The impact of corporate governance and managerial attributes on mutual funds' risk-taking, return and market share

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WORK NOT SUBMITTED ELSEWHERE FOR EXAMINATION

I hereby declare that this thesis has not been, and will not be, submitted in whole or in part to another University for the award of any other degree.

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UNIVERSITY OF SUSSEX
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DEGREE OF DOCTOR OF PHILOSOPHY

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Summary

This thesis examines the effect of board characteristics on mutual funds' risk-taking, return, and market share in the Chinese mutual fund industry, over the period of 2005 to 2015. The thesis investigates the impact of ownership structure on funds' return and market share in the Chinese mutual fund industry between 2005 and 2015. Moreover, the thesis examines the effect of fund managerial attributes on mutual fund performance, as proxied by efficiency and risk-adjusted return during the period from 2005 to 2013.

Firstly, this thesis is the first study to investigate the interplay between board characteristics and risk-taking behavior of Chinese mutual funds. Due to data limitation, we manage to collect manually the governance variables, for instance board size, board structure and gender. We adopt two different measurements of funds' risk-taking, namely funds' total risk and concentration risk. Larger board size leads to a lower stock concentration risk. A greater percentage of independent directors in a board are associated with a lower bond concentration risk. In addition, the representation of female directors on a board not only increases total risk, but also increases concentration risk.

Secondly, we manually assemble a unique dataset of Chinese fund management companies that identify ownership structure in the form of government ownership, foreign ownership and ownership concentration. This thesis provides unique information for examining the impact of ownership structure on Chinese mutual funds' return and market share. We provide evidence with panel estimation shows that the government ownership ratio and government-controlled companies have a positive effect on funds' return. Foreign ownership has a negative impact on funds' return and market share. Having a higher ownership concentration is more likely to increase the funds' market share, whereas government-controlled companies experience a negative impact on their market share.

Thirdly, this thesis is the first study to investigate the impact of fund managerial attributes on fund performance by considering the role of fund governance. Also, we use a comprehensive set of fund managerial attributes that incudes team management structure, manager's tenure and manager education. This research reveals that team-managed funds perform poorly relative to individual-managed funds. However, in the presence of a large number of supervisors on the board and a high proportion of institutional investors, team-managed fund structures generate superior returns compared to individual-managed fund structures. Moreover, we find that the risk-adjusted performance of fund managers with a longer tenure is attractive compared to these fund managers with a shorter tenure. Our results show that managers who hold Ph.D. degrees exhibit risk-adjusted performance superior to the performance of managers without Ph.D. degrees.

Finally, we provide conclusions together with some limitations of this research and a plan for a future work.

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Chapter 1: Introduction

This thesis examines the impact of board characteristics on funds' risk-taking behavior, return, and market share in the Chinese mutual fund industry over the period from 2005 to 2015. We assess the effect of ownership structure on funds' return and market share, during the period from 2005 to 2015. We also investigate the impact of fund managerial attributes on mutual fund performance, as estimated by efficiency and risk-adjusted return during the period from 2005 to 2013. The purpose of this section is to demonstrate the importance of mutual fund in the Chinese financial market and briefly show why it is important to investigate the impact of corporate governance on the funds' return and risk-taking.

Mutual funds, which named "unit trusts" in some countries, offer a more cost efficient means of diversification than small investors by pooling funds from different investors to maximize returns for a given level of risk. In addition, mutual funds play an important role in external governance mechanism by monitoring invested company's activities due to their large ownership stake and sophisticated investment skills (Morgan et al. 2011; Nain and Yao, 2013; Chan et al. 2014; Bi and Wang, 2015 and Liu et al. 2018)[1]. Therefore, we conclude that mutual funds provide two main benefits for small investors, namely the diversification of investment risks and the effective monitor on

[1] See Morgan et al. (2011) examine the role of mutual funds as corporate monitors by investigating the voting decisions on shareholder proposals. They find that mutual funds can effectively monitor the invested company's activities by supporting wealth-increasing proposals.
Chan et al. (2014) show that mutual funds can improve the financial reporting quality for the Chinese listed companies.
Liu et al. (2018) investigate the effect of institutional ownership on corporate transparency in public firms and find that mutual funds play a significant role in improving corporate transparency.

invested companies. In the meanwhile, mutual funds also play an essential role in the financial market. Shawky and Tian (2011) and Idzorek et al. (2012) indicate that mutual funds promote the stock market stability and activism by buying stocks with low liquidity and selling stocks with high liquidity. Aragon et al. (2019) show the importance of bond mutual funds in credit markets and find that bond mutual funds can improve the stability of credit markets during the financial crisis by selling the credit protection to bear counterparty risk.

Over the past three decades, China's capital market has experienced rapid growth and has become the second largest in the world, moving from a predominantly centrally planned economy towards a market-oriented economy. In 2005, the total mutual fund net assets were approximately $67 billion in China. As of 2015, China mutual fund industry managed more than $1.3 trillion in total net value for nearly 1.3 million households. This amount of total net assets is almost half of the total net assets in Asia mutual fund market, as Asia mutual funds total net assets were approximately $3.2 trillion. Moreover, the number of open-end mutual funds grew from approximately 300 to 2558 during the sample period from 2005 to 2015. Meanwhile, the average market share of fund management companies declined from 1.55% to 1.05%.

Furthermore, in China, mutual funds are managed by fund management companies which are sponsored by different financial institutions, for instance, banks and insurance companies. The China Securities Regulatory Commission (hereafter CSRC)[2] made a strategic decision to implement the rules of an establishment of joint venture fund management companies in 2002 in order to improve corporate governance and financial

[2] The China Securities Regulatory Commission (CSRC) is the central regulator of the securities industry in China, and its operations are similar in its charge to the SEC in the United States.

transparency in the mutual fund industry. These changes have allowed foreign institutions to invest in fund management companies which are controlled by government agencies. In light of this strategy, the number of fund management companies with a foreign investor has increased significantly to 46 at the end of 2015, accounting for almost half of fund management companies in the market. Hence, many more joint venture fund management companies are expected to come into China's financial market. Based on the explosive growth of mutual funds in the Chinese financial market, the choice of developing and focusing this thesis on mutual funds in China is appropriate.

The primary focus on this thesis is on mutual fund governance. There have different organizational structures for mutual fund governance, for instance, the corporate model and the contractual model. The corporate model is dominant in the United States[3] and the contractual model is prevalent in the European Union countries, Japan and China. More detail analysis of fund governance will be discussed in chapter two. According to the Chinese corporate governance code, a Chinese contractual mutual fund provides services to fund investors, in contrast to providing equity shares under the corporate form in the U.S. Therefore, Chinese fund investors are, only, fund unit-holders rather than the shareholders of the fund management company. The question is who is the owner of the Chinese mutual funds then? The shareholders of the Chinese fund management companies are mainly financial institutions such as insurance companies or commercial banks. A board of directors is elected by the shareholders of the fund management company. As such fund investors are not represented in the governance

[3] In the U.S, under the corporate model, mutual funds are registered as corporations owned by the fund investors (as shareholders). Board of directors of the mutual fund is elected from shareholders and is responsible for protecting shareholders' interests to supervise operations.

structure of the fund management company. Without a direct representation on the board of directors, it becomes essential to have in place effective corporate governance in protecting fund investors' interests. If the contractual fund governance is ineffective for fund investors, their only recourse is to redeem their fund shares from the fund management company.

In addition, the failure or weak of mutual fund governance may result in fund scandals involving late trading, market timing, front running, free riding and other trading abuses. The literature has widely investigated an inadequate or failed control environment in governance as major causes of excessive risk-taking and significant operational losses. For instance, many studies have been consensus for weakness in corporate governance mechanisms which has been regarded as one of the main reasons for the recent global financial crisis during 2007-2009 (Ingley and Walt, 2008; Andres and Vallelado, 2008; Hardwick et al., 2011; Erkens et al., 2012; Battaglia and Gallo, 2017 and Akbar et al., 2017).

Without effective corporate governance, fund managers would take more risks in order to maintain their chances of winning, particularly if their funds are performing poorly in the relative rankings of fund performance (Chevalier and Ellison, 1997; Kempf et al., 2008a and Chen and Pennacchi, 2009) or as a compensation incentive (Brown et al., 1996; Jans and Otten, 2008; Cullen et al., 2012 and Basak and Makarov, 2014). Increasing risk-taking behaviors is consistent with fund managers' best interests but not necessarily those of fund investors. According to agency theory, having a corporate board of directors is an essential governance mechanism for addressing the agency issues that arise between management and shareholders and facilitating effective

governance to protect shareholder's interests (Kryzanowski and Mohebshahedin, 2016; Wang and Hsu, 2013 and Adams et al. 2010). However, under contractual fund governance, fund investors are fund unit holders rather than the shareholders of the fund management company. A good governance structure should have an incentive to protect fund investors' interests rather than shareholders' interests. Therefore, in this thesis, we focus on the role and structure of the board of directors, given that it is primarily the board's responsibility to monitor management actions and ensure that effective governance is in place, for risk-taking. Given the importance of the board of directors in a company's operations, the first contribution of this thesis is the examination of the relationship between corporate governance and funds' risk-taking in the Chinese mutual fund industry.

In addition, we extend our analysis to examine whether corporate governance affects the funds' return and market share. Adams et al. (2010) and Cremers et al. (2009) argue the importance of corporate governance for the performance of mutual funds. Kong and Tang (2008) point out an important relationship between corporate governance and funds' flow. Following those studies, we focus on the funds' return and market share. Hence, the second contribution of this thesis is the examination of the impact of corporate governance on funds' return and market share under contractual governance.

Since the CSRC implemented the rules of the establishment of joint venture fund management companies in 2002, almost half of fund management companies in the market have foreign investors in 2015. Such changes lead to changes in the ownership structure as government ownership is being transferred to foreign investors. Hence, the third contribution of this thesis is that it explores whether different types of ownership

would affect funds' return and market share, as having different types of owners could lead to different investment behaviors.

Furthermore, this thesis focuses on fund manager level to investigate mutual fund performance. Some researchers have analyzed mutual fund performance by focusing on fund characteristics (including fund size, expense ratio, fees, and turnover ratio) that are observed to have a significant impact on the fund's risk-adjusted performance, for instance, the impact on mutual fund performance of fund size and book to market ratio (Otten and Bams, 2004, Pastor et al. 2015); the active share in the portfolio (Cremers and Patajisto, 2009, or Cremers and Pareek, 2016); the role of incentive fees (Elton et al. 2003); the flows of money into and out of funds (Berrggrun and Lizarzaburu, 2015); and portfolio concentration (Fulkerson and Riley, 2019).

In this thesis, we focus on a comprehensive analysis of fund managerial attributes on fund performance, including the manager's tenure, education, and management structure. The emphasis is on management structure because mutual funds, as different to corporations that adopt a hierarchical management structure, are unique and have two extreme types of management structures which are team-managed funds and individual-managed funds. Also, existing studies in the literature present mixed results on the performance of team-managed funds. Some researchers reveal that team-managed funds perform similarly to their individual-managed counterparts (Bliss et al. 2008). Others find that team-managed funds underperform their individual-managed counterparts (Bar et al. 2005; Karaginnidis, 2010 and Han et al. 2017). We also focus on the length of the manager's tenure and education. Schmidt et al. (1986) claim that people spend more time on activity and would tend to increase their working experience. As a result, their

performance will become better. However, empirical evidence on the impact of the length of the manager's tenure and education is mixed as well. Lastly, we also consider the role of corporate governance in our regression model, as Adams et al. (2018) state that team-managed funds perform better than individual-managed funds if funds have strong board monitoring. Therefore, the fourth contribution of this thesis is that it investigates the impact of fund managerial attributes on fund performance.

This thesis is structured into six chapters. The following chapter, chapter 2, describes the contractual governance structure of Chinese fund management companies and compares the organizational structures for mutual fund governance between China and the U.S. We provide an overview of the evolution of the Chinese open-ended mutual fund industry during the sample period from 2005 to 2015 and make a comparison between China and other developed countries in mutual funds. In addition, we discuss the data sources and the primary governance variables, which are manually collected from fund prospectus and fund financial reports.

Chapter three attempts to investigate the relationship between the unique board characteristics and funds' risk-taking by using manually collected governance data from the period between 2005 and 2015. The main contribution of this chapter is that, due to data limitation, this is the first study to examine the interplay between board characteristics and risk-taking behavior of Chinese mutual funds. We collect manually the governance variables, for instance board size, board structure and gender from fund prospectus on fund management company's website. Moreover, we use two different measurements of funds' risk-taking behavior, proxied by total risk and concentration risks which including stock concentration risk and bond concentration risk.

Our evidence suggests that a larger board size leads to a lower stock concentration ratio. We further show that a greater percentage of independent directors are associated with a lower bond concentration risk. Moreover, the representation of female directors on board not only increases funds' total risk, but also increases its stock concentration risk. This finding is not consistent with the abundance of studies from both the organizational psychology and economics literature (Levin et al. 1988; Byrnes et al. 1999 and Fehr–Duda et al. 2006), but it is consistent with studies by Farrell and Hersch (2005), Adams and Funk (2012) and Berger et al. (2014).

Regarding the percentage of institutional investors' holding, we find that having a higher level of institutional investors has a negative impact on funds' total risk and concentration risk, because institutional investors are more sensitive to risk level than individual investors. Furthermore, by examining the effects of education (board directors with PhDs), we find that an increase in the number of better-educated directors reduces funds' total risk. Our evidence shows that smaller boards are positively associated with market share and suggests that a fund management company with higher managerial ownership is better aligned with fund investors' interests.

The next chapter, chapter 4, investigates the impact of ownership structure on funds' return and market share over the period 2005-2015. The main contribution of this chapter is that we manually assemble a unique dataset of Chinese fund management companies that identify ownership structure in the form of government ownership, foreign ownership and ownership concentration.

Our evidence suggests that government ownership tends to have a greater influence on funds' return than market share, as we find that government ownership is positively related with funds' return and find that insignificant relationship between government ownership and market share. Our finding is consistent with previous studies (Faccio et al. 2006; Chahrumiind et al. 2006; Chaney et al. 2011; Chen et al. 2014; Ben-Nasr, 2016 and Lin et al. 2016).

In addition, we find that foreign ownership and fund management companies with foreign investors are not only linked to a poorer funds' return but also to a lower market share. Our finding is consistent with the previous study Chen et al. (2016). With further investigation, we notice that a fund management company with foreign investors has lower risk level. The result suggests that a negative relationship between foreign ownership and a fund management company's return and market share is contributed by foreign shareholders prefer to invest in less risky assets. We find that government-controlled companies have a statistically positive association with funds' return. This is consistent with the findings of Faccio et al. (2006), Chahrumiind et al. (2006), Chaney et al. (2011), Ben–Nasr (2016) and Lin et al. (2016) but is in contrast to the findings of Chen et al. (2017).

However, the opposite is true for the relationship between government-controlled fund management company and market share. What is more, highly concentrated ownership tends to enhance funds' market share. We find an insignificant relationship between concentrated ownership and funds' return. This result is supported by previous studies by Dong et al. (2014), Nguyen et al. (2015) and Dong et al. (2016) as they report that

highly concentrated ownership promotes the quality of corporate governance and improves monitoring of management.

Regarding the effects of the interaction terms on government ownership and foreign ownership, we find that funds' return is positively associated with government-controlled fund management companies in the presence of foreign ownership. Moreover, we discover that funds' return and market share are positively correlated with government ownership in the case of highly concentrated ownership. Finally, these results are robust under GMM estimations.

Chapter 5 is the first study to investigate the impact of fund managerial attributes on fund performance by considering the role of fund governance. Also, we use a comprehensive set of fund managerial attributes that incudes team management structure, manager's tenure and manager education. With regards to the mutual fund performance measurements, we opt for risk-adjusted return, as estimated by the Capital Asset Pricing Model and Fama-French three-factor model.

There has been an extensive amount of studies use risk-adjusted returns to evaluate mutual fund performance (Almazan et al. 2004; Bliss et al. 2008; Gong et al. 2016 and Adams et al. 2018). We also use frontier efficiency estimation following a similar approach as in Annaert et al. (2003); Gregoriou et al. (2005); Babalos et al. (2015) and Matallin-Saez et al. (2014). Therefore, in this study, we choose to employ risk-adjusted returns and frontier analysis approach that aim to strengthen the robustness of our results.

The result of chapter five shows that team-managed funds underperform solo-managed funds in terms of risk-adjusted return. Hackman (2002) argues that competition within a team can lead to coordination problems and interpersonal conflicts. Team management can result in delays in decision-making, and thus the organizational effectiveness of the team will diminish (Rasmusen, 1987). The ineffectiveness of a team will result in poor fund performance. Moreover, the existence of potential free-riding problems will result in poor fund performance (Sah and Stiglitz, 1988 and Adams et al. 2018). By following Adams et al.'s (2018) study, we employ the board of supervisors and external governance (the percentage of institutional investors) to alleviate the potential free-rider problems within the team-managed funds. We find that team-managed fund structures generate superior returns compared to individual-managed fund structures, in the presence of a large number of supervisors on the board and a high proportion of institutional investors.

The results of this chapter reveal the fund manager tenure is positively related to fund's risk-adjusted performance and fund efficiency score. This result suggests that longer-tenured fund managers outperform those managers are relatively new to a fund. Moreover, this finding leads to support to the human capital theory (Schmidt et al. 1986) that the more time managers spend on an activity, the better performance they will have. We also find that fund managers with Ph.D. degree achieve a better overall comprehensive performance relative to fund managers without Ph.D. degree. This positive impact of education on the performance of funds could suggest that the importance of professional skills and knowledge to fund management.

Finally, chapter 6 presents a summary of the contributions of this thesis and provides some policy implications.

Chapter 2: Background of the mutual fund industry in China

2.1 Introduction

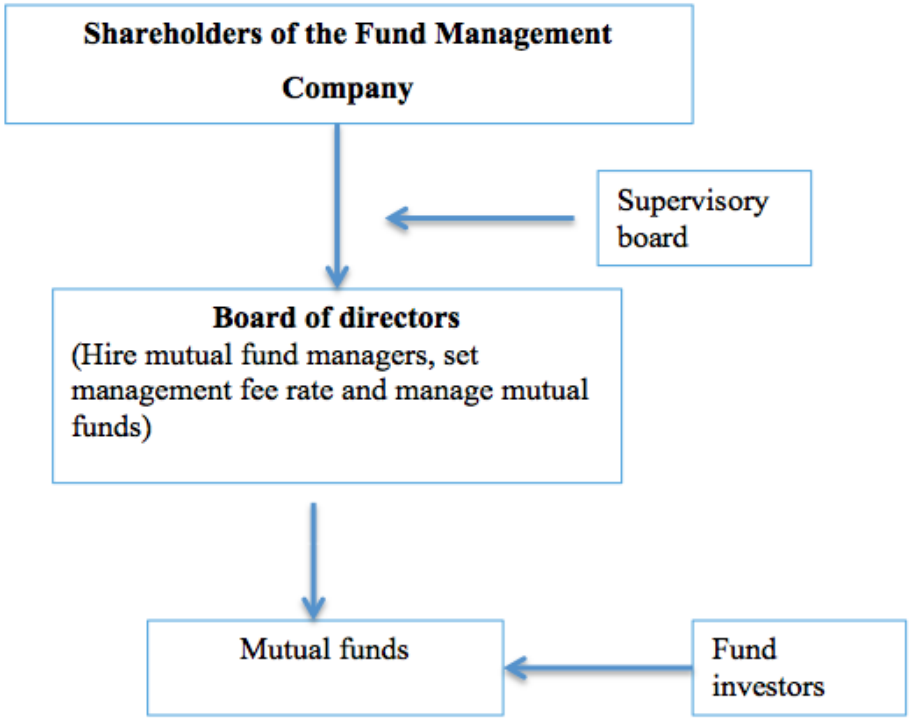
In order to analyze the impact of corporate governance on funds' risk-taking, return and market share, it is essential to understand the structure of contractual fund governance and the development of the mutual fund industry in China. Therefore, the purpose of this chapter is to discuss the contractual governance structure of Chinese fund management companies. We also compare the difference in the organizational structures for mutual fund governance between China and the U.S.

In addition, we present the evolution of the Chinese open-end mutual fund industry from 2005 to 2015. We provide the number of open-ended mutual funds and the total net assets of open-ended mutual funds for the Top-10 largest mutual fund markets based on the rankings at the end of 2015 in term of total net assets. Finally, we present the definitions and summary statistics for all variables, which are manually collected from fund prospectus and fund financial reports.

2.2. Background of fund governance

The mutual fund governance structure in China is known as contractual mutual fund governance. The contractual mutual fund governance can be viewed as a fund management company offers services to investors (Gong et al. 2016). Thus, fund investors are only fund unit-holders. Figure 1 presents the general organizational structure for the fund management company in China. Under this structure, there is one

board overseeing all mutual funds within the fund management companies. In addition, the shareholders of the fund management company could be different types of financial institutional, for instance, a commercial bank or an insurance company. The majority of the fund management companies in China are controlled by state-financial institutions. More detail discussions about shareholders composition and concentration will be presented in Chapter 4.



Sources: Gong et al. (2016)

Fig.1 The figure illustrates the governance structure of contractual mutual fund governance in China.

In China, firms have a two-tier board structure that is including the board of directors and the supervisory board[4]. The fund management companies also have such a two-tier board structure. The board directors, who can be supervisors in a fund management company, are elected by the shareholders to supervise fund management. The leading roles of the supervisory board are to monitor and to evaluate directors and senior managers and to oversee the financial affairs. The board of directors is widely considered as the critical internal corporate governance mechanism. In general, the board of directors is often empowered to monitor the firms' operations, in order to protect the interests of minority shareholders. However, the function of the board in the fund management companies is somewhat different from the other listed firms. The board of directors should safeguard fund investors' wealth and advance fund investors' best interests. According to the Figure.1, fund investors are not represented in the governance structure of the fund management company. Without a direct representation on the board of directors, it becomes important for the board of directors to protect fund investors' best interests and to address the conflict of interests between fund investors and the fund management company.

