Mutual Fund Intentional Style Drift:  
Presence, Motivation and Performance Impact

A thesis submitted in fulfilment of the requirements for the degree of Doctor of Philosophy

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DECLARATION

I certify that except where due acknowledgement has been made, the work is that of the author alone; the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the thesis is the result of work which has been carried out since the official commencement date of the approved research program; any editorial work, paid or unpaid, carried out by a third party is acknowledged; and, ethics procedures and guidelines have been followed.

I acknowledge the support I have received for my research through the provision of an (RTP) International Tuition fee scholarship, formerly International Postgraduate Research Scholarship (IPRS).

Kim Pei Chua

May 09, 2018
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Commitment played a big role in producing this dissertation amongst passion and “luck”. Time is very crucial and limited for a doctorate student, but that is no excuse for slipshod work. While working hard on minute details and keeping track of time are the keys to my successful completion, this would not have been possible without an international scholarship. For that reason, I gratefully acknowledge the financial support from RMIT University for the RTP scholarship. At the same time, I have been very lucky and privileged to have worked with many talented people and met clever researchers at various international conferences who are so fervent in addressing many important issues in the field of mutual funds. Hence, thanking these incredible people who have aided the completion of this dissertation is just as important as celebrating the wonderful experience and accomplishments small and big from my perspective, that are gained from my PhD journey.

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Finally, most thanks to my supportive family and friends in Singapore.
DEDICATION

This thesis is dedicated to my mentor, Professor On Kit Tam, who devotes much of his time in examining my work in minute detail while advancing my ability to excel and aspire to be the best as a researcher. Despite this PhD journey has come to an end, he remains the shining light of my (research) life.
THESIS PUBLICATIONS

List of publications and conference proceedings arising from this thesis:

MANUSCRIPTS SUBMITTED AND IN PREPARATION


PEER-REVIEWED CONFERENCE PAPERS


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ABSTRACT

Style drift is extensively practiced by active mutual funds in mature markets, although fund investors are generally unaware of the extent of this practice. When funds “secretly” invest in stocks that deviate from the fund’s declared investment strategy, fund investor’s risk and return expectations are disrupted and the problem of information asymmetry inherent in the mutual fund market exacerbated. The asymmetric information thus engendered not only limits the efficacy of fund performance evaluation but also renders fund investors to incorrectly assess the amount of risks they are exposed to and thus contributing to systemic risk.

Prior studies often assume that style drift is motivated by fund manager’s desire to increase her compensation linking to assets under management, usually without studying the fund flow-performance relation associated with drift behavior. In addition to the unbeknown distortion to the original risk-return profile on which fund investors bought units of the funds, the opportunistic drift behavior could also produce adverse impact on fund performance as fund managers who drift are likely to increase trading to exploit short-term returns to manipulate performance. This thesis interrogates the presence and pattern of intentional style drift in a market of exclusively in-house fund managers in China, where the fund market is more vulnerable to agency issues as the risk-taking behavior by fund managers is poorly understood. In particular, this thesis attempts to thoroughly investigate whether drift funds attract more subsequent capital inflows because the expected positive fund inflow is seen as the prime motivator for fund managers to strategically manipulate portfolio style and risk in a bid for higher relative performance ranking to maximize compensation. In this respect, we will uncover evidence to shed light on the
motivation for style drift and also gain insights into the performance impact of this drift behavior.

This thesis proposes new metrics for detecting and ranking voluntary style drift for intentional style drift behavior and develops new conceptualization of style-drift tournaments to uncover style drift motivation and effects. We create an original yearly fund style index using the investible universe of 3,000 Chinese stocks, on the basis of the holdings-based approach which is rarely attempted in style drift literature. We then individually mapped 180,000 portfolio units in 274 open-end equity funds’ holdings against our customized style index. Our 18,600 fund-year drift observations show that style drift is prevalent.

We further test the relationship between style drift and subsequent fund flows and investigate how style drift behavior may be driven by fund managers’ pursuit of larger bonus compensation via competing for higher rank-order in 3 tournament contexts: equity fund market “universe”, funds of similar style “segment” and “family” fund. Our novel style drift-tournament model uncovers that style drift increases a fund’s net inflow, affirming that fund manager is motivated to maximize inflows to increase compensation through style drift. To maximize compensation, manager alters fund style to compete for a larger pool of investor through inter-fund company rank tournament than within fund family rank. In addition, larger funds have greater incentive to drift given the considerable impact of positive fund flows on their expected compensation.

On the basis of the evidence we uncover, we find that this agency-motivated style drift behavior is harmful to fund investors. Rather than just examining drift manager’s stock picking and market timing outcomes like most conventional studies, we propose a third alternative average style metrics to capture the likelihood of drift
manager acquiring more expensive stocks when she exploits short-term returns to compete for new cash flows. Notably, we discover with new evidence that the active pursuit of short-term outperformance in drift funds raises total fund costs and affects manager’s ability to deliver productive fund returns.

Apart from bringing together a new collection of evidence and alternative explanations to the extant literature on mutual fund and a more limited one on style drift, this thesis also contributes to the finance literature by incorporating actual risk behavior to better understanding its direct implications on fund inflows and performance. This is in contrast to the conventional notion of risk taking by using the measure of volatility of returns. Our discoveries also substantiate the theoretical argument about the high levels of risk taking within fund organizations with internally managed funds. In the context of mutual fund market development and regulatory reform, this thesis calls for the strengthening of regulatory framework for the mutual fund market to protect and enhance fund investors’ welfare, and advancing the objectives of the financial institutions.

**Keywords:** Style drift, Equity funds, AUM-based compensation, Net inflows, Holdings-based performance, Rank-order tournament, In-house fund managers
CHAPTER 1. INTRODUCTION

1.1 Research Background and Motivation

Whether actively managed fund can serve the interest of the fund investors and enhance the stability of a country’s financial system have been the focus of research in the finance and financial economics literature. There is an important body of literature focusing on the attribution of outperformance of various forms to the skills of managers in their stock picking and stock characteristics timing also known as “style timing”\(^1\) (Holmes and Faff, 2007; Brown, Harlow, and Zhang, 2012; and Wermers, 2012), and more recently market conditions such as the effects of scale economies/diseconomies at the fund industry (Pastor, Stambaugh, and Taylor, 2015) and fund family levels (Chen, Hong, Huang and Kubik, 2004), and in-house versus outsourced fund management (Chen, Hong, Jiang and Kubik, 2013). Yet, very few studies focus on how agency-motivated risk taking in style drift can affect fund’s outperformance. This thesis is the first to comprehensively address the issues of style drift through the development of new empirical metrics to uncover the underlying motives and performance consequences of funds’ intentional drift from their declared investment style in China’s fund market.

Most studies in the literature on mutual funds are premised on fund managers actually executing the advertised portfolio investment allocation mandate. The reality however is that style drift, a practice when a fund manager persistently fails to invest

\(^1\) This thesis uses the term “style-timing” interchangeably with “market-timing” in Daniel, Grinblatt, Titman and Wermers (1997) literature. Broadly, the 2 terms refer to fund manager’s ability to time stock characteristics or style strategies and shift portfolio weight towards such stocks when the style effects are strongest. However, this is not to confuse with market timing, also a widely used term in mutual fund context, which has different denotations such as timing market state: bull/bear market; late-market trading; time-zone trading.
in compliance with the stated investment objective and its risk profile as publicly stated in the fund prospectus, is found to be common in today’s fund management industry (Brown and Goetzmann, 1997; diBartolomeo and Witkowski, 1997; Indro, Jiang, and Lee, 1998; Kim, Shukla, and Thomas, 2000; Brown and Harlow, 2002; Holmes and Faff, 2007, 2008; Ainsworth, Fong, and Gallagher, 2008; Brown, Harlow, and Zhang, 2012; and Wermers, 2012). In a recent example of U.S. equity funds, Cao, Iliev, and Velthuis (2017) shows that there is an increasing trend in small-cap funds buying large market capitalization (“large-cap”) stocks, with small-cap funds investing 35 per cent of fund assets in large-cap stocks in 2009, in contrast to 17 per cent in 1998.

The presence of style drift raises questions of the efficacy of performance assessment of actively managed funds since fund investors are generally unaware of this practice. To illustrate, we create the following scenario using a small cap fund which we call it the A&C small-cap fund (hereinafter “AC”). When manager of AC small-cap fund increases her allocation to stocks with larger market capitalization “large-cap stocks”, this fund becomes vulnerable to large-cap market risks where small-cap fund investors have no knowledge of. The persistence of the divergence of the actual investment strategies from the declared mandate eventually causes AC small-cap fund to develop into a large-cap fund, leading to fund misclassification. When a fund is misclassified, the usefulness of a fund mandate (public information) in investor’s investment process is devalued. This has important implications for the performance evaluation of funds and investment outcome of fund investors.

If funds do not in practice represent the risk-and-return expectation as declared in the fund prospectus, fund investors cannot accurately compare the performance of like-funds to make well-informed fund investment decision. For instance, comparing
performance of the AC small-cap fund (a style drift fund with a large-cap style characteristic in our earlier illustration) vis-à-vis other funds “BC”, “CC” (style dedicated funds) within the small-cap fund category is not meaningful because small-cap funds “BC” and “CC” can no longer serve as an effective benchmark for “AC” which is a large-cap fund in reality. On the other hand, fund investors may thus be subjected to uncalculated risks as a result of fund manager’s style drift decision. Instead of expecting risk exposures that resemble the risk and return characteristics of the stocks as advertised in the prospectus, fund investors are now subject to unexpected portfolio risk changes.

Related studies argue that excess risk exposure generated by changing investment strategies does not guarantee superior ex post fund performance (Kim, Shukla, and Thomas, 2000), particularly when risk changes are motivated by personal monetary incentives, fund tends to earn lower returns (Huang, Sialm, and Zhang, 2011). A recent study on style drift performance shows that funds maintaining a consistent investment style are better at delivering returns (Cao, Iliev, and Velthuis, 2017). Suboptimal performance in style drift funds are commonly attributed to poorly timed market and picking inferior stocks from opportunity set not relevant to fund’s given style (Holmes and Faff, 2007, 2008; Brown, Harlow, and Zhang, 2012), and higher transaction costs (Kim, Shukla, and Thomas, 2000; Wermers 2012; and Brown, Harlow, and Zhang, 2012). The implications of style drift have been a common subject of investigation in the mature fund markets, but there is hardly any study on how compensation incentive drives fund manager’s drift behavior when it has been found to produce inadequate fund returns. Because style drift highlights a serious information asymmetry issue that harms fund investor interest and undermines
the notion of an efficient market, the behavioral motivation must be promptly studied and dealt with, which is one of the key objectives of this thesis.

The issues of style drift have not been extensively investigated in prior studies on mutual fund performance and the behavior is often thought to be driven by the incentive of fund managers to maximize their compensation (Brown and Goetzmann, 1997). As conceded in the literature on mutual fund risk behavior, the compensation model in the fund management industry provides fund managers with the incentives to make riskier fund investment decisions that are not in line with fund investors’ interests. Fund management company (“FMC”), regardless of how funds’ portfolio are run, generally compensates fund manager based on the volume of assets under management (“AUM”). Under this AUM-based compensation scheme, bonus payment forms the dominant component of a fund manager’s total compensation. Given the fact that the potential increase in fund manager’s compensation is linked to a larger bonus pool that is reliant on AUM fees, managers become more sensitive to performance in relative to peers because a higher fund rank increases the size of the AUM through new fund inflows (Sirri and Tufano, 1998). When compensation is linked to AUM, fund managers are found to exploit short-term returns to gamble for a larger personal income by altering portfolio risk profile (Brown, Harlow and Starks, 1996; Chevalier and Ellison, 1997; and Taylor, 2003), marking up net asset values to improve year-end ranking (Carhart, Kaniel, Musto, and Reed, 2002), window-dress fund portfolio (Lakonishok, Shleifer, Thaler, and Vishny, 1991). Alternatively, funds

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2 With respect to how fund managers are compensated in China, our interviews with the directors of some large- and small-sized fund management companies reveal that mutual fund manager’s far substantive bonus payment largely depends on the growth of AUM.

3 Bonus payment is found to have a dominant effect on the overall compensation. A joint study on asset management compensation by Greenwich Associates and Johnson Associates (Q4, 2014) shows that the bulk of the cash compensation received by portfolio managers in 2013 is composed of cash bonuses (43 per cent), base salary (39 per cent) with the remainder 18 per cent from long-term incentive. Findings are based on telephone and in-person interviews with more than 1,000 asset managers in the U.S.
can herd and trade actively (Grinblatt, Titman and Wermers, 1995; Wermers, 1999; Wylie, 2005). It is obvious the AUM-based compensation is capable of driving risk-taking behaviors that do not serve fund investor’s economic interest. Further, the risk attitude of fund managers can be shaped by how a fund management company is organized. Based on idea of the boundaries of the firm, a recent study on U.S. equity funds finds that in-house manager has greater propensity to pursue riskier fund decision than outsourced manager (Chen, Hong, Jiang, and Kubik, 2013), although the theoretical prediction of the risk-taking behavior of in-house managers has not been empirically investigated.

While evidence of fund managers’ risk actions are well documented in mutual fund literature, it is not clear whether the traditional risk taking measures capture fund manager’s intention to seek risk. Particularly in style drift literature, very few studies take into account the possibility of passive drift that could arise when stock characteristics changes in fund portfolio, with the exception of Brown, Harlow, and Zhang (2012) and Wermers (2012) who analyze funds’ portfolio holdings. There is therefore clearly a need to differentiate those style drift funds that perform active trade (active drift) and those engaging a passive buy-and-hold strategy (passive drift) in order to properly investigate the relationship between the role of risk taking in the

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4 While traditional approach usually assumed risk taking by the change in the estimated level of risk measured by fund returns volatility proxies (Brown, Harlow and Starks, 1996; Busse, 2001; Goriaev, Nijman, and Werker, 2005; Kempf and Ruenzi, 2008; Schwarz, 2011; and Chen, Hong, Jiang, and Kubik, 2013) or beta of indexes (Acker and Duck, 2006), it has been acknowledged that intentional and unintentional actions in explaining fund manager’s risk behavior cannot be differentiated under this approach (Brown, Harlow and Starks, 1996; Goriaev, Nijman, and Werker, 2005; and Kempf and Ruenzi, 2008). Although Brown, Harlow and Starks (1996) has attempted to disentangle fund manager’s risk intent from market events, the risk taking evidence is based on simulated control portfolios of buy-and-hold equity funds and actual actively managed equity funds.

5 Conventional studies adopting returns-based style analysis usually regress past fund’s returns on some style indexes and the understanding of fund’s underlying investment style is determined by the strength of the estimated coefficients. In this sense, analysis can produce noisy style drift results as an increase or decrease in fund returns may be due to capital appreciation of the stocks held by fund, not due to buying or selling fund’s stocks.
context of style drift and fund performance, as well as whether style drift decision is motivated by AUM-based compensation.

This thesis is motivated to address the above-mentioned important but under-researched issues about style drift in a novel and integrated approach. We design an original fund classification system on the basis of a fine grained stock-by-stock portfolio analytical framework to conceptualize the detection of style drift. This study creates 125 unique characteristics-sorted style indexes on a yearly basis to define the actual investment style of each fund manager. The purpose of these indexes is two-fold. Because each style index reflects the opportunity set within the stock universe of a specific investment strategy, these indexes in this thesis will adequately measure the performance consequences of style drift. Active investing with aspect to stock picking performance of style drift and style dedicated funds are benchmark-adjusted or synonymously style-adjusted. In this regard, stock picking returns are controlled for cross-sectional return anomalies related to size, book-to-market and momentum style. Although not the key focus of this thesis, whether actively managed funds can outperform passive portfolios can be effectively evaluated since fund performance are benchmarked against these 125 indexes, which are strictly speaking, passive buy-and-hold investment portfolios. This thesis also unveils the “black box” in respect of providing actual evidence for the first time in the literature to the motivational link of style drift and new fund flows that is usually asserted without evidence by researchers and evidence on the effect of this motivation on style drift induced risk taking.

This thesis aims at interrogating the presence of intentional style drift in a market of solely in-house fund managers environment, and investigates the motives

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6 The success of active portfolio management depends greatly on expenses and trading costs, and it is generally accepted that active managers underperform passive index, net of costs (Carhart, 1997; Wermers 2000; Fama and French, 2010).
and effects of style drift in the fast growing but rarely researched mutual funds in China. The Chinese mutual fund industry is an ideal context for the study on fund’s risk-taking behavior considering the embryonic nature of its regulatory regime and weak legal enforcement on fund manager’s compliance in the face of agency conflict, ineffectual internal governance mechanisms (Hu, Tam, and Tan, 2010, and Farag and Mallin, 2016), and the contractual form of Chinese fund management companies that in practice do not accord fund investors governance rights over the management of their funds (Yu, Tam, and Zhou, 2015). These institutional characteristics, coupled with the dominance of AUM-based manager compensation, particularly short-term incentive due to bonus payment, are likely to make the fund environment more conducive for riskier fund manager investment decisions such as style drift. While Chen, Hong, Jiang, and Kubik (2013) focus on the risk behavior of outsourced fund managers in the United States where both outsourced and in-house managers operate, this thesis enriches the literature to uncover how and what similar risk-taking behavior in reality leads to in China’s fund management industry which only operates with in-house managers. By investigating the actual risk actions of fund managers with respect to style drift in contrast to the conventional approach to indirectly measure drift by a proxy (such as returns volatility), this thesis presents a

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7 The legal enforcement rule on fund integrity is less explicit in Chinese fund industry (emerging market) compared to mature fund market. Take U.S. for instance, the mutual fund industry has more explicit regulatory rules. The U.S. regulators take a stern view towards misleading investors with a deceptive fund name. Under the U.S. Investment Company Act, 1940, the U.S. regulators take a stern view towards misleading investors with a deceptive fund name. Under the U.S. Investment Company Act, 1940, Section 35(d), funds that named after a particular type of investment, must ensure that 80% of the assets are invested in that specific type as declared or risked legal penalty.

8 Chinese mutual fund operates in a mandated trilateral structure involving the FMC, the custodian and the fund investor. Funds in China depend less on external fund service institutions because fund service industry is still very much underdeveloped and lack of independence (Huang, 2014). Despite the fact that peripheral fund services can be outsourced under China’s Securities Investment Fund Law 2012 (See Article 102 under Chapter XI Fund Service Providers in 2012 Securities Investment Fund Law of the People’s Republic of China.), investing fund assets in securities remains the core duty of the FMC. Peripheral fund services include fund sale, accounting, trading payment, share registration, valuation, investment advice, rating, and information technology system. However, the ability to outsource to these services to external providers does not relieve the FMC from any liability assumed by it under 2012 Securities Investment Fund Law of the People’s Republic of China.
more precise risk assessment on the intentional risk behavior of in-house managed funds to substantiate the theoretical argument by Chen, Hong, Jiang, and Kubik (2013) about the higher levels of risk taking within fund organization with internally managed funds. The discoveries this thesis makes, and the issues it raises contribute to better understanding of how relevant regulatory framework and mutual fund market settings may move forward for the protection and enhancement of fund investors’ welfare as well as for the development of a more effective financial system and capital market in a market-oriented manner.

1.2 Research Objectives and Empirical Strategies

This thesis uses a methodical stock level analytical framework to uncover the presence of intentional style drift in a market of exclusively in-house fund managers, and investigates the motives and effects of style drift in a fledgling but immature fund market in China.

To cast new light on the practice of style drift and its impact, that is, whether or not the effect is detrimental on Chinese fund investors’ welfare as a result of such agency conflicts, this thesis develops novel empirical strategies by building on Daniel, Grinblatt, Titman and Wermers (1997) methodology to capture the presence of style drift on account of a fine grained stock-by-stock portfolio allocation analysis. The aim of this empirical approach is to uncover evidence attributed to fund manager’s intent to seek risk while identifying the actual underlying investment style of a fund. This thesis creates a novel yearly style index (“characteristics-sorted style index”) as a system for classifying fund styles. The index is computed from 3,000 universe of investible Chinese stocks which is then used to manually map against every 180,000

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9 Whereas Chen, Hong, Jiang, and Kubik (2013) and most literature did not directly measure fund manager’s risk taking action in practice, we directly attribute risk-taking behavior by using fund manager’s stock-by-stock trading behavior.
stock units in 274 Chinese open-end equity funds’ holdings during the period of 2011 to 2015. This procedure identifies the actual implemented investment style of a fund. This original fund style classification method is designed to diagnose and compare fund’s actual investment style attributable to fund manager’s “voluntary” risk decision. Voluntary refers to a fund manager’s intentional investment choice while “involuntary” or unintentional drift represents a change in stock characteristics beyond the direct control of the fund manager. Fund manager’s voluntary risk decision is measured against consistent definitions based on fundamental measures of stock characteristics. This study empirically determines a stock’s characteristics using widely accepted measures in respect of size, book-to-market ratio\textsuperscript{10} and past year returns. The characteristics-sorted style index created in this thesis enables funds to be truly comparable in terms of declared investment objective, and performance can be benchmarked against peers of similar risk.

To make the notion of style drift (i.e. fund with higher investment style volatility) more distinguishable from style dedication (i.e. fund with lower investment style volatility), fractile-based definitions\textsuperscript{11} will be used. In this study, we denote the degree of style volatility by means of voluntary fund volatility ranking (“vFSF”). To illustrate this point, funds that deviate the most from their declared investment style are defined as style drift funds (style dedicated funds are those that adhere more closely to investment style), and they represent the top (bottom) 5 per cent vFSF rank fractile. In addition, this study also considers the top (bottom) 10 and 20 per cent vFSF fractile range to ensure results in this thesis are not affected by the extreme

\textsuperscript{10} This thesis chooses book-to-market ratio as it is a superior estimate for “value” effect in Chinese stocks compare to price-to-sales and price-to-earnings ratios (Malkiel and Jun, 2009).

\textsuperscript{11} The use of fractile-based definition for our style drift analysis avoids the problem of overestimating or underestimating the extent of the style drift as the vFSF values of funds above and below the median vFSF fund are very close. Therefore, if we choose a median-based definition, distinction between drift and dedicated funds near the median vFSF values cannot be clearly made. Fractile-based analysis is also used in Wermers (2012).
upper and lower 5 per cent vFSF fractile range. Accordingly, the evidence we produce will answer the first research question raised in this thesis, that is, whether intentional style drift is present in Chinese equity funds.

While fund managers carrying out style drift may sometimes be viewed favourably as a means to enhance fund performance, there are substantial evidence to suggest that the positive relationship between fund performance and style drift is weak. While Wermers (2012) finds drift managers appears to pick stock successfully to cover for trading costs, he also shows that style drift funds on average generate higher level of trading costs than style dedicated funds. Overall, most studies document that high portfolio trading costs and poor market timing are responsible for eroding fund returns in drift funds (Kim, Shukla, and Thomas, 2000; Huang, Sialm, and Zhang, 2011; Brown, Harlow, and Zhang, 2012; and Cao, Iliev, and Velthuis, 2017).

Drawing on the literature that style drift can hinder fund investor’s interest in maximizing fund returns, the second research question of this thesis investigates the impact of style drift on fund performance, with specific attention on fund manager’s contrasting ability in exploiting risk premium under the style drift versus style dedication setting. This study measures 3 aspects of fund manager’s ability using Daniel, Grinblatt, Titman and Wermers (1997) holdings-based approach that include stock picking, market timing and average style rather than the conventional focus on the 2 aspects of stock picking and market timing abilities in style drift studies. Unlike Wermers (2012) and Brown, Harlow, and Zhang (2012), this study presents new evidence on the amount of value-add that style dedicated funds can generate relative to style drift funds.
With respect to total fund costs, this study examines hidden costs that are often not publicly disclosed in the prospectus. Because portfolio turnover—a common proxy in many mutual fund studies (Indro, Jiang, and Lee, 1998; Brown and Harlow, 2002; Lau, 2007; Holmes and Faff, 2007 and 2008; and Huang, Sialm, and Zhang, 2011)—may bias fund performance results (Chakrabarty, Moulton, and Trzcinka, 2016), this thesis uses fund’s trading costs in absolute amount. Brokerage and commissions fees, a rarely considered performance attribute in existing fund studies, are also examined. This systematic and detailed analytical framework not only deepens the current understanding of the role of style drift on performance attribution, the newer approach developed in this thesis will also clearly demonstrate the relative effects between style drift and style dedicated funds on investors’ welfare.

While this thesis is concerned with the performance impact of style drift, we also raise the third question of what drives the pervasiveness of style drift behavior, which has not been empirically explored or explained in prior style drift studies. In particular, we test how risky style drift behavior is related to fund managers’ desire to maximize compensation via a novel extension of Taylor (2003) tournament theory. We conjecture that investment style alteration is the manifestation of the investment opportunism undertaken by fund managers to compete for the highest relative rank-order result in interim performance in order to attract larger fund inflow for the purpose of maximizing AUM-linked bonus compensation.

This study uncovers evidence for the first time on whether style drift does induce future positive fund inflows to raise AUM. If there is a positive association between style drift and fund flows, we would expect funds to compete for higher relative performance ranking as winners will receive substantial new capital inflow that boosts AUM and consequently a larger compensation. Next, we test whether
funds are involved in yearly universe tournament, segment tournament and family tournament by examining fund manager’s response pattern (in undertaking style drift) to mid-year performance rank. By examining the strategic interaction between mid-year leaders and laggards in 3 different contexts: equity fund market “universe”, funds of similar style “segment” and “family” fund, this study shows how style drift behavior may be driven by fund managers’ pursuit of larger bonus compensation via competing for higher rank-order. The 3 unique tournament settings also allow us to examine the intensity of the distortive impact of “AUM-dominated” incentive arising from FMC-wide competition.

In summary, the 3 broad research questions raised in this thesis are:

1) Is style drift (measured by the degree of style departure from its stated objective) evident in Chinese equity funds?
2) What is the impact of style drift on fund performance?
3) How does AUM-dominated incentive compensation drive fund manager’s style drift behavior?

1.3 Research Significance

This research thesis makes several contributions to the literature and offers some practical implications. It addresses the dynamics and consequence of some key theoretical and empirical issues in respect of the additional and undetected risk taking associated with style drift behavior in actively managed funds within the market context of a completely in-house fund management industry. Based on the reasoning of the agency and tournament theories with reference to previous empirical works, this thesis makes the first empirical attempt in the literature to testing the
interconnection between compensation and investment style drift behavior in fund managers.

Important discoveries of the driving force of style drift behavior in managed fund industry are also made by providing evidence that style drift behavior is a result of the intense conflict of interests under the distortive “AUM-dominated” compensation model, in which fund managers alter fund style in their competitive pursuit for higher relative ranking-order to raise AUM. Although Taylor (2003) provides the theoretical assumption about why fund managers increase risk, attempt to uncover empirical evidence in support of his prediction is scant. While we recognize the fact that in practice, “real-time” portfolio choices in active funds are not directly observable, this thesis finds it more appropriate to incorporate Taylor’s (2003) reasoning in the formulation of our empirical strategy to uncover how fund managers engage in risk taking through style drift, and under what conditions do managers alter their investment style. What is more, there is no prior evidence on the often presumed relationship between style drift and subsequent new fund flows in previous studies. Our empirical test in this study on whether Chinese funds alter their investment style as a means to increase fund inflows therefore provides an important evidence-based analysis to substantiate that assertion. Results on this style drift-fund flows relationship do affirm fund manager’s motivation to maximize inflows to increase compensation through style drift. Notably, this thesis advances the understanding of the extent and impact of the intentional alteration of fund investment style arising from interfirm (between fund management companies) and intrafirm (within fund family) competitive environments. By devising a FMC-wide tournament framework, evidence from this study expands the current scope of prior key tournament studies by including the effect of “universe-relative” tournament in
assessing the extent of compensation maximization conditioned by various investor market size apart from segment (Brown, Harlow and Starks, 1996) and family fund environments (Kempf and Ruenzi, 2008).

This thesis also provides insights beyond the conventional notion of risk taking in the mutual fund literature that usually measures risk by fund returns. Most prior studies on mutual fund risk do not capture the actual fund portfolio alteration and volatility but infer fund manager’s risk actions from fund returns volatility, i.e. the greater the fund fluctuates around its mean returns, the riskier the fund as a whole without reference to the risk-return profile changes of component stock allocation. In contrast, this thesis attempts to present a fuller picture and better understanding of whether and how fund manager’s investment decision in portfolio style allocations contributes to unproductive returns as a result of excessive risk taking. We study fund manager’s actual risk taking tendency by means of detecting style drift on the basis of her stock by stock trading decisions. By examining the actual movement of stock units of the fund holdings at each fund reporting period, this empirical design for risk intention provides a constructive alternative perspective to most of the mutual fund risk studies using fund returns as risk proxy, and key papers on style drift measuring investment style changes using stock prices in portfolio holdings (Brown, Harlow, and Zhang, 2012, and Wermers, 2012). The results also aim to provide concrete evidence to substantiate the theoretical argument by Chen, Hong, Jiang, and Kubik (2013) about the high levels of risk taking within the context of a market with only in-house fund managers.

12 Mutual fund scholars of late, highlight the need to control for risk surprises (Kempf, Ruenzi, and Thiele, 2009), return mean reversion (Kempf and Ruenzi, 2008), changes in stock characteristics (Brown, Harlow, and Starks, 1996) to give a true account of fund manager’s risk-taking behavior under a returns-based methodological framework when fund holdings are not examined.
This thesis also draws a distinction between fund manager’s intentional and unintentional risk behavior, so that we can further test the implications of intentional risk taking on fund performance. This is achieved by building on Daniel, Grinblatt, Titman and Wermers (1997) holdings-based analytical framework to custom design an original fund style index constructed from 180,000 holdings observations. The purpose is to overcome the lack of appropriate style indexes for performance benchmarking in China, and more importantly to categorize funds based on their actual asset allocation so that funds with different investment styles are comparable. This thesis modifies Wermers (2000) decomposition methodology to allow a more granular examination on the performance differences between style drift and style dedicated funds, for which we use the term “drift performance gap” in our research context. In our performance gap analysis, we evaluate the relative return effect and relative cost effect with respect to stock selection, market timing, average style, and trading costs which are not seen in conventional drift studies. In introducing this novel approach, our study rigorously measures if detrimental impact on fund investors’ welfare\textsuperscript{13} is present in style drift funds. Unlike previous holdings-based style drift studies (Wermers, 2012, and Brown, Harlow, and Zhang, 2012), this thesis also considers the impact of average style ("AS") on fund performance. AS has an important implication on fund performance (Daniel, Grinblatt, Titman and Wermers, 1997), but is often overlooked in style drift studies. Because the likelihood of acquiring stocks that are already at their highest price may increase with frequent trading, this measure allows us to investigate the potential impact on fund performance in situation when fund manager increases trading to exploit short-term returns typically in the context of style drift.

\textsuperscript{13} Evidence on post style drift performance is not clear but most studies on mature markets show that style drift fund managers exhibit weaker ability in timing stock style (also known as market timing) and incur higher trading cost compared to style dedicated fund managers.
Findings of this thesis provide some important implications for the efficient functioning of the fund market, the evaluation of fund performance, and the design of compensation structure of fund managers. Specifically, how appropriate methods of fund style evaluation need to be developed and carefully taken into account by regulators, market analysts and fund management companies to detect and monitor the actual behaviors of fund managers so that more accurate information can be disseminated to better inform fund investors and other stakeholders. Our results also demonstrate the need to better monitor and regulate the conduct of the FMCs to protect individual fund investors particularly those in the emerging fund markets who are less able to defend their own interests. In particular, the importance of getting the compensation structure right for fund managers is highlighted so that the motivation for style drift can be addressed at its source to reduce information asymmetry and enhance performance. Improved transparency will benefit fund investors and other market players such as pension funds and insurance companies by providing effective benchmarks for assessing the true risk and returns of mutual funds. This thesis also complements the work of Chen, Hong, Jiang, and Kubik (2013) by analyzing the presence, motives and effects of style drift as an intentional risk-taking behavior of fund managers within an exclusively in-house fund management environment.

1.4 Thesis Structure

The thesis is structured in the following manner. Chapter 2 addresses the industrial practice of fund management business in the context of an emerging economy—China. Critical analysis is made on the regulatory regimes and corporate governance issues. This chapter also examines the structure and incentive issues concerning in-

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14 Chinese fund studies previously documented performance estimates measured in excess of benchmark returns of corresponding style—under the assumption that fund’s declared categories “growth”, “value”, “balanced” are true style characteristics of funds—may risk biased results.
house fund management organization, and discusses how the practice of style drift can undermine the accuracy of the information in the fund prospectus and adequacy of the fund rating system.

Chapter 3 reviews relevant literature, specifically agency and tournament theories in respect of fund manager risk-taking behavior in response to the mode of compensation. This chapter also analyzes the prevalence of style drift and its influence on fund performance. Premised on two major theoretical underpinnings—agency theory (conflicts of interest) and tournament theory (fund managers’ competitive risk-taking behavior), hypotheses are developed in Chapter 3 for empirical testing in Chapters 4, 5 and 6.

Chapter 4 investigates the style behavioral pattern in Chinese equity funds. It describes the hand-collected raw datasets used in this study. It explains how raw datasets are recreated for the formation of a yearly characteristics-sorted style index to serve as a system for classifying fund style. This fund classification system is rule-based and unique to this study. We provide a full account on how a fund’s true investment style identity is diagnosed at each reporting period by mapping each stock in the actual fund holdings against the constructed style index. It further develops a voluntary fund style volatility ranking metric to demonstrate how closely a fund manager adheres to the declared investment style and illustrates how the presence of style drift can lead to fund misclassification. We report the degree of investment style changes for each fund over a 5 year period and discusses the extent of drift behavior across different sub-periods. The chapter also presents the patterns of drift behavior during each calendar year and highlights the detected fund characteristics associated with style drift along with sets of robustness test.
Chapter 5 examines how active fund managers may add value to fund returns. Results on how well style drift funds have performed relative to style dedicated funds are reported using a more precise cost-return performance attribution framework and on a different style drift metric on the basis of fund’s actual stock unit movements. This is in contrast to Wermers (2012) who separates style drift funds from fund managers who perform active trade (active drift) and who engage a passive buy-and-hold strategy (passive drift) using market value of stock holdings. The direct influence of style drift behavior on fund returns through stock picking, market timing and average style is presented. The last-mentioned (average style) is a new measure for style drift performance, not seen in previous studies on style drift. This chapter also discusses cost differences between style drift and style dedicated funds arising through fund’s trading and brokerage commission, fund expenses and management fees, all in explicit\(^{15}\) cost reported by funds. Of considerable interest to the results on whether style drift can improve a fund’s \textit{ex post} performance rank are discussed.

Chapter 6, for the first time in the finance literature, uncovers the driver for style drift in the context of fund manager’s compensation that is commonly tied to assets under management. The chapters begins by detailing how the tournament model developed in this study is derived from style alteration and performance rank-order constructs. It reports results on the incentive effect of fund inflows on style drift. It then discusses the extent of style drift behavior as a result of fund managers altering investment style in all the 3 tournament situations involving (1) equity fund market “universe”, (2) funds of similar style “segment”, and (3) “family” funds. It continues to show how relative rank-order within family funds (“intra-FMC

\(^{15}\) This study uses explicit costs and include all possible cost (expressed as a percentage of fund’s TNA) that fund investors pay for owning a fund rather than implicit expenses through estimation, as they may be difficult to quantify. Wermers (2012) uses estimated trading costs (to include implicit factors) and expense ratios.
tournament”) and across universe funds (“inter-FMC tournament”) drives fund’s intention in altering investment style. Further analysis and robustness tests are presented.

Chapter 7 concludes the thesis with an overview of the major findings, key contributions and implications concerning fund market participants and research limitations. It ends by highlighting ideas for future research. Figure 1.1 outlines how this thesis project is formulated and carried out to present research findings in respective chapters.
1. Introduction

Analytical and empirical ideas raised by style drift

2. Fund Management Industry in China

Establish and develop 3 research questions

3. Theories, Literature Review and Hypotheses

Deductive reasoning

4. Research Question 1:

Select appropriate research design

Primary data

5. Research Question 2:

Quantitative methodology to answer the research questions

No ethical implications

6. Research Question 3:

Variables and measurement methods

DEVELOP A FUND CLASSIFICATION SYSTEM: HOLDINGS-BASED APPROACH

DGTW (1997)

WERMERS (2000)

BHs (1996)

Key Constructions:

Chinese equity style index

(vFSF) style drift ranking

7. Conclusion

Figure 1.1 Research process and written chapters in thesis
CHAPTER 2. FUND MANAGEMENT INDUSTRY IN CHINA

2.1 Introduction

This chapter provides an overview of the development of fund management business in China and reviews the inherent risks that fund investors may possibly face under a weak regulatory framework and distortive AUM-based incentive arrangement. These institutional characteristics can intensify the possibility of fund market failure by encouraging greater conflicts of interest between fund managers and fund investors. On the other hand, fund investor’s vulnerability increases particularly in China where internal governance mechanisms—ownership concentration and high concentration of state ownership—are generally ineffective in enhancing firm performance (Hu, Tam, and Tan, 2010), and controlling corporate risk-taking behavior\(^\text{16}\) (Farag and Mallin, 2016).

Conventional wisdom has it that fund managers are predominantly motivated by the maximization of their compensation, which often conflicts with the pursuit of maximizing the interests of the fund investors. As the fund environment becomes increasingly competitive, fund manager tends to be more “speculative” in the manner of capitalizing on short-term returns to result in higher portfolio turnover (Brown, Harlow and Starks, 1996, Chevalier and Ellison, 1997, Taylor, 2003), and changing fund investment style and fund risk profile without fund investor’s knowledge. Consequently, the problem of adverse selection occurs when the credibility of the fund mandate is compromised and investors being less well-informed about the fund product may end up with an unsuitable investment. Inefficient investment outcome

\(^{16}\) A recent study on CEOs’ demographic characteristics of Chinese IPOs on corporate risk taking finds that firms with higher state ownership makes the environment more conducive for CEO to engage in risky decisions (Farag and Mallin, 2016).
can also create negative externalities in the form of systemic risk as financial intermediaries are highly interconnected with the market.

On the other hand, mutual funds as institutional investors are increasingly expected to hold a long-term view of corporate governance by engaging and monitoring investee companies to promote value creation (Mallin, 2012). Instead of improving long-term corporate value that fund investors desire, style drift funds may not have the incentive to fulfil their role as institutional activist because they tend to hold a short-term investment horizon. As Gasper, Massa and Matos (2005) point out, short-termism hinders institutional shareholder’s activism and effective monitoring of investee company. Taken as a whole, mutual fund undertaking style drift may not duly fulfil the expectation of its broader economic role as an activist shareholder on behalf of its fund investors.

The rest of the chapter is organized as follows. Section 2.2 provides an overview of the development of China’s fund management industry. Section 2.3 reviews the efficacy of the Chinese regulatory and enforcement framework in protecting fund investors’ welfare, including the unique fund management organizational structure in Section 2.3.1, the enforcement of mutual fund mandate in Section 2.3.2, and the compensation policies and incentive issues in China’s fund industry under Section 2.3.3. Section 2.4 analyzes the credibility of Chinese mutual fund prospectus and mutual fund rating system. Section 2.5 concludes.

17 Studies on style drift demonstrate that drift managers tend to buy and sell portfolio stocks more frequently during the year (Brown and Harlow, 2002; Holmes and Faff, 2007, 2008; Brown, Harlow, and Zhang, 2012; Wermers, 2012 and others).
2.2 Development of Fund Management Industry in China

Fund management companies as key financial intermediaries of a country’s financial system, play a vital role in supporting the economic transformation and development, particularly, in emerging economies such as China’s. FMC dominates the U.S. financial system with fund assets amounting to 230 per cent of the country’s GDP in 2012 and a total AUM value of US$36 trillion (World Bank database). China’s total fund assets amounts to 12 per cent of the country’s GDP in 2012, fund management companies in aggregate hold (excluding closed-end fund assets) approximately RMB 6.34 trillion. However, within 3 years, China’s AUM doubled to RMB 13.82 trillion in the capital market in the fourth quarter of 2015.

Table 2.1 Development of Chinese fund management industry since birth from 1998 to 2015 by sub-periods

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Fund Management Company (FMC)</td>
<td>11</td>
<td>33</td>
<td>61</td>
<td>74</td>
<td>106</td>
</tr>
<tr>
<td>Total number funds (closed and open-end funds)</td>
<td>0</td>
<td>88</td>
<td>332</td>
<td>1,011</td>
<td>3,598</td>
</tr>
<tr>
<td>Number of open-end funds</td>
<td>0</td>
<td>74</td>
<td>326</td>
<td>971</td>
<td>3,234</td>
</tr>
<tr>
<td>Number of open-end equity* funds</td>
<td>0</td>
<td>0</td>
<td>177</td>
<td>367</td>
<td>628</td>
</tr>
<tr>
<td>Open-end general equity funds</td>
<td>0</td>
<td>0</td>
<td>21</td>
<td>149</td>
<td>579</td>
</tr>
<tr>
<td>Number of open-end active equity funds</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>15</td>
<td>138</td>
</tr>
<tr>
<td>Open-end mixed funds</td>
<td>0</td>
<td>39</td>
<td>220</td>
<td>465</td>
<td>1,423</td>
</tr>
<tr>
<td>Number of open-end equity-oriented funds</td>
<td>0</td>
<td>19</td>
<td>174</td>
<td>354</td>
<td>490</td>
</tr>
<tr>
<td>AUM of open-end funds at year end (RMB in Billion)</td>
<td>0</td>
<td>0</td>
<td>3,320</td>
<td>2,523</td>
<td>13,819</td>
</tr>
<tr>
<td>AUM of open-end general equity &amp; mixed funds at year end (RMB in Billion)</td>
<td>0</td>
<td>0</td>
<td>3,087</td>
<td>1,683</td>
<td>3,460</td>
</tr>
<tr>
<td>AUM for open-end general equity funds at year end (RMB in Billion)</td>
<td>0</td>
<td>0</td>
<td>350</td>
<td>382</td>
<td>815</td>
</tr>
<tr>
<td>AUM for open-end active equity funds at year end (RMB in Billion)</td>
<td>0</td>
<td>0</td>
<td>70</td>
<td>34</td>
<td>227</td>
</tr>
<tr>
<td>AUM for open-end mixed funds at year end (RMB in Billion)</td>
<td>0</td>
<td>0</td>
<td>2,737</td>
<td>1,301</td>
<td>2,646</td>
</tr>
<tr>
<td>AUM for open-end equity-oriented funds at year end (RMB in Billion)</td>
<td>0</td>
<td>0</td>
<td>2,180</td>
<td>1,020</td>
<td>930</td>
</tr>
<tr>
<td>AUM of open-end equity* funds at year end (RMB in Billion)</td>
<td>0</td>
<td>0</td>
<td>2,230</td>
<td>1,034</td>
<td>1,157</td>
</tr>
</tbody>
</table>

First mutual fund was issued in 1998 however, open-end equity fund only starts in 2004.
AUM, asset under management
open-end funds includes stock, bond, mixed, money-market, QDII, others
ACTIVE equity = actively managed funds
Open-end fund starts to operate in 08 Nov, 2002, only 1 fund is issued.

*Statistics illustrates the number of sub-periods new fund business incorporatized and regulated in China.

As depicted in Table 2.1, Chinese fund management is growing at a rapid rate, although the industry is young. The fund management industry attracted 11 new entrances within the first 2 years since the Chinese regulator has opened up its capital

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18 FMC dominates the U.S. financial system with a total AUM value of US$36 trillion in 2012, amounts to 230 per cent of the country’s GDP of US$16.155 trillion. In the same year 2012, China’s FMCs hold approximately RMB 6.343 trillion (equivalent to US$1.001 trillion) in the capital market with a US$8.561 trillion worth of GDP, the young industry is growing at a rapid rate. (World Bank database)

19 China’s GDP is worth US$8.561 trillion in 2012 (dollar figures for GDP are converted from domestic currency at market exchange rates) and US$11.065 trillion in 2015 (Source: World Bank database).
market to managed fund business in 1998. The new Chinese fund industry continues to see a steady increase in the number of new fund management companies between 2000 to 2007 until 2008 when fund business starts to experience a slowdown amidst the global financial crisis and the number of new entrance has visibly declined to a number on par with the initial opening period between 1998 and 1999. However, managed fund business has regained its foothold in the Chinese market with a surge of 32 fund management company licenses being issued between 2012 to most recently 2015. This marked increase in new fund business has broadened the Chinese capital market and contribute more investment offers for people looking to invest their capital. While more investment choices are desirable, investors need to understand how their interest is being safeguarded during the course of their capital investment horizon. This raises the questions of how fund management companies are managed internally and whether they are acting in accordance with the investment rules regulations imposed on fund business, and what are the factors influencing their behavior.

2.3 Regulatory & Legal Environment and the Corporate Governance of Fund Management Business

The problem of information asymmetry relating to mutual funds undertaking undesirable risk through style drift can be intensified by the lack of appropriate regulatory standards and enforcement efforts on fund manager’s compliance when conflicts of interest arises. Under such circumstances, the functionality of the fund management sector becomes unsustainable, particularly for an emerging economy that manifests weak internal and external governance mechanisms such as China (Hu, 20__).

