MBS Research Thesis

(Finance)

Does Mutual Fund Investment Style Consistency Affect the Performance of Mutual Funds? Evidence from Chinese Mutual Funds

Student name: Zhao Yi
Student ID: 02124670
Supervisor: Associate Professor
Russell Gregory-Allen

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Abstract

While much of the previous research on mutual funds has concentrated on finding the relationship between the investment style, the past performance and the future performance of funds, very few of the studies have paid attention to the effect of a mutual fund manager's execution of investment style on fund returns. Using return-based analysis methodologies for measuring the style consistency of Chinese mutual funds, this thesis demonstrates that the less style-consistent funds tend to produce higher future risk-adjusted returns than more consistent mutual funds, even after controlling for past performance and net asset value (NAV). Further, these findings are robust across mutual fund investment style classifications, test period intervals (one-year or one-quarter interval), and the model used to calculate the expected returns (four-factor model and Sharpe's style analysis model). This thesis also documents the performance-persistency effects that exist in Chinese mutual funds, which remain persistent even under the condition of style consistency. More importantly, the research discovered that at a time of change in the Chinese stock market, the negative correlation between style consistency and future performance becomes weaker. The study concludes that style consistency does matter for mutual funds' future risk-adjusted returns and that there is a significant negative correlation with mutual funds' future risk-adjusted performance in the longer term (i.e., over the entire test period). Moreover, this connection is distinct from those related to the past risk-adjusted performance and NAV of mutual funds. It is also clear that a significant negative correlation between style consistency and the future risk-adjusted return does exist in Chinese stock and asset allocation mutual funds, even after adjusting for the investment style of the fund. Finally, this thesis provide a mutual funds picking strategy for investors base on the main findings of this study, which can provide significant positive alpha at each year during the test period.

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1. Research introduction

Individual investors wishing to invest their money in the financial or security market, including for example the stock market, bond market, or money market et al, always face a choice between investing directly and investing indirectly via professional investment managers such as mutual fund managers. For most of the "unprofessional" investors (who do not have enough time, knowledge or information to do the investment analysis and asset allocation themselves), investing their money via the professional investment managers is always the popular and appropriate answer. The heart of this choice to invest money via the professional managers is that most individual investors believe that the professional investment managers can provide better investment results due to their less costly information and superior investment skills in stock picking or market timing. Indeed, the performance of the professional fund managers has been of great interest to both academic researchers and market practitioners for several decades. They are all interesting in finding out what factors can affect (or be used to predict) the mutual fund's performance.

As we all know, the services of professional investment managers are not free, and thus investors expect good investment performance to cover the costs and they are always trying their best to pick a superior mutual fund in which to invest. Moreover, mutual fund investors are always trying to find some indicators which can be used to predict the performance of mutual funds in order to have more chances to pick the best fund among the many which are found in the market. Previous research of mutual funds have concentrated on discussing and testing two indicators – the past performance of mutual funds (performance persistency of mutual funds or the winner-repeat phenomenon) and the investment style of mutual funds (details of this indicator will be shown in the literature review following).

A number of previous research literature paid a great deal of attention to the relationship between the style of mutual funds and their performance. Capaul, Rawley and Sharpe (1993), Lakonishok, Sheliferm and Vishny (1994), Fama and French (1998), and Chan and Lakonishok (2004) all show that the portfolios of value stocks outperform portfolios of growth stocks on a long-term and risk-adjusted basis (with

varying performance due to varying investment styles). Moreover, there are some previous research concentrated on the mutual funds style misclassification, such as Kim, Shukla, and Tomas (1999), diBartolomeo and Witkowski (1997), and Brown and Goetzmann (1997) et al. The stated objective (or investment style) of mutual funds may be quite different from the mutual funds' actual investment style. Therefore, to evaluate mutual funds performance, we should base on their actual investment style (Kim, Shukla, and Tomas, 1999). In China, there is no specific guideline or requirements of how to declare mutual fund's investment objectives (style). As shown in Appendix 4, there is an only very brief descriptive definition of Chinese mutual funds style made by CSRC. Zhang and Zheng (2008), and He (2009) also concluded that the style misclassification do exist in Chinese mutual funds (Details of the Chinese mutual funds misclassification is not shown in this thesis, but the brief test results are shown in Appendix 10).

However, there is little research which focuses on the relationship between style consistency and mutual fund performance. The style consistency of mutual funds measures the stability of mutual funds managers' investment strategies. In other words, style consistency is concerned with how mutual funds managers execute their investment strategies (which is different from the style misclassification, details see Appendix 10). While much previous research paid attention to how different investment styles would affect a mutual fund's performance, few researchers paid attention to the question of whether the investment strategy execution decisions of mutual fund managers can significantly affect a fund's performance (Harlow, Brown, and Zhang, 2009). As a relatively new addition to the literature, this question will be discussed and tested in this thesis.

The style consistency measures the mutual funds' temporarily style drifting (mutual funds' style stability), which are because of either the performance pressures or less control (Harlow and Brown, 2004). Since true risks of mutual funds are essentially unobservable, some mutual funds may be tempted to deviate from their stated objective and take higher risks to earn higher returns, or they may be change their style temporarily due to avoid market risks during the market decline trend (Brown and Goetzmann, 1997). And He (2009) also mentioned that in different market condition, the mutual funds with same stated objective always behavior quite

different, such in 2008 according to his research, there are several stock mutual funds (namely) actually executed their investment more likely as a mix mutual funds (asset allocation mutual funds).

In this research we will concentrate on finding the relationship between the style consistency of mutual funds and their performance on the basis of the return-based style analysis approach. Additionally, the impact of the investment style and previous performance of mutual funds will be tested. Other than focusing on the US and European markets, as did previous research, my study will focus on a market which has developed very quickly over the last 5 years, the Chinese mutual fund market which has only a 9 year history. The reason for its rapid growth follows in the next section.

1.1 Background

Since the year 2001, the Chinese Securities Regulation Committee (CSRC) allowed some qualified financial institutions, such as financial companies, banks or insurance companies, to build up their fund companies by issuing open-end mutual funds to both institutional and public individual investors. From that point on mutual funds became more and more popular in China; this was especially true after 2005 when the stock mutual funds market developed very fast and mutual fund investments were recognized by many investors as the best way to invest their money with diversified risks and superior returns (see details in Appendix A). For most individual Chinese investors, choosing among the stock mutual funds was done according to the mutual funds' previous performance, the reputation of the mutual funds company and the reputation of the manager, as this information is the most common and easily found in newspapers or other media (Tianxiang Financial Service: www.txsec.com). Institutional investors also used this data, but in addition they considered the investment style of mutual funds, and some other factors. The institutional investors, such as investment companies, insurance companies, or large corporations, regularly change their asset allocations in various mutual funds based on market conditions and the mutual funds' investment styles; they are attempting to match the investment style of mutual funds with the market conditions (2009 investment report of Generalichina

Insurance Co.). The investment styles of the mutual funds represent the mutual funds' investment strategies and their investment behaviors over a period of time. In China, there are two major non-bond open-end mutual fund categories – stock mutual funds and asset allocation mutual funds (according to CSRC definitions). Stock mutual funds and asset allocation mutual funds may be classified into five major sub-categories, including active asset allocation mutual funds, conservative asset allocation mutual funds, growth stocks mutual funds, value stocks mutual funds and balanced stocks mutual funds (He, 2009).

Liu and Ye (2006) conducted research which involved Chinese stock analysis and performance evaluation based on 15 stock mutual funds for the years 2003-2004; they concluded that most of those funds are active (aggressive) asset allocation mutual funds and growth stocks funds. From their studies, no significant performance differences were found between different styles. Most of them had very short-term holding periods (high turnover rate); this indicates that the mutual fund managers were trying to using their stock picking and timing skills to make a profit rather than to pick and hold (Liu & Ye, 2006).

Recently, He (2009) conducted a stock mutual funds style analysis and performance measurement research based on 150 mutual funds' monthly returns (2007-2008). He found that most of the funds were investing in large capitalization and growth stocks during 2007-2008; meanwhile, most of those mutual funds did not provide high selection returns (or risk-adjusted returns). The results of He's research also suggested that during 2007 and 2008 the mutual funds' investment style was stable (with high-style consistency). It is noteworthy that He was using the return-based style analysis method which was used first introduced by Sharpe (1992) and that He's research somehow proved that Sharpe's method is also useful in the analysis of Chinese stock mutual funds.

This research will attempt to learn the following: 1) if the style consistency measure has any predictive power on a mutual fund's future performance; 2) if the past performance of mutual funds can be used to predict their future returns on the basis of mutual funds' style consistency; and 3) if there are distinct effects of style consistency on mutual funds' future performance after taking other factors such as

past risk-adjusted performance into consideration. Moreover, the actual styles which are based on the return-based style analysis are calculated by using Sharpe's style analysis model. All of these research questions will be tested on the basis of the actual style including the robust tests (by means of two-way table tests or regression tests).

Actually, this research indeed finds that RSQ (style-consistency measure of mutual fund) has a negative and significant predictive effect on mutual fund risk-adjusted performance (on both one-year test interval and one-quarter test interval). This conclusion is still true after controlling the factor of previous risk-adjusted return and Net Asset Value of mutual funds (NAV). These results are robust to the indexes used and test model selected. By using Sharpe's multi-factor style analysis model, we re-do the tests and the results of the tests remain unchanged. More importantly, by using the mutual funds picking strategy according to the main findings of this thesis, it is possible to identify a portfolio of mutual funds that produces significant positive risk-adjusted performance (measured by alpha).

1.2 Research contributions

This research may be considered different from any previous research literature in two areas, including "a different market" and "a different factor." This research focuses on the Chinese mutual fund market which is developing quickly. Indeed, it has been deemed the most important emerging market in the world by many important investors such as Jim Rogers and Warren Buffet (see details in Appendix 1). Only a few research on Chinese mutual funds have been done previously; most of these simply introduce the market and give some brief style analysis about the Chinese mutual funds (such as the research of Gao and Shahidur, 2005). The vast majority of previous deep research of mutual fund performance concentrated on the US, European, and Japanese markets. This research provides a more detailed performance analysis of the Chinese mutual funds market than any previous research.

Most of the previous research of mutual funds discuss the performance persistency (or winner-repeat pattern) or style analysis, but none of them have given close attention to the style consistency of mutual funds. This research is attempting to test the correlation between style consistency and mutual funds' future risk-adjusted

returns, which is a relatively new area of mutual fund research, not only for Chinese mutual funds research but also for the mutual funds research on the US or other markets.

Furthermore, beyond the academic contributions, the original practical intuition behind this research thesis is to find out a way to choose the best mutual funds and earn the superior return. There may be lots of complex methods of predicting the mutual funds' future performance, such as using holding-based data or some mathematic programming to pick up the mutual fund which will get higher future return. This research provides a very simple strategy by just using public available information to pick up the mutual funds which will have superior future performance in Chinese market. We found a "lag-alpha and lag-RSQ" based strategy that earns significantly positive risk-adjusted return during the test period: at beginning of each year, select the mutual funds with lowest lag-RSQ and highest lag-alpha. This trading strategy can provide much better result than the traditional winner-repeat picking strategy for Chinese mutual funds (details see section 5.5).

1.3 Thesis structure

This paper is organized as follows: In section 2, some major previous research regarding mutual fund style analysis approaches and mutual fund performance measurements as well as some previous style analysis results are reviewed. Research questions and hypotheses within this paper are outlined in section 3. In section 4, the methodology of this research is introduced and explained in detail, including the data selection, testing period selection, style consistency and performance measurement approach, testing methods, and the robust test approach. Moreover, section 4 also includes illustrations of the statistical tests used in this research, including test approaches. Section 5 shows the results of this research (also including the trading strategies), and Section 6 presents the research conclusions. Finally, in Section 7, the limitations of this research thesis are listed.

2. Literature review

2.1 Style consistency of mutual funds

There is no doubt that the investment style of mutual funds influences the returns the mutual funds produced (Harlow and Brown, 2004). Although most investors (both institutional and individual investors) know that the actual investment style of mutual funds is the one of the most important factor which may affect their performance, few of them know that the style execution of mutual fund managers can also affect a fund's returns (Brown, Harlow and Zhang, 2009). The style consistency of mutual funds measures investment style executions of fund managers. In other words, style consistency indicates how closely the mutual funds follow their designated (actual) investment style in a specific period (Brown, Harlow and Zhang, 2009).

As mentioned by Martin Chapman, "mutual fund investment style describes the types of stocks (or other assets) which are included in their portfolio or the bias which is applied in selecting the portfolio from the investable universe." Actually, the style should be able to inform the individual investors (as well as institutional investors) about the mutual fund products they buy; moreover, they should be able to measure the risks they will face according to the investment style they choose (Brown and Goetzmann, 1997). However, in actuality mutual fund managers do not always follow the actual investment style closely on a consistent basis. For various reasons, such as avoiding market risks or pursuing higher profits, some fund managers may make some "style drifting" choices on a temporary basis (Chan, Chen, and Lakonishok, 2002). It is also very difficult to continue adhering to the designated style 100% of the time. These factors bring up an interesting question: Will the temporal consistency of a manager's investment style decision affect a mutual fund's future returns during a specific period of time? The probable direction of the correlation between mutual funds' style consistency and their performance remains debatable (Brown and Harlow, 2004). Some previous researchers such as Brown and Harlow (2004) have suggested that more style consistent funds have less transaction costs than mutual funds that allow their style to drift because they exhibit less portfolio turnover. It is less likely that asset allocation and security selection errors will be made by high-style consistency managers than those who attempt to time their style

decisions (Barberis and Shleifer, 2003). Managers with consistent investment styles are easier for market participants outside the mutual fund to evaluate accurately; therefore they may attract more fund inflow to achieve better investments (Meier and Rombouts, 2008). Huang, Sialm and Zhang (2008) have suggested that maintaining a style consistent portfolio is one way that fund managers can signal their superior skill to potential investors. Conversely, Asness, Friedman, Krail and Liew (2000) argued that although a more style-consistent portfolio might reduce the potential for underperformance, it is also unlikely to capture the benefits that accrue to a manager who possesses the ability to accurately time the style rotations in the market (also see Swinkels and Tjong-a-Tjoe, 2007). Harlow, Brown and Zhang (2009) mentioned that it may also be true that less style consistent managers might outperform more consistent ones during certain market cycles; furthermore, the same manager might be able to add value by switching between high- and low- consistency strategies given the prevailing conditions in the market.

There are two main approaches to analyzing mutual fund performance and style – holding based analysis and return based analysis. According to the information and data availability, this research preferred to use the return-based approach. In the most recent research on mutual fund style consistency, Brown, Harlow and Zhang (2009) used both of these methods to analyze the relationship between mutual fund style consistency and performance. They concluded that the results from these two approaches are similar to each other. Their research results showed that, on average, those funds that are the most consistent in their investment styles over time produce better absolute and relative performance than those funds demonstrating less style consistency. The results for both methods supported the finding that the high-style consistency of mutual funds indicates better future performance. These authors also found that the return-based analysis method can provide the same reliable results as does the holding based analysis. However, the disadvantage of the return-based approach (using return data only) is that it does not provide a direct way to measure a mutual fund's style consistency. Fortunately, R-square has been used for that purpose by some previous research (e.g., Amihud and Goyenko, 2009; Brown, Harlow and Zhang. 2009).

For mutual fund performance measures, most previous fund performance

research preferred using alphas (excess returns) as the risk-adjusted performance measure of a mutual fund (e.g., Chan, Chen and Lakonihok, 2002; Davis, 2001; Huij and Verbeek, 2006; Brown and Harlow, 2002, 2004; Amenc, Sfeir and Martellini, 2002; Gao and Rahman, 2005).

As has been mentioned above, the impacts of mutual fund style consistency on the performance of a fund is a relatively new area of mutual fund research. There are some existing research works and most of them were done in recent years, including Brown and Harlow, 2002, 2004; Brown, Harlow and Zhang, 2009; Amihud and Goyenko, 2009; Gibson and Gyger, 2006; Aunsworth, Fong and Gallagher, 2008; Meier and Rombouts, 2008). Most of them were focusing on the US market by using the holding based approach. As mentioned above, Brown, Harlow and Zhang (2009) have proven that using return data can provide similar results to those of the holding based approach. In this research, a similar method will be employed to test the relationship between the style consistency and performance of Chinese mutual funds.

2.2 Style consistency and the performance of mutual funds research reviews

Three general designations for structural factors are typically used to calculate performance persistency and style consistency measures: a single-index market model (e.g., Jensen (1968)); multi-factor models based on pre-formed style indexes (e.g., Sharpe (1992) and Elton, Gruber and Blake (1996)); and multi-factor models based directly on portfolios created by characteristic-based stock sorts (e.g., Fama and French (1993) and Carhart (1997)). In this research thesis, the multi-factor model based directly on characteristic portfolios will be used as the main test method, and in addition the Sharpe's style analysis model will be used as the robust test method.

Teo and Woo (2004) conclude that investors might profit from attempting to time style movement, but it remains unclear how this effect relates to the mangers' investment style consistency. Harlow, Brown and Zhang (2009) state that there are two reasons why more style consistent portfolios should exhibit superior risk-adjusted returns: 1) several previous research of US mutual funds have established a significant negative correlation between fund expense ratios and returns (e.g., Carhart (1997) and Bogle (1998)); more active management, with its attendant higher degree of information processing and trading, could increase fund expenses to the point of

diminishing relative performance (Brown, Harlow, and Zhang, 2009); and 2) managers of style-inconsistent funds are chronically underinvested in the "hot" sectors of the market due to their more frequent tactical portfolio adjustments (e.g., Barberies and Shleifer, 2003). Kon (1983), Chang and Lewellen (1984), and Coggin, Fabozzi and Rahman (1993) suggested that professional asset managers generally possess negative market and style timing skills. Therefore, if the managers' market timing causes losses large enough to offset the benefits of their selection skills, then the managers with less style consistency would be expected to perform relatively worse than their more disciplined peers (Huang, Sialm, and Zhang, 2008).

Portfolio managers who rely more on security selection or market/sector timing than on style discipline in order to justify their active management fees may generate less reliable performance relative to the benchmark. Brown and Goetzmann (1995) and Christopherson, Ferson and Glassman (1998) suggest that it is often bad performance that persists from one period to the next. Khorana (1996) concludes that managers who remain more consistent within their designated style mandate may be able to reduce their chances of being replaced.

2.3 Performance Persistency research review

The main purpose of this research is to discover the real impacts of style consistency on the future risk-adjusted performance of mutual funds. The first goal of this thesis is to learn the direct or simple relationship between the style consistency and future performance of mutual funds. However, beyond that, there may be some other factors which affect mutual funds' future returns as well -- the most notable of these being the past performance measure.

Much previous research on mutual funds has provided significant evidence of mutual fund performance persistence. Hendricks, Patel and Zeckhauser (1993) found some evidences of mutual fund performance persistence when they discovered a "hot hand" effect in short-term predicted returns. Goetzmann and Brown (1995) found similar results. Goetzmann and Ibbotson (1994) revealed that past mutual fund returns and relative rankings are useful in predicting future performance. Ibbotson and Patel (2002) also proved that previous performance is useful in predicting the future

performance of mutual funds even after adjusting for the investment style. Other researchers, such as Carhart (1994), Malkiel (1994), Bollen and Busse (2004), Kahn and Rudd (1995), Elton, Gruber, Das and Hlavka (1993), and Blake, Elton and Gruber (1993) have provided sufficient evidence of mutual fund performance persistence.

In order to more accurately discover the impacts of style consistency on mutual funds' future performance, therefore, it is necessary to consider the performance persistency effects while testing the style consistency effects. As mentioned earlier, most of the previous research concentrated on finding the relationship between mutual funds' performance and their investment style. Moreover, many of those research were attempting to discover and compare the mutual funds' performance among different investment styles (i.e., the results were conditional based on investment style). However, there is no evidence to show that any particular style of investment can always provide better performance results.

In this research, in addition of traditional performance persistency tests, the performance persistency will be tested with the condition of a mutual fund's style consistency; this means that performance persistency results among high and low-style consistency groups will be compared.

The past performance and past ranking of mutual funds have been seen as a very important indicator for choosing a mutual fund and predicting its future performance. Performance persistency tests of mutual funds began with the research of Jensen (1968) whose original finding shows that managers are not able to sustain superior performance. Current research, however, is more likely to report data supporting persistence. Hendricks, Patel and Zeckhauser (1993) and Brown and Goetzmann (1995) have documented a short-run positive correlation between abnormal returns produced in successive years. Goetzmann and Ibbotson (1994) find that the past returns and relative rankings are useful in predicting the future returns and rankings of mutual funds in both raw returns and on a risk-adjusted basis over either one year or two year periods. Moreover, Grinblatt and Titman (1992) and Elton, Gruber and Blake (1996) find that past risk-adjusted performance is predictive of future performance for periods as long as three years. Ibbotson and Patel (2002) find that performance persistency also exists on the style-adjusted basis (by using Sharpe's

style analysis model). Elton, Gruber and Blake (1995) reconfirm the "hot hands" results that a high return can predict future high returns in the short-run. Hendricks, Patel and Zeckhauser (1993) also find that this is a short-term phenomenon. Grinblatt and Titman (1992) find evidence that the risk-adjusted returns of some funds are significantly positive. Goetzmann and Brown (1993) make use of a data set that is free of most forms of survivorship bias and find that persistence is strongest in losing mutual funds (those with worst mutual funds performance). Goetzmann and Ibbotson (1994) find that past returns (both raw and risk-adjusted returns) are useful in predicting returns and rankings. Moreover, rather than only using the year rankings, these researchers also used the monthly rankings to test for performance persistency; the monthly results are consistent with the winner-repeat hypothesis -- this provides evidence for the short-term performance persistency of mutual funds.

Brown, Harlow, and Zhang (2009) find that even when considering the impacts of a mutual fund's past performance, the style consistency measures still have significant positive impacts on a fund's future performance. These researchers also use the Fama-MacBeth cross-sectional regression to perform these tests and conclude that using a mutual fund manager's past alpha and investment style consistency skills to help predict future returns over one-year period is neither spurious nor driven by large sample sizes (Pattarin, Paterlini, and Minerva, 2004).