2.3 Fund governance in the United States

Unlike the contractual fund in China, mutual funds in the U.S are named as corporate funds. Under the corporate model, mutual funds under state law are required to register as corporations owned by fund investors. It implies that fund investors are also the shareholders in mutual funds in the U.S. All board members are elected by shareholders for a corporate fund to govern the fund. The primary goals of the board are to undertake

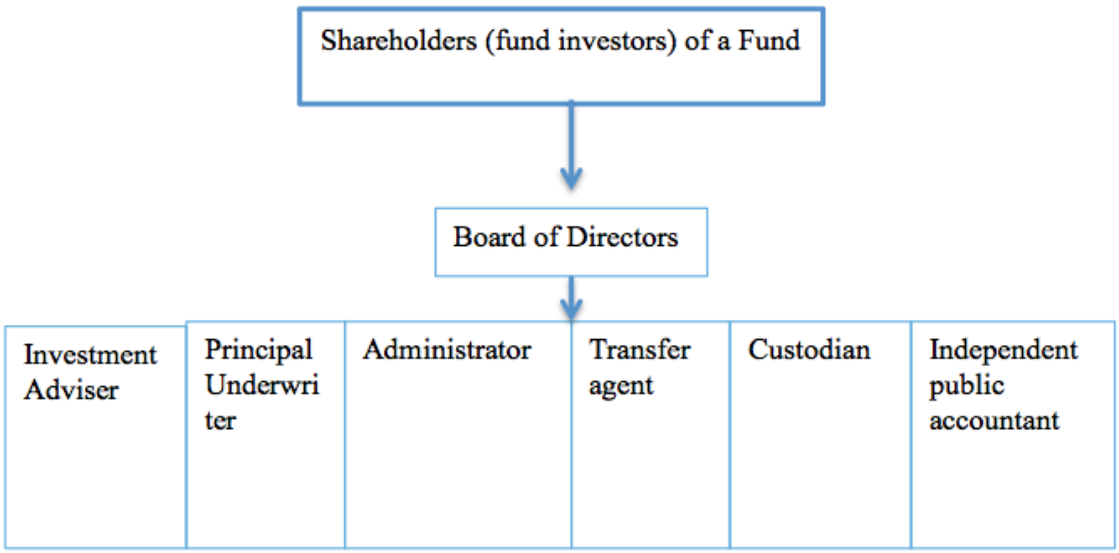
[4] More details about the description of two-tier boards can be found in Kim et al. (2007) and Jiang and Kim (2015). The former one describes a two-tier board in Europe. The latter provides a general description of two-tier boards in China.

oversight and monitor the fund's operation. And Figure 2 shows the types of service providers for the U.S mutual funds.

As shown in Figure 2, mutual fund boards have a substantial effect on the fund's operation through the selection of the management company (investment advisor[5]) and negotiating management fees with this chosen management company. The management fee is charged by the management company to the mutual fund. Mutual fund managers are employed by the management company. The management company can fire and hire fund managers. If the investment performance of the funds is not satisfactory, boards of directors have options to fire the management company or discuss the management fee downward. In Figure 2, we also find that a corporate fund requires to have the approval of the contract with service providers[6], for instance, principal underwriter, transfer agent, administrator, independent public accountant, and custodian, in contrast to such functions being afforded by different departments within the fund management company in China.

[5] Investment advisors have a responsibility to direct the fund's investment.

[6] In some detail, the principal underwriter or the fund's distributor is the place where fund investors can sell or buy fund shares.
The administrator is to offer services to the fund and helps to maintain compliance procedures.
The custodian is to hold the fund's assets and separate them from the advisor's assets.
The transfer agent is to maintain records of transactions for shareholder accounts.
The independent public accountant is to certify the fund's financial statements.



Source: Investment Company Fact Book 2009

Fig.1 The figure shows the governance structure of a corporate mutual fund in the U.S.

The main difference between the contractual fund governance and corporate fund governance is the status of fund investors. Contractual funds provide contractual services to fund investors in China, while corporate funds provide equity shares in the U.S. In chapters 3 and 4, we will discuss the impact of contractual fund governance on funds' return, risk-taking and market share.

2.4 The development of the Chinese mutual fund industry

In this section, we present an overview of the significant developments in the Chinese open-ended mutual fund industry over the period from 2005 to 2015 in Table 1. The table shows that the first two closed-end funds (e.g., Kaiyuan and Jintai) were established and sold to the public in 1998. To support the development of the mutual

fund industry and improve liquidity to the stock market, the China Securities Regulatory Commission (CSRC) issued the Pilot Scheme of Open-end Securities Investment Fund in 2000. The table presents that the first open-end mutual fund known as HuaAn Innovation, was established in 2001. Also, the first open-end bond and index mutual funds were available in 2002. The China Securities Regulatory Commission (CSRC) made a strategic decision to implement the rules of the establishment of joint venture fund management companies in 2002 to improve corporate governance and financial transparency in the mutual fund industry.

In December 2003, the first money market mutual fund was issued and publicly listed. One year after, the Chinese government released the Securities Investment Fund Law of the People's Republic of China to regulate fund activities and protect fund investor's interests. In 2006, the first Qualified Domestic Institutional Investor (QDII) fund was established and allowed to invest in international financial markets. At the same time, the Code of Corporate Governance of the Securities Investment Fund Management Company was issued by CSRC. Moreover, the CSRC approved the trial measures for the securities investments by Qualified Domestic Institutional Investors (QDII) outside the territory of China in 2007.

In 2008, in order to protect fund investors' interests and to ensure fair-trading, the CSRC issued the fair-trading system that should be accepted by the fund management company. In addition, the CSRC implemented the Renminbi Qualified Foreign Institutional Investors (RQFII) program in 2011 to further improve the quality of China's capital market since the Qualified Foreign Institutional Investors (QFII) program was established in 2002. In 2012, the Asset Management Association of China

(AMAC) was established. The AMAC is a self-regulatory organization for the Chinese fund management companies.

In 2013, we find that the CSRC implemented administrative measures for securities investment fund custody business in order to monitor fund investment and convening fund investors' meeting. Later, the revised Securities Investments Fund Law was adopted in China on June 1, 2013. To the most recent, the Securities Investments Fund Law was further amended in 2015. Under this amended regulation, equity funds are required to invest at least 80% of the assets in stocks.

Table.1 An overview of the development for Chinese mutual fund industry

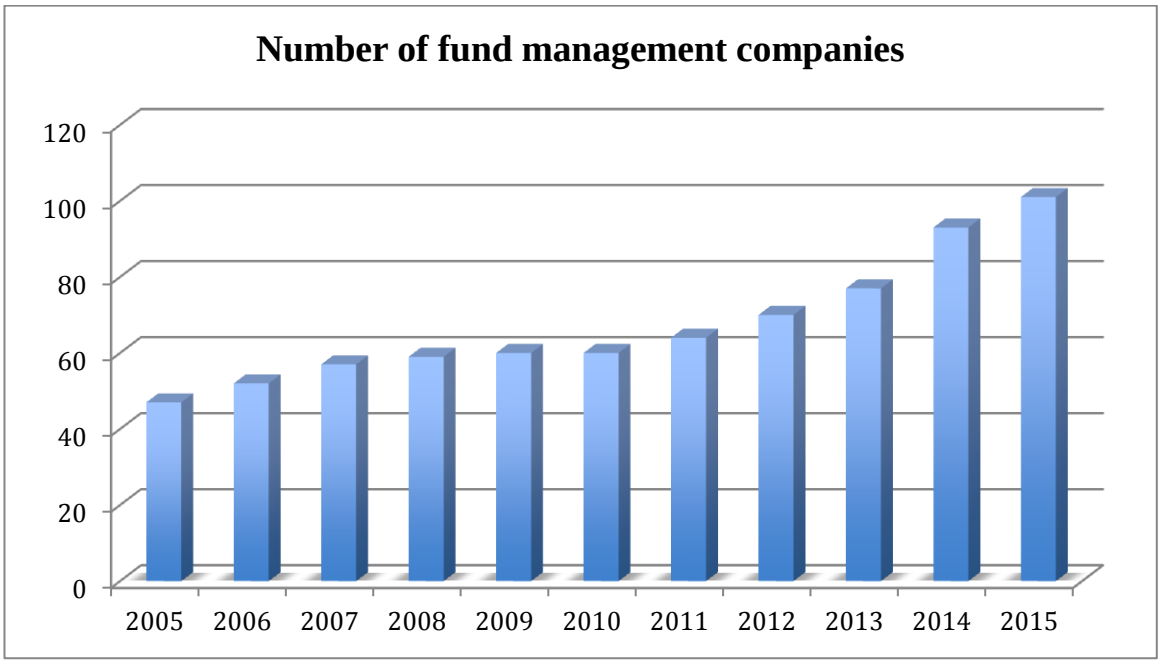
1998	The first two closed-end mutual funds were established in March 1998
2000	The implementation of the Pilot Scheme of Open-end Securities Investment Fund
2001	The first open-end mutual fund was established in September 2001
2002	The first bond mutual fund was established in September 2002
2002	The first index mutual fund was established in October 2002
2002	The implementation of the rules of the establishment of joint venture fund management companies
2003	The first money market mutual fund was established in December 2003
2004	The implementation of the Securities Investment Fund Law
2006	The first Qualified Domestic Institutional Investor (QDII) fund was established in November 2006
2006	Code of Corporate Governance of the Securities Investment Fund Management Company
2007	The Trial Measures for the Administration of Securities Investments outside the territory of China by Qualified Domestic Institutional Investors (QDII)
2008	The instruction for the Fair Trading System of Fund Management Company
2011	The implementation of the Measures for the Administration of Sale of Securities Investment Fund
2011	The implementation of the RMB Qualified Foreign Institutional Investors (RQFII) program
2012	The Asset Management Association of China (AMAC) was established
2013	The implementation of the revised Securities Investments Fund Law
2013	The implementation for the administration of securities investment fund custody business
2015	The implementation of the amended Securities Investments Fund Law

Source: The China Securities Regulatory Commission (CSRC)
Note: This table presents an overview of major development in Chinese mutual fund industry over the sample period from 2005 to 2015.

In Figure 3, we show the evolution of mutual fund industry in China over the sample period from 2005 to 2015. The figure indicates an upward trend in the number of fund management companies. At the beginning of the sample period, there were 47 fund management companies in China. The number of fund management companies

increased to 101 fund management companies in 2015 because of the deregulation in China's capital markets since 2002. In addition, the figure demonstrates that the number of fund management companies was affected adversely by the global financial crisis of 2008-2009, as the number of fund management companies remained stable from 59 to 60. Over the period from 2013 to 2015, we find that the number of fund management companies was increased significantly from 77 to 101.

Figure.3 Change in the number of Chinese fund management companies

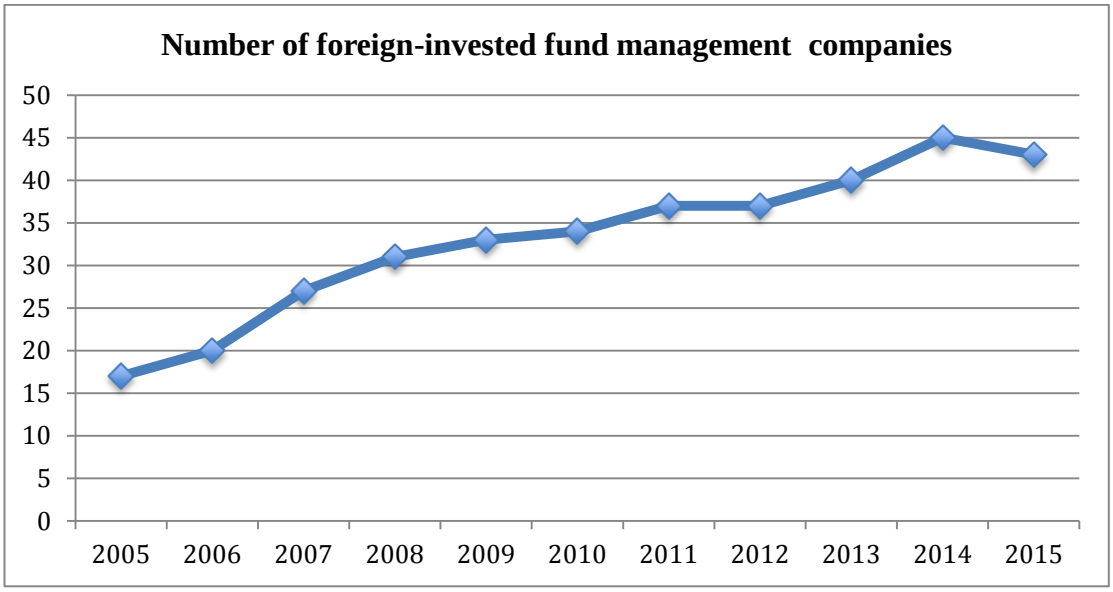


Source: The China Securities Market & Accounting Research database (CSMAR)
Note: This figure shows the number of fund management companies over the sample period from 2005 to 2015.

Figure 4 shows the number of foreign-invested fund management companies over the sample period between 2005 and 2015. The number of foreign-invested fund management companies was increased steadily over the sample period from 2005 to 2014, as the CSRC made a strategic decision to permit the rules of the establishment of

joint venture fund management companies in 2002. We find that there were 17 foreign-invested fund management companies in 2005. Over the period from 2006 to 2007, the number of foreign-invested fund management companies increased from 20 to 27. In 2014, the number of foreign-invested fund management companies reached 45, which is the highest level in our sample period. And this finding suggests that almost half (48%) of fund management companies are joint venture companies, as the total number of fund management companies was 93 in China in 2014. Additionally, since 2014, we find that the number of foreign-invested fund management companies was decreased to 43 in 2015.

Figure.4 Change in the number of foreign-invested fund management companies



Source: Author's estimations.
Note: This figure presents the number of foreign-invested fund management companies over the period from 2005 to 2015.

Also, we report the market competition in the Chinese mutual fund industry over time from 2005 to 2015 by using the changes in the average funds' total net assets (TNA) over the sum of total net assets (STNA) in the Chinese mutual fund industry in Table 2. We find a downward trend for the average ratio of TNA/STNA during the sample

period from 2005 to 2015. In 2005, the average ratio of TNA/STNA was 1.55%. The average ratio of TNA/STNA was increased rapidly to 1.92% in 2006. This result suggests that total net assets were highly concentrated in the large fund management companies and there was a low level of competition in the Chinese mutual fund market. Since 2007, the average ratio of TNA/STNA declined slowly from 1.75% to 1.06% in 2015. One potential reason is that number of fund management companies in the market increased from 57 to 101 over the period between 2007 and 2015. Then, from 2008 to 2009, the average ratio of TNA/STNA decreased by only 0.02%.

We also report the changes in the ratio of TNA/STNA for the Top-3 largest fund management companies in terms of total net assets. Top-3 TNA/STNA is the total net assets (TNA) from the top three largest fund management companies over the sum of total net assets (STNA) in the Chinese mutual fund industry. We observe that there was no significant change in the ratio of Top-3 TNA/STNA. To be more specific, we find that the ratio of Top-3 TNA/STNA fluctuated between 25.34% and 19.11% over the sample period. Moreover, we find that the ratio of Top-5 TNA/STNA consistently decreased and occasionally increased over the sample period from 2005 to 2015. Regarding the ratio of Top-10 TNA/STNA, we discover that the ratio of Top-10 TNA/STNA appeared to fluctuate considerably between 46.08% and 61.76% over the period from 2005 to 2007. Meanwhile, the ratio of Top-10 TNA/STNA was close to 50% for each of sample year. This result suggests that the top ten fund management companies manage the majority of assets in the Chinese mutual fund industry.

Table 2. The evolution of the average funds' total net assets over the sum of total net assets (%)

Year	TNA/STNA	Top 3 TNA/STNA	Top 5 TNA/STNA	Top 10 TNA/STNA
2005	1.55	25.34	33.77	46.08
2006	1.92	22.36	35.95	61.76
2007	1.75	19.52	29.23	47.41
2008	1.69	21.45	30.14	49.00
2009	1.67	19.11	28.08	46.53
2010	1.67	20.44	29.13	45.85
2011	1.56	19.52	29.20	46.77
2012	1.43	20.64	30.83	48.79
2013	1.30	19.55	29.75	48.37
2014	1.09	28.16	38.63	53.13
2015	1.06	22.76	31.66	49.68

Source: Author's estimations.
Note: This table shows the evolution of the average funds' total net assets (TNA) over the sum of total net assets (STNA) in the Chinese mutual fund industry over time from 2005 to 2015. Top3 TNA/STNA is the total net assets (TNA) from the top three largest fund management companies over the sum of total net assets (STNA) in the Chinese mutual fund industry; Top5 TNA/STNA is the total net assets (TNA) from the top five largest fund management companies over the sum of total net assets (STNA) in the Chinese mutual fund industry; Top10 TNA/STNA is the total net assets (TNA) from the top ten largest fund management companies over the sum of total net assets (STNA) in the Chinese mutual fund industry.

Furthermore, we also provide the categories of open-ended mutual funds in China and present the number and the size of mutual funds in each category over the period from 2007 to 2015 shown in Table 3 to 7. There are five categories in the Chinese mutual fund industry, such as, equity mutual funds, hybrid mutual funds, money market mutual

funds, bond mutual funds, and Qualified Domestic Institutional Investor (QDII) mutual funds.

Table 3 shows the number of equity mutual funds and the total net assets from them over the period from 2007 to 2015 in China. Equity mutual funds are required to invest at least 60% of the assets in the stock market. It is clear that the number of equity mutual funds increased from 123 to 699 over the period from 2007 to 2014. After 2014, the number of funds went down to 587 in 2015. We find that the size of equity mutual funds was significantly and negatively affected by the global financial crisis in 2008, as the total net assets decreased sharply from 1618.733 billion Chinese Yuan to 787.124 billion Chinese Yuan. It is also noticeable that the total net assets increased dramatically to 1364.107 billion Chinese Yuan in 2009. Moreover, from 2009 to 2013, the total net assets were steadily declined from 1,364.107 billion Chinese Yuan to 1,095.845 billion Chinese Yuan. In 2015, the total net assets dropped to 765.713 billion Chinese Yuan due to the Chinese stock market turbulence[7]. We found that the Shanghai Stock Exchange Composite Index declined from 5166 to 3686 over three weeks.

[7] The Chinese stock market turbulence was happened on 12 June 2015.

Table 3. Number of equity mutual funds

Year	Number of funds	Total net assets (Billion)
2007	123	1,618.733
2008	172	787.124
2009	235	1,364.107
2010	327	1,304.283
2011	434	1,024.835
2012	534	1,147.528
2013	611	1,095.845
2014	699	1,314.202
2015	587	765.713

Source: The Asset Management Association of China (AMAC)
Note: This table shows the number of equity mutual funds over the period from 2007 and 2015. Equity mutual funds are required to invest at least 60% of the assets in stocks.

Table 4 shows the evolution of bond mutual funds in terms of fund size and fund number. Bond mutual funds are required to invest at least 60% of the assets in the bond market. We can find that the number of bond mutual funds enhanced steadily from 25 to 129 over the period between 2007 and 2011. Since 2011, it is clear that the number of bond mutual funds increased dramatically from 129 to 466 in 2015. Also, the table presents that the total net assets of bond mutual funds surged significantly from 67.88 billion Chinese Yuan to 182.449 billion Chinese Yuan from 2007 to 2008 because of the global financial crash of 2008. Investors prefer to invest in bonds during the financial crisis, as bonds provide regular interest payments. In addition, from 2014 to 2015, the bond mutual funds had doubled in size to 697.384 billion Chinese Yuan.

Table 4. Number of Bond mutual funds

Year	Number of funds	Total net assets (Billion)
2007	25	67.88
2008	58	182.449
2009	80	81.933
2010	98	136.863
2011	129	120.447
2012	225	377.97
2013	341	322.484
2014	409	347.34
2015	466	697.384

Source: The Asset Management Association of China (AMAC)
Note: This table shows the number of bond mutual funds over the period from 2007 and 2015. Bond mutual funds are required to invest at least 60% of the assets in bonds.

Table 5 indicates the development of hybrid mutual funds in terms of fund size and number. Hybrid mutual funds are allowed to invest in stocks, bonds, and money market instruments. It is clear that there was an upward trend for the number of hybrid mutual funds over the sample period from 2007 to 2015. We can find that the number for hybrid mutual funds rose gradually over the period from 2007 to 2014. From 2014 to 2015, the mutual funds had a considerable increase in number from 395 to 1184. In addition, Table 5 also reveals a U-shaped curve for the size of hybrid mutual funds over the period from 2007 to 2014. By 2015, the total net assets of hybrid mutual funds

climbed significantly to 2,228.725 billion Chinese Yuan, almost three times more than the total net assets in 2014.

Table 5. Number of hybrid mutual funds

Year	Number of funds	Total net assets (Billion)
2007	118	1,130.58
2008	126	453.372
2009	158	773.035
2010	166	731.14
2011	192	570.669
2012	218	564.617
2013	287	562.659
2014	395	602.523
2015	1184	2,228.725

Source: The Asset Management Association of China (AMAC)
Note: This table shows the number of hybrid mutual funds over the period from 2007 and 2015. Hybrid mutual funds are allowed to invest in stocks, bonds, and money market instruments.

Table 6 shows the number and the size of money market mutual funds from the sample period 2007 to 2015. Money market mutual funds are only allowed to invest in money market instruments. As shown in Table 6, the number of money market mutual funds went up steadily from 40 to 94 over the period from 2007 to 2013. From 2013 to 2015, it is noticeable that the number of money market mutual funds increased considerably and sored to 220 funds at the end of 2015. The total net assets of money market mutual funds fluctuated between 111.033 billion Chinese Yuan and 747.59 billion Chinese Yuan over the period between 2007 and 2013. Also, from 2014 to 2015, the table shows

that the total net assets of money market funds increased considerably from 2,086.243 billion Chinese Yuan to 44,44.336 billion Chinese Yuan.

Table 6. Number of money market mutual funds

Year	Number of funds	Total net assets (Billion)
2007	40	111.033
2008	40	389.244
2009	43	259.527
2010	46	127.055
2011	51	294.886
2012	61	571.728
2013	94	747.59
2014	171	2,086.243
2015	220	4,444.336

Source: The Asset Management Association of China (AMAC)
Note: This table shows the number of money market mutual funds over the period from 2007 and 2015. Money market mutual funds are only allowed to invest in money market instruments.

Table 7 presents the evolution of QDII mutual funds in terms of fund size and number over the period from 2007 to 2015. QDII mutual funds are allowed to invest in foreign stock markets. There was no considerable change in the number of QDII mutual funds, as the number increased gradually from 5 to 101 over the period from 2007 to 2015. In addition, we can find that the total net assets of QDII mutual funds enhanced

considerably in the first three years from 26.831 billion Chinese Yuan to 74.224 billion Chinese Yuan. From 2010 to 2015, it is clear that the total net assets of QDII mutual funds consistently decreased and occasionally increased. By 2015, we find the total net assets were 66.253 billion Chinese Yuan.