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20 The industry total AUM for open-end general equity and mixed funds was seen shrinking 50 per cent at the end of 2011 compared to AUM at the end of year 2007.
In the following subsections, we provide a thorough review of the internal and external governance mechanisms, fund investment operations, and fund manager’s compensation scheme of the fund management sector in China, to identify situations where risk taking such as style drift can be motivated.

### 2.3.1 The impact of the structure of fund management organization on investor’s protection

In the U.S., each mutual fund is organized as a corporation (the corporate form of fund management organization). This corporation, however, is “empty” with its operations jointly supported by peripheral organizations that provide administration and accounting, investment advisory and custodian services to the fund. Fund investor buying into an American mutual fund is also a shareholder of the FMC. This legally accord them with shareholder voting rights that can in principle be translated into a voice in overseeing the management of the fund management organization. In addition, shareholders of the fund can vote and elect Board of Director to the FMC to oversee the fund operations and review contracts with its peripheral organizations.

In contrast, Chinese mutual fund (also called “Securities Investment Fund” in China) is a product manufactured by the FMC for purchase by fund investors. This product takes the form of a contract stipulating the terms and conditions for owning units in the mutual fund. FMC in China is a contractual form of fund management organization (Yu, Tam, and Zhou, 2015). Fund investors enter voluntarily into the fund contract and only enjoy the rights of a beneficiary. These rights include (1) sharing the income from fund assets that fund manager acquires less the expenses; and (2) convening a fund investors meeting to exercise their voting rights on material issues. However, the hurdles and requirements for convening such a meeting is
challenging\textsuperscript{21} and as a result, such meetings are extremely rare. Fund investors do not receive returns from the overall performance of the fund management organization which may manufacture multiple fund products for investors. In reality, Chinese fund investors can only vote with their feet when they cannot voice their input against management power.

Contractual fund management arrangement often has specific written rules, and investment decision power in managing the collective assets is conferred to the fund manager, an employee of the fund management organization. As a result, Chinese fund investors do not have governance voice as shareholders of the fund management organization. However, Chinese fund management organizations as a trustee of the mutual fund have fiduciary duties in performing their functions.\textsuperscript{22} Specifically, fund managers are also subject to the fiduciary duties to perform under the principle of giving priority to the interests of the fund investors (\textit{Securities Investment Fund Law of the People’s Republic of China, 2012, Article 22}), and they are not to conduct securities trading and other activities that cause damage to the fund interests and the interests of fund investors (\textit{Securities Investment Fund Law of the People’s Republic of China, 2012, Article 19}). Collectively, the primary aim of the above-mentioned 2 provisions is to minimize conflicts of interest between investment decision maker (fund manager) and the beneficiary of the fund contract (fund investor).

Although fund management legislation in China aims to protect fund investors’ interests, the weak internal corporate governance structure within the FMC,

\textsuperscript{21} Under Articles 84 and 88 of the \textit{Securities Investment Fund Law of the People’s Republic of China, 2012}, fund investors have the ability to convene a general meeting to exercise their voting rights if investors own 10 per cent or more of fund shares request it. Further, the fund investor’s meeting may be held only when the fund investors representing more than half of fund shares attend the meeting.

\textsuperscript{22} See Articles 19 and 22 of the \textit{Securities Investment Fund Law of the People’s Republic of China, 2012}.  

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particularly where the proportion of controlling shareholders is high,\footnote{State ownership and controlling shareholders are high in Chinese FMCs. The state on average owns about 59.78 percent of the total FMC’s shareholding (Yu, Tam, and Zhou, 2015). There is also a high degree of state ownership among Chinese listed firms in general (Hu, Tam, and Tan, 2010, and Farag and Mallin, 2016).} makes fund investors in China more vulnerable to agency conflicts that are associated with poor fund performance (Yu, Tam, and Zhou, 2015). Furthermore, it has been found higher risk taking is associated with state-owned Chinese firms (Farag and Mallin, 2016). Because state-owned firms are more likely to receive preferential treatment from the state, these firms are found to be less sensitive to poor financial performance (Hu, Tam, and Tan, 2010). Notwithstanding that Chinese fund investors appear to have their interest protected by law, the existing internal governance mechanisms in FMC are less effective in mitigating agency conflicts between fund managers and fund investors.

### 2.3.2 Enforcement of mutual fund mandate

U.S. regulators take a stern view towards misleading investors with a deceptive fund name since the birth of the fund industry. Under stronger regulatory safeguards, the U.S. Investment Company Act, 1940, Section 35(d) contains clear provision for funds that named after a particular type of investment to have 80 percent of the assets invested in that specific type as declared or risked legal penalty.\footnote{The ICI (2014) has put in place a national fund classification system consisting of multiple fine-levels of categorizing each U.S. funds based on clearly defined description. The explicit definition helps fund provider in naming their fund more accurately, in which they have the legal obligation to manage the portfolio in accordance to stated fund investment objective. As regulated, U.S. fund’s name is to reflect the implemented investment objective of a fund, this is however not a common practice in other fund markets including China. Of course, even under the more stringent and mature regulatory environment of the U.S. market, style drift is found to be common.} In contrast, the Securities Investment Fund Law of the People’s Republic of China, 2004 allows equity funds to operate within a 60-40 (60 percent in stocks and 40 percent in other asset class such as bonds and cash) asset allocation range. Much lower than the mature market standard, equity fund managers in China enjoy a greater flexibility in
their investment policy. Although the *Securities Investment Fund Law of the People’s Republic of China, 2012* has introduced enhancement in recent years to increase the stock holdings requirement in equity fund to 80 per cent,\(^{25}\) the provision to impose civil liability on fund manager for not managing the fund in accordance to mandate is unclear. From a regulatory point of view, the Chinese fund investors seem to have been accorded a lower level of legal protection for fund misclassification. While the *Guidance Opinions on Administration of Investment Management Personnel of Fund Management Companies* requires investment personnel (fund manager, fund management company and related parties) to disclose fund performance truthfully, what constitutes “truthful disclosure” in which performance is achieved remains unclear for this purpose. In this respect, the directive may not extend sufficiently strong safeguards to mitigate the non-adherence to fund mandate for Chinese fund investors (China Securities Regulatory Commission: *CSRC Announcement (2009) No.3 – Guideline Opinions on Administration of Investment Management Personnel of Fund Management Companies*). The less developed regulatory regime for Chinese investor protection in China may provide greater opportunity for fund manager to disregard the interest of the fund investors when regulatory framework does not provide adequate means to discipline inappropriate behavior by managers. Consequently, the agency cost would likely be higher for Chinese fund investors.

### 2.3.3 Compensation structures in fund management industry

This subsection provides a background on how Chinese fund managers are compensated and the implications of the uniquely in-house incentive-contracting arrangement in China.

\(^{25}\) This reduces the flexible approach in equity fund asset allocation, particularly for general equity funds. It also helps draw a clear distinction between equity-oriented, fixed-income-oriented balanced funds and flexible allocation funds in the hybrid category in the Chinese fund market.
It is common for fund managers to receive compensation that ties to the size of AUM. Under 2012 Securities Investment Fund Law of the People’s Republic of China, fund manager is to be paid on a float-rate and receives bonuses based on the value of the assets they managed. The revised regulation has formalized the use of “incentive-fee” in respect of a float-rate and bonuses to attract top fund managers and elicit greater efforts in managing the funds. With the introduction of compensation design flexibility, fund manager can now share the profits at FMC-level (AUM) in the form of a float-rate which can have a more significant impact on her total compensation package. Consequently, all fund managers can be expected to be more motivated to raise AUM under this form of “AUM-dominated” incentive. The compensation regulation is gearing the Chinese fund market towards a more incentive-based system, aligning with international industrial practice, but may unwittingly entrenching the distortive effects of the AUM-linked incentive mechanisms.

Theoretically, incentive fees structure is regarded as a tool to draw and entice star managers in managed funds. When the size of the incentive is a function of fund returns, fund managers exhibit stock picking ability (Elton, Gruber, and Blake, 2003). However, this comes at a cost from the fund investor’s perspective when incentive fees are positively associated with excessive risks. Studies show that funds incentivised by chasing after AUM tend to take on greater risks than non-incentivised funds, and that manager manipulates fund risks following a period of poor performance relative to peers (Chevalier and Ellison, 1997; Brown, Harlow and

26 The U.S has a long history for incentive-based system well rooted in its managed fund market. The SEC Congress has since permit 3 types of compensation contract that fund management companies can offer to their fund manager. They are 1) asymmetric contract—where the proportion of non-performance penalty is relatively lower than bonus, 2) symmetric contract—where non-performance penalty equates bonus and 3) absolute or non-performance based compensation design. Symmetric contract is the most commonly adopted pay scheme for mutual fund managers in the U.S while the asymmetric contract has been prohibited since 1971.
Therefore, the formalization of this distortive AUM-compensation model in China may potentially undermine the interest of fund investors in the face of competition and compensation-maximizing behavior as posited by tournament theory whilst weak governance structure and the ineffective enforcement of investor rights exacerbate the problem.

On the other hand, mutual funds in China operate in a mandated trilateral structure involving the FMC, the custodian and the fund investor. Chinese mutual fund depends less on external fund service institutions for peripheral services, unlike American funds (Huang, 2014). Despite the fact that peripheral fund services can be outsourced, under the China’s Securities Investment Fund Law 2012, investing fund assets in securities remains the core duty of the FMC. In that respect, mutual fund industry in China operates in a setting of in-house fund management model, where the investment operation of mutual fund has to be managed internally by managers within a fund management company (FMC) under Chinese regulations.

Under this in-house institutional structure, funds are expected to exhibit higher risk profile than funds managed by external fund managers as a result of superior in-house incentive terms (Chen, Hong, Jiang, and Kubik, 2013). Unlike in-house fund managers, outsourced managers are found to be more sensitive to underperformance and are more risk adverse because collectively they face greater threat of early

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27 Peripheral fund services include fund sale, accounting, trading payment, share registration, valuation, investment advice, rating, and information technology system. However, the ability to outsource these services to external providers does not relieve the FMC from any liability assumed by it under 2012 Securities Investment Fund Law of the People’s Republic of China.


29 Fund professionals responsible for investing fund assets are employees of the FMC, who must comply with relevant laws and the management rules of their employers (FMC). China Security Regulatory Commission (“CSRC”) Announcement [2012] No. 15, Provision I. FMCs may choose to outsource other fund operations such as sales, trading payment, investment advice to clients, share registration, valuation, rating, information technology system to fund service providers. Chapter XI, Fund Service Providers, Security Investment Fund Law of the People’s Republic of China [2012].
contract termination for poor performance and hence a more substantial loss of FMC fee-based revenue compared to losing individual investors in situation where in-house funds fail to perform. This prediction of Chen, Hong, Jiang, and Kubik (2013) highlights that Chinese fund manager may strive to exploit short-term risk premium to maximize inflows by shifting fund holdings to stocks with characteristics beyond fund mandate given that drift actions are usually shielded against public backlash,\(^30\) and that the Chinese fund market is more vulnerable to agency issues.\(^31\)

2.4 Credibility of Fund Prospectus and Fund Rating System

Fund investors often make use of fund prospectus as their first point of reference when choosing a fund. With the rapidly rising number of new funds created each year in China, it is lucrative for distribution channel to push for new subscriptions. As Chinese fund investors generally lack sophistication in their investment behavior and many have limited knowledge about risk and product differences and capital allocation (Avery, Cai, and Zhu, 2009), it then becomes natural for them to rely on stated fund name and brief descriptions of fund’s investment strategy to inform them of the associated risk and possible return. Therefore, mutual fund prospectus is an important source of document for the individual investors, especially with respect to signalling the anticipated risk-return profile of a fund.

Mutual fund prospectus, a legally binding public document, must offer sufficient and genuine information in terms of fund costs and investment objective, so that investors can judge its worth of investing in the funds against their risk-return

\(^{30}\) Because style drift is often an unobserved action, fund managers can shield themselves from investor’s criticism and legal implications.

\(^{31}\) China, a young mutual fund market, only operates with in-house fund managers (what Chen, Hong, Jiang, and Kubik (2013) designate as “low-powered agents”) with regulations at their developing stage, and that Chinese fund investors interests are less protected in a fund contract-beneficiaries structure. As opposed to other jurisdiction like the U.S. where mutual fund is a legal entity-corporation-by itself, fund investors are shareholders who in principle may exercise governance role over the fund management corporation.
preference. However, the notion of investment style is often unclear and thus mutual fund tends to have vague descriptions for investment objective\textsuperscript{32} in the fund prospectus. Style investing in mutual fund gains its popularity only in the 1980s through the largest and most mature market in the U.S. As noted by Christopher and Williams (1997), fund’s investment style can get more complex as manager invests in various segments (large market capitalization in combination of value and growth investing approach) rather than a single segment (large market capitalization) of the market. At present, style investing is also a common way to approach investing across mutual funds in China. The majority of Chinese equity funds are named after a value or growth investment style in their prospectus. Thus, a lack of transparency in the actual investment strategies when style drift arises not only devalues the usefulness of a fund prospectus (public information) but it also exacerbates information asymmetry issue that harms fund investor interest and undermines the notion of an efficient market.

On the other hand, it is widely accepted that even in mature market, individual investors on average rarely study investment prospectus but base their investment decisions on a readily “understood” salient feature of a fund—past performance rank-order (Sirri and Tufano, 1996, and Chevalier and Ellison, 1997). However, mutual fund star ratings may be flawed if fund manager persistently diverge her actual investment strategies from the declared mandate. Kim, Shukla, and Thomas (2000) demonstrate that drift fund can game its rank upwards within its stated investment style category because funds’ \textit{ex post} performance is relatively compared without attributing to their true investment styles (Brown and Goetzmann, 1997). In situation where relative rank results are biased, fund investors cannot distinguish between a

\textsuperscript{32} Alternatively, funds describe their investment strategies to indicate a specific stylized orientation.
skilled manager and a lucky manager when the latter game their investment strategies through style drift. Gradually, fund investors may thus lose their confidence in mutual funds and as a consequence, withdrawing their capital from fund sector. The chain of consequential events engendered by style drift can contribute to suboptimal efficiency in the fund management sector and may raise question about the stability of the Chinese financial system.

2.5 Conclusion

This chapter provides an overview of the development of fund management business in China while reviewing the issue of efficacy of the Chinese regulatory and enforcement framework in protecting fund investors’ welfare. It is obvious that fund industry in China is undergoing substantial growth in assets under management and that there is an increasingly important role for fund management company in supporting economic growth and the sustainability of the country’s financial system. However, as the fund management industry in China experiences rapid growth, mutual fund faces more challenges in attracting new and maintaining existing fund investors. In the face of intense fund flows competition among fund peers, the likelihood for fund manager to expropriate the interests of the fund investors can potentially increase. Excess risk taking are presumably greater in Chinese mutual funds because the distortionary lower-powered incentive scheme created in-house managed funds can cause managers to become less sensitive to poor performance. The lack of appropriate regulatory standards and enforcement efforts on fund manager’s compliance in the face of agency conflict; the contractual form of Chinese fund management companies that do not accord fund investors governance rights over the management of their funds; the in-house fund management arrangements, and fund manager’s AUM-linked compensation structure, may all contribute to the
promotion of opportunistic behavior such as style drift in Chinese mutual fund. However, the situations regarding the presence of intentional style drift is not clear due to the scant research on this important issue. This thesis is motivated to address these underexplored issues in a fund market of exclusively in-house fund managers, and investigates the motives and effects of style drift.

In the next chapter, we discuss in greater details the recent developments of opportunistic behaviors seen in actively managed mutual funds whilst noting the prevalence of style drift in some international contexts, mainly in mature fund markets. We also develop and uncover on what motivates excess risk taking in fund manager and how risk action, particularly style drift, affects fund performance, issues that are central to this thesis. A better understanding of the (opportunistic) behavioral motivation is important in addressing the adverse impact on fund portfolio outcome, if any, because related suboptimal fund performance could pose risks to fund industry and destabilise a country’s financial system.
CHAPTER 3. LITERATURE REVIEW & HYPOTHESIS DEVELOPMENT

3.1 Introduction

As we observed earlier in Chapter 2 (in Table 2.1), the fund management industry in China has witnessed rapid expansion recently with a total new issuance of 32 fund management company licenses within 3 years. As the industry develops and market competition intensifies, Chinese fund management companies are seen manufacturing more fund products with names or “labels”, which may turn out to be less consistent with fund’s stated investment strategies in the prospectus. Although fund investors now enjoy a wider range of options of funds for investment, funds are becoming too complex\(^{33}\) and confusing for the average and unsophisticated investors to understand and differentiate. In conjunction with the weak regulatory standards and enforcement efforts on fund manager’s compliance in the face of agency conflict; the contractual form of Chinese fund management companies that do not accord fund investors governance rights over the management of their funds; the in-house fund management arrangements, and fund manager’s AUM-linked compensation structure; the inherent risk in Chinese mutual funds becomes greater and this creates potential problems for fund investor’s preferred risk-return portfolio.

This thesis aims to address the problems of style drift, often under-researched, in mutual funds by detecting the presence of this behavior and uncovering its motives and impact on fund performance. In particular, this chapter provides a conceptual framework on the basis of adopting, extending and integrating relevant prior work and existing theories to help identify key issues in respect of the undetected risk taking

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\(^{33}\) Chinese retail investors generally cannot see through the jargons set out in fund names and worded in fund objectives (The Economist, 2013).
associated with style drift behavior and to develop our own methodological approach.
All mutual funds mentioned in this thesis are equity funds that are actively managed, unless otherwise stated. An equity fund, sometimes also known as a “stock fund” in the mutual fund literature, mainly invests its fund assets in stocks.

The rest of the chapter is structured as follows. Section 3.2 highlights the major factors with respect to regulatory regimes and structural issues of fund management organization; corporate governance problems; distortionary AUM-based compensation system; and the circumstance of information asymmetry in China’s fund market which can give rise to style drift behavior. We introduce the concept of style investing in actively managed funds and the widely used analytical approaches in identifying fund investment style which is important in the assessment of fund performance in Sections 3.3, 3.4, 3.4.1, and 3.4.2 respectively. We detail how style drift can affect fund performance with respect to fund manager’s abilities (under Section 3.5 and its subsections), and fund costs (in Section 3.6). Sections 3.7 to 3.10 develop and explain our testable hypotheses in respect of fund manager motivation and its link to risk-taking behavior in the context of style drift. Specifically, we identify the incentives that could drive style drift behavior and describe how drift manager may alter fund style in between calendar-year periods (“style alteration”) in an attempt to improve fund’s rank-order to maximize her AUM-linked compensation.

3.2 Misalignment of Interest and Style Drift Behavior

In fund management setting, principal-agent relationship exists when fund investor (principal) delegates portfolio management to fund manager (agent). Under this condition, fund manager is contracted to perform all investment decisions on behalf of
investors who contribute capital to the fund. This contract, also known as a mandate, commands that the pooled monies are to be invested in a particular asset class and style as declared in the fund prospectus. Agency problems arise when the interest between fund investor and fund manager are misaligned. Fund investors buying a particular equity fund expect their manager to maximize returns within the pre-specified investment strategy or style. This preferred risk-return characteristics associated with the stated fund strategy or style resonates with investor’s risk preference and investment goal.

However, fund manager motivated to maximize her compensation may choose to alter the risk profile and invest in assets outside the boundaries of the investment objective specified in the prospectus. Consequently, the prospectus does not convey the actual risk of a fund and that gives rise to asymmetric information about fund manager’s risk taking. This behavior is commonly known as style drift in the finance and mutual fund literature. This thesis will use the term “style drift” interchangeably with other names such as “style inconsistency”, “style tilt”, “style volatility”, and “style shifting” which are also frequently used in the literature to refer broadly to the divergence of a fund’s actual investment style from its declared contractual investment strategy in the fund prospectus. Studies on style drift have established strong evidence for the shift in fund investment style over time leading to fund misclassification. It has been found that equity funds show cross-sectional unstable

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34 Fund management is a non-rigid activity in that manager needs to exercise investment discretion such as buying and selling assets as and when warranted by the fund.
35 In regulation, fund is to invest 80 per cent of its pooled capital in a particular asset class or equity style as advertised in the prospectus. U.S. Investment Company Act, 1940 and Securities Investment Fund Law of the People’s Republic of China, 2012.
36 “If both parties to a relationship are utility maximizers, there is a good reason to believe that the agent will not always act in the best interests of the principal.”(Jensen and Meckling, 1976, p.5)
37 A compensation system that depends on the market value of the assets fund manager manages “AUM-based compensation”, consequently creates tournaments among managers (Brown, Harlow and Starks, 1996; Chevalier and Ellison, 1997; Taylor, 2003; Kempf and Ruenzi, 2008; Jans and Otten, 2008). It has been found that AUM-based compensation strongly motivates funds to engage in risk taking to compete for higher fund ranking.
portfolio characteristics with investment style that diverges from prospectus investment objective. Although studies are predominantly focused on the fund market in the U.S., the behavior is also found in other mature economy like Australia and emerging economy such as Malaysia (Brown and Goetzmann, 1997; diBartolomeo and Witkowski, 1997; Kim, Shukla, and Thomas, 2000; Brown and Harlow, 2002; Holmes and Faff, 2007, 2008; Brown, Harlow, and Zhang, 2012; Wermers, 2012; and Cao, Iliev, and Velthuis, 2017).

When fund manager invests in stocks with characteristics other than the mandated style, she distorts fund performance although that may give her a chance for a higher mutual fund ranking relative to peers of the same fund category, for instance large-cap oriented funds (Kim, Shukla, and Thomas, 2000). A higher ranking fund tends to attract substantial new inflow of fund capital and increases AUM in the next period (Sirri and Tufano, 1998), with considerable influence on fund managers’ bonuses. In connection with fund managers’ distortive incentives, a recent study by Chen, Hong, Jiang, and Kubik (2013) on the perspective of boundaries of the firm, argues that the form of fund management organization can shape fund manager’s risk undertaking and the returns of active funds. Particularly, it is argued that in-house managed funds outperform funds that are externally managed (“outsourced”). The reason is that when FMC can effectively assign competent manager to a fund and better extract performance through in-house (“lower powered”) incentive, internal manager’s effort can be directly monitored. In contrast, outsourced fund manager’s effort is based on past performance and therefore under the pressure of steeper incentive (early contract termination as “higher powered” incentive), outsourced managers are more sensitive to underperformance and are more risk adverse than in-house managers. The implication from the study of Chen, Hong, Jiang, and Kubik
(2013) is that in-house compensation contract is expected to provide in-house mutual fund manager the incentives to take on more risks. We, thus expect fund managers in China to have a strong tendency to engage in risk taking activities that act against investor’s interest because of the solely in-house fund management environment, where fund assets are managed by fund professionals who are employees of FMC.

This thesis also considers the impact of regulatory and governance dimensions, as discussed in Chapter 2, of fund manager’s risk-taking behavior in China. The widely acknowledged lack of regulatory standards and enforcement on fund manager’s compliance in the face of agency conflicts may inadvertently further encourage the practice of style drift. As beneficiaries of a fund product, fund investors in China can claim the returns on the fund they invest in but do not have any governance rights over the management of the corporation that oversees the investment of their money. In reality, the option for Chinese fund investors is to vote with their feet when they cannot voice their input against management power. Furthermore, the dominance of AUM-based compensation scheme for fund managers, particularly the short-term incentive to maximize bonus payment, is likely to drive funds to become more sensitive to relative ranking. As a result, fund managers alter portfolio risk to try to improve and maintain their performance rank position relative to peers (Brown, Harlow, and Starks, 1996; Chevalier and Ellison, 1997; Taylor, 2003; and Dijk, Holmen, and Kirchler, 2014). Overall, the generally weak and ineffective external and internal governance mechanism (Hu, Tam, and Tan, 2010; Yu, Tam, and Zhou, 2015; and Farag and Mallin, 2016), AUM-based compensation scheme, and the presence of information asymmetry on fund manager’s risk actions, are likely to make the fund environment more conducive for risky behavior. Hence, we predict that style drift is prevalent in China.
Hypothesis 1: Discernible investment style drift can be discovered among actively managed Chinese equity funds.

3.3 The Notion of Investment Style

We review in this subsection, key studies on market anomalies and their implications for measuring the performance of mutual funds, particularly those with different investment styles.

To better understand the concept of mutual funds’ investment styles, we need to trace back to studies on market anomalies. Authors on market anomalies view that stock returns are driven by factors with respect to “size” (Banz, 1980) and “valuation” (Basu, 1977) effects other than a single factor exposure of systemic risk, that is “the market”, under the assumptions of the Capital Market Pricing Model (“CAPM”) developed by Sharpe-Lintner-Mossin in the 1960s (Sharpe, 1964, and Sharpe and Cooper, 1972). The theory that market is partially efficient is founded in a key study on market efficiency and asset pricing (Fama and French, 1992; Fama and French, 1993). The findings that distinctive characteristics exist in stocks have eventually given rise to the notion of investment style, which prompted the creation of numerous style indexes to track various market segments. For example, the well-known Standard &Poor’s “S&P” style indices 500 to represent large-cap market, mid-cap market is represented by S&P mid-cap 400, small-cap market is represented by S&P small-cap 600, growth and value indices to name a few. The introduction of the style index, strictly speaking a portfolio of stocks with similar characteristics suggests that each investment style is characterized by a unique risk-return pattern.

Depending on the declared fund investment objective, a fund manager must adopt various investment strategies in her portfolio construction to add value to fund returns. These strategies are the outcome of manager’s investment philosophy and
they can be categorized into 1) technical analysis—contrarian or momentum approach; and/or 2) anomalies/stock attributes—calendar effect, stock characteristics in respect of size, value or growth (Reilly and Brown, 2003). Within the Adaptive Markets Hypothesis framework, fund manager has the opportunities to profit from mispriced stocks (Lo, 2004).\textsuperscript{38} Indeed, the market has to be less efficient than it has been assumed by the Efficient Markets Hypothesis, otherwise investment strategy such as simultaneously longing a value portfolio and shorting a growth portfolio could not be profitable (Fama and French, 1995). It is an industry-wide practice that mutual funds are categorized into investment styles that reflect the investment objectives and the underlying strategy of funds.

The manifestation of market anomalies and that different investment styles have dissimilar risk and return characteristics provide two important implications for fund performance attribution. First, the common use of beta in CAPM model to adjust for fund returns is inappropriate. Put simply, using a broad market index that represents a large-cap market segment as a performance benchmark for fund investing in other segment of the market, for instance, a small-cap oriented fund will cause performance attribution to be inaccurate and inadequate. Second, style analysis, a methodical approach to discovering a fund’s actual investment style plays a significant role in accurately measuring a fund’s true performance because investment styles can explain the variations in fund returns. Style analysis is of critical importance in situation of fund misclassification, in particular, when stated investment style no longer represents the actual investment style of the fund.

\textsuperscript{38} Lo (2004) illustrates that the population of “market participants” and the environmental factors undergo cycles and change the market conditions, therefore, the market is not constant.
The following subsection highlights the theoretical approach and findings in key studies that employ both the single CAPM beta and multi-factors models in discussing how well these models measure fund performance.

3.4 Investment Style and Performance Variations

As early as 1974, McDonald (1974) has documented the influence of investment style on mutual fund performance in a simple study. His study consists of 123 U.S. mutual funds of various stated objectives from 1960 to 1969. His aim was to examine if monthly excess return of these funds increase with systematic risk. The funds were investigated over a period of 10 years and risk-return analysis was conducted in the context of CAPM. It is interesting to note the difference on fund performance measure in earlier days when style investing in terms of size and style dimension is rare and style classification less refined. As such, stock market index as performance benchmark is often used.

McDonald relies on explicit investment objectives found on fund prospectus to categorize funds. He demonstrates that investment style can help explain the positive risk-return relationship in these funds over the 10-year continuous analysis. It has been found that aggressive growth funds have high levels of beta and total risk, while capital-gain funds have the greatest systematic risk as measured in beta. In comparison, capital-gain funds are the riskiest among the 6 fund categories while income funds exhibit the lowest beta. Adjusted-risk returns based on Sharpe and Treynor ratio appeared to support the positive mean-variance outcome. Over the 10-year period, higher risk funds generate more superior returns than lower risk funds. Capital-gain funds had a mean excess returns of 0.69 per cent while income funds earned only 0.25 per cent on average.
In contrast, Malkiel (1995) finds no risk-return relationship in all U.S. mutual funds during 1971 to 1991 using CAPM. Taking S&P 500 as benchmark, the quarterly excess returns produced insignificant alpha of negative 0.06 per cent over the 10-year period. Similar results were evident when different benchmarks, for example, Wilshire 500 and average general equity mutual funds were employed. In terms of performance predictability, winning funds show considerable persistency in the 1970s when returns were measured over a quarter or a 2-year period. These winners tend to appear frequently. Like the winners, losers also tend to repeat itself. However, performance persistency is less robust in 1980s. It is obvious that performance persistency is time interval-specific and dependent on the spans of years.

Following the discovery of size, value and growth effects (Basu, 1977; Banz, 1980), there is an increase in the use of style factors as risk premium on performance evaluation (Fama and French, 1995; Carhart, 1997). The presence of market anomalies implies that the common use of market beta in CAPM model to adjust for fund returns will produce inadequate results if size and value-growth risk factors are not taken into account. More researchers are further inspired to find ways to refine fund categories at style level to account for the evolving investment strategies through time (Brown and Goetzmann, 1997, diBartolomeo and Witkowski, 1997). Style analysis is able to attribute fund risks more accurately in line with manager’s investment actions, particularly when fund misclassification is widespread in today’s mutual fund industry. In a more pragmatic way, style analysis also allows for a more accurate performance attribution against appropriate style benchmark.

3.4.1 Style drift discovery framework

Returns-based style analysis is widely used to determine investment style. Sharpe (1992) argues that manager’s investment style could be identified with ease by
observing the coefficients between historical fund returns and style indexes returns. With similar CAPM intuitiveness, the Sharpe model\(^{39}\) explains factor sensitivities of past fund returns on style indexes benchmark. It is different from the asset pricing model approach in that, Sharpe-style return analysis is a constraint model. Since the idea is to obtain the highest factor sensitivity against a style index with minimum variance, factor has to be constrained within the range from 0 to 1 with the entire beta summing to 1. Hence, it assumes that no short selling will take place. Style factors can be in the form of pre-formed style indexes (Sharpe, 1992, and Elton, Gruber, and Blake, 1996) or customized style benchmarks (Fama and French, 1993, and Carhart, 1997). By quadratic programming, the exposures (factor loadings) will represent the securities characteristics in a fund. The resultant factor coefficients then define how manager allocates his asset across different styles and from which a manager’s style can be concluded on the basis of percentages of the style benchmark regressed.

Returns-based style analysis is an easy to use approach to classify funds, simply by regressing fund returns against the returns of a set of passive style indexes or some specifically constructed portfolios. The fact that historical returns data can be obtained without difficulty, this low-cost approach has been commonly employed in the study of style drift (Brown and Harlow, 2002; Holmes and Faff, 2007, 2008 and others). Authors define style drift as the inability of manager to adhere to her mandated style and hence investment style deviates over time. The term style drift and style inconsistency are often used interchangeably in the literature. There are various ways—tracking error, R-Squared (“RSQ”), drift scores—to account for style inconsistency. While some prefer traditional methods to provide evidence on style inconsistency, the Sharpe-style analysis model is as follows: 

\[
R_{p,t} = 1F_{1t} + 2F_{2t} + \ldots + k + F_{kt} + t,
\]

where \(R_{p,t}\) is fund return for \(t = 1, 2\ldots T\); \(k\) is the factor sensitivity of fund to style factors \(F\); \(F_{1t}\ldots F_{kt}\) is the returns for style factors \(F\) at time \(t\); \(t\) is the excess return at time \(t\) (proportion of return not explained by style factors \(F\)).
drift (Brown and Harlow, 2002; Lau, 2007), others prefer a later measure developed by Idozrek and Bertsch in 2004 (Holmes and Faff, 2007).

Alternatively, holdings-based style analysis (“HBA”), also known as characteristics-based analysis, directly examines the actual stock characteristics in the portfolio holdings. This technique is not used extensively as it requires large amount of resources in terms of fund and stock data acquisition and analysis. The fund database provides comprehensive details on the asset constituents in each fund holding such as dollar invested in each stock, bond, fund, warrant and the cash holding. On the other hand, the stock database offers knowledge on the characteristics of the securities which must be assessed individually at stock level. These equity style attributes in the form of size, value and growth, and momentum factors are then mapped against the composition of the actively managed portfolio to identify the style centrum, measured by portfolio weight. HBA better reflects the true fund style but is very time consuming and costly to execute. Very few empirical studies on style drift are based on HBA technique (Brown, Harlow, and Zhang, 2012, and Wermers, 2012) while the majority employed RBA methodology (Brown and Harlow, 2002; Holmes and Faff, 2007; and 2008; Lau, 2008).

Another classification is to consider the clustering effects for a similar style group. Kim, Shukla, and Thomas (2000) classify funds according to investment styles using discriminant analysis. By means of Mahalanobis distance, fund styles are identified in multidimensional space and those with similar attributes will cluster in close proximity. This method of classifying funds according to its attributes has concluded that most of the U.S. mutual funds from 1993 to 1996 have misled fund

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40 A customized holdings-based benchmark will capture the dynamic style changes of a fund more accurately and has an added advantage to properly judge a manager’s performance since benchmarks are specified in advance (Hardy, 1997).
investors in terms of its stated objectives. In practice, this methodology has not been widely adopted.

3.4.2 Style analysis in fund attribution

Because equity investment styles have been found to be capable of explaining variations in fund returns, style analysis either in the form of returns-based or holdings-based, have been adopted as the primary approach in recent studies on fund performance attribution.

Brown, Harlow, and Zhang (2012) illustrate the consistently higher average annual returns generated by large-value funds as opposed to large-growth funds in their U.S equity funds study from 1978 to 2009. Small-cap funds are only earning marginally higher while mid-cap funds did not seem to perform. Small-cap funds outperformed large-cap funds on average by 2.11 per cent and 2.93 per cent annually during that period. The idea that different styles appear to generate different level of performance has not been widely examined until the 1990s (Indro, Jiang, and Lee, 1998; Holmes and Faff, 2007; Holmes and Faff, 2008; Lau, 2007; Wermers, 2012; Chi, 2014; and Brown, Harlow, and Zhang, 2012). These studies will be discussed in greater details in Sections 3.5 and 3.6 below.

3.5 The Effects of Style Drift on Fund Returns

The outcome of how an active mutual fund is managed is of great importance to fund investors, particularly when style drift is commonplace in today’s mutual fund market. The information asymmetry of the undetected style drift has important ramifications for fund investors seeking to maximize fund returns. It is because in cases where a fund’s portfolio allocation deviates from its stated investment style, it becomes another fund product with different risk-return profile that is not compatible (mismatched) with fund investor’s initial investment goal. This thesis therefore aims
to better understand how risk taking in style drift affects fund performance by producing new evidence on the basis of the novel approach and new metrics developed in this study. This subsection will discuss evidence on fund performance in relation to style drift in the current literature.

Evidence of funds being misclassified has been documented in prior studies (Brown and Goetzmann, 1997; diBartolomeo and Witkowski, 1997; and Kim, Shukla, and Thomas, 2000).\footnote{Using clustering methodology, Kim, Shukla, and Thomas (2000) show that more than 50 per cent of the U.S. mutual funds are misclassified and approximately about 33 per cent of the funds are severely misclassified. On the other hand, diBartolomeo and Witkowski (1997) report that 31 per cent of the U.S. funds are misclassified with about 9 per cent are severely misclassified, a total of 40 per cent of the fund in U.S market are not “true-to-its-label” using return-based style analysis approach. These two studies suggest that fund misclassification is a large scale phenomenon.} Using various approaches that would define styles in their own way, these studies identifying funds that are incorrectly classified. In the literature, there are three major approaches to fund style being carefully analyzed and then categorized: 1) returns-based, 2) holdings-based and 3) clustering approach. These approaches all aim to diagnose a fund’s actual investment style and quantify style volatility if any. Performance is then measured by grouping funds according to their attributed style. The results from these studies confirm that the underlying action of funds do not always reflect the stated investment styles. The implications can be far reaching for fund investors as well as the development of the financial market as a whole.

From the theoretical mean-variance point of view, any undue risk undertaken by the manager is an additional risk for the investors. This may pose more serious problems to institutional investors, typically, the insurance companies and pension funds that generally operate on asset-liability matching (“ALM”) principles. As these institutions are more constrained by their liability, they aim to maximize returns while minimizing risk. Therefore under the ALM framework, the investment risk-return
profile must match a (defined-benefit) pension fund’s or (life) insurer’s pre-defined risk tolerance to avoid underfunding. Put differently, riskier (pension or insurer) portfolio as a result of investing in riskier funds will lead to greater shortfall risk and increases the risk to institutional investors’ solvency. Therefore, a mutual fund must implement strategy that complies with the declared investment objective so that the fund’s risk-return profile is aligned with pension fund’s (insurer) risk tolerance (Gallagher, Gapes, and Warren, 2017).

The following subsections shall discuss the impact of style drift on fund performance.

3.5.1 Negative link between style drift and fund performance

Earlier work by Indro, Jiang, and Lee (1998) and Kim, Shukla, and Thomas (2000) conducted about the same period (1993 to 1995, and 1993 to 1996 respectively) on U.S. equity funds (excluding passive index funds), show that most funds do not stick to their investment styles. Strong incidence of style drift has been documented with 56.8 per cent by Indro and 54.46 per cent in the Kim, Shukla, and Thomas (2000) study. Kim, Shukla, and Thomas (2000) note the alarming proportion for the worst strayed funds in her study, accounting for 33 per cent of the samples while the Indro samples show 13 per cent. It is noteworthy that both studies employ a characteristics-based method to gather style information for each fund. Indro used style information from Morningstar database that analyzes actual securities within a portfolio using portfolio-based software. Although adopting the same holdings-based methodology, Kim classifies funds into different styles by means of clustering effect using Mahalanobis distances. The only exception between the two studies lies in the measurement for drift. Indro measure style drift based on characteristic tilt in contrast to the discriminant analysis for Kim. Indro find that large-value and large-blend funds
tend to adhere to their investment mandate, and they exhibit the lowest risk among all. Indro also conclude that lower returns are expected from strayed funds with negative 1.77 per cent (raw returns) and negative 1.75 per cent Jensen alpha. It is evident that severely drift funds are the worst performers. Even if funds have mildly strayed, they fail to outperform funds that adhere to the stated investment objective. While study by Kim, Shukla, and Thomas (2000) does not examine how drifting funds perform, it focuses more on fund misclassification and gaming attributes. They find that funds that deviate into higher risk categories result in better relative-performance than those who drift into a lower risk fund categories. There results do not however suggest that funds tend to game by drifting into higher risk groups, as there are more funds found straying into lower risk group. Specifically, only 29 per cent of the funds that drift into higher risk style group attain higher performance ranking among peer within the stated objective group. This finding suggests that drift funds may succeed in gaming their investment style to achieve a star status, although the odds are low. However, the crux of the problem is that high proportion of funds are not adhering to their own investment style mandate but are found shifting out of their mandated risk profile. Such behaviors could cast a detrimental impact on fund investors who require manager to manage the fund portfolio within the risk and return profile according to the declared investment style that has been publicly advertised.

Another U.S. study on the effect of style drift on performance strongly support the claim that investment style does matter. Its findings are also relevant to the subject of investigation of this thesis. Brown, Harlow, and Zhang (2012) recently updated their research findings from their earlier paper (Brown and Harlow, 2002) to incorporate holdings-based analysis using similar variables. In their recent paper, they extended the period of study from 1978 to 1999, a 30-year instead of the 15-year
duration in Brown and Harlow (2002). By defining style on the basis of portfolio holdings and comparing the empirical results obtained by the alternative returns-based analysis, Brown, Harlow, and Zhang (2012) conclude that the effect of style drift on performance is not due to the choice of style classification method. Monthly returns net of fees, commonly known as net returns, total net assets under management, expense ratio and portfolio turnover are gathered from both CSRP and CDA vendors. Using survivorship biased-free equity fund data, these authors sort each fund from 1981 to 1991 on the basis of a four-factor Carhart model on 3-year rolling returns. With the estimated coefficients for size and value-growth dimensions, each fund is first ranked on size (positive to negative $\beta_{SML}$). Within these sizes (small-cap, medium-cap, and large-cap), funds are further divided into value or growth dimension according to estimated $\beta_{HML}$ ranking from positive $\beta_{HML}$ (value) to negative $\beta_{HML}$ (growth). It is interesting to note that empirical outcomes are qualitatively similar in both returns-based analysis and holdings-based analysis. They find clear evidence that style dedicated funds generate higher future risk-adjusted returns from a 1-month to a year interval after controlling for past alpha, fund size, expense ratio and fund turnover. Although Brown, Harlow, and Zhang (2012) do not account for different market conditions, a positive relationship between future returns and style dedication is found in up market while the reverse is evident when the market is down as reported in Brown and Harlow (2002). Taken as a whole, market condition may need to be taken into consideration in the study for fund performance. Like Holmes and Faff (2007), performance in relation to style drift can be attributed to market conditions.

Another study by Huang, Sialm, and Zhang (2011) also contends that managers who are consistent in their investment strategies perform better than those
who are inconsistent. Even if fund managers seek higher risk in return for better performance, only 29 per cent have managed to outperform peers.

3.5.2 Positive link between style drift and fund performance

While style drift may outperform style dedicated funds, the persistence in drift fund’s superior past performance is dependent on market conditions (Holmes and Faff, 2008). Holmes and Faff (2008) show that there is a positive link between style drift and fund manager’s stock picking performance across Australian funds during down market condition. Their study differs from Brown and Harlow (2002) in the methodology for style classification and drift measurement. Holmes and Faff (2008) adopts a returns-based analysis and style drift scoring method (Idzorek and Bertsch, 2004) in their Australian fund studies while Brown and Harlow (2002) uses multi-factor estimation model’s RSQ and tracking error for drift measures. Holmes and Faff examine 198 multi-sector funds over a period of 10 years from 1990 to 1999. In contrast to Brown and Harlow (2002), Holmes and Faff document a positive link between excess returns and style drift funds. However, that relationship is only evident in bear market condition and regressed using Treynor-Mazuy model. They also find that manager is able to time the market with positive inflow but results are again only significant during bear market.

Examining equity unit trusts in the Malaysia market, Lau (2007) also finds a positive link between excess returns and drift funds. Using unconstrained returns-based analytical model developed by Amenc, Sfeir, and Martellini (2002), he adopts information ratio as consistency measure for his study. A positive correlation between fund’s excess returns and style drift is only significant in large-cap funds. Lau reasoned that the results could be due to market or policy changes with capital control regulation implemented during the study period. The study also reveals active
manager’s preference for large-cap, mid-cap stocks and government bonds, all leaning towards less risky asset class.

A more recent study by Wermers (2012)\(^{42}\) also demonstrates a positive link between investment style drift and fund performance. Using a holdings-based approach on U.S. equity funds, his findings contradict those in Brown, Harlow, and Zhang (2012). Wermers (2012) finds that drift managers are good at picking superior momentum stocks, which contributes to the positive performance in drift funds. However, Brown, Harlow, and Zhang (2012) argue that momentum drift explanation on the correlation between style drift and fund performance is weak. Furthermore, drift managers in general, are found to be weak in picking superior stocks regardless of size, value and growth characteristics. The use of different style drift measurements may have contributed to the inconclusive evidence on style drift performance in the U.S. mutual fund market.

3.5.3 No link between style drift and fund performance

Ainsworth, Fong, and Gallagher (2008) investigate how style drift performs in Australian equity funds from 1996 to 2001. The period under investigation, a 6-year period coincides with Holmes and Faff (2007, 2008) studies but shorter in length. Monthly portfolio holdings were collected for 37 equity funds. There is a sharp contrast in Ainsworth, Fong, and Gallagher (2008)’s findings. They refute Holmes and Faff claims by showing that managers fail to exhibit significant performance across funds and in different time windows. In addition, the Ainsworth study also shows that drift managers prefer momentum strategy. Similar findings are found in subsequent study by Allen, Phoon, Watson, and Wickramanayake (2010). That study

\(^{42}\) Wermers (2012) analyzes fund performance in relation to style drift on U.S. equity funds from January 1975 to December 1994. Data is collected from CDA/CSRP database. Monthly net return, total net assets, expense ratio, turnover ratio and quarterly stock holdings are collected for each fund.
extends the earlier investigation on multi-sector managed funds in Australia conducted by Holmes and Faff (2008). In contrast to Holmes and Faff (2008), these Australian funds in the study by Allen, Phoon, Watson, and Wickramanayake (2010) fail to demonstrate any relationship between style drift and fund performance.

