU (trading volume) premia of the (R=6, H=6) strategy over the time periods following UP and DOWN market states in the Chinese Class A share market (Jan. 1996- Dec. 2008) (24 months)



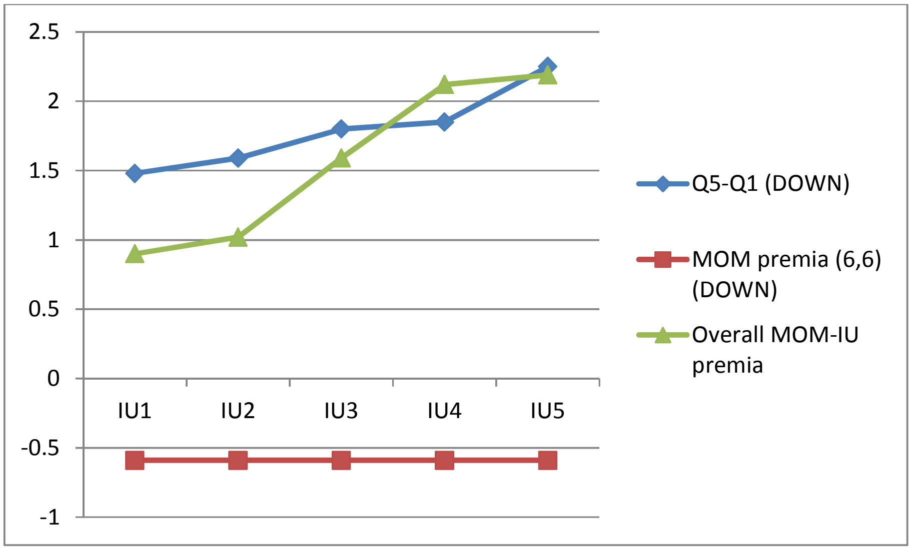
Notes: The column-shaped diagram illustrates the difference of momentum-IU premia of the (R=6, H=6) momentum trading strategy over time periods following UP and DOWN market states in the Chinese Class A share market for the sample time period. The vertical axis measures the momentum-IU premia in percentage form; the horizontal axis labels the 5 different levels of IU, with IU1 representing the lowest level and IU5 the highest level. For each IU level, the corresponding momentum premium following UP market state is demonstrated by the blue-coloured column, whereas that following DOWN market state is indicated by the red-coloured column.

Figure 22. Comparison: momentum-IU (trading volume) premia over periods following UP market state, momentum premia of the (R=6, H=6) strategy conditional on post-UP market state, overall momentum-IU (trading volume) premia in the Chinese Class A share market (Jan.1996- Dec. 2008) (24 months)



Notes: This figure demonstrates the difference among momentum-IU premia over periods following UP market state, momentum premia of the (R=6, H=6) momentum strategy conditional on post-UP market state, overall momentum-IU premia in the Chinese Class A share market. The vertical axis measures the returns in percentage form. The blue line represents the fluctuations in the momentum premia across different levels of IU over the periods following UP market state; the red line illustrates the premium of (R=6, H=6) momentum strategy unconditional on IU and market states; the green line represents the changes of momentum premia across different IU levels unconditional on market states.

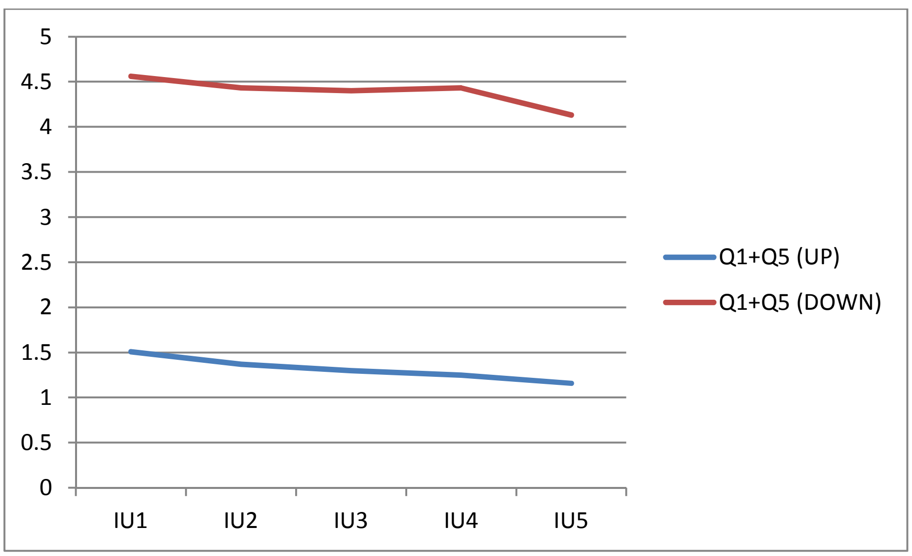
Figure 23. Comparison: momentum-IU (trading volume) premia over periods following DOWN market state, momentum premia of the (R=6, H=6) strategy conditional on post-DOWN market state, overall momentum-IU (trading volume) premia in the Chinese Class A share market (Jan.1996- Dec. 2008) (24 months)