2.4 Measurement of mutual funds performance

There are various ways to measure the performance of mutual funds. In the early studies some research or investors used the actual returns to measure the performance of mutual funds. However, this method has been universally deemed to be inappropriate because the differences in mutual fund performance may only be due to their having varying levels of investment risk rather than the skill of managers (Jensen, 1968; Sharp, 1966). Thus, one of the reasonable methods for the measurement of a mutual fund's performance is to calculate the risk-adjusted return (Avramov and Wermers, 2005). A logical parameter for calculating a mutual fund's risk-adjusted return would be to use the intercept estimated for a return-generating (i.e., alpha) model (Bauer, Koedijk, and Otten, 2005). There are various return-generating models which have been used in the past by previous research to calculate a mutual fund's risk-adjusted returns – these include Jensen's model, the

Fama-French three-factor model, Sharpe's asset class model et al. In the 1990s some researchers used return-based models which are extensions of the classical models mentioned above. Elton, Gruber and Blake (1995) extended the traditional Fama-French three-factor model by adding a factor of the bond index to measure the risk-adjusted performance of US mutual funds. They introduced a factor regression model which included the market index (S&P 500), a size index (SMB), a value index (HML), and a bond index factor. Because mutual funds always hold some bond securities, and as these are in fact stock mutual funds, it may be quite reasonable to add a bond index factor.

Other than the Fama-French model (or the extended version of it), there is another very popular return-based model for mutual funds – Sharpe's asset class model. This model was introduced by Sharpe (1992) and includes a series of stylized benchmarks (stock indexes, bond indexes or others) which cover the entire investment universe of mutual funds (Ibbotson and Patel, 2002). Kahn and Rudd (1995) are also known to have used this model.

It is found, in fact, that the performance of the professional fund managers is not only determined by their investment skills, but that the investment style restriction is always the chief determinant of a mutual fund's performance (Chevalier and Ellison, 1999). Thus, the investment styles of mutual funds directly impact fund performance. As mentioned by Basu (1977) and Banz (1981), "the portfolio managers have been well aware of the benefits of forming a portfolio of stocks that emphasize various firm-related attributes (such as market capitalization, P/E ratios and so on)." In other words, there are two main dimensions in defining a mutual fund's stock investment style: 1) firm-size; 2) growth-value orientation (Gibson and Gyger, 2007).

Therefore, to compare the skills or performance among various managers who are using different investment styles may be not valid, especially if they are not free to adopt each others' investment strategies or are actually using totally different investment styles (Kothari and Warner, 2001). The basis for measuring the performance and skills of mutual fund managers is style analysis; this method is used to learn the style of a mutual fund's investments. In using style analysis, the style return contributions would be separated from the performance of the mutual funds,

and this would then lead to the selection returns being found which can measure the skills of particular fund managers (Lucas and Riepe, 1996). In this thesis, Sharpe's style analysis model would be used in the robust test and then the tests would be done under different category bases to derive the actual investment styles of mutual funds.

3. Research questions and hypotheses

3.1 Research questions

The key "mission" of this research study is to elicit the correlation between style consistency and future risk-adjusted returns of Chinese mutual funds. Behind this central goal are the three core research questions of this research thesis, all of which would be involved under the following circumstances: 1) if there is a positive correlation between mutual funds' style consistency and their future risk-adjusted performance; 2) if the performance persistency still exists on the condition of style consistency; and 3) if the predicative power of style consistency on mutual funds' future performance still exists after considering other factors such as past returns. The details are shown as follows:

Research question 1:

"**Do managers who maintain their investment strategy on a more consistent basis provide better future risk-adjusted performance than the managers who maintain their designated investment strategy on a less consistent basis?"**

In other words, this question aims to learn whether investors can use a mutual fund's style consistency measure to predict its future return, or if the style consistency measure is a useful indicator for predicting a mutual fund's future performance. Actually, there are many indicators which can be used to measure mutual fund style consistency. R-squared (RSQ) is one of the most popular return-based style consistency measures and is easy to calculate (if one only needs to get return-based data) and use by investors (Brown, Harlow and Zhang, 2009).

The RSQ, the proportion of the return variance that is explained by broad portfolios or indexes, is a traditional measure of diversification, and thus 1-RSQ measures the weight of idiosyncratic risk or selectivity (Amihud and Goyenko, 2009).

The closer RSQ is to 1, the closer the fund tracks the benchmark portfolios and the lower the selectivity. And therefore, the low RSQ may indicate that the fund managers change their portfolio holdings such that it rotates between factors (Amihud and Goyenko, 2009). Recent studies on hedge funds, such as Titman and Tiu (2008), derive the negative and statistically significant correlation between RSQ and the future performance of hedge funds (the lower the RSQ, the better the future performance). Titman and Tiu (2008) rank funds by the RSQ generated by regressing hedge fund returns on systematic factors and find that those funds in the lowest RSQ quartile have better future risk-adjusted returns. Cremers and Petajisto (2006) find that funds with portfolios that deviate more from their benchmarks also tend to perform better, and additionally conclude that the hedge funds with lower RSQ tend to take more active risks. The research findings of Amihud and Goyenko (2009) indicate that the RSQ has a negative and statistically significant predictive power on the future risk-adjusted returns of mutual funds (alpha). Conversely, Brown, Harlow and Zhang (2009) suggest that there is a positive and statistically significant correlation between RSQ and the future risk-adjusted performance of mutual funds.

From the statistical point of view, it does not appear to be a problem to use the RSQ in predicting the future alphas of mutual funds. As the RSQ and the future alpha were calculated based on two separate time periods, the test is thus out-of-sample and indeed no overlapping problem exists. Therefore, in this case, to run a regression by using one statistic (RSQ) on another statistic (future alpha) is acceptable from the statistical point of view.

Research question 2:

"Do mutual funds' past performance impacts their future risk-adjusted performance conditional on their previous style-consistency?"

This means that based on the results of style consistency (low or high), the correlation between the past and future risk-adjusted performance of mutual funds would be investigated. Actually, this question can be further divided into several sub-questions: 1) does performance persistency exist in Chinese mutual funds?; 2) does past performance correlate with future performance for a high-style consistency portfolio?; 3) does past performance correlate with future performance for a low-style

consistency portfolio?; and 4) do the high-style consistent mutual funds' past risk-adjusted performance have a higher predictive power on their future risk-adjusted performance than that of the low-style consistent portfolio?

Actually, there is little previous research of Chinese mutual funds performance-persistency has been done, and most of the previous research on oversea mutual funds' performance persistency tested the correlation between a mutual fund's past return and future returns conditional on the mutual fund's investment style only. In this research, in addition to the traditional performance-persistency test, the previous tests will be extended to test the style persistency of mutual funds on the condition of their style consistency (i.e., how the managers executed their investment style). This thesis test the Chinese mutual fund performance-persistency because that: 1). Although many previous research of US mutual funds provide some important evidences of performance-persistency, there is little research evidence available to show that is also true for Chinese mutual funds. Without consider past mutual fund performance, the conclusions of style consistency effect of this thesis would be biased as the previous risk-adjusted performance may impact the future performance as well; 2). And moreover, if the trading strategy of picking Chinese mutual funds base on their past performance can provide very good result, there is no need to use more complex method to do it. However, the test results of this thesis show that using the mutual funds picking strategy based on the main findings of this thesis can produce superior mutual funds risk-adjusted performance than only using the performance persistency trading strategy does.

Research question 3:

"Do a mutual fund's style consistency and its past risk-adjusted performance represent distinct influences on its future risk-adjusted performance?"

This question adds another point of view for testing mutual funds' style consistency impacts on their future performance. It is necessary to consider the impacts of other factors when the research is attempting to define the actual relationship between style consistency and the future performance of mutual funds.

As mentioned above, Question 1 is purely considering the style consistency's

impact on mutual funds' future risk-adjusted return. Question 2 considers the correlation between mutual funds' past risk-adjusted returns and their future risk-adjusted returns. Moreover, in this research, the correlation between risk-adjusted performance is tested conditional on the style consistency of mutual funds. Question 3 considers the style consistency impacts on mutual funds' future risk-adjusted returns while considering the correlation between mutual fund performance (controlling the factor of past risk-adjusted performance). After accounting for the impacts of past risk-adjusted returns on mutual funds' future performance, we will be able to derive the more realistic predictive power of style consistency on mutual funds' future performance. **(Note**: the factor of Net Asset Value (NAV) of mutual funds will be added into the regression tests as well in robust tests)

3.2 Testable hypotheses

Hypothesis 1*: *On average, high-style consistent mutual funds generate higher future risk-adjusted returns than low-style consistent mutual funds.

The first hypothesis examines the relationship between style consistency and mutual funds' future performance. In other words, this hypothesis supposes that there is a positive correlation between the measure of style consistency (RSQ) and the future risk-adjusted performance of mutual funds. There are two reasons that explain why more style consistent (higher RSQ) mutual funds may exhibit superior risk-adjusted returns: 1) several previous studies have found a negative relationship between a mutual fund's expense ratios and its performance (e.g., Carhart (1997), Bogle (1998), Brown, Harlow and Zhang (2009)). Less style consistent mutual funds' higher expenses would diminish their relative performance; and 2) Brown, Harlow and Zhang (2009) have stated that the low-style consistent managers may chronically under-invest in the "hot" sectors of the market due to their more frequent tactical investment adjustments. Some literature also suggest that, on average, professional money managers possess negative market and style timing skills over the long term (e,g., Kon (1983), Chang and Lewellen (1984) et al.). Furthermore, there are a number of literature that provide evidence of a negative correlation between RSQ and the future performance of mutual funds. This is found in the research of Amihud and Goyenko (2009), Titman and Tiu (2008) et al.

For research Question 2's sub-questions, there are three hypotheses:

The reason for basing the performance persistency hypothesis on the condition of investment style consistency is that although previous studies provided some evidence of mutual funds' performance persistency, few of those studies actually analyze the reasons behind the performance persistency. In fact, there are other previous research giving evidence that the more successful mutual funds (those having better past returns) are more likely to continue their existing strategy in the following periods. Furthermore, some literature reaches the conclusion that mutual funds with poor performance are more likely to change their managers and style in order to pursue better returns. Thus the performance persistency of mutual funds may actually be different from other levels of style consistency portfolios.

In this research, therefore, the performance persistency and winner-repeat pattern of the whole test sample are tested first. Following those tests, the performance persistency would be tested under two style consistency categories – high-style consistency and low-style consistency.

Hypothesis two: Mutual funds with better past risk-adjusted returns are more likely to provide better future risk-adjusted returns.

Hypothesis three: High-style consistent mutual funds' future risk-adjusted performance is positively correlated with their past risk-adjusted performance.

Hypothesis four: Low-style consistent mutual funds' future risk-adjusted performance is positively correlated with their past risk-adjusted performance.

The test results for hypotheses three and four will be compared to show if the past risk-adjusted performance of high-style consistency mutual funds has a higher predictability of their future performance than that of low-style consistency mutual funds.

Hypothesis five: A fund's style consistency and its past risk-adjusted performance represent distinct influences on its future risk-adjusted performance.

The final hypothesis of this research involves the relationship between style consistency and the persistence of fund performance. In particular, this research will test whether the two effects are truly distinct from one another in how they influence future returns. In other words, after one has accounted for how a fund's risk-adjusted returns are correlated over time, does the consistency of a manager's style decision still have a significant impact on future performance?

This hypothesis is different from hypotheses 2, 3, and 4 above. Those three hypotheses focus on whether performance persistency exists under high or low-style consistency groups. The performance persistency of mutual funds will be tested by the hypotheses above; however, the aim of hypothesis 5 is to test whether the consistency of the manager's style decision will have a significant impact on future performance after accounting for how a fund's risk-adjusted returns are correlated over time.

4. Methodologies and Data

4.1 Data selection

The data used in this thesis were obtained from the Wind database system. The test period covered by this research is from year 2005 to year 2008. Both the daily and weekly returns of mutual funds and indexes were collected from the database (all of the return data used are net of fees, but do not include applicable loads). Moreover, all other relative information was collected from the Wind database as well. As this research focuses on stock market mutual funds and asset allocation mutual funds, all other mutual funds were excluded from the research sample (such as bond, money market, ETF, close-end, and index mutual funds et al.). Finally, there are 114 mutual funds in this research sample, and all of them were set up before 2005. None of these mutual funds were either delisted, changed their name or merged with other funds during the test period. (A list of the mutual funds in this research sample is provided in Appendix 4 of this research).

The test period of this research thesis commences in the year 2005 because the Split-Share Structure Reformation was begun in the second half of 2004. In China all listed companies can issue two classes of shares: those which are listed on an exchange and can be freely bought and sold by normal investors (tradable shares) and those which cannot (non-tradable shares). The existence of non-tradable shares, which accounts for more than 60% of all shares issued, has been the biggest impediment to the development of China's equity market. In fact, the rights of the tradable and non-tradable shares are exactly the same, but the cost of tradable shares is much higher than non-tradable shares. This imbalance has caused a great many problems for the development of the Chinese equity market; indeed, the confidence of investors was very low due to this situation. Since the beginning of the reformation, however, the Chinese stock market has entered a new stage (for details see the Nomura Capital Market Review, Vol.8 No.3).

As the history of the Chinese mutual fund industry is very short, the number of test periods (yearly) is relatively small. The risk-adjusted performance (alpha) would be calculated over 15 separate 1-quarter periods during the period 2005 to 2008 as well. Analysis of quarterly period is not possible with weekly returns because the

short time series of observations precludes efficient estimation, so the daily data will be used for that purpose. Using the daily data will maximize the number of independent time periods, which will improve the research accuracy as well as providing some results in more detail.

4.2 Measure of risk-adjusted returns and style consistency

In this paper, a four-factor regression model (as shown below) is used to calculate the risk-adjusted returns and style consistency measures of mutual funds. This four-factor model was introduced by Elton, Gruber and Blake (1995) when these researchers were attempting to test the performance persistency of US mutual funds. Brown, Harlow and Zhang (2004, 2009) used a similar four-factor model to measure the style consistency of US mutual funds by their R-squared (RSQ). In this research the risk-adjusted returns of mutual funds will be measured by the alpha (calculated from the four-factor model) while the style consistency of mutual funds will be measured by the RSQ. As mentioned by Brown and Harlow (2004), 1-RSQ captures that portion of a mutual fund's return variability that is not systematically related to co-movements in the returns to the style benchmarks. The RSQ can thus be used as a cross-sectional returns-based measure of style consistency. As long as the basic factor structure fairly represents the style universe confronting the managers, the component of that mutual fund's returns not explained by the model must be related to non-style elements (Brown, Harlow and Zhang, 2009). The four factors which are used in this model are the "whole stock market factor", the "size factor", the "value factor" and the "bond market factor". These four factors can cover the general investment universe of Chinese mutual funds, and no other investment factor would be included in this model (i.e., no options, future contracts, convertible bonds et al.).

In China, the regulation on investing in financial derivatives is very strict, not only for mutual funds but also for other investments. Mutual funds are not permitted to invest in very complex financial derivatives such as MBS. Further, in China there is no stock market future contract or options available to investors. Additionally, the domestic mutual funds in China are not allowed to invest in oversea markets, so there is no need for them to hedge the foreign exchange risks (as a corollary, there would also be no need for them to invest in swaps). In this research sample, there are more

than 100 stock security mutual funds and mixed security mutual funds. The top 50 holdings for each of them have been checked (to December 30, 2008). None of these funds hold any financial derivatives in their top 50 holdings (these details may be checked either at http://fund.eastmoney.com/ or in the Wind financial data system). It is difficult to say definitively that absolutely none of these funds hold any financial derivatives. However, even if a few of them do hold derivatives, the holding positions of such financial derivatives would account for very little in a mutual fund's asset allocations. Such holdings, therefore, would not substantially affect a mutual fund's performance and would thus not affect the usage of the four-factor model in this research. The formula for this model is shown below:

Four factors model

$$r_{it} - R_f = \alpha + \beta_3 * (Rm - R_f) + b_s * SMB + b_v * HML + b_b * (r_{bt} - R_f) \quad [1]$$

r_{it} is the weekly return of mutual fund i at week t;

R_f is the risk-free return rate (reason for risk-free rate selection, see appendix 7), and Rm is the return of the entire stock market (full A-stock market in both the Shanghai and Shenzhen stock exchanges). SMB stands for "small (market capitalization) minus big" and HML for "high (book-to-price ratio) minus low"; they measure the historic excess returns of small caps over big caps and of value stocks over growth stocks (Fama and French, 1993). b_s and bv are corresponding coefficients of SMB and HML; they can take negative values as well as positive values (i.e., there are no constraints on them). r_{bt} is the Total Chinese bond index weekly (or daily) return. (Note: the reasons and details about the benchmark selection **see Appendix 7**)

R_f is the risk free rate of return and is the average fixed saving account interest rate of China's several largest commercial banks; it is the rate after the interest income tax.

The risk-adjusted performance measures and style-consistency measures of mutual funds in this study are calculated by using the formula [1] above, as follows:

(1) Starting at the beginning of the test sample (first week of 2005 or first trading day 2005) for each mutual fund in the sample, the parameters of [1] are estimated by using the 52 weeks of mutual funds' returns in the current year (or daily returns during a quarter test period). This estimation produces the return-based

consistency measures (R-squared) as well as alpha, the proxy for past risk-adjusted return measures.

(2) The 52 weeks' returns in the subsequent year (or daily returns for the next quarter) are used to calculate the risk-adjusted returns of the subsequent period. This refers to the risk-adjusted future returns because they are calculated over a different time period than the style consistency and past performance variables which are used to explain them.

(3) To create a complete data-set of all the mutual funds, the previous steps are repeated by sequentially rolling the estimation window forward by one year (or one quarter).

In this study, both the weekly returns and daily returns data of mutual funds are used. There are 3 separate test periods for weekly returns (with a 1-year interval) and 15 separate test periods for daily returns (1-quarter intervals).

4.3 Tests of hypothesis 1:

4.3.1 Two-way table test:

One of the traditional methods for this type of research is to rank the past performance or other indicators of mutual funds over two-year, three-year or five-year intervals as seen in Elton, Gruber and Blake (1995) as well as Ibbotson and Patel (2002). This study uses the weekly-alpha over a 1-year period as the mutual funds' risk-adjusted performance measure. For example, the mutual funds' style consistency is ranked from the year 2005 and they are categorized as "high-style consistent and low-style consistent mutual funds" according to whether or not their RSQs were above or below the median RSQs. At that point the mutual funds' risk-adjusted performance (alpha) in 2006 will be ranked and categorized as high performance and low performance mutual funds depending on whether they were above or below the median alpha. The same process would also be used for the years 2007 and 2008. Based on that information, the two-way table would be used to show the results.

There are several reasons why this research thesis calculated alpha and RSQ over a relatively short time interval such as the 1-year interval test period or even the 1-quarter interval test period. Firstly, the performance test interval periods should not

be so long that the management skill level or strategy for the fund is likely to change (Goetzmann and Ibbotson, 1994). On average, most of the previous academic research of the US mutual funds market used 2 or 3 year periods to test the performance of mutual funds; some of the research even used a 7-year time period. In China, the average tenure of mutual fund managers is only about 2 years or even less (see details at Tianxiang Financial Services: www.txsec.com). Indeed, the US mutual fund managers' average tenure is more than 4 years. It is preferable for this research on Chinese mutual funds, however, to use a relatively short period (one year or one quarter) to calculate the risk-adjusted performance measures (alpha) and style consistency (RSQ). Secondly, for Chinese investors the average mutual fund holding period is 7 months while in the US the average is 3-4 years. Therefore, Chinese investors are more concentrated on short-term performance or profits than long-term holdings; most of these investors do not like to hold one mutual fund for the long term. As mentioned by Xie, Li and Zhang (2008), the Chinese mutual funds always face serious redemption during 2005-2008, but in the same period US mutual funds face high net cash inflows. They also concluded that Chinese mutual funds investors are more sensitive for short-term market condition and they would not like hold the mutual funds constantly as US investors do (more details about these shown in Appendix 1). And moreover, to use long time period to evaluate the mutual funds' performance, may be biased as the situation of current market may be quite different from the previous market conditions. For example, in China, due to Split-Share Structure Reformation of Chinese stock market, the stock market has changed very much compare to the market before 2005.

In this research, a 1-year interval test period (weekly data) will be used to do the test first. As well, the daily data will be used to calculate alpha and RSQ over a 1-quarter period (although the 1-quarter testing period may be too short, in this case it can increase the number of testing periods and thus help to improve the accuracy of the research results). The history of the Chinese mutual funds industry is only 8 years long (2001-2009), and in this research the sample covers the period from 2005-2008 (4 years). This is a relatively short-term period, so this study prefers to use 1-year and 1-quarter periods to calculate alpha and RSQ, which can increase the number of testing periods in the research. In a word, this research is concentrated on the Chinese mutual fund market, which is totally different from the US market in several aspects

including fund managers' behavior, market structure, the investment preferences of investors and so on, therefore to use the short test interval (the 1-year test interval and one-quarter interval) is found to be more suitable than the traditional longer intervals in this thesis

As mentioned above, the two-way table tests are used first to give a brief picture of the correlation between mutual funds' style consistency and their future risk-adjusted returns. The summary of the results for all test periods will be shown in a combined results table. The results will indicate that the ratio associated with picking a high alpha mutual fund is based upon the past RSQ.

A standard statistical test of two-way tables will be used in this paper which is known as the log odds ratio test.