In sum, there are mixed conclusions about the effects of style drift on fund performance in the literature. However, there are reasons why style drift may harm fund investor’s returns. As noted in Section 3.5.3, predictions in Holmes and Faff (2007; 2008) with respect to the positive stock picking and market timing returns on Australian funds are weak and those results are contradictory to the Ainsworth, Fong, and Gallagher (2008) and Allen, Phoon, Watson, and Wickramanayake (2010) Australian studies of the same period. On average, it is found that fund managers are poor at predicting which stock characteristics will do well in the subsequent periods (“market timing” or “style bet”) according to Ferson and Schadt (1996), and drift funds only perform well in bear market (Brown and Harlow, 2002, Holmes and Faff, 2007, 2008), a time when market is highly volatile with large mispricing opportunities (Kosowski, 2006). Although some managers may succeed, successful market timing outcome is inconsistent (Kon and Jen, 1979). For this thesis, it will consider the effect of mean reversion on short-term market anomalies, in which, returns tend to converge quickly (Lo, 2004). If so, superior performance in style drift funds may be temporary and excess returns (if any) are expected to vary systematically over time, which fail to serve the long-term interest of fund investors. This mean reversion aspect on drift performance predictions has not been taken into account in Wermers (2012) or Brown, Harlow, and Zhang (2012) studies. Thus, we predict that style drift funds are likely to exhibit poor stock picking and market timing performance compared with style dedicated funds.
**Hypothesis 2a:** There is a significant difference in stock picking returns between style-drift and style-dedicated funds.

**Hypothesis 2b:** Style-drift funds exhibit poorer market timing returns compared with style-dedicated funds.

It is also possible that returns in drift fund can be further eroded when fund managers engage in excessive market timing that results in frequent trades. As Daniel, Grinblatt, Titman and Wermers (1997) illustrates, increase in trading due to market timing will disadvantage investors’ returns because managers may acquire stocks that are already at their high. This argument is of importance to the study of agency-motivated style drift behavior particularly when the intention of style drift is related to AUM-based bonus maximization. If drift managers are motivated to pursue short-term outperformance to compete for new fund inflows for a larger bonus payment, they are more inclined to chase after style risk premium by engaging in wide ranging asset allocation approach outside the declared investment style boundary. If this is the case, there is greater likelihood for drift managers to generate lower fund returns. This measurement on average-style returns has however been largely overlooked in the style drift literature.

**Hypothesis 2c:** Style-drift funds earn relatively lower average-style returns than style-dedicated funds.

### 3.6 Style Drift, Transaction Costs, and Fund Expenses

In addition to the published fees charges, fund investors should ideally be aware of the less transparent costs such as transaction costs and fund expenses, because such costs may harm the overall fund performance at the end of the investment period. It has long been established that there is a negative link between fund expenses and
performance (Bogle, 1998). However, not many studies have considered the effect of style drift when investigating the link between fund expenses and performance. Since style investing is an important aspect of the fund management industry, and with researchers capturing the effect of style on investment performance, there is a need to better understand how fund portfolios are actually managed across the different style categories. However, research on this area is rare.

The relationship between style drift and fund’s portfolio turnover, along with expense ratio, is the subject of investigation by Brown and Harlow (2002) on the basis of a returns-based analysis, and Brown, Harlow, and Zhang (2012) using a holdings-based analytical method. Their findings show funds with high style consistency are superior to inconsistent funds in terms of portfolio turnover and expense ratio. Strong evidence provided by Brown and Harlow (2002) shows that inconsistent funds do incur higher expenses than their counterparts. The median expense ratio can go as high as 1.50 per cent for funds with low style consistency\(^{43}\) while funds with high style consistent incurred 1.33 per cent within the same style category. Although investment style inconsistency in general generates higher average and median expense ratios, fund expenses are most pronounced in small-cap funds.\(^{44}\) Similarly, funds with high style consistency have lower portfolio turnover, which also explains the reason why the fund’s expenses can be contained. Evidence from Brown and Harlow (2002) suggests that funds that charge high fees tend to associate with high portfolio turnover.

Findings in Brown, Harlow, and Zhang (2012) support the predictions of Brown and Harlow (2002) who show that style consistent funds are less active in

\(^{43}\) Style drift is defined by R\(^2\) value, on returns-based style analysis technique. Similar median expense ratio (1.46 per cent) is also found in funds with low consistency defined by tracking error.

\(^{44}\) The emphasis on buying and selling of small-cap stocks increases trading cost, particularly when style drift funds tend to execute frequent round-trip trades in short-intervals (Chincarini and Kim, 2006).
trading, as evidenced by lower fund turnover across all the 9 style categories in their sample funds. A negative association between style consistency and expense ratio is also found in all the style categories. Thus, style consistent funds are found to produce higher total returns as well as relative returns within the same style group.

Results from Ainsworth, Fong, and Gallagher (2008) employing the holdings-based style classification approach, provide further support that style inconsistency increases portfolio turnover. They find that extreme value-growth drift tends to exhibit the highest turnover. This suggests that funds that drift tend to trade more and therefore incur higher trading costs. Likewise, trading costs in style drift funds are found to be comparatively higher due to excessive short-term trading (Holmes and Faff, 2007, 2008, and Wermers, 2012).

The fact that higher trading costs are associated with style drift is clearly indisputable in the large body of research. Studies on fund performance in relation to trading cost contend that trading expenses varies across stocks with different characteristics (Chan and Lakonishok, 1995). For instance, small-cap stocks generally incurred higher trading cost than large-cap stocks due to liquidity (Chincarini and Kim, 2006). Because small-cap stocks are less liquid, funds are found to incur costly round trip trades. This also explains why the drift among small-cap funds is very costly for fund investors in terms of expenses and trading costs in earlier work by Brown and Harlow (2002). Similarly, trading cost associated with buying and selling growth stock is higher than trading in value stock. Another strand of research indicates that trading cost varies across different portfolio investment style and objective (Keim and Madhavan, 1997). In sum, the existing evidence suggests that

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45 The lower the liquidity of a stock, the bigger the bid-ask price (Chincarini and Kim, 2006).
46 In the same way, it affects large-cap funds that drift to a small-cap stock orientation.
style drift can increase fund expenses and affect fund performance through frequent buying and selling stocks of different characteristics.

Trading costs and brokerage and commission fees are often not disclosed to investors but these costs provide an intuitive understanding of a fund’s trading behavior. The reported portfolio turnover ratio in the prospectus however may not accurately describe a fund’s trading activities because high incidence of short-term trades is found in funds with low fund turnover rate (Chakrabarty, Moulton, and Trzcinka, 2016). Taking up the concerns of earlier studies, this thesis includes actual trading cost, and brokerage and commission fees to test the theoretical link between style drift and fund total costs to more accurately capture the incidence of frequent fund trading associated with style drift. On the basis of the above-mentioned evidence, we postulate that total fund costs are relatively higher in style drift funds.

**Hypothesis 2d:** Funds that drift raise total costs to fund investors. *(Total costs include trading costs, brokerage and commission fee and fund expenses.)*

Unless the expected increase in fund trading costs in drift funds can be offset against gains in returns from consistent discovery of superior stocks, successful market timing and higher average style returns, as discussed in Section 3.5, we expect a lower net-of-costs returns in style drift funds. In other words, excessive trading in style drift funds will compromise fund returns optimization, in net terms.

**Hypothesis 2e:** Style dedicated funds are positively associated with higher net returns.

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47 The Investment Management Association (2011) points out that both the SEC and its European equivalent explicitly state that a fund’s turnover rate is meant only to give investors a sense of how portfolio turnover and resulting transaction costs affect fund performance, not to give an indication of trade holding periods. *(Investment Management Association, 2011, cited in Chakrabarty, Moulton, and Trzcinka, 2016, p.3)*
3.7 Style Drift Motivation

Studies have shown that some mutual fund managers do not comply with their contracted investment style (Brown and Goetzmann, 1997; diBartolomeo and Witkowski, 1997; Kim, Shukla, and Thomas, 2000; Brown and Harlow, 2002; Holmes and Faff, 2007, 2008; Brown, Harlow, and Zhang, 2012; Wermers, 2012; and Cao, Iliev, and Velthuis, 2017). In the context of style drift, it is interesting to note that asset managers holding the Chartered Financial Analyst (“CFA”) designation in the West are expected to manage a pooled fund or portfolio in a manner consistent with the stated mandate (CFA Institute Asset Manager Code, 2017). Non-compliance with the investment mandate arises, for example, when a small-cap fund manager invests heavily and persistently on large-cap stocks (Cao, Iliev, and Velthuis, 2017). How do we explain manager’s style drift behavior? Unfortunately, research on the motivation for the persistence of style drift is scant.

Industry practitioners and scholars commonly agree that the use of incentives is a way to align the interests of fund manager (agent) with fund investor (principal). Over the years, there have been debates on changing incentives for fund managers that are based on assets under management to a retainer model that emphasizes fund manager expertise and wisdom in money managing (Grinold and Rudd, 1987; Pullen, 2003; and Veres, 2013). The aim is to resolve the inherent conflict of interests between fund managers and fund investors that is exacerbated by AUM-based incentive. In the absence of empirical evidence, it is not clear whether a new retainer-based compensation scheme will alleviate agency issues to elicit better performance for fund investors. However, the current reward system tied to the size of assets under

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48 Although CFA Institute requires asset managers holding the charter to take investment actions that aims to protect investor’s interest and comply with the governing rules in the capital markets, the association does not hold responsibility to verify a fund manager’s claim or actual practice of compliance.
management is still the dominant model and has been found to present several deficiencies such as inducing fund managers to undertake riskier investment decisions and manipulate fund profile.

3.8 Tournament Theory: Compensation Risk-Taking Incentives

While the broad body of research finds that fund managers do engage in style drift, empirical evidence on what motivates style drift is scant as noted earlier. However, probable explanations on why fund manager investment style shifts as the study by diBartolomeo and Witkowski, (1997) suggests, may be driven by the compensation scheme and a highly competitive fund market. The discussion here focuses on some key previous studies on mutual fund tournament which attempt to explain how compensation incentive drives fund manager’s risk behavior.

Tournament theory has been widely used in the context of management research to explain the rapidly rising compensation gap in organizations during the 1980s. Seminal work by Lazear and Rosen (1981) introduces the concept of optimum labour contracts to explain the wage differences between high-ranking and low-ranking worker in a firm. Theories in labour economics argue that relative rank-order compensation better motivates participants than the use of pay-for-performance scheme. The former excites a larger pool of workers to contest and compete for top prize while the latter may at best encourage personal performance. Put simply, rank-order “reward” better incentivizes worker to work harder than when reward is based on absolute output.

The use of tournament theory has been extended to other disciplines as the model becomes more widely adopted. In recent years, tournament theory has been applied in the context of fund management to describe fund manager’s risk-taking behavior in response to interim rank-order performance when their compensation is
linked to the market value of the assets under management (Brown, Harlow and Starks, 1996; Chevalier and Ellison, 1997; Taylor, 2003; and Jans and Otten, 2008). These authors identify mutual fund industry as a potential tournament field which gives rise to fierce competition among peers. Mutual fund tournament is fostered by the fact that fund performance are commonly published in rank-order by fund resources everywhere. Relative ranking is a common practice in fund industry as fund performance can be easily compared with peers as opposed to simply looking at absolute fund returns. Just as any job performance, fund manager’s performance can be difficult to measure in absolute terms. It is almost impossible for fund investors to observe manager’s ex ante performance in managing their assets but they can monitor the “results” of managerial effort through the ranking system. The relative performance ranking system offers timesaving solution to investor’s fund buying decision by reducing the time needed in identifying top performing funds. Fund investors intuitively make use of this quick assessment “tool” to buy into star funds (Sirri and Tufano, 1998, and Schwarz, 2011). Accordingly, it has been argued that because rank-order performance can influence fund investor’s buying decision, as a consequence both winning (also known as “leader”) and losing (also known as “laggard”) fund managers tend to manipulate the return-risk profile of their funds in an attempt to maximize compensation through the anticipated larger AUM associated with a higher performance ranking (Taylor, 2003, and Jans and Otten, 2008).

Studies on mutual fund tournament often emphasize calendar year rank-order competition among fund managers across fund-families (inter-FMC denotes “external firms competition”) with comparable investment objectives, also known as “segment

funds” (Brown, Harlow and Starks, 1996) without considering net inflow incentives within fund-family (intra-FMC denotes “internal firm competition”) that could also drive fund manager’s risk-taking behavior. Kempf and Ruenzi (2008) consider several factors on why competition within U.S. fund family can also occur. First, investors may prefer to consolidate their fund investment activities within a FMC for cost advantage and convenience, and as such, they are more likely to switch their investment to top performing funds within the same fund-family thus bringing about an incentive effect of intra-FMC net inflows competition. Second, the amount of advertisement budget set aside by fund family to promote best performing “star” fund that will help attract fund inflows in the next period. Fund promotion is more effective in large fund families in particular, given a bigger budget. Therefore, fund managers may be incentivised to compete for higher fund ranking within the FMC because “internal” winners will receive large inflows (Kempf and Ruenzi, 2008).

In addition, the asymmetrical mutual fund flow-performance relationship (Ippolito, 1989; Chevalier and Ellison, 1997; Sirri and Tufano, 1998; and Guercio and Tkac, 2001), can motivate fund managers to undertake more risk than she would otherwise do (Peck, 2011). While fund that outperforms peers by a margin can expect a substantial net cash inflow in the subsequent period, fund does not get “punished” by the same amount of fund outflow in the next period if it fails to perform. Hence, the risk-taking incentive created by flow-performance relation may encourage fund manager to adopt extreme strategies by increasing portfolio risk (Schwarz, 2011), and style drift in particular to improve relative performance.

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50 Seminal fund tournament work by Brown, Harlow and Starks (1996) explains how fund’s ranking position within market segment—“growth” funds influences manager’s risk adjustment decision, considering that top performing funds attract substantial net inflows (Sirri and Tufano, 1998).

51 The cost of fund switching within FMC is lower than the cost of fund redemption and subscription across fund-families. Investors having large amount of investment within fund family (for instance Fidelity, Vanguard) benefit from one-stop-shop service on fund advice, the ease of consolidated fund statement and others.
Another strand of literature also highlights other fund manager’s opportunism (beyond risk taking decision) in connection to the use of distortive AUM-dominated compensation scheme in today’s fund market. Carhart, Kaniel, Musto, and Reed (2002) finds that the positive effect of fund inflow-performance can also tempt fund managers to inflate fund’s net asset value (“NAV”) before the year-end payout for maximizing bonus compensation. Equity fund managers thus tend to trade their stock holdings excessively on the last day of the quarter (“quarter-end”) by speculating on last-trade prices with last-minute trading. Distortive NAV marking up in funds is prominent in last calendar year quarter-end with small-cap\textsuperscript{52} fund managers are found to be more likely to manipulate fund pricing.

It is obvious that there are inherent incentive problems in AUM-based compensation scheme. Given the important role of the fund industry in a country’s financial system, there is a clearly a need to shed light on whether, and why mutual funds engage in style drift. Thus, this thesis seeks to find out if and how fund managers are motivated to engage in rank-order competition and whether they are likely to compete externally and/or internally\textsuperscript{53} for larger inflow of new fund capital by means of style drift. Although papers reviewed below are not directly related to the study of style drift behavior, they have explored the link between risk taking and fund ranking under the influence of AUM-based compensation. The evidence discussed in Section 3.9 helps to connect and derive the motivational link to the risk-taking behavior of style drift.

\textsuperscript{52} Small-cap fund manager tends to inflate fund’s NAV by 2 per cent while large-cap fund manager’s NAV inflation range from 0.5 per cent.

\textsuperscript{53} External (Internal) competition relates to a contest between (within) fund families (family).
3.9 Compensation Model and Opportunistic Style Drift Behavior

It is generally accepted that the form of compensation scheme has profound incentive impact on fund manager’s investment behavior and risk taking decision. As discussed earlier in Section 3.8, funds in interim loosing position have been found to exhibit tournament behaviors as evidenced by the increasing portfolio risk at mid-year in an attempt to win peers. Results of relevant studies have confirmed that fund manager is motivated to improve her relative position in order to maximize her expected compensation (Brown, Harlow and Starks, 1996, and Schwarz, 2011). In addition, Brown, Harlow and Starks (1996) demonstrate that competition is more prevalent when fund market is burgeoning.

Competition among fund peers is highly intense. Competition can occur when funds are ranked against peers with the same investment objective, and the intensity grows following interim performance results. Researchers on mutual fund use tournament theory as the key to address the incentive effects of compensation on fund manager’s behavior. It is widely accepted that the compensation scheme that rewards fund managers based on performance has a strong influence on their investment behavior (Grinold and Rudd, 1987; Kritzman, 1987; and Golec, 1996). Even in the absence of incentive compensation, the market’s environmental competitiveness in the form of relative ranking is found to have a profound influence on the investment actions of fund managers (Brown, Harlow and Starks, 1996). The tournament interpretation in the Brown, Harlow and Starks (1996) study suggests that poor performing fund managers tend to shift their portfolio risk upwards to chase after winning peers. Tournament behavior is defined as the practice of fund managers in losing position at mid-year increasing portfolio systematic risk, while winning managers “locking” in their position by reducing systematic risk.

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Khorana (2001) also finds similar behavioral pattern in fund managers as demonstrated by Brown, Harlow and Starks (1996). Specifically, fund managers will revise portfolio composition to assume higher systematic risk when relative performance in previous period is poor. His study includes a combination of bond and equity funds in the U.S. with a slightly shorter sample period spanning from 1979 to 1991. For the period, he identifies a total of 393 new managers replacing 152 positive performing and 239 non-performing fund managers. Based on CAPM as performance measure, he discovers behavioral differences among the two groups of fund managers. In terms of fund total risk, tournament effect is evident prior to manager’s departure, which is consistent with the findings of Brown, Harlow and Starks (1996). On average, total risk for non-performing funds in pre-replacement period increased by 0.6 per cent at 5 per cent significant level, but reduced by 0.7 per cent and 0.6 per cent during post-periods. Post-replacement result shows the upward shift in systematic risk is significant at 1 per cent level for non-performing funds.

While early evidence relates how losing fund managers adjust their investment action in pursuit of short-term outperformance likely to be induced by such temptation, subsequent empirical works uncover that winning fund manager will in fact take counteract actions. Winning managers thus also engage in altering systematic risk in the portfolio which some authors designate it a strategic behavior (Taylor, 2003, and Jans and Otten, 2008). It is contended that both tournament and strategic behavior exist in the mutual fund context. Strategic behavior occurs as a result of winning fund managers anticipating the increase in risk taking by losing fund managers, tournament behavior is also evident. These findings support earlier tournament study by Chevalier and Ellison (1997) that shows winning manager tends

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54 Strategic reaction appears to occur from 1997 onwards (Jans and Otten, 2008) after tournament behavior has been published in 1996 by Brown, Harlow and Starks (1996). Tournament behavior is more pronounced in 1997 – 2003 sub-period.
to increase portfolio risk relative to losing managers. In aggregate, existing evidence further confirms the mutual fund industry is a fertile ground for tournament behavior when rank-order practice is common, whether or not incentive compensation is explicitly involved.55

On the other hand, Carhart, Kaniel, Musto, and Reed (2002) finds interim best performing fund managers “winners” of the year are inclined to manipulate fund’s net asset value at quarter-ends to maintain or improve their rank position. Of importance, winning fund manager’s strategic response is notable in the last quarter of each calendar year, in line with the prediction that rank-order improvement will help fund managers to profit from bonus compensation—the positive effect of inflow-performance incentive.

While fund tournament literature is generally based on the notion that risk taking is driven by a desire to increase compensation by engaging in tournaments to achieve higher ranking to raise the volume of AUM, there is no prior evidence on the link between style drift and fund inflows. And this thesis provides new evidence on this missing link. If there is a positive association between style drift and fund flows, we expect funds to compete for higher relative performance rank under the assumption that winner will receive substantial new capital that boosts AUM and consequently a larger compensation. As Brown and Goetzmann (1977) suggest, the market generally accept that funds adhere to the declared fund objectives, as such funds that actually consist of different styles are thus relatively ranked against supposedly same style category based on ex post performance. Thus, it is possible for style drift funds to successfully move up to become “top fund” in the publicly declared rank category and consequently attract new fund capital. Along this premise,

55 Studies did not explicitly study on the effects of compensation on risk-taking behavior but implied that asset-based compensation incentivizes risk-taking behavior in the rank-order environment.
we postulate that investment style alteration in Chinese funds is a means to increase fund inflows.

**Hypothesis 3a:** There is a positive relationship between style drift and net-inflows in mutual funds.

In sum, the design of a fund manager’s compensation contract can affect fund’s portfolio risk. Because the expected compensation is directly tied to a fund’s assets under management, a fund manager becomes more sensitive to changes in her fund ranking. As Brown and Goetzmann (1997) suggest, “fund misclassification may be intentional, in that it works to improve ex post relative performance measures, on average” (p.374). Hence, it will be of considerable interest to examine how fund manager adapt her investment style to maximize AUM-based compensation within fund organization with internally managed funds in China, where levels of risk taking are presumably high (Chen, Hong, Jiang, and Kubik, 2013). We propose that style drift is associated with AUM-based compensation scheme in which fund managers are motivated to exploit short-term returns. Under the constantly changing investment opportunity sets as characterized by the adaptive markets hypothesis (Lo, 2004), if fund managers exploit style risk premium in the right direction through picking quality stocks and market timing, successful predictions will have significantly greater influence on their expected compensation. Extending Taylor’s (2003) tournament predictions that the optimal response for mid-year leading funds is to increase their portfolio risk to secure their interim winning positions while laggard funds should engage opposite strategy by reducing portfolio risk to win the contest, we posit that fund managers will pursue style drift to chase after style risk premium to compete for the highest relative rank-order for larger fund inflow, in an attempt to maximize their compensation. Specifically, we expect mid-year leading funds to
engage in style drift to a greater degree than mid-year laggard funds.

**Hypothesis 3b:** Fund managers pursue style drift in response to their performance rank position at mid-year, and the extent is larger in leading funds.

### 3.10 Inter-FMC versus Intra-FMC Tournament

This thesis extends the scope of prior work in the literature and offers a more comprehensive style drift-tournament analytic framework by introducing a new FMC-wide ranking effect by means of “universe-relative” tournament in assessing the extent of compensation maximization in the overall fund market, in addition to segment fund (Brown, Harlow and Starks, 1996) and family fund environments (Kempf and Ruenzi, 2008).

In the Kempf and Ruenzi (2008) study, it is found that U.S. funds adjust fund risk profile in response to their relative family ranking. The risk-taking incentives are higher in funds with larger expense ratios which are indicative of fund managers reacting to compensation incentives. In addition, tournament effect is stronger in large-family funds and notably in solo-managed funds. The key implication from their study is that fund managers do not merely compete against peers of similar fund categories (style) to maximize compensation, but also against peers across fund categories within family. In a nutshell, family rank matters and the study of fund manager’s risk adjustment behavior with respect to fund manager’s self-seeking interest to maximize compensation should include intra-FMC rank-order competition as explanatory factor.

Although family fund tournament is evident, this intra-firm competition may not necessarily happen if the incentive to maximize year-end bonus pool at FMC-level becomes greater. In this situation, fund managers are induced to compete for inter-firm new fund inflows than engaging in intra-firm competition. Given the firm-
level bonus pool is common practice among Chinese FMC, Chinese fund managers are less likely to compete within FMC (family tournament) but more likely between FMCs (universe tournament and segment tournament). Accordingly, we expect that the extent of investment style alteration is larger in universe and segment-relative rank systems than in family-relative rank system in such strategic tournaments. This family tournament hypothesis, also known as “intrafirm tournament”, allows us to examine the intensity of the distortive impact of “AUM-dominated” incentive arising from FMC-wide competition. This thesis presents fresh perspective with innovative metrics designed to explore how fund managers alter their investment styles in different tournament situations.

**Hypothesis 3c:** The extent of style drift is greater in inter-FMC than in intra-FMC tournament conditions.
3.11 Research Conceptual Framework

Figure 3.1 outlines the conceptual framework for the research of the thesis.

![Conceptual Framework Diagram]

Figure 3.1 Conceptual framework

3.12 List of Testable Hypotheses

**Hypothesis 1:** Discernible investment style drift can be discovered among actively managed Chinese equity funds.

**Hypothesis 2a:** There is significant difference in stock picking returns between style-drift and style-dedicated funds.

**Hypothesis 2b:** Style-drift funds exhibit poorer market timing returns compared with style-dedicated funds.

**Hypothesis 2c:** Style-drift funds earn relatively lower average-style returns than style-dedicated funds.
**Hypothesis 2d:** Funds that drift raise total costs to fund investors. (Total costs include trading costs, brokerage and commission fee and fund expenses.)

**Hypothesis 2e:** Style dedicated funds are positively associated with higher net returns.

**Hypothesis 3a:** There is a positive relationship between style drift and net-inflows in mutual funds.

**Hypothesis 3b:** Fund managers pursue style drift in response to their performance rank position at mid-year, and the extent is larger in leading funds.

**Hypothesis 3c:** The extent of style drift is greater in inter-FMC than in intra-FMC tournament conditions.

### 3.13 Conclusion

When fund managers invest in stocks that deviate from the fund’s declared investment strategy, they in practice mislead the fund investors’ risk and return expectations of their fund investment and pose a serious issue of information asymmetry that hinders the efficient functioning of the market. The asymmetric information puts fund investors to uncalculated risk of investment loss, and further encourages the practice of style drift. Despite the fact that riskier investment decisions arising from style drift can undermine fund performance, research attention given to the issues is scant in the literature, particularly for the emerging and rapidly growing mutual fund market in China.

This thesis interrogates the presence, motives and effects of style drift in a unique in-house fund management model in China. Specifically, the study on the relationship between the risk-taking incentives generated by AUM-based
compensation and style drift and how the behavior affects fund returns will be carried out in China’s fund market context, and as fund managers are presumably more prone to risk taking within the in-house fund management environment. China’s mutual fund market is an ideal context for new discoveries because all funds are internally run within FMCs, as opposed to other fund market where both in-house and outsourced funds co-exist. This unique fund management model also provides an opportunity for testing the propensity of fund manager to pursue riskier fund decisions amidst the misalignment of interest associated with the manager’s incentive arrangement; the lack of appropriate market institutions and the regulatory standards with generally weak enforcement on fund manager’s compliance.
CHAPTER 4. STYLE DRIFT EVIDENCE IN CHINESE EQUITY FUNDS

4.1 Introduction

The first study (Research Question 1) of this thesis focuses on investigating the presence of style drift in a fund management industry where funds are organized and managed internally, as in-house funds. Style drift refers to fund managers not adhering to investment objective as published in the fund prospectus. Studies on style drift have established strong evidence for significant shift in fund investment style over time leading to fund misclassification. Not just in the United States, the practice of style drift is also observed in other markets like Australia and Malaysia in recent years (Brown and Goetzmann, 1997; diBartolomeo and Witkowski, 1997; Indro, Jiang, and Lee, 1998; Kim, Shukla, and Thomas, 2000; Brown and Harlow, 2002; Lau 2007; Holmes and Faff, 2007, 2008; Ainsworth, Fong, and Gallagher, 2008; Allen, Phoon, Watson, and Wickramanayake, 2010; Huang, Sialm, and Zhang, 2011; Brown, Harlow, and Zhang, 2012; Wermers, 2012; and Cao, Iliev, and Velthuis, 2017).

Unlike prior studies on style drift that are primarily concerned with how the behavior could affect fund performance, this thesis empirically examines both the impact of drift on fund performance and the root causes of the behavior. We extend the notions of conflicts of interest and theory of tournaments in mutual fund literature to explain why manager is tempted to trade outside the bounds of investment objective mandated by the contract between fund investors and fund managers in the form of the prospectus of a mutual fund.
Style drift can be fostered by a number of factors. From the tournament perspective, fund managers’ compensation arrangement is positively related to the form and magnitude of their risk taking (Brown, Harlow and Starks, 1996; Taylor, 2003; Jans and Otten, 2008; and Dijk, Holmen, and Kirchler, 2014). Under the AUM-dominated compensation structure, fund manager’s potential financial gain arising from the AUM-based bonus is more substantial relative to her base income. Thus, fund manager’s desires to maximize income will motivate her to undertake extreme strategies such as higher risk taking and to focus on short-term investment horizon to outperform other funds. For example, fund managers may consistently exploit mispriced stocks regardless of whether the characteristics of these stocks conform to fund’s declared investment style. Unnecessary risk taking by fund managers to increase personal wealth is established by Golec and Starks (2004) which show performance-based income induces fund managers to undertake excessive risks compared to non-performance based compensation scheme. Further, a performance gap relative to peers will trigger risk alteration to a greater extent in interim laggard and lead funds (Chevalier and Ellison, 1997). The key explanation for such risk taking actions is that if a fund is highly ranked, it receives more new cash inflows in the next period and consequently, the fund manager involved can earn a bigger bonus payment based on the larger AUM.

This chapter is organized as follows. Section 4.2 discusses the persistence of style drift problem with reference to fund manager’s compensation structure and the form of mutual fund organization. Section 4.3 outlines the settings for investment objective and style of mutual funds. Section 4.4 discusses the study’s methodology. Section 4.5 describes the empirical data. Section 4.6 highlights the key results of the research of this thesis, and discuss our robustness checks. Section 4.7 concludes.
4.2 The Persistence of Style Drift Problem

According to mutual fund flow-performance theory, compensation that is tied to the size of a fund’s assets under management can give rise to a more powerful incentive supported by market force (Smith, 1978; Ippolito, 1989; Chevalier and Ellison, 1997; Sirri and Tufano, 1998; and Guercio and Tkac, 2001). This market force is represented by the new fund inflows and competitiveness in the fund market. It has been found that fund investors are representative biased, that is, investment decisions are made primarily on the basis of fund’s rank-order performance. Therefore, fund investors are highly sensitive to funds that have performed relatively well in the previous period. Consequently, funds that outperformed are expected to receive more new money in the subsequent period. As Smith (1978) demonstrates, there is a linear relationship between fund flow and performance. Related study suggests that fund investors are “star chasers” who follow best manager with superior past returns (Berk and Green, 2004). These authors argue that investors may not intelligently distinguish between a skilled manager and a lucky manager. Some of these high performers are due to luck while some are really talented. In other instances, poorly performing funds might change their fund names to winning style to attract higher inflows (Cooper, Gullen, and Rau, 2005). These studies clearly demonstrate the existence of information asymmetry in fund management environment and thus, we would expect fund manager to undertake risky action such as style drift to improve performance ranking particularly when such risk-taking actions are not likely to be detected by the fund investors.
While style drift’s effect on fund performance is found to be mixed,\textsuperscript{56} it is widely accepted that style drift will increase trading cost due to higher portfolio turnover. Moreover, it has been found that drift fund managers, on average, do not possess superior market timing ability.\textsuperscript{57} As a result, suboptimal investment outcome may arise to undermine fund investor’s interest (Indro, Jiang, and Lee, 1998; Kim, Shukla, and Thomas, 2000; Brown and Harlow, 2002; Huang, Sialm, and Zhang, 2011;\textsuperscript{58} and Brown, Harlow, and Zhang, 2012). To the best of our knowledge, the theoretical and empirical issues of style drift raised and examined in this thesis have not been previously examined on Chinese mutual funds. This thesis contributes to the literature by analyzing the tendency and explain the persistence of style drift behavior across mutual funds that operate under a fund environment with significant issue of information asymmetry.

China’s mutual fund market provides an ideal context to study the relationship between style drift and the risk-taking incentives generated by AUM-based compensation and style drift, and how the behavior affects fund performance for several reasons. First, the problem of information asymmetry between fund managers and fund investors can be intensified by the lack of appropriate regulatory standards and enforcement efforts on fund manager’s compliance when conflicts of interest arises. Because Chinese mutual fund operates in a contractual organizational form under which fund investors are buyers of the mutual fund as a product manufactured

\textsuperscript{56} Some studies suggest that style drift may benefit fund investor but is dependent on market condition (Brown and Harlow, 2002; Holmes and Faff, 2007).

\textsuperscript{57} Holmes and Faff (2008) report that fund manager has very weak style characteristics timing ability and their results are model dependent. Seminal study by Treynor and Mazuy (1996) documents little style timing (also known as market timing) evidence in mutual funds, others also record similar weak results (Henriksson and Merton, 1981; Henriksson, 1984; Bollen and Busse, 2001).

\textsuperscript{58} Huang, Sialm, and Zhang (2011) illustrate that fund managers who alter fund risks are more prone to agency conflicts—funds with inferior performance, smaller-families, and higher expenses are worst performer when they increased portfolio risk level. Fund altering portfolio risk level exhibits poor performance while those increasing risk level end up with much more severe consequences. Inferior performance is mainly due to inability to diversify portfolio and deviate too much from benchmark. Higher turnover is associated with risk shifting.
by the FMC. These Chinese fund investors are therefore not given a voice on the corporate governance of the FMC but only receive the beneficiary rights under the contractual form of fund management (Yu, Tam, and Zhou, 2015). In addition, the ineffectual internal corporate governance mechanisms in Chinese FMC (Hu, Tam, and Tan, 2010; and Farag and Mallin, 2016) may further facilitate style drift behavior.

Second, the dominance of the compensation scheme for Chinese fund managers that is linked to the size of assets under management, thus gives rise to the distortive short-term incentive to maximize bonus payment. Under *2012 Securities Investment Fund Law of the People’s Republic of China*, fund managers can be paid on a float-rate and receives bonus based on the value of the fund asset they managed. In essence, the Chinese fund market is more attuned to performance-based system which would potentially generate risk-taking incentives that harm fund investor’s interest, especially in the face of competition as explained under tournament theory.

Third, because all actively managed mutual funds are internally run within Chinese FMCs, managers have greater tendency to act against investor’s interest by seeking higher risk than outsourced fund managers. Chen, Hong, Jiang, and Kubik (2013) show that FMC can effectively incentivizes in-house manager to perform well through a more attractive and less steep contract arrangement. Against the above-discussed institutional characteristics in China and the reasoning of prior literature, it can be expected that style drift would be present and practiced by fund managers in this market.

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59 In contrast, outsourced fund manager’s effort is based on past performance and therefore under the pressure of steeper incentive (early contract termination as “higher powered” incentive), outsourced managers are more sensitive to underperformance and are more risk adverse than in-house managers.
4.3 Investment Objective and Style in Mutual Funds

Unlike broad asset-class investing, investment style in mature market such as the U.S. often does not carry a clear definition on what constitute value, growth, large and small-cap investing. It is very much dependent on how a stock is analyzed and selected to a portfolio, which can include the professional judgement of a fund manager. However, in practice, fund managers commonly adopt investment strategies such as market-capitalization investing, value investing, growth investing, or a combination of 2 or 3 of these strategies to accomplish fund’s stated investment objective. Therefore, a loosely defined investment objective can be interpreted and executed differently across funds (Buetow, Johnson, and Runkle, 2000). Take for instance, an aggressive-growth fund may execute investment strategy that is similar to a sector-focused fund.

Actively managed mutual fund is a portfolio of different broad asset classes designed with an investment objective in mind to serve the unique interest of fund investors in terms of their risk-return preference. A fund’s declared objective serves an important purpose as a statement on how fund manager seeks to make money for its investors, that is, a description of the fund’s primary approach—value investing, capital appreciation and dividend, or interest payments—with each associated with the type of asset class and the type of stock to be invested. This sets the boundary for fund manager in selecting securities in meeting investor’s investment goal. In China, fund investment objective is specified at the point of a mutual fund establishment, registering its operating mode (open-end or closed-end) and the investment proportions to be allocated to stock, bond and cash asset class to serve as the
statement for the contract\textsuperscript{60} (2012 \textit{Securities Investment Fund Law of the People’s Republic of China}). An open-end fund typically has an unfixed number of fund units and allows for continuous subscription and redemption throughout the fund’s lifetime as agreed in the fund contract (detailed in the prospectus). In contrast, fund units in a closed-end fund are fixed and this type of fund allows no additional subscription and redemption during the lifetime of the fund contract.\textsuperscript{61} A fund can in principle change its contract by convening a fund investors meeting if it receives more than two-thirds of the votes by the attending investors. However, as convening of such a meeting is difficult and rarely done, it appears that mutual fund managers have in practice the flexibility to tilt its investment proportion without a resolution of the fund investors meeting.\textsuperscript{62}

Fund investment objective has been getting more sophisticated particularly in the mature markets in developed economies over the years. Table 4.1 illustrates the development of open-end equity fund’s investment objective in China since 2004. Particularly, new fund objectives aim to better serve more diverse investors for their niche investment needs, aiming at special themes such as new economy, emerging industries, internet-related sectors among others in 2014 and 2015. This development also reflects the changing personal investment goal of fund investors. On the other hand, more modernized fund names can also be initiated in response to market competition as fund market matures. For instance, there are at least 5 internet-plus oriented funds issued in 2015. The modernized fund objective has prompted the industry to keep up with the way a fund is defined and classified. Specifically,

\textsuperscript{60} Chinese mutual fund operates in a contractual form between fund investor and the fund management company.

\textsuperscript{61} See Article 46 under Chapter IV Operating Mode and Organization of a Fund in 2012 \textit{Securities Investment Fund Law of the People’s Republic of China}.

\textsuperscript{62} A total of 37 old funds have changed their names from equity to hybrid fund and from index to a hot sector fund without convening a fund investors meeting. This is so when fund cannot meet stock holding limit when stock market plunges in August, 2015 (source: www.lqz.com).
Investment Company Institute in the U.S. react and revised its fund classification system in 2014 to require clearer investment descriptions to reflect the changes in investment trend in the marketplace. By standardizing fund objectives across fund market, fund providers can name their funds more accurately, for which they have legal obligation to manage the portfolio in accordance with the stated fund investment objective.

Peculiar to the U.S. fund market, fund’s name and its corresponding investment strategy are under the control of the regulators. In this regard, the name of an U.S. fund is to reflect the investment objective, often based on investment style of the fund manager. However, the evidence of fund misclassification in U.S. funds underscores the weak legal enforcement of fund names rule, and that means fund investors cannot solely rely on the fund investment objective on the prospectus. Likewise and to a more serious extent, we find that Chinese fund names do not usually convey much details about the fund investment style. When fund names are confusing, they exacerbate the inherent information asymmetry issue in the fund industry that leads to possible investment style irregularities. Given the high likelihood of non-compliance with the declared investment mandate, a style analysis is therefore an important first step in detecting the nature and extent of style drift so that its motivation and impact can be investigated and better understood.

It is a common practice in the literature that actual investment style of a fund is identified based on fund’s trading activities, and investment style consistency is usually measured using a returns-based style analysis. This conventional approach in prior studies is due to the readily obtainable fund returns data, and the less laborious

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63 The *U.S. Investment Company Act, 1940, Section 35(d)* contains clear provision for funds that named after a particular type of investment to have 80 per cent of the assets invested in that specific type as declared or funds will face legal penalties.

64 Fund name confuses with the fund strategy e.g. CCB Principal big safety strategic selected equity fund.
classification process as compared to the more recent holdings-based style analysis. The latter is subject to data availability and the need for deeper analytical work in profiling the style for each and every fund based on the stock characteristics in each fund’s holdings over time. What is more, the higher the frequency of the data used (e.g. daily returns used in the conventional studies), the noisier the evaluation, which leads to less meaningful empirical results. Hence, modifications such as return smoothing are sometimes applied to reduce the biasness in the results (Getmansky, Lo, and Makharov, 2004, and Markov, Mottl, and Muchnik, 2004). More critically, the greatest criticism of the returns-based approach is the model’s inability to capture the presence of dynamic style changes. Studies on the extreme style volatility in hedge fund managers find that the estimated parameters under the stable assumption of linear regression are violated (Bollen and Whaley, 2009, and Markov, Mottl, and Muchnik, 2004). According to Bollen and Whaley (2009) and Markov, Mottl, and Muchnik (2004), the constraints such as non-negativity coefficients and moving window under Sharpe returns-based cannot capture in a timely manner the abrupt shift in investment style that style drift activities will generate.

This study is motivated by the papers of Daniel, Grinblatt, Titman, and Wermers (1997), and Gallo and Lockwood (1997), which demonstrate the importance of accurately and directly categorizing funds by their true attributes (investment styles) to serve as a benchmark for performance comparison of similar funds. While most conventional style drift studies chose returns-based analysis, we use a fine grained holdings-based approach in this thesis to accurately and comprehensively detect the presence of style drift and to measure whether style drift funds outperform style dedicated funds. The metrics and index we develop in this study are direct and targeted measure of fund manager’s intention to seek risk. The benchmark created in
this thesis contributes to the literature by deepening our understanding and enriching the methodological approach to uncovering some key but rarely researched areas in managed funds and fund style drift in particular.

4.4 **Style Drift Methodology**

4.4.1 **Investment style diagnosis**

To establish whether style drift is present and prevalent among fund managers, we first identify the declared investment style of each fund. We manually examine and classify each fund carefully by analyzing the declared fund name, investment strategy, detailed description of fund objective, and other relevant information in each fund prospectus to establish a fund’s investment goal and style. Figure 4.3 demonstrates how stated investment objectives of all the Chinese mutual funds are examined and spliced.

An analysis of Chinese equity funds shows that in general the choice of words used in naming the funds convey very little information on their style orientation, and this is more pronounced in themed equity funds. Take for instance, “Wanjia quality life equity fund”, a typical themed-fund, describes its investment objective as “fund assets to be invested in enterprises that benefit and enhances the quality of life in Chinese market”. Clearly, Wanjia fund provides very limited details about its investment intention. Apart from some funds being loosely defined, funds also have confusing names that do not coincide with their stated investment objectives. To illustrate, CCB “Principal big safety strategic selected equity fund” has its investment strategy vested in small and medium market capitalization segments and venture enterprises. The name “big safety” creates confusing interpretation about the fund’s investment risk. Observations in our sample further suggest that the language in
fund’s prospectus lacks clarity and fund names may not be a reliable guide to fund’s actual investment style.

While fund name may not be clearly articulated, we review as part of our identification process the fund objective for clarity in style definition and a further assessment of the investment strategy. Our fund style review also drills down to fund’s exposure to market sectors. In general, manager of a sector-oriented fund selects investible stocks based on quantifiable characteristics with respect to size, value, growth and past year returns factors. By definition, sector funds are industry oriented portfolios where the stocks invested can be identified by WIND industry classification code system which breakdowns the industry into 10 major sectors. Equity funds that are not sector-oriented will be separated and classified as “general equity” division. These equity funds are grouped according to traditional mutual fund categories in identical investment style with respect to size such as large, mid, small cap; to style in terms of value and growth. An example of sector fund is ICBCCS “Internet Plus Equity Fund”, China Merchants “Mobile Internet Industry Equity Fund”, China Merchants “Leisure Sports Cultural Equity Fund”, and ICBCCS “Agriculture Industry Equity Fund”. General equity funds will be grouped according to same style category. For instance, mid-small cap fund consists of Franklin Templeton “FTS Mid-Small Cap Stock Fund”, ChangXin “Changxin Quantitative Mid-Small Cap Equity Fund”, HSBC Jintrust “HSBC Jintrust Mid-Small Cap Equity Fund”.

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65 A brief examination on a fund’s sector concentration is carried out to understand whether a fund, typically whether style drift or style dedicated fund is subject to specific sector risk. Table 4.7 and table 4.9 describe the sector exposure of a style dedicated fund and style drift respectively.