Table 7. Number of QDII mutual funds

Year	Number of funds	Total net assets (Billion)
2007	5	26.831
2008	10	52.241
2009	10	74.224
2010	28	74.844
2011	51	57.602
2012	67	62.958
2013	82	58.409
2014	89	48.675
2015	101	66.253

Source: The Asset Management Association of China (AMAC)
Note: This table shows the number of QDII mutual funds over the period from 2007 and 2015. QDII mutual funds are allowed to invest in foreign stock markets.

To sum up, from Table 3 to 7, the number of mutual funds of all categories was increased sharply during the sample period except for QDII mutual funds. We notice that, after global financial crisis 2008, total net assets of equity mutual funds and hybrid mutual funds enhanced rapidly, while the total net assets of bond mutual funds and money market mutual funds declined. Moreover, over the period from 2014 to 2015, we

only find the total net assets of equity mutual funds declined. Mutual funds from other categories were increased significantly, especially money market mutual funds and hybrid mutual funds. One potential reason is that the Chinese stock market crashed in 2015. Fund investors maybe forced to sell their shares in equity mutual funds and invest their assets into money market mutual funds or hybrid mutual funds. Another potential reason is that the implementation of the amended Securities Investment Fund Laws in 2015, as the new regulation required equity mutual funds to invest at least 80% of the assets in the stock market. Hence, some of equity mutual funds changed their category from equity mutual funds to hybrid mutual funds.

The following three tables (8-10) present the evolution of the top ten largest open-end mutual fund markets in the worldwide. In Table 8, we compare the number of open-ended mutual funds in ten countries over a period of 8 years. It clearly shows that the number of open-ended mutual funds increased in most of the countries between 2008 and 2015. In China, we can find that the amount of open-ended mutual funds was 429 in 2008. From 2008 to 2015, the number of open-ended mutual funds increased to 2,558. In addition, it is noticeable that China had the lowest number of mutual funds in every year. In 2015, the number of mutual funds in China was close to the United Kingdom, in which there were 2,573 funds.

Moreover, we find that the number of open-ended mutual funds in Japan rose dramatically from 3,333 to 9,804 over the period from 2008 to 2015. We observe that Luxembourg had the highest number of open-ended mutual funds 12,074 in 2015. And U.S is the second highest in the number of mutual funds. Moreover, since 2008, we find that the number of open-ended mutual funds had largely stabilized from the following

countries: Germany, the United Kingdom, and Ireland. Over the same period, some countries had steadily increased the number of open-ended mutual funds, such as, the United States, Luxembourg, Canada, and Brazil.

Table. 8 Worldwide numbers of open-ended mutual funds

Countries	2008	2009	2010	2011	2012	2013	2014	2015
China	429	547	660	831	1065	1415	1763	2558
Japan	3333	3656	3905	4196	4384	7818	8761	9804
Canada	2015	2075	2117	2655	2866	2963	3164	3283
United States	8768	8463	8478	8722	8784	9009	9339	9710
France	8301	7982	7791	7744	7392	7154	11273	11122
Germany	5633	5967	5923	5813	5868	5906	5509	5604
United Kingdom	2371	2266	2204	1941	1922	1910	2597	2573
Brazil	4169	4744	5618	6513	7468	8072	8650	8783
Luxembourg	11166	11136	11860	12258	12458	12760	11838	12074
Ireland	3097	2721	2899	3085	3167	3345	5833	3864

Source: Investment Company Fact Book 2016
Note: This table shows the number of mutual funds worldwide from 2008-2015.

Furthermore, Table 9 compares Top-10 countries in terms of the mutual fund total net assets from 2008 to 2015. We find the total net assets of open-ended mutual funds increased in most the countries between 2008 and 2015. In 2008, total net assets were approximately $276 billion in China. As of 2015, China mutual fund industry managed more than $1.26 trillion in total net assets. Over the period, mutual funds quadrupled its size from $276 billion to $1.26 trillion in China. In addition, this amount of total net assets is similar to the total net assets in Japan, as Japan's total net assets in the mutual fund industry were $1.33 trillion in 2015. Before 2015, it is clear that China not only had the smallest size of the mutual fund industry but also had the lowest number of mutual funds (see Table 8). In 2015, Table 9 demonstrates that the total net assets in China exceed two other countries-Brazil and Canada, as the total net assets were $743 billion and $889 billion, respectively. Compared to the United States, we notice that China's total net assets were only approximately 1/14 of total net assets in the United States in 2015, as the total net assets were $17,756 billion in the United States.

In some detail, as shown in Table 9, it is clear that the total net assets in the United States enhanced sharply from $10,152 billion to $17,756 billion over the sample period from 2008 to 2015. In 2015, we can find that almost half of the global total net assets of open-ended mutual funds were concentrated in the United States, as the world total net assets of open-ended funds were $37, 190 billion. Furthermore, although we find that the number of mutual funds in some of the mutual fund markets remained stable, their total net assets were increased rapidly over the period from 2008 to 2015, such as Germany, the United Kingdom, and Ireland. We also find that the total net assets grew gradually in the following countries: Canada, France, and Brazil. While Luxembourg

had the highest number of open-ended mutual funds, Luxembourg's total net assets only was the second highest over the sample period.

Finally, in Table 9.1, we compare the top-10 largest mutual fund markets in term of the ratio of TNA/GDP over the sample period from 2008 to 2015. The ratio of TNA/GDP is the total net asset (TNA) divided by Gross Domestic Product (GDP). It is clear that the ratio of TNA/GDP indicates an upward trend for all mutual fund markets over the sample period. We can find that China had the smallest ratio of TNA/GDP across the sample period, followed by Japan. In 2008, the ratio of TNA/GDP was 0.06 in China. From 2008 to 2014, it is noticeable that the ratio of TNA/GDP fluctuated between 0.045 and 0.075. By 2015, we can find that the ratio of TNA/GDP had a considerable increase from 0.068 to 0.114. Moreover, although the ratio of TNA/GDP reached the highest point 0.114, the ratio is still the lowest in our sample countries. Also, we find that the highest ratio of TNA/GDP in China was the lowest ratio in Japan. One possible reason is China is the world's second-largest economy. However, China's mutual fund industry had a short history and the size is small. Hence, it is expected to see that China's mutual fund industry will have a considerable increase in the near future.

Furthermore, as shown in Table 9.1, there were three countries that the amount of mutual fund total net assets exceeded their GDP amount, such as Luxembourg, Ireland, and the United States. Luxembourg had the highest number of TNA/GDP ratio across period. Although there was a small decline between 2010 and 2011, the ratio of TNA/GDP increased steadily over the sample period from 36.562 to 61.695. Also, we find that Ireland has the second highest ratio of TNA/GDP throughout the period. The ratio of TNA/GDP climbed from 2.618 to 7.112. In the United States, we find that the

ratio of TNA/GDP increased sharply from 0.69 to 0.825 over the period from 2008 to 2009. Since 2013, the size of mutual funds was more than the amount of GDP, as the ratio of TNA/GDP was 1.002. By 2015, we can see a small decline in the ratio of TNA/GDP to 0.98. Overall, we find that the ratio of mutual fund TNA/GDP was high in developed countries, for instance, the United Kingdom, and France. Also, the ratio of mutual fund TNA/GDP increased steadily for those countries over the period from 2008 to 2015.

Table. 9 Worldwide total net assets of open-end mutual funds (Billions of U.S. dollars)

Countries	2008	2009	2010	2011	2012	2013	2014	2015
China	276	381	364	339	437	460	708	1,263
Japan	575	660	785	745	738	1,157	1,171	1,328
Canada	416	565	636	753	856	940	981	889
United States	10,152	11,889	12,825	12,680	14,393	16,725	17,849	17,752
France	1,591	1,805	1,617	1,382	1,473	1,531	1,940	1,823
Germany	1,130	1,342	1,389	1,356	1,587	1,842	1,847	1,799
United Kingdom	504	729	854	816	985	1,166	1,501	1,578
Brazil	479	783	980	1,008	1,070	1,018	989	743
Luxembourg	2,042	2,538	2,799	2,587	3,007	3,453	3,518	3,565
Ireland	720	860	1,242	1,324	1,581	1,811	2,020	2,067

Source: Investment Company Fact Book 2016
Note: This table shows the size of mutual funds worldwide over the period from 2008-2015.

Table. 9.1 Worldwide TNA/GDP ratios of open-end mutual funds

Countries	2008	2009	2010	2011	2012	2013	2014	2015
China	0.060	0.075	0.060	0.045	0.051	0.048	0.068	0.114
Japan	0.114	0.126	0.138	0.121	0.119	0.224	0.241	0.302
Canada	0.269	0.412	0.394	0.421	0.469	0.510	0.545	0.570
United States	0.690	0.825	0.857	0.817	0.891	1.002	1.024	0.980
France	0.545	0.671	0.612	0.483	0.549	0.545	0.680	0.748
Germany	0.301	0.393	0.406	0.361	0.448	0.491	0.475	0.533
United Kingdom	0.174	0.306	0.350	0.311	0.370	0.426	0.497	0.547
Brazil	0.282	0.470	0.444	0.385	0.434	0.412	0.403	0.412
Luxembourg	36.562	49.406	52.600	43.113	53.054	55.929	53.040	61.695
Ireland	2.618	3.639	5.596	5.539	7.009	7.565	7.826	7.112

Source: Investment Company Fact Book 2016 and World Bank
Note: This table shows the ratio of the total net asset divided by Gross Domestic Product (GDP) for the open-ended mutual fund markets from 2008 to 2015.

2.5 Data description

The existing literature on mutual fund governance is typically limited in developing countries, and some related studies have focused mainly on the banking sector and non-financial firms. Moreover, studies on the fund management companies' shareholders composition and concentration are also minimal, in particular, China. This is because it is extremely tough to collect data for the governance of Chinese fund management companies. In this thesis, we manually assemble a unique dataset of Chinese fund management companies that identify board structure (including board size and board compositions) and ownership structure in the form of government ownership, foreign ownership, and ownership concentration. Most previous researches on the Chinese mutual funds focus on investigating the impact of fund governance on the performance of equity fund. We employ a much larger unique dataset including all open-ended mutual funds in our sample to analyze the impact of fund governance on funds' return, risk-taking and market share.

In this thesis, the dataset is collected from four data sources, which are the fund prospectus, the fund financial reports, the China Securities Market & Accounting Research database (CSMAR) or called the Guo Tai An (GTA) database and the World Bank database. The first data source is the fund prospectus which provides detailed governance information and other funds related information. The fund management companies renew the fund prospectus every six months. The governance information about a fund management company includes the board of directors, the supervisory board and composition of shareholders. It provides all information about board characteristics including director's age, educational background, gender and working

experience, except for the compensations to the board directors. In addition, the composition of shareholders presents the percentage of shares owned by each agency. However, the background of each agency is not disclosed in the fund prospectus. The fund related information is about the fund's investment objectives, the fund's past return and risks, the fund's expenses and fees and information on fund managers.

The second data source is the fund financial report. The fund management companies release fund financial data every six months on their website. The fund financial report indicates the information about mutual fund holding data, fund net asset value (NAV), the composition of the investment portfolio, financial statement, auditor's report and other fund-specific information.

The third data source is the China Securities Market & Accounting Research database (CSMAR). The CSMAR database provides all financial data of the listed companies in Shanghai and Shenzhen Stock Exchanges, mutual fund data and information about the Chinese economy. For the Chinese mutual fund data, the CSMAR database provides fund information about fund attributes (including fund size, fund objective, fund age, fund expense, fund fees, and fund flows), fund net asset value (NAV), fund investment portfolio and other fund related information. However, The CSMAR database does not provide information about the corporate governance of the fund management company. The CSMAR database is widely used for Chinese research (Gong et al. 2016; Feng and Johansson, 2015; Yuan et al. 2008 and Zhang and Ding, 2006;) and is included in the Wharton Research Data Services (WRDS) database. For instance, Gong et al. (2016) collected data on fund-specific variables and fund management company ownership from the CSMAR database to analyze equity fund performance. In addition, we find

that other studies use the Wind Financial Terminal database (WIND) to analyze Chinese mutual fund performance (Feng et al. 2014 and Tang et al. 2012). The WIND database provides fund characteristics information. However, we do not have the WIND database, so we use the CSMAR database in our thesis.

The last data source is the World Bank. The World Bank offers information about development indicators in countries around the world, for instance, economy, education, and financial sector.

2.5.1 Data description for Chapter three

Chapter three attempts to examine the relationship between the unique board characteristics and funds' risk-taking during the period between 2005 and 2015. Table 10 provides the definition of the variables used in this chapter. The board characteristics include the board structure, board size, gender, and education. The board structure is the proportion of independent directors on the board and has been employed extensively in the previous studies (Pfeffer, 1972; Cheng, 2008; Wang, 2012; Ho et al., 2013; Pathan and Faff, 2013; Dong et al., 2016 and Ferris et al., 2017). In the literature, we find that the impact of board structure on funds' risk-taking is complicated. Some researchers claim that independent directors may not provide effective monitoring on funds' risk-taking behavior as some of the investments may need for specialized knowledge (Raheja 2005 and Kryzanowski and Mohebshahedin 2016). However, other studies find that independent directors have a negative impact on funds' risk-taking, as independent directors may have more incentive to monitor and disciple fund managers. Thus, the level of risk may be reduced.

Table 10. Definitions of Variables

	Description	Sources
Board size	The number of directors on the board	Fund prospectus
Board structure	The proportion of independent directors on the board	Fund prospectus
Gender	A dummy variable that equal to 1 if the board has at least one female director, and 0 otherwise	Fund prospectus
Education	The number of directors with a Ph.D. degree	Fund prospectus
Total risk	Total risk is the weighted average of return volatility across all funds within the fund management company	CSMAR
Concentration-stock	The proportion of the value of top 5 stocks to the total net assets of a fund management company value	CSMAR
Concentration-bond	The proportion of the value of top 5 corporate bonds to the total net assets of a fund management company value	CSMAR
Expense ratio	The funds' weighted average expense ratio computed across all the fund management company	CSMAR
Abnormal return	The difference between funds' return and market return	CSMAR
Market share	The ratio of total net assets managed by the fund management company over sum of total net assets managed by the open-end mutual fund industry	CSMAR
Company Size	The logarithm of total net assets managed by the fund management company	CSMAR
No. of funds started	The total number of new funds started by a fund management company in a given year	CSMAR
Company experience	The number of years for a fund management company exists in the industry	CSMAR

In addition, board size is the total number of directors on the board (Bennedsen et al. 2008; Cheng, 2008; Wang, 2012; Wintoki et al. 2012 and Ho et al., 2013). We find that the relationship between board size and funds' risk-taking is also complicated. On the one hand, a larger board size may reduce funds' risk-taking, as larger boards with more

coordination and communication issues may have a less extreme decision, thus resulting in lower risk-taking level. Moreover, larger boards may help to add more knowledge to the board, especially for large fund management companies which have multiple investment objectives, leading to better monitoring management and less risk-taking behavior. On the other hand, a larger board size may result in greater conflicts among directors and lead to lower decision-making quality. Thus, it may hinder the board's ability to determine an appropriate level of risk.

Concerning the gender, it is a dummy variable that equals one if the board has at least one female director, and 0 otherwise (Dowling and Aribi 2013). According to the previous studies, we find that the impact of a female director on funds' risk-taking behavior may be twofold. On the one hand, some studies document that women naturally tend to more risk-averse compared to men (Levin et al. 1988, Byrnes et al. 1999 and Fehr-Duda et al. 2006). And, female directors may have a similar function as the independent directors by providing a monitoring role (Adams and Ferreira, 2009). On the other hand, some empirical studies find that female director may result in more risk-taking behavior (Adams and Funk, 2012 and Berger et al. 2014). With respect to education, we count the number of directors on a board who hold a Ph.D. degree (Berger et al. 2014). More educated directors imply more knowledge to the board, which thereby signals better risk management techniques. Therefore, education is expected to be negatively related to the funds' risk-taking behavior.

These variables are manually collected from fund prospectus on the fund management company’s website. The information from fund prospectus will be updated every six months, for instance at the end of June and December. Thus, we collect governance

information at the end of December of each sample year. In addition, we also use the fund financial reports to gather governance information when it is not available on fund prospectus. We focus on the fund financial report at the end of each sample year. Table 11.1 shows descriptive statistics for the governance data. We find that the average board size is 8.68, which is similar to that of 8.58 found in Fu and Wedge (2011) and 9.24 by Kong and Tang (2008) in their sample for the U.S. The average value of independent directors is 38.7 percent, which is much less than that of 78 percent found in Kong and Tang (2008). In addition, we find that the average value of the gender is 0.6. It means that more than half of fund management companies have a female director in their board. The sample mean of board directors with a Ph.D. degree is 2.24.

Table 11.1. Summary statistics of corporate governance

Governance variables	Mean	SD	MIN	MAX	Median
Board size	8.68	1.57	5	13	9
Independent Board (%)	38.7	5.98	0	60	37.5
Gender	0.6	0.49	0	1	1
Education (PhD)	2.24	1.58	0	7	2

Note: This table presents summary statistics on governance variables from 2005 to 2015. Board size is the number of directors on the board; Independent board is the percentage of independent directors on the board; Gender is a dummy variable and equals to 1 if the board of the fund management company has at least one female member; Education is the number of directors on a board who hold a Ph.D. degree.

Concerning funds' risk-taking, we employ two different measurements. The first measure of funds' risk-taking is the funds' total risk. The funds' total risk is the weighted average of return volatility across all funds within the fund management company. The computation of funds' total risk requires two steps. The first step is to calculate the volatility of return for each fund. Each fund's return volatility is measured as the standard deviation of 12 monthly returns (Kong and Tang, 2008 and Jordan and

Riley, 2015). The second step is to compute the weighted average of return volatility across all funds within the fund management company, in which the weight is the relative size of the fund within the fund management company. Hence, we have to collect open-ended mutual fund net asset value (NAV) monthly data for each open-ended fund from the CSMAR database to calculate fund monthly return. In addition, funds with less than six months records are not included in our sample.

The second measure of funds' risk-taking is concentration risk (Chen et al. 2008). We adopt stock concentration risk and bond concentration risk. The stock centration risk is computed as the value of the top 5 stocks divided by the total net assets held by the fund management company. Similarly, the bond centration risk is computed as the value of the top 5 corporate bonds divided by the total net assets held by the fund management company. Therefore, we have to collect the fund investment portfolio data from the CSMAR database. We combine the information about fund investment portfolio data within the same fund management company to find out the top 5 stocks and top 5 corporate bonds. Moreover, the CSMAR database also provides the top 10 stocks. Thus, for robustness, we employ the value of the top 10 stocks divided by the total net assets held by the fund management company.[8]

Table 11.2 presents the summary statistics for different funds' risk-taking measurements. Moreover, Table 11.2 presents that the sample mean of funds' total risk is 5.48%, which is much higher than that of 3% reported by Kong and Tang (2008) in their sample for the U.S market. In terms of stock concentration risk, Table 6 indicates that the average value is 10%. For comparison, Chen et al. (2008) find that the sample mean of stock

[8] Fund management companies only release top 5 bonds in their annual reports.

concentration risk is 4% in the U.S. In addition, we find that funds' average bond concentration risk is 4%.

Table.11.2 Summary statistics of funds' risk-taking

Variables	Mean	SD	MIN	MAX	Median
Total risk (%)	5.48	3.51	0	22.08	4.87
Concentration-Stock (%)	10	7	0	48	8
Concentration-Bond (%)	4	7	0	66	2

Note: This table presents summary statistics for different risk measurements from 2005 to 2015. Total risk is the funds' return volatility which is calculated by the weighted average of return volatility across all funds within the fund management company; Concentration-bond is the value of top 5 bonds divided by the total net assets held by the fund management company. Concentration-stock is the value of top 5 stocks divided by the total net assets held by the fund management company.

Furthermore, we construct the fund management company-specific variables and fund-specific variables from the CSMAR database, for instance, the size of the fund management company, the total number of new funds started, a fund management company's experience, funds' expense ratio, and funds' abnormal return. The size of the fund management company is total net assets managed by the fund management company. We collect data on mutual fund total net assets at fund level to calculate the size of the fund management company by adding up all fund's total net assets under management by a fund management company in a particular year. We use the logarithm of total net assets managed by the fund management company in our regressions. The total number of new funds started is the total number of new funds started by a fund management company in a given year. We also collect the total number of funds under a fund management company for all sample years to compute the total number of new funds started by a fund management company in a given year.

A fund management company's experience refers to the number of years since a fund management company has been in existence in the Chinese mutual fund industry. Longer company's experience may reduce funds' risk-taking, as Kong and Tang (2008) claim that older fund management companies with a quality name are less likely to be involved in risky activities.

Funds' abnormal return is the difference between funds' return and market return. The computation of funds' abnormal return may need four steps. First of all, we collect annual data on fund net asset value (NAV) to calculate the fund annual return. Secondly, we compute the funds' value-weighted average return, where the weight is the size of the fund within the same fund management company (Khorana and Servaes, 2012). Thirdly, we compute the market return on the Chinese financial market index. Market index is by calculating 40% of the Shanghai Government bond index, 30% of the Shenzhen Composite index, and 30% of the Shanghai Composite index, because approximately 40% of the total assets are invested in the bond market in the Chinese mutual fund industry on average. Most studies use the average return of the Shanghai and Shenzhen market index as the market return (Zeng et al. 2015), as they are only concerned with the performance of equity mutual funds. In addition, the Shanghai Composite index, the Shenzhen Composite index and the Shanghai Government bond index are collected from the CSMAR database. Finally, funds' abnormal return is computed as the difference between the funds' value-weighted average return and the market return.

Funds' expense ratio is the weighted average expense ratio computed across all the fund within the management company. The calculation of the expense ratio is similar to the

funds' return. Firstly, we collect the data on fund expenses to calculate the fund expense ratio by dividing fund expenses by a fund's total assets. Secondly, we compute the funds' value-weighted average expense ratio, where the weight is the size of the fund within the same fund management company.

Table 12 shows the summary statistics of the fund management company-specific variables. We find that the sample mean of fund management company size is 36 billion Chinese Yuan. Table 12 presents that the average fund management company experience is 7.41 years. This result implies that the Chinese mutual fund industry is relatively young. In addition, the sample mean of funds' abnormal return is 1.68%, which reflects fund management companies on average performed better than the market. Moreover, the number of new funds started is 3.33 on average. The funds' expense ratio is 1.9% on average.