Odd ratio $(\theta) = \pi_{hh} * \pi_{ll} / \pi_{lh} * \pi_{hl}$ [2]

Log odd ratio = Log (θ) [3]

π_{hh} is the ratio of the high-RSQ – high-alpha case happens;

π_{hl} is the ratio of the high-RSQ – low-alpha case happens;

π_{lh} is the ratio of the low-RSQ – high-alpha case happens;

π_{ll} is the ratio of the low-RSQ – low-alpha case happens;

If the log odd ratio is more than 0, that means the mutual funds with high-RSQ are more likely to get high-alpha in the next period than the mutual funds with low-RSQ. If the ratio is equal to 0, then the chance to get future high-alpha is equal to both portfolios. If the ratio is less than 0, that means the mutual funds with low-RSQ are more likely to get high-alpha in the next period. At this point the Z-test would be applied to test the statistical significance of the log odd ratios.

SE(log (θ)) = square-root(1/Nhh + 1/Nhl + 1/Nlh + 1/Nll) [4]

Where: SE represent of the standard error;

Nhh is the number of mutual funds in the portfolio of "high-RSQ – high-alpha";

Nhl is the number of mutual funds in the portfolio of "high-RSQ – low-alpha";

Nlh is the number of mutual funds in the portfolio of "low-RSQ – high-alpha";

Nll is the number of mutual funds in the portfolio of "low-RSQ – low-alpha".

A Z-test will be used to test the statistical significant of the log odd ratio:
Z= log(θ)/SE(log(θ)) [5]

This two-way table method was used by Goetzmann and Ibbotson (1994) for testing the performance persistency of US mutual funds. In this method the researchers made two sub-groups of mutual funds based on their alphas. The purpose of the process is to find out if, on average, the high-style consistency mutual funds will have higher future risk-adjusted returns (winner-repeat). Although there are many other ways to do the test, such as 10 sub-group based on their RSQs, the two-way table should be enough to find the answer to that question. The correlation and regression tests, which follow the two-way table method, will be able to give more detailed results related to the question of performance persistency.

4.3.2 Basic Correlation Tests (cross-section)

A more direct test of the first hypothesis is possible when we consider how the pattern of correlation between the style consistency measures and the future performance of mutual funds evolved over time. The correlation (r) between style consistency (RSQ) and mutual funds' future risk–adjusted fund returns (alpha) provides direct evidence as to whether consistency and future performance are positively or negatively related. As mentioned above, the consistency statistics are measured out-of-sample; this means that the RSQ are based on mutual funds' weekly returns for 50 weeks (over a 1-year interval test period) preceding the interval (1-year) for which the performance of mutual funds are produced. In this way the cross-sectional correlation between the style consistency and future risk-adjusted returns of mutual funds will be calculated. Additionally, the T-test will be used to test the statistical significance of the cross-sectional correlation results.
The test process is shown below:

$$S_r = \sqrt{(1-r^2)/(n-2)} \quad [6]$$

S_r is standard error of r; r is the cross-sectional correlation between RSQ and future risk-adjusted return (alpha); n is the number of mutual funds in the sample.

The t-test is shown below:

$$t_r = \frac{r-0}{S_r} = \frac{r-0}{\sqrt{(1-r^2)/(n-2)}} \text{ [7]}$$

4.4 Test methods for Hypotheses 2, 3 and 4

4.4.1 Two-way table test:

The two-way tables will be used to show the relationship between the past performance and the future performance of mutual funds for both the high-style consistency and low-style consistency portfolios (the mutual funds are categorized as high or low-style consistency first, according to whether or not their RSQs are above or below the median RSQ). The alpha calculated from formula [1] will be used to measure the performance of mutual funds.

For example, we will use the prior 1-year performance for the year 2005 to predict the performance of the subsequent 1-year, 2006. Similarly, we use the prior 1-year performance to predict the 1-year interval of 2007 and 2008.

For testing hypotheses 2 and 3, the conditional two-way table test will be used and an example is shown below: First, the mutual funds are categorized into high-style consistent and low-style consistent funds. The RSQs of the mutual funds are calculated by running formula [1] over the entire period followed by rank. The mutual funds with RSQ above median are categorized as high-style consistent mutual funds and vice versa.

The log odd ratio and the Z-test will be used to interpret and test the statistical significance of the two-way table results. The details of these are shown above (see formulas [2], [3], [4] and [5]).

4.4.2 Basic Correlation Tests (cross-sectional)

The cross-sectional correlation test will be used as well to provide a more direct test of hypotheses 2, 3, and 4. The correlation between past risk-adjusted returns and future risk-adjusted fund returns provides direct evidence as to whether past and future performance are positively related. This test will be taken under the style consistency condition, which means that for each period the cross-sectional

correlation between past and future risk-adjusted returns for both high- and low- style consistency portfolios will be measured. As mentioned above, the consistency statistics are measured out-of-sample; this means that past risk-adjusted performance are based on mutual funds' weekly returns for 50 weeks (or 1-year period) preceding the interval (1-year) for which the performance of mutual funds are produced.

As shown above, the T-test will be used to test the statistical significance of the cross-sectional correlation results (see formulas [6] and [7]).

4.5 Tests for Hypothesis 5

The cross-sectional regression will be employed to test the hypothesis and is shown as follows:

$$R_{it} = \alpha + \beta_1 * RSQ + \beta_2 * R_{it-1} + e_i \quad [8]$$

R_{it} is the risk-adjusted return of mutual fund i at year t; RSQ is the measure of style consistency and R_{it-1} is the risk-adjusted return of mutual i at year t-1, which are both calculated from regression [1] base on mutual funds' weekly return data in year t-1. Notably, the regression [8] is the cross-sectional regression.

4.6 Robust Test

The four-factor model used above is very popular and efficient and it can provide a very useful measurement of performance relating to the risks faced by mutual funds. However, it is not very good for measuring the investment style of mutual funds. As mentioned by Ibbotson and Patel (2002), the performance of mutual funds can largely be attributed to the capitalization or investment objective of a fund rather than manager skill. Thus any superior performance by a mutual fund can be due to the investment style that the fund has employed rather than the fund's style consistency or past performance. In order to avoid this potential problem in this paper, rather than using the four-factor model to estimate the actual style of mutual funds (risk-adjusted performance measures are also available), the previous analysis will be extended by using Sharpe's return-based style analysis regression to determine the mutual funds' investment style categories.

Other than the Fama-French factor model, this research also uses Sharpe's style analysis regression to perform the test. The reason for using Sharpe's style analysis is that it is able to construct the customized benchmark which identifies the weights in passive indices that would be necessary to mimic the funds' return stream over a specific period (Ibbotson and Patel, 2002). Any over- or underperformance versus the stylized benchmark can be called the style-adjusted alpha, a measure of value-added manager skill that is not attributable to the style of the fund. Thus, the performance measure from this model is the style-adjusted alpha.

The three key research questions above are focused on learning whether investors can use the style consistency of mutual funds to predict their future performance. However, the fact that some mutual funds perform better than others may only be due to their investment style. For example, balanced mutual funds may perform better than stock mutual funds during a stock market recession. To prevent these problems in the robust test (using a technique this researcher has employed previously), Sharpe's style analysis method will be used to determine the actual investment style of each mutual fund in each year of the test period. At that point the relationship between style consistency and mutual funds' future returns will be tested conditional on the investment style of the funds. Additionally, the selection returns calculated from Sharpe's method will also be referred as style-adjusted returns of mutual funds. The relationship between style consistency and future performance would thus be tested within 5 investment style groups as determined by Sharpe's return-based style analysis model.

Sharpe's return-based style analysis

$$R_{it} = \sum_{i=1}^{7} w_i r_{it} + e_i \qquad [9]$$

Rit represents the actual total rate of return for mutual fund i at week t; r_{it} represents the return of index i at week t; Wi is the coefficient for index i，there are two constraints for those coefficients – 1) Wi is larger than 0; 2) sum of Wi equal to 1.

$$r_{bt} = \sum_{i=1}^{7} w_i r_{it} \quad [10]$$

Wi represents the coefficient to index i over a 1-year period prior to t as calculated by regression [1], and r-it is the return to index i in week t. r-bt, therefore, is the style benchmark return for mutual i at week t.

$$\alpha_{it} = r_{it} - r_{bt} \quad [11]$$

The difference between the actual return of mutual fund i and its style benchmark return at week t is the style-adjusted alpha of mutual fund i at week t.

Because 50 weeks (a 1-year period) of data is required to create the customized benchmark, the first style-adjusted alpha that is calculated is for the first week in 2006. The benchmark created for week 1 of 2006 is based on a regression that uses data from the prior 50 weeks in 2005. At week 1 of 2006, the actual return is compared to the benchmark return to determine alpha. In this manner, rolling forward out-of-sample alphas are calculated for each week from 2006 to 2008. The weekly style-adjusted alphas are then compounded into a single, annualized style-adjusted alpha for each calendar year. The RSQs for 2005, 2006, 2007 and 2008 are calculated by the regression [9] and then the two-way ranking tables would be used to show the relationship between style consistency and future mutual funds' performance (as mentioned above). Finally, the cross-sectional regression would be used to test the relationship.

In reality, there are two methods for performing the robust tests: 1) to use Sharpe's style analysis method to determine the style of mutual funds and to then use alpha and R-squared from the four-factors model above to test under different investment style categories; or 2) to use the style-adjusted return as the performance measure to perform the tests above. In this research the use of the first method of doing the robust test is preferred. Moreover, all the style-adjusted returns as well as the robust test results of these mutual funds have also been calculated using the second method; these results also support the conclusions of this thesis (available on request，see Appendix 6 for details).

5. Results

5.1 The results for tests of hypothesis 1

5.1.1 one-year interval test results

Two-way table tests results:

Exhibit 1 shows that the combined results of all three 1-year interval test periods indicate that the ratio associated with picking a winner based upon past low-style consistency (low RSQ) is about 60.12%. Therefore, these results indicate the mutual funds with past low style-consistency are more likely to perform better in next year during the whole test period. However, the "low style consistency-high risk-adjusted performance" phenomenon occurred for two out of the three test periods of this research (as shown in Exhibit 1). In the first two 1-year interval test periods (05-06, 06-07), the results of the two-way table tests indicate that the mutual funds with low-style consistency are more likely to produce the better risk-adjusted performance (alpha) in the next test period. Notably, at the last 1-year interval test period (07-08), the results indicate that the previous high-style consistency mutual funds will perform better.（**Note：The reasons for these are analyzed later**）

The results in Exhibit 3 indicate that the log odd ratio test results of the first two test periods do not support hypothesis 1 of this thesis. Conversely, the log odd ratio results for the period 2007-2008 do support hypothesis 1 of this research, but the Z-test result shows that the positive correlation is statistical insignificant.. Therefore, none of the three test period results support the hypothesis 1 of this thesis. Of even more significance, the combined log odd ratio test results of the three 1-year interval test periods did not support hypothesis 1 of this study. The combined results show a statistically significant negative correlation between style consistency and mutual fund future risk-adjusted returns over whole test-period (2006-2008). The results on the negative correlation between previous style-consistency of mutual funds (RSQ) and the future risk-adjusted returns are consistent with the findings of Amihud and Goyenko (2009), Cremers and Petajisto (2008), and et al.

(**Note**: **In the results table, 05-06 means using 05 results to predict 06's performance; 05 q1 – 05 q2 means using the results from 2005 quarter 1 to predict the performance in 2005 quarter 2.**)

Why is the test result of 2006 and 2007 different from that of 2008?

One of the most significant differences between the Chinese stock market (i.e., the Shanghai and Shenzhen markets) and the more developed stock markets (such as the US, Japanese or European markets) is that the Chinese stock market is a "one-side" market which means there is no short sell or future contract or options of stocks allowed so that market participants cannot hedge their stock holding positions. Without the function of short-selling stocks, the participants (including mutual funds managers) in the Chinese stock market can only invest strategically by following the market trend (the growth or decline trend). The investors themselves cannot change the market trend (not even the institutional investors). What they can do, however, is to buy stocks when they predict those stocks will grow in the next period, although they cannot do any short selling when they predict the stocks will decrease (they only can sell what they have purchased previously). The Chinese stock market trend can only be affected or modified by changes in government policies (such as monetary or financial policies, macro-economic policies et al.) or the macro-economic environment (such as financial crises). Therefore, the changing of market trends is always sudden and difficult to be predicted by Chinese stock market investors. (More details are given in Appendix 3 of this study). For example, in October 2007 more than 80% of mutual fund managers stated their belief that the stock market would keep growing to 8000 points (according to the 2008 stock market preview of Citics Securities Co.); however, the market actually declined to only 1660 points within a twelve-month period. (This was due to the worldwide financial crisis and the Chinese central bank's having switched its monetary policy from loose to tight.) The historical data indicates that during this period the Chinese stock market fluctuated much more seriously than the US market (see details in Appendix 3).

Due to these policies and facts, Chinese mutual fund managers adjust or set up their stock holding positions and make their asset allocation decisions based on their judgment of the market trend. They would like to make stock holding rotations (stock selections or timing) according to market trend as well (He, 2009). If the market trend changed completely but the managers continued to make their stock rotations and holding adjustments according to their previous judgments, inevitably their mutual funds would perform much worse than expected (He, 2009). This set of circumstances

actually occurred at the end of 2007.

As mentioned above, the style consistency-future performance results in the last 1-year interval test period of this study are different from the results of the previous two periods. The last period is for the year 2007-2008, which was the year of changing market trend for the Chinese stock market. During the years 2005 to 2007 the Chinese stock market was in a bullish market period with its market value increasing more than 500% (see details in Appendix 3). However, at the end of 2007 and the beginning of 2008, the worldwide financial crisis broke out and the Chinese economy also went into a declining period. During the year 2008 the Chinese stock market continued to decline from 6000 points to 1600 points.

The low-style consistent mutual funds perform better during a market growth trend (2005-2007) because the managers have grasped the rhythm of market hot sector rotations and therefore have more chances to adjust their stock holdings properly (better timing and stock holding rotation). When the market trend suddenly changed, the rhythm of the market sector rotation changed as well; the low-style consistent mutual funds would perform worse as it is hard for them to adjust their stock holdings properly at the precise time of a market trend change (i.e., the managers need a good amount of time to adjust their stock rotation strategies). On the other hand, those mutual funds with high-style consistency and which do not make stock holding rotations very often may coincidentally lower their risks at the moment of a sudden market trend change and thereby perform better in that period. (these will be mentioned later in this thesis as well).

Therefore, according to the previous findings and what have been mentioned above, investors of Chinese mutual funds should hold low style-consistent mutual funds to chase the superior performance during a stable market trend, but to hold high style-consistent mutual funds when the market trend changing to hedge the market risks (there will be more tests and results to support these in following).

Pearson correlation tests results:

Exhibit 11 reports the Pearson correlation statistics between the style consistency measure and the future risk-adjusted returns of mutual funds for all three 1-year interval test periods. As mentioned above, the style consistency statistics are measured out-of-sample; in other words, the R-squared are based on mutual funds' returns over a 52-week period (one year) preceding the interval for which the risk-adjusted performance of mutual funds are produced .

Exhibit 11 shows similar results as those found in Exhibit 3. The correlation test results did not support hypothesis 1 of this study. The style consistency measure has a statistically significant negative correlation with the future risk-adjusted return in the first two 1-year test intervals (2005-2006 and 2006-2007). Additionally, in the last 1-year test interval of this study (2008), the negative correlation between the style consistency measure and future risk-adjusted performance is statistically insignificant. These results indicate that the "low-style consistency-high risk-adjusted returns" phenomenon was strong during the years 2005-2007 when the market was in a growth trend. However, in the year 2008, the "low-style consistency-high risk-adjusted returns" phenomenon was much weaker (statistically insignificant) when the market trend suddenly changed (as explained earlier). These results are highly consistent to the results obtained from the two-way table tests above. Moreover, the combined correlation test results indicate there is a very strong statistically significantly negative relationship between mutual funds' style consistency and their future risk-adjusted returns. Again, the one-year interval Pearson correlation tests results approved that the previous style consistency of Chinese mutual funds have significant negative predict power on their future risk-adjusted performance over the whole test period.

5.1.2 one-quarter interval tests

Two-way table tests results:

Because the history of the Chinese mutual funds industry is very brief and the test sample of this research covers only the period 2005 to 2008, rather than using weekly data to do the 1-year interval tests, the daily return data of mutual funds are used to do the tests over 1-quarter intervals as well. Additionally, the two-way table

tests (as mentioned above) are repeated using the daily data. For example, the winners and losers among the mutual funds are ranked and determined over 1-quarter interval test periods and then ranked again over the subsequent 1-quarter interval test periods. This process allows the study to have 15 separate periods in which to compare the results of the tests.

The results of the 1-quarter interval tests show that the short-period data do generate some noise (as the market is fluctuating very seriously over the short-term), but in general the results still support the above conclusions on the 1-year interval tests. The 1-quarter interval test results (shown in Appendix 9) indicate that the ratio associated with picking a winner, based upon past low-style consistency, is about 58%. Therefore, the results of one-quarter interval two-way table test shows the mutual funds with low style consistency like to provide higher alpha in next quarter, which is consistent with the findings over one-year interval tests. Although this one-quarter interval result is weaker than the 1-year interval results, it still supports the fact that, on average, the lower style consistency mutual funds can produce better risk-adjusted returns than high-style consistency funds. Of more significance is that the "low consistency-high future performance" phenomenon occurred in 12 out of 15 1-quarter periods in this study. Exhibit 10 shows the log odd ratio test results of style consistency and mutual funds' future risk-adjusted returns for each 1-quarter interval test period. Three one-quarter test periods did not show that phenomenon, including "05 q1-05 q2", "07 q3-07 q4", and "08 q3-08 q4". All three of these 1-quarter test periods occurred at the same time as the change in the stock market trend; the first period took place at the beginning of 2005 when the Chinese stock market changed from a Bearish market period to Bullish market period (due to the finish of Chinese stock market Split-Share Structure Reformation); the fourth quarter of 2007 is the time when the three-year Bullish market ended, the market turned into the rapid decline trend (due to the world financial crisis); and 4th quarter of 2008 is the momentum of the bearish market finished and the market turned into the growth trend (due to the Chinese government announced the 4000 billion Yuan economy stimulus plan). These changes may be explained as: during the periods of market growth or a declining trend, the mutual fund managers might be able to achieve superior performance by selecting stocks or timing the market rotations according to their judgments of the market trend, but during the market trend change their timing or

selections made according to their previous market trend judgments might have caused them to suffer higher losses than others.

The combined test results shown in Exhibit 10 indicate that there is a statistically strong negative correlation between mutual funds' style consistency and their future risk-adjusted performance (during the subsequent period), which also strongly support the findings from the one-year interval tests above. More significantly, the quarterly log odd ratio test results indicate that during the test period the negative correlation results of several quarters are statistical insignificant, which approved that to picking the mutual funds quarterly according to the RSQ is less reliable than picking the mutual funds based on one-year test interval. Notably, in first three quarter of 2008 the negative correlation results are all statistical significant, which indicates that not only during growth market trend but also during decline market trend, the mutual funds with low style-consistency like to produce better performance.

Pearson correlation tests results:

Exhibit 13 shows the Pearson cross-sectional correlation test results between style consistency measures and risk-adjusted returns for all 15 1-quarter test intervals, and giving results that are quite interesting. As shown in Exhibit 13, the preceding style consistency measures and the risk-adjusted returns are significantly negatively correlated in the 9 1-quarter interval test periods from quarter 2 of 2005 to quarter 3 of 2007. However, in the other 5 test periods, the correlation between the preceding style consistency measures and risk-adjusted performance is significantly positive. The results of the Pearson correlation test are a bit different from the results of the log odd ratio tests above. During the market decline trend (quarter 4 2007 to quarter 4 2008), the preceding style consistency measures and risk-adjusted returns of mutual funds are significantly positively correlated. This may be reasonable, as is mentioned by Brown, Harlow and Zhang (2009); these researchers find that the correlation between style consistency measures and mutual funds' performance may be different from other periods when the market is in a continuous growth or decline period. The Pearson cross-sectional correlation test is a simple and direct method to test the relationship between two variables and does not consider any other factors; thus it is possible to be biased or noisy. In this study, the regression test would be used to

render more details concerning the relationship between style consistency measures and the mutual funds' later performance. Notably, the combined results of the correlation tests in Exhibit 13 still provide very strong evidence for the negative correlation between style consistency and the risk-adjusted performance of mutual funds.

The contribution of one-quarter interval tests

Although most previous empirical research chose not to test the mutual funds performances over a short-term time period (such as 1-quarter), in the case of Chinese mutual funds such testing may be considered reasonable. As mentioned earlier, most Chinese mutual fund investors are focused on short-term trading and profits. Often they hold mutual funds over only a relatively short period compared to US investors (see Appendix 1 for details). The most significant mutual fund investors in China are large institutions such as insurance companies, large financial investment companies, commercial banks, large corporation et al. They trade most often in mutual funds because it is difficult to invest directly in the stock market under some Chinese regulations (see Appendix 2 for details), so they time the market trend by trading mutual funds (buying or redeeming).

Although, the quarterly tests results shows more fluctuations and most of previous empirical research did not suggest to predict the mutual fund perform over such a short interval, the results of this thesis indeed provide some helpful information for Chinese mutual funds investors (especially for those institutional investors). During a stable market trend (no matter growth or decline market trend), if they have to make some asset allocation on mutual funds over short-term, they should pick the mutual funds with low style-consistency than high style-consistent mutual funds. (These will be mentioned again later in this thesis)

5.2 Results for tests of hypothesis 2,3 and 4

5.2.1 one-year interval test results

Two-way table tests results

Exhibit 2 shows the combined results of all test periods and indicates that the ratio associated with picking a winner, based upon past winning performance, is about 68.82%. Of even higher significance is the fact that the winner-repeat phenomenon occurred in all three 1-year test periods of this study. However, the results of the log odd ratio test in Exhibit 4 establish that in two out of three 1-year interval test periods the results of this study are statistically significant. Similarly, the results of the first two periods (2005-2006 and 2006-2007) are statistically significant, but the results of the last test period (2007-2008) are not statistically significant. As mentioned above, from 2005 to 2007 the Chinese stock market was in the fast growth trend but that in 2008 the market suddenly entered a fast decline trend. Some of the winners in the growth trend may find it difficult to retain their superior performance in the new declining market trend, which is an important reason for explaining the test results of the last 1-year interval test period.