66 WIND breakdowns industry into 10 major sectors. Common stock is classified as consumer discretionary, consumer staples, energy, financials, healthcare, industrials, information and technology, materials, telecommunication services and utilities. Fund’s sector orientation will be analyzed using WIND industry level standard between 2004 – 2015 sample years.
4.4.2 Characteristics-based style analysis

In evaluating the presence of style drift, we use holdings-based style analysis ("HBA"), also known as characteristics-based analysis in the mutual fund literature, to examine the actual stock characteristics in each fund’s portfolio holdings. This approach is first introduced in Jagadeesh and Titman (1993) and adapted in subsequent studies by Daniel, Grinblatt, Titman and Wermers (1997) to evaluate performance of U.S. funds. For our analysis, two datasets are created. The first set of data provides comprehensive details on the asset constituents in each fund holdings such as number of share units and dollar invested in each security, bond, fund, warrant and cash holding for each reporting period. The second set of data offers information on the characteristics of the securities which are assessed individually at stock level. These equity style attributes—size, value/growth (book-to-market ratio or “BE/ME”), monthly stock returns for past year returns (“PYR”) factors—are then mapped against the composition of each actively managed portfolio to identify the style centrum, measured by fund managers’ actual stock movements between reporting periods instead of the dollar value of the funds’ portfolio. HBA better reflects the actual fund style as it periodically captures fund’s exposure to changes in style factors. Therefore, HBA estimates are dynamic in nature. This is in contrast to most style drift studies using a returns-based style analysis ("RBA") that assume factor exposures are constant. Given HBA is time intensive and costly to execute, only a few academic studies on style drift are based on this technique (Brown, Harlow, and Zhang, 2012, and Wermers, 2012) while the majority adopts RBA methodology (Brown and Harlow, 2002; Holmes and Faff, 2007, 2008; and Lau, 2008).
We employ HBA to ascribe the style orientation of each equity fund characterised by style and size dimensions unique to each stock in a fund’s holdings, at prescribed time intervals for the period of our investigation from 2011 to 2015. With a series of fund characteristics thus derived, we are able to determine at fund level if each manager adheres to her investment mandate, and to assess the prevalence of style drift in aggregate across the entire mutual fund industry. As discussed earlier in Section 4.4.1, the declared investment style of Chinese equity funds is very much loosely worded while fund name and investment strategy are often not clearly articulated. Under this circumstance, style analysis results using RBA approach will be unstable and highly unreliable (Buetow, Johnson, and Runkle, 2000). Further, RBA will not be effective as there is a lack of well prescribed Chinese indexes that match fund manager’s investment style. According to Buetow, Johnson, and Runkle (2000), returns-based technique is advantageous only when investment style is stable over time.
CHARACTERISTICS-SORTED STYLE INDEX
Formation
adapted from: Daniel, Grinblatt, Titman and Wermers (1997)

STYLE FACTORS CONSTRUCTION
- Universe of investible Chinese A-shares
- Shanghai Stock Exchange (SSE)
- Shenzhen Stock Exchange (SZSE)
No. of Shares
- 1,718
  - 1,062
Monthly closing stock price:
- Adjusted for dividends, stock splits
  - Controlled for market event
Size characteristics construction
- Adjusted closing stock price x outstanding market shares
  - Market Cap
Value-Growth characteristics construction
- BE/ME ratio
  - BE = Book Value to Equity; ME = Market-cap
Past-Year-Return (PYR) characteristics construction
- cumulative returns over the past 9 months

STYLE FACTORS SORTING
- 3 way sorting by quintiles

A-shares are characterized
- against the STYLE-INDEX to determine the
- contrarian: bottom 20%, score 1

For Actual "Guo'an Ji Jin" fund style as of June, 2015 is identified

Figure 4.1 Yearly Chinese style index formation, mapping procedure and actual fund style identification for the period: 2011-2015. This diagram provides a brief outline of our style drift methodology detailed in Section 4.4. Figure 4.1 illustrates how the style index for Chinese mutual funds is innovatively constructed every year from 2011-2015, using the universe of investible A-shares (approximately 3,000 stocks on a yearly basis). This is followed by a mapping procedure, where every single stock (by units) in each fund’s portfolio is mapped against the style index to obtain the unique style score separately for size, value-growth (BE/ME) and PYR factors, and eventually identifying the actual investment style of each 274 funds in our sample.
Figure 4.2 Diagnosing a fund’s style drift over a period of 5 years. This diagram outlines how style drift is diagnosed for every 274 funds in our sample following the identification of the actual investment style through the mapping procedure described in Figure 4.1. As denoted in equation (4.2), our style volatility formula measures style drift by the equally weighted standard deviation of the fund’s style orientation at various time $t$ that corresponds to fund’s reporting periods.
4.4.3 Characteristics-sorted style benchmark formation

To understand how well a fund manager has adhered to the investment strategy stated in the prospectus, we diagnose investment style using holdings-based data. We first construct sets of yearly customized characteristics-sorted portfolio using the universe of investible Chinese A-shares. We characterize each stock for size, BE/ME and PYR factors during a given year\(^\text{67}\) and then proceed with a sorting method used by Daniel, Grinblatt, Titman and Wermers (1997).

This characteristics-sorted style index consists 125 unique portfolios using a three way\(^\text{68}\) sort procedure, also known as a conditional sorting technique where stocks are first ranked on size characteristics, followed by a second sort on BE/ME characteristic within the first sorted portfolios and lastly a final sort by PYR characteristic. Through this sorting procedure, each portfolio represents a unique combination of size, BE/ME and PYR investment strategy at each formation date. These 125 unique portfolios are also the benchmark portfolios our study establish for evaluating performance between style drift and style dedicated funds. The development of this style index is of key importance as it allows funds to be truly comparable.

Let us illustrate how these yearly characteristics-sorted style indexes are formed starting from the year 2011. We consider all the investible publicly traded stocks on Shanghai Stock Exchange and Shenzhen Stock Exchange, also known as A-shares at the beginning of each year, that is, in the month of January. However, only

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\(^{67}\) Only stocks with complete prior year historical data, that is, monthly closing price will be considered in the characteristics-sorted style index formation. For instance, in year 2013 style index formation, five SSE stocks are excluded as these are newly listed stocks during the year and momentum factor cannot be calculated.

\(^{68}\) This is not to be confused with a triple sort method where characteristics are independently sorted on one another.
stocks having a full 12 months closing stock price information will be included in the index formation for the purpose of PYR computation—momentum characteristics measure. We follow Fama and French (1993) method to remove stocks with negative BE/ME value as negative BE/ME does not quantify value investing.

At each formation date (January), stocks listed on Shanghai Stock Exchange are first sorted into quintiles\(^69\) based on market capitalization just prior to the formation date, that is, last day of December. Using Shanghai Stock Exchange size breakpoints,\(^70\) Shenzhen Stock Exchange stocks\(^71\) will be sorted and insert into the existing Shanghai Stock Exchange quintile portfolios. Characteristics scores will be assigned in descending order for each quintile with the largest market-cap stock being at the top quintile with a highest score of 5 and bottom-most quintile being the smallest cap size having a lowest score of 1. Using this rule-based construction framework, we now have 5 different size portfolios represented by all investible A-shares. Next, the stocks in each size quintile is sorted according to BE/ME value and rank in ascending sequence. This second sort generates 25 portfolios in a 5 x 5 size and BE/ME sort. The lowest BE/ME value representing a “deep value” stock has a score of 5 while the highest BE/ME value, a growth stock has a score of 1. A final sort is conducted on these 25 size-BE/ME portfolios by PYR factor. Stocks with the highest previous year return will top the quintile and assigned a 5 point and stocks

\(^{69}\) Through quintiles, we will have 5 size breakpoints based on Shanghai Stock Exchange A-shares which will be used for Shenzhen Stock Exchange A-share size sort. Consistent with Daniel, Grinblatt, Titman and Wermers, this ensures that there will be an equal number of Shanghai Stock Exchange stocks in each of the 5 size portfolios. Breakpoints can be in quintiles or deciles depending on the number of stock observations in the study.

\(^{70}\) Similar to Daniel, Grinblatt, Titman and Wermers (1997), Wermers (2012) and Brown, Harlow, and Zhang (2012) index formation procedure, we adopt quintile breakpoints rather than deciles to avoid having empty sub-portfolios at the end of the characteristics sort (PYR). In this case, there are at least 10 A-shares in each of the 125 unique size-BE/ME-PYR portfolios.

\(^{71}\) On average, there are more stocks listed on Shenzhen Stock Exchange than Shanghai Stock Exchange; 1,685 and 1,072 respectively. However, Shenzhen Stock Exchange total market cap is much smaller than Shanghai Stock Exchange. This is because Shenzhen Stock Exchange focuses on small-medium enterprise (SME board) and growth enterprise market (GEM) listing while Shanghai Stock Exchange concentrates on mainboard listing.
with the lowest previous year return form the bottom-most quintile with a score of 1. Figure 4.1 depicts the yearly style index formation procedure.

A fund’s actual investment style is diagnosed at each reporting period by mapping each stock in the actual fund holdings against the constructed style index. For simple illustration, Guo’an Ji Jing fund had half of its position (measured using stock units) allocated to stocks with size quintile 5, BE/ME quintile 4 and PYR quintile 5 at end of June 2013. It also placed another half of the portfolio asset in firms having a size quintile 4, BE/ME quintile 5 and PYR quintile 3. The computation will yield an average scoring for each characteristics, that is, 4.5 for size and BE/ME respectively while a score of 4 for PYR. Through this firm level characteristics mapping procedure, we are able to diagnose the investment style of each manager accurately across all intervals. By tracking this investment style over time, we are able to detect style drift.

4.4.4 Voluntary fund style volatility ("vFSF") metrics

To distinguish whether a fund manager style drift is “voluntary” (intentional) or “involuntary” (unintentional), we use a weight-based metrics, under which we observe the weight of each stock in units instead of stock market value as in the conventional studies of Brown, Harlow, and Zhang (2012), and Wermers (2012). The advantage of our approach is that it isolates some key extraneous influences, for example, stock price appreciation and changes at different points in time. Thus, our fund style volatility metrics (vFSF) is a direct estimate of a fund manager’s risk intention.

The approach for estimating style drift is based on Brown, Harlow, and Zhang (2012). We measure the degree of a fund’s exposure in 3 characteristics “C” in equation (4.1), namely, size, BE/ME and PYR at every reporting date throughout
periods under investigation of 5-year and 3-year. We then compare these character values to the mean actual investment style of a fund. In equation (4.2), style drift represents the equally weighted volatility of the style orientation of fund $j$ at time $t$.

Voluntary fund style volatility, our measurement for style drift is:

$$C_{j,t} = \left[ \sum_{n=0}^{59} \text{rank } C_{j,t-n} - \left( \text{mean rank } C_j \right)^2 / (60 - 1) \right]^{\frac{1}{2}}$$  \hspace{1cm} (4.1)

where $\text{rank}_{c, j, t-n} = \text{weighted average characteristic ranking at time } t-n$; $\text{mean rank}_{c, j} = \text{mean of these rankings over the 5-year investment style window}$.

$$\text{Style volatility } v_{FSF_{j,t}} = \sum_{c=1}^{3} C_{j,t} / 3$$  \hspace{1cm} (4.2)

where $v_{FSF_{j,t}} = \text{characteristics-based voluntary fund style standard deviation value of each fund } j \text{ at time } t \text{ calculated by equally weighted of } \sigma_{c, j, t}$.

$$C_{j,t} = \left[ \sum_{n=0}^{35} \text{rank } C_{j,t-n} - \left( \text{mean rank } C_j \right)^2 / (36 - 1) \right]^{\frac{1}{2}}$$  \hspace{1cm} (4.3)

Alternatively, standard deviation of fund $j$ style orientation over a short-term trading period of 3-year is also considered in this study and a fund’s style drift is measured as equation (4.3).

While we have the voluntary fund style volatility ($v_{FSF}$) to measure a fund manager’s style loyalty, we need to set some rules to differentiate the notion of style drift fund (i.e. fund with higher investment style volatility) from style dedication fund (i.e. fund with lower investment style volatility). We first rank funds on their $v_{FSF}$ values in descending order so that fund with the highest $v_{FSF}$ value (least consistent investment style) is ranked top in our $v_{FSF}$ ranking. With this ranking, we employ
fractile-based definitions\textsuperscript{72} for our style drift analysis. Funds that deviate the most from their declared investment style are defined as style drift funds (style dedicated funds are those that adhere more closely to investment style), and they represent the top (bottom) 5 per cent vFSF rank fractile. Our analysis also covers the top (bottom) 10 and 20 per cent vFSF fractile range to ensure our results are not biased by the extreme upper and lower 5 per cent vFSF fractile range.

4.5 Empirical Data

Data used in this thesis mainly comes from WIND Information Co., Ltd (“WIND”) which offers comprehensive fund details and a rich set of capital market indicators in China. WIND is the leading financial data and solutions provider in China and has a strong client base consisting of major research, financial and academic institutions. It is commonly used by reputable fund resources like Capital Week, Securities Association of China (“SAC”) and others. Other fund information is obtained from fund prospectus published on the website of FMC that manufactures and manages these funds.

The initial dataset includes all open-end equity funds from 2004 to 2015. Since the aim of the thesis is to investigate the existence, characteristics patterns, impacts and drivers of style drift in Chinese equity funds, only actively managed funds with at least 80 per cent of its fund holdings in stocks are included in the samples. The 2012 Securities Investment Fund Law of the People’s Republic of China, ruling requires that mutual fund named after a particular type of investment to have at least 80 per cent of the fund assets invested in that specific asset type as

\textsuperscript{72} The use of fractile-based definition for our style drift analysis avoids the problem of overestimating or underestimating the extent of the style drift as the vFSF values of funds above and below the median vFSF fund are very close. Therefore, if we choose a median-based definition, distinction between drift and dedicated funds near the median vFSF values cannot be clearly made. Fractile-based analysis is also used in Wermers (2012).
declared. For instance, a fund is set up as an equity fund will need to hold at least 80 per cent of the fund assets in stocks with the remaining 20 per cent in bond and cash.\textsuperscript{73}

Considering the key objective of this thesis is to investigate actively managed equity style drift decision incentivised by fund manager’s AUM-dominated compensation, non-actively managed funds such as index funds and enhanced-index funds are excluded from this study. Other exclusion includes funds that are invested in other broad asset classes like bond funds, money market funds, hybrid funds (including fixed-income-oriented balanced funds and flexible allocation funds). Qualified Domestic Institution Investor (“QDII”) funds which invest in overseas securities are also not considered in the investigation. The dataset also does not consider closed-end equity funds, exchange-traded equity funds (“ETF”) since the incentive for style drift is weaker under the tournament theory\textsuperscript{74} and the intra-day NAV calculation differs from open-end funds. These exclusions allow the study to effectively control for relevant risk-return measure. Additionally, only equity funds issued by CSRC approved companies with fund management credentials will be included in the sampling process as these fund management companies are required to act in accordance with the provisions of the 2012 \textit{Securities Investment Fund Law of the People’s Republic of China}, Securities Investment Fund Management Companies (CSRC decree No. 84), Securities Investment Fund Industry Senior Management Personnel Management Approach (CSRC Decree No. 23) and other relevant

\textsuperscript{73} CSRC has recently revised its ruling on the administration of equity fund; fund sold as equity fund must have at least 80 per cent of its holdings in Chinese stocks instead of a 60 per cent requirement provisioned in 2004 (2012 \textit{Securities Investment Fund Law of the People’s Republic of China}, Decree No. 79). Clearly, this amendment helps draw the line between equity fund and hybrid fund, particularly the fixed-income-oriented balanced funds and flexible allocation funds.

\textsuperscript{74} The incentive to alter portfolio risk to attract fund investors is limited in ETF, LOF and closed-end funds. Specifically, ETF and LOF are passively managed with ETFs designed to track against specific indexes. Closed-end funds are actively managed but fund shares are not offered continuously.
provisions. These funds are products manufactured and managed within FMCs and are subject to government regulations. We end up with a total of 274 eligible funds, containing more than 180,000 holdings data for our voluntary style drift study.

The purpose of the holdings-based analysis adopted in this study is to diagnose the style orientation of each equity fund, as characterized by size, value, growth and momentum dimensions. These characteristics are unique to each stock in fund’s holdings and are measured at various reported time periods. After a series of fund characteristics has been derived, we will be able to determine if each manager adheres to her investment mandate and the prevalence of style drift across funds in China’s mutual fund industry.

4.5.1 Chinese mutual fund data

We collect raw data and information from WIND for processing and eventually create 2 sets of unique data for our investigation.

For fund data, information on fund names, fund objective, fund strategy and inception date are obtained and cross-checked against FMC websites. A list of semi-annual stock holdings for each fund and the amount invested in each stock are also gathered. In compliance with CSRC regulations, all managed funds are required to report and publish their full set of fund holdings half yearly. Quarterly trading cost, brokerage and commissions, management fees and fund expenses (in RMB) are also collected.

To provide some perspective on the context and scale of our study, we briefly outline the development of mutual fund market in China with some relevant statistics.

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75 In comparison, funds sold by other E-commerce companies are less regulated (different set of asset management credentials being approved). An example is Yu’E Bao (余额宝), an online investment fund issued by Chinese E-commerce firm, Alibaba Group. Trust funds (Collective Investment Trusts) are also excluded as they are lightly regulated.
As Table 4.1 illustrates, our study covers 106 licensed Chinese FMCs that manage a total asset value of RMB 13.82 trillion at the close of second quarter in 2015. From the period 2013 onward, we observe a burgeoning of the equity fund segment where fund product issuance has doubled by the last quarter of 2014 and increased another twofold in the second quarter of 2015. Tables 4.2, 4.3 and 4.4, present a complete list of FMCs in China. Funds are issued based on legal structure (closed or open-ended) and then divided into various official categories depending on the proportion of its investible net assets in broad asset classes. Categories of funds include equity fund, index fund, hybrid fund, bond fund, money market fund, QDII fund and other specialty fund. Most funds do not sub-divide their mutual funds beyond this broad categorization on their website and in the prospectus. Figure 4.3 describes the evolution of investment styles in Chinese mutual fund industry through a splicing method. Figures 4.4 and 4.5 outline in details the inception of each fund in this study.

The equity fund segment consists of funds mainly invested in domestic stocks, commonly known as A shares, listed on two exchanges in China, namely, the Shanghai Stock Exchange (“SSE”) and Shenzhen Stock Exchange (“SZSE”). Apart from stocks, portfolio composition of these equity funds includes bonds and cash holdings. Fund characteristics (in percentage, and in million RMB) of our sample are presented under Table 4.5. Summary statistics of 274 equity funds during the period under investigation (2011-2015) are included. Averages for all years on funds’ asset allocation, age, management fees, fund expenses, transaction fees, brokerage and commissions, fund investor ownership structure and total net assets are reported. Actual stock holdings shows that fund managers generally comply with the fund asset administration ruling that is required for funds classified under the equity

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76 Enhanced-index funds are always considered under the category of index fund.
77 Compliance with asset allocation ruling does not necessitate the adherence to fund investment mandate.
category which also serves as a fund selection criteria in this study. On average, approximately 5 per cent of the fund assets are held in Chinese bonds with the remaining 15 per cent of the fund assets invested in cash. Since the focus of this thesis is on voluntary style drift in equity funds, study sample has on average 81 per cent of its net assets invested in domestically listed firms,\textsuperscript{78} that is, A shares quoted in RMB.

### 4.5.2 Chinese stock data and construction

The stock data consists of all the domestic stocks listed on both SSE and SZSE. These are the investible stocks that fund manager can invest their fund dollars in. Details about the universe stocks as described in the following are collected:

- Stock name, listing exchange, industry classification, shareholding reform compensation details (bonus shares compensated, implementation date)
- Stock closing price\textsuperscript{79} for the computation of size characteristics
- Float Market capitalization for the computation of size characteristics
- Price-to-book ratio (hereinafter BE/ME) for the computation of value/growth characteristics
- Monthly stock returns for the computation of past year returns (hereinafter PYR), that is, momentum characteristics

Generally, historical stock prices are quoted at opening, intraday (high and low), average and closing. The closing price is used in this study where the stock is last traded in the market at each trading day with the view that investors track their portfolio performance or make any investment decision using end of day’s stock prices.

\textsuperscript{78} CSRC \textit{2012 Securities Investment Fund Law of the People’s Republic of China} requires that Chinese mutual fund can only invest in domestic listed firms’ securities unless it has obtained a QDII (\textit{Qualified Domestic Institutional Investor}) license and the fund will be classified under QDII category.

\textsuperscript{79} We use forward-adjusted stock prices, descriptions about the adjustment are outlined in the next paragraph.
price. Further, an adjusted closing stock price ($p_{na}$) on historical stock data is used instead of a non-adjusted market price as this will incorporate all corporate events such as dividend distribution, stock splits or rights offerings which will affect stock price volatility. The price is adjusted on the day of the event occurrence prior to next day’s opening price. This better represents the stock’s equity value based on buy-and-sell behavior instead of corporate action. Forward-adjusted closing price for each stock is obtained from WIND for the period under investigation.

A stock’s market capitalization is defined as the total market value on its outstanding shares in the market, a proxy used to characterize fund style in size dimension. This study uses a free-float market capitalization methodology instead of a full market capitalization. Peculiar to the economic reform in China, A-shares are owned by 3 distinctive types of shareholders, namely, the state, legal person and public individual. Trading of state-owned shares and legal person shares were previously prohibited in the market and hence they are known as non-tradable shares (hereinafter NTS), leaving only public individual shares to be freely floated in the stock market, also called the tradable shares (“TS”). However, China has initiated a successful shareholding structure reform in April 2005 that gives NTS holders the right but no obligation to sell their holdings in the market after the restricted window following the reform (Huang, 2014). The share reform implementation by publicly listed stocks took place between June 2005 and November 2014. During this period, Chinese stock market sees a gradual increase in floated shares. These restricted shares together with the floated shares add up the full market capitalization of each stock.81 Considering that full market capitalization reflects a more realistic market

80 There is a lock up period of twelve months after the reform is completed and NTS holder who owns more than 5 per cent of the NTS are prohibited to trade more than 5 per cent in the first twelve months and not more than 10 per cent within the 24-month period.

81 Alternatively, total shares issuance = restricted shares + float shares.
movement and is commonly adopted by index builder such as the Financial Times Stock Exchange ("FTSE") methodology. The market capitalization calculation in this study follows the same approach. In specific, float-capitalization (FC) in RMB for each stock is computed as:

$$ FC = \text{adjusted closing price} \times \text{float shares in unit} $$

The float capitalization value depicts the size characteristics of each stock necessary for constructing multiple equity style portfolios, in which, each portfolio consists a unique set of quantitative style attribute measured in size, value, growth and momentum factors. However, there is one key consideration in WIND forward stock price data. Although stock prices have been adjusted for dividends and stock spilt, the price does not reflect the adjustment for reform compensation made to TS by NTS, typically in bonus shares.\(^{82}\)

After the reform is completed, the amount of previously non-tradable shares will become tradable in a gradual process. More instantly, the number of float shares will increase after the reform process when NTS have to compensate TS, for example, 3 bonus shares for every 10 shares bought (compensation ratio). This additional supply of tradable shares can be expected to exert a downward pressure on stock price thus causing an adverse price impact on stocks. To isolate the artificial value change in each stock arises from the compensation offer in the reform process, previous closing stock price will be adjusted for the compensation ratio agreed by NTS and TS holders for each stock. Formally, compensation-adjusted stock price in this study is defined as:

\(^{82}\) According to WIND, share price is not adjusted for reform compensation given to TS by NTS.
\[ p_{ca} = p_{na} \left( \frac{\text{ Tradable shares}}{\text{ Tradable shares} + \text{ Total bonus shares compensated}} \right) \]

where \( p_{na} \) is the closing price for each stock before shareholding reform, \( p_{ca} \) is the closing price adjusted for reform bonus shares.

We quantify investment style\(^{83}\) of each fund following the seminal evidence in the study of (Fama and French, 1995) that funds engage in strategies to capitalize market inefficiencies with respect to value and growth. By definition, a value oriented fund will seek stock that has lower market value relative to its book value. Equity funds use various valuation approaches but they are in general related. Value fund can use financial ratios for example Price-to-Book (hereinafter P/B), Price-to-Earnings (hereinafter P/E), Price-to-Sales (hereinafter P/S) and/or Price-to-Cash Flow (hereinafter P/CF) to identify a value stock. Whereas style definition is a challenging concept, this thesis adopts the BE/ME ratio measure in classifying value and growth stocks, following Fama and French (1995) and Daniel, Grinblatt, Titman and Wermers (1997) methodology for two reasons. First, we want to ensure that our style drift fund performance evaluation approach is consistent with broad mutual fund literature such as Brown, Harlow, and Zhang (2012), Wermers (2012) and others. Second, BE/ME ratio is a superior estimate for “value” effect in Chinese stocks compared with P/S and P/E ratios (Malkiel and Jun, 2009).

Using the historical adjusted-closing stock prices collected, this thesis defines past year returns characteristic of a stock as the preceding 12-month cumulative returns prior to style benchmark formation date\(^{84}\) (which is the last day of December)

\(^{83}\) Factor investing refers to asset allocation to size, value, momentum, following the evidence of factor premiums.

\(^{84}\) Formation date is set at beginning of each January.
and is calculated through end of September. This study uses monthly log returns to calculate for past year returns characteristic of a stock. Absolute returns for a given month is calculated as taking a natural log on the last trading price on the last business day of the month divided by the last trading price in the previous month. These monthly past year returns will be summed up to form PYR characteristic of a stock at each formation date. A positive PYR denotes a stock with the highest previous year returns while a negative PYR indicates a stock with the lowest previous year returns. PYR measures whether a fund prefers momentum or contrarian strategy. This momentum effect is a market anomaly which demonstrates that stock exhibits short-term performance persistence. Carhart (1997) shows that past stock winner continues to outperform in the subsequent year while loser continues to underperform by constructing a factor-mimicking portfolio for 1-year returns on U.S. stock.

While constructing PYR, it is common to ignore the most recent month returns in the formation, that is, December to avoid short-term reversal effect (pricing correction) in stocks (Daniel, Grinblatt, Titman and Wermers, 1997). However, it has been shown that medium-term momentum profit is shorter in Chinese stocks compared to U.S. Typically, momentum effect is strongest for 1 to 3-month holding periods with formation periods not exceeding 9 months (Su, 2011). Momentum is primarily due to industry effect and is attributable to Chinese investor’s behavioral bias. Specifically, Chinese individual investors are found to underreact to industry-specific information as explained in the augmented delayed-reaction Fama-French three-factor model (Su, 2011). Chinese individual investors tend to extrapolate past

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85 Su (2011) finds that momentum effect in Chinese stocks is strongest for holding periods one to three months and when past performance is calculated over nine months or less.

86 Short to medium-term momentum effect differs between the U.S. and Chinese stock market; in which, momentum tends to last longer i.e. up to 12 months over more formation periods (11 to 12 months) in the U.S. (Jagadeesh and Titman, 1993) compared to the Chinese market where momentum on average is more pronounced during the first three months with a relatively shorter formation period of nine months (Su, 2011).
performance when making investment decisions and their sentiment tends to swing in tandem with market rumours. Chinese stock market is said to be fuelled by short-term speculative investment behavior. It is also plagued by investors with poor financial literacy, poor investment skills, and low risk perception, which all contribute to herding and trend following (Wang, Shi, and Fan, 2006). Further, Chinese institutional investors are often momentum traders and tend to chase after relative stock returns. These unique characteristics in Chinese investors explain why industry-specific information is not incorporated into stock prices in a timely manner.
Table 4.1: Mutual funds sample and the development of mutual fund market in China

This table reports the development of mutual fund market in China by year, between 2004 and 2015. The numbers listed under open-end active equity funds represent our first dataset required for fund style analysis. Our mutual fund data are drawn from WIND Information Co., Ltd (“WIND”). Information on fund names, fund objective, investment strategy and inception date is obtained from WIND and cross checked against FMC websites. We require that sample funds should be at least 5 years of age and each fund has at least 80 percent of its net assets invested in domestically listed firms, that is, A shares quoted in RMB throughout the study period. 

Sample excludes index funds, enhanced-index funds, bond funds, money market, hybrid funds (consisting of fixed-income-oriented balanced funds and flexible allocation funds), and Qualified Domestic Institution Investor (“QDII”) funds which invest in overseas securities that are not oriented to the objective of this thesis. Our sample consists of 274 open-end equity funds and approximately 180,000 portfolio units for our analysis.

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</thead>
<tbody>
<tr>
<td>Number of Fund Management Company (FMC)</td>
<td>45</td>
<td>53</td>
<td>59</td>
<td>61</td>
<td>64</td>
<td>64</td>
<td>67</td>
<td>74</td>
<td>78</td>
<td>94</td>
<td>101</td>
<td>106</td>
</tr>
<tr>
<td>Total number funds (closed and open-end funds)</td>
<td>110</td>
<td>172</td>
<td>269</td>
<td>332</td>
<td>446</td>
<td>596</td>
<td>763</td>
<td>1011</td>
<td>1372</td>
<td>1952</td>
<td>2541</td>
<td>3598</td>
</tr>
<tr>
<td>Number of open-end funds</td>
<td>104</td>
<td>166</td>
<td>263</td>
<td>326</td>
<td>440</td>
<td>588</td>
<td>746</td>
<td>971</td>
<td>1129</td>
<td>1383</td>
<td>1823</td>
<td>2356</td>
</tr>
<tr>
<td>Number of open-end equity* funds</td>
<td>47</td>
<td>78</td>
<td>129</td>
<td>177</td>
<td>213</td>
<td>261</td>
<td>312</td>
<td>367</td>
<td>414</td>
<td>444</td>
<td>500</td>
<td>628</td>
</tr>
<tr>
<td>Number of open-end active equity funds</td>
<td>10</td>
<td>12</td>
<td>21</td>
<td>23</td>
<td>53</td>
<td>96</td>
<td>149</td>
<td>197</td>
<td>323</td>
<td>597</td>
<td>138</td>
<td>138</td>
</tr>
<tr>
<td>Number of open-end mixed funds</td>
<td>73</td>
<td>110</td>
<td>169</td>
<td>220</td>
<td>273</td>
<td>338</td>
<td>393</td>
<td>465</td>
<td>529</td>
<td>622</td>
<td>757</td>
<td>1423</td>
</tr>
<tr>
<td>Number of open-end equity-oriented funds</td>
<td>46</td>
<td>77</td>
<td>126</td>
<td>174</td>
<td>210</td>
<td>256</td>
<td>302</td>
<td>354</td>
<td>397</td>
<td>424</td>
<td>445</td>
<td>490</td>
</tr>
<tr>
<td>AUM of open-end funds at year end (RMB in Billion)</td>
<td>323.65</td>
<td>494.48</td>
<td>717.00</td>
<td>3,320.10</td>
<td>2,190.20</td>
<td>2,832.57</td>
<td>2,615.54</td>
<td>2,522.89</td>
<td>3,563.04</td>
<td>3,967.10</td>
<td>5,534.22</td>
<td>13,818.90</td>
</tr>
<tr>
<td>AUM of open-end general equity &amp; mixed funds at year end (RMB in Billion)</td>
<td>223.81</td>
<td>228.91</td>
<td>584.39</td>
<td>3,087.20</td>
<td>1,353.49</td>
<td>2,250.06</td>
<td>2,127.39</td>
<td>1,683.49</td>
<td>1,790.66</td>
<td>1,725.40</td>
<td>1,918.53</td>
<td>3,460.48</td>
</tr>
<tr>
<td>AUM for open-end general equity funds at year end (RMB in Billion)</td>
<td>27.59</td>
<td>33.42</td>
<td>49.89</td>
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<td>AUM for open-end mixed funds at year end (RMB in Billion)</td>
<td>10.83</td>
<td>10.41</td>
<td>23.47</td>
<td>70.44</td>
<td>23.94</td>
<td>42.22</td>
<td>38.89</td>
<td>34.30</td>
<td>36.07</td>
<td>40.37</td>
<td>44.46</td>
<td>227.15</td>
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<td>AUM for open-end equity-oriented funds at year end (RMB in Billion)</td>
<td>196.22</td>
<td>195.50</td>
<td>534.51</td>
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<td>1,196.50</td>
<td>1,818.61</td>
<td>1,704.15</td>
<td>1,301.10</td>
<td>1,294.28</td>
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<td>1,278.52</td>
<td>2,645.75</td>
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<td>AUM for open-end equity-oriented funds at year end (RMB in Billion)</td>
<td>118.65</td>
<td>122.86</td>
<td>370.54</td>
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<td>946.77</td>
<td>1,452.30</td>
<td>1,348.33</td>
<td>1,019.54</td>
<td>1,015.22</td>
<td>938.87</td>
<td>930.10</td>
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</table>
| Source: WIND database 2004-2015. First mutual fund was issued in 1998 however, open-end equity fund only starts in 2004. AUM, asset under management open-end funds includes stock, bond, mixed, money market, QDI, others ACTIVE equity = actively managed funds Open-end fund starts to operate in 08 Nov, 2002, only 1 fund is issued. * Equity funds include "general equity" and "equity-oriented mixed" funds (initial sample) ** Fund criteria: These funds of at least 5 years are subject to further exclusion criteria: ETF, listed on exchange, less than 80 percent of fund assets invested in domestic listed stocks through the study period 2011-2015 (explains why we should have a total of 312 funds but ended up with 274 eligible funds as sample)
### Table 4.2 List of fund management companies in China (as of September 2015)

<table>
<thead>
<tr>
<th>No.</th>
<th>English Company Name</th>
<th>Chinese Company Name</th>
<th>Company Code</th>
<th>Inception Date</th>
<th>No. of Funds</th>
<th>Place of Registration</th>
<th>Establishment Date</th>
</tr>
</thead>
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<td>Chinese Company Name</td>
<td>Company Code</td>
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<td>No. of Funds</td>
<td>Place of Registration</td>
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<td>Place of Registration</td>
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</tbody>
</table>
Figure 4.3 Fund investment objective splicing based on prospectus
Figure 4.4 Equity mutual fund timeline 2004 – 2011
Figure 4.5 Equity mutual fund timeline 2012 – 2015
Table 4.5 Descriptive statistics of fund sample from 2011 to 2015
This table summarizes the yearly averages characteristics of our samples in percentage and in million RMB, from 2011 to 2015. The numbers listed under open-end active equity funds represent our first dataset required for fund style analysis. Our mutual fund data are drawn from WIND Information Co., Ltd (“WIND”). We require that sample funds should be at least 5 years of age and each fund has at least 80 per cent of its net assets invested in domestically listed firms, that is, A shares quoted in RMB throughout the study period. Our sample consists of 274 open-end equity funds eligible for this study on fund manager’s voluntary style drift.

<table>
<thead>
<tr>
<th>Summary Statistics for Fund Characteristics from 2011-2015</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Year 2011 - 2015</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>80.98</td>
</tr>
<tr>
<td>5.23</td>
</tr>
<tr>
<td>8.85</td>
</tr>
<tr>
<td>1.50</td>
</tr>
<tr>
<td>45.89</td>
</tr>
<tr>
<td>1.66</td>
</tr>
<tr>
<td>28.21</td>
</tr>
<tr>
<td>1.46</td>
</tr>
<tr>
<td>19.83</td>
</tr>
<tr>
<td>1.10</td>
</tr>
<tr>
<td>11.31</td>
</tr>
<tr>
<td>0.63</td>
</tr>
<tr>
<td>2,810.61</td>
</tr>
<tr>
<td>2,861.85</td>
</tr>
<tr>
<td>16.67</td>
</tr>
<tr>
<td>0.10</td>
</tr>
<tr>
<td>83.30</td>
</tr>
</tbody>
</table>

**Note:**

1 Equity funds includes “general equity” funds and "equity-oriented mixed” funds.

2 Expense ratio is the yearly fee that funds charge their fund investors. It is expressed as a percentage of fund’s total assets deducted in each calender year which includes custodian fee, distribution & service fee, interest expense, expenses for repo and other expense.

3 Transaction fees refers to fund’s trading fees.
4.6 Results

4.6.1 Actual investment style

This study begins by examining the actual investment style of Chinese equity funds on the basis of their trading activities. Actual investment style of a fund is determined from its holdings data, under which, average style is measured by cross-sectional value-weighted portfolio average quintile scores on three factors—size, BE/ME and PYR. These value-weighted portfolio average measurements are described in Section 4.4.3.

Panel A in Table 4.6 provides an overview of the fund’s stated investment style and its actual implemented investment style at the end of our assessment period in 2015. We show the results of each fund’s style in its true form within the top and bottom 5 per cent drift range, based on fund’s actual stock holdings. On average, 23 out of 28 of the above top 5 per cent funds in νFSF ranking tend to invest outside their mandated size and value/growth boundary, whilst the investment approach of the bottom 5 per cent νFSF ranking equity funds are aligned with their investment mandate as of end December 2015.

To illustrate how style drift can lead to fund misclassification, consider one of the equity funds—E&P Mid & Small Cap (hereinafter E&P). Our holdings-based style analysis reveals that E&P investment style has tilted to a mega large-cap value orientation, not adhering to E&P’s declaration of a mid-small cap fund. The asset allocation in size was directed at small-cap at January 31, 2011, with a weighted-average size centrum of 1.73 and at the same time towards stocks with neutral BE/ME characteristics of 2.51. E&P investment style is in compliance with its declaration at January 31, 2011, however, E&P fund conducted a major style shift in the subsequent
reporting periods. By end December 2012, E&P fund drastically increased its holdings in mega large firms and is biased towards deep value firms. As a result, E&P fund investors are exposed to a fund with a weighted-average cap centrum of 4.51 while holding more shares in far cheaper stocks (BE/ME centrum of 4.13), an investment objective falling well short of the declared investment mandate at the time of their initial fund product purchase in January 2011.

Our results are consistent with evidence found in the style drift literature (Kim, Shukla, and Thomas, 2000; Brown and Harlow, 2002; Brown, Harlow, and Zhang, 2012; Wermers, 2012; and others). In addition, a distinctive drift pattern in style dimension is observed between Chinese and U.S. funds. It appears that fund managers in China, on average, are less aggressive in pursuing momentum screening in stock selection but are more likely to shift in and out of different stock size, intentionally. By comparison, U.S. fund manager tends to show variations in momentum strategy which is most prominent upon examination with lesser drift in size dimension (Wermers, 2012).

Our findings show that fund managers have a tendency to pick stocks that have different size and BE/ME characteristics from the declared investment objective at any point in time. Our novel voluntary style drift (vFSF) evaluation framework proposed in this thesis facilitates better understanding of the actual investment approach of fund managers and how well they follow the investment strategy in the fund mandate.
### Table 4.6 Voluntary fund style volatility snapshot for equity funds.

This table reports actual fund style and style drift metrics for top and bottom 5 per cent style drift funds from 2011-2015. Actual fund style is diagnosed using holdings-based style analysis, described in Section 4.4. Style drift values are computed by using equally weighted standard deviation of fund j style orientation at time t as shown in equation (4.2). Our voluntary fund style volatility “vFSF” measurement signals a fund’s “intentional” investment style consistency where a fund’s actual trade is measured by the number of fund units allocated to each stock. Time series average style drift statistics for all the fund sample and a fractile of 5 per cent of funds—representing the extreme distribution of style behavior of fund managers—are also presented. The top 5 per cent represents funds that deviate most from their declared investment objectives.

<table>
<thead>
<tr>
<th>Fund name</th>
<th>Years since inception</th>
<th>Panel A. Fund Style</th>
<th>Panel B. vFSF - Voluntary Fund Style Volatility Values</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Stated</td>
<td>Actual (based on Holdings-based analysis as of end Dec 2015)</td>
</tr>
<tr>
<td>Top 5%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E&amp;P Mid &amp; Small Cap Hybrid Fund</td>
<td>5.80</td>
<td>Mid-small</td>
<td>Mega-Deep value</td>
</tr>
<tr>
<td>China Southern Long Yuan Equity Investment Hybrid Fund</td>
<td>8.26</td>
<td>Growth</td>
<td>Mid-Blend</td>
</tr>
<tr>
<td>Bosera Services Sector Growth Hybrid Fund</td>
<td>8.85</td>
<td>Growth</td>
<td>Small-value</td>
</tr>
<tr>
<td>Wanji Harmonious Growth Fund</td>
<td>9.22</td>
<td>Growth</td>
<td>Mega-value</td>
</tr>
<tr>
<td>Tianhong Cyclical Strategy Hybrid Fund</td>
<td>6.13</td>
<td>Growth</td>
<td>Large-value</td>
</tr>
<tr>
<td>Manulife Teda Growth Hybrid Fund</td>
<td>12.87</td>
<td>Growth</td>
<td>Mid-growth</td>
</tr>
<tr>
<td>Dacheng Selected Value Growth Equity Fund</td>
<td>11.20</td>
<td>Blend</td>
<td>Mid-Blend</td>
</tr>
<tr>
<td>Tianhong Cyclical Strategy Hybrid Fund</td>
<td>6.13</td>
<td>Growth</td>
<td>Large-value</td>
</tr>
<tr>
<td>GTJA Allianz Desheng Dividend Hybrid Fund</td>
<td>7.29</td>
<td>Dividend-income</td>
<td>Large-Blend</td>
</tr>
<tr>
<td>E Fund Kexiang Hybrid Fund</td>
<td>7.23</td>
<td>Dividend-income</td>
<td>Mid-Blend</td>
</tr>
<tr>
<td>Harvest Thematic Fund</td>
<td>9.58</td>
<td>Growth</td>
<td>Mid-value</td>
</tr>
<tr>
<td>Baoying Pan-Coastal Regional Growth Hybrid Fund</td>
<td>10.97</td>
<td>Growth</td>
<td>Small-Blend</td>
</tr>
<tr>
<td>China Universal Value Hybrid Fund A</td>
<td>7.04</td>
<td>Value</td>
<td>Large-value</td>
</tr>
<tr>
<td>Golden Eagle Selected Industries Hybrid Fund</td>
<td>6.59</td>
<td>Growth</td>
<td>Large-Deep value</td>
</tr>
<tr>
<td>Bottom 5%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ChinaAMC Income Fund</td>
<td>10.27</td>
<td>Income</td>
<td>Mega-value</td>
</tr>
<tr>
<td>E&amp;P Dividend Hybrid Fund</td>
<td>9.91</td>
<td>Dividend-income</td>
<td>Mega-value</td>
</tr>
<tr>
<td>FTS Potential Portfolio Hybrid Fund</td>
<td>8.91</td>
<td>Blend</td>
<td>Large-blend</td>
</tr>
<tr>
<td>China Southern Tianyuan New Industry Equity Fund</td>
<td>16.59</td>
<td>Small</td>
<td>Large-value</td>
</tr>
<tr>
<td>New China Dividend Selected Investment Fund</td>
<td>10.44</td>
<td>Dividend-income</td>
<td>Mega-Deep value</td>
</tr>
<tr>
<td>Harvest Value Advantage Hybrid Fund</td>
<td>5.65</td>
<td>Growth</td>
<td>Large-blend</td>
</tr>
<tr>
<td>Huaan Core Advantage Hybrid Fund</td>
<td>7.29</td>
<td>Core</td>
<td>Mega-Deep value</td>
</tr>
<tr>
<td>GTJA Allianz Desheng Small Cap Selected Fund</td>
<td>11.89</td>
<td>Small</td>
<td>Large-value</td>
</tr>
<tr>
<td>Dacheng Blue-Chip Stable Growth Equity Fund</td>
<td>11.74</td>
<td>Growth</td>
<td>Mega-Deep value</td>
</tr>
<tr>
<td>ChinaAMC Dividend Fund</td>
<td>10.66</td>
<td>Dividend-income</td>
<td>Large-value</td>
</tr>
<tr>
<td>Fullgoal Tianyi Value Hybrid Fund</td>
<td>11.71</td>
<td>Value</td>
<td>Mega-blend</td>
</tr>
<tr>
<td>Goldstate Capital Core Power Hybrid Fund</td>
<td>5.97</td>
<td>Core</td>
<td>Mega-Deep value</td>
</tr>
<tr>
<td>E&amp;P Quantitative Core Stock Fund</td>
<td>11.51</td>
<td>Large-core</td>
<td>Large-value</td>
</tr>
<tr>
<td>E&amp;P Advantage Allocation Hybrid Fund</td>
<td>8.48</td>
<td>Growth</td>
<td>Mega-Deep value</td>
</tr>
</tbody>
</table>

**Style drift vs. Style-dedicated managers (Top - Bottom 5% Fractile)**

- Average vFSF top 5% fractile (style-drift)
  - 2.662
- Average vFSF top 5% fractile (style-dedicated)
  - 4.318
- Average vFSF bottom 5% fractile (style-dedicated)
  - 1.656

**All funds**

- 2.987
- 1.394
- 0.495
- 1.118
- 0.182
- **-**
4.6.2 The presence of style drift

Results in the preceding subsection show that Chinese equity fund’s actual investment style does not in general adhere to the publicly declared fund objective in the prospectus. In this respect, fund investors cannot solely rely on prospectus when making a fund investment decision. How closely a fund manager adheres to the declared investment style is assessed by means of a voluntary fund style volatility ranking metrics. This style consistency rank is based on the weighted average standard deviation of style characteristics estimated for each reporting period. The lower the \(v\)FSF value, the higher the fund’s consistency in investment approach, suggesting that fund tends to manage fund assets within the bounds of its investment mandate. In contrast, the higher the \(v\)FSF, the lower the fund’s consistency in investment approach, indicating that fund has a tendency of not adhering to its investment mandate.

Some distinctions need to be made clear prior to our empirical testing. We distinguish style drift and style dedicated funds by their median \(v\)FSF value. Funds having style volatility above the median \(v\)FSF value are denoted as drift funds. In contrast, funds with lower style volatility below the median \(v\)FSF value are classified as dedicated funds.

Panel B in Table 4.6 depicts a summary of the degree of style deviation for each fund for the period 2011 to 2015. As shown, funds that strictly adhere to investment mandate as denoted by the bottom 5 per cent of the fractile group, have an average \(v\)FSF value of a mere 1.66. In comparison, funds that drifted the most as represented by top 5 per cent of the fractile group, have far higher average \(v\)FSF value of 4.32. These results indicate that fund managers following fund investment style
consistently have a significant lower style drift value relative to a fund manager who
deviates from the investment style mandate in managing the fund’s trading activities.
The difference in style drift value between top and bottom 5 per cent vFSF manager is
2.66, statistically significant at $\alpha = 0.01$. Figure 4.6 shows graphically the stability of
a fund’s investment style in the case of style dedication, taking “Fullgoal Tianyi
Value Fund” for example, whilst Figure 4.8 illustrates the case of style drift using
“E&P Mid & Small Cap Fund” as an example.

In terms of fund age, style drift fund represented by top 5 per cent of vFSF
rank have an average age of 8 while style dedicated fund at the bottom most 5 per
cent of vFSF rank has an average age of 10. Our results confirm the presence of
extensive style drift among Chinese funds, and that style drift behavior is not affected
by fund age.

A brief profile of Fullgoal Tianyi, a style dedicated fund, is provided in Figure
4.7. The purpose is to show how fund investment styles diverge over time using a 3 x
3 grid style box, widely used in the U.S. fund market. The vertical (horizontal) axis
denotes fund’s size (value-growth) orientation. Each sphere within the style box
represents the cross-sectional implemented investment style of Fullgoal Tianyi Value
Fund at each reporting period using holdings-based size, value and growth
characteristics score, construction described in Section 4.4.3. Clearly, Fullgoal Tianyi
consistently invests in value firms which reasonably adheres to its declared
investment objective in the prospectus. Figure 4.7 also reveals additional information
about the fund’s investment style orientation in market capitalization segment. This
size characteristics aspect of the fund is not disclosed in the prospectus but is of
informational value to fund investors holding other large-cap fund. Overall, Fullgoal Tianyi Fund is primarily invested in undervalued large to mega-large listed stocks in a very consistent manner and on that basis, the fund is ranked highly in the top 5 per cent vFSF fractile range with a low style volatility measure.