Notes: This figure demonstrates the difference among momentum-IU premia over periods following DOWN market state, momentum premia of the (R=6, H=6) momentum strategy conditional on post-DOWN market state, overall momentum-IU premia in the Chinese Class A share market. The vertical axis measures the returns in percentage form. The blue line represents the fluctuations in the momentum premia across different levels of IU over the periods following DOWN market state; the red line illustrates the premium of (R=6, H=6) momentum strategy unconditional on IU and market states; the green line represents the changes of momentum premia across different IU levels unconditional on market states.

Figure 24. Asymmetry of positive momentum (Q5) and negative momentum (Q1) over the time periods following UP and DOWN market states in the Chinese Class A share market (Jan. 1996 – Dec. 2008) (trading volume) (24 months)

	UP market		
	Q1	Q5	Q1+Q5
IU1	0.48	1.03	1.51
IU2	0.32	1.05	1.37
IU3	0.18	1.12	1.3
IU4	0.07	1.18	1.25
IU5	-0.09	1.25	1.16
IU5-IU1			-0.35
	DOWN market		
	Q1	Q5	Q1+Q5
IU1	1.54	3.02	4.56
IU2	1.42	3.01	4.43
IU3	1.3	3.1	4.4
IU4	1.29	3.14	4.43
IU5	0.94	3.19	4.13
IU5-IU1			-0.43



Notes: The statistics box above the figure summarizes positive momentum (Q5) and negative momentum (Q1) for testing periods following UP and DOWN market states. This figure depicts the difference of the asymmetry of positive momentum (Q5) and negative momentum (Q1) over the time periods following UP market state, plotted as the blue line, and DOWN market state, graphed as the red line in the Chinese Class A share market over Jan. 1996 to Dec. 2008.The vertical axis measures 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 level of information uncertainty. The upward sloped lines suggest that regardless of market states, 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 strength of corporate governance as IU proxy

Table 13. Momentum premia (monthly returns) under IU (proxied by the strength of corporate governance) during the time periods following UP and DOWN market states (24 months) (the (R=6, H=6) momentum trading strategy) in the Chinese Class A share market (Jan. 1996- Dec. 2008)

Panel A.	**Monthly returns of momentum quintiles and momentum premia Following UP market state (24 months)**						
	Momentum Quintile						
	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q5-Q1**	**t-value**
	Information uncertainty proxy: Corporate governance (proxied by 1/free float ratio)						
IU1	0.85	1.21	2.11	2.26	3.06	2.21	7.19
t-stats	3.05	2.17	5.15	3.99	8.03		
IU2	0.73	1.25	1.65	2.62	3.15	2.42	7.1
t-stats	2.38	3.56	4.19	2.99	5.05		
IU3	0.83	0.95	1.85	2.06	3.47	2.64	6.55
t-stats	3.46	3.95	2.79	3.03	4.16		
IU4	0.76	0.79	1.67	1.83	3.55	2.79	8.91
t-stats	1.94	3.09	3.81	4.1	7.14		
IU5	0.51	0.82	1.53	1.68	4.21	3.7	12.44
t-stats	4.15	2.96	3.17	3.84	8.19		
IU5-IU1	-0.34	-0.39	-0.58	-0.58	1.15	1.49	
t-value	-0.99	-1.07	-2.84	-3.61	4.18	3.1	

Panel B.	Monthly returns of momentum quintiles and momentum premia Following DOWN market state (24 months) Momentum Quintile						
	Q1	Q2	Q3	Q4	Q5	Q5-Q1	t-value
	Information uncertainty proxy: Corporate governance (proxied by 1/free float ratio)						
IU1	0.99	1.32	1.6	2.17	3.5	2.51	4.17
t-stats	3.71	4.58	5.99	3.28	6.09		
IU2	1.02	1.41	1.65	2.07	3.85	2.83	8.91
t-stats	3.16	5.62	4.93	5.31	8.53		
IU3	0.91	1.25	1.5	2.14	4.23	3.32	12.9
t-stats	3.74	5.18	4.09	7.71	6.1		
IU4	0.79	1.18	1.42	1.69	5.05	4.26	10.31
t-stats	1.42	2.08	4.61	1.94	4.18		
IU5	0.72	1.15	1.58	1.83	5.75	5.03	8.42
t-stats	2.38	3.05	5.19	4.7	8.89		
IU5-IU1	-0.27	-0.17	-0.02	-0.34	2.25	2.52	
t-value	-1.17	-0.78	-2.18	-0.19	3.89	3.88	