In essence, even though the test result of the 2007-2008 period are not statistically significant, hypothesis 2 of this study is still proven by the results of the other two period tests; more importantly, the combined log odd ratio test results also strongly support hypothesis 2. On average, therefore, Chinese mutual funds with higher previous risk-adjusted performance are more likely to perform better in the future (but still within the test periods); however, if the market trend suddenly changes, the winner-repeat phenomenon will be weaker (as shown by the test results).

Although the test results in Exhibit 4 provide some evidences on the performance persistency of Chinese mutual funds over 1-year intervals, the performance persistency results that are showing might be due to the different levels of style consistency of these mutual funds (as shown in Exhibits 1 and 2). Therefore, it may be arguable that test results with no consideration of the previous style consistency level of mutual funds merely document the differential risk-adjusted returns between high-style consistent and low-style consistent mutual funds.

Exhibits 5 and 6 present two-way tables on the winner-repeat phenomenon for 1-year results split into the high- and low- style consistent mutual funds. Exhibit 5 presents the low style-consistent mutual funds and Exhibit 6 presents the high style--consistent funds. Exhibits 7 and 8 show the log odd ratio test results of the two conditional tables. Not surprisingly, the groupings are quite different from one another. There are some test periods when the winner-repeat hypothesis is confirmed in both groups, while in other years it is confirmed in only one or in no categories.

During the 1-year interval test periods of 2005-2006 and 2006-2007, the winner-repeat phenomenon of low-style consistent mutual funds is not as strong as the high-style consistent mutual funds. During 2006-2007, the winner-repeat phenomenon was not confirmed in the low-style consistent group. The high-style consistent mutual funds did not exhibit the winner-repeat phenomenon during the test period of 2007-2008. These results indicate that the style consistency of mutual funds is an important factor which can affect a funds' performance persistency.

Indeed, these results are consistent with the data showing for Chinese mutual funds and the Chinese stock market. During 2005-2007, the Chinese stock market continued to grow rapidly; the Shanghai A-stock index increased from 998 to 6160 points during this 3-year period; and in the year 2007 the A-stock index increased by more than 500%. During the fast growth stage of the stock market, the "winner" mutual funds in the high-style consistency group may more easily maintain a good performance and ranking. Because the entire Chinese stock market was growing up quickly, the mutual fund managers who had done well in the past did not actually need to change their asset allocation or stock holdings very often in order to continually produce superior performance (the average annual return of stocks was more than 150% at that time). However, mutual funds of lower style consistency may always prefer to do more timing and stock sector rotations for higher profits and therefore may face more risk and also have more chances to change their ranking. For this reason, the ranking in the low-style consistency category may have more extreme changes than those in the high-style consistency mutual funds category during a period of change in the market trend.

Interestingly, this pattern reverses itself when the 2007 rankings are used to predict 2008 rankings in both high-style consistency and low-style consistency mutual fund groups. These results suggest that the relative performance of mutual funds with different levels of style consistency may be driven by common responses to some phenomenon that varies with time. During 2008 the market declined from 6000 points to 1600 points within 11 months. The results shown in Exhibits 7 and 8 indicate that in 2008 the mutual funds in the low-style consistency groups have stronger winner-repeat phenomenon numbers than the mutual funds in the high-style consistency groups. Because of the tremendous change in market conditions, the previous winners in the high-style consistency mutual fund group found it difficult to maintain their good performance, but the previous winners in the low-style consistency mutual fund group found that the might be able to maintain their ranking by means of stock timing or changing their stock holdings.

Notably, the combined test results for both categories (as shown in Exhibits 7 and 8) provide strong evidence for the winner-repeat phenomenon, therefore the results indeed support the hypothesis 3 and 4. Moreover, the winner-repeat phenomenon is stronger for low-style consistent mutual funds than high-style consistent mutual funds.

Pearson correlation tests results

Exhibit 12 reports the Pearson cross-sectional correlation statistics between previous risk-adjusted returns and the future risk-adjusted returns of mutual funds for all three 1-year interval periods. Hypothesis 2 assumes that there is a positive correlation between past risk-adjusted returns and future risk-adjusted returns (the winner-repeat phenomenon). The results in Exhibit 12 show that the positive correlation between risk-adjusted returns occurs in all three 1-year test intervals. Similar to the results of the log odd ratio tests above, the results are statistically significant in the first two test periods but not statistically significant in the last period. As mentioned above, the performance persistency of mutual funds in China are very strong during the period 2005 to 2007, when the market growth trend was stable and continuous. However, this persistency became weak when the market trend suddenly turned downward in 2008. Significantly, the combined results in Exhibit 12 still

strongly support the conclusions from the above tests.

5.2.2 one-quarter interval tests results

Two- way table tests results:

The results of the 1-quarter interval performance persistency two-way table tests show that the ratio associated with picking a winner, based upon past winning performance, is about 57.5% (for details see Appendix 3) which is lower than the results of the 1-year interval tests. These results indicate that predicting or picking winners "quarter by quarter" may be less reliable and weaker than "year by year" picking.

Exhibit 9 shows the log odd ratio tests results of mutual fund performance persistency. As shown in Exhibit 9, the repeat-winner phenomenon occurs in 11 out of 15 1-quarter test periods. In other words, the winner-repeat phenomenon did not occur in 4 1-quarter periods, including "05 q1 - 05 q2", "05 q2 – 05 q3", "07 q3 – 07 q4", and "08 q3 – 08 q4". This situation is very similar to the two-way table test results of "style consistency-future winner" above. At the time of the market trend changing, these test results differ from other periods in the study.

The winner-repeat phenomenon occurred in 11 out of 15 1-quarter test periods in this study. The log odd ratio test results in Exhibit 9 indicate that the results in 6 out of 11 periods are statistically significant while the other 5 periods are statistically insignificant. These results actually show that the possibility of picking a winner based on previous winners is about 40% (6 out of 15) during the test period of this study. Even though the single 1-quarter interval test results cannot really provide significant evidence of the winner-repeat phenomenon, the combined results of the entire 15 test periods nevertheless give very strong evidence of the winner-repeat phenomenon. Moreover, the results show the following: 1) in general, we can support the finding that the winner-repeat phenomenon is likely to occur during a period when the market trend is not changing (54.5%) and that this phenomenon would not occur in a quarter when the market trend is changing; and 2) to pick the future winning mutual funds in 1-quarter intervals based solely on their previous performance is not a reliable method (even less reliable than picking base on the style-consistency), rather investors need to consider changes in the market trend.

Why is picking mutual funds based on the performance of past-quarter less reliable?

Because there are no stock futures contract instruments in the Chinese stock market (the short-sell is not allowed in Chinese stock market), investors can only follow the trend but cannot substantially affect or change it. On the other hand, Chinese government policies or activities greatly affect the market trend, and the market thus changes very suddenly and seriously when the trend changes. Previous winners always trade according to their estimate of the future market trend, which may be quite different from the actual market trend after a sudden change of government policy or market environment. The winners' stock holdings cannot change very fast, and under the new market trend the stock sector rotation is very fast and therefore the holding stocks of previous winners may lose money under the new market trend. It is also difficult for previous losers to change their holding positions; however, there are two main explanations for why they are more likely to get better performance at a time of market change: 1) the previous losers have strong motivations to adjust their holdings, so they may rotate their stock holdings more actively and faster than those previous winners; and 2) even if they do not have enough time to change their holdings completely, their previous holdings may produce better performance under the new market trend as the market sectors rotate very quickly in the Chinese market. For example, the stock sector which was losing money under the previous trend may become a hot sector under the new trend, as was the case during June and July of 2009 when steel company stocks grew much faster than the market as a whole. Therefore, the mutual funds holding these stocks performed better, but in August of 2009 the market trend was changing and the steel company stock sector became the top loser in the market. Thus, the mutual funds which are still holding these stocks may become the loser in this period.

Base on the facts and tests results above, this study dose not recommend that the investors of Chinese mutual funds to make their investment decisions of picking mutual funds purely according to previous quarterly risk-adjusted return or rankings (the better mutual funds picking strategy will be provide in this thesis later).

Pearson correlation tests results

Exhibit 14 above shows the Pearson cross-section correlation test results between preceding risk-adjusted returns (alpha) and succeeding risk-adjusted returns of mutual funds in all 15 1-quarter interval test periods. The results shown in Exhibit 14 are only slightly different from the log odd ratio test in Exhibit 9. Preceding alpha and succeeding alpha is significantly positively correlated in 10 out of 15 test periods. Similar to the results of the log odd ratio test, they are negatively correlated in the first two test periods and the periods of 07 q3 – q4 when the market trend was changing. However, the results also show that they are significantly negatively correlated in 06 q2 – q3 and insignificantly positively correlated in 06 q3 - q4. Significantly, the combined results of the correlation tests in Exhibit 14 provide very strong evidence for the positive correlation between the past risk-adjusted performance and the future risk-adjusted performance of mutual funds.

5.3 Test results for hypothesis 5

The Pearson cross-sectional correlation test mentioned above is only able to indicate a general direction of the relationship between two variables. As noted above, the last hypothesis in this thesis considers whether the style consistency effect is distinct from the impacts associated with the persistence of past mutual fund risk-adjusted performance. The formula [10] is used to do the test for the last hypothesis of this study.

5.3.1 one-year interval test results

Exhibit 15 reports the results for the regression test of 1-year interval regression tests. The results strongly confirm the results of the correlation test and the two-way table tests which are calculated above in this thesis.

In the first two 1-year interval test periods (2005-2006 and 2006-2007), the results strongly support hypothesis 5's conclusion that the style consistency and the future risk-adjusted performance of mutual funds are meaningfully correlated (negatively correlated) even after the performance persistency effects (i.e., the positive correlation between the past and future risk-adjusted performance is statistically significant) have been taken into account. It is also consistent with the

results of previous tests in this study that, with regard to the sudden change in the Chinese stock market trend, the coefficients of both the past alpha and style consistency measures are statistically insignificant (see the explanations of these above). Moreover, the combined results of the entire test period, which were shown in Exhibit 15, are highly statistically significant for both performance persistency and the style consistency effect.

The regression test over a 1-year interval period supports hypothesis 5 that the significant negative style consistency effect on future risk-adjusted performance of mutual fund is distinct from the impacts associated with the persistence of past fund performance.

5.3.2 one-quarter interval test results

Exhibit 16 reports the results of regression tests for all 15 1-quarter interval test periods (the daily data was used). Surprisingly, the results of some individual 1-quarter test periods in Exhibit 16 did not strongly support the conclusions of mutual funds' performance persistency. The past and future risk-adjusted returns are positively correlated in 10 out of 15 1-quarter interval test periods and the positive correlations are statistically significant only in 6 out of 10 periods. These results suggest that the short-term performance of mutual funds fluctuate a great deal in China. In quarter 3-quarter 4 2007 and quarter 3-quarter 4 2008, when the market trend changed, the past and future risk-adjusted returns are negatively correlated (which is consistent with the previous test results of this study).

Additionally, the results of Exhibit 16 show that there is still a strong connection between mutual funds' style consistency and their future risk-adjusted performance, although the connection is somewhat less reliable and weaker when the short test periods are used in this study (such as using the daily data to do the 1-quarter interval tests). These results of style-consistency coefficients support the results of the Pearson cross-sectional correlation tests. During a market growth trend there is a strong negative correlation between mutual funds' style consistency and their future risk-adjusted performance on a quarter by quarter basis, but there is a strong positive correlation between them during the market decline trend.

Although the individual one-quarter interval regression test results did not provide the same very strong results as the previous tests had, the combined regression test results do provide very significant results, which are shown in Exhibit 16 in Appendix 3. The combined results indicate that the performance persistency effect is strongly statistically significant during the entire test periods; additionally, the style consistency measures are strongly negatively correlated with mutual funds' future risk-adjusted returns.

In general, the results of the regression test supported hypothesis 5. Even after considering the past risk-adjusted performance, the mutual funds' style consistency still has a strong negative connection with their future risk-adjusted performance.

5.4 Robust test

5.4.1 Regression test with more factors

Actually, there are some other factors (other than past performance and style consistency) may affect the mutual funds' future risk-adjusted performance as well, such as Net asset value (NAV), Expense ratio, turnover ratio, and age of mutual funds. Brown, Harlow and Zhang (2009) used a regression test which includes R-squared, Past performance, NAV, Expense ratio and turnover ratio, and the results of the regression test indicated that R-square (style consistency measure) still have significant connection with mutual funds' future risk-adjusted returns even after considering the other factors.

Because the information of expense ratio and turnover ratio of Chinese mutual funds are not available, this research added NAV of mutual funds into the one-year interval test regression (to examine if the correlation between style consistency and future risk-adjusted return is distinct from the effect of NAV). NAV data used in this thesis are collected from Wind system, and they are all shown in Quarterly reports of each mutual fund, and the NAV value used in the regression tests are the average NAV over the each year of this test sample. The results of single test-periods and combined test are shown in Exhibit 26. The style-consistency measure are significant negative connected with mutual funds' future risk-adjusted returns during 05-06 and

06 -07 one-year interval test period, and at the momentum of market trend changing the negative connection became statistical insignificant (those results are consistent with the results from previous tests in this research). More importantly, the combined test results indicate that the style consistency measure is significantly negative correlated with future risk-adjusted return.

The results in Exhibit 26 also indicate the future risk-adjusted return positive connects with NAV. During the year 2006 and 2007, the future risk-adjusted return is significant positive correlated with previous NAV, and in 2008 the connection became statistical insignificant. The results are consistent with the previous conclusions of this research. The combined results in Exhibit 26 show a very strong positive correlation between future risk-adjusted returns and NAV of mutual funds.

5.4.2 Sharpe style analysis model

As mentioned at the beginning, the key "mission" of this study is to find the connection between style consistency and the future risk-adjusted return of mutual funds. The results of the previous tests in this study have provided evidences that there is a strong negative connection between style consistency and future risk-adjusted returns. However, without considering the investment style category of the mutual funds, the results are still arguable. In order to test whether the style consistency effects might be due to different mixtures of stocks and bonds, the tests on the condition of investment style categories of mutual funds will be employed below.

(Note: the details about this robust test method and Sharpe-style analysis model are shown in Appendix 4)

Using Sharpe's style analysis method, in the period from 2005 to 2008, there are 58 Aggressive asset allocation mutual funds; 43 Growth stock mutual funds; 7 balanced stock mutual funds; and 6 Conservative stock mutual funds. Surprisingly, during the years 2004-2008 none of these 114 mutual funds were Value stock mutual funds. (style classification standards shown in Appendix 4)

In the robust test of this research, the same measure of mutual funds' risk-adjusted returns and style consistency would be used as above, and the two-way

table tests and log odd ratio tests would be used conditional on a mutual fund's style. Notably, as there are only 6 and 7 mutual funds respectively in the Conservative and Balanced stock mutual funds, these are too few to complete the test; thus the robust tests were done for the Growth stock mutual funds category and the Aggressive asset allocation mutual funds category.

(**Note:** The previous tests are also robust by using different selection returns (style-adjust return) and R-squares from the Sharpe's regression, but as the test results from their use support the conclusions of the research, they are not shown in this thesis. However, the details of those results are available in **Appendix 6 of this thesis**).

The robust tests were done for both the 1-year interval and 1-quarter interval test periods. The log odd ratio tests results for aggressive asset allocation mutual funds and growth stock mutual funds are shown below.

Exhibits 17 and 18 show the 1-year interval log odd ratio test results of aggressive asset allocation mutual funds, while Exhibits 19 and 20 show the 1-year interval log odd ratio test results of the growth stock mutual funds. All of these results provide very strong support for the results which have been obtained from the previous tests conducted in this research. Significantly, both the performance persistency and "style consistency effects" of aggressive asset allocation mutual funds are stronger than those of growth stock mutual funds.

One-year interval tests results:

Aggressive asset allocation mutual funds

The positive correlation between the past risk-adjusted performance and future risk-adjusted performance of aggressive asset allocation mutual funds occurred in all of the three 1-year test periods. And similar to the results from those previous tests, in the last 1-year test period (2008) when the market trend was changing, the test results were statistically insignificant. The combined results provide very strong support for hypothesis 2.

The results in Exhibit 18 report that the "low-style consistency-high

risk-adjusted performance" phenomenon occurred in all three 1-year interval test periods. Not surprisingly, when the market trend was changing (2008), the results were statistically insignificant. The combined results still provide strong evidence of a negative correlation between the style consistency and future risk-adjusted returns of mutual funds.

Growth stocks mutual funds

The 1-year interval two-way table test results of growth mutual funds are shown in Exhibits 19 and 20. These results are very similar to the results of aggressive asset allocation mutual funds. However, as shown in Exhibits 19 and 20, the test results of growth mutual funds are a bit weaker than those of aggressive asset allocation mutual funds (lower Z-test results).

One-quarter interval test results:

Exhibits 21 to 24 show the 1-quarter interval two-way table tests results for both aggressive asset allocation mutual funds and growth stock mutual funds. The 1-quarter interval test results are generally consistent with the results of previous tests in this thesis. The combined results of the 1-quarter interval tests strongly support the conclusions which have been obtained from the previous tests in this thesis for both aggressive asset allocation mutual funds and growth stock mutual funds.

5.5 Mutual fund performance based on sorting on lagged R-squared and lagged risk-adjusted performance

Actually, the conclusions and the test results of this thesis are not only meaningful for academics, but also very important for Chinese mutual funds investors. By using the strategy according to my research results, a group of funds can be identified at beginning of each year, which generates significant superior positive risk-adjusted performance. At beginning of each year during the test sample, we sort mutual funds into 10 portfolios by their RSQ in previous year, and also sort mutual funds into 10 portfolios by their alpha in previous year（**Note: the 10 percentile portfolios will be used, as shown in Exhibit 32**）. Then the average current year

alpha for all mutual funds in each of the 20 portfolios will be estimated. Exhibit 32 shows the average current year alpha for all funds that are included in each of the portfolios (for each year from 2006-2008). Base on the main findings of this thesis, we pick the mutual funds which are in both Lowest-RSQ portfolio and Highest-Alpha portfolio, and the average current year alpha of our "picking portfolio" is shown in Exhibit 32 as well.

Panel A reports the average alpha of each portfolio at 2006 for both lag-alpha and lag-RSQ based; Panel B reports average alpha of each portfolio at 2007; and Panel C reports average alpha of each portfolio at 2008. Exhibit 32 shows that, for each year, the average alpha increases in lag-alpha and decreases in lag-RSQ (but in 2008, the effect is weaker). Those results are consistent with what has been found by this thesis. In each year (2006 – 2008), mutual funds are sorted into 10 portfolios by their current alpha of each year; the results of those are shown in Exhibit 33.

If we just picked mutual funds according to their alpha or RSQ of previous year, the strategy can provide positive results as shown in the Exhibit 32. However, the simply picking strategy (purely based on lag-alpha or lag-RSQ) did not provide the superior alpha than the average alpha of the "highest current alpha portfolio" of each year (2006 – 2008). For example, for year 2006, the average alpha of the portfolio based on the highest lag-alpha strategy is 0.38%; the average alpha of the portfolio based on the lowest lag-RSQ strategy is 0.33%; the average alpha of the portfolio of the highest 10% alpha in 2006 is 0.41% (shown in exhibit 33); the average alpha of the portfolio based our strategy is 0.71%.

As shown in the bottom of Panel A, B and C, by using the trading strategy according to the main conclusions of this thesis (highest lag-alpha and lowest lag-RSQ), we can get superior average alpha at each year, and those results are much better than the results of simply picking strategy. And comparing the results of our strategy with the average alpha of highest alpha portfolio at each year (shown in Exhibit 33), our results are much better in 2006 and 2007, and in 2008 our result is similar to those of highest alpha portfolio.

However, as there are only 114 mutual funds in the test sample of Chinese

mutual funds, only 4-5 mutual funds would be picked at beginning of each year by using our highest lag-alpha and lowest lag-RSQ strategy. In fact, these will cause problems on both academic and practical aspects. As our strategy-picking portfolio only has 4-5 mutual funds, so it is hard to do any statistical tests for such small sample. And moreover, Chinese institution investors (insurance companies, investment companies, or asset management companies) who have huge asset allocation needs (always more than 1 billion yuan), 4-5 mutual funds may not be enough to do the asset allocation.

To deal with those problems, our trading strategy is extended to "highest 4 portfolios lag-alpha and lowest 4 portfolio lag-RSQ", which means picking the mutual funds in both highest 40% lag-alpha and lowest 40% lag-RSQ. The picking portfolio performance results are shown in Exhibit 34. As shown in Exhibit 34, in 2006 and 2007, the extend strategy provide significant positive average alpha, but in 2008 the strategy provide an insignificant negative alpha (this is consistent with the test results of this thesis as well). Notably, the insignificant negative results in 2008 means the average alpha of our picking mutual funds is not different from zero. During 2008, as the market declining very fast and most of mutual funds provided negative alpha, so even our strategy provide only average alpha equal to zero, the result is still relative good.

In a word, our mutual funds picking strategy base on main findings of this thesis indeed produced very positive results. For individual investors, the "highest alpha-lowest RSQ" picking strategy can provide them significant superior risk-adjusted returns. And for institutional investors, although the extended strategy may not provide as superior performance as the original strategy dose, it still provided good results and it is also helpful for their asset allocation decision-making.

6. Conclusions

The past risk-adjusted return has been used to evaluate future risk-adjusted performance of mutual funds by much previous literature. This thesis extends the previous research by using style consistency (RSQ) to evaluate mutual funds' future risk-adjusted performance. While most of the previous research focus on the US, Japanese or European markets and on long-term mutual fund performance, this research focuses on the largest and fastest growth emerging market, the Chinese mutual funds industry and its short-term performance (one-year test interval. Because this study's test period is only 4 years (other than using the 1-year interval test), this research also uses the 1-quarter interval test. Significantly, the quarterly results are consistent with the results of the 1-year interval tests. The chief conclusions of this research follow:

First, this research finds that the style consistency and the relative rankings are useful in predicting future risk-adjusted returns and rankings, and that all the test results (for both the 1-year interval tests and 1-quarter interval tests) provide strong evidence of negative correlation between style consistency and future risk-adjusted performance. Notably, this thesis found that at the time of the stock market trend changing, the correlation between style consistency and future performance became different, namely positively correlated or statistically insignificant correlated (for both the 1-year interval test and the 1-quarter interval test).