Figure 4.9, in contrast, describes a style drift fund, “E&P Mid-Small Cap Fund” or E&P in short, using the 3 x 3 grid style box. Similarly, each sphere within the style box represents the cross-sectional implemented investment style of E&P at each reporting period using holdings-based size, value and growth characteristics score. The style box shows that E&P is invested in a wide variety of stocks of different characteristics in terms of size and value-growth dimensions. As a result, fund has very high measure of style volatility which indicates that manager fails to comply with her stated investment objective as a mid-small cap fund.

---

87 Say an investor seeking for a return that replicates a large-cap-value portfolio allocates his wealth to two investment vehicles (stocks and funds): 25 per cent of his total wealth is directly invested in the equity market for large-cap stocks, another 25 per cent investing in a “true-to-its-label” (or style dedicated) large-cap fund (other than Fullgoal Tianyi) and the balance 50 per cent a declared value fund (Fullgoal Tianyi). Without the knowledge of the actual fund characteristics, investor is overexposed to large-cap stock with a less diversified investment portfolio.
Figure 4.6 Investment style fluctuation for “Fullgoal Tianyi Value Fund”, a style dedicated fund: 2011-2015. This figure illustrates the yearly style fluctuation of a Chinese equity fund in the 3 characteristics, namely, Cap or market capitalization (for size dimension), Book-to-Market or BE/ME ratio (for value and growth dimensions) and PYR (past year returns for momentum dimension). This fund sits in the bottom 5 per cent of the vFSF rank which denotes a style dedicated fund. The fund’s investment style pattern ranges from January 2011 to December 2015, a period of 5 years.
**Portfolio Statistics for Fullgoal Tianyi Value Fund, 31 December 2015**

<table>
<thead>
<tr>
<th>Equity Portfolio Composition (%)</th>
<th>Fund Regional Exposure (%)</th>
<th>Sector Weightings (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stocks</td>
<td>China stocks</td>
<td>Financials</td>
</tr>
<tr>
<td>Bonds</td>
<td>Non-China stocks</td>
<td>Materials</td>
</tr>
<tr>
<td>Cash &amp; others</td>
<td></td>
<td>Consumer Discretionary</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Consumer Staples</td>
</tr>
<tr>
<td><strong>Fund Manager(s) - Experience</strong></td>
<td></td>
<td>Industrials</td>
</tr>
<tr>
<td>Previous Manager(s) since inception</td>
<td></td>
<td>Health Care</td>
</tr>
<tr>
<td>张辉</td>
<td>Assets in Top 10 holdings</td>
<td>7.14</td>
</tr>
<tr>
<td>谢文</td>
<td>71.80</td>
<td>Information Technology</td>
</tr>
<tr>
<td><strong>Current Manager(s)</strong></td>
<td></td>
<td>Utilities</td>
</tr>
<tr>
<td>谢辉</td>
<td>烟草</td>
<td>3.1</td>
</tr>
<tr>
<td>许炎</td>
<td>食品/饮料</td>
<td></td>
</tr>
<tr>
<td>香雪制药</td>
<td>消费者服务</td>
<td></td>
</tr>
<tr>
<td>浙江龙新</td>
<td>3.45</td>
<td></td>
</tr>
<tr>
<td>宁波华翔</td>
<td>国际化</td>
<td>3.02</td>
</tr>
<tr>
<td>东方园林</td>
<td>2.55</td>
<td></td>
</tr>
<tr>
<td>银座股份</td>
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<td></td>
</tr>
<tr>
<td>诺普信</td>
<td>6.35</td>
<td></td>
</tr>
<tr>
<td>李晓铭</td>
<td>6.89</td>
<td></td>
</tr>
<tr>
<td>万华化学</td>
<td>11.15</td>
<td></td>
</tr>
<tr>
<td>永辉超市</td>
<td>11.74</td>
<td></td>
</tr>
<tr>
<td>永辉超市</td>
<td>汽车</td>
<td>12.92</td>
</tr>
<tr>
<td>汽车</td>
<td>12.92</td>
<td></td>
</tr>
<tr>
<td>东方日升</td>
<td>4.16</td>
<td></td>
</tr>
<tr>
<td>浙江龙新</td>
<td>3.52</td>
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</tr>
<tr>
<td>东方园林</td>
<td>2.55</td>
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<td>诺普信</td>
<td>6.35</td>
<td></td>
</tr>
<tr>
<td>李晓铭</td>
<td>6.89</td>
<td></td>
</tr>
<tr>
<td>张晖</td>
<td>3.77</td>
<td></td>
</tr>
<tr>
<td>谢文</td>
<td>9.51</td>
<td></td>
</tr>
<tr>
<td><strong>Actual Investment Style</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Holdings-based Style Analysis at each reporting period)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 4.7 Profile and investment style box for Fullgoal Tianyi value fund, December 31, 2015. This figure illustrates the customized Chinese style box. Style Box is first introduced by Morningstar to describe and understand the portfolio investment style of U.S. funds in a 3 x 3 grid layout. A depiction of a fund’s yearly style fluctuation in size and value-growth characteristics of a Chinese equity fund in the bottom 5 per cent vFSF rank fractile is provided. Bottom 5 per cent fractile group denotes a style dedicated fund with the lowest style volatility measured as vFSF. Cap or market capitalization for size dimension and Book-to-Market or BE/ME ratio for value and growth dimensions. The style box gives an account of the dominant investment style of Fullgoal Tianyi fund at each reporting period from January 31, 2011 to December 31, 2015, an aggregate of 5 years. Over time, we are able to visualize how Fullgoal Tianyi’s investment style evolves and whether the fund’s style orientation is stable or unstable. Additional fund details are also provided. For example fund’s portfolio composition, portfolio region exposure, portfolio stock concentration, sector weightings, and whether the fund is solo or team managed.
Figure 4.8 Investment style fluctuation for “E&P Mid & Small Cap Fund”, a style drift fund: 2011-2015. This figure illustrates the style fluctuation in the three characteristics, namely, Cap or market capitalization (for size dimension), Book-to-Market or BE/ME ratio (for value and growth dimensions), PYR (past year returns for momentum dimension). This fund sits in the top 5 per cent of the vFSF rank which denotes a style drift fund. The fund’s investment style pattern ranges from January 2011 to December 2015, a period of 5 years.
Portfolio Statistics for E&P Mid & Small Cap Fund, 31 December 2015

Fund Company: Everbright Pramerica Fund Management Limited
Legal Structure: Joint Venture
Fund category: Open-end Equity Fund
Total Asset (RMB): 393,065,865.48
Inception Date: 2010-04-14
Prospectus Benchmark: CSI 700 Index Yield * 75% + CSI Bonds Index Yield * 25%
Prospectus Investment Objective:
本基金通过深入挖掘具有高成长特性或者潜力的中小盘上市公司股票,以求获取基金资产的长期增值。

Fund invests primarily in stocks with high growth potential or small-cap characteristics of listed companies with the aim to obtain long-term value of fund assets.

No. of Manager: 1

Equity Portfolio Composition (%)
- Stocks: 84.81
- Bonds: 0.50
- Cash & others: 14.69

Fund Regional Exposure (%)
- China stocks: 100
- Non-China stocks: 0

Stock Concentration (%)
Assets in Top 10 holdings: 71.30

Sector Weightings (%)
- Financials: 40.56
- Consumer Discretionary: 18.35
- Consumer Staples: 15.65
- Energy: 11.55
- Health Care: 5.61
- Materials: 3.85
- Industrials: 3.43
- Information Technology: 1

Fund Manager(s) - Experience (Year)
- Previous Manager(s) since inception:
  - 袁宏隆: 3.84
  - 李阳: 3.95
- Current Manager(s):
  - 戴奇雷: 5.19

Figure 4.9 Profile and investment style box for E&P Mid-Small Cap “E&P Fund”, December 31, 2015. This figure illustrates the customized Chinese style box. Style Box is first introduced by Morningstar to describe and understand the portfolio investment style of U.S. funds in a 3 x 3 grid layout. A depiction of a fund’s yearly style fluctuation in size and value-growth characteristics of a Chinese equity fund in the top 5 per cent vFSF rank fractile denoting a style drift fund is provided. Style drift fund has the highest style volatility measured as vFSF. Cap or market capitalization for size dimension and Book-to-Market or BE/ME ratio for value and growth dimensions. The style box gives an account of the dominant investment style of E&P fund at each reporting period from January 31, 2011 to December 31, 2015, a total of 5 years. Over time, we are able to visualize how E&P’s investment style evolves and whether the fund’s style orientation is stable or unstable. Additional fund details are also provided. For example fund’s portfolio composition, portfolio region exposure, portfolio stock concentration, sector weightings, and whether the fund is solo or team managed.
4.6.3 Sub-periods style drift assessment

vFSF determines the voluntary investment style volatility of a fund manager at each measurable period or a window. Style volatility analysis is conducted over a 3 year period with vFSF ranking showing whether sample fund follows its investment mandate in the short term.

Table 4.7 describes style deviation of each equity fund over a window from 2013 to 2015. A repeated examination using similar style drift analytical framework as described in Section 4.4, confirms that Chinese equity funds are prone to style drift. A close examination of the extreme top 5 per cent fractile group (style drift funds) and bottom 5 per cent fractile group (style dedicated funds) reveals different level of voluntary style drift. As shown in Panel B of Table 4.7, style dedicated funds have a mean style deviation value of 1.15 over the assessment window. To illustrate, Figure 4.10 provides a visual illustration of how well a fund has maintained its investment style, using “Fullgoal Tianyi Value Fund” as an example.

In contrast, the top 5 per cent funds displaying the worst drift in investment style have a mean style deviation value of 3.55. Figure 4.11 illustrates a typical style fluctuating trend of the three different style characteristics of “Huatai-PB Value Plus Fund”, in the top 5 per cent. Funds in the top 5 per cent have investment style that deviate drastically as opposed to funds in the bottom 5 per cent. The difference in style drift value for top and bottom 5 per cent vFSF manager is 2.4, statistically significant at $\alpha = 0.01$. In terms of fund age, results are consistent with our findings in long term investment style behavior in Section 4.6.2. That is, style drift funds (top 5 per cent) and style dedicated funds (bottom 5 per cent) do not have a wide age gap,
with style drift funds having an average age of 8.3, whilst style dedicated funds are 8.8 of age on average.

Overall, our results confirm that style drift is evident in Chinese equity funds and that style drift is a common practice in the fund market. On average, the estimated style drift level for all funds is 2.99, over a period of 5 years.
Table 4.7 Sub-period voluntary fund style volatility analysis.
This table reports actual fund style and style volatility statistics for top and bottom 5 per cent equity style drift ranking from 2013 to 2015. Actual fund style is diagnosed using holdings-based style analysis, described in Section 4.4.3. Style drift values are computed by using equally weighted standard deviation of the fund j style orientation at time t as shown in equation (4.2). Our voluntary fund style volatility “vFSF” measurement tells a fund’s “intentional” investment style consistency where a fund’s actual trade is measured by the number of fund units allocated to each stock. Time series average style drift statistics for all the fund sample and a fractile of 5 per cent of funds—representing the extreme distribution of style behavior of fund managers—are also presented. The top 5 per cent represents funds that deviate most from their declared investment objectives.

<table>
<thead>
<tr>
<th>Fund name</th>
<th>Years since inception</th>
<th>Stated</th>
<th>Actual (based on Holdings-based analysis as of end Dec 2015)</th>
<th>Panel A. Fund Style</th>
<th>Panel B. vFSF - Voluntary Fund Style Volatility Values</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total</td>
<td>Mean</td>
</tr>
<tr>
<td>Top 5%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Huatai-PB Value Plus Hybrid Fund</td>
<td>7.57</td>
<td>Value</td>
<td>Mega-Deep value</td>
<td>4.515</td>
<td>0.125</td>
</tr>
<tr>
<td>GTIA Allianz Desheng Dividend Hybrid Fund</td>
<td>7.29</td>
<td>Dividend-income</td>
<td>Large-core</td>
<td>4.025</td>
<td>0.112</td>
</tr>
<tr>
<td>ICBCS High Yield Hybrid Fund</td>
<td>8.58</td>
<td>Dividend-income</td>
<td>Mid-growth</td>
<td>3.775</td>
<td>0.105</td>
</tr>
<tr>
<td>Manulife Teda Growth Hybrid Fund</td>
<td>12.87</td>
<td>Growth</td>
<td>Mid-growth</td>
<td>3.614</td>
<td>0.100</td>
</tr>
<tr>
<td>Citic-Prudential Superior Selected Hybrid Fund</td>
<td>6.44</td>
<td>Growth</td>
<td>Small-core</td>
<td>3.492</td>
<td>0.097</td>
</tr>
<tr>
<td>Dacheng Industry Rotation Hybrid Fund</td>
<td>6.40</td>
<td>Growth</td>
<td>Mid-core</td>
<td>3.429</td>
<td>0.095</td>
</tr>
<tr>
<td>HFT Equity Hybrid Fund</td>
<td>10.58</td>
<td>Large-growth</td>
<td>Small-Core</td>
<td>3.425</td>
<td>0.095</td>
</tr>
<tr>
<td>Golden Eagle Growth Hybrid Fund</td>
<td>5.80</td>
<td>Growth</td>
<td>Small-Deep value</td>
<td>3.414</td>
<td>0.095</td>
</tr>
<tr>
<td>Orient Selected Hybrid Fund</td>
<td>10.11</td>
<td>Growth</td>
<td>Mid-Blend</td>
<td>3.399</td>
<td>0.094</td>
</tr>
<tr>
<td>Citic-Prudential Essential Growth Hybrid Fund</td>
<td>9.23</td>
<td>Growth</td>
<td>Large-Deep value</td>
<td>3.369</td>
<td>0.094</td>
</tr>
<tr>
<td>E Fund Kexiang Hybrid Fund</td>
<td>7.23</td>
<td>Dividend-income</td>
<td>Mid-Blend</td>
<td>3.347</td>
<td>0.093</td>
</tr>
<tr>
<td>China Nature Innovation Pioneer Hybrid Fund</td>
<td>7.76</td>
<td>Large-growth</td>
<td>Small-Blend</td>
<td>3.312</td>
<td>0.092</td>
</tr>
<tr>
<td>E&amp;P Mid &amp; Small Cap Hybrid Fund</td>
<td>5.80</td>
<td>Mid-small</td>
<td>Mega-Deep value</td>
<td>3.307</td>
<td>0.092</td>
</tr>
<tr>
<td>Changxin Yinli Selected Hybrid Fund</td>
<td>11.11</td>
<td>Large-value</td>
<td>Mid-Blend</td>
<td>3.258</td>
<td>0.091</td>
</tr>
<tr>
<td>Guotai Jingpeng Blueschip Value Equities Fund</td>
<td>9.39</td>
<td>Large-value</td>
<td>Large-value</td>
<td>1.160</td>
<td>0.032</td>
</tr>
<tr>
<td>China Universal Value Hybrid Fund-A</td>
<td>7.04</td>
<td>Value</td>
<td>Large-value</td>
<td>1.307</td>
<td>0.036</td>
</tr>
<tr>
<td>ChinaAMC Dividend Fund</td>
<td>10.66</td>
<td>Dividend-income</td>
<td>Large-value</td>
<td>1.304</td>
<td>0.036</td>
</tr>
<tr>
<td>E&amp;P Quantitative Core Stock Fund</td>
<td>11.51</td>
<td>Large-core</td>
<td>Large-value</td>
<td>1.237</td>
<td>0.034</td>
</tr>
<tr>
<td>New China Dividend Selected Investment Fund</td>
<td>10.44</td>
<td>Dividend-Income</td>
<td>Mega-Deep value</td>
<td>1.219</td>
<td>0.034</td>
</tr>
<tr>
<td>CCB Principal Perpetual Value Hybrid Fund</td>
<td>10.23</td>
<td>Value</td>
<td>Large-value</td>
<td>1.199</td>
<td>0.033</td>
</tr>
<tr>
<td>ChinaAMC Blue Chip Core Fund</td>
<td>8.81</td>
<td>Large-core</td>
<td>Large-value</td>
<td>1.185</td>
<td>0.033</td>
</tr>
<tr>
<td>Bosera Franchise Value Hybrid Fund</td>
<td>7.70</td>
<td>Value</td>
<td>Mega-Deep value</td>
<td>1.172</td>
<td>0.033</td>
</tr>
<tr>
<td>Huaan Core Advantage Hybrid Fund</td>
<td>7.29</td>
<td>Core</td>
<td>Mega-Deep value</td>
<td>1.160</td>
<td>0.032</td>
</tr>
<tr>
<td>Lord Mid &amp; Small Cap Hybrid Fund</td>
<td>5.59</td>
<td>Mid-small</td>
<td>Mega-Deep value</td>
<td>1.125</td>
<td>0.031</td>
</tr>
<tr>
<td>Goldstate Capital Core Power Hybrid Fund</td>
<td>5.97</td>
<td>Core</td>
<td>Mega-Deep value</td>
<td>1.085</td>
<td>0.030</td>
</tr>
<tr>
<td>Fullgoal Tianyi Value Hybrid Fund</td>
<td>11.71</td>
<td>Value</td>
<td>Mega-core</td>
<td>1.043</td>
<td>0.029</td>
</tr>
<tr>
<td>China Southern Select Hybrid Fund</td>
<td>8.76</td>
<td>Growth</td>
<td>Mega-Deep value</td>
<td>0.981</td>
<td>0.027</td>
</tr>
<tr>
<td>E&amp;P Advantage Allocation Hybrid Fund</td>
<td>8.48</td>
<td>Growth</td>
<td>Mega-Deep value</td>
<td>0.976</td>
<td>0.027</td>
</tr>
</tbody>
</table>

| Style-drift Vs. Style-dedicated managers | - | - | - | 2.395 | 0.066*** | - | - | - |
| Top - Bottom 5% Fractile | (33.32) | Average vFSF top 5% Fractile (style-drift) | 3.549 | Average vFSF bottom 5% Fractile (style-dedicated) | 1.154 | All funds | 2.351 | 0.065 | 0.064 | 0.107 | 0.029 | - |

**Note:** The table provides a comprehensive analysis of fund style and style volatility, with a focus on the top and bottom 5% of funds, illustrating the deviation from their declared investment objectives.
Figure 4.10 Investment style fluctuation for “Fullgoal Tianyi Value Fund”, a style dedicated fund 2013-2015. This figure illustrates the yearly style fluctuation of a Chinese equity fund in the 3 characteristics, namely, Cap or market capitalization (for size dimension), Book-to-Market or BE/ME ratio (for value and growth dimensions) and PYR (past year returns for momentum dimension). This fund sits in the bottom 5 per cent of the vFSF rank which denotes a style dedicated fund. The fund’s investment style pattern ranges from January 2013 to December 2015, a period of 3 years.
Figure 4.11 Investment style fluctuation for “Huatai-PB Value Plus Fund”, a style drift fund: 2013-2015. This figure illustrates the yearly style fluctuation of a Chinese equity fund in the 3 characteristics, namely, Cap or market capitalization (for size dimension), Book-to-Market or BE/ME ratio (for value and growth dimensions) and PYR (past year returns for momentum dimension). This fund sits in the top 5 per cent of the vFSF rank which denotes a style drift fund. The fund’s investment style pattern ranges from January 2013 to December 2015, a period of 3 years.
4.6.4 Robustness tests: Alternative risk definitions

To check that our results are not influenced by the choice of style drift measure defined in equation 4.2 of this thesis, an alternative measure—tracking error (“TE”), a returns-based metric is considered.\textsuperscript{88} TE tracks the deviation of manager’s actual investment style from the style benchmark represented by their declared investment objective in the prospectus over the measurement period. Instead of using raw returns from fund’s NAV in prior studies, this thesis adopts the weighted-average fund returns based on portfolio holdings\textsuperscript{89} (more representative for fund manager actual stock investment decisions) in which the weight of each stock in the fund portfolio is multiplied by the corresponding stock returns. A high TE as denoted by greater returns differential between a fund and a benchmark portfolio of similar characteristics (with reference to our style index) signals a high degree of style drift and vice versa. The results show that style drift funds have a higher annualized TE of 4.17, when assessed over a 3-year period. In contrast, style dedicated funds have a much lower annualized TE of 3.44. Results remain qualitatively unchanged for test over 4-year and 5-year assessment periods. These findings provide further support that style drift is present and prevalent in equity mutual funds in China. TE estimates in drift funds are not affected by our style drift definition as results remain qualitatively stable within the 10th and 20th percentile (vFSF) range. From another perspective, our TE results also suggest that style drift fund portfolio is riskier than

\textsuperscript{88} This study considers TE measure more favourably over regression-based style drift measure for the following reasons: model may subject to specification error in the functional form (Brown, Harlow, and Zhang, 2012); \textsuperscript{89} This standardizes the measurement of returns between funds and their benchmarks since benchmark portfolio defined by stock-level characteristics are not net of costs.
style dedicated funds, in terms of meeting fund investor’s expected investment outcome. When fund managers engage in style drift, portfolio risks are thus increased.

4.7 Conclusion

Style drift is found to be extensively practiced in mature and emerging market such as the U.S., Australia and Malaysia. Persistent style drift behavior by fund managers over time can lead to fund misclassification. When fund managers commit style drift by deviating from their fund’s declared objective and strategy, they often alter the risk profile of their portfolio. Consequently fund investor’s risk and return expectations are disrupted, amplifying the agency problem associated with the FMC governance structure, and hampering the efficient functioning of the fund market undermined.

This thesis is motivated to investigate empirically this important but under-researched topic that covers the existence, characteristics, motivation, and effects of style drift in the context of an exclusively in-house fund management model in China where regulatory environment is weak. Chinese mutual funds are manufactured and marketed in a contractual form. Under this contractual setup, fund investors purchase fund products that are offered by a licensed fund management company which oversees numerous funds. In this case, fund investors are not accorded governance rights over the management of their funds. In addition, managers’ compensation structure linking remuneration to the value of assets under management consolidates a potentially distortive incentive that may promote style drift behavior. Tournament behavior stemming from the ranking of their fund returns against their peers may further drive fund managers to engage in style drift and undertake riskier investment decisions. Prior studies have not examined the form of risk decision a fund manager may assumes in the course of competing against peers to improve interim rank
position, and the tournament literature have not provided empirical evidence on the actual risk behavior. One can however postulate that style drift can be one of the possible risk taking moves by fund managers, given the higher tracking error found in Section 4.6.4. This missing link between tournament and style drift behavior will be empirically explored in this thesis using a more systematic approach for the first time in the finance and mutual fund literature. The investigation on style drift’s motivational link with AUM-based compensation will be presented in the third study (Research Question 3 in Chapter 6) of this thesis.

In order to accurately investigate the presence of style drift in China, this thesis further develops a novel fund classification system and manually collect and analyze an equity fund’s name, inherent objective, strategy and philosophy. This study builds on Daniel, Grinblatt, Titman and Wermers (1997) holdings-based analytical framework to custom design an original fund style index using investible universe of 3,000 stocks and 180,000 portfolio units held by 274 funds. Holdings-based approach is employed rather than the returns-based analysis given that mutual fund name in China often does not reflect the implemented investment strategy in reality. Returns-based analysis is more useful in an environment where the investment philosophy is stable over time but this may not apply to the young mutual fund industry in China. With our customized index, we overcome the lack of relevant specific style indexes in China that can be used to benchmark mutual fund’s performance.

The findings in the first study (Research Question 1 in Chapter 4) of this thesis confirm that intentional style drift is evident among Chinese equity funds, with about 82 per cent of funds failing to invest in accordance to prospectus. We demonstrate that fund managers tend to pick stocks that have different size and BE/ME
characteristics from the declared investment objective. We further test the presence of style drift using different sub-periods. The repeated analysis confirms that Chinese equity funds are prone to style drift. The extent of this behavior is not affected by fund characteristics such as fund age. Our findings complement the work of Chen, Hong, Jiang, and Kubik (2013) by analyzing the presence of style drift as an intentional risk-taking behavior of fund managers within an exclusively in-house fund management environment. Our study attempts to present a fuller picture and better understanding of how fund manager’s investment decision process in portfolio style allocations contributes to excessive risk taking by adopting of a novel measure of manager’s risk intention on the basis of actual portfolio stock units rather than the stock price commonly used in previous studies on style drift (Wermers, 2012, and Brown, Harlow, and Zhang, 2012). We also provide concrete evidence to substantiate the theoretical argument by Chen, Hong, Jiang, and Kubik (2013) about the high levels of risk taking within fund organization with internally managed funds. We present fresh perspective on the actual risk actions of fund managers to produce a more precise\(^9\) risk assessment on the intentional risk behavior of in-house managed funds.

This new evidence also offers several important practical implications. First, fund prospectus can present misleading information with respect to asset allocation and risk profile, thus posing significant challenges to the growing body of mutual fund literature that are generally premised on fund managers actually executing the advertised portfolio investment allocation mandate. On the other hand, our results demonstrate style drift heightens information asymmetry and fund risk. These

\(^9\)Whereas Chen, Hong, Jiang, and Kubik (2013) and most studies do not directly measure fund manager’s risk taking actions in practice, we try to directly attribute risk-taking behavior by using fund manager’s stock by stock trading.
discoveries highlight the importance for improved transparency in fund prospectus to benefit fund investors and other market players such as pension funds and insurance companies so that these fund investors can correctly categorize funds by their true attributes (investment styles) to serve as effective benchmarks for performance comparison of similar funds. In view of the fact that the concept for fund style is poorly articulated by fund managers in China, we suggest a regulatory response to standardize investment objectives by means of more quantitative measures to avoid unclear investment goal and to enhance fund product comparability.

Second, the practice of style drift in Chinese mutual funds suggests that proper fund performance evaluation and less distortive compensation structure of fund managers will require some form of regulatory and market interventions. Appropriate methods of fund style monitoring and evaluation need to be developed and the phenomenon\(^91\) of style drift needs to be carefully taken into account by regulators, market analysts, and fund management companies to detect the actual behaviors of fund managers so that more accurate information can be disseminated to better inform fund investors and other stakeholders. These issues have a significant impact on fund investors’ welfare as well as for the development of China’s financial system and capital market in a sustainable and market enhancing manner.

\(^{91}\) There is some evidence that insurance companies and pension funds in the UK, US and France invest procyclically – a shift between and/or within asset classes. (Bank of England and Procyclical Working Group, 2014).
CHAPTER 5. THE IMPACT OF STYLE DRIFT ON FUND PERFORMANCE

5.1 Introduction

Chapter 4 demonstrates that equity funds exhibit unstable portfolio characteristics with actual investment style that diverges from the investment objective advertised in the prospectus. While our results indicate that Chinese equity fund managers do intentionally engage in style drift, such risk taking activities may sometimes be viewed favourably by scholars and practitioners as a way to enhance fund performance. However, research on how risk taking in style drift affects fund performance particularly in the context of the distortionary “lower-powered” incentive created in in-house managed funds is scant.

China’s mutual fund market provides a unique empirical test setting of in-house fund management model to analyze the prediction of Chen, Hong, Jiang, and Kubik (2013) that the form of fund management organization can shape fund manager’s risk undertaking. In their study, in-house fund managers are less sensitive to poor performance and are less risk averse by virtues of less steep in-house incentive-contracting arrangement compared to outsourced fund managers. However, Chen, Hong, Jiang, and Kubik (2013) define risk action as the tendency of a mutual fund’s returns, measuring the volatility in fund prices. In this thesis, we focus on studying fund manager’s actual risk taking and how increase in risk taking can affect fund performance by means of detecting style drift on the basis of her stock by

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92 In U.S., fund management company tends to terminate outsourced fund manager when they perform badly or take excessive risks (Chen, Hong, Jiang, and Kubik, 2013). Therefore, outsourced funds face steeper penalty than in-house funds.
stock trading decisions.\textsuperscript{93} This thesis’s empirical design for risk intention provides a constructive alternative perspective to most of the mutual fund risk studies on fund performance using fund returns as risk proxy,\textsuperscript{94} and key papers on style drift that measure investment style changes using stock prices in portfolio holdings (Brown, Harlow, and Zhang, 2012, and Wermers, 2012). Research Question 2 of this thesis aims to address this issue with new perspective and empirical evidence.

The presence of style drift raises questions of the efficacy of performance assessment of actively managed funds if such funds do not in practice represent the return-risk expectation as declared in the fund prospectus. Style drift behavior by fund managers highlights a serious information asymmetry issue that harms fund investor interest and undermines the notion of an efficient market.

A more recent study by Cao, Iliev, and Velthuis (2017) on small-cap and large-cap oriented funds in the U.S. market suggests that style drift actually leads to poor fund performance. Another two highly cited papers, Brown and Harlow (2002), and Wermers (2012) explore the effects of style drift on fund performance. Using a returns-based style analysis approach, Brown and Harlow find evidence of misclassified U.S. funds during the period of 1998 to 2003. They show that style-dedicated funds tend to generate higher returns than funds that strayed from the mandated objectives. Similar to Cao, Iliev, and Velthuis (2017), small-cap and mid-cap funds within the value, blend, and growth style categories have a greater tendency to drift compared to large-cap funds. In terms of performance, Brown and Harlow demonstrate that high consistent funds have a higher median annual returns. For example, dedicated large-growth funds earned 14.75 per cent in annual return as

\textsuperscript{93} As we did in Chapter 4, we examine the actual movement of stock units of the fund holdings at each fund reporting period.

\textsuperscript{94} Fund manager’s risk action is inferred from fund returns volatility, i.e. the greater the fund fluctuates around its mean returns, the riskier the fund.
opposed to 14.26 per cent in drifting large-growth funds. The performance gap between style dedicated and style drift funds appears wider in small-cap categories. Notably, style dedicated small-blend funds earn an annual return of 19.65 per cent versus 16.38 per cent by style drift funds of the same nominal fund style. On average, style drift funds also incur higher trading cost as a result of higher portfolio turnover. Style drift can increase fund expenses and affect fund performance through frequent buying and selling stocks of different characteristics. It has been shown that excessive trading cost is directly affected by portfolio investment strategy and it varies across trading style (Keim and Madhavan, 1997) and between stocks with different characteristics such as value and growth (Chan and Lakonishok, 1995).

The asymmetric information regarding style drift has important ramifications for fund investors seeking to maximize fund returns because fund performance can be compromised when style-drift managers place priority in maximizing their own wealth and in effect selling a different product to fund investors. Although there are mixed conclusions about how style drift can affect fund performance, related studies argue that excess risk exposure generated by changing investment strategies does not guarantee superior ex post fund performance (Kim, Shukla, and Thomas, 2000), particularly when risk changes are motivated by personal monetary incentives, fund tends to earn lower returns (Huang, Sialm, and Zhang, 2011). Further, evidence that higher trading costs are found to be correlated with greater volatility in investment style; drift funds are found to only perform well in bear market (Brown and Harlow, 2002; Holmes and Faff, 2007, 2008; and Wermers, 2012), where market is highly volatile with large mispricing opportunities (Kosowski, 2006), thus increasing fund investor’s vulnerability to suboptimal fund investment outcome.
The outcome of how an active mutual fund is managed is of great importance to fund investors. Much of the existing fund performance evidence focuses on the expected monetary returns of funds. This thesis aims to interrogate the ability of a fund manager in meeting fund investors’ investment preference of varying risk-return characteristics and horizons with reference to the investment objectives declared in the prospectus. We examine fund manager’s investment decision using stock holdings data to assess her skill and outcome in 3 aspects: stock picking, market timing and average investment style, following Daniel, Grinblatt, Titman, and Wermers (1997) performance attribution methodology. To precisely appraise the cost and return effects of style drift on fund performance, we employ a performance gap concept. Specifically, we break down the key components on fund costs and returns, which goes beyond the conventional fund performance attribution approach often seen in style drift studies. Conventionally, fund manager’s contributions in fund performance are commonly examined within the scope of stock selection ability and style timing skills in style drift studies (Wermers, 2012) without detailing returns and cost disparities, particularly trading, brokerage and commission fees incurred by fund manager’s intentional action to alter or adhere to investment style. Because it has been demonstrated that trading cost varies across trading style (Keim and Madhavan, 1997) and between stocks with different characteristics such as value and growth (Chan and Lakonishok, 1995), this thesis considers trading cost is of equal importance to fund manager’s skills in maximizing fund investor’s wealth. Therefore, trading cost is an important aspect in our style drift performance analysis.

95 Also known as “style-timing” in the context of this thesis. (See footnote 1)
96 Research Question 2 of this thesis examines the performance gap to determine if hidden benefit (skills) can outweigh hidden costs (trading cost, brokerage and commissions and fund’s operational expenses), of which, variables are often not observed by the public.
The rest of the chapter is organized as follows. Sections 5.2 and 5.3 provide the background for the adoption of our new style drift performance metrics. Section 5.4 details our methodology for characteristics-sorted style benchmark formation, style-drift measurement and fund performance attribution. Section 5.5 describes the data used in the study. Section 5.6 presents and discusses the findings including robustness tests. Section 5.7 concludes.

5.2 Agency-Motivated Style Drift Performance

Our analysis aims to deepen the current understanding of style drift behavior in the context of style drift literature in several important ways. First, most inquiries in the style drift literature tend to echo the success of style drift as an investment “strategy” under different market conditions, asserting that fund managers are style “generalists” who possess talent in identifying under-priced stocks across different size-style characteristics (Holmes and Faff 2007, Wermers, 2012). However, neither of these studies considers the effect of mean reversion\(^{97}\) on short-term anomalies, in which, returns tends to converge quickly (Lo, 2004) and so superior performance in style drift funds (short-term horizon) varies systematically over time, which fails to serve the interest of long-term fund investors. We therefore tackle the issues of style drift impacts for the protection of fund investor’s long term interest in today’s fund marketplace where there is ample evidence on fund manager’s gambling behavior incentivised by their compensation maximization in mature fund industry (Brown, Harlow, and Starks, 1996, and Chevalier and Ellison, 1997). By delving into the performance gap between style drift and style dedicated funds using our fine grained

\(^{97}\) Mean reversion theory argues that stock prices do not follow a random walk and that stock prices will revert to historical average after a period of divergence between market and fundamental values (Poterba & Summers, 1989).
cost-and-return approach, we attempt to clearly identify the contributing factors that negatively affect returns in drift funds.

5.3 New Methodological Approaches to Style Drift Performance

Investor buying a mutual fund is concerned with the returns delivered by fund managers. Much of the existing fund performance evidence focuses on the expected monetary returns of funds. This thesis, however, aims to interrogate the ability of a fund manager in meeting fund investors’ investment goals of varying risk-return characteristics and horizons\(^{98}\) with reference to the investment objectives declared in the prospectus. Here, we focus on whether active fund managers can add value to fund investor’s wealth by maximizing returns through outperforming the fund’s benchmark because it has been found that the differences of manager’s attributes are powerful determinants of mutual fund performance (Daniel, Grinblatt, Titman and Wermers, 1997, Brown, Harlow, and Zhang, 2012; and Wermers, 2012).

We build on Daniel, Grinblatt, Titman, and Wermers (1997) to categorize funds by their true attributes (investment styles) to serve as a benchmark for performance comparison of similar funds. These benchmarks, also known as “characteristics-sorted style indexes” are created for the purpose of evaluating the comparative performance of drift-versus dedicated-funds. These indexes are formulated and constructed in Chapter 4. We use these benchmarks to assess whether style drift funds outperform style dedicated funds with respect to fund manager’s competency in picking quality stocks, successfully predicting the best time to execute her investment strategy through market timing; and maintaining investment style.

\(^{98}\) Fund management business in China predominantly relies on active portfolio management for revenue (fund capital inflow), where open-end index equity funds’ AUM is only 14 per cent of the total AUM of open-end active general equity and mixed equity funds in 2015 (data source from WIND). Style investing is common in global mutual fund market. Style based on stock size, value/growth and momentum factors are commonly seen in early adopters particularly in developed fund market like U.S. In similar fashion, style investing is also embraced in the emerging fund market in China.
Notwithstanding the fact that fund manager’s competency contributes to gross returns, fund manager’s ability to minimize fund costs through her trading behavior is another key factor that will determine investor’s investment outcome.

In the following subsections, we introduce several enhancements to the common methodological approaches undertaken in previous style drift studies. Section 5.3.1 describes our new direct cost approach in determining the performance impact of style drift on fund investors’ wealth, while in Section 5.3.2, we propose new metrics to measure the direct benefits of fund managers’ consistently holding on to stocks with certain characteristics.

**5.3.1 Trading cost and expense ratio proxies**

First, the large body of style drift studies argue that higher trading cost is accompanied by excessive trading which constitutes one of the consequential costs of style drift. Holmes and Faff (2007) speculate a possible link between style drift and Australian fund manager’s compensation structure, and document a significant positive effect of style drift on fund expense ratio using returns-based style analysis, particularly in multi-sector trust funds. However, expense ratio is observed using funds’ management fee as a proxy for fund cost, without considering a variety of additional (and often opaque) actual trading cost, brokerage and commission arising from fund managers’ trading activity, thus their approach may contribute to biased estimates.

We offer our reasoning below for why the fund performance results in the existing literature may be biased as a result of the commonly used cost proxies. First, expense ratio is widely used in broad mutual fund literature and particularly on style

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99 Holmes and Faff (2007) find that fund managers in multisector trust exhibit severe style drift behavior while wholesale trusts (pooled super trusts) managers tend to follow stated investment objective closely.
drift studies as a proxy for funds’ total cost. Studies presume that expense ratio is an adequate indicator of overall expenditure incurred by investors in mutual fund. However, it is important to understand the composition of expense ratio to avoid being misguided by its emphasis as a total fund expenditure. FMCs are required to report yearly fund expenses in their annual financial statements, however in most circumstances, expense ratio is published on prospectus and financial press as a snapshot of the multifaceted spending in the fund. Expense ratio represents annual fund expenditure comprising of funds’ administrative fee, operating cost, management fee and other asset-related costs, expressed as a percentage of funds’ total assets. Additional fund costs such as brokerage fees and commissions, sales load are excluded from the ratio. Although brokerage and commission fees are not a function of the total fund assets or accrued on a daily basis the way expense ratio does, it better reflects the trading activities of a fund. These transaction fees are not directly observed by fund investors but they are real costs that are paid from investors’ investment money (deducted from fund’s assets).

Second, style drift studies on mutual funds in the U.S. affirm that investors in style drift funds are likely to suffer investment losses due to higher trading costs associated with frequent trading by using portfolio turnover as a proxy (Brown and Harlow, 2002). Interestingly, Chakrabarty, Moulton, and Trzcinka (2016) reveal surprising evidence that fund’s turnover ratio is not an accurate indication of fund’s actual trades when short-duration trades are prevalent in funds with reportedly low annual turnover ratio. We therefore avoid introducing possible bias in our trading costs estimates by employing absolute fund costs in monetary unit for calculating trading expenses, brokerage and commission fees, management fees and fund operating expenses to explain the variations in stock picking, market timing abilities
and average fund style benefits between style drift and style dedicated funds. Reinterpreting total fund costs in this explicit\textsuperscript{100} and comprehensive\textsuperscript{101} manner will more accurately determine whether style drift negatively affects Chinese fund investors’ wealth. This line of analysis makes new contribution to the literature on mutual funds and in particular style drift, as it extends the analysis and findings of pioneering works by Brown and Harlow (2002),\textsuperscript{102} Holmes and Faff (2007)\textsuperscript{103} and Wermers (2012)\textsuperscript{104} with fresh evidence in a unique empirical test setting of exclusively in-house fund managers.

### 5.3.2 Fund manager’s skills

Prior holdings-based style drift studies (Wermers, 2012, and Brown, Harlow, and Zhang, 2012) have not explored the direct benefits of fund manager’s systematically holding on to stocks with certain characteristics such as high B/E stocks. As Daniel, Grinblatt, Titman and Wermers (1997) illustrate, fund managers trying to exploit style timing (style betting) will disadvantage investors’ returns when they acquire stock that is already at its high. At the same time, market bets may yield inconsistent returns. We therefore consider the concept of “average style” (“AS”) which measures the excess returns of fund managers who tend to hold on to a particular style. AS is an important subcomponent measure in our style drift performance analysis because if a style-drift fund have stronger incentive to outperform other funds in the shorter-term to compete for new fund capital, it tends not to hold on to stocks in the previous

\textsuperscript{100} We use explicit costs and include all possible cost (expressed as a percentage of fund’s TNA) that fund investors pay for owning a fund rather than implicit expenses through estimation, as they may be difficult to quantify. Wermers (2012) uses estimated trading costs (to include implicit factors) and expense ratios.

\textsuperscript{101} Holmes and Faff (2007) include only one proxy as fund cost in their study: expense ratio.

\textsuperscript{102} Style drift studies in the U.S. strongly support that investors in style drift funds are likely to suffer investment losses due to higher trading costs associated with frequent trading but using portfolio turnover as a proxy (Brown and Harlow, 2002), in which, results may be biased according to Chakrabarty, Moulton, and Trzcinka (2016).

\textsuperscript{103} Holmes and Faff (2007) include only one proxy as fund cost in their study: expense ratio.

\textsuperscript{104} Wermers (2012) uses estimated trading costs (to include implicit factors) and expense ratios.
period but actively engaged in style bets, thus potentially harming fund performance.

AS measure has important implications on style drift fund performance but is often neglected in prior work that quantify the impact of stock selection, market timing and trading costs using fund holdings to test the link between style drift and fund performance (Brown, Harlow and Zhang, 2012; Wermers, 2012).

By incorporating AS measure in our drift performance attribution, we not only enrich the discussions in holdings-based style drift studies (Wermers, 2012, and Brown, Harlow and Zhang, 2012) but also complement the evidence of style drift on the basis of returns-based approach. As argued by Radcliffe (2003), parameters of returns-based analysis are just statistical estimates of the portfolio average asset allocation during the chosen time interval. This implies that the regressed style coefficients using Fama-French and/or Carhart model as a single method for performance measure can be insufficient. These fixed style coefficients represent a static measure for style loadings that may not fully capture precise fund performance.

To address this potential shortcoming with returns-based approach, holdings-based style analysis is adopted to account for the dynamic switch in investment style as reflected in AS measure to ensure timeliness in attribution analysis. This is especially crucial in studies that focus on how style shifting is related to fund performance as investment style may change over time during the investigation period. Studies employing returns-based analysis usually do not give a breakdown of manager’s skills. For example, the results of Brown and Harlow (2002) show that funds adhering to mandated investment style outperform funds that drift, although the study does not provide detailed breakdown of the returns differential attributable to manager’s stock selection, market timing and average investment style skills, because returns-based analytical approach by its nature cannot measure fund performance in relation to
market timing and average style. Further, Daniel, Grinblatt, Titman and Wermers (1997) show that measure of stock picking ability that is based on fund’s holdings has a much lower standard errors and therefore is a more reliable measure compared to alphas (constant coefficient) generated by using a returns-based analysis technique.

5.4 Characteristics-based Style Drift Performance Methodology

Gross returns (before trading cost and expenses) is analyzed using Daniel, Grinblatt, Titman and Wermers (1997)’s holdings-based performance attribution framework. Daniel, Grinblatt, Titman and Wermers have developed style control analytical methodology to evaluate performance based on past style characteristics of each fund. The benchmark portfolio for each month is constructed according to the procedure outline under Section 4.4.3 for characteristic-based style analysis. Daniel, Grinblatt, Titman and Wermers gross returns is a aggregate of the stock picking, market timing and average style components.

We detail each component of our performance attribution metrics in the following subsections, including fund manager’s ability in respect of: (1) stock picking (also known as stock “characteristics-selectivity” returns) in Section 5.4.1, (2) market timing (also known as stock “characteristics-timing” returns) in Section 5.4.2, and average style returns in Section 5.4.3. We also discuss the new empirical strategy we design in measuring the performance gap between style drift and style dedicated funds in Section 5.4.4.

5.4.1 Characteristics-selectivity metric

Brown, Harlow, and Zhang (2012) establish that style drift erodes U.S. investors’ wealth. Their evidence contradicts Wermers (2012)’s finding on fund manager’s skill in stock picking. Although these two studies do not provide details about fund
manager’s market timing skill, the relationship between fund trading costs and active style drift are found to be positive in both studies.

To evaluate whether in-house fund managers have the skill to generate excess returns through picking quality stocks, we use Daniel, Grinblatt, Titman, and Wermers (1997) performance attribution for stock characteristics selectivity returns (“CS”); characteristics timing returns; average style; and then measure the performance gap between style drift and style dedicated funds (equation 5.1).