Table 12 Summary statistics of the fund management company-specific variables

Variables	Mean	SD	MIN	MAX	Median
Abnormal return (%)	1.68	18.75	-74.42	95.4	0.7
Company experience	7.41	4.23	1	18	7
Company size (in billions)	36	62.4	0.012	684	15.2
No. of funds started	3.33	4.23	0	34	2
Expense ratio (%)	1.9	1.3	0.01	19.66	1.76

Note: This table presents summary statistics on the key fund management company-specific variables. Company size is the total net assets of a fund management company; Abnormal return is the difference between funds' return and market return; Company experience is the number of years for a fund management company exists in the industry; No. of funds started is total number of new funds started by a fund management company in a given year; Expense ratio is funds' weighted average expense ratio.

Furthermore, Table 13 shows a correlation matrix of the independent variables. It is clear that almost all of the correlation coefficients are below 0.7. We can find that company size has a moderate relationship with other variables. For instance, the highest number of the correlation coefficient is 0.65 between company size and company experience. We find a moderate positive relationship between company size and market share and the estimated correlation coefficient is 0.6. In addition, we also find that company size is positively correlated with the number of funds started and the correlation coefficient is 0.51. Overall, the independent variables in the regressions are not highly correlated.

Table 13 Correlation matrixes of independent variables

	1	2	3	4	5	6
1-Board size	1					
2-Board structure	-0.41	1				
3-IIHold	-0.003	0.02	1			
4-Gender	0.13	-0.09	-0.05	1		
5-Education	0.29	-0.07	0.001	0.13	1	
6-No.funds started	0.06	-0.08	0.09	-0.04	0.14	1
7-Market share	0.04	-0.02	-0.09	-0.13	0.16	0.33
8-Abreturn	0.05	-0.04	-0.12	0.03	0.01	0.01
9-Expense	-0.02	-0.004	-0.27	0.09	-0.1	-0.2
10-Company size*	0.08	-0.03	-0.2	-0.09	0.15	0.51
11-Company experience	0.23	0.001	-0.01	-0.05	0.18	0.49

(Continued)

	7	8	9	10	11
7-Market share	1				
8-Abreturn	0.02	1			
9-Expense	-0.2	-0.02	1		
10-Company size*	0.6	0.16	-0.22	1	
11-Company experience	0.34	0.11	-0.08	**0.65**	1

Notes: Pearson correlation coefficients for independent variables from 2005 to 2015. The variable with an asterisk (*) is measured in logarithmic; Independent variables with high correlation coefficients are marked boldface. Board size is the number of directors on the board; Independent board is the percentage of independent directors on the board; Gender is a variable and equals to 1 if the board of the fund management company has at least one female member; Education is the number of directors on a board who hold a Ph.D. degree; Company size is the log of total net assets for a fund management company; Abnormal return is computed as the difference between funds' return and market return; Company experience is the number of years for a fund management company exists in the industry; No. of funds started is total number of new funds started by a fund management company in a given year; Expense ratio is funds' weighted average expense ratio.

2.5.2 Data description for Chapter four

Chapter four is investigating the relationship between ownership structure and funds' return and market share over the period 2005-2015. Table 14 provides the definition of the variables used in that chapter. We use government ownership ratio (GO), government-controlled companies (GCCs), foreign ownership ratio (FO) and foreign-invested companies (FICs) to represent ownership structure. We manually collect the information on the composition of shareholders from fund prospectus. However, the background of each agency is not disclosed in the fund prospectus. Therefore, we have to gather their background manually via on their websites in a given year.

Table 14. Definitions of Variables

Variable	Description	Sources
Government ownership	The percentage of shares owned by government agencies	Fund prospectus
GCCs	A dummy variable that equal to 1 if the largest (controlling) shareholder is a government agency and 0 otherwise	Fund prospectus
Foreign ownership	The percentage of shares owned by foreign strategic investors	Fund prospectus
FICs	A dummy variable that equal to 1 if a fund management company has foreign investment and 0 otherwise	Fund prospectus
OC1	Herfindahl index based on the ownership held by the shareholders of the mutual fund management company	Fund prospectus
OC2	The percentage of shares owned by the largest shareholder	Fund prospectus
Expense ratio	Expense ratio is the funds' weighted average expense ratio	CSMAR
Return	Return is the funds' weighted average return	CSMAR
Company Size	The total net assets managed by the fund management company	CSMAR
No. of funds started	The total number of new funds started by a fund management company in a given year	CSMAR
Top-1 fund	A dummy variable that equal to 1 if the fund management company has at least on fund operating in the top 1 of a given category in a given year	CSMAR
Company focus	Herfindahl index based on investment objective in a fund management company	CSMAR
Company experience	The number of years for a fund management company exists in the industry	CSMAR

Government ownership is calculated as the percentage of shares owned by the government agencies (Chen et al. 2006; Liang et al. 2013; Fan et al. 2013; Lin et al. 2016). We compute the government ownership in a fund management company by adding up all percentage of shares owned by the differnt government agencies. Gong et al. (2016) claimed that the percentage of government ownership would be high as they find a large number of government-controlled financial institutions in China's economy. A government-controlled company is a dummy variable that is equal to 1 if the largest shareholder is a government agency and 0 otherwise (Fan et al. 2007). We find a mixed relationship between government ownership and funds' performance. On the one hand, fund management companies with high level of government ownership weaken the corporate governance mechanisms and decrease funds' performance, because managers from these firms are not subject to market pressures (Chen et al. 2017). On the other hand, to some extent, it is possible to observe the benefits of government-controlled fund management companies as a high level of government ownership results in effective monitoring on corporate governance and improved financial transparency, because governments have a monopoly on the use of coercive power. Therefore, a high level of government ownership or government-controlled companies may enhance funds' performance.

In addition, foreign ownership is the percentage of shares owned by foreign investors (Ferreira and Motas, 2008; Aggarwal et al. 2011; Chen et al. 2013; Chen et al. 2016; Lin and Fu, 2017; Singla et al. 2017). We calculate the foreign ownership ratio by adding up all percentage of shares owned by the foreign agencies. We define a foreign-invested company if a fund management company has foreign investors. In the emerging market, the entry of foreign institutional investors will enhance human capital,

skills and knowledge transfer. Therefore, foreign ownership is expected to have a positive impact on funds' performance.

In this chapter, we use two measures of ownership concentration, namely ownership concentraion1 (OC1) and ownership concentration2 (OC2). By following the study Dong et al. (2014), ownership concentration1 is the ownership Herfindahl index (HHI) based on the ownership held by the shareholders of the mutual fund management company. The ownership Herfindahl index is calculated by the sums of the squared ownership shares. We are manually collecting the information about the percentage of shares owned by each agency from fund prospectus. Ownership concentration2 (OC2) is the percentage of shares owned by the largest shareholder (Dong et al. 2014). We find that the impact of ownership concentration on funds' return and market share is mixed in the existing literature. On the one hand, a high ownership concentration is beneficial for large shareholders and might damage the financial performance of the firm, as large shareholders seek to reap benefits of control at the expense of outside or minority shareholders (Goergen 2014). In addition, ownership concentration is related to the separation of ownership from management (Jensen and Meckling, 1976) that could also raise concerns of possible conflicts. On the other hand, high concentration in ownership may have positive effects on firm value due to the additional monitoring imposed on firms by large shareholders to mitigate principal-agent problems associated with dispersed ownership.

Table 15.1 shows the descriptive statistics of the ownership structure. We find that the average value of government ownership is 54.54 percent, which is higher than that of 23.89 percent reported by Chen et al. (2017). Additionally, the sample mean of state-

controlled companies is 70 percent. Turning to foreign ownership, the sample mean of foreign ownership is 18.56 percent, while that of fund management companies with foreign investment is 49%, which is larger than Lassoued et al.'s (2016) figure that is 33%. This finding means that almost half of Chinese mutual fund management companies have foreign shareholders. Furthermore, Table 14 presents that the mean of the ownership concentration ratio is 0.425. The mean of the largest shareholder's holding is 50.17 percent.

Table 15.1 Descriptive statistics of the ownership structure

Variables	Mean	SD	MIN	MAX	Median
GO (%)	54.54	27.59	0	100	52
GCCs	0.7	0.457	0	1	1
FO (%)	18.56	20.44	0	49	0
FICs	0.49	0.5	0	1	0
OC1	0.425	0.13	0.2	1	0.39
OC2	50.17	13.22	20	100	49

Note: This table reports summary statistics the mean, standard deviation, minimum, maximum and median values for the ownership structure. GO: Government ownership is the percentage of shares owned by a government agency; GCCs: Government-controlled companies is a dummy variable that equal to 1 if the largest shareholder agency and 0 otherwise; FO: Foreign ownership is the percentage of shares owned by foreign strategic investors; FICs: Foreign-invested companies is a dummy variable that is equal to 1 if a fund management company has foreign investors and 0 otherwise; OC1: ownership concentration1 is the ownership Herfindahl index (HHI) based on the ownership held by the shareholders of the mutual fund management company; OC2: ownership concentration2 is the percentage of shares owned by the largest shareholder.

In addition, Table 15.2 presents the evolution of ownership structure over the sample period from 2005 to 2015. We can find that the sample mean of government ownership (GO) fluctuated between 52% and 59% between 2005 and 2015. It is noticeable that the sample mean of government-controlled companies (GCCs) improved considerably from

65% in 2005 to 75% in 2008. From 2009 to 2015, while we find that the average value of GCCs had a small decline from 70% to 67% between 2009 and 2013, the sample mean of GCCs reached 71% in 2015.

Moreover, as shown in Table 15.2, we find that the average percentage of foreign ownership ratio (FO) was raised from 12.86% to 21.64% over the period between 2005 and 2011. After 2011, the mean of the foreign ownership ratio reduced gradually to 16.01% at the end of 2015. The table presents that the mean of foreign-invested fund management companies increased steadily from 2005 to 2011 and reached the highest point of 0.58. This result implies that more than half of fund management companies are invested by foreign institutional investors. Between 2011 and 2015, the average value of FICs was dropped from 0.58 to 0.43. Regarding ownership concentration, we observe an upward trend in the average ratio of ownership concentration 1 during the sample period, with a stable increase from 0.38 to 0.47. Also, a similar pattern is found by using the second ownership measurement OC2, as the average ratio of ownership concentration2 increased steadily from 0.48 to 0.55 over the period from 2005 to 2015.

Table 15.2 Change of ownership structure over time

Year	GO	GCCs	FO	FICs	OC1	OC2
2005	55.0	0.65	12.86	0.36	0.38	0.48
2006	56.2	0.69	14.05	0.38	0.37	0.46
2007	55.7	0.74	18.97	0.47	0.41	0.48
2008	59.0	0.75	21.4	0.54	0.42	0.49
2009	54.0	0.7	21.5	0.55	0.42	0.49
2010	54.3	0.7	21.4	0.57	0.42	0.49
2011	53.3	0.72	21.64	0.58	0.41	0.48
2012	53.5	0.69	19.47	0.53	0.41	0.49
2013	52.7	0.67	19.11	0.52	0.43	0.51
2014	53.8	0.7	17.42	0.48	0.46	0.54
2015	55.0	0.71	16.01	0.43	0.47	0.55

Note: This table presents changes in the ownership structure over the sample period from 2005 to 2015. GO: Government ownership is the percentage of shares owned by a government agency; GCCs: Government-controlled companies is a dummy variable that equal to 1 if the largest shareholder agency and 0 otherwise; FO: Foreign ownership is the percentage of shares owned by foreign strategic investors; FICs: Foreign-invested companies is a dummy variable that is equal to 1 if a fund management company has foreign investors and 0 otherwise; OC1: ownership concentration1 is the ownership Herfindahl index (HHI) based on the ownership held by the shareholders of the mutual fund management company. OC2: ownership concentration2 is the percentage of shares owned by the largest shareholder.

Furthermore, we construct the fund management company-specific variables and fund-specific variables from the CSMAR database, for instance, funds' return, funds' market share, top-1 fund, company focus, the size of the fund management company, the total number of new funds started, and the fund management company's experience. Regarding funds' return, it is the weighted average of returns across all funds within the fund management company. First of all, we collect data on fund annual net asset value (NAV) to calculate fund annual return (Kong and Tang 2008 and Cremers et al. 2009). Secondly, we compute the funds' value-weighted average return, in which the weight is the size of the fund within the same fund management company. Then, funds' market

share, following the previous study by Khorana and Servaes (2012), is computed by the sum of all assets managed by each fund management company divided by all assets in the mutual fund industry. Therefore, the first step is to compute the size of the Chinese mutual fund industry by the sum of all assets managed by fund management companies in the mutual fund industry in a given year. The second step is to compute funds' market share by assets managed by each fund management company divided by the size of the Chinese mutual fund industry.

The top-1 fund is a dummy variable that is equal to 1 if the fund management company has at least one fund operating in the top-1 of a given category in a given year. We collect data about the mutual fund ranking in a given category at a given year from the CSMAR database and use it to define top-1 fund (or otherwise called star fund performer) in a given category for a fund management company. Nanda et al. (2004) indicate that top-1 (or otherwise called star fund performer) contributes a greater cash inflow to the fund. This means that funds in top-1 might have a positive impact on funds' market share.

In addition, company focus is the Herfindahl index based on investment objective in a fund management company (Khorana and Servaes 2012). We collect data from the CSMAR database to calculate the fund management company's focus, as the CSMAR database offers investment objectives for each fund. We conclude that there are 19 investment objectives in the Chinese mutual fund markets, such as emerging markets Equity, US equity, global bonds and equities, value investment equities and short-term and long-term bonds. Hence, we first compute assets under each investment objective for each fund management company. Secondly, we calculate the Herfindahl index as the

sum of the squared fractions of the fund management company's assets invested in each objective.

The fund management company size is measured by the total net assets managed by the fund management company. Larger fund management companies tend to perform better because of better concessions on trading commissions and more resources for research (Chen et al. 2004). Funds' expense ratio is calculated by the weighted average of expense ratios across all funds within the same fund management company, where the weight is the size of the fund within the same fund management company. Company experience is the number of years that a fund management company has existed in the industry. We collect the number of new funds started by a fund management company in a given year.

The descriptive statistics for fund management company characteristic variables are provided in Table 16. As shown in Panel A of Table 16, the average funds' market share is 1.44%, which is greater than the figures of 0.36% obtained by Khorana and Servaes (2012) for their U.S. sample. And, the sample mean of funds' return is 16%. In Panel B, we show some descriptive statistics of mutual fund management company-specific variables. The sample mean of a fund management company's risk is 5.48%, which is slightly higher than that of 3% reported by Kong and Tang (2008). Meanwhile, The sample mean of top-1 fund and company focus are 0.08 and 0.44, respectively.

In addition, Table 17 shows a correlation matrix of the independent variables. It is noticeable that most of the correlation coefficients are below 0.7. The highest number of the correlation coefficient is 0.92 between foreign ownership and FICs, followed by the

coefficient between OC1 and OC2. We find that the correlation coefficient between OC1 and OC2 is 0.87. The correlation coefficient between government ownership and GCCs is more than 0.7. To avoid the issue of mullticollinearity, independent variables with high correlation coefficients will not be appeared in the same regression.

Table. 16 Summary statistics for main variables

Variables	Mean	SD	MIN	MAX	Median
Panel A: Dependent variables					
Market share (%)	1.44	1.72	0.003	7.8	0.75
Return (%)	16	34.96	-60.76	158.27	6.99
Panel B: Company-specific					
Risk (%)	5.48	3.51	0.05	22.08	4.89
Top-1 fund	0.08	0.28	0	1	0
Company focus	0.44	0.24	0.13	1	0.36

Note: This table presents summary statistics the mean, standard deviation, minimum, maximum and median values for the key variables. Market share is calculated by the sum of all assets under management by each company divided by all assets under management in the fund industry; funds' return is the weighted average of returns across all funds within the fund management company; Risk is the funds' return volatility is calculated by the weighted average of return volatility across all funds within the fund management company; Top-1 fund is a dummy variable that equal to 1 if the fund management company has at least one fund operating in the top1 of a given category in a given year; Company focus is the Herfindahl index based on investment objective in a fund management company;

Table 17. Correlation matrix of independent variables

	1	2	3	4	5	6
1-Government ownership	1					
2-GCCs	**0.76**	1				
3-Foreign ownership	-0.29	-0.05	1			
4-FICs	-0.22	-0.01	**0.92**	1		
5-OC1	0.09	0.1	0.3	0.28	1	
6-OC2	0.18	0.14	0.1	0.17	**0.87**	1
7-Expense	-0.15	-0.15	0.07	0.04	-0.02	-0.07
8-Company size*	0.14	0.16	0.08	0.14	0.02	0.03
9-Company experience	0.12	0.1	-0.001	0.03	-0.19	-0.19
10-No. of funds started	0.06	0.05	0.004	0.06	-0.02	0.01
11-Company top1	-0.06	-0.04	0.05	0.06	-0.04	-0.05
12-Company focus	-0.08	-0.11	-0.11	-0.16	0.05	0.08

(Continued)

	7	8	9	10	11	12
7-Expenses	1					
8-Company size*	-0.22	1				
9-Company experience	-0.02	0.65	1			
10-No. of funds started	-0.23	0.51	0.44	1		
11-Company top1	0.03	0.03	0.02	0.04	1	
12-Company focus	0.05	-0.59	-0.69	-0.46	-0.04	1

Notes: Pearson correlation coefficients for independent variables from 2005 to 2015. The variable with an asterisk (*) is measured in logarithmic; Independent variables with high correlation coefficients are marked boldface. Government ownership is the percentage of shares owned by a government agency; GCCs: Government-controlled companies is a dummy variable that equal to 1 if the largest shareholder agency and 0 otherwise; Foreign ownership is the percentage of shares owned by foreign strategic investors; FICs: Foreign-invested companies is a dummy variable that is equal to 1 if a fund management company has foreign investors and 0 otherwise; OC1: ownership concentration1 is the ownership Herfindahl index (HHI) based on the ownership held by the shareholders of the mutual fund management company; OC2: ownership concentration2 is the percentage of shares owned by the largest

shareholder; Market share is calculated by the sum of all assets under management by each company divided by all assets under management in the fund industry; funds' return is the weighted average of returns across all funds within the fund management company; Risk is the funds' return volatility is calculated by the weighted average of return volatility across all funds within the fund management company; Company top1 is a dummy variable that equal to 1 if the fund management company has at least one fund operating in the top1 of a given category in a given year; Company focus is the Herfindahl index based on investment objective in a fund management company;

2.5.3 Data description for Chapter five

Chapter 5 investigates the relationship between the fund managerial attributes and fund performance and focuses on fund manager level characteristic, including the manager's tenure, education, and management structure. Table 18 provides the definition of the variables used in this chapter. In this chapter, we collect data on equity mutual fund attributes, fund manager's attributes, market capitalization and stock returns from the CSMAR database. With respect to fund performance, we choose the Stochastic Frontier Approach-SFA approach and the Capital Asset Pricing Model (CAPM) and Fama-French three-factor model to evaluate fund performance. We collect monthly data on equity fund NAV, stock returns and market capitalization to compute the CAPM alpha and Fama-French alpha to proxy for fund performance.

In addition, we adopt the Stochastic Frontier Analysis (SFA) to measure fund performance. In our study, we opt for multiple inputs such as fund' expense ratio and risk (measured by the standard deviation of monthly returns), and a single output, for instance, the mean fund return. Therefore, we collect annual data on fund expenses and monthly data on fund NAV. A fund expense ratio is measured as the fund expenses divided by the total fund net assets. We use monthly data on fund NAV to calculate the fund monthly return and the mean fund return over a year. Then, we compute equity fund risk as the standard deviation of fund monthly returns.

Table 18 Definitions of variables

Variables	Description	Sources
CAPM-alpha	It is estimated from the Capital Asset Pricing Model	CSMAR
FF3-alpha	It is estimated from the Fama-French three-factor model	CSMAR
Efficiency score	It is estimated from the Stochastic Frontier Analysis approach	CSMAR
Team management structure	A dummy variable which takes the value of 1 if the fund is managed by a team and the value of 0 otherwise	CSMAR
Tenure	The number of years that managers have been with a fund	CSMAR
Education	A dummy variable which takes the value of 1 if the fund managers have a Ph.D degree	CSMAR
Fund size	The logarithm of total net assets managed by a fund	CSMAR
Risk	The standard deviation of fund return	CSMAR
Market return volatility	The standard deviation of market return	CSMAR
Turnover	The ratio of the minimum of annual purchase of sales stocks divided by the average annual amount of fund wealth	CSMAR
Expense	The expense ratio is fund expense divided by the total fund assets	CSMAR
Supervisory Board size	The number of supervisors on the supervisory board of fund management company	Fund prospectus
IIhold	The percentage share held by institutional investors for each fund management company	CSMAR
GDP	It is the rate of growth in the gross domestic product of China in a given year	CSMAR
Inflation	It represents the level of prices for goods and services of China in a given year	CSMAR

Table 19.1 presents the summary statistics for the average equity fund performance. We find that the average value of fund's efficiency score is 69 percent, which is less than that of 81.2 percent found in Babalos et al. (2015) in their U.S sample during the period

from 2002 to 2010. Moreover, we find that the average value of CAPM-alpha is 0.26%. Similarly, the sample mean of Fama-French3-alpha is 0.53%. The results reveal that the equity mutual funds gain positive risk-adjusted returns in our sample period from 2005 to 2013. Moreover, this result is similar to the figure of 0.483% reported by Gong et al. (2016) for their Carhart4-alpha in China sample.

Furthermore, we concern that the efficiency score and risk-adjusted returns might be highly correlated, thus leading to similar findings. Table 19.2 reports a correlation matrix of the fund performance. As shown in Table 19.2, we find that the correlation between the efficiency score and risk-adjusted returns (CAPM-Alpha and Fama-French3-Alpha) is relatively low. This result reveals that these two performance measures might present a different type of information. Moreover, we find the highest correlation coefficient is 0.7 between CAPM-Alpha and Fama-French3-Alpha.

Table 19.1 Summary statistics of fund performance

Variables	Mean	SD	MIN	MAX	Median
Efficiency Score	69%	12%	48%	99%	66%
CAPM-Alpha	0.26%	1.48%	-4.8%	29.38%	0.06%
Fama-French3-Alpha	0.53%	1.98%	-4.1%[9]	28.5%	-0.05%

Notes: The table reports summary statistics the mean, standard deviation, minimum, maximum and median values for the equity fund performance from the sample period between 2005 and 2013. Efficiency score is estimated from the Stochastic Frontier Analysis approach; CAPM-Alpha is estimated from the Capital Asset Pricing model; Fama-French3-Alpha is estimated from the Fama-French three-factor model.

[9] We find this negative value alpha in studies Gong et al. (2016) and Ghoul and Karoui (2017).