Secondly, this research found that past risk-adjusted returns and rankings are useful in predicting future risk-adjusted returns and rankings of Chinese mutual funds. Additionally, this research extended the mutual funds winner-repeat tests further than previous research by considering the effect of style consistency. The mutual funds were divided into two groups – high-style consistency and low-style consistency. Even the low-style consistency mutual funds exhibit a stronger winner-repeat pattern than high-style consistency mutual funds. The combined test results indicate that the winner-repeat pattern is present in both groups.

Thirdly, to accurately learn the correlation between style consistency and the future performance of mutual funds, the distinct effect of style consistency on future

performance is tested by considering the effect of past performance. Both 1-year interval test results and 1-quarter interval test results confirm that hypothesis 5 is true. Even after considering the past risk-adjusted performance, the mutual funds' style consistency still has a strong negative correlation with their future risk-adjusted performance.

Fourthly, the robust regression test results (one-year test interval) indicate the style consistency significant negative correlated with future risk-adjusted mutual funds, even after adding the factor of NAV in the test regression.

Fifthly, to control the mutual fund investment style effects on risk-adjusted performance, this study divided mutual funds into four groups according to their actual investment style (the investment style of each mutual fund was evaluated by using Sharpe's style analysis model). Additionally, two major groups were used to do the robust tests – aggressive asset allocation mutual funds and growth stock mutual funds. The two-way table tests and log odd ratio test results of both groups indicated a statistically negative correlation between style consistency and mutual funds' future risk-adjusted returns (by both 1-year interval tests and 1-quarter interval tests). Moreover, the combined test results of the two groups show a strong winner-repeat pattern.

The 1-year interval test results show that both the winner-repeat pattern and the "low-style consistency-high performance" effect of aggressive asset allocation mutual funds are stronger than those of growth stock mutual funds.

The 1-quarter interval test results indicate that the winner-repeat pattern of aggressive asset allocation mutual funds is stronger than that of growth stock mutual funds. However, both of the groups show a strong negative correlation between style consistency and mutual funds' future risk-adjusted returns.

Finally, the mutual funds picking strategy which based on the main findings of this thesis was tested. And the results indicate that our mutual funds picking strategy base on main findings of this thesis indeed produced very positive results. For individual investors, the "highest alpha-lowest RSQ" picking strategy can provide

them significant superior risk-adjusted returns. And for institutional investors, although the extended strategy may not provide as superior performance as the original strategy dose, it still provided good results and it is also helpful for their asset allocation decision-making.

In a word, this research concludes that the style consistency does matter for mutual funds' future risk-adjusted returns. It is significant negatively correlated with mutual funds future risk-adjusted performance in long-term (over the entire test period), and this connection is distinct from those related to the past risk-adjusted performance and NAV of mutual funds. It is also clear that the significant negative correlation between style consistency and future risk-adjusted return do exist in Chinese stock and asset allocation mutual funds, even after adjusting for the investment style of the mutual fund. Beyond those meaning research findings in academic, the research indeed provides a very effective mutual funds picking strategy which based on the main findings for those Chinese mutual funds investors. And the "highest lag-alpha and lowest lag-RSQ" picking strategy provide significant positive risk-adjusted performance in each year during the test period.

Altogether, this study provides a new and very convenient method to predict the Chinese mutual funds risk-adjusted performance by only using their return-based information.

7. Limitation of this research thesis:

Although this thesis does provide some meaningful and useful conclusions, there are still some limitations of it which should be mentioned here:

- The test period of this research is relatively shorter than those of US market researches.
- Because the Chinese mutual funds industry is a rapidly developing market, so the test sample of mutual funds in this research is relatively small than previous research of other developed market.
- The investors of Chinese mutual funds are immature compare with US investors. Therefore, their behaviors are quite different from the behaviors of US investors. Those may cause the behaviors of Chinese mutual funds managers be different from the behaviors of US managers.
- The holding-based information of Chinese mutual funds are hard to get (not available for free). Therefore, the results of this thesis can not be robust by using holding-based analysis method.

References

Amihud, Y., & Goyenko, R. (2009), Mutual fund R2 as Predictor of Performance. Working Paper, New York University.

Barberis, N., & Shleifer, A. (2003). Style investing. Journal of Financial Economics, 68: 161-191.

Bauer, Rob, Koedijk, Kees, & Otten, Roger (2005). International evidence on ethical mutual fund performance and investment style. Journal of Banking & Finance, 29: 1751-1767.

Brown, K., V. Harlow, and Zhang, H (2009). Staying the Course: the role of investment style consistency in the performance of mutual funds.

Brown, Stephen J., & Goetzmann, William N. (1997). Mutual fund styles. Journal of Financial Economics, 43: 373-399.

Brown, Stephen J., Goetzmann, William N., Ibbotson, Roger G., & and Ross, Stephen A. (1992). Survivorship Bias in Performance Studies. Review of Financial Studies, December 1992, 553-580.

Chan, L., Chen, H., & Lakonishok, J. (2002). On mutual fund investment styles. Review of Financial Studies, 15: 1407-1437.

Chevalier, Judith, & Ellison, Glenn (1999). Are some Mutual Fund Managers Better than others? Cross-Sectional Patterns in Behavior and Performance. The Journal of Finance, Vol. LIV, No.3 June 1999.

Cremers, M., & Mei, J. (2007). Turning over turnover. Review of Financial Studies, 20: 1749-1782.

diBartolomeo, Dan and Witkowski, Erik, 1997, Mutual fund misclassification: Evidence based on style analysis, *Financial Analysts Journal*, vol. 53, no.5 (September/October), 32-43.

Daniel, Kent D., & Titman, Sheridan (1997). Evidence on the characteristics of cross- sectional variation in common stock returns. Journal of Finance, 52: 1-33.

Elton, E., Gruber, M., & Blake, C. (1996). The persistence of risk-adjusted mutual fund performance. Journal of Business, 69: 133-157.

Fama, E., & French, K. (1992). The cross-section of expected returns. Journal of Finance, 47: 427-466.

Fama, E., & French, K. (1993). Common risk factors in the returns on stocks and bonds. Journal of Financial Economics, 33: 3-56.

Fung, William, & Hsieh, David A. (1998). Performance Attribution and Style Analysis: From mutual funds to Hedge Funds. Fuqua School of Business, Duke University.

Gao, Z., & Shahidur, R. (2005). Style analysis of Chinese funds. Applied Financial Economics Letters, 2005, 1, 165-168.

Gibson, R., & Gyger, S. (2007). The style consistency of hedge funds. European Financial Management, 13: 287-308.

Grinblatt, Mark, Titman, Sheridan, & Wermers, Russ (1993). Momentum strategies, portfolio performance and herding: A study of mutual fund behavior. American Economic Review, 85: 1088-1105.

Grinblatt, M., & Titman, S. (1992). The persistence of mutual fund performance. Journal of Finance, 47: 1977-1984.

Grinblatt, M., & Titman, S. (1989). Mutual fund performance: An analysis of quarterly portfolio holdings. Journal of Business, 62: 393-416.

Hendrick, Darryl, Patel, Jayendu, & Zeckhauser, Richard (1993). Hot Hands in Mutual Funds: Short-Run Persistency of Performance in Relative Performance, 1974-88. Journal.

Huang, J., Sialm, C., & Zhang, H. (2008). Risk shifting and mutual fund performance.Working Paper, The University of Texas.

Ibbotson, R., & Patel, A. (2002). Do winners repeat with style? Working Paper, Yale University International Center for Finance.

Jensen, M. (1968). The performance of mutual funds in the period 1945-1964. Journal of Finance, 23: 389-416.

Kahn, R., & Rudd, A. (1995). Does historical performance predict future performance? Financial Analysts Journal, 51: 43-52.

Kent, Daniel, Grinblatt, Mark, Titman, Sheridan, & Wermers, Russ (1997). Measuring mutual fund performance with Characteristic-based benchmarks. Journal of Finance, 52: 1035-1058.

Kim, Moon, Shukla, Ravia, & Tomas, Michael (1999). Mutual Fund Objective Misclassification, Syracuse University, NY 13244.

Kothari, S. P., & Warner, Jerold B. (2001). Evaluating mutual fund performance. The Journal of Finance, Vol. LVI, No.5, Oct, 2001.

Khorana, A., 1996, Top management turnover: An empirical investigation of mutual fundmanagers, Journal of Financial Economics 40: 403-427.

Liu, Chao, & Ye, Qiu (2006). Chinese stock mutual fund styles. TianJin University Journal of Economics, 33.

Louis, K., Chan, C., Chen, Hsiu-Lang, & Lakonishok, Josef (2002). On Mutual Fund Investment Styles. The Review of Financial Studies, Winter 2002 Vol. 15: 1407-1437.

Lucas, Lori, & Riepe, Mark W. (1996). The Role of Returns-based style analysis: Understanding, Implementing, and Interpreting the Technique. Ibbotson Associates, Inc.

Pattarin, Francesco, Paterlini, Sandra, & Minerva, Tommaso (2004). Clustering financial time series: an application to mutual funds style analysis. Computational Statistics & Data Analysis, 47: 353-372.

Sharpe, W. (1992). Asset allocation: Management style and performance measurement. *Journal of Portfolio Management*, 18: 7-19.

Surz, Ron (2002). Style Analysis: How and Why. PPCA, Inc.

Teo, M., & Woo, S. (2004). Style effects in the cross-section of stock returns. Journal of Financial Economics, 74: 367-398.

Wermers, R., (2002). A matter of style: The causes and consequences of style drift in institutional portfolios. Working Paper, The University of Maryland.

Wermers, Russ (2000). Mutual fund performance: An empirical decomposition into stock-picking talent, style, transactions costs, and expenses. The Journal of Finance, Vol. LV, No.4 August 2000.

Zhao, X., J & Wang, S., Y. (2007). Empirical Study on Chinese mutual funds' performance. System Engineering – Theory & Practice, volume 27, Issue 3, March 2007.

Appendix 1:

Development of the Chinese Mutual Funds Industry

Although the starting point of the Chinese mutual fund industry can be traced back to 1991, the year 1998 is recognized as the beginning of the development of the Chinese mutual fund industry by the vast majority of people. Before 1998 the funds were only available to institutional investors, not to individual investors. The passage into law of the Interim Measure for the Administration of Securities Investment Funds (IMASIF) in 1997 was the watershed event (Li, 2002). Before 1997, there were seventy-two investment funds in China which share some common characteristics: 1) all of them are closed-end funds; 2) most of them (69 out of 72) are contractual funds; 3) they are all of comparatively small size; and 4) they were only available to some institutional investors, but not available to retail investors (Li, 2002).

The introduction of IMASIF in 1997 was actually a strong signal for Chinese securities investment funds to enter into a regulated phase. In 1998, the first 5 Chinese closed-end securities investment funds were set up and at that point the Chinese fund industry went into a new phase. In 2001 the first Chinese open-end mutual fund was set up, and by the end of 2002 the number of open-end mutual funds had increased to 17; furthermore, by the end of 2005 there were 200 open-end mutual funds trading in the Chinese financial market. These included bond mutual funds, stock mutual funds, asset allocation mutual funds, money market mutual funds et al.

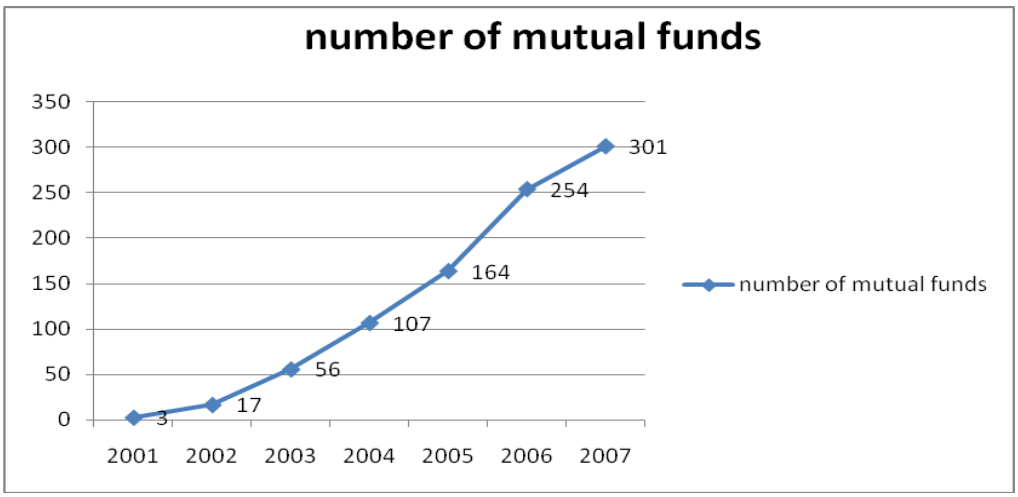
After 2001, when the Chinese government began allowing the fund companies to issue open-end mutual funds, the growth of the Chinese mutual fund industry began to accelerate. The number of Chinese open-end mutual funds increased from 17 in 2001 to more than 400 by the end of 2008.

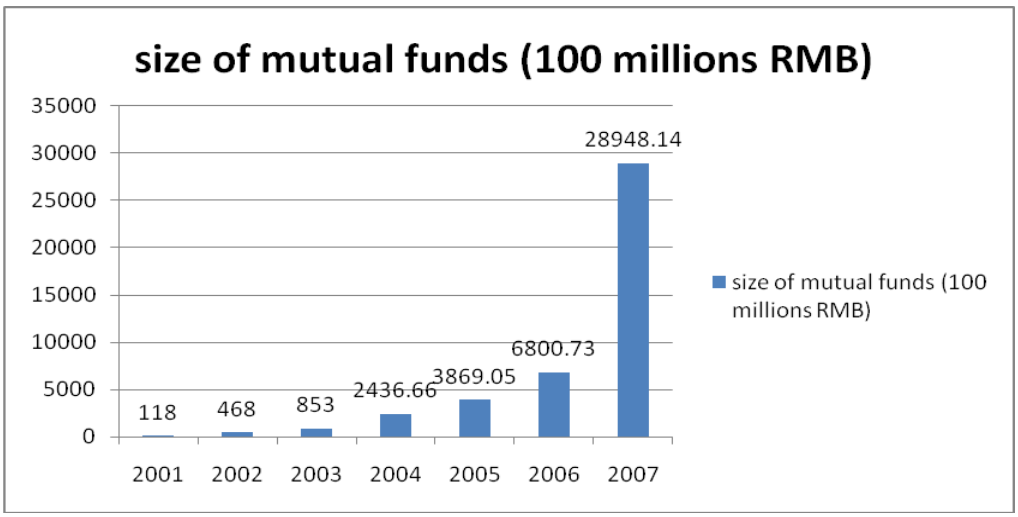
Just as the Chinese mutual fund industries have rapidly developed, the Chinese financial market has grown tremendously during the last 10 years. More and more foreign investments are pouring into Chinese financial markets, including the stock markets, the mutual fund markets, the bond markets and others.

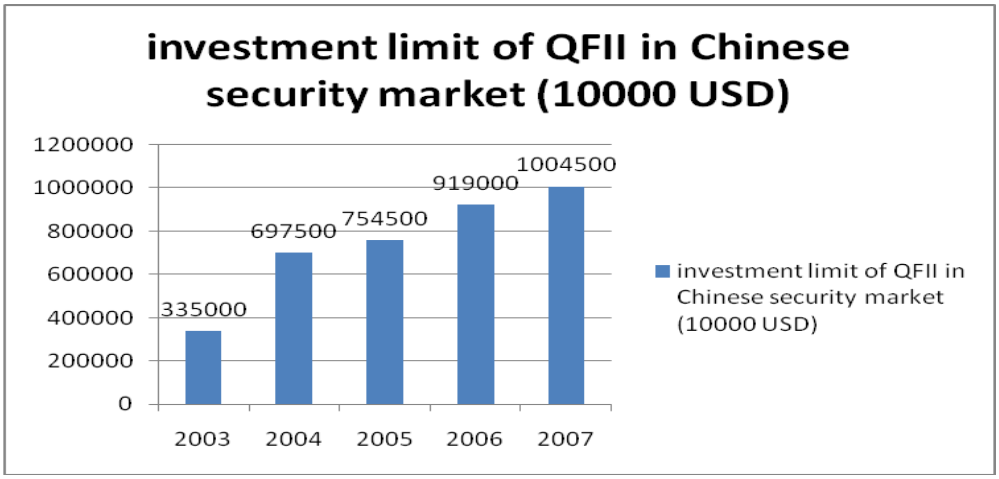
In 2003, the Chinese government began to allow the QFII (quality foreign investment institution) funds to invest in the Chinese stock market or other financial markets directly. In 2003, there were only 8 QFII funds in China with 335 million in USD investments; however, by the end of 2007 there were 52 QFII funds in China

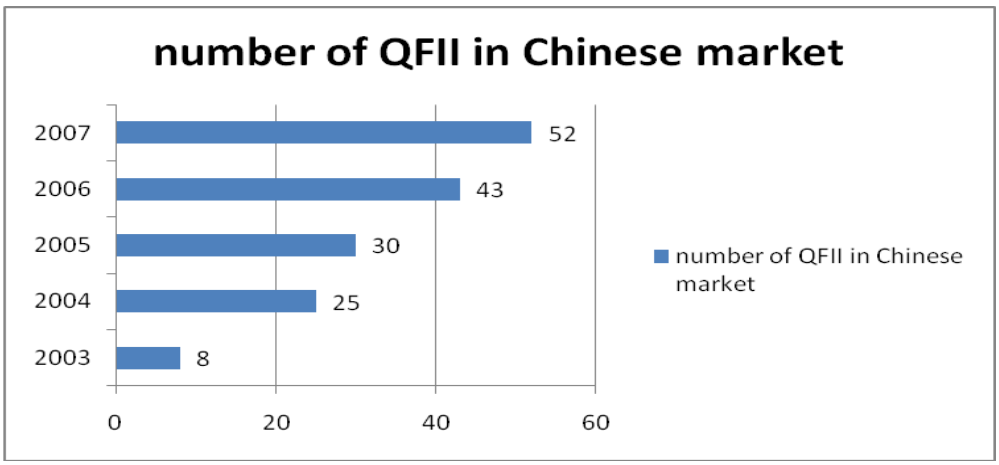
with 1004 million in USD investments.

In recent years, with the rapid growth of the Chinese economy and financial market, China has been recognized as the largest and most important emerging market around the world. More and more foreign investors are planning to invest in China, and especially in the Chinese financial market. For most of these investors, the easiest and most direct way to accomplish this is to invest in Chinese mutual funds. However, most investors (even domestic investors) know little about this new market in China. That is why this thesis focuses on Chinese mutual funds rather than on the US or European markets.







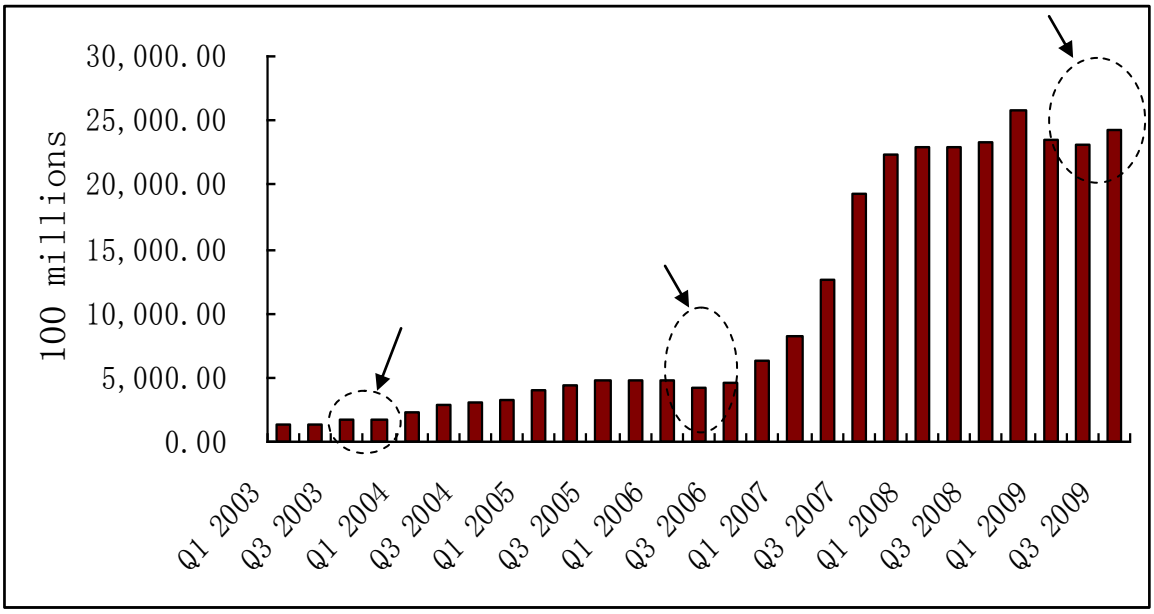


Chinese mutual funds investors' behaviors:

According to Chinese mutual funds investors' behaviors research of the China southern-west security company (CSWS), Chinese mutual funds redemption rate is much higher than that of US and other developed market. The 2008 research report of American investment company institution (ICI) shows that, from 1993 to 2007, US open-end mutual funds faced serious redemption at 2003 only, and there were net cash inflow to US mutual funds industry in rest of years. There were very serious redemptions in 2nd quarter of 2003, 4th quarter of 2005, and 2nd quarter of 2006, and the rate of redemption reached 14.2% (Xie, Li and Zhang, 2008). And moreover, during 2008, the rate of redemption of mutual funds increased as the market declined very much. And more interestingly, there are some previous research indicates that Chinese mutual funds investors are more likely to hold mutual funds under 8 months and they are more like to do redemption during market growth period than decline

trend (CSWS research report of Chinese mutual funds investors' behavior, 2008). (More information and Chinese research are available upon on requests).