CS measures how successful a fund manager has been in picking quality stocks from the investible universe that will outperform other similar stocks characterized by size, BE/ME and PYR. The style-adjusted result, like most holdings-based approach, does not equate to the actual capital gain/lost value earned by fund investors but the returns that would be earned or eroded through fund manager’s skill. A positive CS indicates a manager’s ability in enhancing fund investors’ wealth by exceeding benchmark returns:

$$CS_t = \sum_{k=1}^{n} \hat{w}_{k,t-1} (\bar{R}_{k,t} - \bar{R}_{b,k,t-1})$$  \hspace{1cm} (5.1)

where \(\hat{w}_{k,t-1}\) denotes portfolio weight for stock \(k\) at end of month \(t-1\), that is, we use the most recent fund holdings of previous reporting period as current period fund holdings. \(\bar{R}_{k,t}\) denotes buy-hold returns of stock \(k\) at month \(t\). \(\bar{R}_{b,k,t-1}\) is the buy-hold returns of equally-weighted benchmark portfolio matched to stock \(k\) based on characteristic at the beginning of the reporting period. To illustrate, if Guotai fund held ChangAn automobile stock on 30 June 2011, we would subtract the 31 July 2011 returns of the benchmark portfolio that best match ChangAn in terms of size, BE/ME ratio, PYR from ChangAn’s as of 31 July 2011 returns.
5.4.2 Characteristics-timing metric

Characteristics timing (“CT”) is also widely known as “style timing” and “market timing” in the literature. CT measures how well a fund manager can predict which stock characteristics will be in favour in the market and successfully adjust her fund’s portfolio weight prior to market change. CT has critical implications for style drift performance, as the current fund literature shows that most market style bets by fund managers are futile (Holmes and Faff, 2007 and 2008). Although some managers can successfully predict CT, successful outcome is inconsistent (Kon and Jen, 1979). Trading costs in style drift funds are also comparatively higher due to excessive shorter-term tradings (Brown and Harlow, 2002; Holmes and Faff, 2007, 2008; Brown, Harlow, and Zhang, 2012; Wermers, 2012). Hence, a lower CT will have a significant impact on the overall fund returns. A positive CT indicates successful characteristics timing prediction by fund managers and thus higher fund returns. We compute CT as:

$$CT_t = \sum_{k=1}^{n} \bar{w}_{k,t-1} \bar{R}^{bk,t-1} - \bar{w}_{k,t-13} \bar{R}^{bk,t-13}$$  \hspace{1cm} (5.2)

A 12-month lagged weight from the current $t$ is used to measure the monthly payoff ability of the timing strategy. For instance, if the market is set to favour “value” stocks and fund managers are able to overweigh in value stocks 1 year before these stocks become profitable, she will generate positive CT returns. The degree of positive CT depends on how much fund managers adjust their portfolio weights in advance to capture the greatest profitability in the stock returns.
5.4.3 Average style metric

Average-style measures the excess returns of fund managers who tend to hold on to a particular style. This measurement, free from style timing effect, considers the benefit of systematically holding on to stocks with certain characteristics e.g. high B/E stocks. As Daniel, Grinblatt, Titman, and Wermers (1997) demonstrate, AS does not reward style exploiting fund managers who buy stocks that are already at their high. In other words, it suggests an important but overlooked implication on style drift funds, particularly when managers place greater emphasis on short-term outperformance to compete in the second half of the calendar year (tournament behavior). In this situation, we would expect lower AS returns. We build in this important subcomponent measure in attributing style drift performance to enrich the discussions in Wermers (2012) and Brown, Harlow, and Zhang (2012) holdings-based studies. While other style drift studies using return-based methodology may have considered the effects of average stocks holdings, the regressed style coefficients only represent a static measure for style loadings during the chosen time interval (Radcliffe, 2003), which may not fully capture the precise performance. Since the practice and extent of style drift is not a fixed phenomenon, our findings which incorporate AS measure will better account for the dynamic styling and ensure timeliness in attribution analysis. It should be noted that the returns from AS is free from any market timing effect (CT component as measured in equation 5.2) since the result at $t$ is summed at end of month $t-13$, using a lagged weight of 12 months from the current $t$ as suggested by Daniel, Grinblatt, Titman and Wermers (1997).

$$AS_t = \sum_{k=1}^{n} \tilde{w}_{k,t-13} R^{bk,t-13}$$

(5.3)
In sum, the gross returns (before fund expenses and cost) is obtained by adding up the 3 aspects of stock picking (CT), market timing (CT) and average style (AS). Style-adjusted gross returns is:

\[ \text{Gross Returns} (GR_t) = CS_t + CT_t + AS_t \]  \hspace{1cm} (5.4)

### 5.4.4 Attribution analysis

The attribution stage is another critical analytical segment to explain for the sources of returns. Conventional style drift studies based on regression framework generally do not provide a breakdown of the fund returns attributing to CS, CT and AS when evaluating performance between style drift and style dedicated funds (Indro, Jiang, and Lee, 1998; Kim, Shukla, and Thomas, 2000; Lau, 2007; and Huang, Sialm, and Zhang, 2011). Although the alpha obtained from Fama and French or Carhart model can be used as a proxy for manager’s stock picking, the average style (AS) may not adequately capture the shift in style and therefore one cannot simply measure AS by multiplying the fixed coefficient with style-premium and sum them together (Daniel, Grinblatt, Titman, and Wermers, 1997; Hardy, 2003; and Makharov, 2004). Other studies might evaluate timing skills in the study on fund consistency by means of Treynor-Mazuy measure (Holmes and Faff, 2007, 2008), however, it may still be subject to pitfalls of returns-based performance measure, such as the inability to capture actual portfolio changes.

In contrast, holdings-based performance measure can more adequately quantify for manager’s competency given the advantage of stock characteristics accuracy even though it has been criticized for data timeliness. Wermers (2000) provides a comprehensive overview of each component that contributes to overall performance, specifically accounting for the difference between gross and net returns.
He finds that in general, U.S. actively managed funds outperform market in gross terms by 1.3 per cent per year but on net return basis, mutual funds underperform by 1 per cent per year. Wermers demonstrates that out of the 15.8 per cent in gross returns, 0.75 per cent is due manager’s stock picking ability and 0.2 per cent is due to market timing whilst the remaining 14.8 per cent is average style (AS). Another 0.25 per cent which is unaccounted for, is likely due to the missing data in their sample. He further explains that underperformance in net returns is due to the inability of the manager to contain the costs incurred by funds. Transaction costs and other fund expenses are greater than returns earned by funds, while poor performance is in part due to non-performing bond and cash portion of the portfolio. Wermers’ comprehensive analysis in 2000 only illustrates the performance of equity mutual funds in the U.S. on average without considering the effects of style drift on fund returns. His recent study in 2012 takes into account funds with active and passive drift nature. Although the attribution breakdown is not as detailed as in the earlier 2000 study, he shows that active drift managers in the top 5 per cent and 10 per cent fractiles exhibit high level of stock picking skills and that drift managers outperform benchmark by 3 per cent. In respect of market timing, U.S. fund managers on average are able to forecast market style and earn very modest returns between 0.02 per cent and 0.03 per cent per year. In terms of transaction cost, Wermers (2012) observes that drift funds have substantially higher estimated trading cost. Similarly, these funds also have higher expenses of about 0.39 per cent per year compared to style-dedicated funds. Wermers (2012) findings pertaining to fund costs support Brown, Harlow, and Zhang (2012)’s study.

The primary objective of our second research question (Chapter 5) of this thesis is to provide a complete breakdown account of fund’s sources of returns and costs. A decomposition of unobserved benefits as depicted by manager’s skills and
how these benefits are found to be eroded by unobserved cost by means of trading cost and expenses uncovered in this study. Unlike Wermers (2000)’s study which evaluates mutual fund performance between active and passive funds by means of performance decomposition method, we adopt a different approach by examining fund’s relative return and cost effects in the context of style drift. In our study, we dissect fund returns into 3 keys aspects of manager’s skills namely, 1) characteristic selectivity (CS), characteristic timing (CT) and 3) average style (AS) while trading costs, brokerage and commissions, fund expenses are the measures of fund costs. In contrast to conventional style drift studies, our performance gap framework extends better and considerably more comprehensive view on how active returns can be explained by: 1) funds that stay close to style mandate and 2) funds that exhibit style drift by means of CS, CT and AS components as gross performance and net-of-cost performance. This comparison produces a new perspective and greater details on which aspect of outperformance is rewarded to style drifting- and style dedicated-funds.

In our study, the relative cost-and-return aspects and net performance outcomes will address the proposed hypotheses 2a, 2b, 2c and 2d developed in Chapter 3. Performance attribution procedure is depicted in Figure 5.1.
**Figure 5.1** Monthly cost-return performance attribution for each fund manager throughout the study period: 2011-2015

This diagram offers a quick reference to our fine-grained cost-return performance attribution methodology described in Section 5.4.4. Figure 5.1 illustrates how the appraisal of fund manager’s performance is conducted, separately for style drift and style dedicated funds, on a monthly basis for the period 2011 to 2015. This performance gap approach clearly identifies the contributing factors that affect returns optimization by disintegrating fund returns and fund costs into very fine subcomponents and attributing sources of fund returns (in gross terms) to fund manager’s stock selectivity ability and style timing judgement using Daniel, Grinblatt, Titman, and Wermers (1997) holdings-based methodology. Sources of fund costs (realized, absolute monetary unit) include trading costs, brokerage and commission fees, management fees and fund operating expenses. Finally, a fund’s returns net of costs is demonstrated to establish whether style drift produces suboptimal fund performance.
5.5 Empirical Data

Data used in Research Question 2 (Chapter 5) of this thesis are mainly from WIND which offers comprehensive fund database and a rich set of capital market indicators. This study uses the same dataset obtained for Research Question 1 (Chapter 4), with the same fund selection criteria as described in earlier Section 4.5. However, in addition to stock and fund data collected for the first study, raw data and information on fund total expenses such as quarterly trading costs, brokerage and commission fees, management fees and fund expenses (in RMB) are also collected for our analysis in this second study.

5.6 Results

5.6.1 Gross performance gap: style dedicated vs. style drift funds

Central to our study objective, this chapter examines and differentiates the performance between style drift and style dedicated funds using a comprehensive absolute cost-return analytical framework. We conceptualize and build an original characteristics-based style index for the China market by adapting the Daniel, Grinblatt, Titman, and Wermers (1997) model. Because our unique style index consists of the entire universe stocks that fund managers within a specific style can select, it serves as a benchmark to allow us to measure fund performance against the returns of like-characteristics\textsuperscript{105} portfolios more effectively. Thus, performance is risk-adjusted.\textsuperscript{106} A complete breakdown of the returns\textsuperscript{107} attributable to fund

\textsuperscript{105} Along 3 style dimensions: size, BE/ME and PYR.
\textsuperscript{106} It is also known as style-adjusted returns in studies that employ style analysis in mutual fund performance evaluation.
\textsuperscript{107} Unobserved benefit (returns)-absolute cost is designed from fund investors’ point of view. Fund investors often have no knowledge of fund managers’ true skill ability in buying and selling stocks as well as the hidden costs such as brokerage and commissions, trading expenses which are not mandatory to disclose in the annual fund report.
manager’s skills is provided and how these benefits in terms of stock picking, market timing, and investment style consistency are eroded by unreported fund costs with respect to trading costs, brokerage and commissions, management fees and fund operational expenses. The performance gap between style drift and style dedicated funds explains how fund returns are eroded by costs and the net returns show whether style drift harms fund investors’ interests in terms of its effect on investors’ wealth.

Using a novel style drift construct (vFSF) that produces 18,600 fund-year time variant drift observations, we can evaluate whether in-house fund managers have the skills to generate excess returns and appraise relative fund performance between dedicated versus drift behaviors more accurately. Fund investors’ wealth in style drift funds and style dedicated funds in gross term (before fund costs and fees) are measured as explained in equation 5.4.

Table 5.1 illustrates the average style-adjusted gross returns of fund managers over 1-year, 3-year and 4-year horizons for performance evaluation, ranked by vFSF. vFSF—voluntary fund style volatility—measures the degree of style consistency in 3 dimensions: size, BE/ME, PYR, based on fund’s computed bi-annual characteristic ranking as denoted by equation 4.2. To avoid performance bias due to time horizon and for the purpose of sensitivity check, we assess fund managers’ gross performance over multiple time horizons. We use a 3-year assessment window as a rule of thumb for understanding how well style drift funds have performed relative to style dedicated funds in picking stocks. This is in line with Chinese regulator’s (CSRC) definition for reasonable stock holding period\textsuperscript{108} which is also an industry-wide notion for long-term investment. We also evaluate fund performance for 1-year and 4-year horizons for robustness checks. Sources of returns in gross term constitute 3

\textsuperscript{108} Major shareholders of the FMC shall uphold the concept of long-term investment, and make written commitments to hold stocks of the FMC for not less than 3 years (Measures for the Administration of Securities Investment Fund Management Companies, 1 November, 2012).
subcomponents: CS, CT, and AS are computed using monthly data and expressed on an annual basis. As explained in Sections 5.4.1 and 5.4.2 of this chapter, CS and CT measure a fund manager’s success in selecting superior stocks and predicting most profitable time-varying style premium, respectively. On the other hand, AS returns rewards fund managers who tend to hold on to stocks that are of certain style characteristics—in size, BE/ME, PYR dimensions.

Our results strongly indicate that fund managers following investment mandate deliver higher fund returns over a 3-year horizon, as presented in Panel B of Table 5.1. Fund investors investment loss increases with vFSF rank. Style drift funds suffer significant investment loss of 8.64 per cent per annum.

Panel A of Table 5.1 presents results for performance gap between style drift and style dedicated funds in gross terms over 1-year with similar pattern as observed in the 3-year period. Drift funds underperform style dedicated funds under an alternative definition, that is, bottom 10 per cent vFSF quintile rank while results in the 5 and 20 per cent quintiles are insignificant. When measurement period is extended to a 4-year period, style dedicated funds exhibit significant outperformance, as shown in Panel C of Table 5.1. In the same vein as style dedicated funds over a 3-year horizon, fund investors in the 4-year period receive higher returns albeit with a lesser magnitude. Style drift funds exhibit significant suboptimal returns of negative 5.37 per cent, negative 5.03 per cent and negative 2.73 per cent per annum using various vFSF fractiles of 5 per cent, 10 per cent and 20 per cent, respectively. Overall, our results show that as style volatility increases, fund investor suffers greater investment loss. Therefore, fund investors benefit more when fund managers adhere closely to fund investment mandate.
On average, Chinese in-house fund managers are able to generate gross excess returns by exploiting time-varying style factors. Using stock level characteristics controlled-portfolios of similar size, BE/ME ratio and PYR, we find managers of style-dedicated funds outperforming style benchmark by 3.21 per cent per annum in short horizon of 1 year. In comparison, fund managers earn higher excess style-adjusted returns in longer horizon of 3 and 4 years which account for 7.11 per cent and 9.89 per cent per annum on gross basis. Clearly, style dedicated funds outperform style drift funds with higher gross returns which is consistent with the findings in Brown, Harlow, and Zhang (2012) study.
Table 5.1 Gross returns (per cent per year): an aggregate of CS, CT, AS measures of style dedicated vs. style drifting fund manager: ranked on vFSF values

This table reports risk-adjusted gross returns of style drift and style dedicated fund managers over 3 different investment horizons of 1-year, 3-year and 4-year (Panels A, B and C respectively) from 2011 to 2015, ranked on vFSF values. vFSF metrics—voluntary fund style volatility—illustrate a fund manager’s intention in maintaining a consistent approach in investment style in respect of size, growth/value, PYR, as shown in equation (4.2). A total of 180,000 stocks in all the funds’ holdings have their unique characteristics (size, BE/ME, PYR) matched against our characteristics-sorted style index and actual implemented fund style identified. Gross excess returns (“alpha”) is measured using holdings-based method and consisting of 3 components: stock picking (CS), market timing (CT) and the ability to systematically holding on to stocks of certain style in the lagged 12 months (AS) described under Section 5.4. CS, CT, AS are monthly style-adjusted returns derived from a total of 10.8 million stock-months observations across all funds, over 60 months. Average gross alpha in percentage, is expressed on an annual basis. Results are presented within each vFSF fractiles. Specifically, top and bottom 5 per cent vFSF fractiles denotes style drift funds and style dedicated funds. Average gross alpha in vFSF quintiles are also presented. Significance levels are denoted with asterisks.

<table>
<thead>
<tr>
<th>vFSF Quintile</th>
<th>Panel A. 1-year</th>
<th>Panel B. 3-year</th>
<th>Panel C. 4-year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Average Total</td>
<td>Average Annual</td>
</tr>
<tr>
<td></td>
<td>of funds</td>
<td>Net Assets</td>
<td>Gross Returns</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(RMB) Million</td>
<td>(%)</td>
</tr>
<tr>
<td>Top 5% (Worst Drift)</td>
<td>14</td>
<td>2,449</td>
<td>3.80</td>
</tr>
<tr>
<td>Top 10%</td>
<td>27</td>
<td>2,545</td>
<td>1.36</td>
</tr>
<tr>
<td>Top 20%</td>
<td>55</td>
<td>2,320</td>
<td>3.67</td>
</tr>
<tr>
<td>2nd 20%</td>
<td>55</td>
<td>2,188</td>
<td>2.56</td>
</tr>
<tr>
<td>3rd 20%</td>
<td>54</td>
<td>1,747</td>
<td>4.23</td>
</tr>
<tr>
<td>4th 20%</td>
<td>55</td>
<td>2,058</td>
<td>3.11</td>
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<tr>
<td>Bottom 20%</td>
<td>55</td>
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<tr>
<td>Bottom 10%</td>
<td>27</td>
<td>1,175</td>
<td>2.55</td>
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<tr>
<td>Bottom 5% (Most Consistent)</td>
<td>14</td>
<td>727</td>
<td>3.26</td>
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<tr>
<td>Top - Bottom 5% fund managers</td>
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<td>0.54</td>
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<td>Top - Bottom 10% fund managers</td>
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<td>-</td>
<td>-1.20</td>
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<tr>
<td>Top - Bottom 20% fund managers</td>
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<td>-</td>
<td>1.18</td>
</tr>
<tr>
<td>All funds</td>
<td>274</td>
<td>545,881</td>
<td>3.21</td>
</tr>
</tbody>
</table>

*Significant at 90% confidence level
**Significant at 95% confidence level
***Significant at 99% confidence level
5.6.2 Net performance gap: style dedicated vs. style drift funds

Next, we evaluate risk-adjusted net returns, also known as alphas, between style drift funds and style dedicated funds. Net returns take into account the total costs incurred by funds. Fund’s total costs comprise of 4 subcomponents: management fees, fund operational expenses, transaction fees and, brokerage and commissions. Each cost subcomponent is computed separately by expressing fund’s monthly realized cost (absolute amount in RMB) over its total net assets. We subtract a fund’s monthly total costs from its corresponding monthly gross returns and annualized these net returns. We then analyze the net returns across all the funds in our vFSF fractile and quintile ranks and evaluate the net performance gap difference between style drift and style dedicated funds.

Consistent with Brown, Harlow, and Zhang (2012), our results show strong superior net performance in style dedicated funds. As shown in Panel B of Table 5.2, style dedicated fund (top 5 per cent vFSF fractile) with trading activities most consistent with the funds’ investment objectives earns an optimal and significantly higher net returns of more than 10 per cent per annum than style drift funds.
Table 5.2 Net returns (per cent per year) of style dedicated fund vs. style drifting fund: ranked on vFSF values
This table reports risk-adjusted net returns (after realized total fund costs) of style drift and style dedicated fund managers over 3 different investment horizons of 1-year, 3-year and 4-year (Panels A, B and C respectively) from 2011 to 2015, ranked on vFSF values. First, fund style-adjusted net return (alphas) style drift funds and style dedicated funds is determined, that is, actual returns after taking into account the total costs realized by funds. A fund’s total costs is considered in 4 aspects: management fees, fund operational expenses, transaction fees, and brokerage and commissions. Each cost subcomponent is computed separately and expressed over fund’s annual total net assets (in RMB). Average net return of each fund is computed by subtracting fund’s monthly total costs from its monthly gross returns and expressed in percentage and on an annual basis. vFSF metrics—voluntary fund style volatility—illustrates a fund manager’s intention in maintaining a consistent approach in investment style in respect of size, growth/value, PYR, as shown in equation (4.2). Top and bottom 5 per cent vFSF fractiles represent style drift fund managers and style dedicated fund managers in terms of investment style. Average net returns are presented within each vFSF fractiles, specifically, top and bottom 5 per cent vFSF fractiles denotes style drift funds and style dedicated funds. Average net alpha in vFSF quintiles are also presented. Significance levels are denoted with asterisks.

<table>
<thead>
<tr>
<th>vFSF Quintile</th>
<th>Panel A. 1-year</th>
<th>Panel B. 3-year</th>
<th>Panel C. 4-year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of funds</td>
<td>Average Total Net Assets (RMB) Million</td>
<td>Average Annual Net Returns (%)</td>
</tr>
<tr>
<td>Top 5% (Worst Drift)</td>
<td>14</td>
<td>2,449</td>
<td>-0.87</td>
</tr>
<tr>
<td>Top 10%</td>
<td>27</td>
<td>2,545</td>
<td>-3.02</td>
</tr>
<tr>
<td>Top 20%</td>
<td>55</td>
<td>2,320</td>
<td>-0.58</td>
</tr>
<tr>
<td>2nd 20%</td>
<td>55</td>
<td>2,188</td>
<td>-1.60</td>
</tr>
<tr>
<td>3rd 20%</td>
<td>54</td>
<td>1,747</td>
<td>0.59</td>
</tr>
<tr>
<td>4th 20%</td>
<td>55</td>
<td>2,058</td>
<td>-0.43</td>
</tr>
<tr>
<td>Bottom 20%</td>
<td>55</td>
<td>1,643</td>
<td>-0.59</td>
</tr>
<tr>
<td>Bottom 10%</td>
<td>27</td>
<td>1,175</td>
<td>-0.41</td>
</tr>
<tr>
<td>Bottom 5% (Most Consistent)</td>
<td>14</td>
<td>727</td>
<td>0.26</td>
</tr>
<tr>
<td>Top - Bottom 5% fund managers</td>
<td>-</td>
<td>-</td>
<td>-1.13</td>
</tr>
<tr>
<td>Top - Bottom 10% fund managers</td>
<td>-</td>
<td>-</td>
<td>-2.61</td>
</tr>
<tr>
<td>Top - Bottom 20% fund managers</td>
<td>-</td>
<td>-</td>
<td>0.01</td>
</tr>
<tr>
<td>All funds</td>
<td>274</td>
<td>545,881</td>
<td>-0.53</td>
</tr>
</tbody>
</table>

*Significant at 90% confidence level
**Significant at 95% confidence level
***Significant at 99% confidence level
5.6.3 Sources of returns: style dedicated vs. style drift funds

Active fund managers can add value to fund returns through 3 key aspects: (1) the ability to pick quality stock (CS), (2) the ability to predict the optimal time to execute investment strategy through style timing (CT), and (3) maintaining fund style (AS) by not trading in and out on stocks having different style characteristics.

A 3-year assessment window is used as a rule of thumb for fund performance, with fund returns expressed on an annual basis. As Panel B of Table 5.3 depicts, style drift funds do not exhibit the ability to pick superior stocks (CS), leading to an investment loss of 2.2 per cent, on average. In comparison, style dedicated funds generate a positive return of 0.47 per cent through picking quality stocks within the mandated fund style. CS performance difference between style drift and style dedicated funds, is a significant negative 2.67 per cent. The difference is statistically significant at $\alpha = 0.05$. On average, we find that performance increases with investment style consistency.

A question arises as to why style drift managers, in general, pick inferior stocks when their compensation is sensitive to relative rank? A plausible interpretation is that managers who drift, focus too much on short-term results in their attempt to beat peers to maximize year end compensation. We will, however, investigate further whether the suboptimal style drift returns are due to fund manager’s short-termism outlook in Chapter 6.

Our findings are different from Wermers (2012), a holdings-based study on U.S. funds that uses a different measure for style volatility. Greater level of drift in price momentum is found to have contributed to the positive performance in drift funds. In other words, managers are found by Wermers to be better at picking momentum stocks but this evidence is refuted by another study on U.S. funds by
Brown, Harlow, and Zhang (2012). They find that the momentum drift explanation on the correlation between style drift and fund performance is weak. Although the Brown, Harlow, and Zhang (2012) study does not provide breakdowns of fund manager’s stock picking skill, the relationship between fund performance and active style drift remains negative after considering all the possible differential effects of style volatility with respect to size, value and growth, and momentum characteristics on performance. Consistent with Brown, Harlow, and Zhang (2012) findings on the U.S. fund market, our study shows that style dedicated funds tend to meet its benchmark returns and has lower portfolio risk, highlighting the ability of a fund manager to maintain a consistent investment style is a valuable skill that adds value for fund investors.
Table 5.3 Time series characteristics selectivity (CS) ability of style dedicated vs. style drifting fund manager: ranked on vFSF values

This table summarizes time series characteristics selectivity (CS) or also known as the returns from stock picking of style dedicated vs. style drifting fund manager over 3 different investment horizons of 1-year, 3-year and 4-year (Panels A, B and C respectively), ranked on vFSF values. Returns are computed using monthly holdings data and converted into equivalent annualized units. We evaluate how well a fund manager can select quality stock using equation (5.1), with descriptions of the measurement in Section 5.4.1. We present average CS returns (in per cent) for each vFSF fractiles across all funds. Our vFSF metrics—voluntary fund style volatility—illustrates a fund manager’s intention in maintaining a consistent approach in investment style in respect of size, growth/value, PYR, as shown in equation (4.2). Top and bottom 5 per cent vFSF fractiles represent style drift fund managers and style dedicated fund managers in terms of investment style. We also present average CS returns (in per cent) in vFSF quintile. Significance levels are denoted with asterisks.

<table>
<thead>
<tr>
<th>vFSF Quintile</th>
<th>Panel A. 1-year</th>
<th>Panel B. 3-year</th>
<th>Panel C. 4-year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of funds</td>
<td>Average Total Net Assets (RMB) Million</td>
<td>Average Annual CS Returns (%)</td>
</tr>
<tr>
<td>Top 5% (Worst Drift)</td>
<td>14</td>
<td>2,449</td>
<td>5.12</td>
</tr>
<tr>
<td>Top 10%</td>
<td>27</td>
<td>2,545</td>
<td>3.01</td>
</tr>
<tr>
<td>Top 20%</td>
<td>55</td>
<td>2,320</td>
<td>4.16</td>
</tr>
<tr>
<td>2nd 20%</td>
<td>55</td>
<td>2,188</td>
<td>3.12</td>
</tr>
<tr>
<td>3rd 20%</td>
<td>54</td>
<td>1,747</td>
<td>4.24</td>
</tr>
<tr>
<td>4th 20%</td>
<td>55</td>
<td>2,058</td>
<td>3.49</td>
</tr>
<tr>
<td>Bottom 20%</td>
<td>55</td>
<td>1,643</td>
<td>2.59</td>
</tr>
<tr>
<td>Bottom 10%</td>
<td>27</td>
<td>1,175</td>
<td>1.97</td>
</tr>
<tr>
<td>Bottom 5% (Most Consistent)</td>
<td>14</td>
<td>727</td>
<td>1.94</td>
</tr>
<tr>
<td>Top - Bottom 5% fund managers</td>
<td>-</td>
<td>-</td>
<td>3.18</td>
</tr>
<tr>
<td>Top - Bottom 10% fund managers</td>
<td>-</td>
<td>-</td>
<td>1.04</td>
</tr>
<tr>
<td>Top - Bottom 20% fund managers</td>
<td>-</td>
<td>-</td>
<td>1.57</td>
</tr>
<tr>
<td>All funds</td>
<td>274</td>
<td>545,881</td>
<td>3.52</td>
</tr>
</tbody>
</table>

*Significant at 90% confidence level
**Significant at 95% confidence level
***Significant at 99% confidence level
Next, we examine CT returns to explain if fund managers can successfully exploit superior information to predict the best time to invest in certain stock characteristics. Fund manager who time the market will shift portfolio weight of certain stocks prior to the increase in stock returns. To illustrate, if managers expect a market correction that will increase large-cap stock prices, they will increase funds’ exposure to large-cap stocks. We use a 3 year assessment window as a rule of thumb for investigating how well style-drift funds have performed relative to style-dedicated funds when managers attempt to time the market. As Table 5.4 shows, funds on average outperform style benchmark and deliver positive CT returns. Notably, style dedicated funds better serve the interests of the fund investors, by adding 2.39 per cent more to investors’ wealth. The difference is statistically significant at $\alpha = 0.05$. By following stocks of similar characteristics consistently, style-dedicated fund managers are more likely to make superior investment decision in terms of market timing and generate 7.40 per cent in excess of style benchmark.

Our findings on average style (AS) returns are particularly illuminating. AS contributes largely to the higher risk-adjusted gross returns that fund investors of style dedicated funds can expect to receive. AS measures the success of fund manager in holding on stocks with certain style characteristics over a 12-month period (as in equation 5.3). This thesis postulates that style drift fund managers have a stronger incentive to outperform other funds in near term to compete for new cash inflows and retain or increase specific fund assets. As a result, fund managers tend not to hold on to stocks in the previous period but are actively engaged in style bets. In line with the proposition made in Section 5.4.3, our results show that market timing (“style bets”) yield inconsistent returns. As illustrated in Table 5.5, the practice of style drift undermines fund investors’ interests.
Panels A, B and C of Table 5.5 consistently demonstrate that style dedicated funds are rewarded with higher AS returns by systematically holding on to stocks of similar style in the lagged 12 months. Style drift severely penalize fund performance in the 3-year horizon. Put differently, the practice of style dedication improves fund returns significantly because the excessive use of market timing strategy proves to be an unproductive attempt. Fund investors can expect an additional 3.56 per cent per year in gross returns, driven by AS, when funds deviate the least from their investment style. Results in AS assessment reinforces our view that fund investors’ interest will be undermined when fund managers practice investment style drift. Taken as a whole, the greater the volatility in investment style, the larger the fund’s investment loss.
Table 5.4 Time series characteristics timing (CT) ability of style dedicated vs. style drifting fund manager: ranked on vFSF values

This table summarizes time series characteristics selectivity (CT) or also known as the returns from market timing of style dedicated vs. style drifting fund manager over 3 different investment horizons of 1-year, 3-year and 4-year (Panels A, B and C respectively), ranked on vFSF values. Returns are computed using monthly holdings data and converted into equivalent annualized units. We evaluate how well a fund manager can opportunistically shift the weights of portfolio to expose to certain stock characteristics prior to the rise in stock value (the shift has to be 1 year before) using equation (5.2). Descriptions of the measurement are in Section 5.4.2. We present average CT returns (in per cent) for each vFSF fractiles across all funds. Our vFSF metrics—voluntary fund style volatility—illustrates a fund manager’s intention in maintaining a consistent approach in investment style in respect of size, growth/value, PYR, as shown in equation (4.2). Top and bottom 5 per cent vFSF fractiles represent style drift fund managers and style dedicated fund managers in terms of investment style. We also present average CT returns (in per cent) in vFSF quintile. Significance levels are denoted with asterisks.

<table>
<thead>
<tr>
<th>vFSF Quintile</th>
<th>Number of funds</th>
<th>Average Total Net Assets (RMB) Million</th>
<th>Average Annual CT Returns (%)</th>
<th>Number of funds</th>
<th>Average Total Net Assets (RMB) Million</th>
<th>Average Annual CT Returns (%)</th>
<th>Number of funds</th>
<th>Average Total Net Assets (RMB) Million</th>
<th>Average Annual CT Returns (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top 5% (Worst Drift)</td>
<td>14</td>
<td>2,449</td>
<td>-0.73</td>
<td>14</td>
<td>2,449</td>
<td>5.01</td>
<td>14</td>
<td>2,449</td>
<td>9.02</td>
</tr>
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<td>Top 10%</td>
<td>27</td>
<td>2,545</td>
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<td>6.55</td>
<td>27</td>
<td>2,545</td>
<td>9.88</td>
</tr>
<tr>
<td>Top 20%</td>
<td>55</td>
<td>2,320</td>
<td>0.37</td>
<td>55</td>
<td>2,320</td>
<td>7.40</td>
<td>55</td>
<td>2,320</td>
<td>9.94</td>
</tr>
<tr>
<td>2nd 20%</td>
<td>55</td>
<td>2,188</td>
<td>0.28</td>
<td>55</td>
<td>2,188</td>
<td>7.09</td>
<td>55</td>
<td>2,188</td>
<td>10.14</td>
</tr>
<tr>
<td>3rd 20%</td>
<td>54</td>
<td>1,747</td>
<td>0.34</td>
<td>54</td>
<td>1,747</td>
<td>6.87</td>
<td>54</td>
<td>1,747</td>
<td>8.92</td>
</tr>
<tr>
<td>4th 20%</td>
<td>55</td>
<td>2,058</td>
<td>0.83</td>
<td>55</td>
<td>2,058</td>
<td>7.12</td>
<td>55</td>
<td>2,058</td>
<td>8.55</td>
</tr>
<tr>
<td>Bottom 20%</td>
<td>55</td>
<td>1,643</td>
<td>1.24</td>
<td>55</td>
<td>1,643</td>
<td>7.42</td>
<td>55</td>
<td>1,643</td>
<td>8.81</td>
</tr>
<tr>
<td>Bottom 10%</td>
<td>27</td>
<td>1,175</td>
<td>1.57</td>
<td>27</td>
<td>1,175</td>
<td>7.83</td>
<td>27</td>
<td>1,175</td>
<td>8.92</td>
</tr>
<tr>
<td>Bottom 5% (Most Dedicated)</td>
<td>14</td>
<td>727</td>
<td>1.39</td>
<td>14</td>
<td>727</td>
<td>7.40</td>
<td>14</td>
<td>727</td>
<td>7.66</td>
</tr>
<tr>
<td>Top - Bottom 5% fund managers</td>
<td>-</td>
<td>-</td>
<td>-2.12*</td>
<td>-</td>
<td>-</td>
<td>-2.39**</td>
<td>-</td>
<td>-</td>
<td>1.36</td>
</tr>
<tr>
<td>Top - Bottom 10% fund managers</td>
<td>-</td>
<td>-</td>
<td>-1.86**</td>
<td>-</td>
<td>-</td>
<td>-1.27</td>
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<td>0.96</td>
</tr>
<tr>
<td>Top - Bottom 20% fund managers</td>
<td>-</td>
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<td>-0.87</td>
<td>-</td>
<td>-</td>
<td>-0.03</td>
<td>-</td>
<td>-</td>
<td>1.13</td>
</tr>
<tr>
<td>All funds</td>
<td>274</td>
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<td>0.61</td>
<td>274</td>
<td>545,881</td>
<td>7.18</td>
<td>274</td>
<td>545,881</td>
<td>9.27</td>
</tr>
</tbody>
</table>

*Significant at 90% confidence level
**Significant at 95% confidence level
***Significant at 99% confidence level
Table 5.5 Time series average style (AS) maintenance of style dedicated vs. style drifting fund manager: ranked on vFSF values

This table summarizes time series average style (AS) of style dedicated vs. style drifting fund manager over 3 different investment horizons of 1-year, 3-year and 4-year (Panels A, B and C respectively), ranked on vFSF values. Returns are computed using monthly holdings data and converted into equivalent annualized units. We evaluate how well a fund manager is rewarded by holding on to stocks that are of certain style characteristics – size, BE/ME, PYR dimensions. AS returns is calculated using equation (5.3). Descriptions of the measurement are in Section 5.4.3. We present average AS returns (in per cent) for each vFSF fractiles across all funds. Our vFSF metrics—voluntary fund style volatility—illustrates a fund manager’s intention in maintaining a consistent approach in investment style in respect of size, growth/value, PYR, as shown in equation (4.2). Top and bottom 5 per cent vFSF fractiles represent style drift fund managers and style dedicated fund managers in terms of investment style. We also present average AS returns (in per cent) in vFSF quintile. Significance levels are denoted with asterisks.

<table>
<thead>
<tr>
<th>vFSF Quintile</th>
<th>Panel A. 1-year</th>
<th>Panel B. 3-year</th>
<th>Panel C. 4-year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of funds</td>
<td>Average Total Net Assets (RMB) Million</td>
<td>Average Annual AS Returns (%)</td>
</tr>
<tr>
<td>Top 5% (Worst Drift)</td>
<td>14</td>
<td>2,449</td>
<td>0.14</td>
</tr>
<tr>
<td>Top 10%</td>
<td>27</td>
<td>2,545</td>
<td>-0.65</td>
</tr>
<tr>
<td>Top 20%</td>
<td>55</td>
<td>2,320</td>
<td>-0.25</td>
</tr>
<tr>
<td>2nd 20%</td>
<td>55</td>
<td>2,188</td>
<td>-0.10</td>
</tr>
<tr>
<td>3rd 20%</td>
<td>54</td>
<td>1,747</td>
<td>0.48</td>
</tr>
<tr>
<td>4th 20%</td>
<td>55</td>
<td>2,058</td>
<td>-0.29</td>
</tr>
<tr>
<td>Bottom 20%</td>
<td>55</td>
<td>1,643</td>
<td>-0.33</td>
</tr>
<tr>
<td>Bottom 10%</td>
<td>27</td>
<td>1,175</td>
<td>0.10</td>
</tr>
<tr>
<td>Bottom 5% (Most Consistent)</td>
<td>14</td>
<td>727</td>
<td>0.96</td>
</tr>
<tr>
<td>Top - Bottom 5% fund managers</td>
<td>-</td>
<td>-</td>
<td>-0.81</td>
</tr>
<tr>
<td>Top - Bottom 10% fund managers</td>
<td>-</td>
<td>-</td>
<td>-0.74</td>
</tr>
<tr>
<td>Top - Bottom 20% fund managers</td>
<td>-</td>
<td>-</td>
<td>0.08</td>
</tr>
<tr>
<td>All funds</td>
<td>274</td>
<td>545,881</td>
<td>-0.10</td>
</tr>
</tbody>
</table>

*Significant at 90% confidence level
**Significant at 95% confidence level
***Significant at 99% confidence level
5.6.4 Sources of costs: style dedicated vs. style drift funds

Table 5.6 presents the average annual total fund costs of style dedicated funds versus style drift funds, ranked by vFSF values from 2011 to 2015. Results support the propositions raised in our Research Question 2 of this thesis. As shown in Panel B, the practice of style drift, which tends to trade in short-interval, imposes a significant higher realized trading expenses compared to style dedicated funds. Annual trading expenses amount to 1.15 per cent in drift funds. In contrast, funds adhering closely to declared investment style are more cost efficient in terms of trading costs, incurring only 0.51 per cent. The considerable difference in trading costs is 0.64 per cent for investors whose funds are most aligned with fund objectives over a 3-year horizon. The difference is statistically significant at $\alpha = 0.01$. At the same time, average brokerage and commission fees in style drift funds are twice as much as style dedicated funds. Notably, style drift funds tend to charge higher management fees although fund size is 2 times smaller than style dedicated funds. Overall, total absolute fund costs increase steadily with the degree of style volatility. In other words, fund investors may be able to capture an extra significant amount of 1.79 per cent in returns if fund managers adhere to fund investment mandate.

Comparing our results with Wermers (2012) study conducted in the U.S, the variations in execution costs and expense ratios between the 2 countries are not very wide. However, style dedicated funds (defined as bottom 5 per cent vFSF fractile) in the U.S. are able to keep execution costs much lower at 0.09 per cent than Chinese style dedicated funds (0.51 per cent). A possible reason is that U.S. funds might have benefitted from the low trading fees offered by the more innovative and advanced trading environment in the U.S. Notwithstanding lower execution costs, U.S. style
dedicated funds reduce trading costs by 0.87 per cent, which is close to the findings in our study (0.67 per cent).

However, increase in fund trading activities (and therefore trading costs) may be argued to indicate the frequent discovery of superior stocks by fund managers, and if this is true, fund performance should have a positive relationship with trading expenses. We therefore sum all the results from value-creation (returns), costs subcomponents to determine whether style drift can still add net value to overall fund performance. Unfortunately, the fund returns net of costs results confirm our proposition that style drift is a value-destroying behavior. In summary, the ability of a fund manager to maintain a consistent investment style is indeed a valuable skill that adds value for fund investors.

To put everything in perspective, style drift is capable of exploiting the interests of the fund investors by imposing a combined cost of 10.41 per cent per year, over a period of 5 years, in the Chinese fund market. Consequently, a total investor’s wealth reduction of RMB 87,796 million\textsuperscript{109} (equivalent to US$12,784 million) from 2011 to 2015 results in suboptimal efficiency in the fund management industry. Consistent with Brown, Harlow, and Zhang (2012) findings, our study shows that style dedicated funds tend to meet its benchmark returns and has lower portfolio risk.\textsuperscript{110} Clearly, investment style dedication signals fund manager’s competency in consistently generating higher style-adjusted returns and this evidence deepens our understanding of the role of in-house fund management organization in shaping the motivation and performance of mutual fund managers in meeting their benchmark, an

\textsuperscript{109} Based on average AUM of our sample funds from 2011-2015, which amounts to RMB 843,390 million.
\textsuperscript{110} Results on how fund manager can meet or exceed benchmark returns are discussed in earlier Section 4.6.4.
area that has received only limited attention in the literature (Chen, Hong, Jiang and Kubik, 2013).
Table 5.6 Average realized total fund costs of style dedicated fund manager vs. style drifting fund manager: ranked on vFSF values

This table shows the time series average realized total fund costs of style dedicated fund manager vs. style drifting fund manager over three different investment horizons of 1-year, 3-year and 4-year (Panels A, B and C respectively), ranked on vFSF values. This study considers a fund’s total costs in 4 subcomponents: management fees, fund operating expenses, trading costs, and brokerage and commission fees. Each cost component is considered separately by expressing fund costs in realized amount denominated in RMB dollar over fund’s total net assets. To illustrate, a fund’s management fees (in RMB) is expressed as a percentage of its total assets (in RMB); fund’s trading costs (in RMB) is divided by its total net assets (TNA in RMB). Next, funds’ management fee, fund operating expenses, trading costs, and brokerage and commission fees are computed for each vFSF fractiles by averaging them across different horizons. The difference in costs measurement between style drifting funds (top 5 per cent vFSF fractile) and dedicated funds (bottom 5 per cent vFSF fractile rank) is examined. This table also presents the average fund costs separately in 4 subcomponents within each vFSF quintiles. Significance levels are denoted with asterisks.

<table>
<thead>
<tr>
<th>vFSF Quintile</th>
<th>Number of funds</th>
<th>Avg Total Net Assets (RMB) Million</th>
<th>Panel A, 1-year</th>
<th>Panel B, 3-year</th>
<th>Panel C, 4-year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Avg Management Fees (%)</td>
<td>Avg Fund Expenses (%)</td>
<td>Avg Transaction Fees (%)</td>
<td>Avg Commissions (%)</td>
</tr>
<tr>
<td>Top 5% (Worst Drift)</td>
<td>14</td>
<td>2,449</td>
<td>1.55</td>
<td>1.43</td>
<td>1.07</td>
</tr>
<tr>
<td>Top 10%</td>
<td>27</td>
<td>2,545</td>
<td>1.51</td>
<td>1.37</td>
<td>0.99</td>
</tr>
<tr>
<td>Top 20%</td>
<td>55</td>
<td>2,320</td>
<td>1.48</td>
<td>1.29</td>
<td>0.92</td>
</tr>
<tr>
<td>2nd 20%</td>
<td>55</td>
<td>2,188</td>
<td>1.55</td>
<td>1.22</td>
<td>0.89</td>
</tr>
<tr>
<td>3rd 20%</td>
<td>54</td>
<td>1,747</td>
<td>1.52</td>
<td>1.01</td>
<td>0.67</td>
</tr>
<tr>
<td>4th 20%</td>
<td>55</td>
<td>2,058</td>
<td>1.52</td>
<td>0.97</td>
<td>0.66</td>
</tr>
<tr>
<td>Bottom 20%</td>
<td>55</td>
<td>1,643</td>
<td>1.49</td>
<td>0.80</td>
<td>0.51</td>
</tr>
<tr>
<td>Bottom 10%</td>
<td>27</td>
<td>1,175</td>
<td>1.46</td>
<td>0.76</td>
<td>0.46</td>
</tr>
<tr>
<td>Bottom 5% (Most Consistent)</td>
<td>14</td>
<td>727</td>
<td>1.45</td>
<td>0.78</td>
<td>0.47</td>
</tr>
<tr>
<td>Top - Bottom 5% fund managers</td>
<td>-</td>
<td>-</td>
<td>0.09</td>
<td>0.65**</td>
<td>0.60***</td>
</tr>
<tr>
<td>Top - Bottom 10% fund managers</td>
<td>-</td>
<td>-</td>
<td>0.06</td>
<td>0.61***</td>
<td>0.53***</td>
</tr>
<tr>
<td>Top - Bottom 20% fund managers</td>
<td>-</td>
<td>-</td>
<td>-0.01</td>
<td>0.49***</td>
<td>0.42***</td>
</tr>
<tr>
<td>All funds</td>
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<td>545,881</td>
<td>1.51</td>
<td>1.06</td>
<td>0.73</td>
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</table>

*Significant at 90% confidence level
**Significant at 95% confidence level
***Significant at 99% confidence level
Table 5.7 Gross and net returns (per cent per year) of style dedicated fund manager vs. style drifting fund manager: ranked on 36 months TNA

This table reports robustness checks on gross (before total fund costs) and net returns (after net of total fund costs) of style drifting and style dedicated fund managers over a 3-year horizon (Panels A and B respectively), ranked on fund’s 36 months TNA. TNA-adjusted returns take into account the impact of fund size in achieving returns. This study measures fund managers’ 3-year risk-adjusted net returns (in per cent per year), net of total costs realized by funds. Similarly, fund costs consist of 4 subcomponents: management fees, fund operational expenses, transaction fees, and brokerage and commissions. Each cost subcomponent is computed separately by expressing a fund’s monthly realized cost amount in RMB dollar over its annual total net assets. Next, average gross returns (Panel A) and average net returns (Panel B), are ranked on fund size. We present results across vFSF quintiles for like-sized returns comparison between fund managers representing top 50 per cent of drift funds and bottom 50 per cent style dedicated fund managers. Style drift funds are represented by funds above the median vFSF value while style dedicated funds are those below the median vFSF value. Significance levels are denoted with asterisks.