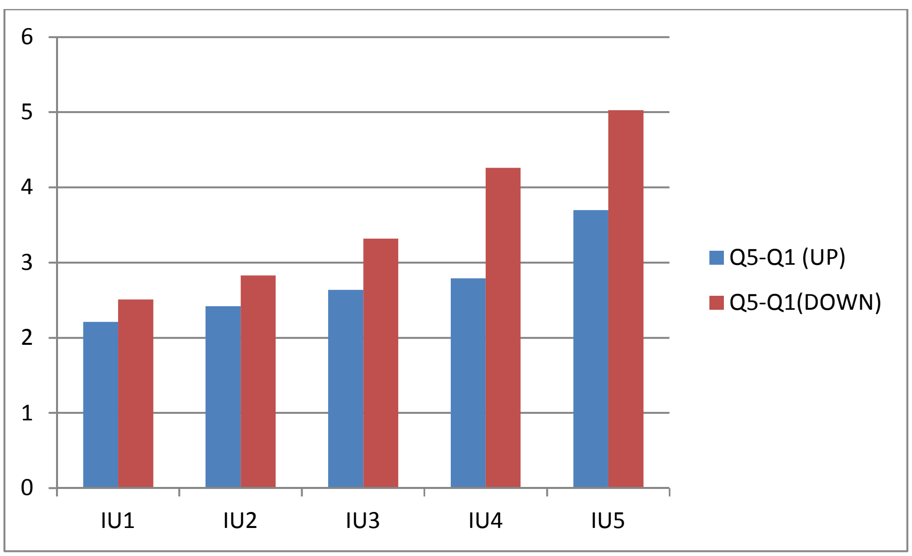
This table presents the average monthly returns of momentum quintiles and momentum premia under the influence of different levels of IU over time periods following UP and DOWN market states, as shown in Panel A and Panel B respectively, in the Chinese Class A share market for the sample period spanning from January 1996 to December 2008. The UP and DOWN market states are defined by prior 24-month average market return, with a consolidated Chinese Share A index being employed as a proxy for market portfolio. The methological approach is described in detail underneath Table 1.

Table 14. Equality test results of state-dependent momentum-IU (corporate governance) premia (following UP and DOWN market states) in the Chinese Class A share market (the (R=6, H=6) momentum trading strategy) (24 months)

Equality test (MOM and IU (corporate governance))(24 months) UP-DOWN=0						
	IU1	IU2	IU3	IU4	IU5	IU5-IU1
Q5-Q1 (UP)	2.21	2.42	2.64	2.79	3.7	1.49
Q5-Q1(DOWN)	2.51	2.83	3.32	4.26	5.03	2.52
Difference	-0.3	-0.41	-0.68	-1.47	-1.33	
t stats	-2.05	-2.88	-1.96	-2.63	-3.05	
Overall	1.79	2.09	2.42	2.65	4.04	2.25

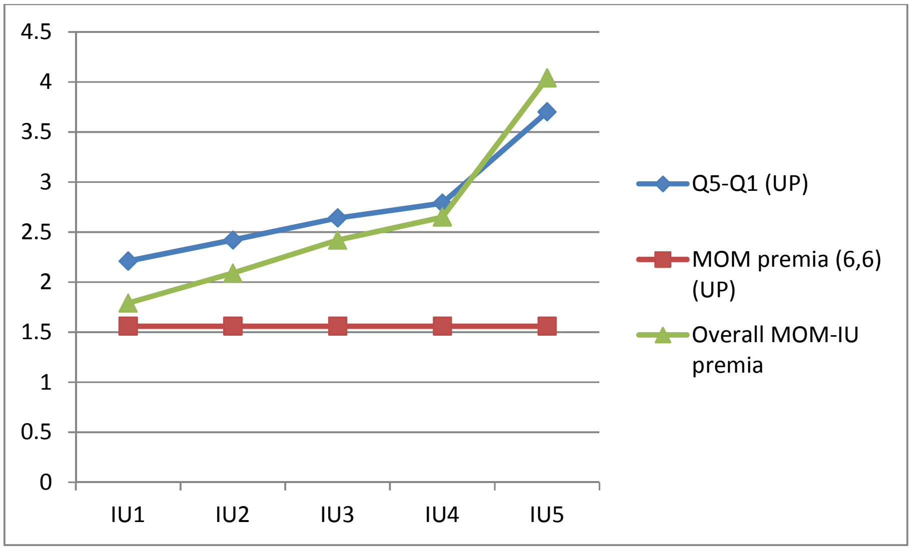
This table reports the difference between the momentum premia of the (R=6, H=6) momentum trading strategy conditional on different level of information uncertainty in the Chinese Class A share market for the sample period from Jan. 1996 to Dec. 2008. The difference is estimated by regressing the raw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