Table 19.2. Correlation of efficiency score and risk-adjusted returns

	Efficiency Score	CAPM-Alpha	Fama-French3-Alpha
Efficiency Score	1		
CAPM-Alpha	-0.0022	1	
Fama-French3-Alpha	0.0602	0.7065	1

Notes: The table shows the correlation of efficiency score and risk-adjusted returns for a sample of China mutual funds over the period from 2005 to 2015. Efficiency score is estimated from the Stochastic Frontier Analysis approach; CAPM-Alpha is estimated from the Capital Asset Pricing model; Fama-French3-Alpha is estimated from the Fama-French three-factor model.

We collect information about the fund manager's attributes including the manager's tenure, education, and team management structure from the CSMAR database. Moreover, we also use fund prospectus to manually collect the fund manager's attributes when the CSMAR database lacks such information, especially for the fund manager's education. The fund manager’s tenure is the number of years that a fund manager worked for a fund (Golec, 1996 and Prather et al. 2004). When there is more than one manager in the fund, the more senior manager’s tenure is used (Golec, 1996). The impact of manager tenure on fund performance is mixed in the literature. On the one hand, some studies argue that longer tenure would lead to more investment experience and thus better fund performance (Prather et al. 2004; Wang and Ko 2017). On the other hand, other studies present a negative relationship between manager tenure and fund performance (Porter and Trifts 2012, 2014 and Fang et al. 2014), which reveals that fund managers with longer tenure may lead to more bored and less incentive. Therefore, it is expected to find a positive relationship between tenure and fund performance.

With respect to the manager's educational degree, this chapter focuses on whether the manager holds a Ph.D. degree. Therefore, education is a dummy variable which takes the value of 1 if the fund is managed by a manager with a Ph.D. degree and the value of 0 otherwise (Clare, 2017). We are also interested to know the impact of business degrees on fund performance. So, we collect information about whether the manager holds an MBA or a CFA. We consider that fund managers with a Ph.D. degree, an MBA or a CFA may have more knowledge and better professional skills. Thus, a higher degree may signal a better investment quality. It is expected to have a positive relationship between education and fund performance

Furthermore, the team management structure is that the fund has more than one manager. The team management structure will be a dummy variable which equals one if the fund has more than one manager (Adams et al. 2018). The conflicts between team members would result in coordination problems (Hackman, 2002) and ineffective in the decision-making process. Consequently, we expect to find a negative impact of the management structure on fund performance.

Table 20 presents descriptive statistics for the managerial attributes. As shown in Table 20, the sample mean of education is 16%, which indicates that 16% of funds are managed by a Ph.D. holder on average. This number is higher than Fang and Wang's (2015) average of 11.4% in their sample for Chinese mutual funds over the period between 2008 and 2011. The sample mean of team-managed funds is 29%, which is a much lower percentage than the reported figure of 58.62% reported by Adams et al. (2018) for U.S fund management structure. Meanwhile, we find that the sample mean of manager tenure is 2.68, with a minimum and a maximum of 1 and 8 years, respectively.

According to Clare (2017), the average manager tenure is 16 years, much longer than the average manager tenure in our sample.

Table 20 Summary statistics of fund managerial attributes

Variables	Mean	SD	MIN	MAX	Median
Team Management structure (%)	29	45	0	100	0
Education (%)	16	37	0	100	0
Tenure	2.68	1.42	1	8	2

Notes: The table reports summary statistics the mean, standard deviation, minimum, maximum and median values for the variables used in analyzing equity fund performance from the sample period between 2005 and 2013. Team management structure: dummy which takes the value of 1 if the fund is managed by a team and the value of 0 otherwise; Education is a dummy which takes the value of 1 if the fund is controlled by a manager with Ph.D. degree and the value of 0 otherwise; Tenure is the number of years that manager has been with a fund.

The following fund-specific variables are also selected in our study, fund size, turnover ratio, funds under management and market return volatility. Fund size estimated by the logarithm of a fund's total net assets. We collect annual data on the fund's total net assets (TNA) from the CSMAR database. Empirical studies present a mixed result for the impact of fund size on fund performance. Some studies show that large funds would result in lower expense and low transaction costs, leading to better fund performance (Otten and Bams, 2002; Annaert et al. 2003 and Ferreira et al. 2013). However, Prather et al. (2004), Chen et al. (2004), Nanda and Wang, (2008) and Tang et al. (2012) find a negative impact of fund size on performance.

Turnover rate is estimated by the minimum annual sales or purchase divided by average annual total net assets and is used to measure the fund's trading activities (Adams et al. 2018). We collect the information about fund's minimum sales and purchases over a year to compute fund's turnover rate. In the literature, Adams et al. (2018) find that turnover is negatively related to fund performance. In contrast, Ippolito, (1989), Droms and Walker, (1994) and Gottesman and Morey, (2006) demonstrate that there is an insignificant relationship between turnover and fund performance.

Concerning the funds under management, it is the number of mutual funds under a single-manager or a team. We use funds under management to check the fund's management effectiveness, as management effectiveness might be deteriorated when fund managers attempt to cover more funds (Prather et al. 2004). Market return volatility is calculated by the standard deviation of market return. There are two steps to calculate Market return volatility. First of all, we use the data from the CSMAR database to calculate the monthly market return in monthly market index price by using 40% of the Shenzhen composite index, 20% of the Shanghai Government bond index, and 40% of the Shanghai Composite index. Secondly, we use the market return to calculate the standard deviation of market return to proxy for market return volatility. Finally, data from the World Bank are the GDP growth rate and inflation rate as the macroeconomic control variables.

Table 21 presents the summary statistics results for the fund-specific characteristics and macroeconomic variables. As shown in Panel A of Table 21, we find that the sample mean of open-ended mutual fund mean return is 5.8%. The sample mean of fund expense ratio is 2.9%, which is higher than that of 1.32% reported by Bai et al. (2019)

in their sample for U.S equity mutual funds. Moreover, the sample mean of Market return volatility is 5.99%, which is slightly higher than that of fund risk of 5.01%. We find that the average fund size is 3.92 billion Chinese Yuan. For comparison, Gong et al. (2016) find that the average fund size is 6.38 billion in China over the period from 2004 to 2009. The average turnover ratio is 2.75. An average fund manager manages 1.65 funds. Regarding the macroeconomic variables shown in Panel B in Table 14, the sample mean of the GDP growth rate and inflation rate are 9.26% and 4.15%, individually.

Table 22 presents a correlation matrix of the independent variables. It is clear that most of the correlation coefficients are below 0.6. We can find that the highest number of the correlation coefficient is 0.6 between expense ratio and turnover ratio. Also, we find a moderate positive relationship between GDP and inflation rate and the correlation coefficient is 0.55. Therefore, we can conclude that the independent variables are not highly collinear in this chapter.

Table 21. Summary statistics for control variables

Variables	Mean	SD	MIN	MAX	Median
Panel A: Funds specific characteristics					
Mean return	5.80%	38.40%	-84%	175.88%	3.50%
Expense ratio	2.90%	1.15%	0.20%	12.71%	2.65%
Risk	5.01%	2.27%	0.05%	23.07%	5.00%
Market return volatility	5.99%	1.59%	4.04%	9.28%	5.65%
Fund size (in Billions)	3.92	4.9	0.01	4.14	
Turnover	2.75	3.44	0.07	86.23	2.14
Funds under management	1.65	1.04	1	10	1
Panel B: Macroeconomic variables					
GDPg	9.26	1.78	7.65	14.16	9.2
Inflation	4.15	3.05	0.61	6	1.99

Notes: The table reports summary statistics the mean, standard deviation, minimum, maximum and median values for the variables used in analyzing equity fund performance from the sample period between 2005 and 2013. Mean return is the average of raw return in a given year; expense ratio is calculated by dividing the fund expenses by the total fund assets. Risk is the annualized standard deviation of fund returns; Market return volatility is the standard deviation of market return; Fund size is measured by total net asset (TNA) which is equal to total assets minus total liabilities; Turnover is the ratio of the minimum of annual purchase or sales stocks divided by the average annual amount of fund wealth; Funds under management presents the number of funds under a sole manager or team of managers; GDP growth rate is the rate of growth in gross domestic product of China in a given year; Inflation is the inflation rate in a given year.

Table 22. Correlation matrix of key variables

	1	2	3	4	5	6
1-Team	1.00					
2-Tenure	0.03	1.00				
3-Education	0.09	-0.06	1.00			
4-Fund size*	0.05	0.18	-0.10	1.00		
5-FundUM	0.30	0.05	0.17	-0.06	1.00	
6-GDP	-0.01	-0.03	-0.02	0.30	-0.13	1.00
7-Inflation	0.001	-0.15	-0.03	0.15	-0.04	0.55
8-Expense	0.02	-0.10	0.07	-0.44	0.00	-0.12
9-Risk	0.03	-0.18	0.00	-0.04	-0.10	0.23
10-Market return volatility	0.03	-0.14	-0.02	0.33	-0.08	0.44
11-Turnover	-0.03	-0.12	0.08	-0.51	-0.01	-0.09

(Continued)

	7	8	9	10	11
7-Inflation	1.00				
8-Expense	0.20	1.00			
9-Risk	-0.07	0.11	1.00		
10- Market return volatility	0.04	0.11	0.39	1.00	
11-Turnover	-0.14	**0.60**	0.16	-0.08	1

Notes: Pearson correlation coefficients for persistence and fund characteristic and managerial attributes from 2005 to 2013; The variable with an asterisk (*) are measured in logarithmic; Independent variables with high correlation

coefficients are marked boldface. Team management structure is a dummy which takes the value of 1 if the fund is managed by a team and the value of 0 otherwise; Education is a dummy which takes the value of 1 if the fund is controlled by a manager with Ph.D. degree and the value of 0 otherwise; Tenure is the number of years that manager has been with a fund; Mean return is the average of raw return in a given year; expense ratio is calculated by dividing the fund expenses by the total fund assets. Risk is the annualized standard deviation of fund returns; Market return volatility is the standard deviation of market return; Fund size is measured by total net asset (TNA) which is equal to total assets minus total liabilities; Turnover is the ratio of the minimum of annual purchase or sales stocks divided by the average annual amount of fund wealth; Funds under management presents the number of funds under a sole manager or team of managers; GDP growth rate is the rate of growth in gross domestic product of China in a given year; Inflation is the inflation rate in a given year.

2.6. Limitations of database

There are several limitations associated to the databases. First of all, our sample size on the fund management company is relatively small compared with researches documented in the United States[10] because of the short history of China's mutual fund industry. Secondly, as the Chinese mutual fund management companies do not disclose their financial reports, for instance, compensation for board members, so we can only focus on board structure in chapter three. Thirdly, it is difficult to find a market index for our sample. In chapter four, we use 30% of the Shanghai Composite index, 30% of the Shenzhen Composite index and 40% of the Shanghai Government bond index to calculate the market index. However, this market index may not be reasonable to apply to all mutual fund companies when we estimate the funds' abnormal return, as different fund management companies have different asset allocations. Finally, in chapter five, we only focus on equity mutual funds, as it is challenging to construct appropriate benchmark indexes for other categories, for instance, hybrid mutual funds.

2.7 Conclusion

[10] Cici et al. (2018) state that there are 875 fund families in the United States in 2013. In our sample, the number of fund management companies is 77 in 2013.

In this chapter, we first present the differences between contractual mutual fund governance and corporate mutual fund governance. Fund investors are not shareholders of the fund management companies and are also not represented in the governance structure of the fund management company under contractual mutual fund governance in China. Thus, it becomes essential for the board of directors to safeguard fund investors' wealth and advance fund investors' best interests and to address the conflict of interests between fund investors and the fund management company. Therefore, we start to examine the effectiveness of contractual fund governance by investigating the impact of governance on funds' risk-taking, return and market share.

In addition, we also present the development of open-ended mutual funds in China over the sample period from 2005 to 2015. We find that not only the number of mutual funds increased rapidly, but also the size of mutual funds increased significantly over the sample period. Given the explosive growth of mutual funds in the Chinese capital market, it is interesting to investigate the mutual funds in China. Also, we present the definition and summary statistics for the main variables in this thesis. Furthermore, we present the limitation of the database regarding the CSMAR. We manually collected the corporate governance variables from fund prospectus and fund financial reports.

Chapter 3: Does corporate governance affect risk-taking behavior of Chinese mutual funds?

3.1. Introduction

The mutual fund industry in China has experienced rapid growth during the past two decades, partly due to the rapid growth in capital markets and the participation of masses of individual investors. For instance, the total mutual fund net assets were approximately $67 billion in 2005. As of 2015, China mutual fund industry managed more than $1.3 trillion in the total net value for nearly 1.3 million households. This amount of total net assets is almost half of total net assets in Asia mutual fund market, as Asia mutual funds total net assets were approximately $3.2 trillion. Moreover, the number of mutual funds grew from approximately 300 to 2722 during the sample period from 2005 to 2015. However, despite the Chinese mutual fund industry is strongly growing over recent years it remains to a large extent an '*enigma'* to many as there are few studies that look into the industry (Gong et al. 2016). An area where there is not at all evidence of the underlying corporate governance structure of Chinese mutual fund industry. This study comes in a timely manner and fills this gap in the literature.

In some detail, China has a different type of mutual fund governance structure compared for example to the U.S. The main difference is that according to the Chinese

corporate governance code a Chinese mutual fund provides contractual services to fund investors as opposed to providing equity shares, which is the case in the U.S. This implies that Chinese fund investors are not shareholders of the funds, they are fund unit holders whereby they buy the right to participate in a certain asset pool. So, then the question is: if the Chinese fund investors are not the owners of the funds who are the owners? The shareholders of the Chinese funds are mainly financial institutions such as insurance companies or commercial banks. As such fund investors are not represented in the governance structure of the fund management company. Without a direct representation on either the board of directors or the supervisory board, it becomes important to have in place effective corporate governance in protecting fund investors' interests. If the contractual fund governance is ineffective for fund investors, their only recourse is to redeem their fund shares from the fund management company (Jank and Wedow, 2013). This chapter is focusing primarily on revealing how effective is the corporate governance of Chinese mutual funds in relation also to the underlying risk-taking. We argue that risk is key for protecting the interest of investors given the corporate governance structure.

Moreover, the literature (Ingley and Walt, 2008; Andres and Vallelado, 2008; Hardwick et al., 2011; Erkens et al., 2012; Tao and Hutchinson, 2013; Battaglia and Gallo, 2017 and Akbar et al., 2017) shows that failing corporate governance is a major cause of excessive risk-taking and thereby significant operational losses in the financial industry in general. In recent years, there some studies that recognize the importance of corporate governance for mutual funds (see, e.g. Fu and Wedge, 2011; Calluzzo and Dong, 2014; Adams et al., 2016; Kurniawan et al., 2016). Most studies examine the impact of a mutual fund board structure either on accounting measures of performance

(Adams et al., 2010 and Gong et al., 2016), on expense ratios (Cremers et al., 2009 and Kryzanowski and Moheshahedin, 2016) or on merger activities (Khorana et al., 2007). Yet, few studies investigate the relationship between governance and mutual funds' risk-taking. For instance, Berkowitz and Qiu (2003) examine the impact of ownership of mutual fund management companies on their performance and risk-taking behavior and document that publicly-traded management companies invest in riskier assets than private management companies in Canada. However, Ferris and Yan (2007) show that operational risk as measured by late trading and other trading abuses are not related to corporate governance such as board independence, though Chou et al. (2011) provide evidence that mutual funds with high-quality governance tend to avoid investing in riskier firms which have poor governance in the United States.

This chapter fills a gap in the literature on an important missing link in the literature as we argue that higher risk-taking behaviors might serve fund managers' best interests, but not necessarily the interests of fund investors. Also, in the case of Chinese mutual funds, investors are not shareholders of the mutual funds. We follow the agency theory and focus on the role and structure of the board of directors, given that it is primarily the board's responsibility to monitor management actions and ensure that effective governance is in place, for risk-taking. In addition, and given our unique data set of corporate governance for Chinese mutual funds we further examine whether the former would also affect the effectiveness of the latter apart their risk-taking behavior. In some detail, Adams et al. (2010), Cremers et al. (2009) and Kong and Tang (2008) argue of the importance of corporate governance for the funds' return and market share. Following those studies, we focus on funds' return and market share to proxy for the effectiveness of fund governance.

This chapter makes several contributions to the literature. Firstly, it is the first study to investigate the impact of board characteristics on funds' risk-taking behavior in the Chinese mutual fund industry. Data availability is usually limited, especially for emerging markets, but we manage to collect manually the necessary data. We employ, therefore, a unique dataset obtained from mutual fund management companies' website, which contains complete information about board size, structure and gender to construct indications of the composition of the board during the period between 2005 and 2015 for 731 observations, based on annual observations of 94 mutual fund management companies. Secondly, this chapter responds to measurement issues and employs total risk and concentration risk as risk-taking measures. Funds' total risk is the funds' return volatility that is a traditional risk measurement in the mutual fund industry (Brown et al., 1996; Elton et al., 2007; Kong and Tang, 2008; Babalos, 2015; Cumming et al., 2015 and Sila et al., 2016). In addition, concentration risk is the value of top-5 stocks or top-5 corporate bonds as a proportion of the total fund management company value and we consider issues related to endogeneity by estimating a dynamic analysis panel with GMM. Thirdly, we provide measures of the effectiveness of corporate governance.

Our main results show that fund governance affects the risk-taking behavior of Chinese funds management. A large board size endures a lower stock concentration risk. Having a higher percentage of independent directors may also be associated with a lower bond concentration risk. However, female directors on a board would increase funds' total risk and stock concentration risk. We also find that external governance (institutional investors' holding) is vital for effective risk management, as it has a significantly negative impact on both the total risk and concentration risk. Finally, having a more

highly educated board director reduces the total risk incurred by a fund management company.

The rest of the chapter is structured as follows. Section 3.2 provides related studies on fund governance and presents the hypotheses development. Section 3.3 reveals the methodology and introduces the data. Section 3.4 discusses the findings of the empirical study. Section 3.5 presents the conclusion and makes some policy suggestions.

3.2. Hypotheses development

Over the past decade, the mutual fund literature focuses particularly on the impact of fund characteristics on fund performance (see, e.g. Chevalier and Ellison, 1997; Dahlquist et al. 2000; Huang et al. 2007; Cuthbertson et al., 2008; Cuthbertson et al., 2010; Cuthbertson and Nitzsche, 2013; Fama and French, 2010; Ferreira et al. 2012; Zeng et al., 2015 and Berggrun and Lizarzaburu, 2015). In recent years, the role of corporate governance on mutual fund performance has begun to achieve greater prominence both in the developed and emerging countries. Some studies examine the impact of corporate governance on funds' expense ratio (Tufano and Sevick, 1997; Del et al., 2003; Cremers et al., 2009 and Kryzanowski and Moheshahedin, 2016) and merger activities (Khorana et al., 2007). However, a few existing studies in the literature investigated the relationship between corporate governance and funds' risk-taking.

3.2.1 Board characteristics and risk taking

Although there are numerous studies of board characteristics and risk-taking in the academic literature, most focus on listed companies and banks rather than mutual funds (Dalton et al., 1998, Boone et al., 2007, Brick and Chidambaran., 2008, Cheng, 2008, Pathan, 2009, Wang, 2012, Wang an Hsu., 2013, Berger et al., 2014, Levi et al., 2014, Huang and Wang., 2015, Dong et al., 2016, Faleye and Krishnan, 2017 and Akbar et al., 2017)[11]. With respect to the literature on mutual fund governance, Berkowitz and Qiu (2003) examine the impact of ownership of mutual fund management companies on their performance and risk-taking behavior and document that publicly-traded management companies invest in riskier assets than private management companies in Canada. Khorana et al. (2007) find that mutual funds with more independent directors have better risk management by approving to merger underperformance funds using mutual fund mergers database between 1999 and 2001. Using a Lipper 2003 mutual fund board data, Fu and Wedge (2011) conclude that mutual funds with a higher percentage of independent directors are more likely to replace underperforming managers. In support of this view, Ding and Wermers (2012) study the governance structure of open-end mutual funds from 1985 to 2002, especially for the independent directors. Ding and Wermers show that funds with a higher percentage of independent directors tend to control risk at a certain level by terminating underperforming portfolio managers. They also conclude that inside directors appear to provide better monitor on funds operation.

However, Qian (2006) examines the board's effectiveness with a sample of 92 fund families and 10220 funds in 2003. Qian finds weak evidence of an association between

[11] Cheng (2008), Pathan (2009) and Wang and Hsu (2012) find that having a larger board might lead to lower risk-taking behaviour. Brick and Chidambaran (2008), Pathan (2009), Chernobai et al. (2011), Ho et al. (2013) and Vallascas et al. (2017) suggest that more independent boards on a board is more likely to have better internal control, leading to less risk-taking behaviour.

board structure and trading violations. Moreover, Ferris and Yan (2007) show that operational risk as measured by late trading and other trading abuses are not related to corporate governance such as board independence. Using a unique database of closed-end mutual funds in the U.S. during the period from 1994-2013, Kryzanowski and Mohebshahedin (2016) examine the mutual funds' board effectiveness and find that independent directors cannot provide effective monitoring on funds' risk-taking in the case of funds with high information asymmetry.

Furthermore, Chou et al. (2011) analyze the quality of mutual fund governance by using Morningstar mutual fund stewardship data from the sample period between 2004 and 2006. They find that mutual funds with high quality governance tend to avoid investing in riskier firms that have poor governance in United States. Using a sample of 273 open-ended the U.S. mutual funds during the period between 2007 and 2011, Kurniawan et al. (2016) examine the mutual fund governance and investigating the influence that funds with better governance quality would reduce the risk in style drift[12]. They also conclude that mutual funds with higher managerial incentives exhibit more risks in style drift.

There has been little attempt to analyze board characteristics and risk taking in the Chinese mutual fund industry. Huang and Wang (2015) point out that large boards are associated with less risk. Dong et al. (2016) claim that the proportion of female directors on the board appears to lower the risk, based on a manually collected unique dataset in China during the period from 2003 to 2011. These findings are consistent with the evidence provided by Khaw et al. (2016), who find that risk-taking behaviors

[12] Style drift is funds can and do stray from their pronounced style (Kurniawan, et al., 2016).

increase with the presence of male-only boards among Chinese corporations, though this positive relationship became more prominent since the Non-Tradable share (NTS) reform launched in 2005.

Based on the above literature, we set the following hypothesis:

Hypothesis 1: the fund management company's board characteristics have an impact on funds' total risk and concentration risk.