<table>
<thead>
<tr>
<th>Fund Size Fractile</th>
<th>Panel A. 3-year Gross Returns</th>
<th>Panel B. 3-year Net Returns</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Style-drift Funds</td>
<td>Style-dedicated Funds</td>
</tr>
<tr>
<td></td>
<td>Number of funds</td>
<td>Avg Total Net Assets (RMB) Million</td>
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<tr>
<td>Top 20% (Largest Funds)</td>
<td>27</td>
<td>5,348</td>
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<td>2nd 20%</td>
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<tr>
<td>3rd 20%</td>
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<td>1,393</td>
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<td>4th 20%</td>
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<td>Bottom 20% (Smallest Funds)</td>
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<td>Top 20% largest fund: style-drift consequent costs</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2nd 20% largest fund: style-drift consequent costs</td>
<td>-</td>
<td>-</td>
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<td>3rd 20% largest fund: style-drift consequent costs</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4th 20% largest fund: style-drift consequent costs</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bottom 20% smallest fund: style-drift consequent costs</td>
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<td>-</td>
</tr>
<tr>
<td>All funds</td>
<td>136</td>
<td>271,274</td>
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</tbody>
</table>

*Significant at 90% confidence level
**Significant at 95% confidence level
***Significant at 99% confidence level
Table 5.8 The likelihood of *ex post* relative performance rank

This table reports the likelihood of *ex post* relative performance rank improvement of style drifting fund manager (Panel A) vs. style dedicated fund manager (Panel B). We rank 274 Chinese equity funds relative to peers on a yearly basis using holdings-based returns. Based on fund’s half yearly reported stock holdings, we construct monthly value-weighted holdings-based returns by matching each stock in fund’s holdings to our characteristics-sorted style index developed in Section 4.4.3. We assess the rank of each fund every year and examine whether style drift funds (top 5 per cent of vFSF fractile) are best performers compared with style dedicated funds (the bottom-most 5 per cent vFSF fractile). We define best performers as funds ranked within 1 to 55, out of 274. We sum these observations separately for drift funds and dedicated funds for each performance rank quintile, over a 5-year period.

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<th>Fund ID</th>
<th>2011 Rank</th>
<th>2012 Rank</th>
<th>2013 Rank</th>
<th>2014 Rank</th>
<th>2015 Rank</th>
<th>Annualized 5-year Gross Returns (%)</th>
<th>No. of observations</th>
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1st Quintile = Performance Rank 1 - Rank 55
2nd Quintile = Performance Rank 56 - Rank 110
3rd Quintile = Performance Rank 111 - Rank 164
4th Quintile = Performance Rank 165 - Rank 219
5th Quintile = Performance Rank 220 - Rank 274

All funds
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<th>Fund ID</th>
<th>2011 Rank</th>
<th>2012 Rank</th>
<th>2013 Rank</th>
<th>2014 Rank</th>
<th>2015 Rank</th>
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1st Quintile = Performance Rank 1 - Rank 55
2nd Quintile = Performance Rank 56 - Rank 110
3rd Quintile = Performance Rank 111 - Rank 164
4th Quintile = Performance Rank 165 - Rank 219
5th Quintile = Performance Rank 220 - Rank 274

All funds
5.6.5 Further Analysis

An intriguing question that follows from the above is: why would fund managers practice style drift funds when the evidence of superior fund performance in funds that constantly switch in portfolio risks and moving into different investment styles proves to be weak and unpredictable? Although not the key focus of this thesis, for exploratory purposes, we examine the likelihood of style drift fund improving its *ex post* relative performance rank on an annual basis.

We further review the study by Kim, Shukla, and Thomas (2000) and find that portfolio risk alteration does not promise higher performance ranking since only 29 per cent have managed to beat peers in relative terms. Strictly speaking, there may be a slim chance for style drift funds to outperform peers if they choose to game their performance benchmark for self-interest. To answer this question, we rank 274 Chinese equity funds relative to peers on an annual basis using holdings-based returns. Based on fund’s half-yearly reported fund holdings, we construct monthly value-weighted holdings-based returns by matching each stock to our characteristics-sorted style index developed in Section 4.4.3.

For each year, we assess the rank of each fund and examine whether style drift funds (top 5 per cent vFSF fractile) are best performers compared with style dedicated funds (bottom 5 per cent vFSF fractile). We define best performers as funds ranked within 1 to 55, out of 274. We sum these observations separately for drift and dedicated funds for each performance rank quintile, over a 5-year period. Table 5.8 of Panel A, clearly demonstrates that equity drift managers can improve their yearly rank relative to peers because such a performance comparison is highly problematic and flawed. It is flawed as the market generally assumes that funds adhere to fund objectives, as such funds that in practice consist of different styles are compared
based on *ex post* performance which introduce biases in the *relative* rank results. In our findings, 4 style drift managers have successfully moved up to “top fund” rank category in the subsequent year (2012) when none was in the same rank category in 2011. However, the likelihood of becoming best performers within rank 1-55 is lower. For instance, there are only 9 out of 70 observations (in Table 5.8 of Panel A) while the observations on style dedicated funds are more than twofold (in Table 5.8 of Panel B). Our findings are consistent with the predictions of Brown and Goetzmann (1997) and Kim, Shukla, and Thomas (2000). Drift managers tend to rank at the bottom-most performance quintile (rank 220-274), primarily because drift funds tend to generate weaker returns than style dedicated funds, on average. Our results over the 5-year period remain qualitatively unchanged when: (1) funds are ranked on investment style, and (2) we use alternative style drift definitions (5th to 10th vFSF percentile) and style dedicated definitions (90th to 95th vFSF percentile).

Interestingly, the low odds of winning also did not deter fund managers from gambling on the success of style drift in the case of China. This probably explains why the behavior is commonplace in today’s global fund markets (Brown and Goetzmann, 1997; diBartolomeo and Witkowski, 1997; Indro, Jiang, and Lee, 1998; Kim, Shukla, and Thomas, 2000; Brown and Harlow, 2002; Holmes and Faff, 2007, 2008; Brown, Harlow and Zhang, 2012; and Wermers, 2012). As Brown and Goetzmann (1997) demonstrate, “misclassification may be intentional, in that it works to improve *ex post* relative performance measures, on average” (p.374).
Robustness tests

We conduct additional robustness tests on our performance estimates. First, different definitions for style drift are employed in gross and net performance gap evaluation.

Alternative gross and net returns definitions

Gross performance between style drift (top 10 per cent and 20 per cent vFSF rank) and style dedicated funds (bottom 10 per cent and bottom 20 per cent) account for negative 7.23 per cent and negative 3.16 per cent per annum respectively over a 3-year horizon. On the other hand, we reassess stock picking, market timing and average style performance using 1-year and 4-year horizons, making sure our findings are not influenced by certain time period. Likewise, a strong positive outperformance in funds within the bottom 10 per cent and 20 per cent vFSF fractiles, statistically significant at $\alpha = 0.01$. We confirm that fund investors’ interest is best served by style dedicated funds.

We also conduct robustness tests on net performance gap variations using 1-year and 4-year horizons and under alternative drift definitions. Results are reported in Panels A and C of Table 5.2. Net returns for style drift funds (top 10 per cent vFSF fractile rank) are much lower in the 1-year period (in Panel A of Table 5.2), in which, fund investors’ wealth is reduced by 2.61 per cent in comparison to peers in style dedicated funds although insignificant. Similar evidence on weaker net returns in style drift funds are presented over a longer horizon of 4-years (in Panel C of Table 5.2). Suboptimal fund returns are evident in all the top 3 vFSF fractiles. Our results show significant consequent costs of -6.83 per cent, -6.85 per cent and -4.09 per cent per annum are incurred for top 5 per cent, top 10 per cent and top 20 respectively.
Further robustness checks to see whether suboptimal performance in style drift funds are influenced by fund size. To test, we rank 3-year net returns—in which, we subtract the total absolute cost from the aggregate CS and CT returns, in compounding effect and annualized—earned by style drift managers (top 50 per cent by vFSF value) and style dedicated managers (bottom 50 per cent by vFSF value) on 36 months TNA. Like-sized deciles comparison under Panel B of Table 5.7 show that drift funds incurred significant net consequent costs that range from negative 0.14 per cent, negative 0.12 per cent and negative 0.23 per cent per annum for larger funds whilst smallest size funds make a loss of 0.11 per cent. This robustness tests demonstrate that the inferior net returns in funds is not due to the increasing fund size but the severity of style drift.

5.6.6.2 Alternative performance measure: information ratio

We conduct further tests on our performance results using a different measure: information ratio (“IR”), to assess if style drift or style dedicated funds performs better by normalizing monthly excess returns with fund risk in the last 3 years. Fund returns are defined as funds’ net returns (returns earned in excess of like characteristics benchmark portfolio, net of fund costs) while fund risk is the fund’s return dispersion around its mean, in absolute terms. The higher the IR, the more consistent a fund mangers’ ability in generating excess fund returns. For illustration, if fund A has higher IR than fund B, it signifies that fund A’s manager invests on superior information thereby earning higher active returns that is not due to excessive risk taking. In unreported results we have obtained, these results show that style drift funds deliver inconsistent active returns compared with style dedicated funds. In extreme drift situation (5 per cent of vFSF quintile), style dedicated funds have a

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111 As fund size gets larger, it adversely affects fund’s returns (Berk and Green, 2004).
much higher annualized IR of 0.77 on average, over a 3-year period. In comparison, style drift funds have an annualized IR of 0.02. Intuitively, style dedicated funds generate a more stable excess returns pattern as a result of style consistency. Across funds in the 10 per cent vFSF fractile, we find consistent outperformance in style dedicated funds with annualized IR of 0.62 compared with negative 0.03 in style drift funds. It follows that negative IR in style drift funds are attributed by negative average excess returns over the 3-year period. Overall, consistent outperformance in style dedicated funds are statistically significant at $\alpha = 0.01$ in 3-year and 4-year periods but not in the 1-year. Results in 1-year assessment period appears to be random as performance covering a year may not be a reliable indicator of fund manager’s ability.

In summary, the practice of style drift is harmful to fund investors as evidenced by the suboptimal performance with respect to returns before and after cost/fees, over multiple horizons and after adjusted for fund size.

5.6.6.3 CS, CT, AS and cost aspects

The main findings on CS returns presented in Section 5.6.3 remain qualitatively unchanged in 4-year period (Panel C in Table 5.3), showing negative 2.37 per cent (positive 0.64 per cent) in style drift (style dedicated) funds, with a total return erosion of 3.02 per cent. In the 1-year period (Panel A in Table 5.3), the likelihood of positive CS returns earned by both style drift and style dedicated managers are weak. Likewise, style drift weakens the success of style timing strategies, causing a reduction of 2.12 per cent in 1-year CT returns (Panel A in Table 5.4). Although it appears that drift managers may outperform peers who adhere to fund style in CS and CT abilities, these results are random (Panel A under Table 5.3 and Panel C of Table 5.4, respectively). Similarly, style drift undermines AS returns. Fund investors’
wealth is reduced by 0.81 per cent per year in a 1-year horizon (Panel A in Table 5.5) and fund investment outcome reduces by 3.24 per cent in the long run (4-year period, Panel C of Table 5.5), statistically significant at $\alpha = 0.05$, when fund managers attempt style drift. The main findings are statistically robust to our alternative “style drift” definitions on the basis of various quintile-based notions using 10 and 20 per cent vFSF fractile ranks.

Next, we perform sensitivity checks on our total costs results. Our main findings showing that style drift funds subject fund investors to more costly portfolios are not affected by the assessment time horizons of 1-year and 3-year (Panels A and C of Table 5.6, respectively). Results are also comparable with those in other vFSF fractiles, specifically, 10 per cent and 20 per cent.
5.7 Conclusion

This chapter investigates the effects of style drift on fund performance across actively managed open-end equity funds in China, an area that is rarely researched, unlike in the U.S., Australia and Malaysia where the behavior has been a subject of varying extent of investigation. When fund manager alters the risk-and-return characteristics of her portfolio and trade excessively as she diverges from a fund’s declared objective and strategy, this manipulative decision erodes fund returns, which diminishes investors’ wealth without their knowledge. This risk taking through style drift can also cause a possible loss of confidence in the fund market.

Chapter 5 of this thesis is motivated to investigate empirically with a new analytical perspective and metrics to uncover why the ability of a manager to maintain a consistent investment style is important and a skill that should be valued in the marketplace. As Chapter 4 has demonstrated, intentional style drift is evident among our sample equity funds, with about 82 per cent of funds tend to pick stocks that have different size and BE/ME characteristics from the declared investment objective. This finding is consistent with the holdings-based style drift studies on U.S. mutual funds (Brown, Harlow, and Zhang, 2012, and Wermers, 2012), which raises the question of how risk taking such as style drift affects fund performance in the market context of a completely in-house fund management industry in China. This line of inquiry is important for the reasons outlined as follows. First, style drift behavior challenges the efficacy of performance assessment of actively managed funds because the investing public is not aware of the fact that the return-risk expectation as declared in the fund prospectus has been distorted. Second, evidence shows that excess risk exposure generated by changing investment strategies does not guarantee superior ex post fund
performance, and fund tends to earn lower returns in situations where risk changes are motivated by personal monetary incentives.

In this Chapter 5, we investigate the how of the investment risk-taking actions by managers via style drift have on fund performance. We test the hypothesis that fund manager’s style drift decision reduces fund returns through poor stock picking, weak market timing, lower average style returns and higher trading costs associated with short-interval trading activities. We appraise 3 aspects of fund manager’s skill namely, stock picking, market timing, and ability to maintain average style using the holdings-based approach and conduct a comparative analysis for each of these individual skills for style drift and style dedicated funds.

We find strong evidence suggesting fund manager’s style drift decision reduces fund returns. Performance gap across most deciles on average is significantly large through weak market timing (negative 2.39 percent), inferior stock picking (negative 2.67), irregular fund style (negative 3.56 percent) relative to style dedicated managers, and higher trading costs (1.79 percent) associating with short-interval stock transactions. Our evidence on investment style consistency shows that dedicated funds produce consistent positive returns through picking quality stocks and thereby better serves fund investor’s interest, in line with findings on U.S. mutual funds by Brown, Harlow, and Zhang (2012) who also adopt a holdings-based approach. Our results are robust to different assessment periods, fund size, and alternative style drift definitions and other performance measures.

There are several important implications arising from this study. Our results provide concrete evidence to substantiate the theoretical argument by Chen, Hong, Jiang, and Kubik (2013) about the high levels of risk taking within fund management organization with internally managed funds. Specifically, we show that funds taking
greater risk through higher level of style volatility rather than following the mandated style can interfere with fund manager’s stock picking, market timing, and average style return outcomes. We demonstrate that style dedication is more likely to contribute positively to a fund’s competitive advantages while style drift presents negative implications for fund performance and distortions to the mutual fund market by showing that style drift limits the efficient use of capital resources available to firm by approximately RMB 87,796 million (US$12,784 million) during the period from 2011 to 2015. Hence, style drift behavior is found to exacerbate the agency problem inherent in the current fund management environment in China, aggravating a serious issue of information asymmetry that will hinder the development of such a market.

Our fund classification system and style drift metrics contribute to establishing some new standards and methodology that can be applied by market participants and regulators to institute greater clarity and transparency regarding product attributes. The product improvement thus made will diminish the problem of information asymmetry for fund investors and other major stakeholders in general, and in particular to this fast growing and nascent fund market.

Our study offers some important new evidence and better understanding for the evaluation of fund performance and the design of compensation structure of fund managers. For regulatory consideration, regulators, market analysts and FMCs need to carefully devise an appropriate method for fund style evaluation to reflect the true behavior of fund managers for disclosure purposes in fund prospectus and for aligning fund manager’s effort with appropriate incentives. In conjunction, the market should reduce its common reliance on relative performance ranking on narrow measures that espouses the concept of “stellar” funds and should for example incorporate appraising fund manager’s performance in absolute terms to minimize personal bonus
maximization reinforced by AUM-dominated compensation. The regulatory authority could also consider adopting new regulatory standards for fund style adherence and effective mechanisms to ensure compliance for advancing fund investors’ interests, particularly those in the emerging fund markets whose fund investors are less able to defend their own interests.

In the next chapter, we will focus on addressing the why of investment risk-taking actions via style drift by fund managers. Specifically, we investigate the motivation of style drift by studying the relationship between the risk-taking incentives generated by AUM-based compensation and style drift in China’s market context. Research on what motivates the practice of style drift anywhere is an important but under-researched topic in the literature.
CHAPTER 6. THE MOTIVATION OF STYLE DRIFT

6.1 Introduction

Research Question 3 (Chapter 6) of the thesis extends the notion of mutual fund tournaments in a new research context to test the motivation of style drift, for the first time in the finance literature. Premised on the reasoning of tournament theory, this thesis postulates that fund managers may undertake risky fund decision because their compensation is ultimately based on the size of the assets they manage; and relative performance ranking matters in the fund management industry.

Prior studies on mutual fund risk document that fund managers are predominantly motivated by the maximization of their compensation, which often conflicts with the pursuit of maximizing the interests of the fund investors. Studying the root causes of this common risk-taking practice, particularly in the form of style drift, is important because of the fact that when a fund manager persistently fails to invest in compliance with the fund’s declared investment strategy as publicly stated in the fund prospectus, it will actually lead to poor fund performance, as demonstrated in Chapter 5.

Fund management company, regardless of how the funds’ portfolio are run, generally compensates fund manager based on the assets under management, under which bonus payment forms the dominant component of a fund manager’s total compensation.112 Because compensation is geared to AUM, fund managers have been found to strategically “game” calendar-based compensation system by diverging from

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112 Both individual performance and the overall fund management company performance affect fund manager’s compensation pool. In a joint study on asset management compensation in the U.S. by Greenwich Associates & Johnson Associates (2016), it has been found that organizational performance—FMC revenue (fee) related to assets under management—(50 per cent –70 per cent) is the dominant driver of fund manager’s pay in the U.S. rather than individual performance.
fund investors’ tolerable risk as prescribed in the fund prospectus to maximize new fund flows (Ha and Ko, 2017) in an attempt to boost AUM (Brown, Harlow, and Starks, 1996, Kempf and Ruenzi, 2007, 2008) but end up hurting fund performance (Huang, Sialm, and Zhang, 2011). Alternatively, funds are found to “mark-up” net asset values prominently at year-end quarter (Carhart, Kaniel, Musto, and Reed, 2002) and windowdress portfolio holdings in December (Lakonishok, Shleifer, Thaler, and Vishny, 1991). Given the inherent incentive problems of AUM-based compensation model and the important role of the fund industry in a country’s financial system, there is a clear need to shed light on why style drift is a common practice among mutual funds. While research on the performance of drift fund has been the primary focus in the literature, investigation on how compensation incentive drives fund manager’s drift behavior is scant. This thesis extends and further develops this conventional line of inquiry by unveiling the “black box” in respect of the motivational link between style drift and new fund flows that is usually asserted without evidence by researchers and the effect of this motivation on style drift induced risk taking.

The chapter is organized as follows. Section 6.2 outlines the theoretical framework of our fund inflows-drift empirical testing. Section 6.3 develops and explains our testable hypotheses in respect of fund manager motivation and its link to risk-taking behavior in the context of style drift. Section 6.4 presents our innovative FMC-wide tournament framework to test the extent of the distortive impact of “AUM-dominated” incentive via the settings of internal and external FMC competitions. Section 6.5 details how our tournament model derives from style alteration and performance rank-order metrics. Section 6.6 describes the characteristics of our data. Section 6.7 discusses our findings on the incentive effect
of pursuing bigger fund inflow on style drift behavior, and presents style drift-tournament results with further analysis. Section 6.8 concludes.

6.2 Style Drift and Fund Flows

As discussed in the Introduction section of this chapter, the size of the bonus pools may constitute material influence on fund managers’ total compensation because fund managers’ calendar-year end cash bonus is linked to AUM growth and individual performance. Consequently, fund managers may be tempted to pump up AUM through participating in tournament to maximize compensation as individual fund investors are generally considered to be myopically attracted to leading funds (Chevalier and Ellison, 1997, and Sirri and Tufano, 1998).

The fund tournament literature is generally based on the notion of fund manager incentive that is driven by a desire to increase compensation by engaging in tournaments to achieve higher ranking to raise the volume of AUM. And style drift is considered to be a means to achieve that. Therefore, it is important to ascertain empirically whether style drift does induce positive fund inflows to raise AUM. To test this important strand of argument, we first investigate the link between style drift and fund inflows. Next, we assess whether funds are involved in yearly universe, segment, and family tournaments by examining fund manager’s response (in undertaking style drift) to mid-year performance rank. Our study will examine the strategic interaction between mid-year leaders and laggards and distinguish the extent of external and/or internal competition for larger fund inflow by means of investment style alteration.

As there is no prior evidence on the relationship between style drift and subsequent new fund flows in previous studies, we aim to empirically test whether Chinese funds altering their investment style is a means to increase fund inflows. If
there is a positive association between style drift and fund flows, we expect funds to compete for higher relative performance rank under the assumption that winner will receive substantial new capital that boosts AUM and consequently a larger compensation. It is widely accepted that fund investors are representative biased and that they respond favourably to top performing funds in the previous period (Sirri and Tufano, 1998). In relation to style drift, drift funds may have a tendency to attract subsequent new fund flows because the commonly adopted relative rank-order approach is flawed. In general, relative rank-order in the context of style drift is highly problematic with the market generally assumes that funds adhere to the declared fund objectives. As such, funds that in practice actually follow different styles are thus relatively ranked against supposedly same style category based on ex post performance. As a result, style drift funds are found on superficial evidence to have successfully moved up to become “top fund” in the publicly declared rank category (Kim, Shukla, and Thomas, 2000) and can thereby attract new fund capital. Along this premise, we predict that there is a positive relationship between style alteration and fund net-inflows.

6.3 Style Drift-Tournament Behavior

It is common for fund managers to receive compensation that ties to the size of AUM. Under such a scheme, fund managers can enhance their compensation either by selecting a portfolio of quality stocks so that superior stock appreciation will lift AUM, or by attracting new fund inflows by competing for higher performance rank position with other funds. Sirri and Tufano (1998) suggest that fund managers may

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113 Be it based at fund level, that is, assets managed by specific manager or at Fund Management Company (FMC) level, where overall business performance is measured by AUM growth; both factors account for bonus determination although the percentage breakdown for individual and organizational performance is not often apparent.
perceive, a priori, the increasing difficulty in picking quality stocks so they may more often resort to chasing rank-order for more new fund inflow.

A broad body of literature on mutual fund tournament has shown that fund managers have a propensity to gamble (Brown, Harlow and Starks, 1996; Carhart, Kaniel, Musto, and Reed, 2002; Taylor, 2003; and Kempf and Ruenzi, 2008) by manipulating portfolio risk. However, studies on the link between tournament and style drift behavior is absent. We conjecture that investment style alteration is the manifestation of the investment opportunism undertaken by fund managers to compete for the highest relative rank-order result in interim performance in order to attract larger fund inflow for the purpose of maximizing AUM-linked bonus compensation. The fundamental idea of the tournament theory in management literature (Lazear and Rosen, 1981) shows that employees seeking to maximize their compensation are motivated to win a promotion/reward in a relative-rank order compensation system because the prize differences under this “winners and losers” structure are huge\(^1\) compared with absolute individual performance. In our style drift-tournament model, the prize (fund inflow in this case) is the key motivator in such tournaments.

We explore in this thesis, how fund managers alter their investment styles in different tournament settings. Studies of fund managers in the tournament literature demonstrate that fund managers adjust their investment risk exposure in response to mid-year performance position relative to other fund managers (Brown, Harlow and Starks, 1996; Chevalier and Ellison, 1997; Taylor, 2003; and Dijk, Holmen, and Kirchler, 2014). Using standard deviation of fund returns as a risk proxy, managers are found to react in 2 ways: either by increasing or reducing portfolio risks based on

\(^{114}\) Sirri and Tufano (1998) shows that winner in the rank-order competition attracts substantially large rewards in the form of cash inflows.
whether they are mid-year leaders or laggards in the competing environment. The context in which fund managers compete (draw investors to their fund products) and whether opponent’s portfolio choice is observable are the key to predicting fund manager’s tournament behavior (Taylor, 2003).

To investigate whether style drift in actively managed funds is an intentional response to improve mid-year fund performance rank, this study will examine the investment decisions of active managers, whose portfolio choices are not directly observable. Taylor (2003) argues that if both Manager A and B are active, intuitively portfolio choices are unobservable, thereby triggering contrasting strategic interactions between fund managers. Accordingly, fund manager forms belief about the action likelihoods of peers and incorporate his self-evident expectation in risk-taking choices. Mid-year leaders expect laggards to pursue greater risk in the second period, therefore, the optimal response for the leaders is to increase risk to secure their interim winning state. In contrast, mid-year laggards will react by not mimicking the opponents’ strategy so that they have a chance to win the contest. Since mid-year laggards expect the leaders to increase risk, they react by pursuing a less risky portfolio, an opposite strategy. Although Taylor (2003) provides the theoretical assumption about why fund manager increase risk, empirical evidence based on his prediction is scant. Hence, we incorporate Taylor’s (2003) reasoning in the formulation of our empirical strategy for fund managers to uncover how they engage in risk taking through style drift and under what conditions do managers alter their investment style as we recognize the fact that in practice, “real-time” portfolio choices in other active funds are not directly observable.

Previous studies on fund manager’s tournament behavior are focused primarily only on the change in the estimated level of risk measured by fund returns
volatility, that is, the greater the fund fluctuates around its mean returns, the riskier the fund. In contrast, our study captures the actual fund portfolio alteration and volatility using a novel measure of manager’s risk intention on the basis of actual portfolio stock units rather than the stock price. We argue that fund managers may engage in similar gambling behavior in the form of investment style bets——style alteration that changes the asset allocation and risk profile of the fund. It is widely accepted that individual investors on average rarely study investment prospectus but base their investment decisions on a readily “understood” salient feature of a fund—past performance rank-order (Sirri and Tufano, 1996, and Chevalier and Ellison, 1997).

Given that investors of Chinese mutual funds are largely individual investors, we expect fund managers to exploit short-term risk premium and engage in equity fund “universe” tournament in the actively managed equity fund market as a whole to maximize AUM. Under this “universe” tournament, the fund market consists of all active fund managers of different investment styles, with actual portfolio choices of competing fund managers unobserved, providing a situation that makes strategic interaction between managers relevant to their decisions. At the same time, fund managers also compete for net-inflows by drawing existing/potential fund investors away from peers of similar fund style (“segment”) since fund market may

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115 When one equates fund risk with returns volatility, the results only offer superficial understanding of the risks an investor is exposed to. As recognized by practitioners, fund investors are concerned with the likelihood of “permanent loss in investment value” rather than the how much the stock price goes up and down (Saft, 2014). Along the same vein, this thesis views that studies on fund performance in relation to risk taking should consider wider aspects of risks and detect them, and not using price volatility as a single source of risk.

116 In style investing literature, it is generally accepted that asset price anomalies exist and that specific characteristics (also known as style factors) such as size, value and momentum contain risk premium. The terms “bet” and “gamble” are used interchangeably throughout the chapter.

117 In our sample funds, about 83 per cent of the equity fund’s assets are owned by individual investors.

118 In a tournament that compromises of “active” fund managers, portfolio choices of these contestants are theoretically assumed to be unobservable (Taylor, 2003).
also rank performance among like-funds. In this market “segment” tournament context, fund managers of similar fund style are similarly caught up in the unknown strategic choices of their opponents since all the contestants are active managers. On the whole, if risky style drift behavior is related to fund managers’ desire to maximize compensation, we would expect mid-year leaders to exhibit a stronger propensity to alter investment style than mid-year laggards within the universe and segment fund market conditions. This behavioral context guides the formulation of our second hypothesis that fund managers pursue style drift in response to their performance rank position at mid-year. Specifically, we expect universe-relative mid-year fund leaders to increase the degree of style drift than universe-relative mid-year laggards. Similarly, the extent of style drift is larger in segment-relative mid-year leading funds in contrast to segment-relative mid-year laggards.

6.4 Internal or External FMC Competition

Our analysis also extends to investigate in a new area of fund-family tournament in the context of style drift, which has rarely been explored in the literature. Family tournament is found to occur when fund managers compete with other managers within the same fund family in the U.S market context for promotion and scarce resources for advertisement budget, and cross-fund subsidization (Kempf and Ruenzi, 2008). Family fund tournament is evident but not necessarily so if the incentive to maximize bonus pool at FMC-level becomes greater so that fund managers are induced and more inclined to compete for interfirm new fund inflows. The rationale being that fund manager’s year-end cash bonus is ultimately linked to the bonus pool at FMC level. Given that firm level bonus pool is common practice.

119 Relative performance of similar fund style are published periodically by large financial data vendors in China. For instance, Morningstar (China), WIND, CSMAR report fund performance by relative rank in their database.

120 These extra resources will help to improve fund’s inflow and thereby fund managers’ compensation.
among Chinese FMC, we predict Chinese fund managers are less likely to compete within FMC (family tournament) but more likely between FMCs (universe and segment tournaments). Accordingly, we test our third hypothesis that the extent of style drift is expected to be larger in universe and segment-relative rank systems than in family-relative rank system in such strategic tournaments. This family tournament (also known as intrafirm tournament) hypothesis allows us to examine the intensity of the distortive impact of “AUM-dominated” incentive arising from a FMC-wide competition.

Our novel FMC-wide tournament framework expands the current scope of key tournament works that focus on segment (Brown, Harlow and Starks, 1996) and family fund competition (Kempf and Ruenzi, 2008) by uncovering how fund managers react to universe ranking (universe tournament setting) that comprises of all equity funds, and approach the competition with style drift to maximize compensation. Our results will provide clear evidence on the effects of inter-FMC and intra-FMC competition incentives on style drift, the first time such empirical evidence to be produced in the mutual fund literature.

6.5 Tournament Methodology

To find out if fund managers have the incentives to engage in rank-order competition and whether they are likely to compete externally and/or internally\textsuperscript{121} for larger inflow of new fund capital by means of style alteration, our Research Question 3 of this thesis develops two new variables: (1) style alternation spread, and (2) relative performance rank order. We test for the strategic interaction between interim leading and laggard funds in the settings of universe, segment, and family tournaments.

\textsuperscript{121}External (Internal) competition relates to a contest between (within) fund families (family).
6.5.1 Style alteration metric

The strategic interaction between leading and laggard fund managers involves the varying degree in style alteration after the mid-year performance assessment. Style alteration is measured as the change in fund’s style deviation value (as in equation 6.1) from the first half to the second half of each calendar year y:

\[
\text{Style Alteration Spread } (\text{SAS}_{ty}) = vFSF_{ty}^{(2)} - vFSF_{ty}^{(1)}
\]  

(6.1)

where \(vFSF_{ty}^{(1)}\) and \(vFSF_{ty}^{(2)}\) represent the style deviation representing the equally weighted standard deviation of fund manager \(i\) style orientation in first (second) part of the year \(y\).

For the purpose of discussion and quantifying how managers strategically manipulate fund style in a bid for higher relative performance ranking with the use of style alteration spread in this chapter, we use the term “style alteration” here instead of style drift where appropriate.

6.5.2 Relative performance rank-order

We build on Daniel, Grinblatt, Titman, and Wermers (1997) holdings-based performance measure as fund returns for the 3 relative ranks in the universe, segment, and family tournaments. Subgroups of mid-year leaders and laggards are identified and created on the basis of a fund’s relative rank at the end of first part of the year \(y\), which is a six-month window from January, following Brown, Harlow and Starks (1996) methodology. A (6,6) specification\(^{122}\) is used to represent first and second half of each calendar year in our tournament related style drift study as full disclosure on

\(^{122}\) Generally, results are unchanged using different specifications e.g. 5, 6, 7, and 8 months for pre-tournament performance ranking (Brown, Harlow and Starks, 1997, Kempf and Ruenzi, 2008). Thus (6, 6) is a reasonable measure.
Chinese fund holdings are only available twice yearly. Therefore, cross-sectional cumulative returns of fund manager \(i\) from January to June in year \(y\) is calculated as:

\[
RTN_{i,My} = [(1 + HBRTN_{i,1y})(1 + HBRTN_{i,2y})\ldots(1 + HBRTN_{i,6y})] - 1
\]  

where \(HBRTN_{i,1y}\ldots HBRTN_{i,6y}\) is the monthly holdings-based returns of fund manager \(i\), from January (1) to June (6).

Next, the relative rank of a fund is developed within each of the universe, segment, and family groups which provides 3 types of ranking to test for 3 different tournament contexts. First, relative-universe rank for each year \(y\) (“UniRank”) by ordering funds (whole sample) from the worst to the best performance based on fund returns is constructed using equation 6.2. Next, a rank number is assigned to each fund, and the rank distribution is normalized in the range of (0) and (1), indicating worst (best) fund. Second, relative-segment rank of each fund for each year \(y\) (“SegRank”) is constructed using the same ranking procedure as in UniRank except that funds are now grouped into like-style categories to denote different market segments e.g. growth-, value-, large-funds. Lastly, rank-of-rank is employed in the relative-family rank (“FamRank”) construct for each fund in year \(y\), in line with Kempf and Ruenzi (2008). By rank-of-rank, it means funds’ performance within their family (FMC) are ranked by segment performance. Rank-of-rank ensures that performance of family-funds in different segments—having non-identical risk-return characteristics, are comparable. Each family requires at least 2 funds to be included in the study so that we can establish relative ranking and create our tournament scenario. To illustrate, suppose FMC \(i\) contains 3 funds but 2 are of the same segment with SegRank (R) in year \(y\): \(R_{i,Growth1}=0.8\), \(R_{i,Growth2}=0.2\) and \(R_{i,Value}=0.6\). I then arrange the
3 sets of SegRank from worst to best funds and compute their new fractional ranks. Now, the relative family rank for the 3 funds are: \( R_{i \text{Growth}1} = 1.0, R_{i \text{Value}1} = 0.5 \) and \( R_{i \text{Growth}2} = 0 \). On the whole, a higher (lower) \( R_i \) denotes leading (laggard) funds.

To show that fund managers compete for yearly new fund inflows by gambling on fund style, strategic interaction between contesting fund managers must be present. To test this style drift tournament behavior, this study adopts a 2 x 2 contingency table (Brown, Harlow and Starks, 1996) using the Chi-square test statistic \( X^2 \) (Conover, 1980) Relationships between the SAS\(_{iy} \) (rows—r) and RTN\(_{i \text{My}} \) (columns—c) variables are tested for significance with the following \( X^2 \) computation:

\[
X^2 = \sum_{i=1}^{r} \sum_{j=1}^{c} \frac{(\text{Obs}_{ij} - \text{Exp}_{ij})^2}{\text{Exp}_{ij}}
\]

where \( \text{Obs}_{ij} \) and \( \text{Exp}_{ij} \) denote observed and expected frequencies for each SAS\(_{iy} \)/ RTN\(_{i \text{My}} \) cell. \( \text{Exp}_{ij} \) refers to the expected number of counts if SAS\(_{iy} \) (r) and RTN\(_{i \text{My}} \) (c) are independent, computed as \( (r_i)(c_j)/n \). A computed \( X^2 \) exceeds critical values of \( X^2 \) for 1 df indicates that the distribution for leaders/laggards are different among high/low SAS. Henceforth, with the computation results, this study can conclude whether the relationship between interim rank and style alteration is statistically significant.

### 6.5.3 Fund net-inflows metric

The 12-month pre-and-post performance review period measures the magnitude of fund flows using holdings-based returns (net of costs) estimation from Section 5.4 in Chapter 5 and total net asset calculation as follows:

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\(^{123}\) Normalized rank instead of rank number in rank-of-rank method is considered as funds of different segments may end up with the same segment rank position, thereby making family-rank impossible.
\[
Flow_{i,t} = TNA_{i,t} - TNA_{i,t-1} (1 + R_{i,t})
\]

(6.3)

\[
FlowVOL_{i,t} = \frac{\frac{TNA_{i,t} - TNA_{i,t-1} (1 + R_{i,t})}{TNA_{i,t-1}}}{TNA_{i,t-1}}
\]

(6.4)

\(FlowVOL\) is the fund flow volatility measured by the change in monthly total net assets less fund appreciation (Kempf and Ruenzi, 2008). The new money growth in equation 6.4, adjusted for fund size is used as a proxy to test the link between style drift and fund net-inflows.

6.6 Empirical Data

Data used in this study are described in earlier Section 4.5 in Chapter 4. However, additional fund data are collected for this style drift tournament investigation which include: (1) total net assets (“TNA”); (2) vFSF estimates measuring a fund’s style volatility are obtained from Chapter 4; (3) holdings-based return (“HBRTN”) on the basis of fund’s half yearly holdings data from Chapter 5. These 3 variables are required to construct measures for equations 6.1, 6.2, 6.3 and 6.4.

6.7 Results

As explained in the Introduction section of this chapter, the size of the bonus pools may constitute material influence on fund managers’ total compensation. The rationale being that fund managers’ calendar-year end cash bonus is primarily linked to AUM growth (FMC performance) and individual performance. Consequently, fund managers may be tempted to pump up AUM through tournament to maximize compensation since retail fund investors may generally be myopically attracted to leading funds. Prior to testing whether fund managers are involved in yearly universe, segment and family tournaments by means of fund style alteration, it is important to establish the risk-taking incentives that induce style drift decisions because fund
manager’s compensation is proportional to investor’s redemptions and subscriptions in mutual fund. The testing of the relationship between fund inflows and style drift therefore serves as foundation for style drift tournament. In addition, we examine the strategic interaction between interim leaders and laggards and distinguish the extent of external and/or internal competition for larger inflow of new fund capital by means of style alteration.

6.7.1 Style alteration and fund flows

To investigate if style drift can induce future new cash flows into the funds, we track the net-inflows of each equity funds ranked by \( v_{FSF} \) (our measurement for style drift in Chapter 4). Fund’s net-inflow is measured by 3 different rolling \( v_{FSF} \) of 1-year, 2-year and 3-year. This is to reflect Radcliffe’s (2003) view that style drift is a dynamic phenomenon and therefore employing a longer drift assessment period provides additional tests to account for the future fund flows in respond to the behavior.

Table 6.1 shows that higher net-inflows is associated with funds that exhibit the largest drift in fund investment style. Results are statistically significant when 2-year and 3-year rolling drift measures are employed. 1-year assessment shows insignificant drift-inflow association, a priori that style drift is characterized by a constant change in investment style (Radcliffe, 2003). Using 1,642 fund-period observations in a 2-year drift measure, we find that highest drift funds attract a net-inflow of 0.15 per cent on a semi-annual basis as presented in Panel B, whereas style dedicated funds experience a slight net-outflows of 0.01 per cent. The positive link between style drift and net-inflow remains statistically significant in the 3-year rolling period (Panel C). Results are robust to alternative style drift (style dedicated) definitions using \( v_{FSF} \) quintile 2 (\( v_{FSF} \) quintile 4). Our findings confirm empirically that style drift increases a fund’s net inflow, affirming that fund manager’s motivation
to maximize inflows to increase compensation through style drift. This discovery also highlights the issue of a distortive relative rank-order system where drifted funds are incorrectly ranked by the market within the originally mandated fund category thus resulting in a possible higher relative position that enhances fund inflows. This not only undermines the skill valued in the marketplace as style dedicated fund tends to meet its benchmark returns and has lower portfolio risk measured as TE ratio in Section 4.6.4 of Chapter 4, but also hampers the efficient functioning the fund market through an inappropriate “reward distribution” scheme.
Table 6.1 Net-inflows (per cent on a semi-annual basis) of style dedicated fund manager vs. style drifting fund manager: ranked on vFSF values

This table reports the average net-inflows response to funds with varying degree of style volatility, on a half-yearly basis. First, the net-inflows of fund $i$ is constructed following Kempf and Ruenzi (2008) who employ similar procedure from Chevalier and Ellison (1997) and Sirri and Tufano (1998). I then track the net-inflows of each equity funds ranked by style volatility under three different rolling vFSF of 1-year, 2-year and 3-year, respectively in Panel A, B and C. Top 5 per cent vFSF quintile represents the style drift funds whereas most-bottom vFSF quintile, that is, a rank of five, denotes style dedicated funds. The difference in net-inflows between drift funds (vFSF rank one) and dedicated funds (vFSF rank five) are presented in the second last row in Table 6.1. Table 6.1 also presents (last row) results using different vFSF quintiles of vFSF rank two and vFSF rank four as robustness checks. Significance levels are denoted with asterisks.

<table>
<thead>
<tr>
<th>vFSF Quintile</th>
<th>Panel A: 1-year Rolling</th>
<th>Panel B: 2-year Rolling</th>
<th>Panel C: 3-year Rolling</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of fund-period</td>
<td>Average Net-inflows</td>
<td>No. of fund-period</td>
</tr>
<tr>
<td></td>
<td>observations (%)</td>
<td>(%)</td>
<td>observations (%)</td>
</tr>
<tr>
<td>Rank 1 (Drift)</td>
<td>438</td>
<td>0.05</td>
<td>329</td>
</tr>
<tr>
<td>Rank 2</td>
<td>439</td>
<td>0.04</td>
<td>328</td>
</tr>
<tr>
<td>Rank 3</td>
<td>439</td>
<td>0.01</td>
<td>328</td>
</tr>
<tr>
<td>Rank 4</td>
<td>438</td>
<td>-0.01</td>
<td>328</td>
</tr>
<tr>
<td>Rank 5 (Dedicated)</td>
<td>438</td>
<td>0.00</td>
<td>329</td>
</tr>
<tr>
<td>Drift (vFSF Rank 1) - Dedicated (vFSF Rank 5) funds</td>
<td>877</td>
<td>0.05</td>
<td>657</td>
</tr>
<tr>
<td></td>
<td>(0.82)</td>
<td></td>
<td>(1.97)</td>
</tr>
<tr>
<td>Drift (vFSF Rank 1,2) - Dedicated (vFSF Rank 5,4) funds</td>
<td>876</td>
<td>0.05</td>
<td>657</td>
</tr>
<tr>
<td></td>
<td>(1.25)</td>
<td></td>
<td>(1.99)</td>
</tr>
<tr>
<td>All funds</td>
<td>2192</td>
<td></td>
<td>1642</td>
</tr>
</tbody>
</table>

*Significant at 90% confidence level
**Significant at 95% confidence level
***Significant at 99% confidence level
6.7.2 Style alteration pattern in universe tournament

Our results show that style drift induces fund inflows, thus providing the risk-taking incentives for funds to compete for higher relative performance rank in return for a larger compensation.

Panel A of Table 6.2 reports the observed frequencies\(^{124}\) in a 2 x 2 contingency table (observed frequencies in percentage are shown in parentheses) showing the tournament behavior between mid-year leaders and laggards funds. Clearly, equity fund universe tournament has a strong presence in the Chinese fund market based on their respective \(p\)-values, regardless of whether SAS is fractile or median-based. Our results as shown in Table 6.2 provide evidence to support our prediction that Chinese equity fund managers participate in yearly tournament. More specifically, Chinese fund managers compete against one another across the entire fund market.

As to how fund managers react to mid-year rank-order, we find strong evidence for strategic behavior that is consistent with Taylor’s (2003) predictions, in which, mid-year fund leaders (laggards) are more (less) likely to gamble by actively making riskier investment decisions. From the observed frequencies, we show that mid-year laggards tend to make less investment bets while mid-year leaders are more likely to trade stocks with style characteristics that differ from the fund mandate.

Panel B presents the expected frequencies (in per cent) of our observations showing

\(^{124}\) We count the number of style alteration occurrences under 2 scenarios; where fund managers are classified as mid-year (1) leaders and (2) laggards. In respond to the mid-year rank position, fund managers may attempt to alter fund style in 2 ways: (1) increase trading in stocks with characteristics beyond declared fund style, resulting in greater investment style drift or (2) reduce style bets. We will have 4 possible outcomes following this strategic interactions. We then examine the significance relationship of each occurrence to establish for the tournament effect in style drift behavior.
the greater the divergence from the observations, the more significant the strategic behavior.125

6.7.3 Style alteration pattern in segment tournament

Results from Panel A in Table 6.3 are very similar to the findings in universe tournament, in that, fund managers in China fight for higher rank-order within the same fund segment. In this analysis, the whole sample funds is divided into market-segments 126 of growth, value, large-cap, mid-small cap and dividend/income (prospectus-declared style) rather than just focusing on growth group as commonly reported in the conventional tournament literature. The cell frequencies across the 2 x 2 contingency table support the second hypothesis 3b that strategic interaction is prevalent in Chinese fund market segment. With the findings in the bottom and top SAS 40 per cent fractile-defined group being the strongest at $\alpha = 0.05$, less investment style alteration in the subsequent period—July to December is a consequence of a poorer mid-year performance measuring from January to June. In line with theoretical explanation by Taylor (2003), our results indicate that interim laggards counter-react to their anticipation that leaders will contest by making more style bets and therefore the laggards will gamble in the opposite direction for a greater chance of reversing their position. In contrast, interim leaders are found to increase their trades in stocks with characteristics outside of the fund mandates in anticipation that laggards will increase on style bets.