Total number of Chinese mutual funds shares:



The graph above shows three serious redemptions did happened during the period from 2003 to 2009.

Appendix 2:

Chinese Regulation of Institutional Investors in the Stock Market

The China Insurance Regulatory Commission has decreed that the insurance companies can only invest in the stock market indirectly. In other words, the insurance institutional investors have to invest in the stock market by means of a security company's or an asset management company's trustee accounts, which are a great deal more expensive than investing directly. Moreover, investing in the stock market indirectly may also be inconvenient (the trading orders may not be fulfilled in a correct and timely manner). Therefore, for insurance institutional investors, mutual funds became the major investment method when investing in the Chinese stock market.

Other major players in the mutual fund industry are the large corporations (especially nationalized government corporations). The State-owned Assets Supervision and Administration Commission of the State Council has ruled that the State-owned corporations cannot invest in the stock market (i.e., cannot trade in stocks). To circumvent this rule, some of the large State-owned corporations have set up their own investment companies and are investing in mutual funds.

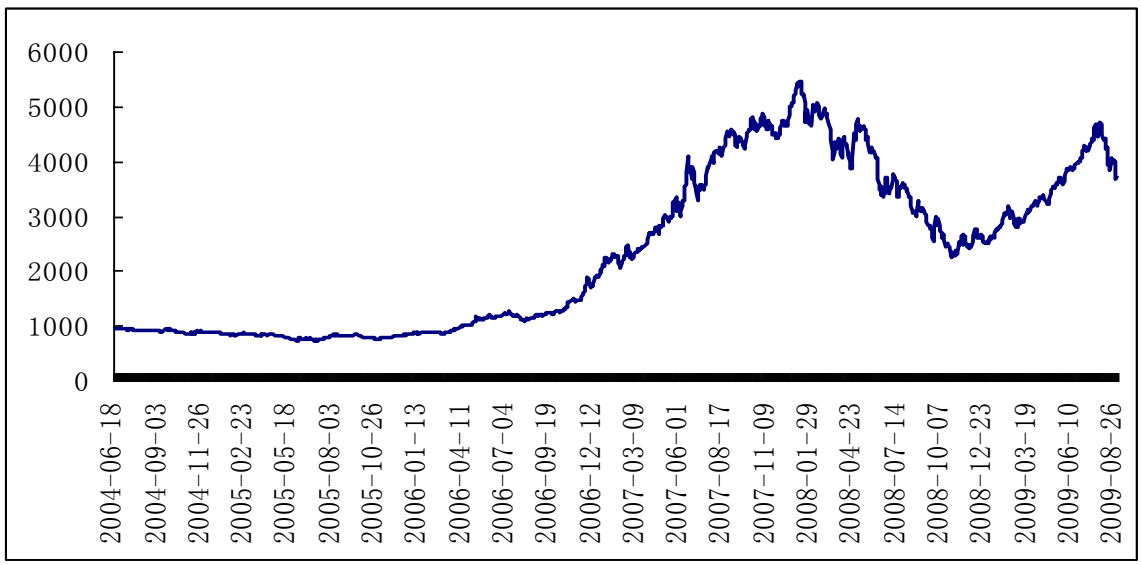
Appendix 3: Chinese stock market trend 2005 -2008 and Test results

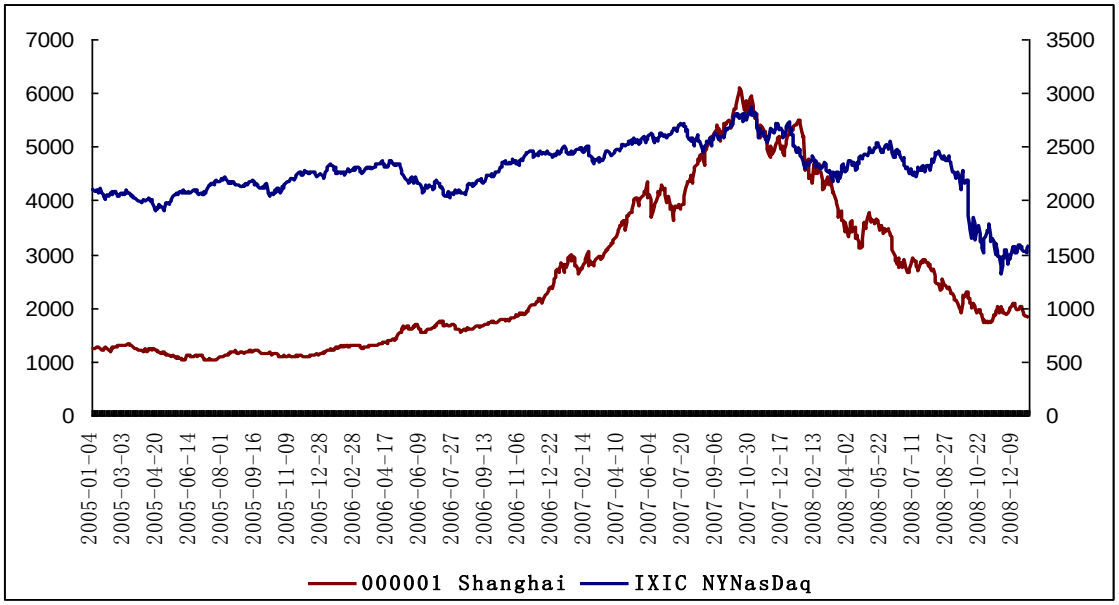
The graph above shows the market trend of the Shanghai stock index (SH index) during June 2004 to the end of 2008. The three key changes in market trend are shown in the graph. The market began to increase gradually from the second quarter of 2005 (due to the Split-Share Structure Reformation which ended at the beginning of 2005) and then increased in speed at the end of 2005. During 2006 and 2007, the market grew rapidly. However, in October 2007 the market suddenly entered into a decline trend which continued until November 2008 (due to the worldwide financial crisis). The market trend of the Chinese stock market is both determined by and affected by government policies and the macro economy. Any change to the market trend, therefore, is very sudden, and because there is no way to sell short or do some hedging, the market is always a one-sided trend, as shown in the graphs below. During the Financial Crisis (Nov 2007-Nov 2008), the Chinese stock market declined by over 66% while the US stock market declined by only 28%. The fact is, however, that the Financial Crisis had a much more serious impact on the US economy than the Chinese economy.

As shown in the graph above, the market trend always lasts more than one year and until the government makes a significant policy change or the economy changes. For example, after November 2007 (when the financial crisis began) the stock market went into a rapid decline trend (dropping from 6000 points to 1660 points). However, in November 2008 the government announced the 400 billion Yuan economic stimulus plan, at which point the market returned to a growth trend.

During the financial crisis the Chinese stock market fluctuated much more seriously than the US market does, as shown in the graph below:

Mutual fund index trend:





During the period from 2005 to 2008, the Chinese stock market fluctuated a great deal, which establishes that this is a one-sided market (as shown in the graph above).

Test results:

(note: in following results exhibits, for example, 06-07 means using 2006's risk adjusted return or style consistency to predict mutual funds' risk-adjusted return in 2007)

Exhibit 1:

Two-way tables of Ranked mutual fund style consistency and risk-adjusted return over successive one-year interval:

	High R 05	**Low R 05**
Winner 06	21	38
Loser 06	36	19
	High R 06	**Low R 06**
Winner 07	16	37
Loser 07	41	20
	High R 07	**Low R 07**
Winner 08	35	21
Loser 08	21	36
	Combined initial High consistent	**Combined initial low consistent**
Successive Winners	67	101
Proportion	39.88%	60.12%
Successive Losers	103	70
Proportion	59.54%	40.46%

Exhibit 2: Two-way tables of Ranked mutual fund risk-adjusted returns over successive one-year interval:

	05 winner	05 loser
06 winner	40	17
06 loser	17	40
	Winner 06	Loser 06
Winner 07	38	19
Loser 07	19	38
	07 winner	07 loser
08 winner	39	17
08 loser	18	40
	Combined initial winners	Combined initial losers
Successive Winners	117	53
Proportion	68.82%	31.18%
Successive Losers	54	118
Proportion	31.40%	68.60%

Exhibit 3: Log odd ratio test results of style consistency – risk adjusted performance of mutual funds.

	05-06	**06-07**	**07-08**	**Combined**
0dd ratio	0.291666667	0.21094265	1.375739645	0.4508315
log odd ratio	-0.535113202	-0.675835602	0.138536253	-0.345986
Stand error	0.392866636	0.404866979	0.377510894	0.2209543
Z-test	**-1.362073417**	**-1.669278151**	**0.366972861**	**-1.56587**

Exhibit 4: Log odd ratio test results of risk-adjusted returns of mutual funds

	05-06	**06-07**	**07-08**	**Combined**
0dd ratio	5.53633218	4	2.727272727	3.8965517
log odd ratio	0.74322214	0.602059991	0.43572857	0.5906804
Stand error	0.40944726	0.397359707	0.386552454	0.2289252
Z-test	**1.81518406**	**1.515151085**	**1.127217187**	**2.5802339**

Exhibit 5: Two way tables of Ranked low style consistent mutual fund risk-adjusted returns over successive one-year interval

Proportion	**Next year Winner**	**Next year Loser**
2005 winner	0.642857143	0.357142857
2005 loser	0.310344828	0.689655172
2006 winner	0.642857143	0.357142857
2006 loser	0.379310345	0.620689655
2007 winner	0.785714286	0.214285714
2007 loser	0.24137931	0.75862069
	Next year Winner	Next year Loser
2005 winner	18	10
2005 loser	9	20
2006 winner	18	10
2006 loser	11	18
2007 winner	22	6
2007 loser	7	22

Exhibit 6: Two way tables of Ranked high style consistent mutual fund risk-adjusted returns over successive one-year interval

Proportion	**Next year Winner**	**Next year Loser**
2005 winner	0.75862069	0.24137931
2005 loser	0.285714286	0.714285714
2006 winner	0.714285714	0.285714286
2006 loser	0.310344828	0.689655172
2007 winner	0.607142857	0.392857143
2007 loser	0.448275862	0.551724138
Number	Next year Winner	Next year Loser
2005 winner	22	7
2005 loser	8	20
2006 winner	20	8
2006 loser	9	20
2007 winner	17	11
2007 loser	13	16

Exhibit 7: Log odd ratio test results of risk-adjusted returns of low style consistent mutual funds

	05-06	06-07	07-08	combined
Odd ratio	4	2.945455	11.52381	4.957265
log odd ratio	0.60206	0.469152	1.061596	0.695242
Stand error	0.562731	0.549564	0.632798	0.330767
Z-test	1.069889	0.853682	1.677623	2.101911

Exhibit 8: Log odd ratio test results of risk-adjusted returns of high style consistent mutual funds

	05-06	06-07	07-08	combined
Odd ratio	7.857142857	5.555555556	1.902097902	4.235897
log odd ratio	0.895264649	0.744727495	0.279232867	0.626945
Stand error	0.602753422	0.579750904	0.537731994	0.326498
Z-test	1.48529169	1.284564611	0.519278878	1.92021

Exhibit 9: Log odd ratio test results of risk-adjusted return of daily data

	05 q1-05 q2	05 q2-05 q3	05 q3-05 q4
Odd ratio	0.703433923	0.81	4
log odd ratio	-0.152776692	-0.091514981	0.602059991
Stand error	0.376084041	0.375154289	0.397359707
Z-test	-0.406230191	-0.243939584	1.515151085
	05 q4-06 q1	06 q1-06 q2	06 q2-06 q3
Odd ratio	3.7	2.93877551	4.333333333
log odd ratio	0.568201724	0.468166412	0.636822098
Stand error	0.394935938	0.388321582	0.400179897
Z-test	1.438718711	1.205615228	1.591339553
	06 q3-06 q4	06 q4-07 q1	07 q1-07 q2
Odd ratio	1.234567901	4.213296399	1.6384
log odd ratio	0.091514981	0.624622012	0.214419939
Stand error	0.375154289	0.395657945	0.377491722
Z-test	0.243939584	1.57869195	0.568012295
	07 q2-07 q3	07 q3-07 q4	07 q4-08 q1
Odd ratio	2.185255198	0.81	1.421597633
log odd ratio	0.339502162	-0.091514981	0.152776692
Stand error	0.381811539	0.375154289	0.376084041
Z-test	0.8891878	-0.243939584	0.406230191
	08 q1-08 q2	08 q2-08 q3	08 q3-08 q4
Odd ratio	2.530991736	3.4225	0.610351563
log odd ratio	0.403290727	0.534343457	-0.214419939
Stand error	0.384775192	0.392497203	0.377491722
Z-test	1.048120398	1.361394306	-0.568012295
	Combined		
Odd ratio	**1.844508192**		
log odd ratio	**0.265880588**		
Stand error	**0.097808164**		
Z-test	**2.718388494**		

Exhibit 10: Log odd ratio test results of style consistency of mutual funds (daily data):

	05 q1-05 q2	05 q2-05 q3	05 q3-05 q4
Odd ratio	1.6384	0.292184076	0.52892562
log odd ratio	0.214419939	-0.534343457	-0.276605396
Stand error	0.377491722	0.392497203	0.379393455
Z-test	0.568012295	-1.361394306	-0.729072662
	05 q4-06 q1	06 q1-06 q2	06 q2-06 q3
Odd ratio	0.610351563	0.213017751	0.340277778
log odd ratio	-0.214419939	-0.671584204	-0.468166412
Stand error	0.377491722	0.40298035	0.388321582
Z-test	-1.568012295	-1.666543304	-1.205615228
	06 q3-06 q4	06 q4-07 q1	07 q1-07 q2
Odd ratio	0.25	0.81	0.457612457
log odd ratio	-0.602059991	-0.091514981	-0.339502162
Stand error	0.397359707	0.375154289	0.381811539
Z-test	-1.515151085	-0.243939584	-1.8891878
	07 q2-07 q3	07 q3-07 q4	07 q4-08 q1
Odd ratio	0.52892562	1.890625	0.292184076
log odd ratio	-0.276605396	0.276605396	-0.534343457
Stand error	0.379393455	0.379393455	0.392497203
Z-test	-0.729072662	0.729072662	-1.361394306
	08 q1-08 q2	08 q2-08 q3	08 q3-08 q4
Odd ratio	0.340277778	0.25	1.890625
log odd ratio	-0.468166412	-0.602059991	0.276605396
Stand error	0.388321582	0.397359707	0.379393455
Z-test	-1.205615228	-1.515151085	0.729072662
	Combined		
Odd ratio	0.523872431		
log odd ratio	-0.280774456		
Stand error	0.097996371		
Z-test	-2.865151569		

Exhibit 11: Cross sectional correlation test results of style consistency and future risk-adjusted returns (yearly)

	05-06	06-07	07-08	Combined
Correlation	-0.33518	-0.21342	-0.07565	-0.272027788
SD	0.089025	0.092314	0.09422	0.05218747
T-test	-3.7651	-2.3119	-0.8029	-5.21251152

Exhibit 12: ***Cross sectional correlation test results of risk-adjusted returns (one-year interval test period)***

	05 - 06	06 - 07	07 - 08	Combined
Correlation	0.32911773	0.294497722	0.112676294	0.163311792
SD	0.089226914	0.090300643	0.093889375	0.053504515
T-test	3.688647729	3.261302592	1.200096326	3.052299272

Exhibit 13: Cross sectional correlation test results of style consistency and future risk-adjusted returns (quarterly)

Period	05 q1-q2	05 q2-q3	05 q3-q4
correlation	0.33418217	-0.559550248	-0.094662568
Standard deviation	0.089058682	0.078313901	0.094066798
T-test	3.752381695	-7.144967101	-1.006333483
Period	05 q4- 06 q1	06 q1 -q2	06 q2- q3
correlation	-0.198718339	-0.289581582	-0.08361854
Standard deviation	0.092606648	0.090442489	0.094160195
T-test	-2.145832331	-3.201831188	-0.888045522
Period	06 q3-q4	06 q4- 07 q1	07 q1-q2
correlation	-0.637991842	-0.173773388	-0.66449723
Standard deviation	0.072762236	0.093053499	0.070612336
T-test	-8.768172609	-1.867456785	-9.41049771
Period	07 q2-q3	07 q3-q4	07 q4-08 q1
correlation	-0.633166979	0.256437697	0.371616123
Standard deviation	0.073137565	0.091331407	0.087724277
T-test	-8.657206206	2.807771225	4.236183386
Period	08 q1-q2	08 q2-q3	08 q3-q4
correlation	0.756058028	0.639716177	0.295163092
Standard deviation	0.061844871	0.072626934	0.090281245
T-test	12.2250725	8.808249811	3.269373323

	Combined
correlation	-0.17652
Standard deviation	0.023817
T-test	-7.41167

Exhibit 14: Cross sectional correlation test results of risk-adjusted returns (quarterly)

Period	05 q1-q2	05 q2-q3	05 q3-q4
correlation	-0.118464328	-0.308022527	0.210668309
Standard deviation	0.093825741	0.089896872	0.092370511
T-test	-1.262599444	-3.426398731	2.280687923
Period	05 q4- 06 q1	06 q1 -q2	06 q2- q3
correlation	0.163489513	0.232188972	-0.143635978
Standard deviation	0.093219747	0.091908742	0.093511301
T-test	1.753807725	2.526299112	-1.536028014
Period	06 q3-q4	06 q4- 07 q1	07 q1-q2
correlation	0.043841352	0.550848641	0.868810301
Standard deviation	0.094400266	0.078862775	0.046786813
T-test	0.4644198	6.984900564	18.56955492
Period	07 q2-q3	07 q3-q4	07 q4-08 q1
correlation	0.469322168	-0.286876687	0.191692591
Standard deviation	0.08343821	0.090519422	0.092738782
T-test	5.624787129	-3.169227998	2.067016482
Period	08 q1-q2	08 q2-q3	08 q3-q4
correlation	0.323924078	0.649890523	0.162328925
Standard deviation	0.089396448	0.07181588	0.093237854
T-test	3.623455798	9.049398587	1.741019525

	Combined
correlation	0.406850315
Standard deviation	0.022103557
T-test	18.40655411

Exhibit 15: Regression test results summary (one-year interval)

05-06	Intercept	Preceding Alpha	Preceding R-squared
Coefficients	0.485312585	0.479779879	-0.467680725
Stand error	0.141718207	0.171354464	0.161566069
t Stat	3.424490011	2.799926355	-2.894671678
P-value	0.000864019	0.006030135	0.004570893

06-07	Intercept	Preceding Alpha	Preceding R-squared
Coefficients	0.357688078	0.341512237	-0.27766274
Stand error	0.155166002	0.125973128	0.185391961
t Stat	2.305196196	2.710992759	-1.497706471
P-value	0.023014452	0.007774948	0.137047901

07-08	Intercept	Preceding Alpha	Preceding R-squared
Coefficients	0.085818215	0.067547972	-0.131647122
Stand error	0.191740574	0.063157674	0.220220433
t Stat	0.447574624	1.069513297	-0.597797037
P-value	0.655332464	0.287158683	0.551193056
Combined	Intercept	Preceding Alpha	Preceding R-squared
Coefficients	0.510953	0.128205962	-0.51016
Stand error	0.092625	0.060257786	0.108559
t Stat	5.516365	2.12762483	-4.69943
P-value	6.88E-08	0.034089492	3.8E-06

Exhibit 17 aggressive asset allocation mutual funds Alpha-alpha:

	05-06	06-07	07-08	combined
Odd ratio	6.890625	9.87755102	1.514793	4.440051
log odd ratio	0.838258615	0.994649282	0.180353	0.647388
Stand error	0.587569651	0.613696486	0.528059	0.324541
Z-test	1.426654038	1.620751144	0.34154	1.99478

Exhibit 18 aggressive asset allocation mutual funds Style consistency – alpha:

	05-06	06-07	07-08	combined
Odd ratio	0.2025	0.101239669	0.66015625	0.25
log odd ratio	-0.693574972	-0.994649282	-0.180353261	-0.60206
Stand error	0.567646212	0.613696486	0.528058855	0.321634
Z-test	-1.221843743	-1.620751144	-0.341540075	-1.87188

Exhibit 19 growth stock mutual funds Alpha-alpha:

	05-06	06-07	07-08	combined
Odd ratio	10.24	6.25	0.757575758	**3.322134387**
log odd ratio	1.010299957	0.795880017	-0.120573931	**0.521417197**
Stand error	0.724568837	0.683130051	0.611753565	**0.371097419**
Z-test	1.394346409	1.16504905	-0.197095592	**1.405068239**

Exhibit 20 growth stock mutual funds Style consistency – alpha:

	05-06	06-07	07-08	combined
Odd ratio	0.091911765	0.15	0.909090909	**0.374797188**
log odd ratio	-1.036628895	-0.823908741	-0.041392685	**-0.426203677**
Stand error	0.722027374	0.680073525	0.610513941	**0.352751621**
Z-test	-1.435719658	-1.211499507	-0.067799738	**-1.208225992**

Aggressive asset allocation mutual funds:

Exhibit 21: Alpha – alpha:

	05 q1 - 05 q2	05 q2 - 05 q3	05 q3 - 05 q4
Odd ratio	2.67768595	1.147959184	4.938271605
log odd ratio	0.42775964	0.059926447	0.693574972
Stand error	0.541229427	0.525538273	0.567646212
Z-test	0.790348082	0.114028701	1.221843743

	05 q4 - 06 q1	06 q1 - 06 q2	06 q2 - 06 q3
Odd ratio	3.61	2.67768595	0.871111111
log odd ratio	0.557507202	0.42775964	-0.059926447
Stand error	0.552506251	0.541229427	0.525538273
Z-test	1.009051392	0.790348082	-0.114028701