Figure 25. Comparison between the momentum-IU (corporate governance) premia of the (R=6, H=6) strategy over the time periods following UP and DOWN market states in the Chinese Class A share market (Jan. 1996- Dec. 2008) (24 months)



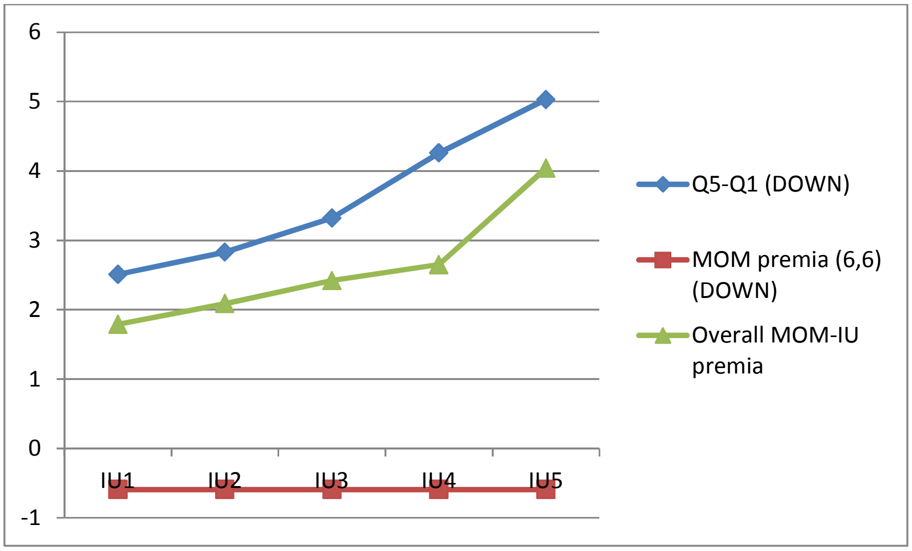
Notes: The column-shaped diagram illustrates the difference of momentum-IU premia of the (R=6, H=6) momentum trading strategy over time periods following UP and DOWN market states in the Chinese Class A share market for the sample time period. The vertical axis measures the momentum-IU premia in percentage form; the horizontal axis labels the 5 different levels of IU, with IU1 representing the lowest level and IU5 the highest level. For each IU level, the corresponding momentum premium following UP market state is demonstrated by the blue-coloured column, whereas that following DOWN market state is indicated by the red-coloured column.

Figure 26. Comparison: momentum-IU (corporate governance) premia over periods following UP market state, momentum premia of the (R=6, H=6) strategy conditional on post-UP market state, overall momentum-IU (corporate governance) premia in the Chinese Class A share market (Jan.1996- Dec. 2008) (24 months)



Notes: This figure demonstrates the difference among momentum-IU premia over periods following UP market state, momentum premia of the (R=6, H=6) momentum strategy conditional on post-UP market state, overall momentum-IU premia in the Chinese Class A share market. The vertical axis measures the returns in percentage form. The blue line represents the fluctuations in the momentum premia across different levels of IU over the periods following UP market state; the red line illustrates the premium of (R=6, H=6) momentum strategy unconditional on IU and market states; the green line represents the changes of momentum premia across different IU levels unconditional on market states.

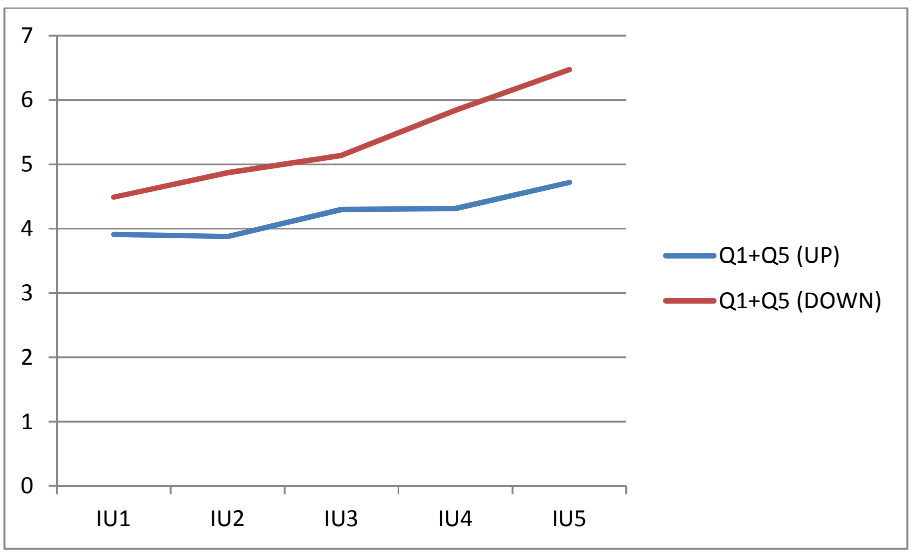
Figure 27. Comparison: momentum-IU (corporate governance) premia over periods following DOWN market state, momentum premia of the (R=6, H=6) strategy conditional on post-DOWN market state, overall momentum-IU (corporate governance) premia in the Chinese Class A share market (Jan.1996- Dec. 2008) (24 months)