3.2.2 Effectiveness of corporate governance of mutual funds

Jensen and Meckling (1976) and Dalton et al. (1998) suggest that independent directors are positively related to firm performance. Recent empirical study that focuses on the mutual funds indicates that an increase in the proportion of independent directors could be more beneficial to fund investors. Guercio et al. (2003) study the effectiveness of board structure of closed-end funds. They find a positive association between board independence and board effectiveness by using a sample of 476 closed-end funds. Moreover, a higher level of independence may lead to merge poor performance funds for the subsample of across-family mergers (Khorana et al. 2007). Also, Fu and Wedge (2011) investigate the relationship between board independence and fund manager turnover and find that a greater percentage of independent directors are more likely to replace underperforming fund managers by using a sample of 5,982 equity and bond mutual funds in 2003. In support of this argument, Ding and Wermers (2012) suggest that independent directors more often terminate underperforming fund managers. Additionally, Kryzanowski and Mohebshahedin (2016) find that board independence

reduces the fund performance, as estimated by benchmark-adjusted returns, of all U.S. closed-end funds over the sample between 1994 and 2013. They also indicate that funds with higher percentages of independent directors have lower expense ratios.

Using a sample of 969 U.S. mutual funds, Kong and Tang (2008) examine the effectiveness of unitary board structure and find that funds with more independent boards may result in higher expense ratios and lower stewardship. They conclude that a unitary board with smaller size may tend to have lower fees. In addition, Adams et al. (2010) find that board size is negatively association with index fund overall performance, as estimated by expense ratio, return differential, and alpha by using a manually collected data consisting of 148 mutual funds over the period 1998-2007.

Furthermore, Chen et al. (2008) find that board ownership is positively correlated with benefits to fund investors from the director's monitoring effort, for a sample of U.S. mutual funds over the 2002-2003 periods. Similarly, Cremers et al. (2009) argue that there is a positive relationship between board ownership and fund performance for a sample of U.S. mutual funds during the period 1996-2004. The reason is that director ownership could lead directors to be more active monitors. Using a sample of 606 mutual funds in 2003, Fricke (2015) investigates that the impact of board ownership on the turnover of fund managers and shows that funds with lower level of ownership are less likely to replace underperforming fund managers. This finding is further to explain why some funds consistently perform worse than other funds over a long time.

Despite the above, there are not many studies to provide an analysis of the Chinese mutual fund industry. Most empirical evidences reveal the importance of corporate

governance on public companies. For instance, Liang et al. (2013) show that a higher level of independence may lead superior firm performance. Liu et al. (2015) adopt several different methods to examine the impact of board structure on firm performance, for instance, GMM estimator, the difference in differences method and instrumental variables. The result suggests that an increase in the proportion of independent boards in the board exerts a positive impact on performance. Likewise, Zhu et al. (2016) examine the relevance of independent-director rankings on firm value by hand-collecting the listing order of directors in the company's annual report during the period from 2006 to 2009. Their results show that independent director rankings are positively related with firm value and empowering independent directors improves firm's governance effectiveness.

Based on the above literature, we set the following hypothesis:

Hypothesis 2: there is a positive impact of board characteristics on the fund's effectiveness as measured by funds' return and market share.

3.3. Data and Methodology

Our analysis includes data from the China Securities Market & Accounting Research (CSMAR) database for the 2005-2015 periods. The CSMAR database has been widely applied in previous studies (Yuan et al., 2008; Chan et al. 2014 and Gong et al., 2016 and Liao et al. 2017). The CSMAR database provides fund information about fund attributes (including fund size, fund objective, fund age, fund expense, fund fees and

fund flows), fund net asset value (NAV), fund investment portfolio and other fund related information.

In addition, as information on corporate governance data of fund management company is extremely difficult to construct, we manually collect corporate governance data at fund management company level each year during the period between 2005 and 2015 for 731 observations, based on annual observations of 94 mutual fund management companies. The corporate governance variables including board size, board structure, gender and education are manually collected from fund prospectus[13] and fund financial reports on the fund management company's website. Then, we match the two data sets.

3.3.1 Governance variables and Risk measures

The governance variables include the board structure, board size, female directors, director's education and external governance variable-institutional investor holding. The first two governance variables have been employed extensively in the previous studies (Cheng, 2008; Wang, 2012; Ho et al., 2013; Dong et al., 2016 and Ferris et al., 2017). The board structure is represented by the percentage of independent directors on the board. The board size is the number of members in the board. The effect of board independence on funds' risk-taking may be mixed. On the one hand, independent directors may have more incentive[14] to monitor and disciple fund managers, thus help to mitigate trading violations (late trading and style shift) and decrease funds' risk-taking

[13] A fund prospectus contains investment objective, fees, expenses, performance measurement, risks, fund managers and corporate governance directors.

[14] Fama and French (1983) state that the motivation for independent directors is to maintain their reputation in the directorship market. And other studies find career opportunities for independent directors in the directorship market are related with past performance (Coles and Hoi, 2003; Harford 2003 and Jiang et al. 2015).

behavior (Qian 2006). On the other hand, independent directors may not provide effective monitoring on funds' risk-taking behavior as some of investments may need for specialized knowledge (Raheja 2005 and Kryzanowski and Mohebshahedin 2016). The effect of board size on funds' risk-taking behavior may also be mixed. A larger board may reduce funds' risk-taking for two reasons. The first reason is that larger boards with more coordination and communication issues may have a less extreme decision, thus resulting in lower risk-taking level. The second reason is that larger boards may help to add more knowledge to the board especially for large fund management companies which have multiple investment objectives, leading to better monitoring management and less risk-taking behavior. However, larger boards may result in greater conflicts among directors and lead to lower the decision-making quality. Thus, it may hinder the board's ability to determine an appropriate level of risk.

For the identifying the gender, we opt for a dummy variable that equals to 1 if the board has at least one female director, and 0 otherwise (Dowling and Aribi 2013). We test whether gender diversity has an effect on risk-taking, by examining whether women are more averse to risk than men. However, the impact of female director on funds' risk-taking behavior may be twofold. On the one hand, according to the previous literature, they document that women naturally tend to more risk averse compared to men (Levin et al, 1988; Byrnes et al, 1999 and Fehr-Duda et al, 2006). And, female directors may have a similar function as the independent directors by providing monitoring role (Adams and Ferreira, 2009). On the other hand, some of empirical studies find that female directors may result in more risk-taking behavior (Adams and Funk, 2012 and Berger et al. 2014). With respect to education, we count the number of directors on a board who hold a Ph.D. degree (Berger et al. 2014). More educated directors imply

more knowledge to the board, which thereby signals better risk management techniques. Therefore, education is expected to have a negative impact on funds' risk-taking behavior.

Lastly, we measure the external governance variable with the institutional investor holding which is the percentage of shares held by the institutional investor for a fund management company (Gong et al., 2016). Although institutional investors are not shareholders in a contractual fund and have no direct impact on a fund management, the large institutional investors holdings in a fund would attract fund management companies' attention. Hence, larger institutional investors may have an indirect impact on a fund management. Previous studies in the literature document a negative relationship between institutional ownership and firms' risk taking (Baker and Stein 2004 and Cao and Petrasek 2014). The institutional investor holding is expected to be negatively associated to funds' risk-taking.

Table 1 presents descriptive statistics for the corporate governance data. We find that the average board size is 8.68, which is similar to that of 8.58 found in Fu and Wedge (2011) and 9.24 by Kong and Tang (2008) in their sample for the U.S. The average value of independent directors is 38.7 percent, which is much less than that of 78 percent found in Kong and Tang (2008). The reason for this significant difference is that the Securities and Exchange Commission (SEC) in the US required mutual fund companies must have at least 75% of their directors to be independent. The representation of female directors on a board is a dummy variable and is 0.6 on average. In addition, the number of board directors with a Ph.D. degree is 2.24.

Table 1. Summary statistics of risk measures and corporate governance

Variables	Mean	SD	MIN	MAX	Median
Governance Variables					
Board size	8.68	1.57	5	13	9
Independent Board (%)	38.7	5.98	0	60	37.5
Gender	0.6	0.49	0	1	1
Education (PHD)	2.24	1.58	0	7	2
External Governance					
Institutional investors holding (%)	25.43	19.01	0	99.26	21.11
Risk Taking					
Total risk (%)	5.48	3.51	0	22.08	4.87
Concentration-Stock (%)	10	7	0	48	8
Concentration-Bond (%)	4	7	0	66	2

Note: This table presents summary statistics the mean, standard deviation, minimum, maximum and median values for governance variables and different risk measurements from 2005 to 2015. Board size is the number of directors on the board of the fund management company; Independent board is the percentage of independent directors on the board of the fund management company; Gender is a variable and equals to 1 if the board of the fund management company has at least one female member; Education is the number of directors on a board who hold a Ph.D. degree. Total risk is the funds' return volatility which is calculated by the weighted average of return volatility across all funds within the fund management company; Concentration-bond is the value of top 5 bonds divided by the total net assets held by the fund management company. Concentration-stock is the value of top 5 stocks divided by the total net assets held by the fund management company.

This chapter adopts two different methods to measure funds' risk-taking. The first measure of risk-taking is the funds' total risk. Funds' total risk is the funds' return volatility that is calculated by the weighted average of return volatility across all funds within the fund management company. Each fund's return volatility is measured as the standard deviation of 12 monthly returns (Kong and Tang, 2008 and Jordan and Riley,

2015). The second measure of risk concerns the concentration risk. We use the stock concentration risk and bond concentration risk. Fulkerson and Riley (2019)[15] show that a higher portfolio concentration would result in a higher fund's idiosyncratic risk (unsystematic risk). In this chapter, we follow the study by Chen et al. (2008) to measure the concentration ratio. Chen et al. (2008) take the value of the top 10 securities in a fund divided by the total fund value as a proxy for concentration risk. Due to data availability issues, we measure bond concentration risk as the value of top 5 bonds divided by the total net assets held by the fund management company. Stock concentration risk is the value of top 5 stocks divided by the total net assets held by the fund management company. For robustness, we also employ the value of the top 10 stocks divided by the total net assets held by the fund management company.[16]

Furthermore, Table 1 presents the summary statistics of different risk measurements. Moreover, Table 1 indicates that the average funds' total risk is 5.48%, which is much higher than that of 3% obtained by Kong and Tang (2008) in their sample for the U.S market. In terms of stock concentration risk Table 1 reports that the average value is 10%. For comparison, Chen et al. (2008) find that the average stock concentration risk is 4% in the U.S. The average bond concentration risk is 4%.

3.3.2 Corporate Governance Effectiveness

In this chapter, we use two approaches to evaluate governance effectiveness. There are several empirical researches (Adams et al. 2010 and Kong and Tang, 2008) that employ

[15] Fulkerson and Riley (2019) adopt the Herfindahl-Hirschman Index (HHI) to measure concentration.
[16] Fund management companies only release top 5 bonds in their annual reports.

funds' return to evaluate governance effectiveness. We construct mutual funds' return on fund net asset value (NAV) from the CSMAR database. Funds' return is the funds' value-weighted average return, in which the weight is the size of the fund within the same fund management company. The second method is the funds' market share. Khorana and Servaes (2012) state that market share indicates the culmination of all the decisions made by fund management companies and the fund investors' reaction to those decisions. To measure funds' market share, we follow the previous study by Khorana and Servaes (2012). Market share is computed by the sum of all assets managed by each fund management company divided by all assets in the mutual fund industry.

Table 2 provides the summary statistics of governance effectiveness. The average funds' return measured 16%.[17] The average market share is 1.46%, which is greater than that of 0.36% obtained by Khorana and Servaes (2012) for their U.S. sample.

Table 2. Summary statistics for governance effectiveness

Variables	Mean	SD	MIN	MAX	Median
Return (%)	16.00	34.96	-60.76	158.27	6.98
Market share (%)	1.46	1.83	0.01	15.14	0.77

Note: This table presents summary statistics the mean, standard deviation, minimum, maximum and median values for the variables used in analyzing fund management company's governance effectiveness from 2005 to 2015. Market share is the ratio of assets managed by the fund management company and all assets managed by the open-end mutual fund industry; Return is the weighted average return computed across all the fund within the management company.

[17] Guo et al., (2017) report that the weighted average stock market return is 29.12% in China over the period from 2005 to 2014.

3.3.3 Control variables

With respect to the fund management company-specific control variables that are not related to corporate governance, we opt for the size of fund management company, as estimated by the logarithm of total net assets managed by the fund management company (Chen et al. 2004 and Gong et al. 2016). However, empirical evidence shows that the effect of fund size on fund performance is mixed. Some studies claim that fund size has a positive impact on fund performance due to economy of scale (Otten and Bams, 2002 and Ferreira et al. 2013). Others find that fund size is negatively related to performance (Prather et al. 2004 and Chen et al. 2004). We also use the total number of new funds started by a fund management company (Khorana and Servaes, 2012). We further employ the expense ratio and abnormal return. The difference between funds' return and market return[18] is used to measure abnormal return in this thesis. Lastly, company experience is measured by the number of years since a fund management company has been in existence. Fund management companies with greater experience are associated with higher market share (Khorana and Servaes, 2012), as these companies have a long track record of performance.

[18]The market return is calculated by 40% of the Shanghai Government bond index, 30% of the Shenzhen Composite index, and 30% of the Shanghai Composite index, because approximately 40% of the total assets are invested in the bond market in the Chinese mutual fund industry on average. Most studies use the average of the Shanghai and Shenzhen market index as the market return (Zeng et al. 2015), as they are only concerned with the performance of equity mutual funds.

Table 3 presents summary statistics of the fund management company-specific variables. We also summarize the definitions of governance variables and control variables used in this chapter in Table 4.

Summary statistics results indicate that the average fund management company size is 36 billion Chinese Yuan and the average fund management company experience is 7.41 years. It implies that the history of Chinese mutual fund industry is relatively young. The average funds' abnormal return is 1.68%, which reflects fund management companies on average performed better than the market. Moreover, the number of new funds started is 3.33 on average. The expense ratio is 1.9% on average.

Table 3 Summary statistics of the fund management company specific variables

Variables	Mean	SD	MIN	MAX	Median
Abnormal return (%)	1.68	18.75	-74.42	95.4	0.7
Company experience	7.41	4.23	1	18	7
Company size (in billions)	36	62.4	0.012	684	15.2
No. of funds started	3.33	4.23	0	34	2
Expense ratio(%)	1.9	1.3	0.01	19.66	1.76

Note: This table presents summary statistics the mean, standard deviation, minimum, maximum and median values for the variables used in analyzing funds' risk-taking behavior from 2005 to 2015. Company size is the logarithm of total net assets under a fund management company; Abnormal return is computed as the difference between funds' and market return; Company experience is the number of years for a fund management company exists in the industry; No. of funds started is total number of new funds started by a fund management company in a given year; Expense ratio is weighted average expense ratio computed across all the fund within the management company.

Table 4. Definitions of Variables Used in the Fixed effect and GMM Estimations

	Description	Sources
Board size	The number of directors on the board	Fund prospectus
Board structure	The percentage of independent directors on the board	Fund prospectus
Institutional Investor Hold	The percentage of share held by institutional investors in a fund management company	CSMAR
Gender	A dummy variable that equal to 1 if the board has at least one female director, and 0 otherwise	Fund prospectus
Education	The number of directors with Ph.D. degree	Fund prospectus
Total risk	The weighted average of fund return volatility across all funds within the fund management company	CSMAR
Concentration-stock	The proportion of the value of top 5 stocks to the total net assets of a fund management company	CSMAR
Concentration-bond	The proportion of the value of top 5 corporate bonds to the total net assets of a fund management company	CSMAR
Expense ratio	The weighted average fund expense ratio computed across all the fund within the management company	CSMAR
Abnormal return	The difference between funds' return and market return	CSMAR
Market share	The ratio of total net assets managed by the fund management company over sum of total net assets managed by the open-end mutual fund industry	CSMAR
Company Size	The logarithm of total net assets managed by the fund management company	CSMAR
No. of funds started	The total number of new funds started by a fund management company in a given year	CSMAR
Company experience	The number of years for a fund management company exists in the industry	CSMAR

Furthermore, Table 5 reports the entire correlation matrix of the independent variables. It is clear that almost all of the correlation coefficients are below 0.7. The highest number of the correlation coefficient is 0.65 between company experience and company size. Overall, the independent variables in this chapter are not highly correlated.

Table 5: Correlation matrix of independent variables

	1	2	3	4	5	6
1-Board size	1					
2-Board structure	-0.41	1				
3-IIHold	-0.003	0.02	1			
4-Gender	0.13	-0.09	-0.05	1		
5-Education	0.29	-0.07	0.001	0.13	1	
6-No.funds started	0.06	-0.08	0.09	-0.04	0.14	1
7-Market share	0.04	-0.02	-0.09	-0.13	0.16	0.33
8-Abreturn	0.05	-0.04	-0.12	0.03	0.01	0.01
9-Expense	-0.02	-0.004	-0.27	0.09	-0.1	-0.2
10-Company size*	0.08	-0.03	-0.2	-0.09	0.15	0.51
11-Company experience	0.23	0.001	-0.01	-0.05	0.18	0.49

	7	8	9	10	11
7-Market share	1				
8-Abreturn	0.02	1			
9-Expense	-0.2	-0.02	1		
10-Company size*	0.6	0.16	-0.22	1	
11-Company experience	0.34	0.11	-0.08	**0.65**	1

Notes: Pearson correlation coefficients for independent variables from 2005 to 2015. The variable with an asterisk (*) is measured in logarithmic; Independent variables with high correlation coefficients are marked boldface.

3.3.4 Research design

This chapter opts for a panel regression estimation to examine the funds' risk-taking behavior. In the first instance we shall employ simple panel fixed effect analysis that can control for the heterogeneity across funds. Hence, the general model for measuring

the relationship between contractual fund governance and risk-taking can be expressed as follows:

$$Risk_{i,t} = \alpha_0 + \beta_1 Corporate\ Governance_{i,t} + \beta_2 Control_{i,t} + \varepsilon_{i,t} \quad (1)$$

where $Risk_{i,t}$ is the dependent variable and reflects funds' total risk, stock concentration risk and corporate bond concentration risk. $Corporate\ Governance_{i,t}$ is board size, board structure, gender, education and external governance variable-institutional investor holding; $Control_{i,t}$ represents the control variables, including the fund management company's size, expense ratio, abnormal returns, the company's experience and number of funds started, while $\varepsilon_{i,t}$ denotes the error term.

In addition, we examine corporate governance effectiveness. Hence, the general model for measuring the relationship between fund management company governance and governance effectiveness can be expressed as follows:

$$GEffectiveness_{i,t} = \alpha_0 + \beta_1 Corporate\ Governance_{i,t} + \beta_2 Control_{i,t} + \varepsilon_{i,t} \quad (2)$$

where $GEffectiveness_{i,t}$ is the dependent variable and is reflected by funds' return and market share; $Corporate\ Governance_{i,t}$ is board size, board structure and managerial ownership; $Control_{i,t}$ represents the control variables including the fund management company's size, the company's experience and number of funds started, while $\varepsilon_{i,t}$ denotes the error term.

3.4. Empirical results

In this section, we will present the empirical results relating to whether Chinese fund management companies' board characteristics affect risk-taking behavior after controlling for different fund management company characteristics, such as company size, company experience, number of funds started and expense ratio. We first employ the fixed effect analysis to control for omitted heterogeneous fund management company-specific effects.

3.4.1. Board characteristics and risk-taking behavior

Tables 6 and 7 present the results of the fixed effect analysis. The impact of each of the governance variables is presented in Models (1) to (3) in Table 6. Table 6 suggests that the representation of female directors on a board is not conducive to decreasing funds' total risk. Rather, a board with female directors increases funds' total risk. The results are robust at the 1% level of significance (Table 6, Model 3). In particular, a one unit increase in female director would increase funds' total risk by 0.009. This finding is not in line with studies from both the organizational psychology and economics literature (Levin et al., 1988; Byrnes et al., 1999 and Fehr-Duda et al., 2006) and corporate settings (Levi et al., 2014 and Dong et al., 2016), which conclude that females are more risk-averse. However, by contrast, Farrell and Hersch (2005), Adams and Funk (2012)

and Berger et al. (2014) find that female directors are more prone to take risks than their male counterparts. In addition, we find that the board size and the board structure negatively affect funds' total risk, but the estimated coefficients are statistically insignificant (see Table 6, Models 1 and 2)

Table 6: The relationship between board characteristics and total risk: panel-fixed effects

Dependent variable	Total Risk		
Model	Model 1	Model 2	Model 3
Log(Company assets)	0.0140***	0.0140***	0.0143***
	(0.00164)	(0.00164)	(0.00156)
Expense	0.00908***	0.00905***	0.00913***
	(0.00279)	(0.00279)	(0.00279)
Abnormal return	0.0738***	0.0736***	0.0734***
	(0.0113)	(0.0114)	(0.0113)
Company experience	-0.00602***	-0.00604***	-0.00616***
	(0.000611)	(0.000613)	(0.000587)
No. of funds started	-2.07e-05	-4.40e-05	-2.00e-05
	(0.000336)	(0.000337)	(0.000331)
Board size	-0.000919		
	(0.00120)		
Board structure		-0.0177	
		(0.0347)	
Gender			0.00921***
			(0.00324)
Constant	-0.239***	-0.240***	-0.257***
	(0.0387)	(0.0362)	(0.0337)
Observations	731	731	731
R-squared	0.452	0.452	0.461

Note: The table reports results of the fixed effect models investigating the contractual mutual fund governance on funds' total risk for the period 2005 to 2015. The dependent variable is funds' total risk. Total risk is the funds' return volatility which is calculated by the weighted average of return volatility across all funds within the fund management company. For the independent variables the paper adopts board size: it is the number of directors on the board of the fund management company; Board structure is the percentage of independent directors on the board of the fund management company; Gender is a variable and equals to 1 if the board of the fund management company has at least one female member; Log(company assets) is the logarithm of fund management company asset; Expense is the fund management company's weighted average expense ratio expense ratio; Abnormal return is computed as the difference between funds' return and market return; Company experience is the number of years for a fund management company exists in the industry; No. of funds started is total number of new funds started by a fund management company in a given year; the financial crisis period from 2008 to 2009 is a series of year dummy variables and is not reported in this table, for instance, the year of 2008 which takes the value of 1 if the year is 2008 and the value of 0 otherwise; we also consider the impact of Chinese split – share reform in the year of 2006 which will be as a year dummy variable and is not reported in this table. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; ** significance at the 5% level; *** significance at the 1% level.