125 This is reported in the p-values using Chi-square statistics ($X^2$).
126 Growth market segment consists of growth-oriented and aggressive-growth oriented fund managers. Value segment comprises of value and deep-value oriented fund managers. Mid-small-cap segment represents fund managers with primary investing objective in mid-small size stocks and while may include growth as secondary objective. Other segments include large-cap funds and dividend & income.
Overall, our results document that getting to the top of the rank by end-year is crucial among Chinese fund managers as this is incentivised by the substantial inflows in the subsequent periods.
This table reports actual investment style alteration behavior in fund managers as a result of interim performance rank-order against other fund managers in the “universe”, that is, the aggregate Chinese fund market. This study establishes the actual style drift behavior by controlling for unintentional drift, under which, we isolate some key extraneous influences, for example, stock price appreciation and changes at different points in time. Subgroups of cross-sectional mid-year leaders and laggards based on fund’s relative rank using Daniel, Grinblatt, Titman, and Wermers (1997) holdings-based fund returns are created. Empirical assessment uses a (6,6) specification to represent first and second half of each calendar year in our tournament related style drift study, which is a 6-month window from January, following Brown, Harlow and Starks (1996) methodology. There are 3 different measures for our style alteration variable to ensure our results are not biased by a single definition. Low and High SAS are fractile-based: (1) bottom and top 20 per cent, (2) bottom and top 40 per cent and median-based: (3) below and above median value of SAS. Finally, the variables are cross-tabulated for SAS and laggards/leaders in a 2 x 2 classification method and the strategic interaction in each cell frequency are examined. Using $X^2$ statistics, this study tests whether the observed frequencies are significantly different from the expectations. The $p$-values indicate the significance of the relationship across the contingency table at 90 per cent, 95 per cent and 99 per cent confidence level.

### Table 6.2 Frequency distribution for style alteration spread (SAS) and leader/laggard rank-order interaction in universe tournament

<table>
<thead>
<tr>
<th>Style Alteration Spread (SAS) Ranked by Fractile</th>
<th>Number of funds</th>
<th>Low Returns (Laggards)</th>
<th>High Returns (Leaders)</th>
<th>$X^2$</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottom &amp; Top 20%</td>
<td>438</td>
<td>125 (28.54)</td>
<td>96 (21.92)</td>
<td>7.68</td>
<td>0.01</td>
</tr>
<tr>
<td>Bottom &amp; Top 40%</td>
<td>872</td>
<td>240 (27.52)</td>
<td>320 (36.70)</td>
<td>34.03</td>
<td>0.00</td>
</tr>
<tr>
<td>Median</td>
<td>1,080</td>
<td>291 (26.94)</td>
<td>248 (22.96)</td>
<td>6.23</td>
<td>0.01</td>
</tr>
</tbody>
</table>

**Panel A.** Observed Frequency (unit)

<table>
<thead>
<tr>
<th>Style Alteration Spread (SAS) Ranked by Fractile</th>
<th>Number of funds</th>
<th>Low Returns (Laggards)</th>
<th>High Returns (Leaders)</th>
<th>$X^2$</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottom &amp; Top 20%</td>
<td>438</td>
<td>110.50</td>
<td>110.50</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bottom &amp; Top 40%</td>
<td>872</td>
<td>281.28</td>
<td>278.72</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Median</td>
<td>1,080</td>
<td>270.50</td>
<td>268.50</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Panel B.** Expected Frequency (%)

---

*Yearly interim performance ranking is conducted at the end of June. We mark June as the period where most fund performance results for first half of the year (Jan-June) are released in the press media.

*Leaders and Laggards are ranked by median

*Low and High SAS are ranked by SAS fractile that constitute bottom & top 20%, bottom & top 40% and below & above median.

The observed frequencies in % are shown in parentheses next to the observations in unit.
Table 6.3 Frequency distribution for style alteration spread (SAS) and leader/laggard rank-order interaction in segment tournament

This table reports actual investment style alteration behavior in fund managers as a result of interim performance rank-order against other fund managers in the market segment—equity funds of similar investment style. This study establishes the actual style drift behavior by on controlling for unintentional drift, under which, we isolates some key extraneous influences, for example, stock price appreciation and changes at different points in time. Subgroups of cross-sectional mid-year leaders and laggards based on fund’s relative rank are created using Daniel, Grinblatt, Titman, and Wermers (1997) holdings-based fund returns. A (6,6) specification is used to represent first and second half of each calendar year in our tournament related style drift, which is a 6-month window from January, following Brown, Harlow and Starks (1996) methodology. Analysis is based on 3 different measures for style alteration decision to ensure our results are not biased by a single definition. Low and High SAS are fractile-based: (1) bottom and top 20 per cent, (2) bottom and top 40 per cent and (3) below and above median value of SAS. Finally, variables are cross-tabulated for SAS and laggards/leaders in a 2 x 2 classification method and the strategic interaction in each cell frequency are examined. Using Chi-square ($X^2$) statistics, this study tests whether the observed frequencies are significantly different from the expectations. The $p$-values indicate the significance of the relationship across the contingency table at 90 per cent, 95 per cent and 99 per cent confidence level.

<table>
<thead>
<tr>
<th>Style Alteration Spread (SAS) Ranked by Fractile</th>
<th>Number of funds</th>
<th>Low Returns (Laggards)$^a$</th>
<th>High Returns (Leaders)$^b$</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>
| Bottom & Top 20%                             | 440            | 123 (27.95)                 | 103 (23.41)                 | 97 (22.05)     | 117 (26.59)    | 3.64           | 0.06
| Bottom & Top 40%                             | 880            | 235 (26.70)                 | 206 (23.41)                 | 205 (23.30)    | 234 (26.59)    | 3.82           | 0.05
| Median                                       | 1,088          | 286 (26.29)                 | 257 (23.62)                 | 258 (23.71)    | 287 (26.38)    | 3.09           | 0.08

Panel A. Observed Frequency (unit)

<table>
<thead>
<tr>
<th>Style Alteration Spread (SAS) Ranked by Fractile</th>
<th>Number of funds</th>
<th>Low Returns (Laggards)$^a$</th>
<th>High Returns (Leaders)$^b$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottom &amp; Top 20%</td>
<td>440</td>
<td>113.00</td>
<td>113.00</td>
</tr>
<tr>
<td>Bottom &amp; Top 40%</td>
<td>880</td>
<td>220.50</td>
<td>220.50</td>
</tr>
<tr>
<td>Median</td>
<td>1,088</td>
<td>271.50</td>
<td>271.50</td>
</tr>
</tbody>
</table>

Panel B. Expected Frequency (%)

\(^a\)Yearly interim performance ranking is conducted at the end of June. We mark June as the period where most fund performance results for first half of the year (Jan-June) are released in the press media.

\(^b\)Leaders and Laggards are ranked by median

\(^c\)Low and High SAS are ranked by SAS fractile that constitute bottom & top 20%, bottom & top 40% and below & above median.

The observed frequencies in % are shown in parentheses next to the observations in unit.

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6.7.4 Style alteration pattern in family tournament

We analyze whether fund managers also compete for higher rank position within their own respective FMC by testing the impact of relative-family rank-order on fund managers’ style alteration behavior. We conduct a rank-of-rank family tournament using fund managers’ segment-rank so that funds of different investment styles within the same FMC are comparable.

Table 6.4 shows how relative performance of fund managers within a FMC affects a fund’s investment style in this 2-stage tournament. We make an interesting discovery that fund managers do not compete within their own FMCs. As Panel A demonstrates, fund managers appear to alter investment style in response to relative-family rank but none of these strategic moves are statistically significant. Results remain unchanged in all the 3 SAS classifications, defined using fractile and median-based measures.

This result can be explained by the fact that any increase in AUM from new fund inflows, and therefore the potential increase in manager’s compensation comes from the bonus pool of the same FMC for distribution, thus there is little to gain from intra-FMC competition.
Table 6.4 Frequency distribution for style alteration spread (SAS) and leader/laggard rank-order interaction in family tournament

This table reports actual investment style alteration behavior in fund managers as a result of interim performance rank-order against other fund managers within the FMC. This study controls for unintentional drift by isolating some key extraneous influences, for example, stock price appreciation and changes at different points in time. Analysis uses fund managers’ performance in the segment market, also known as rank-of-rank in our relative-family rank system so that performance of funds with different fund objectives are comparable within the FMC (Kempf and Ruenzi, 2008). Next, subgroups of cross-sectional mid-year leaders and laggards are created based on fund’s relative rank using Daniel, Grinblatt, Titman, and Wermers (1997) holdings-based fund returns. A (6,6) specification is used to represent first and second half of each calendar year in our tournament related style drift study, which is a 6-month window from January. 3 different measures for fund manager’s style alteration decisions are considered to ensure our results are not biased by a single definition. Low and High SAS are fractile-based: (1) bottom and top 20 per cent, (2) bottom and top 40 per cent and (3) below and above median value of SAS. Finally, the variables are cross-tabulated for SAS and laggards/leaders in a 2 x 2 classification method and the strategic interaction in each cell frequency are examined. Using Chi-square (X²) statistics, this study tests whether the observed frequencies are significantly different from the expectations. The p-values indicate the significance of the relationship across the contingency table at 90 per cent, 95 per cent and 99 per cent confidence level.

<table>
<thead>
<tr>
<th>Style Alteration Spread (SAS) Ranked by Fractile</th>
<th>Number of funds</th>
<th>Low Returns (Laggards)</th>
<th>High Returns (Leaders)</th>
<th>X²</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottom &amp; Top 20%</td>
<td>385</td>
<td>109 (28.31)</td>
<td>101 (26.23)</td>
<td>84 (21.82)</td>
<td>91 (28.64)</td>
</tr>
<tr>
<td>Bottom &amp; Top 40%</td>
<td>770</td>
<td>203 (26.36)</td>
<td>188 (24.42)</td>
<td>186 (24.16)</td>
<td>193 (25.06)</td>
</tr>
<tr>
<td>Median</td>
<td>949</td>
<td>251 (26.45)</td>
<td>229 (24.13)</td>
<td>233 (24.55)</td>
<td>236 (24.87)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assessment Period (6,6)a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel A. Observed Frequency (unit)</td>
</tr>
<tr>
<td>Low Returns (Laggards)b</td>
</tr>
<tr>
<td>High Returns (Leaders)b</td>
</tr>
<tr>
<td>X²</td>
</tr>
<tr>
<td>385</td>
</tr>
<tr>
<td>770</td>
</tr>
<tr>
<td>949</td>
</tr>
</tbody>
</table>

| Panel B. Expected Frequency (%) |

Notes:
aYearly interim performance ranking is conducted at the end of June. We mark June as the period where most fund performance results for first half of the year (Jan-June) are released in the press media.
bLeaders and Laggards are ranked by median.
cLow and High SAS are ranked by SAS fractile that constitute bottom & top 20%, bottom & top 40% and below & above median.
The observed frequencies in % are shown in parentheses next to the observations in unit.
6.7.5 Style alteration tendency: inter- or intra-FMC tournament

We now examine the extent of style alteration behavior in all the 3 tournament situations illustrated above in Sections 6.7.1, 6.7.2 and 6.7.3 to determine whether these results differ between inter-FMC (“externally”) and intra-FMC (“internally”). Inter-FMC (Intra-FMC) competition is characterised by universe and segment (family) tournaments.

It is clear that fund managers compete externally for top rank by calendar-year end that could reward them with substantial net inflows, leading to a higher total compensation. Results in Table 6.2 and Table 6.3 show that fund managers tend to enhance their relative position in the overall Chinese fund market as the amount of new capital in the (aggregate) universe market is potentially larger than the segment market. In contrast, the relationship between relative rank-order and style alteration spread in the family tournament is weaker as illustrated in Table 6.4. Our findings support our prediction that inter-FMC tournament is more pronounced than intra-FMC tournament as the larger investor pool in the universe and segment fund markets induce fund managers to compete more intensively through style drift to maximize net inflows under the distortive “AUM-dominated” compensation model. The findings in this subsection confirm that inter-FMC tournament is more pronounced than intra-FMC tournament under the distortive “AUM-dominated” incentive model, which support hypothesis 3c of this thesis.
Table 6.5 Sensitivity checks on the frequency distribution for style alteration redefined (SAR) and leader/laggard rank-order interaction in all tournaments

This table reports the sensitive checks for the relationship between investment style alteration behavior in fund managers and interim performance rank-order against other fund managers in the universe, segment and family settings. The style deviation and tournament methodology remains the same except that now, the robust test adopts a different metric for the SAS variable. Style alteration redefined (“SAR”) is expressed as \( vFSR_{iy}^{(2)} - vFSR_{iy}^{(1)} \), representing the degree standard deviation of fund manager \( i \) style orientation in second part of the year \( y \). Using \( \chi^2 \) statistics, we test whether the observed frequencies are significantly different from the expectations. The \( p \)-values indicate the significance of the relationship between SAR and mid-year Leader/Laggard Rank-Order across the contingency table at 90 per cent, 95 per cent and 99 per cent confidence level.

<table>
<thead>
<tr>
<th>Style Alteration Redefined (SAR) Ranked by Fractile</th>
<th>Number of funds</th>
<th>Low Returns (Laggards)(^b)</th>
<th>High Returns (Leaders)(^b)</th>
<th>( \chi^2 )</th>
<th>( p )-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Low SAR(^c)</td>
<td>High SAR</td>
<td>Low SAR</td>
<td>High SAR</td>
</tr>
<tr>
<td>Bottom &amp; Top 20%</td>
<td>438</td>
<td>128 (29.22)</td>
<td>101 (23.06)</td>
<td>91 (20.78)</td>
<td>118 (26.94)</td>
</tr>
<tr>
<td>Bottom &amp; Top 40%</td>
<td>872</td>
<td>240 (27.52)</td>
<td>198 (22.71)</td>
<td>198 (22.71)</td>
<td>236 (27.06)</td>
</tr>
<tr>
<td>Median</td>
<td>1,080</td>
<td>291 (26.94)</td>
<td>250 (23.15)</td>
<td>251 (23.24)</td>
<td>288 (26.67)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low SAR(^c)</td>
<td>High SAR</td>
<td>Low SAR</td>
<td>High SAR</td>
</tr>
<tr>
<td>Bottom &amp; Top 20%</td>
<td>440</td>
<td>125 (28.41)</td>
<td>108 (24.55)</td>
<td>95 (21.59)</td>
<td>112 (25.45)</td>
</tr>
<tr>
<td>Bottom &amp; Top 40%</td>
<td>880</td>
<td>236 (26.82)</td>
<td>207 (23.52)</td>
<td>204 (23.18)</td>
<td>233 (26.48)</td>
</tr>
<tr>
<td>Median</td>
<td>1,088</td>
<td>286 (26.29)</td>
<td>259 (23.81)</td>
<td>258 (23.71)</td>
<td>285 (26.19)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low SAR(^c)</td>
<td>High SAR</td>
<td>Low SAR</td>
<td>High SAR</td>
</tr>
<tr>
<td>Bottom &amp; Top 20%</td>
<td>385</td>
<td>110 (28.57)</td>
<td>103 (26.75)</td>
<td>85 (22.08)</td>
<td>87 (22.60)</td>
</tr>
<tr>
<td>Bottom &amp; Top 40%</td>
<td>767</td>
<td>203 (26.47)</td>
<td>188 (24.51)</td>
<td>185 (24.12)</td>
<td>191 (24.90)</td>
</tr>
<tr>
<td>Median</td>
<td>950</td>
<td>248 (26.11)</td>
<td>234 (24.63)</td>
<td>233 (24.53)</td>
<td>235 (24.74)</td>
</tr>
</tbody>
</table>

\( ^a \)Yearly interim performance ranking is conducted at the end of June. We mark June as the period where most fund performance results for first half of the year (Jan-June) are released in the press media.

\( ^b \)Leaders and Laggards are ranked by median.

\( ^c \)Low and High SAR are ranked by SAR fractile that constitute bottom & top 20%, bottom & top 40% and below & above median. The observed frequencies in % are shown in parentheses next to the observations in unit.
6.7.6 Robustness tests

6.7.6.1 Alternative style alteration definition

In Section 6.5.1., the measure for fund managers’ actual style alteration behavior (“SAS”) in the tournament process is constructed by subtracting a fund’s style volatility in the second half of each calendar year \( y \) from the first half. To check the robustness of the main results that uses a SAS measure, an alternative measure—SAR is considered. SAR measures the degree of style deviation in the second half of the year, expressed as a fraction of the style deviation in the second half of each calendar year \( y \):

\[
\text{Style Alteration Redefined (SAR}_{iy}) = \frac{\nu FSP_{iy}^{(2)}}{\nu FSP_{iy}^{(1)}}
\]

(6.5)

where \( \nu FSP_{iy}^{(1)} \) (\( \nu FSP_{iy}^{(2)} \)) is the style deviation representing the equally weighted standard deviation of fund manager \( i \) style orientation in first (second) part of the year \( y \).

Panel A, B and C in Table 6.5 present the sensitivity test results on our main empirical findings in universe, segment and family tournaments, respectively. Clearly, the results are consistent with and similar to our main findings, in that, Chinese fund managers participate in yearly tournament by strategically altering funds’ investment style in response to their mid-year performance against peers. Likewise, the results show that fund managers tend to alter their investment style more significantly in inter-FMC tournament, particularly in the universe equity fund market.
6.7.6.2 Fund characteristics and style alteration

We also test whether fund characteristics such as size and age will influence fund managers’ tendency to alter fund style following the release of mid-year performance results relative to peers. For brevity, the key findings are highlighted without tables here. We find that funds strategically alter investment style during tournaments and such a behavior persists when fund competes in universe equity fund market, and is particularly stronger in large funds (statistically significant irrespective of 20, 40, median SAS fractiles) than small funds at $\alpha = 0.1$ (only significant for 20 per cent SAS fractile). More specifically, the observed frequency is higher (34 per cent) in mid-year “large” leaders in the second half of the assessment year. In contrast, we only observe 23 per cent from “small” leading funds. Similarly, there is strong evidence for drift behavior in entrenched funds (or “old” funds defined as number of years since inception below the median age value for year $i$) in universe tournament at $\alpha = 0.01$. Whereas fund style alteration pattern in newer funds is less significant, typically in segment tournament, at $\alpha = 0.1$. We also find that these large and old funds tend to compete in the segment tournament setting although results are weaker. Similar to our results in Section 6.7.5, family tournaments are statistically insignificant.

The implication from the analysis of the evidence we have uncovered is that large and entrenched leading fund managers competing in the universe equity fund market have greater incentive to secure their interim winning stakes as it can cast a larger impact on their expected compensation given the sizable AUM of large funds.

127 We use annual mid-year total net assets reported for each fund as a proxy for fund size. We define “small” (“large”) as funds’ assets above (below) the median total net assets value for year $i$. Alternatively, we use total assets in place of total net assets and we still find that leaders in large funds have higher incentive to alter fund style in the second half of each assessment year $i$. SAS—our central measurement for style alteration is used in the robust testing. Results are estimated using contingency table analysis with chi-square statistics.
Because large fund managers are more likely to experience difficulty in outperforming peers (Berk and Green, 2004), they have to find more investment opportunities to improve performance for new fund inflows to maximize year-end bonuses (Pollet and Wilson, 2008). Therefore, large funds have stronger incentive for style drift to avoid the threat of a shrinking compensation.

6.8 Conclusion

Style drift can lead to fund misclassification and the consequently altered risk-return profile can weaken market integrity and impedes the efficient functioning of the capital market. Kim, Shukla, and Thomas (2000); Brown and Harlow (2002); Holmes and Faff, (2007, 2008); Wermers (2012); and Brown, Harlow, and Zhang (2012) find that style drift is costly for fund investor because fund returns are eroded by high turnover rates and poorly timed market and thus, such a practice may create additional agency conflict between “in-house” fund managers and fund investors (Chen, Hong, Jiang, and Kubik, 2013). Although style drift have been a common subject of investigation in the literature, no study has investigated with empirical evidence the source of this agency problem. This chapter examines and empirically tests the hypothesis that active fund managers in pursuit of maximizing total compensation will intentionally increase risk taking by altering their investment style via a novel adaptation and extension of Taylor’s (2003) tournament theory.

We create an original fund classification system on the basis of a more granular stock-level style drift analytical approach that defines clearly the fundamental characteristics of each stocks in every Chinese mutual funds at each reporting periods which we used to map 180,000 portfolio units in 274 open-end equity funds’ holdings. Our new empirical strategy which produces 18,600 fund-year drift observations allows us to uncover new evidence on the presence and the driver of
style drift in the emerging Chinese fund market with the unique institutional setting of having only in-house managers for the actively managed equity fund market.

Our study produces several discoveries with new evidence. First, we show that style drift is present in open-end equity funds in China. Second, we find that fund managers in their pursuit of maximizing compensation, strategically alter their investment style relative to mid-year rank order to improve performance ranking. Our finding on the motivational link to the risk-taking behavior of style drift empirically supports Taylor’s (2003) theoretical predictions with empirical evidence of our study for the first time in the literature, and our further tests confirm that style drift is indeed incentivized by the expected positive net-inflows. Third, fund managers compete more intensely for inflows through inter-fund company rank-order than within fund family rank, and is more prominent in large-entrenched funds. Finally, our results are robust to fund size, various assessment periods and different style drift definitions defined by fractile rank.

This thesis contributes to deeper understanding of the intentional risk taking in the form of style drift, a topic which is important yet hardly researched in the finance and mutual fund literature. First, our results show that style drift behavior stems from the misalignment of interests between fund investors and fund managers under the distortive AUM-dominated compensation model, in which fund managers alter fund style to chase after higher relative ranking-order to raise AUM. Second, our evidence confirms that style drift practice is incentivised by the anticipated positive association with net inflows. Third, this study addresses the methodological shortcomings (Brown, Harlow and Starks, 1996) in traditional tournament studies by controlling for unintentional risk behavior in our style drift results. We use a granular holdings-based approach with a more intricate measure of fund’s intentional risk taking in respect of
investment style changes rather than the returns-based method which is commonly adopted in many tournament studies. Our approach has two important implications in explaining active in-house fund’s risk behavior: (1) we control for market factors that can contribute to “unintentional” actions by fund managers, and so our findings that an increase in risk taking in funds such as engaging in style drift during tournaments are directly attributed to fund manager’s intention (2) our study complements Chen, Hong, Jiang, and Kubik (2013) study by showing how and why intentional risk taking occurs within an exclusively in-house fund management setting. Fourth, we extend the scope of prior studies and offer a more comprehensive analytical framework by introducing a new FMC-wide ranking effect by means of “universe-relative” tournament in assessing the extent of compensation maximization in the equity fund market, in addition to segment (Brown, Harlow and Starks, 1996) and family fund environments (Kempf and Ruenzi, 2008). Lastly, our results provide an alternative explanation for the inverse relation between style drift and fund performance in Chapter 5, in which we question why style drift managers, in general, pick inferior stocks when their compensation is sensitive to relative rank. Here, in Chapter 6, our results show that managers who drift, focus too much on short term results in their attempt to beat peers to maximize year end compensation. Under this short-termism outlook, fund managers may not devote the needed time and resources to properly evaluate the qualities of stocks since stocks will not be held for the long term. The result is therefore likely to be poorer stock picking outcomes.

In summary, this study also highlights the potential danger of AUM-linked fee-based tournament incentives, indicating a need to better manage the misalignment of fund manager-fund investor interests when the usual assumption of risk taking by fund returns/beta approach does not adequately explain fund manager’s behavior.
CHAPTER 7. CONCLUSION

7.1 Introduction

Persistent style drift, often escaped from public scrutiny, can lead to fund misclassification and weakens market integrity over time. The fund’s altered risk-return profile not only poses increased risk for investors, in respect of uncalculated risk exposure and inefficient performance evaluation, it also heightens information asymmetry and creates negative externalities for the financial markets. Despite the fact that fund manager’s AUM-based compensation can create risk-taking incentives and promote opportunistic behaviors, no study investigates the root of style drift behavioral problem.128 This thesis is the first integrated study to address the issues of style drift with a methodically integrated scope of investigation. Employing novel empirical approach and metrics, the investigations undertaken in the thesis establish principles and model to detect the presence and patterns of style drift in China’s mutual fund market, and produce several discoveries with new evidence on the underlying motives and performance consequences of funds’ intentional style drift in the country’s fund market.

This chapter is structured as follows. Section 7.2 highlights the major arguments and theoretical reasonings which help to develop the framework to explore and answer the key research questions. Within the same section, key findings of the thesis are also summarized. Section 7.3 details how the findings of the thesis contribute to the growing body of relevant literatures. Section 7.4 discusses the

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128 Style drift has not gained much academic interest notwithstanding the rising public concern. In a recent press article (Financial Times, 2017), media express disappointment for the large record of 64 per cent of U.S. active funds not adhering to investment objectives in the prospectus—known as style drift—and 40 per cent of U.S. funds received early termination due to underperformance.
research limitations, how further studies can evolve, and identifies possible avenues for future research.

7.2 **Research Framework and Major Findings**

One of the key contributions of this thesis is that it adds new insights to the extant literature by developing alternative and novel metrics, and new analytical strategies to quantify fund manager’s voluntary and intentional risk taking in response to the criticisms of prior studies that most of them infer a fund manager’s risk actions from fund returns volatility without directly capturing her actual investment decision behavioral process. Using a more granular and innovative analytical approach, we effectively and precisely measure the intentional risk-taking behavior of actively managed funds in the form of style drift by uncovering evidence from the fast growing but rarely researched fund industry with only in-house managers in China.

The main objective of this thesis is to address the dynamics and consequence of the additional and undetected risk taking associated with style drift behavior, and particularly, responding to the following critical questions that are rarely mentioned in the finance literature.

- Is there a tendency for fund managers to deviate from their mandated investment style to result in mutual fund style drift in China’s context? (Chapter 4)
- How do we accurately detect style drift behavior that is directly attributed to fund manager’s intention to seek risk? (Chapter 4)
- If style drift is prevalent, does the practice produce any extra benefit to fund investor’s wealth? (Chapter 5)
- What are the sources of benefit and harm on fund returns associated with style drift? (Chapter 5)
What motivates style drift? Is style drift associated with AUM-based compensation scheme in which drift managers are motivated to capture the additional fund inflows to increase asset base to maximize compensation? (Chapter 6)

If pursuing larger fund inflow has an incentive effect on style drift, how do fund managers strategically engage in style drift to compete for higher performance rank-order to maximize their compensation? (Chapter 6)

How do relative rank-order within fund family (FMC in China) and across universe funds drive manager’s intention to alter investment style? (Chapter 6)

By going beyond the scope of conventional analysis, this thesis aims to help deeper understanding by integrating the studies of the cause and consequence of the increasing practice of risky fund investment decisions that are not in line with fund investors’ interests.

We examine the unique aspects of the mutual fund industry in China, including the structure of in-house fund management organization, its external and internal governance mechanisms to assess the tendency of style drift. On the basis of the country’s regulatory policies, and the literatures on agency and tournament theories (in Chapter 2 and 3 respectively), we identify that Chinese fund managers are likely to be more inclined to risk taking. The unique exclusively in-house fund management organization framework in China, within which the distortionary “lower-powered” incentive generated by in-house funds is likely to make the Chinese fund market more susceptible of style drift behavior. We therefore conjecture that this behavior can be exacerbated by the ineffectual internal and external governance mechanisms and AUM-based compensation policies, thus creating strong short-term risk taking incentives to maximize bonus payment.
To conceptualize the detection of style drift, and explain its existence and performance consequences, this thesis develops an integrated style drift framework for a thorough stock level analysis by building on the holdings-based methodology of Daniel, Grinblatt, Titman, and Wermers (1997). As highlighted in the literature, style analysis using returns-based approach can produce inconsistent results in certain research context. Clearly in the case of Chinese fund market, we show in this study that a holdings-based style methodology is more appropriate for diagnosing a fund’s actual investment style, and capture the presence of style drift on account of a fine grained stock by stock portfolio allocation analysis (Chapter 4). Our new style drift volatility metrics also aim to uncover evidence on what drives fund manager’s intent\textsuperscript{129} to seek risk and engage in style drift (Chapter 6). We reprocess the raw stocks and fund data collected from WIND as detailed in Chapter 4, to create a novel yearly style index (“characteristics-sorted style index”) not just as a system for classifying fund styles but also to ensure that the actual investment style of a fund is identified through highly consistent definitions. Because appropriate style indexes are generally lacking in China, our characteristics-sorted style index computed from 3,000 universe of investible Chinese stocks provides a more precise benchmark for the evaluation of fund performance and performance gap between drift and dedicated funds in particular (Chapter 5).

We first diagnose the actual implemented investment style (Chapter 4) of a fund by manually mapping against every 180,000 stock units in 274 open-end equity funds’ holdings against our yearly style index. Our holdings-based style analysis shows that majority of the funds are misclassified as managers tend to pick stocks that have different size and BE/ME characteristics from the declared investment objective.

\textsuperscript{129} Unlike literature on risk taking that often defines risk action as the tendency of a mutual fund’s returns by measuring the volatility in fund prices, we focus on fund’s trading activities.
Next, we employ a different voluntary style drift (vFSF) evaluation framework to test how well fund managers adhere to the investment strategy in the fund mandate over a period of time. The advantage of our weight-based vFSF metrics on the basis of stock units instead of stock market value is that, our results are directly isolated from key extraneous influence, for example, stock price appreciation at different points in time. To measure the presence of style drift, we develop the notion of style drift by means of fractile-based definitions. In this thesis, style drift (style dedicated) is defined as funds representing the top (bottom) 5 per cent vFSF rank fractile.

Our results confirm that style drift is evident in Chinese equity funds and that style drift is a common practice in the mutual fund market. This finding is consistent with the holdings-based style drift studies on U.S. mutual funds (Brown, Harlow, and Zhang, 2012, and Wermers, 2012). Our results remain statistically robust to sub-periods assessment and alternative “style drift” fractile-based notions within the vFSF percentile range of 10 and 20. We also conduct additional analysis using a returns-based “tracking error”130 (TE) measure in place of our holdings-based style drift metrics. TE results affirm that style drift is prevalent in equity mutual funds in China. Notably, our TE results also suggest that style drift fund portfolio is riskier than style dedicated funds, in terms of meeting fund investor’s expected investment outcome. When fund managers engage in style drift, portfolio risks are thus increased.

The debate that increase in risk taking in the form of style drift enhances fund performance remains controversial in the finance literature. Despite the inconclusive evidence, it is generally conceded in the style drift studies on U.S. funds that the behavior leads to poor fund performance through excessive trading costs.

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130 TE tracks the deviation of manager’s actual investment style from the style benchmark represented by their declared investment objective in the prospectus over the period under investigation. We use weighted-average fund returns based on portfolio holdings.
unsuccessful market timing outcome, and particularly when risk changes are motivated by personal monetary incentives. The thesis focuses on appraising a fund manager’s ability to enhance fund returns in the forms of stock selection, market timing, average style and trading costs using Daniel, Grinblatt, Titman, and Wermers (1997) holdings-based approach discussed in Chapter 5. Much of the existing fund performance evidence focuses on the expected monetary returns of funds with only a few studies analyze fund manager’s actual ability to deliver. Unlike Wermers (2000), we conduct a comparative analysis by decomposing fund returns and costs into finer components to explain the performance gap between style drift and style dedicated funds. In our study, fund returns are benchmarked against the unique 125 characteristics-sorted style portfolios developed in Chapter 4, and are thus risk-adjusted so that merits are not given to fund manager for taking opportunistic risk-premiums across stocks with characteristics deviating from fund’s stated investment style.

In Chapter 5, the analysis finds strong evidence of style drift funds reducing fund returns compared with peers of similar declared investment style, in line with findings on U.S. mutual funds by Brown, Harlow, and Zhang (2012) who also adopt the holdings-based approach of Daniel, Grinblatt, Titman, and Wermers (1997); and a more recent study by Cao, Iliev, and Velthuis (2017). Net performance gap between style drift and style dedicated funds across most deciles is significantly large. We find that drift funds produce consistent negative returns due to stocks picking and market timing. Because style drift funds tend to trade in and out of investment styles, average style returns are significantly lower. On the other hand, the stronger tendency for short interval trading has rendered style drift funds to incur considerable trading costs and higher brokerage and commission fees. On average, operating expenses are also
lower in dedicated funds compared to funds that drift. Our evidence supports our proposition that the ability of a fund manager to maintain a consistent investment style is a valuable skill in the marketplace as it adds extra benefit to fund investor’s wealth. Notably, our results provide an alternative explanation for the inverse relation between style drift and performance by showing that the active pursuit of short-term outperformance in drift funds affects manager’s ability to deliver optimal returns, rather than attributing performance to the success of drift strategy within size, value, growth and momentum style dimensions that offers inconclusive evidence within the same research context in the U.S. mutual fund market.

We also conduct a preliminary analysis in Chapter 5, to find out why style drift managers, in general, pick inferior stocks and engage in (widely conceded) ineffective market timing strategy when poor performance could affect their compensation. We find that drift funds indeed may succeed in gaming their investment style to achieve higher relative rank and this short term result will benefit winning managers because they are rewarded with bigger compensation payout at year end, including cash bonus of considerable size. Our analysis has 2 important implications. First, it suggests that style drift weakens the efficacy of performance evaluation as fund investors are generally unaware of this practice and the consequent undetected change in the risk-return profile of the fund and the harmful ramifications. Second, drift managers may make use of this distortive performance rank system to maximize compensation because a higher \textit{ex post} relative rank attract larger fund inflows.

\footnote{Wermers (2012) finds that drift funds are better at picking momentum stocks but his evidence is refuted by the study on U.S. funds by Brown, Harlow, and Zhang (2012). Brown, Harlow, and Zhang (2012) find that momentum drift explanation on the correlation between style drift and fund performance is weak. Although Brown’s study does not provide breakdowns of fund manager’s stock picking skill, the relationship between fund performance and active style drift remains negative after considering all the possible differential effects of style volatility with respect to size, value and growth, and momentum characteristics on performance.}
As discussed in Chapter 6, prior studies often assume that style drift is related to agency issues arising from fund manager’s desire to outperform peers to maximize compensation. Although style drift can successfully manipulate performance rank, there is no prior empirical evidence on whether the strategical adjustment of fund risk by changing investment style is motivated by net-inflows. If the motivational link between style drift and fund inflows is supported, we would then establish a firm evidence-based analytical basis to expect fund managers to compete for higher relative performance ranking by altering portfolio allocation and the tendency to drift will be affected by manager’s expected compensation.

In Chapter 6, we test whether the new cash inflows provide fund managers the financial incentives to increase risk taking through style drift. Our results show that style drift increases a fund’s net inflows, affirming that fund manager’s motivation to maximize inflows to increase compensation through style drift. This findings also highlight the issue of a distortive relative rank-order system where drifted funds are in practice incorrectly ranked within the original fund category (as shown in Chapter 5) thus resulting in a possible higher relative position that enhances fund inflows.

We further empirically test the hypothesis that active fund managers in pursuit of maximizing total compensation will intentionally increase risk taking by altering their investment style via a novel extension of Taylor (2003) tournament theory. Specifically, we examine how fund managers adjust their investment styles strategically in response to their interim performance position relative to other fund managers under 3 tournament situations denoted by universe-, segment- and family-relative rank systems. The analysis supports our conjecture that style drift is a result of tournament activities of fund managers who are motivated by seeking higher AUM-based compensation. The economic incentives arising from fund manager’s
AUM dominated compensation structure drive them to engage in style drift in an attempt to outperform fund peers to become top ranked fund. We discover a significant difference in the degree of investment style alteration between the interim leaders and interim laggard, which empirically supports Taylor (2003)’s fund tournament theory. We find that investment style in interim fund leaders (laggards) tend to deviate more (less) from fund mandate in the subsequent calendar-year period.

We extend our analysis to further unveil the motivational link of style drift by testing the magnitude of investment style alteration in leaders funds between “inter-FMC” (universe-, segment-relative rank system) and “intra-FMC” (family-relative rank system) in view of the fact that any increase in AUM from new fund inflows will potentially increase the bonus pool of the same FMC that is used for manager’s compensation payout. We find that inter-FMC tournament is more pronounced than intra-FMC tournament as the larger investor pool in the universe and segment fund markets induces fund managers to compete more intensively through style drift to maximize net inflows under the distortive “AUM-dominated” compensation model.

Finally, these style drift-tournament results suggest that short-termism is potentially a root cause for weaker returns in style drift funds as managers may sacrifice quality information for their desire to bet on short-term returns.

### 7.3 Research Contributions and Implications

This thesis contributes to the literature by making the most comprehensive attempt to the best of our knowledge at addressing the key theoretical and empirical issues in respect of mutual funds’ undetected risk taking associated with style drift behavior, with special reference to a fast growing in-house fund management industry in China. By investigating the actual practice of risk taking in actively managed equity funds, our study deepens the understanding of the role of in-house fund management
organization in shaping the motivation and performance of mutual fund managers in meeting their benchmark, an area that has received limited attention in the literature (Chen, Hong, Jiang and Kubik, 2013). Despite that style drift is found to be extensively practiced in developed economies, no study has analyzed its root causes and our results contribute to the literature by showing the implications of the risk-taking incentives generated by AUM-based compensation on the tendency and motivation for style drift.

Instead of assuming that style drift is driven by fund manager’s desire to outperform peers to maximize compensation (Brown and Goetzmann, 1997) without evidence on the effect of style drift on new inflows, we show, for the first time, that style drift is incentivized by the expected positive net-inflows. In the context of in-house funds, we discover that fund managers alter fund style to chase after higher relative rank-order to raise AUM. To maximize compensation, managers are found to alter fund style to compete for a larger pool of investor through inter-fund company rank tournament than within fund family rank.

Our studies contribute new insights beyond the conventional notion of risk taking in the mutual fund literature that usually measures risk by fund returns. Most prior studies on mutual fund risk do not capture the actual fund portfolio alteration and volatility but indirectly infer fund manager’s risk actions from fund returns volatility. In contrast, this thesis attempts to present a fuller picture and better understanding of how fund manager’s investment decision process in portfolio style allocations contributes to excessive risk taking. We use a novel measure of manager’s risk intention on the basis of actual portfolio stock units rather than the stock price commonly adopted in previous studies on style drift (Wermers, 2012, and Brown, Harlow, and Zhang, 2012). Our study further adopts a more rigorous approach to
include the use of absolute fund costs in our analysis to avoid potential measurement bias. Chakrabarty, Moulton, and Trzcinka (2016) report that portfolio turnover as a proxy for trading cost can be unreliable. Our new methodical framework provides concrete evidence to substantiate the theoretical argument by Chen, Hong, Jiang, and Kubik (2013) about the high levels of risk taking within fund organization with internally managed funds. We present new perspective on the actual risk actions of fund managers to produce a more precise\(^\text{132}\) risk assessment on the intentional risk behavior of in-house managed funds. Notably, we document that short-termism is the root cause for weaker stock picking returns in style drift funds as managers may sacrifice quality information for their desire to bet on short term returns. In the same vein, the rampant attitude of excessive short-termism in fund management engenders unproductive returns through the exploitative effects of market timing, consistently buying expensive stocks and excessive trading costs. As we have shown in our analysis, funds taking greater risk through higher level of style volatility rather than following the mandated style can interfere with fund manager’s ability to deliver productive fund returns. In a nutshell, agency-motivated style drift behavior harms fund’s investment outcomes.

This thesis casts new light on why the ability of a fund manager to maintain a consistent investment style is important and a skill that should be valued in the marketplace. While related style drift studies focus on testing the link between style drift and fund performance, and quantify the impact of stock selection, market timing and trading costs on investor’s wealth, we are concerned with the excess returns earned by fund that tends to hold stocks within a particular style for a long time.

\(^{132}\) Whereas Chen, Hong, Jiang, and Kubik (2013) and most studies do not directly measure fund manager’s risk taking actions in practice, we try to directly attribute risk-taking behavior by using fund manager’s stock by stock trading.
(measuring by average style returns), and also in addition to the conventional measures. This focus is relevant to our study as we expect funds to undertake a wide ranging asset allocation approach outside the declared investment style boundary in their attempt to beat peers to maximize year end compensation. In that context, funds may end up buying stocks that are already at their high (Daniel, Grinblatt, Titman, and Wermers, 1997), instead of profiting from mispriced stocks for short-term outperformance (Lo, 2004). Consistent with Brown, Harlow, and Zhang (2012) findings, we demonstrate that style dedication is more likely to contribute positively to a fund’s competitive advantages while style drift presents negative implications for fund performance and distortions to the mutual fund market.

Our findings highlight the importance of fund performance evaluation and getting the compensation structure right for fund managers so that the motivation for style drift can be addressed at its source. Our fund classification system and style drift metrics contribute to establishing some standards and methodology that can be applied by market participants (such as pension funds and insurance companies) and regulators to institute greater clarity and transparency regarding product (mutual funds) attributes to diminish the problem of information asymmetry. Improved transparency will benefit all market players in general by providing effective benchmarks for assessing the risk and returns of mutual funds.

To improve market transparency, we see a need for new disclosure regimes in response to the prevalence of fund manager’s opportunistic style drift behavior. Fund regulators in China and other jurisdictions should consider stronger disclosure requirements for mutual funds to more timely and fully report “hidden” costs in their
prospectus. Fund performance and portfolio turnover\textsuperscript{133} ratios are presently reported. However, if fund’s transaction costs relating to investment decisions taken by fund managers including trading costs and brokerage and commissions are presented alongside with net performance, the investing public can more intuitively judge whether fund’s risk-adjusted returns are optimal in the context of transaction costs.

On the other hand, manager compensation details such as salary banding across fund managers should be transparent to fund investors. Because industry players perceive salary details as "proprietary information", compensation information is often not disclosed to protect a company's commercial position (SMH, 2012). However, as shown in Chapter 6, greater transparency on fund manager compensation design and structure can enrich our knowledge of fund’s opportunistic behavior in correspond to the size of AUM-linked-bonus-pool which needs to be tailored to properly manage conflicts of interest given that AUM-linked-compensation has been found to encourage portfolio risk alteration through style drift.

Quarterly full disclosure on portfolio holdings should be legislated in most fund markets including China as it has been empirically observed that less frequent disclosure can lead to undesirable trading behaviors such as window dressing, assets gathering and tournaments in between reporting periods.

This thesis hopes that the discoveries it makes, and the issues it raises can help regulators and key stakeholders of the fund market to deal more effectively with the causes and impact of style drift for the development of a more transparent, honest and market-oriented fund market. We also hope that our study will encourage more research work on the mutual fund market, style drift and the development of a well-functioning fund market.

\textsuperscript{133} As discussed in Section 5.3.1, reported turnover ratio in the fund prospectus is not an accurate indication of fund’s actual trades according to (Chakrabarty, Moulton, and Trzcinka, 2016).
7.4 Limitations and Future Research

This thesis aims to address underexplored issues in relation to fund manager’s style drift behavior in active equity funds against the background of opportunism arising from the distortive AUM-linked-bonus compensation structure. Although this thesis endeavours to cover a broad range of key issues, the institutional, statutory and market conditions place some limits on the scope of the research. As the thesis centres on investigating equity fund manager’s style drift behavior, only actively managed open-end funds with at least 80 per cent of its total asset invested in Chinese stock market are included in the 3 integrated studies of this thesis. Passively managed equity funds such as Index funds, closed-end funds, ETFs are excluded. Although the findings are restricted to equity mutual funds, this thesis casts new and critical light on better understanding the cause and impacts of such manipulative behavior beyond stock-oriented equity funds, for example, bond funds, which also employ some form of style investing and are also categorized accordingly. Studying of bond funds could be a worthwhile subject of investigation, particularly on whether funds that are mandated to invest only in (high quality) investment grade corporate bonds are in practice overexposed to (low quality but higher returns) high-yield corporate bonds. Perhaps more importantly, our methodological approaches and evidence will be useful for adaptation, further improvements and development for undertaking investigations into the mutual fund markets in other jurisdictions.

While every effort has been made to ensure all empirical estimates established in the thesis are accurate and robust, they may be somewhat affected by the availability of data and market conditions in China. For instance, the thesis adopts holdings-based technique for research suitability and methodological advantages over returns-based analysis, however, stock holdings in the fund may be subject to
window-dressing by fund manager because FMCs only disclose full portfolio holdings of funds twice a year under Chinese regulations.

\[134\] A common criticism of HBA is that “stale” portfolio data tends to affect the accuracy of identifying a portfolio style when fund management companies do not report their portfolio composition as frequently as the availability of return pricing. However, Rekenthaler, Gambera, and Charlson (2006) find that HBA produces lower standard error in predicting current portfolio styles even if “non-current” 1-year portfolio holding is used. In contrast, RBA produces significantly weaker results in respect of correlation or absolute deviation using the same dataset.
REFERENCES