Notes: This figure demonstrates the difference among momentum-IU premia over periods following DOWN market state, momentum premia of the (R=6, H=6) momentum strategy conditional on post-DOWN market state, overall momentum-IU premia in the Chinese Class A share market. The vertical axis measures the returns in percentage form. The blue line represents the fluctuations in the momentum premia across different levels of IU over the periods following DOWN market state; the red line illustrates the premium of (R=6, H=6) momentum strategy unconditional on IU and market states; the green line represents the changes of momentum premia across different IU levels unconditional on market states.

Figure 28. Asymmetry of positive momentum (Q5) and negative momentum (Q1) over the time periods following UP and DOWN market states in the Chinese Class A share market (Jan. 1996 – Dec. 2008) (corporate governance) (24 months)

	UP market		
	Q1	Q5	Q1+Q5
IU1	0.85	3.06	3.91
IU2	0.73	3.15	3.88
IU3	0.83	3.47	4.3
IU4	0.76	3.55	4.31
IU5	0.51	4.21	4.72
IU5-IU1		1.15	1.15
	DOWN market		
	Q1	Q5	Q1+Q5
IU1	0.99	3.5	4.49
IU2	1.02	3.85	4.87
IU3	0.91	4.23	5.14
IU4	0.79	5.05	5.84
IU5	0.72	5.75	6.47
IU5-IU1			1.98



Notes: The statistics box above the figure summarizes positive momentum (Q5) and negative momentum (Q1) for testing periods following UP and DOWN market states. This figure depicts the difference of the asymmetry of positive momentum (Q5) and negative momentum (Q1) over the time periods following UP market state, plotted as the blue line, and DOWN market state, graphed as the red line in the Chinese Class A share market over Jan. 1996 to Dec. 2008.The vertical axis measures 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 level of information uncertainty. The upward sloped lines suggest that regardless of market states, 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.

Appendix 9. the definitions of the JVSF and JVFMF and the discussion on the development of the two avenues

JVSFs: a foreign party may own up to 33% of the stock capital of a JVSF. These companies may, without hiring Chinese intermediaries, underwrite A-shares, and underwrite and trade B-shares, H-shares and government and corporate bonds. They cannot, however, broker or deal in A-shares on a proprietary basis. No timetable has been agreed for increasing the 33% ownership limit. JVSF will need RMB 500 million yuan in registered capital, a relatively large sum, and at least 50 qualified employees, to receive a license.

JVFMF: the foreign party may, again initially own 33% of the company, a percentage which will be allowed to rise to 49% after 2004, subject to the approval of both shareholders and the CSRC. Such firms may manage funds raised in China, and must raise RMB 200 million yuan within three months of launch. The foreign party will need paid-up capital of RMB 300 million yuan, though the rules are silent on whether JVFMFs can be set up by multiple foreign parties. Management fees are set at 2.5% or below; quite a generous rate compared with Western markets (CSRC[64]; Green, 2003: page 200).

Notwithstanding, the development of the JVSFs and JVFMFs has been a mixed bag. Firstly, the introduction of the JVSF idea has received lukewarm welcome from both Chinese securities firms and foreign securities firms for three main reasons in particular. First, the picture of the profitability of the JVSFs looks rather dim considering the fact that the size of the Chinese stock market, measured by total

[64] CSRC. March 29, 2011. < http://www.csrc.gov.cn/pub/newsite/ >

market capitalization, is relatively small compared to that of the U.S. stock market. Yet, the former has never been short of domestic securities firms, which forges a very crowded and competitive market situation. In other words, the profits can be easily competed away. Second, the large, well-established international investment banks can provide investment banking services to corporations in the mainland China directly through their Hong Kong offices. Thirdly and above all, the operation of the joint venture can be fragile due to the potential conflicts between the domestic shareholder and foreign shareholders provoked by cultural and workstyle-related differences (Paul, 2003).

On the other hand, the JVFMFs had some success prior to the year 2000, "China's fund sector is undeveloped" (Green, 2003: page 203). i.e. fund management as a form of financial service has great growth potential. Also, the Chinese government was in need of professional help from fund management companies to manage its equity holding positions and pension funds. After the honey moon period till 2002, foreign firms became less keen on partnering with domestic fund management firms, mainly for the concern over the amount of risks flagged.