	06 q3 - 06 q4	06 q4 - 07 q1	07 q1 - 07 q2
Odd ratio	2.006944444	0.871111111	2.006944444
log odd ratio	0.302535351	-0.059926447	0.302535351
Stand error	0.53321077	0.525538273	0.53321077
Z-test	0.567384171	-0.114028701	0.567384171

	07 q2 - 07 q3	07 q3 - 07 q4	07 q4 - 08 q1
Odd ratio	2.006944444	0.66015625	1.514792899
log odd ratio	0.302535351	-0.180353261	0.180353261
Stand error	0.53321077	0.528058855	0.528058855
Z-test	0.567384171	-0.341540075	0.341540075

	08 q1 - 08 q2	08 q2 - 08 q3	08 q3 - 08 q4
Odd ratio	2.006944444	2.67768595	1.147959184
log odd ratio	0.302535351	0.42775964	0.059926447
Stand error	0.53321077	0.541229427	0.525538273
Z-test	0.567384171	0.790348082	0.114028701

	combined
Odd ratio	1.75881495
log odd ratio	0.245220149
Stand error	0.136966066
Z-test	1.790371552

Exhibit 22: Style consistency – alpha:

	05 q1 - 05 q2	05 q2 - 05 q3	05 q3 - 05 q4
Odd ratio	1.514792899	1.147959184	0.27700831
log odd ratio	0.180353261	0.059926447	-0.557507202
Stand error	0.528058855	0.525538273	0.552506251
Z-test	0.341540075	0.114028701	-1.009051392

	05 q4 - 06 q1	06 q1 - 06 q2	06 q2 - 06 q3
Odd ratio	0.2025	0.66015625	1.147959184
log odd ratio	-0.693574972	-0.180353261	0.059926447
Stand error	0.567646212	0.528058855	0.525538273
Z-test	-1.221843743	-0.341540075	0.114028701

	06 q3 - 06 q4	06 q4 - 07 q1	07 q1 - 07 q2
Odd ratio	0.145124717	0.37345679	0.27700831
log odd ratio	-0.838258615	-0.42775964	-0.557507202
Stand error	0.587569651	0.541229427	0.552506251
Z-test	-1.426654038	-0.790348082	-1.009051392

	07 q2 - 07 q3	07 q3 - 07 q4	07 q4 - 08 q1
Odd ratio	0.871111111	1.147959184	0.498269896
log odd ratio	-0.059926447	0.059926447	-0.302535351
Stand error	0.525538273	0.525538273	0.53321077
Z-test	-0.114028701	0.114028701	-0.567384171

	08 q1 - 08 q2	08 q2 - 08 q3	08 q3 - 08 q4
Odd ratio	0.37345679	0.498269896	2.006944444
log odd ratio	-0.42775964	-0.302535351	0.302535351
Stand error	0.541229427	0.53321077	0.53321077
Z-test	-0.790348082	-0.567384171	0.567384171

	combined
Odd ratio	0.579324362
log odd ratio	-0.237078208
Stand error	0.136877551
Z-test	-1.732045956

Exhibit 23: Growth stock mutual funds:
Alpha – alpha

	05 q1 - 05 q2	05 q2 - 05 q3	05 q3 - 05 q4
Odd ratio	0.1171875	0.426035503	6.666666667
log odd ratio	-0.931118711	-0.370554208	0.823908741
Stand error	0.701189466	0.624465583	0.680073525
Z-test	-1.327913148	-0.593394124	1.211499507

	05 q4 - 06 q1	06 q1 - 06 q2	06 q2 - 06 q3
Odd ratio	4.285714286	10.88	3.5
log odd ratio	0.632023215	1.036628895	0.544068044
Stand error	0.651006547	0.722027374	0.640869944
Z-test	0.970840029	1.435719658	0.848952348

	06 q3 - 06 q4	06 q4 - 07 q1	07 q1 - 07 q2
Odd ratio	1.925925926	2.84375	4.017857143
log odd ratio	0.284639579	0.453891414	0.603994491
Stand error	0.618448569	0.63115105	0.633395987
Z-test	0.460247778	0.719148631	0.953581178

	07 q2 - 07 q3	07 q3 - 07 q4	07 q4 - 08 q1
Odd ratio	2.347222222	0.641025641	1.925925926
log odd ratio	0.370554208	-0.193124598	0.284639579
Stand error	0.624465583	0.600213637	0.618448569
Z-test	0.593394124	-0.321759764	0.460247778

	08 q1 - 08 q2	08 q2 - 08 q3	08 q3 - 08 q4
Odd ratio	1.925925926	3.5	0.285714286
log odd ratio	0.284639579	0.544068044	-0.544068044
Stand error	0.618448569	0.640869944	0.640869944
Z-test	0.460247778	0.848952348	-0.848952348

	Combined
Odd ratio	1.757913669
log odd ratio	0.244997543
Stand error	0.158596875
Z-test	1.544781651

Exhibit 24: Style –consistency – alpha

	05 q1 - 05 q2	05 q2 - 05 q3	05 q3 - 05 q4
Odd ratio	1.925925926	0.757575758	0.186666667
log odd ratio	0.284639579	-0.120573931	-0.728933228
Stand error	0.618448569	0.611753565	0.665475126
Z-test	0.460247778	-0.197095592	-1.095357587

	05 q4 - 06 q1	06 q1 - 06 q2	06 q2 - 06 q3
Odd ratio	0.426035503	0.426035503	0.519230769
log odd ratio	-0.370554208	-0.370554208	-0.284639579
Stand error	0.624465583	0.624465583	0.618448569
Z-test	-0.593394124	-0.593394124	-0.460247778

	06 q3 - 06 q4	06 q4 - 07 q1	07 q1 - 07 q2
Odd ratio	0.351648352	0.519230769	0.186666667
log odd ratio	-0.453891414	-0.284639579	-0.728933228
Stand error	0.63115105	0.618448569	0.665475126
Z-test	-0.719148631	-0.460247778	-1.095357587

	07 q2 - 07 q3	07 q3 - 07 q4	07 q4 - 08 q1
Odd ratio	0.426035503	0.909090909	0.233333333
log odd ratio	-0.370554208	-0.041392685	-0.632023215
Stand error	0.624465583	0.610513941	0.651006547
Z-test	-0.593394124	-0.067799738	-0.970840029

	08 q1 - 08 q2	08 q2 - 08 q3	08 q3 - 08 q4
Odd ratio	1.925925926	0.426035503	0.757575758
log odd ratio	0.284639579	-0.370554208	-0.120573931
Stand error	0.618448569	0.624465583	0.611753565
Z-test	0.460247778	-0.593394124	-0.197095592

	Combined
Odd ratio	0.524979267
log odd ratio	-0.279857848
Stand error	0.15955295
Z-test	-1.754012369

One-quarter interval regression test results:

Exhibit 16:

05 q1-q2	Intercept	Preceding Alpha	Perceding R-squared
Coefficients	-0.06575043	0.056246163	0.039465051
Stand error	0.026608559	0.055363353	0.028552822
t Stat	-2.47102546	1.015945743	1.382176916
P-value	0.014992515	0.311864572	0.169692419

05 q2-q3	Intercept	Preceding Alpha	Preceding R-squared
Coefficients	0.136825227	-0.071827516	-0.126349077
Stand error	0.019297546	0.077266502	0.020941671
t Stat	7.090291574	-0.929607459	-6.033380754
P-value	1.31574E-10	0.354591611	2.16023E-08

05 q3-q4	Intercept	Preceding Alpha	Preceding R-squared
Coefficients	0.017758284	0.19690755	-0.005782377
Stand error	0.017224768	0.095892992	0.018414335
t Stat	1.030973786	2.053409188	-0.314014957
P-value	0.304794296	0.042383197	0.75409907

05 q4- 06 q1	Intercept	Perceding Alpha	Perceding R-squared
Coefficients	0.128363428	0.24903296	-0.062567824
Stand error	0.025924132	0.158794119	0.03141467
t Stat	4.951503491	1.568275715	-1.991675354
P-value	2.6504E-06	0.11966321	0.048862502

06 q1- q2	Intercept	Perceding Alpha	Perceding R-squared
Coefficients	0.226015934	0.062296305	-0.73994159
Stand error	0.035125393	0.135456133	0.039423212
t Stat	6.434545344	0.459900215	-18.76918566
P-value	3.24147E-09	0.646487404	3.14458E-36

06 q2- q3	Intercept	Perceding Alpha	Perceding R-squared
Coefficients	0.051237457	0.090864786	-0.041837602
Stand error	0.022883848	0.044860981	0.026346936
t Stat	2.239022808	2.025474805	-1.587949428
P-value	0.027148288	0.045217724	0.115142299

06 q3- q4	Intercept	Perceding Alpha	Perceding R-squared
Coefficients	0.399231454	-0.261323074	-0.416227646
Stand error	0.039328377	0.225513972	0.047099888
t Stat	10.15123127	-1.158788838	-8.837125932
P-value	1.60362E-17	0.249029181	1.67778E-14

06 q4-07 q1	Intercept	Perceding Alpha	Perceding R-squared
Coefficients	-0.23899193	1.146990443	-0.179288433
Stand error	0.093014878	0.166885805	0.110044517
t Stat	-2.56939459	6.872905965	-1.629235496
P-value	0.01151383	3.85528E-10	0.106097986

07 q1-07 q2	Intercept	Perceding Alpha	Perceding R-squared
Coefficients	0.366665136	0.724503811	-0.304327677
Stand error	0.051309631	0.051130878	0.059825269
t Stat	7.146126979	14.16959452	-5.086942064
P-value	9.96416E-11	1.19898E-26	1.49252E-06

07 q2-07 q3	Intercept	Perceding Alpha	Perceding R-squared
Coefficients	0.202616594	0.08148938	-0.197041502
Stand error	0.02563594	0.025523096	0.02882269
t Stat	7.903614652	3.192770151	-6.836332834
P-value	2.14967E-12	0.001833665	4.61415E-10

07 q3-07 q4	Intercept	Perceding Alpha	Perceding R-squared
Coefficients	0.01118181	0.134285354	0.027419477
Stand error	0.029386541	0.080127272	0.030771536
t Stat	0.380507858	1.675900734	0.891066254
P-value	0.704295659	0.096572271	0.374821035

07 q4-08 q1	Intercept	Perceding Alpha	Perceding R-squared
Coefficients	-0.09943318	0.128440099	0.105316104
Stand error	0.024122924	0.110998001	0.027610651
t Stat	-4.1219374	1.157138846	3.814328974
P-value	7.27115E-05	0.249699703	0.0002249

08 q1-08 q2	Intercept	Perceding Alpha	Perceding R-squared
Coefficients	-0.20141569	0.016867832	0.225857828
Stand error	0.018870937	0.068242004	0.020527675
t Stat	-10.673327	0.247176678	11.00260126
P-value	1.00051E-18	0.805228093	1.74198E-19

08 q2-08 q3	Intercept	Perceding Alpha	Perceding R-squared
Coefficients	-0.21191908	0.646444015	0.182160998
Stand error	0.049049405	0.172081879	0.054109849
t Stat	-4.320523	3.756607129	3.36650357
P-value	3.40504E-05	0.000276186	0.001046601

08 q3-08 q4	Intercept	Perceding Alpha	Perceding R-squared
Coefficients	-0.06302729	-0.044842107	0.092153575
Stand error	0.030512909	0.063486976	0.032742459
t Stat	-2.06559426	-0.706319774	2.81449765
P-value	0.041195306	0.481469242	0.005781027
Combined results	Intercept	Preceding alpha	Style consistency
Coefficients	0.060386052	0.387107492	-0.053141995
standard error	0.011507997	0.022613317	0.013428362
t Stat	5.247312012	17.11856293	-3.957444297
P-value	1.73619E-07	9.44446E-61	7.88614E-05

Exhibit 26: One-year interval regression test with NAV

05-06	Intercept	Preceding Alpha	Preceding R-squared	NAV
Coefficients	0.527737239	0.447282649	-0.552936423	2.28577E-05
Stand error	0.143043021	0.171240968	0.168645886	1.39938E-05
t Stat	3.689360262	2.612007249	-3.278683144	1.633412595
P-value	0.000351242	0.010258231	0.001396626	0.10524138

06-07	Intercept	Preceding Alpha	Preceding R-squared	NAV
Coefficients	0.2896937	0.35351048	-0.229184752	1.45133E-05
Stand error	0.16397362	0.126011133	0.188904521	1.15636E-05
t Stat	1.76670918	2.805390859	-1.613230638	1.255076438
P-value	0.08005064	0.005944188	0.227640479	0.212110878

07-08	Intercept	Preceding Alpha	Preceding R-squared	NAV
Coefficients	0.074633934	0.044266447	-0.14243031	2.70644E-06
Stand error	0.191614096	0.066008599	0.219996904	2.27531E-06
t Stat	0.38950127	0.670616366	-0.647419608	1.189480649
P-value	0.697658436	0.503870552	0.518709286	0.236811757

Combined	Intercept	Preceding Alpha	Preceding R-squared	NAV
Coefficients	0.497466001	0.167087738	-0.474258355	3.29012E-06
Stand error	0.09217201	0.062046779	0.108877046	2.2268E-06
t Stat	5.397148222	2.6929317	-4.355907615	2.375663251
P-value	1.277E-07	0.007435655	1.75953E-05	0.018074508

Appendix 4: Mutual funds classification definitions:

Although it may be easy to confuse the investment style and the style consistency of mutual funds, they are actually quite different. Investment style refers to the investment strategies of mutual funds during a particular time period, which includes the asset allocation decision among various financial instruments and the various holding positions of stocks et al. The style consistency, as mentioned above, measures how close mutual funds follow their investment style. For example, a mutual fund was classified as a growth stock fund according to its returns in the last 3 years, but this does not mean the mutual fund is always investing as a growth mutual fund at any point of time during the 3-year period. Moreover, the mutual funds which are in the same style categories may have different style consistencies. To discover the true effect of mutual funds' style consistency, the investment style effects should be ignored. To deal with this problem, the tests would be taken under the different style categories.

The Sharpe's style analysis model is used by this study to find the actual investment style of Chinese mutual funds (**details on this method were shown earlier in this thesis; the MATLAB programming details are available on request**). The asset class factors using Sharpe's return-based style analysis regression in this research are carefully selected and include the following comprehensive and mutually-exclusive benchmarks: Citics 100 growth stock index; Citics 100 value stock index; Citics 200 value stock index; Citics 200 growth stock index; Citics small cap growth stocks index; Citics small cap value stocks index; and Citics total Chinese bond index (CCBI), all of which have been devised by the Citics-Standard & Poor Index Company (CSP).

The Citics 100 index includes high liquidity and high market value stocks. In other words, the Citics 100 index represents the Large Cap Chinese stocks. Moreover, CSP also developed the Citics 100 Growth and Citics 100 Value indexes which represent Large Cap growth and Large Cap value stocks.

The Citics 200 index includes all middle capitalization stocks in the Chinese

stock market. The Citics 200 growth index and Citics 200 Value indexes represent middle Cap growth and middle Cap value stocks.

The Citics small cap index includes all small stocks in the Chinese stock market. The Citics small growth and Citics small value index stocks represent small cap growth and small cap value stocks

There are thus 6 stock asset class factors in the return-based style analysis regression of this research paper: Large-cap growth; Large-cap value; Middle-cap growth; Middle-cap value; Small-cap value; and Small-cap growth (similar class factors were used by He (2009) as well).

Other than the 6 stock index factors, there is also 1 debt index factor: Citics total Chinese bond index (CCBI). The CCBI is a comprehensive bond index which accounts for all market-trading bonds in both the Shanghai and Shenzhen bond markets and inter-bank trading bonds such as government bonds, government bills, corporate bonds, financial institution bonds et al.

Importantly, as this research is concentrated on non-fixed-income mutual funds (stock mutual funds or asset allocation mutual funds), the research thus pays more attention to the returns of these types of mutual funds rather than the returns of different kinds of bonds. Therefore, in this research only one comprehensive bond index factor was used in the regression. Actually, although the single bond factor is not enough to indicate the changing allocation among different types of bonds, this comprehensive bond index factor is still enough to discern the investment exposure changing trend among stocks and bonds.

The asset class factors data used in this research was the weekly rate of return of those indexes during the period from Jan 2005 until Dec 2008. All of the index returns data was sourced from the Wind database as well.

According to the mutual fund classification taxonomy rules developed by the China Security Regulatory Committee (CSRC), there are 5 basic “types” for stocks and asset allocation mutual funds. These include Aggressive asset allocation mutual

funds; Conservative asset allocation mutual funds; Growth stock mutual funds; Value stock mutual funds; and Balanced stock mutual funds. The definitions of these style classifications are shown below:

Mutual Fund Classification Definitions

Mutual Funds' Type Definitions:

Type	**Definition**
Active asset allocation mutual funds	Invest in equity, fixed income or other financial products, and the portion of fixed income investment is not more than 50% of the fund's net value, meanwhile equity investment is not more than 70% of its net value.
Conservative asset allocation mutual funds	Invest in equity, fixed income or other financial products, and the portion of fixed income investment is more than 50% of the fund's net value.
Growth stock mutual funds	Invest more than 70% of its net value in Equity (stocks), and more than 60% of its equity investment on Growth stocks.
Value stock mutual funds	Invest more than 70% of its net value in Equity (stocks), and more than 60% of its equity investment on Value stocks.
Balanced stock mutual funds	Invest more than 70% of its net value in Equity (stocks), and does not match the definition of either Growth stock mutual funds or Value stock mutual funds.

In fact, the mutual fund classification system in China is imperfect, as it only makes a very rough classification of mutual funds (stock mutual funds, bond mutual funds et al.). There is no very detailed classification available for mutual funds in China, so that a detailed classification cannot be offered in this research thesis. Because of this deficiency, the Sharpe's style analysis model is used to define the style of Chinese mutual funds. Moreover, according to the requirements of the China Security Committee, each Chinese stock mutual fund is required to announce their investment style and show their investment composition to investors. However, there is no explicit time requirement for disclosing their holding compositions, so that Chinese mutual funds always disclose their holdings quarterly or annually. In fact, each mutual fund has an announced investment style, but for some reason (either intentional or unintentional) the actual investment style may not be the same as the announced investment style. Moreover, because investors choose mutual funds in

which to invest based on the funds' various styles, then if the true style of a fund is not the same as the announced style, the investors will face extra risks (although they are unaware of these risks). In this research Sharpe's return-based style analysis method (1992) will be used to test mutual funds' actual investment styles during the period from 2005 to 2008. As mentioned by Louis K. C. Chan, Hsiu-Lang Chen and Josef Lakonishok (2002), the styles which are announced to public investors are generally too vague to be very informative. Using the return-based style analysis, this research will be able to show a clearer picture with regard to mutual funds' actual asset exposures.

Additionally, because personal career considerations and performance achievement pressures may lead fund managers to alter their behavior and change the actual investment style to some degree at some point in time, these factors may also lower the style consistency of mutual funds (Chan, Chen and Lakonishok, 2002).

Appendix 5: List of mutual funds

List of mutual funds in the sample of this thesis

Code	Name
002001	HuaXia Income 16,072,645,478.19
002011	HuaXia benefit
020003	GuoTai Industry selection
020005	GuoTai Stable income
040004	HuaAn Asset allocation
050001	BoShi Value increase
070001	Harvest growth income
070002	Harvest increse
070003	Harvest stable
070006	Harvest Service growth
080001	ChangSheng Value increase
090003	DaCheng Bule-clip stable
090004	DaCheng selection increase
100016	Fuguo balance
100022	Fuguo Tianrui selection
110001	E-Fund stable increase
121002	UBS SDIC industry selection
151103	Galaxy YinTai dividend income
151001	Galaxy Stable
151002	Galaxy income
160105	China Southern Aggressive Asset allocation
160311	HuaXia Blue-clip Core
160603	PengHua Income
160605	PengHua China 50
160805	Changsheng TongZhi
160901	DaCheng Creative growth
161601	RongTong New Bule-clip stocks
161606	RongTong industry
162102	JinYing small and medien stocks
162205	ABN AMRO TEDA risk budget
163801	BOC China selection stocks
180001	YinHua advantage stocks
200001	Great Wall JiuHeng
202001	Southern stable growth
206001	PengHua Sector growth
213001	BaoYing benefits income
217002	CMF ANTai Balance
217005	CMF Forward stock

233001	JuTian fuandamental sector stocks
240002	HuaBao Xingye
253010	GuoLianAn growth
255010	GuoLianAN Stable
260103	JingShun Great wall active balance
270001	GF fund JuFu
270002	GF stale growth
288001	Citics Classic asset allocation
290002	First-trust advanced strategy
310308	SYWG BNP PARIBAS selection stocks
310318	SYWG BNP PARIBAS Asset Allocation
320001	NuoAn Balance
340001	ARGON-Industrial stocks
350001	China Nature Wealth growth
350002	China Nature selection
375010	ST Mongen China advantage selection
398011	ZhongHai profit growth
400001	Orient balanced stocks
410001	HuaFu Competibility selection
450001	Franklin Templeton Sealand China income
500058	Yinfeng stocks
510081	Changsheng Active Seleciton
519003	Forits HaiTong income growth
519008	China Universial advantage selection
519011	Forits HaiTong selection
580001	SOOCHOW Advantage
360001	Everbright Pramerica Core stock selection
398001	Zhonghai stocks selections
460001	AIG-HuaTai China stocks selection
481001	ICBC Credit Suisse stocks selection
510050	CAM Shanghai stock selection
519005	Forits Haitong stocks
519180	Wanjia Shanghai stocks
551996	ChangXin YinLi selection
000001	CAM growth
000011	CAM large stocks
020001	GuoTai growth
040001	HuaAn Creative stocks
040002	HuaAn MSCI China stocks
050002	BOSHI YUFU
050004	BOSHI Selection
090001	Da Cheng Value stocks
100020	Fullgoal TianYi

110002	E-Fund Strategy growth
110003	E-Fund Shanghai stocks
110005	E-Fund Aggressive growth
160106	Southern fast growth
160314	CMA Industrial selection
160505	BOSHI Zhuti selection
161640	RongTong ShenZhen stocks
161605	Rongtong Bule-clip Growth
161607	Rongtong JuChao stocks selection
161610	Rongtong advance growth
161903	Wanjia Public industrial stocks
162006	Great Wall JiuFU
162201	ABN AMRO TEDA Growth
162202	ABN AMRO TEDA Circle
162203	ABN AMRO TEDA Stable
162204	ABN AMRO TEDA Industrial Selection
162605	JingShun Great wall DingYi
162703	GF small stocks growth
180003	YINHUA Dow Jones 88 selection
200002	Great Wall JiuTai target 300
210001	Golden Eagle Selection
213002	BaoYing Growth
217001	China MerCharts stocks
240001	Forture SGAM Comsuptions
240005	Forture SGAM Strategies
257020	GTJA Selection
260101	JingShun Great Wall stocks selection
260112	JingShun Great Wall energy
360006	Everbright Pramerica Core stock Growth
398031	ZhongHai Bule-clip allocation
159902	CAM samll and Mediem stocks
519815	Wanjia Selection stocks
519993	ChangXin Growth strategy

Appendix 6: Robust tests by using style-adjusted returns

Since 1992 the return-based style analysis as introduced by Sharpe (1992) has become a very popular tool or method for analyzing mutual fund returns and investment styles. As mentioned by de Roon, Nijman, and ter Horst (2003), this method is essentially used to explain fund returns and can actually indicate the real investment style of a mutual fund based on its past returns. There are two constraints on this return based model: 1) all the coefficients should be more than 0; and 2) all of them sum to 1. As long as those asset factor exposures are in fact positively weighted, Sharpe's return-based style analysis method is highly efficient. Because Chinese stock mutual funds are not permitted to use leverage or short sell, in this case the two constraints of this analysis style match perfectly with reality. Moreover, the total number of trading stock mutual funds and asset allocation mutual funds in the Chinese market came to more than 250 by the end of 2008, and more than half of these were established after 2005. Therefore, in this research paper, a sample which includes 114 mutual funds during the period 2005 to 2008 will be used. All of the funds were established before January 2005. This Sharpe's style analysis method will be used in the robust tests of this research thesis.