In Table 7, we extend our analysis to examine the impact of governance on funds' concentration risk. We find that the board size negatively affects the stock concentration risk (Table 7, Model 1). The result remains robust at the 5% significance level. This implies that when the board size increases by one unit, funds' stock concentration risk would be reduced by approximately 0.605%. In contrast, the board size is positively correlated with funds' bond concentration risk in Model 4, but the result is statistically insignificant. This implies that a larger board size would be of less importance to the bond concentration ratio, compared to the stock concentration ratio. The above findings are consistent with those of Cheng (2008), Wang (2012) and Wang and Hsu (2013), as they document a negative relationship between risk-taking behavior and its board size. With respect to studies of Chinese companies, this significant negative effect is consistent with the findings of Huang and Wang (2015), while Dong et al. (2016) report an insignificant relationship between board size and corporate risk-taking.

Therefore, these findings support the notion of a negative correlation between board size and funds' risk level in our hypotheses H1which states that the fund management company's board characteristics have an impact on funds' risk taking. It implies that a fund management company may be able to exert effective monitoring on funds' stock concentration risk.

Table 7: The relationship between board characteristics and concentration risk: panel-fixed effects

Dependent variable	Stock concentration risk			Bond concentration risk		
Model	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Log(Company assets)	0.00192	0.00199	0.00249	-0.0121***	-0.0122***	-0.0122***
	(0.00386)	(0.00385)	(0.00364)	(0.00292)	(0.00292)	(0.00293)
Expense	0.00995**	0.00993**	0.0100**	-0.0170***	-0.0171***	-0.0170***
	(0.00449)	(0.00451)	(0.00452)	(0.00524)	(0.00524)	(0.00525)
Abnormal return	0.0584***	0.0578***	0.0570***	-0.0182**	-0.0184*	-0.0179*
	(0.0144)	(0.0146)	(0.0144)	(0.00913)	(0.00925)	(0.00922)
Company experience	-0.00590***	-0.00586***	-0.00623***	0.00279**	0.00268**	0.00284**
	(0.00136)	(0.00138)	(0.00127)	(0.00108)	(0.00105)	(0.00110)
No. of funds started	-0.00106*	-0.00118**	-0.00114**	6.49e-05	7.95e-05	9.28e-05
	(0.000541)	(0.000547)	(0.000526)	(0.000453)	(0.000444)	(0.000455)
Board size	-0.00605**			0.00171		
	(0.00291)			(0.00196)		
Board structure		0.0282			-0.0897*	
		(0.0655)			(0.0538)	
Gender			0.0218***			-0.00360
			(0.00801)			(0.00458)
Constant	0.130	0.0649	0.0534	0.321***	0.373***	0.340***
	(0.0924)	(0.0883)	(0.0794)	(0.0683)	(0.0776)	(0.0673)
Observations	731	731	731	731	731	731
R-squared	0.243	0.237	0.257	0.166	0.168	0.166

Note: The table reports results of the fixed effect models investigating the contractual mutual fund governance on concentration risk for the period 2005 to 2015. The dependent variable is funds' concentration risk. The stock centration risk is computed as the value of the top 5 stocks divided by the total net assets held by the fund management company; the bond centration risk is computed as the value of the top 5 corporate bonds divided by the total net assets held by the fund management company. For the independent variables the paper adopts board size: it is the number of directors on the board of the fund management company; Board structure is the percentage of independent directors on the board of the fund management company; Gender is a variable and equals to 1 if the board of the fund management company has at least one female member; Log(company assets) is the logarithm of fund management company asset; Expense is the fund management company's weighted average expense ratio expense ratio; Abnormal return is computed as the difference between funds' return and market return; Company experience is the number of years for a fund management company exists in the industry; No. of funds started is total number of new funds started by a fund management company in a given year; the financial crisis period from 2008 to 2009 is a series of year dummy variables and is not reported in this table, for instance, the year of 2008 which takes the value of 1 if the year is 2008 and the value of 0 otherwise; we also consider the impact of Chinese split-share

reform in the year of 2006 which will be as a year dummy variable and is not reported in this table. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; ** significance at the 5% level; *** significance at the 1% level.

In terms of the effect of board independence, Table 7 shows that board independence has a negative impact on funds' bond concentration risk at the 10% significance level (see Table 7, Model 5). The estimated value of the coefficient implies that the bond concentration risk of funds may decline by 0.09 as a result of a one unit increase in independent board members. This finding highlights that a fund management company with a high percentage of independent directors is likely to take fewer concentration risk, because independent directors can diminish such risks through their expertise, experience and objectivity in the investment decision-making process (Dalton et al., 1998). This finding is also consistent with previous studies (Brick and Chidambaran, 2008; Chernobai et al., 2011 and Ho et al., 2013), suggesting that more independent boards are more likely to have better internal control, which reduces risk. In addition, the negative effect of board independence on risk-taking behavior is consistent with the reputation hypothesis, indicating that independent directors are more likely to support investments in less risky assets which would help companies to avoid losses and protect their image (Pathan, 2009). However, this result is opposite to that of Huang and Wang (2015) and Dong et al. (2016) in relation to corporate governance in Chinese companies.

Moreover, we find that funds' stock concentration risk has a positive relationship with board structure. However, the result is statistically insignificant (Table 7, Model 2). Overall, as a result, mutual fund management companies with a lower concentration ratio might be preferred by independent directors. Therefore, the result is in line with

Hypothesis H1 as they claim that an increase in the percentage of independent directors on the board will have a negative impact on funds' bond concentration risk.

Furthermore, as shown in Table 7, we find that the estimated coefficient of the bond concentration risk is negative, but it is statistically insignificant (Table 7, Model 6). Nonetheless, the estimated coefficient of funds' stock concentration ratio is positive and statistically significant (Table 7, Model 3). This result is consistent with the findings in Table 6, indicating that a board with female directors increases funds' total risk. It means that a one unit increase in female director will increase funds' stock concentration risk by 0.0218. In addition, this finding is not in line with studies (Levin et al., 1988; Byrnes et al., 1999; Fehr-Duda et al., 2006; Levi et al., 2014 and Dong et al., 2016), which conclude that females are more risk-averse. However, by contrast, Farrell and Hersch (2005), Adams and Funk (2012) and Berger et al. (2014) find that female directors are more prone to take risks than their male counterparts.

Overall, the presence of female directors on a board increases funds' total risk and stock concentration risk. This finding is consistent with recent study by Poletti-Hughes and Briano-Turrent (2019), indicating that firms with more female directors assume more risk. One possible reason is that the presence of female directors on a board will have more informed and strategic actions to discover excellent investment opportunities for the fund investors, as female directors may have different professional experiences and perspectives compared male directors. These strategic actions may contribute to increase funds' risk level as the board monitors fund manager's engagement on risky investments in expectation of improved fund investors' value. In addition, female

directors may be motivated by non-financial reasons such as maintaining the market liquidity during the crisis, if the female directors are appointed by government. Due to data limitation, I cannot provide more information regarding the background of female directors.

Hence, the findings indicate that female director can affect the governance of Chinese fund management companies to some extent, and also suggest that a board with female directors is not window-dressing. Therefore, this result supports Hypothesis H1 that if a fund management company has female directors, this will have an impact on funds' total risk and stock concentration risk.

In terms of the impact of control variables, an increase in a fund management company's size is found to increase its total risk. This finding is in line with Chen et al. (2004) and Bhagat et al. (2015), indicating that firm size is positively correlated with risk-taking. Furthermore, the fund management company size has a mixed impact on funds' concentration risk. We find that the fund management company size has a positive impact on the stock concentration risk, but it also has a negative impact on the bond concentration risk. The latter is statistically significant. Additionally, fund management companies with a higher expense ratio seem to be involved in higher risk activities. This outcome demonstrates that the management teams have an incentive to take excessive risks in order to compensate investors for the higher fee components of the fund (Buchner and Wagner, 2017).

In addition, regarding the effect of funds' abnormal return, we find that it has a positive and significant impact on the funds' total risk and stock concentration risk. The relationship between funds' abnormal return and bond concentration risk is negative.

An increase in a fund management company's experience is found to be associated with less total risk and stock concentration risk, as fund management companies with greater experience are likely to have a more sophisticated risk management team and policies, which could lead to lower risk. The number of new funds is negatively and significantly correlated with the stock concentration risk. This result demonstrates that diversification in assets or products reduce risk levels.

3.4.2 Dynamic panel analysis

Furthermore, by taking into account endogeneity issues[19] and considering the short-run relationship between board characteristics and funds' risk-taking[20], we employ the two-step system generalized method of moments (GMM) estimator (Arellano and Bover, 1995; Blundell and Bond, 1998). We also apply Windmeijer's (2005) bias-corrected robust standard errors. In addition, according to Arellano and Bond (1991), we present two goodness-of fit tests for our results of the two-step system GMM estimator. The first test examines the null hypothesis of the validity of instruments using Hansen's diagnostic test. The second test examines for second-order autocorrelation of the error terms. The null hypothesis is no serial correlation in second differences (AR(2)). As shown in the model presented in equation (3), we regress the risk-taking on a set of corporate governance variables and control variables, as follows:

$$Risk_{i,t} = \alpha_0 + \beta_1 Risk_{i,t-1} + \beta_2 Corporate\ Governance_{i,t} + \beta_3 Control_{i,t} + \varepsilon_{i,t}$$

[19] This chapter employs Roodman's (2009) "Xtabond2" specification in Stata.
[20] The fixed effect focuses on the long-run relationship between board characteristics and funds' risk-taking in previous sections.

(3)

The potential concerns of serial correlation and heteroscedasticity have been discussed and addressed in our previous section. We employ the two-step system GMM to address the endogeneity issue in this section. This chapter reveals that the basic diagnostics test (AR (2)) for second-order serial correlations in all corresponding models are insignificant. Also, the Hansen test indicates that our instruments are valid, as the Hansen J-statistics of over-identifying restrictions are insignificant in all corresponding models (see Tables 8 and 9).

In terms of the effect of board size, Table 8 shows similar results to those of Table 6, indicating that the board size has a negative impact on funds' total risk (Model 1), but the estimated coefficient is statistically insignificant. We also find that the estimated coefficient of board structure is negative and statistically insignificant (see Table 8, Model 2). In addition, Table 8 indicates that female directors on a board would increase funds' total risk, as gender has a positive and significant impact on funds' total risk (Model 3). The result is robust at the 5% level of significance. This finding is consistent with studies by Farrell and Hersch (2005), Adams and Funk (2012) and Berger et al. (2014).

Table 8: The relationship between board characteristics and total risk-GMM

Dependent variable	Total Risk		
Model	Model 1	Model 2	Model 3
L. Total Risk	-0.324***	0.280**	0.213**
	(0.0933)	(0.117)	(0.0964)
Log(Company assets)	0.0222***	0.00901***	0.0218***
	(0.00529)	(0.00316)	(0.00487)
Expense	0.0216***	0.00922*	0.0128**
	(0.00743)	(0.00466)	(0.00511)
Abnormal return	0.176***	0.167***	0.0785***
	(0.0169)	(0.0167)	(0.0119)
Company experience	-0.00781***	-0.00308***	-0.00577***
	(0.00124)	(0.000779)	(0.00112)
No. of funds started	0.000882	-0.000202	-0.000301
	(0.000732)	(0.000590)	(0.000545)
Board size	-0.00521		
	(0.00346)		
Board structure		-0.204	
		(0.145)	
Gender			0.0139**
			(0.00582)
Constant	-0.394***	-0.0911	-0.456***
	(0.131)	(0.101)	(0.111)
Observations	637	637	637
AR(2)	0.448	0.946	0.537
Hansen p value	0.294	0.178	0.215

Note: The table reports results of the two - step system GMM estimator investigating the contractual mutual fund governance on funds' total risk for the period 2005 to 2015. The dependent variable is funds' total risk. Total risk is the funds' return volatility which is calculated by the weighted average of return volatility across all funds within the fund management company. For the independent variables the paper adopts board size: it is the number of directors on the board of the fund management company; Board structure is the percentage of independent directors on the board of the fund management company; Gender is a variable and equals to 1 if the board of the fund management company has at least one female member; L.Total risk is the one year lagged of the funds' total risk; Log(company assets) is the logarithm of fund management company asset; Expense is the fund management company's weighted average expense ratio expense ratio; Abnormal return is computed as the difference between funds' return and market return; Company experience is the number of years for a fund management company exists in the industry; No. of funds started is total number of new funds started by a fund management company in a given year; the financial crisis period from 2008 to 2009 is a series of year dummy variables and is not reported in this table, for instance, the year

of 2008 which takes the value of 1 if the year is 2008 and the value of 0 otherwise; we also consider the impact of Chinese split-share reform in the year of 2006 which will be as a year dummy variable and is not reported in this table. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; ** significance at the 5% level; *** significance at the 1% level.

According to Table 9, an increase in a Chinese fund management company's board member decreases its stock concentration ratio. The estimated coefficients are statistically significant at the 10% levels respectively (Model 1). The evidence implies that smaller boards push fund managers to take more investment risks. This result is consistent with those of Cheng (2008), Wang (2012) and Wang and Hsu (2013). We notice that these findings are consistent with the findings from the fixed effect models. Therefore, these results support Hypothesis H1 that a fund management company with a large board size will incur less risk-taking behavior.

Moreover, greater board independence is of significance for funds' risk-taking. We find that the percentage of independent directors has a negative impact on the funds' bond concentration risk 10% significance level (Tables 9, Model 5). This finding suggests that an increase in the percentage of independent board members will improve the quality of internal corporate governance by reducing investment risks (Brick and Chidambaran, 2008; Chernobai et al., 2011 and Ho et al., 2013). Therefore, these results are in line with Hypothesis H1, implying that an increase in the percentage of independent directors on the board will have a negative impact on funds' concentration risk.

Also note that the presence of female directors, Table 9 presents the similar result to that of Table 7, suggesting that a board which includes female directors leads to higher funds' stock concentration risk. We find that having female directors on the board has a

positive impact on stock concentration risk (Table 9, Model 3). The result remains robust at the 5% level of significance. The above findings are supported by studies Farrell and Hersch (2005), Adams and Funk (2012), Berger et al. (2014) and Levi et al (2014), as they also find that female directors are positively correlated with risk-taking. Overall, this result supports Hypothesis 1 that if a fund management company has female directors, this will affect funds' total risk and stock concentration risk.

Table 9: The relationship between board characteristics and Concentration risk–GMM

Dependent variable	Stock concentration risk			Bond concentration risk		
Model	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
L. Concentration	0.400***	0.406***	0.360***	0.208*	0.669***	0.453***
	(0.0760)	(0.144)	(0.0741)	(0.112)	(0.114)	(0.141)
Log(Company assets)	-0.00605	0.00144	-0.00358	-0.0150***	0.00677	0.00647
	(0.00591)	(0.00417)	(0.00447)	(0.00535)	(0.00541)	(0.00493)
Expense	0.00540	0.0155	0.00691	-0.0229***	0.00384	-0.00358
	(0.0107)	(0.00945)	(0.0104)	(0.00453)	(0.0112)	(0.00739)
Abnormal return	0.0724***	0.0813***	0.0694***	-0.0251	-0.0298	-0.0282
	(0.0164)	(0.0170)	(0.0156)	(0.0207)	(0.0255)	(0.0187)
Company experience	-0.00470***	-0.00348***	-0.00486***	-0.00175	-0.00160	-0.00217
	(0.00147)	(0.00131)	(0.00152)	(0.00134)	(0.00150)	(0.00181)
No. of funds started	-7.98e-05	-0.000933	-0.000641	0.00167**	0.00109***	0.000892
	(0.000689)	(0.000842)	(0.000706)	(0.000805)	(0.000386)	(0.000564)
Board size	-0.0115*			0.000472		
	(0.00644)			(0.00714)		
Board structure		0.128			-0.180*	
		(0.186)			(0.103)	
Gender			0.0204**			-0.00194
			(0.00786)			(0.00887)
Constant	0.317*	-0.0339	0.153	0.430***	-0.0787	-0.113
	(0.175)	(0.141)	(0.126)	(0.146)	(0.127)	(0.117)
Observations	637	637	637	637	637	637
AR(2)	0.546	0.465	0.328	0.342	0.886	0.865
Hansen p value	0.322	0.378	0.393	0.564	0.265	0.269

Note: The table reports results of the two-step system GMM estimator investigating the contractual mutual fund governance on concentration risk for the period 2005 to 2015. The dependent variable is funds' concentration risk. The stock centration risk is computed as the value of the top 5 stocks divided by the total net assets held by the fund management company; the bond centration risk is computed as the value of the top 5 corporate bonds divided by the total net assets held by the fund management company. For the independent variables the paper adopts board size: it is the number of directors on the board of the fund management company; Board structure is the percentage of independent directors on the board of the fund management company; Gender is a variable and equals to 1 if the board of the fund management company has at least one female member; L.concentration is the one year lagged of the fund management company's concentration risk; Log (company assets) is the logarithm of fund management company asset; Expense is the funds' weighted average expense ratio expense ratio; Abnormal return is computed as the difference between funds' return and market return; Company experience is the number of years for a fund management company exists in the industry; No. of funds started is total number of new funds started by a fund management company in a given year; the financial crisis period from 2008 to 2009 is a series of year dummy variables and is not reported in this table, for instance, the year of 2008 which takes the value of 1 if the year is 2008 and the value of 0 otherwise; we also consider the impact of Chinese split-share reform in the year of 2006 which will be as a year dummy variable and is not reported in this table. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; ** significance at the 5% level; *** significance at the 1% level.

3.4.3 External governance, board education background and risk-taking behavior

Furthermore, this chapter follows Gong et al (2016) study in adopting the percentage of institutional investors' holding in a fund management company's funds as a measure of external governance. According to the studies on public companies, they reveal that a higher percentage of institutional investor holdings may enhance the effectiveness of management team and have more incentive to monitor firm's operation (Baker and Stein 2004 and Cao and Petrasek 2014). In the Chinese mutual fund industry, although institutional investors are not shareholders in a contractual fund and have no direct impact on a fund management, the large institutional investors holdings in a fund would attract fund management companies' attention. Hence, larger institutional investors may have an indirect impact on a fund management and have incentive to monitor operation of management team. The institutional investor holding may have a negative impact on funds' risk-taking.

Tables 10 reports that the institutional investors' holding has a significant and negative impact on funds' total risk. The result is robust at the 1% level of significance (Table 10,

Model 1). We also find that the institutional investors' holding negatively affects the stock concentration risk. The estimated coefficients are significant at 5% level (Table 10, Model 2). This means that if the average institutional investor holding increases by roughly one percent, funds' stock concentration risk may decrease by 0.03 percent on average. Similarly, the relationship between the institutional investors' holding and bond concentration risk is statistically significant at the 5% level (Table 10, Model 3).

In addition, Table 11 provides the results from the two-step system Dynamic GMM approach and shows that the institutional investors' holding has a significant and negative impact on funds' total risk and stock concentration risk. The results are robust at the 1% and 5% level of significance respectively (Table 11, Models 1 and 2). We notice that the estimated coefficient of IIHold has no significant impact on bond concentration risk.

Overall, fund management companies with a higher percentage of institutional investor holdings will incur either a lower total risk level or concentration risk level. This result implies that institutional investors are more sensitive to risk level than individual investors and suggests that institutional investors can affect the governance of fund management companies to some degree. This finding is in line with the evidence in the literature, as Baker and Stein (2004) and Cao and Petrasek (2014) claim that institutional ownership can reduce risk-taking behavior.

Table 10: The impact of external governance on risk-taking: panel fixed-effects

Dependent variable	Total Risk	Concentration (1)	Concentration(2)
Model	Model 1	Model 2	Model 3
IIHold	-0.0303***	-0.0438**	-0.0562**
	(0.00685)	(0.0200)	(0.0223)
Log(Company assets)	0.0124***	-0.000406	-0.0152***
	(0.00170)	(0.00392)	(0.00346)
Expense	0.00802***	0.00838*	-0.0190***
	(0.00265)	(0.00447)	(0.00518)
Abnormal return	0.0719***	0.0551***	-0.0213**
	(0.0112)	(0.0145)	(0.00952)
Company experience	-0.00572***	-0.00546***	0.00335***
	(0.000604)	(0.00133)	(0.00115)
No. of funds started	0.000171	-0.000885	0.000490
	(0.000333)	(0.000573)	(0.000445)
Constant	-0.202***	0.142	0.419***
	(0.0378)	(0.0877)	(0.0837)
Observations	731	731	731
R-squared	0.469	0.250	0.192

Note: The table reports results of the panel fixed-effects estimator investigating the impact of external governance on funds' risk-taking for the period 2005 to 2015. The dependent variables are funds' total risk, stock concentration risk (Concentration 1) and bond concentration risk (Concentration 2). Total risk is the funds' return volatility which is calculated by the weighted average of return volatility across all funds within the fund management company. The stock centration risk is computed as the value of the top 5 stocks divided by the total net assets held by the fund management company; the bond centration risk is computed as the value of the top 5 corporate bonds divided by the total net assets held by the fund management company. For the independent variables the paper adopts IIHold is the proportion of institutional investor holding in the fund management company; Log(company assets) is the logarithm of fund management company asset; Expense is the funds' weighted average expense ratio expense ratio; Abnormal return is computed as the difference between funds' return and market return; Company experience is the number of

years for a fund management company exists in the industry; No. of funds started is total number of new funds started by a fund management company in a given year; the financial crisis period from 2008 to 2009 is a series of year dummy variables and is not reported in this table, for instance, the year of 2008 which takes the value of 1 if the year is 2008 and the value of 0 otherwise; we also consider the impact of Chinese split – share reform in the year of 2006 which will be as a year dummy variable and is not reported in this table. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; ** significance at the 5% level; *** significance at the 1% level.