Appendix 10. Three different versions of the EMH—the weak-form EMH, semi-strong-form EMH and strong-form EMH

The weak-form EMH says that current security prices instantaneously and fully reflect all information contained in the past history of security prices. In other words, past prices provide no information about future prices that would allow an investor to earn excess returns (over a passive buy-and-hold strategy) from using active trading rules based on historical prices.

The semi-strong-form EMH says that current security prices instantaneously and fully reflected all publicly available information about securities markets. If the hypothesis is true, then when any new information (i.e news) becomes public, it is very rapidly incorporated in security prices. Good new will lead to a rise in prices and bad news will lead to a fall in prices, but once this has happened no further predictable price changes can be expected to occur. In short, this version of the EMH implies that there are no learning lags in the dissemination of publicly available information that can give rise to profitable trading rules. Similarly, if news does not lead to any change in security prices, then if the Semi-strong-form EMH is true, we can infer that the news contained no relevant information.

The strong-form EMH says that current security prices instantaneously and fully reflect all known information about securities markets including privately available inside information. This implies that the markets respond so quickly that not even someone with the most valuable piece of inside information can trade profitably on the basis of it. (Blake, 2000: page 392-93)

Appendix 11. The Chinese Class A share market revisited with market states being defined by prior 24-month average market return

Table 15 Monthly momentum premia over periods following UP and DOWN market states in the Chinese Class A share market over sample period (Jan. 1996- Dec. 2008) (24 months)

Panel A. Overall momentum premia Share A following UP market (24 months) Jan. 1996- Dec. 2008

Ranking periods		Holding periods H=3	H=6	H=9	H=12
R=3	Q1	-0.61	-0.74	-0.85	-0.84

	Q5	1.32		1.51		1.31		1.41	
	Q5-Q1	1.93	*	2.25	**	2.16	*	2.25	*
R=6	Q1	-0.73		-0.86		-0.91		-0.87	
	Q5	0.62		0.7		1.25		1.31	
	Q5-Q1	1.35	*	1.56	*	2.16	**	2.18	*
R=9	Q1	-0.71		-0.69		-0.62		-0.83	
	Q5	1.11		1.2		1.23		1.33	
	Q5-Q1	1.82	*	1.89	**	1.85	*	2.16	**
R=12	Q1	-0.57		-0.69		-0.71		-0.88	
	Q5	1		1.15		1.08		1.25	
	Q5-Q1	1.57	*	1.84	**	1.79	*	2.13	*

Panel B. Monthly momentum premia Share A following DOWN market (24 months) Jan. 1996- Dec. 2008

Ranking periods	Holding periods	H=3		H=6		H=9		H=12	
R=3	Q1	0.94		0.93		0.74		0.91	
	Q5	0.46		0.26		0.28		0.4	
	Q5-Q1	-0.48		-0.67	*	-0.46		-0.51	
R=6	Q1	0.89		0.98		0.92		0.71	
	Q5	0.51		0.39		0.19		0.42	
	Q5-Q1	-0.38		-0.59	*	-0.73	*	-0.29	
R=9	Q1	0.67		0.92		1.31		0.65	
	Q5	0.35		0.45		0.69		0.46	
	Q5-Q1	-0.32		-0.47	*	-0.62	*	-0.19	*
R=12	Q1	0.49		0.85		0.72		0.9	
	Q5	0.34		0.42		0.36		0.48	
	Q5-Q1	-0.15	*	-0.43	**	-0.36	*	-0.42	

This table presents the momentum premia (the difference between average monthly returns of "winner" portfolios and those of "loser" portfolios) following UP market state and DOWN market state, where UP and DOWN market state are defined as positive and negative prior 24-month average market returns respectively. The methodological approach used in calculating monthly momentum returns and quantifying the momentum returns under different market states is described in detail underneath results table 5.2.

Table 16 Equality test results of state-depedent monthly momentum premia (following UP and DOWN market states) in the Chinese Class A share market (24 months)

Class A share market (24 months)

Equality test for UP-DOWN=0

MOM	(3,3)	(3,6)	(3,9)	(3,12)	(6,3)	(6,6)	(6,9)	(6,12)
UP	1.93	2.25	2.16	2.25	1.35	1.56	2.16	2.18
DOWN	-0.48	-0.67	-0.46	-0.51	-0.38	-0.59	-0.73	-0.29
Difference	2.41	2.92	2.62	2.76	1.73	2.15	2.89	2.47
t stats	3.81	2.75	3.05	4.15	2.55	3.26	2.99	3.74