Robust Tests: Sharpe's Multi-factor Regression Test Results

Formulas 11-13 of this research thesis have shown the details of Sharpe's multi-factors model. The selection returns (style-adjusted returns) are calculated from Sharpe's style analysis model. As mentioned above, the rolling 52 weeks (a one-year period) are used to determine the customized benchmark for each test period. The difference between the actual return of mutual fund i and its style benchmark return at week t is the style-adjusted alpha of mutual fund i at week t (selection returns). And for each one-year interval test period (2006-2008), the average weekly style-adjusted alpha is calculated and used as the mutual fund's performance measure. The style-adjusted alpha and R-squared (average) is used to invigorate the tests of risk-adjusted alpha and R-squared from the four-factor model.

Because the rolling 52 week periods are used to calculate the style analysis alpha, the style-adjusted alpha is only available for the years 2006, 2007 and 2008.

Therefore, there will be only two one-year interval test periods available for the robust tests. It is preferred in this research to use Sharpe's model to do the style classification and to then test the effects of style consistency based on the various investment styles (as shown in Section 5.4.2).

The robust regression test results are obtained by using the style-adjusted returns of mutual funds are shown below. The results in Exhibits 27, 28 and 29 indicated that the style consistency significantly negatively correlated with the future style-adjusted returns of mutual funds during the entire test period (2006-2008). Moreover, the robust test results still support the conclusions of this thesis. Notably, that at the point of change in market trend (2007-2008), the test results did not show the significant correlations. This is consistent with the previous test results in this thesis. The combined test results strongly support the conclusions of this thesis, and the style consistency effects are distinct from the effects of past style-adjusted returns.

The results in Exhibits 30, 31 and 32 indicate that the effects of style consistency on the future style-adjusted return of mutual funds are distinct from the effect of the net asset value of mutual funds (NAV) and past style-adjusted returns. Although the results in Exhibits 30, 31 and 32 indicate that the effect of style consistency on future style-adjusted returns are weaker after adding the NAV factor in the regression test, there is still a strong negative correlation between style consistency and a mutual fund's future style-adjusted returns over the entire test period.

Exhibit 27: 06-07 Regression test results

	Intercept	Preceding selection return	Preceding R-squared
Coefficients	0.135664732	1.071245322	-0.143951202
Stand error	0.157646084	0.103426861	0.185360033
t Stat	0.860565191	10.35751561	-1.776603239
P-value	0.391332561	5.35817E-18	0.139044656

Exhibit 28: 07-08 Regression test results

	Intercept	Preceding selection return	Preceding R-squared
Coefficients	-0.023246974	-0.041060143	-0.095646157
Stand error	0.183381945	0.084636275	0.213365851
t Stat	-0.126768063	-0.485136465	-0.448273033
P-value	0.899353325	0.628535649	0.654829946

Exhibit 29: 06-08 Combined regression test results

	Intercept	Preceding selection return	Preceding R-squared
Coefficients	0.070554123	0.290043782	-0.1630052
Stand error	0.136888761	0.072177893	0.159995611
t Stat	0.515412093	4.018457298	-1.618810449
P-value	0.606771114	7.99094E-05	0.089387191

Exhibit 30: 06-07 Regression test results with NAV

	Intercept	Preceding selection return	Preceding R-squared	NAV
Coefficients	0.15041567	1.074398454	-0.128127843	-1.44672E-05
Stand error	0.154489185	0.101284065	0.181624075	6.02494E-06
t Stat	0.973632361	10.60777386	-1.705456273	-2.401216264
P-value	0.332375321	1.56815E-18	0.18201758	0.01801767

Exhibit 31: 07-08 Regression test results with NAV

	Intercept	Preceding selection return	Preceding R-squared	NAV
Coefficients	-0.053672872	-0.029795845	-0.091015288	2.98788E-06
Stand error	0.18391143	0.084666963	0.212493566	2.14486E-06
t Stat	-0.29184087	-0.351918201	-0.428320207	1.393045237
P-value	0.770957968	0.725572885	0.669255522	0.166414979

Exhibit 32: 06-08 Combined regression test results with NAV

	Intercept	Preceding selection return	Preceding R-squared	NAV
Coefficients	0.064087264	0.29322626	-0.164402559	1.42983E-06
Stand error	0.137259956	0.072356545	0.160145717	1.83584E-06
t Stat	0.466904304	4.052518803	-1.426581057	0.778845444
P-value	0.641022158	6.98967E-05	0.105725064	0.43689276

Appendix 7:

Risk-free Rate Selection

When researchers are evaluating a portfolio's performance, they always use the return of the short-term national bond as the risk-free rate. For instance, when Arugslan et al. (2008) applied the Treynor ratio, Sharpe's ratio and Jensen's alpha to evaluate the performance of US mutual funds, they adopted the rate of the 90-day return of US Treasury Bills as the risk-free rate (see also Sharpe (1992) and other US mutual fund studies). However, in China the bond market is much less developed than the US bond market. Indeed, to date the Chinese bond market is unprofitable, and the bond's rate of liquidity remains low (Zhang, 2008).

Until February 2008, the total of the saving deposits of Chinese urban and rural residents was 18.7 trillion Yuan, while only 160 billion Yuan in national bonds were issued by the end of 2007 (Liu, 2008). This data is sufficient to demonstrate that when we are studying the Chinese capital market we should avoid using the return rate of the national bond as the risk-free rate, as most Chinese investors (especially individual investors) continue to deposit their money in banks as their basic investment method. Furthermore, the People's Bank of China (the central Chinese bank) increased the deposit interest rate six times in 2007 and reduced the interest rate tax from 20% to 5% in 2008 (Zhang, 2008). In China some short-term government bond rates are even lower than the bank deposit interest rate. Therefore, in this research the deposit interest rate is preferred as the risk-free rate. This thesis has chosen as the risk-free rate the mean of the one-year savings account interest rate (after deducting the interest tax) over the period from 2005 to 2008. The actual average daily risk-free rate is 0.0079% and the weekly risk-free rate is 0.056%.

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Benchmark Selection

As mentioned above, the four-factor model was used to calculate the risk-adjusted return and R-squares of mutual funds. Five stock index factors (small cap stocks, large cap stocks, value stocks, growth stocks and the full stock market index) and one bond market index were needed for this research. The S&P/CITIC small cap stock index was used as the small cap stock index; the Shanghai and

Shenzhen 300 stock index (HS 300) was used as the large cap stock index; the S&P/CITIC value stock index was used as the value stock index; the S&P/CITIC growth stock index was used as the growth stock index; the S&P/CITIC Chinese full-A stock index, which includes all 1,670 stocks in the Chinese Shanghai and Shenzhen stock market, was used as the full stock market index; and the S&P/CITIC Composite Bond Index was used as the bond market index in the four-factor model.

The S&P/CITIC Small Cap covers 300 stocks from China's A-Shares small cap market.

The HS 300 covers the largest and most liquid stocks from China's A-Shares market. These may be both invested and traded and they form the basis for index products and trading tools such as mutual funds, Exchange-Traded Funds (ETFs) and other index derivatives.

The S&P/CITIC Value stock index covers all the value stocks in the Chinese stock market. The S&P/CITIC growth stock index covers all the growth stocks in the Chinese stock market. (The details on how the indexes are set up are found at http://www.spciticindex.com).

The S&P/CITIC A-Share Indices are designed to serve as barometers for the China A-Share market, which covers over 1,600 stocks. These indices are market-cap weighted and provide a complete product suite for exposure to Chinese companies and markets.

The S&P/CITIC Composite Bond Index covers all bonds listed on SSE, SZSE or inter-bank markets with sizes of more than 100 million RMB, term of maturity over one year, and credit rating at investment grade only. All exchange-traded bonds that meet the above criteria are included in the index. Inter-bank bonds are selected using a stratified sampling method based on bond types and duration.

The S&P/CITIC Bond Index methodology is aligned with international practice and standards. For the detailed methodology, please visit the website http://www.spciticindex.com.

Appendix 8: Trading strategy results and data

Exhibit 32:

2006 mutual funds picking results:

Panel A:

	05-06 Low-R picking (%)	**05-06 high Alpha-picking (%)**
>90%	0.16	0.38
80%-90%	0.13	0.22
70%-80%	-0.01	0.12
60%-70%	0.17	0.10
50%-60%	0.10	0.19
40%-50%	0.21	0.10
30%-40%	0.16	0.13
20%-30%	0.17	0.11
10%-20%	0.12	0.13
<10%	0.33	0.06
Our picking strategy		
05 alpha>90% and 05 R<10%	0.71	

Panel B:

	06-07 Low-R picking (%)	**06-07 high-Alpha picking (%)**
>90%	0.13	0.47
80%-90%	0.05	0.23
70%-80%	0.18	0.24
60%-70%	0.08	0.15
50%-60%	0.11	0.22
40%-50%	0.12	0.18
30%-40%	0.21	0.12
20%-30%	0.31	0.17
10%-20%	0.34	0.09
<10%	0.39	-0.20
Our picking strategy		
06 alpha>90% and 06 R<10%	0.61	

Panel C:

	07-08 Low-R picking (%)	**07-08 high-alpha picking (%)**
>90%	-0.14	0.06
80%-90%	-0.05	-0.06
70%-80%	-0.04	0.07
60%-70%	-0.04	-0.02
50%-60%	-0.03	0.03
40%-50%	-0.07	-0.04
30%-40%	-0.04	-0.10
20%-30%	0.07	0.03
10%-20%	0.08	-0.08
<10%	0.10	-0.05
Our picking strategy		
07 alpha>90% and 07 R<10%	0.19	

Exhibit 33:

Percentile	**06 Alpha (%)**	**07 Alpha (%)**	**08 Alpha (%)**
>90%	0.405680865	0.534520721	0.199126195
80%-90%	0.267765813	0.363003414	0.134209968
70%-80%	0.230275793	0.303246073	0.090075008
60%-70%	0.184838997	0.237325383	0.05368427
50%-60%	0.136148345	0.175473863	0.00980276
40%-50%	0.105061921	0.125880261	-0.042091807
30%-40%	0.057491188	0.055162536	-0.083292221
20%-30%	-0.004494304	-0.001335484	-0.174635735
10%-20%	-0.06105576	-0.111632212	-0.240894061
<10%	-0.6366871	-0.572531478	-0.95247871

Exhibit 34

	2006	**2007**	**2008**
average alpha	0.322419681	0.310628931	-0.017498269
t-test	3.887208441	3.452965316	-0.34079415

Appendix 9: one-quarter interval two way table tests results

One quarter test results of style consistency and mutual funds performance

	high R 05 q1	Low R 05 q2
Winner 05 q2	0.561403509	0.438596491
Loser 05 q2	0.438596491	0.561403509
	High R 05 Q2	Low R 05 q2
Winner 05 q3	0.350877193	0.649122807
Loser 05 q3	0.649122807	0.350877193
	High R 05 q3	Low R 05 q3
Winner 05 q4	0.421052632	0.578947368
Loser 05 q4	0.578947368	0.421052632
	High R 05 q4	Low R 05 q4
Winner 06 q1	0.438596491	0.561403509
Loser 06 q1	0.561403509	0.438596491
	High R 06 q1	Low R 06 q1
Winner 06 q2	0.315789474	0.684210526
Loser 06 q2	0.684210526	0.315789474
	high R 06 q2	Low R 06 q2
Winner 06 q3	0.368421053	0.631578947
Loser 06 q3	0.631578947	0.368421053

	high R 06 q3	low R 06 q3
Winner 06 q4	0.333333333	0.666666667
Loser 05 q4	0.666666667	0.333333333
	high R 06 q4	high R 06 q4
winner 07 q1	0.473684211	0.526315789
loser 07 q1	0.526315789	0.473684211
	high R 07 q1	Low R 07 q1
Winner 07 q2	0.403508772	0.596491228
Loser 07 q2	0.596491228	0.403508772
	high R 07 q2	Low R 07 q2
winner 07 q4	0.421052632	0.578947368
loser 07 q4	0.578947368	0.421052632
	high R 07 q3	low R 07 q3
winner 07 q4	0.578947368	0.421052632
loser 07 q4	0.421052632	0.578947368
	high R 07 q4	low R 07 q4
winner 08 q1	0.350877193	0.649122807
loser 08 q1	0.649122807	0.350877193
	high R 08 q1	low R 08 q1
winner 08 q2	0.368421053	0.631578947
loser 08 q2	0.631578947	0.368421053
	high R 08 q2	low R 08 q2

winner 08 q3	0.333333333	0.666666667
loser 08 q3	0.666666667	0.333333333
	high R 08 q3	low R 08 q3
winner 08 q4	0.578947368	0.421052632
loser 08 q4	0.421052632	0.578947368
Combined	Pre high R	Pre low R
Sucessive high R	0.419883041	0.580116959
Sucessive low R	0.580116959	0.419883041

One quarter test results of performance persistency

Proportion	05 q1 winner	05 q2 loser
05 q2 winner	0.456140351	0.543859649
05 q2 loser	0.543859649	0.456140351
Proportion	05 q2 winner	05 q2 loser
05 q3 winner	0.473684211	0.526315789
05 q3 loser	0.526315789	0.473684211
Proportion	05 q3 winner	05 q3 loser
05 q4 winner	0.666666667	0.333333333
05 q4 loser	0.333333333	0.666666667
Proportion	05 q4 winner	05 q4 loser
06 q1 winner	0.649122807	0.350877193
06 q1 loser	0.333333333	0.666666667
Proportion	06 q1 winner	06 q1 loser

06 q2 winner	0.631578947	0.368421053
06 q2 loser	0.368421053	0.631578947
Proportion	06 q2 winner	06 q2 loser
06 q3 winner	0.684210526	0.315789474
06 q3 loser	0.333333333	0.666666667
Proportion	06 q3 winner	06 q3 loser
06 q4 winner	0.526315789	0.473684211
06 q4 loser	0.473684211	0.526315789
Proportion	06 q4 winner	06 q4 loser
07 q1 winner	0.672413793	0.327586207
07 q1 loser	0.327586207	0.672413793
Proportion	07 q1 winner	07 q1 loser
07 q2 winner	0.561403509	0.438596491
07 q2 loser	0.438596491	0.561403509
Proportion	07 q2 winner	07 q2 loser
07 q3 winner	0.596491228	0.403508772
07 q3 loser	0.403508772	0.596491228
Proportion	07 q3 winner	07 q3 loser
07 q4 winner	0.473684211	0.526315789
07 q4 loser	0.526315789	0.473684211
Proportion	07 q4 winner	07 q4 loser
08 q1 winner	0.543859649	0.456140351

08 q1 loser	0.456140351	0.543859649
Proportion	08 q1 winner	08 q1 loser
08 q2 winner	0.614035088	0.385964912
08 q2 loser	0.385964912	0.614035088
Proportion	08 q2 winner	08 q2 loser
08 q3 winner	0.649122807	0.350877193
08 q3 loser	0.350877193	0.649122807
Proportion	08 q3 winner	08 q3 loser
08 q4 winner	0.438596491	0.561403509
08 q4 loser	0.561403509	0.438596491
	Previous winner	Previous loser
Sucessive winner	0.575934579	0.424065421
Sucessive loser	0.424065421	0.575934579

Appendix 10: Chinese mutual funds style misclassification

The mutual funds' investment style may be misclassified because of either deliberately or due to insufficient control (diBartolomeo and Witkowski, 1997). Recently, in China, the mutual funds market grows rapidly (as shown in Appendix 1), and the competition among mutual funds are very serious. The fund companies, for attracting more investors, always employ very attractive name or stated objectives according to different market conditions. As mentioned by Zhang and Zheng (2008), in China, during the stock market growth trend (2006-2007) the stock mutual funds are very popular, during 2007 there are more than 50 stock mutual funds were issued (base on their stated style). However, during market decline trend (2008), most fund company began to issue bond fund, mix fund or money market fund instead of issuing the stock mutual funds (namely). Notably, the style misclassification is different from style- inconsistency. Style misclassification means in a period of time the mutual funds' actual investment style was different from what it stated to investors (Kim, Shukla, and Tomas, 1999). However, style-inconsistency measures the stability of the actual investment style of mutual funds during a period of time (2005-2008 for this thesis) (Harlow, Brown, and Zhang, 2009). The research on style misclassification concentrated on testing the mutual funds actual investment style V.S. their stated style, and most of those research (such as Kim, Shukla, and Tomas,1999; diBartolomeo and Witkowski, 1997; Brown and Goetzmann, 1997; He, 2009; Zhang and Zheng, 2008; et al.) concluded that the style misclassification do exist (for both US and Chinese mutual funds); therefore the actual investment style should be evaluated first before to evaluate the mutual funds performance (in this thesis, the actual investment style was evaluated by Sharpe's style analysis model in Robust test).

Although the research of style classification provides a guideline of how to evaluate the mutual funds performance and their style, and also dig out the reasons behind the style misclassification, the conclusions of that research are still hard to provide some useful method of predicting on mutual funds' performance for investors and academics. As the previous style classification research of both US and Chinese

mutual funds have already got the conclusions about the style misclassification, this thesis would like to concentrate on the other new area of mutual funds research – style consistency and mutual funds' risk-adjusted performance.

However, in following, the thesis still did the style misclassification tests by using Sharpe's style analysis model; the results are consistent with the previous research.

The comparison results of 114 Chinese mutual funds actual investment style and Announced investment style of mutual funds

Every mutual fund has its own announced investment style or stated investment style which can be found in their "issue statement", but in fact the mutual funds do not always follow the announced investment style in actual investment process, so their actual investment style may different from the announced or stated investment style. There are several reasons which may cause the actual style to be different with the announced investment style: to pursuit higher profits; the mutual funds ranking pressure; to avoiding market risks in certain period; and so on. By using the return-based style analysis method (Sharpe, 1992), the actual style of investment of mutual funds during whole test period from year 2005 to year 2008 can be found out. By comparing the actual style and announced style of 114 mutual funds (base on weekly returns), there are 31 mutual funds' actual investment style during the test period are different to their announced investment styles (27.19%).

The results of the style comparison suggested that most of Chinese mutual funds' actual investment style were consistent with their announced investment style during the test period. Notably, during the test period, Chinese stock market experienced a serious fluctuation stage – sharply growth in year 2007 and huge depression in year 2008, due to the mutual funds rank pressure some of those fund managers did some investment sector rotation which may affect the investment style of the mutual funds.

In this research, there were two mutual funds portfolios according to if the mutual

funds followed the announced style or not. As mentioned before, there are 31 mutual funds in the portfolio of mutual funds did not follow their announced investment style, and rest of the 114 mutual funds are in the portfolio of mutual funds followed their announced investment style. The table 6 below is the comparison of the statistical results of the two mutual funds portfolios.

Performance comparing results during Year 2005 to 2008:

%	Misclassification	Well-classification
Mean	0.218345154	0.156018907
Medium	0.388597641	0.412815279
Variance	15.40282894	17.38247833
Standard deviation	3.924643797	4.169229945
Min	-8.631470968	-9.581915217
Max	9.6235	10.07034022
Sample size	204	204
Number of mutual funds	31	83
T-test	3.18	2.245

The equal weighted average rate of return was calculated for each portfolio at each week, and then the average weekly rate of return of each portfolio over the whole test period can be calculated.

As shown in table above, during year 2005 to 2008 the average weekly return of the “misclassification” portfolio is 0.2183%, and that of the “follow style” portfolio is 0.156%. The standard deviation of the “not follow style” portfolio is 3.92% and that of the “follow style” portfolio is 4.17%. And the t-test results indicate that the results of average rate of return of each portfolio are statistical significant. During the whole test period, the misclassification mutual funds provide a better style-adjusted performance than the well-classification mutual funds. And to our surprise, the

misclassification-mutual funds do not only provide the better performance, but also provide the lower standard deviations than the well-classification mutual funds. Therefore, the superior performance of those misclassification mutual funds may be not from the higher risks they undertaken, but from their superior skills.