MOM	(9,3)	(9,6)	(9,9)	(9,12)	(12,3)	(12,6)	(12,9)	(12,12)
UP	1.82	1.89	1.85	2.16	1.57	1.84	1.79	2.13
DOWN	-0.32	-0.47	-0.62	-0.19	-0.15	-0.43	-0.36	-0.42
Difference	2.14	2.36	2.47	2.35	1.72	2.27	2.15	2.55
t stats	4.03	3.87	2.94	3.26	2.94	3.15	1.93	2.08

This table reports the difference between the momentum premia following UP and DOWN market states in the Class A share market for 16 different momentum trading strategies. The difference is estimated by regressing the raw momentum premia against an UP dummy variable (UP_t) and an intercept (α) , following the same methodology for equality test used by Cooper et al. (2004) and Du et al. (2009). Mathematically, it can be written as $R_{W-L,t} = \alpha + R_{W-L,UP-DOWN} UP_t + e_t$. The t statistics associated with each difference is listed in the following row.

Appendix 12. Summary of listing and trading costs for Class A shares and Class B shares on the SHSE and the SZSE

The SHSE

It costs a mainland firm 0.03% of total par value listed (no more than RMB[65] 30,000 yuan) to get its Class A share issuance listed on the SHSE, and thereafter the firm is obliged to pay an annual listing fee at the amount of 0.012% of total par value listed

[65] RMB stands for Renminbi. Being the official currency of the People's Republic of China (PRC), the RMB's primary unit is the yuan. Before July 21, 2005, the RMB had been pegged to the U.S. dollar at relatively fixed exchange rates (1.50 yuan/USD in the 1980s; 8.62 yuan/USD in the early 1990). Between the time period from July, 2005 to July, 2008, the Chinese government briefly loosened its grip on the yuan pegging until the global financial crisis triggered the comeback of pegging in late 2008. Since then, the Chinese government has maintained a "managed floating exchange rate" policy. i.e. the value of RMB is determined by market condition (the amount of supply and demand) "with reference to a basket of foreign currencies". (March 9, 2011. "Managed Float" < http://en.wikipedia.org/wiki/Renminbi >)

(no more than RMB 6,000 yuan). On the SHSE, the listing of B shares is subject to an initial listing fee at the amount of 0.1% of total issued share capital (no more than equivalent of US$ 5,000) and an annual listing fee at the amount of 600 U.S. dollars per year[66].

For a Class A share transaction, the incurred trading costs can be mainly partitioned into 3 categories: 0.011% of trading value for both buy and sell sides as handling fee paid to the SSE; 0.004% of trading value on both buy and sell sides as securities management fee paid to the CSRC (collected by the SHSE); stamp duty, 0.1% of trading value on buy or sell side, shall be paid to tax authorities (collected by the SHSE). On the other hand, the trading costs revolving a Class B share transaction can be divided into two parts: handling fee, which is 0.026% of trading value on both buy and sell sides paid to the SHSE and securities management fee, 0.004% of trading value on both sell and buy sides paid to the CSRC (collected by the SHSE)[67].

The SZSE

On the SZSE, the initial listing fee for Class A and Class B shares is at the amount of RMB 30,000 yuan. Thereafter, the companies are subject to pay a monthly fee---500 yuan for par value below 50 million yuan and it increases by 100 yuan as the par value goes up by every 10 million yuan (no more than 2500 yuan per month)[68].

Despite having similar listing fee scheme on the SZSE, the transaction of Class A and Class B shares are subject to different amount of trading costs. The costs to trade Class A shares include: a commission fee, which is no more than 0.3% of the

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[66] The SHSE. “Stocks Listing Fees” March 9, 2011. < http://www.sse.com.cn/sseportal/en/c02/c01/c05/p1020/c15020105_p1020.shtml >
[67] The SHSE. “Fees and Taxes Charged or Collected by S[H]SE” March 9, 2011. < http://www.sse.com.cn/sseportal/en/c04/c01/c04/c04/p1296/c1504010404_p1296.shtml >
[68] The SZSE. “Fees of Shenzhen Stock Exchange” The SZSE Fact Book 2006 (Page 332-4).

trading value yet no less than the administration fees incurred during the transaction, starting from 5 yuan paid to the brokerage firms; a stamp duty at the amount of 0.1% of trading value on one side paid to the tax authorities (collected by SZSE); a handling fee at the amount of 0.01475% of trading value on both buy and sell sides paid to SZSE (collected by brokerage firms); a securities management fee at the amount of 0.004% of trading value on both buy and sell sides paid to CSRC(collected by brokerage firms). Similar to the transaction costs for Class A shares on the SZSE, the grand trading costs for Class B share on the SZSE also comprise four components, namely, commission fee, stamp duty, handing fee and securities management fee. However, most of these components are quantified based on different criteria: the commission fee incurred for trading a Class B share cannot be more than 0.3% of the trading value or less than total administration costs associated with the transaction, starting from 5 Hong Kong dollars to be paid by investors to their brokerage firm; 0.1% of trading value as the stamp duty to be collected by the national tax authorities via the SZSE; 0.0301% of trading value on both buy and sell sides is to be paid to the SZSE through brokerage firms; 0.004% of the trading value is to be paid, on both buy and sell sides, as securities management fee to the CSRC via brokerage firms[69].

Appendix 13. A detailed description portraying domestic individual investors, domestic foreign investors, and foreign (institutional) investors

Domestic individual investors

Overall, with the Chinese stock market generally portrayed as young and emergent, the Chinese investors in general can be deemed as very inexperienced in terms of

[69] The SZSE. “Fees of Shenzhen Stock Exchange” The SZSE Fact Book 2006 (Page 332-333).

investing(Chen et al., 2004). Simply put, the majority of the Chinese investors' investing decisions are still made based, to a considerable extent, on speculations. The speculation –driven investing behaviours are found to be the main impetus behind "share price bubble" formation by a few academic studies in the field such as Yao and Luo's research(2009), where they find that three economic psychological factors—namely, " 'greed', 'envy' and 'speculation' " (page 668)—are responsible for the formation of the Chinese stock market bubble (2005-2007). Nonetheless, three other investment psychological factors—"'fear', 'lack of confidence' and 'disappointment' " (page 669)—are blamed for contributing to the burst of the Chinese stock market bubble in 2008. The above-listed investment psychological factors are most prevalent among the Chinese individual (retail) investors who are prone to steep losses in the long term (Yao and Luo, 2009), as opposed to other domestic institutional investors and foreign investors (mostly at institutional level), whose behavioural characteristics will be described later in this section. Specifically, 'greed' factor reflects Chinese individual investors' naïve desire of 'becoming rich overnight' triggered by their witness of small portion of individuals thriving financially precipitously since the launch of the Chinese open-market economic policy. The investing attitude among Chinese investors, consequently, leads to the prevalence of 'Envy' factor. The 'Envy'-factor-driven individual investors flocked into stock trading en masse, portrayed by a steep surge in the number of trading accounts (Class A shares) registered with the SHSE and the SZSE over the sample period 1996- 2008 (from 10 million in 1996 to 80 million by the end of 2008 and from 10 million in 1996 to 74 million by the end of 2008 respectively).

Domestic institutional investors

With the perception that the overwhelmingly high proportion of the Chinese retail investors, provoking market inefficiency, exaggerated by the press and semi-professionals, the impact of domestic institutional investors on the Chinese stock market microstructure, understandably, has been grossly overlooked. The domestic institutional investors can be generally put into four major categories: “the securities companies, investment funds, insurance companies and the informal privately-raised funds (simu jijin)” (Green, 2003:71). At the first glance, it appears to be rather obvious that the economic importance of the individual investors overwhelms that of the institutional investors. Yet, like most emerging financial markets, the development of the securities law is still at its baby stage, allowing some institutional investors abuse their right in the financial market. The manipulations of stock market trading by institutional investors directly distorted the picture of the composition of market participants in the Chinese stock market observed due to two main reasons: first, a large number of formal and informal institutional investors execute trading using “fraudulently-opened individual accounts” (Green, 2003: page 70), believed to account for 50% of market capitalization. Secondly, camouflaged with individual trading accounts, the domestic institutional investors abuse their right through accessing large amount of capital and insider information, and consequently possessing influential power over the stock trading operation (Green, 2003).

Foreign investors

In response to calling for financial market globalisation and to attract foreign capital, the Chinese authority gradually opens up the stock market to foreign investors (mainly foreign institutional investors), signified by the decreasing level of restrictions on the proportion of foreign stake in companies listed in the Chinese stock market.

This can be vividly illustrated by change in the limit in percentage term for a single qualified foreign institutional investors' (QFII) investment in a listed company over years. Prior to 1997, the limit is 10%, which was raised to 15% in 1997, and then to 30% in 1998. By the end of 2000, the barrier was virtually lifted. In terms of the amount of capital that foreign investors are allowed to inject into listed Chinese corporation, in 2001, most of QFIIs are subject to the limit of $ 3 billion, which was soon completed relaxed(Green, 2003). Foreign institutional investors normally qualify to penetrate the Chinese stock market through two avenues: (1) forming joint-venture securities firms (JVSFs); (2) becoming part of a joint-venture fund management firm (JVFMF). Based on CSRC regulations published in June 2002, the definitions of the JVSF and JVFMF and the discussion on the development of the two avenues can found in Appendix 9.

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