Table 11: The impact of external governance on risk-taking–GMM

Dependent variable	Total Risk	Concentration (1)	Concentration (2)
Model	Model 1	Model 2	Model 3
L. Total risk	0.178*		
	(0.0950)		
L.Concentration (1)		0.405***	
		(0.0557)	
L.Concentration(2)			0.210**
			(0.0959)
IIHold	-0.0443***	-0.0825**	-0.0206
	(0.0130)	(0.0360)	(0.0248)
Log(Company assets)	0.0204***	-0.00702	-0.0185***
	(0.00434)	(0.00492)	(0.00680)
Expense	0.0115**	-0.00293	-0.0255**
	(0.00438)	(0.0102)	(0.0113)
Abnormal return	0.0740***	0.0629***	-0.0514**
	(0.0118)	(0.0179)	(0.0227)
Company experience	-0.00592***	-0.00330**	-0.00166
	(0.00106)	(0.00140)	(0.00147)
No. of funds started	0.000428	-0.000367	0.00192**
	(0.000605)	(0.000528)	(0.000821)
Constant	-0.401***	0.269**	0.530***
	(0.0983)	(0.122)	(0.180)
Observations	637	637	637
AR(2)	0.594	0.419	0.36
Hansen p value	0.237	0.479	0.352

Note: The table reports results of the two-step system GMM estimator investigating the impact of external governance on funds' risk-taking for the period 2005 to 2015. The dependent variables are funds' total risk, stock concentration risk (Concentration 1) and bond concentration risk (Concentration 2). Total risk is the funds' return volatility which is calculated by the weighted average of return volatility across all funds within the fund management company. The stock centration risk is computed as the value of the top 5 stocks divided by the total net assets held by the fund management company; the bond centration risk is computed as the value of the top 5 corporate bonds divided by the total net assets held by the fund management company. For the independent variables the paper adopts L.total risk: it is the one year lagged of funds' total risk; L.concentration (1) is the one year lagged of stock concentration risk; L.concentration (2) is the one year lagged of the bond concentration risk; IIHold is the

proportion of institutional investor holding in the fund management company; Log(company assets) is the logarithm of fund management company asset; Expense is the funds' weighted average expense ratio; Abnormal return is computed as the difference between funds' return and market return; Company experience is the number of years for a fund management company exists in the industry; No. of funds started is total number of new funds started by a fund management company in a given year; the financial crisis period from 2008 to 2009 is a series of year dummy variables and is not reported in this table, for instance, the year of 2008 which takes the value of 1 if the year is 2008 and the value of 0 otherwise; we also consider the impact of Chinese split-share reform in the year of 2006 which will be as a year dummy variable and is not reported in this table. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; ** significance at the 5% level; *** significance at the 1% level.

Furthermore, Tables 12 and 12.1 examine the effect of education (measured by the number of directors holding a Ph.D. degree) on funds' risk-taking behavior by using the fixed effect and dynamic panel regressions. In Table 12, we find that an increase in the representation of better-educated directors seems to reduce the funds' total risk. The result remains robust at the 1% significance level (Table 12, Model 1). It implies that a one-unit increase in better-educated directors is shown to reduce the total risk by 0.01. Moreover, we find that education has a negative impact on stock concentration risk and bond concentration risk, but the estimated coefficients are statistically insignificant. Table 12.1 presents the results for the dynamic panel regression. We find that education has a negative impact on funds' total risk at the 10% level of significance (Table 12.1, Model 1). This outcome is consistent with the finding from the fixed effect model, indicating that education negatively and significantly affects the total risk. Moreover, while we find that Ph.D. representation has a negative impact on funds' stock concentration, the result is not robust (Table 12.1 Model 2). Similarly, the dynamic panel analysis shows an insignificant relationship between Ph.D. representation and funds' bond concentration risk (Table 12.1, Model 3).

Therefore, the outcome implies that board members with PhDs have better risk management techniques. Moreover, this finding suggests that an increase in the number of better-educated directors has significant consequences for the decision-making process at the executive level. This finding is supported by Graham and Harvey (2001)

and Berger et al. (2014), as they indicate that the presence of board members with PhDs or MBAs is associated with a decrease in portfolio risk. However, King et al. (2016) claim that MBA CEOs would prefer to take riskier activities to improve firms' performance.

Table 12: The impact of Education on Fund Management Company Risk: panel fixed-effects

Dependent variable	Total Risk	Concentration (1)	Concentration (2)
Model	Model 1	Model 2	Model 3
Ph.D representation	-0.00911*	-0.00120	-0.00888
	(0.00460)	(0.0120)	(0.00800)
Log(Company assets)	0.0141***	0.00198	-0.0121***
	(0.00166)	(0.00386)	(0.00291)
Expense	0.00889***	0.00988**	-0.0172***
	(0.00274)	(0.00451)	(0.00524)
Abnormal return	0.0734***	0.0577***	-0.0183*
	(0.0113)	(0.0147)	(0.00924)
Company experience	-0.00593***	-0.00588***	0.00288***
	(0.000607)	(0.00134)	(0.00109)
No. of funds started	-6.13e-05	-0.00119**	7.95e-05
	(0.000335)	(0.000541)	(0.000448)
Constant	-0.241***	0.0773	0.341***
	(0.0365)	(0.0843)	(0.0691)
Observations	731	731	731
R-squared	0.455	0.237	0.167

Note: The table reports results of the two-step system GMM estimator investigating the impact of education on funds' risk-taking for the period 2005 to 2015. The dependent variables are funds' total risk, stock concentration risk (Concentration 1) and bond concentration risk (Concentration 2). Total risk is the funds' return volatility which is calculated by the weighted average of return volatility across all funds within the fund management company. The stock centration risk is computed as the value of the top 5 stocks divided by the total net assets held by the fund management company; the bond centration risk is computed as the value of the top 5 corporate bonds divided by the total net assets held by the fund management company. For the independent variables the paper adopts Education: it is the number of board directors with Ph.D degree; Log(company assets) is the logarithm of fund management company asset; Expense is the funds' weighted average expense ratio; Abnormal return is computed as the difference between funds' return and market return; Company experience is the number of years for a fund management company exists in the industry; No. of funds started is total number of new funds started by a fund management company in a given year; the financial crisis period from 2008 to 2009 is a series of year dummy variables and is not reported in this table, for instance, the year of 2008 which takes the value of 1 if the year is 2008 and the value of 0 otherwise; we also consider the impact of Chinese split-share reform in the year of 2006 which will be as a year

dummy variable and is not reported in this table. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; ** significance at the 5% level; *** significance at the 1% level.

Table 12.1: The impact of Education on Fund Management Company Risk-GMM

Dependent variable	Total Risk	Concentration (1)	Concentration (2)
Model	Model 1	Model 2	Model 3
L. Total risk	0.266***		
	(0.0882)		
L.Concentration (1)		0.414***	
		(0.128)	
L.Concentration (2)			0.139**
			(0.0601)
Ph.D representation	-0.0162*	-0.00160	-0.000168
	(0.00823)	(0.0127)	(0.0161)
Log(Company assets)	0.0133***	-0.000498	-0.00746
	(0.00337)	(0.00662)	(0.00668)
Expense	0.00867**	0.0159*	-0.0113*
	(0.00405)	(0.00836)	(0.00668)
Abnormal return	0.0763***	0.0845***	-0.0288***
	(0.0120)	(0.0198)	(0.0107)
Company experience	-0.00405***	-0.00225*	-0.00310
	(0.000797)	(0.00126)	(0.00189)
No. of funds started	-0.000709	-0.000678	0.00287***
	(0.000492)	(0.000669)	(0.000888)
Constant	-0.240***	0.0506	0.245
	(0.0819)	(0.174)	(0.163)
Observations	637	637	637
AR(2)	0.383	0.437	0.603
Hansen p value	0.194	0.218	0.391

Note: The table reports results of the two-step system GMM estimator investigating the impact of education on funds' risk-taking for the period 2005 to 2015. The dependent variables are funds' total risk, stock concentration risk (Concentration 1) and bond concentration risk (Concentration 2). Total risk is the funds' return volatility which is calculated by the weighted average of return volatility across all funds within the fund management company. The stock centration risk is computed as the value of the top 5 stocks divided by the total net assets held by the fund management company; the bond centration risk is computed as the value of the top 5 corporate bonds divided by the total net assets held by the fund management company. For the independent variables the paper adopts Education: it is the number of board directors with Ph.D degree; Log(company assets) is the logarithm of fund management company asset; L.total risk is the one year lagged of funds' total risk; L.concentration (1) is the one year lagged of stock concentration risk; L.concentration (2) is the one year lagged of bond concentration risk; Expense is the fund management company's weighted average expense ratio expense ratio; Abnormal return is computed as the difference between return of the fund management company and market return; Company experience is the number of years for a fund management company exists in the industry; No. of funds started is total number of new funds started by a fund management company in a given year; the financial crisis period from 2008 to 2009 is a series of year dummy variables and is not reported in this table, for instance, the year of 2008 which takes the value of 1 if the year is 2008 and the value of 0 otherwise; we also consider the impact of Chinese split-share reform in the year of

2006 which will be as a year dummy variable and is not reported in this table. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; ** significance at the 5% level; *** significance at the 1% level.

3.4.4 Robustness check

This section discusses the robustness check. Tables 13 and 13.1 show the findings for the panel fixed effect and dynamic panel regressions, where we opt for the top 10 securities as a proportion of total assets held by the fund management company for measuring concentration risk. Table 13 reports results in line with previous findings,[21] indicating that board size has a negative and significant impact on stock concentration risk at the 1% level of significance (Table 13, Model 1). Similarly, the dynamic panel analysis presents a negative relationship between board size and stock concentration risk. The result remains robust at the 5% significance level (Table 14, Model 1).

In addition, the fixed effect results show that the gender has a positive impact on stock concentration risk at the 1% level of significance (Table 13, Model 3). We find that dynamic panel regressions also indicate a positive relationship between the gender and stock concentration risk at the 5% level of significance (Table 14, Model 3). Regarding to the impact of the board structure, while we find that the board structure has a positive impact on stock concentration risk, the coefficient is not robust (Table 13, Model 2). The dynamic panel analysis reports the same result that the relationship between board structure and stock concentration risk is statistically insignificant. Therefore, we conclude the robustness findings are consistent with those previously findings in Table 8.

[21] We did not report the proportion of top 10 bonds, as fund management companies only release top 5 bonds in their annual reports.

Table 13: The relationship between board characteristics and concentration risk: panel fixed effects (Robustness check)

Dependent variable	Stock concentration risk		
Model	Model 1	Model 2	Model 3
Log(Company assets)	-0.00544	-0.00528	-0.00451
	(0.00478)	(0.00482)	(0.00456)
Expense	0.0150**	0.0150**	0.0151**
	(0.00639)	(0.00643)	(0.00646)
Abnormal return	0.0887***	0.0873***	0.0860***
	(0.0166)	(0.0167)	(0.0163)
Company experience	-0.0137***	-0.0137***	-0.0143***
	(0.00176)	(0.00179)	(0.00163)
No. of funds started	-0.00212***	-0.00239***	-0.00233***
	(0.000702)	(0.000723)	(0.000701)
Board size	-0.0137***		
	(0.00378)		
Board structure		0.0647	
		(0.0912)	
Gender			0.0338***
			(0.0102)
Constant	0.506***	0.358***	0.349***
	(0.110)	(0.112)	(0.101)
Observations	731	731	731
R-squared	0.508	0.496	0.512

Note: The table reports results of the panel fixed effects estimator investigating the contractual mutual fund governance on funds' risk-taking for the period 2005 to 2015. The dependent variable is funds' concentration risk. Concentration risk is the proportion of the top 10 stocks to the total fund management company value. For the independent variables the paper adopts board size: it is the number of directors on the board of the fund management company; Board structure is the percentage of independent directors on the board of the fund management company; Gender is a variable and equals to 1 if the board of the fund management company has at least one female member; Log(company assets) is the logarithm of fund management company asset; Expense is the funds' weighted average expense ratio; Abnormal return is computed as the difference between funds' return and market return; Company experience is the number of years for a fund management company exists in the industry; No. of funds started is total number of new funds started by a fund management company in a given year; Market share is calculated by the sum of all assets under management by each company divided by all assets under management in the fund industry; the financial crisis period from 2008 to 2009 is a series of year dummy variables and is not reported in this table, for instance, the year of 2008 which takes the value of 1 if the year is 2008 and the value of 0 otherwise; we also consider the impact of Chinese split-share reform in the year of 2006 which will be as a year dummy variable and is not reported in this table. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; ** significance at the 5% level; *** significance at the 1% level.

Table 13.1: The relationship between board characteristics and concentration risk – GMM (Robustness check)

Dependent variable	Stock concentration risk		
Model	Model 1	Model 2	Model 3
L. Concentration	0.372***	0.490***	0.295***
	(0.0678)	(0.139)	(0.104)
Log(Company assets)	-0.000997	0.00381	0.0125*
	(0.00858)	(0.00986)	(0.00714)
Expense	0.0219*	0.0293**	0.0409***
	(0.0127)	(0.0119)	(0.0130)
Abnormal return	0.100***	0.0771**	0.108***
	(0.0189)	(0.0339)	(0.0235)
Company experience	-0.00804***	-0.00327	-0.00598***
	(0.00195)	(0.00288)	(0.00207)
No. of funds started	-0.00191*	-0.00270**	-0.00449***
	(0.00101)	(0.00133)	(0.00131)
Board size	-0.0146**		
	(0.00660)		
Board structure		0.140	
		(0.101)	
Gender			0.0261**
			(0.0129)
Constant	0.270	-0.0940	-0.219
	(0.225)	(0.284)	(0.172)
Observations	637	637	637
AR(2)	0.547	0.372	0.457
Hansen p value	0.583	0.343	0.396

Note: The table reports results of the two-step system GMM estimator investigating the contractual mutual fund governance on funds' risk-taking for the period 2005 to 2015. The dependent variable is funds' concentration risk. Concentration risk is the proportion of the top 10 stocks to the total fund management company value. For the independent variables the paper adopts board size: it is the number of directors on the board of the fund management company; Board structure is the percentage of independent directors on the board of the fund management company; Gender is a variable and equals to 1 if the board of the fund management company has at least one female member; L.concentration is the one year lagged of stock concentration risk; Log(company assets) is the logarithm of fund management company asset; Expense is the funds' weighted average expense ratio; Abnormal return is computed as the difference between funds' return and market return; Company experience is the number of years for a fund management company exists in the industry; No. of funds started is total number of new funds started by a fund management company in a given year; Market share is calculated by the sum of all assets under management by each company divided by all assets under management in the fund industry; the financial crisis period from 2008 to 2009 is a series of year dummy variables and is not reported in this table, for instance, the year of 2008 which takes the value of 1 if the year is 2008 and the value of 0 otherwise; we also consider the impact of Chinese split-share reform in the year of 2006 which will be as a year dummy variable and is not reported in this table. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; ** significance at the 5% level; *** significance at the 1% level.

3.4.5 Board characteristics -governance effectiveness

For contractual governance mutual funds, the board of directors is responsible for fund operations and is important in the decision-making process. Tables 14, 15, 16 and 17 present the results for the impact of board characteristics on contractual fund governance effectiveness, using fixed effect analysis (see Tables 14 and 15) and the dynamic panel analysis (see Tables 16 and 17). With regards to the board size, Table 14 shows that the board size is positively association with funds' return. The result remains robust at the 5% level (Table 14, Model 1). This finding is inconsistent with the study Kong and Tang (2008), as they find that the board size has an insignificant impact on funds' return[22]. However, they find that the board size is negatively related to objective-adjusted return. Concerning the impact of board independence on funds' return, the result shows an insignificant relationship between board independence and funds' return. This finding is also documented by Ferris and Yan (2007), indicating fund return is not correlated with board independence. However, this result is inconsistent with studies by Ding and Wermers (2012), Khorana et al (2007) and Fu and Wedge (2011), indicating a greater proportion of independent directors in a board is more beneficial to fund investors by providing a monitoring role and an advisory role. Moreover, Liu et al. (2015) state that independent directors are effective at reducing agency conflicts resulting in better performance. This finding may be caused by the shortage of qualified independent directors leading to ineffective monitor on the operation of fund management company. We find that managerial ownership has an insignificant impact on funds' return (Table 14, Model 3).

[22] When performance is adjusted by market return, we find that none of governance structure is significantly association with funds' return.

Table 14: Fixed effect regressions for funds' return

Dependent variable	Funds' return		
Model	Model 1	Model 2	Model 3
Log (company assets)	-0.0550***	-0.0540***	-0.0606***
	(0.0119)	(0.0119)	(0.0120)
Company experience	0.0457***	0.0452***	0.0475***
	(0.00528)	(0.00518)	(0.00520)
No. of funds started	-0.00470***	-0.00441***	-0.00431***
	(0.00129)	(0.00130)	(0.00128)
Expense	-0.0357**	-0.0355**	-0.0351**
	(0.0162)	(0.0163)	(0.0160)
Market share	1.678***	1.543***	1.796***
	(0.600)	(0.573)	(0.590)
Board size	0.0146**		
	(0.00705)		
Board structure		-0.0464	
		(0.176)	
Ownership			-0.0623
			(0.0473)
Constant	0.878***	1.004***	1.121***
	(0.244)	(0.258)	(0.240)
Observations	731	731	731
R-squared	0.772	0.771	0.772

Note: The table reports results of the fixed effect models investigating the contractual mutual fund governance on funds' return for the period 2005 to 2015. The dependent variable is funds' return which is the weighted average return computed across all the fund within the management company. For the independent variables the paper adopts board size: it is the number of directors on the board of the fund management company; Board structure is the percentage of independent directors on the board of the fund management company; Ownership is the managerial ownership including board ownership; Log (company assets) is the logarithm of fund management company asset; Company experience is the number of years for a fund management company exists in the industry; No. of funds started is total number of new funds started by a fund management company in a given year; Market share is calculated by the sum of all assets under management by each company divided by all assets under management in the fund industry; Expense is the funds' weighted average expense ratio; the financial crisis period from 2007 to 2009 is a series of year dummy variables and is not reported in this table, for instance, the year of 2007 which takes the value of 1 if the year is 2007 and the value of 0 otherwise, we also consider the impact of Chinese split-share reform in the year of 2006 which will be as a year dummy variable and is not reported in this table. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; ** significance at the 5% level; *** significance at the 1% level.

Furthermore, we find a strong negative relationship between the board size and funds' market share at the 1% (Table 15, Model 1) significance level. This finding implies that fund management companies with larger boards would reduce their market share. Specifically, the result indicates that when the board size increases by one board member, funds' market share would reduce 0.13% approximately. Yet, little is known about the impact of board size on funds' market share in the corporate governance literature. With regards to public companies, Allen and Gale (2000) reveal that firms with larger board size are related to higher quality, cheaper prices and better designs, leading to higher market share. Moreover, we find that board independence has an insignificance effect on funds' market share (Table 15, Model 2). This finding is consistent with the study Kong and Tang (2008), as they demonstrate that a greater percentage of independent directors on a board is not rewarded by more fund inflows.

In addition, we find that ownership is positively related to funds' market share. The result remains robust at the 1% level of significance (Table 15, Model 3). This result implies that when managerial ownership increase in one unit, funds' market share would increase 0.697 basis points approximately.

By considering endogeneity issues, Tables 16 and 17 report the results from the two-step system dynamic GMM approach. We find that board size has a positive impact on funds' return. The result is robust at the 10% level of significance (Table 16, Model 1). This finding is contrary to study Fama and Jensen (1983) and Adams et al. (2010). In addition, Table 16 indicates that board structure and ownership are negatively related to funds' return, but the estimated coefficients are statistically insignificant. Moreover,

Table 17 shows that a large board of directors is negatively association with funds' market share. The result is robust at the 10% level of significance (Table 17, Model 1). Managerial ownership exerts a positive impact on the funds' market share at the 5% level of significance (Table 17, Model 3).

Table 15: Fixed effect regressions for Funds' Market Share

Dependent variable	Market share		
Model	Model 1	Model 2	Model 3
Log(company assets)	0.00842***	0.00840***	0.00894***
	(0.00193)	(0.00193)	(0.00197)
Company experience	-0.00319***	-0.00315***	-0.00336***
	(0.000687)	(0.000693)	(0.000694)
No. of funds started	9.09e-05	6.55e-05	5.31e-05
	(0.000121)	(0.000124)	(0.000123)
Return	0.00385***	0.00357**	0.00406***
	(0.00137)	(0.00137)	(0.00143)
Expense	0.000914**	0.000905**	0.000844**
	(0.000360)	(0.000364)	(0.000394)
Board size	-0.00137***		
	(0.000469)		
Board structure		0.0151	
		(0.0168)	
Ownership			0.00697***
			(0.00237)
Constant	-0.145***	-0.162***	-0.168***
	(0.0403)	(0.0391)	(0.0406)
Observations	731	731	731
R-squared	0.347	0.340	0.358

Note: The table reports results of the fixed effect models investigating the contractual mutual fund governance on funds' market share for the period 2005 to 2015. The dependent variable is funds' market share. Market share is the total net asset under management by each fund management company divided by sum of total net assets under management in the fund industry. For the independent variables the paper adopts board size: it is the number of directors on the board of the fund management company; Board structure is the percentage of independent directors on the board of the fund management company; Ownership is the managerial ownership including board ownership; Log(company assets) is the logarithm of fund management company asset; Company experience is the number of years for a fund management company exists in the industry; No. of funds started is total number of new funds started by a fund management company in a given year ; Return is funds' return which is calculated by the weighted average of raw returns across all funds within the fund management company; Expense is the funds' weighted average expense ratio; the financial crisis period from 2007 to 2009 is a series of year dummy variables and is not reported in this table, for instance, the year of 2007 which takes the value of 1 if the year is 2007 and the value of 0 otherwise, we also consider the impact of Chinese split-share reform in the year of 2006 which will be as a year dummy variable and is not reported in this table. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; ** significance at the 5% level; *** significance at the 1% level.

Table 16: Dynamic panel regressions for funds' return

Dependent variable	Funds' return		
Model	Model 1	Model 2	Model 3
L.Return	0.117***	0.0532*	0.0747**
	(0.0386)	(0.0287)	(0.0327)
Log(company assets)	-0.110**	-0.0222	-0.0592
	(0.0480)	(0.0272)	(0.0411)
Company experience	0.0259**	0.0172***	0.0226***
	(0.0113)	(0.00612)	(0.00781)
No. of funds started	-0.00590	-0.000243	-0.000690
	(0.00439)	(0.00195)	(0.00242)
Expense	-0.263***	-0.0342	-0.105***
	(0.0417)	(0.0257)	(0.0365)
Market share	-0.966	-1.326	-0.901
	(3.400)	(1.259)	(1.776)
Board size	0.0552*		
	(0.0303)		
Board structure		-0.427	
		(0.278)	
Ownership			-0.00553
			(0.284)
Constant	2.479**	0.674	1.462
	(1.139)	(0.652)	(0.941)
Observations	637	637	637
AR(2)	0.205	0.215	0.469
Hansen p value	0.415	0.328	0.183

Note: The table reports results of the two-step system GMM estimator investigating the contractual mutual fund governance on funds' return for the period 2005 to 2015. The dependent variable is funds' return which is the weighted average return computed across all the fund within the management company. For the independent variables the paper adopts board size: it is the number of directors on the board of the fund management company; Board structure is the percentage of independent directors on the board of the fund management company; Ownership is the managerial ownership including board ownership; L.return is the one year lagged estimate of the funds' return; Log (company assets) is the logarithm of fund management company asset; Company experience is the number of years for a fund management company exists in the industry; No. of funds started is total number of new funds started by a fund management company in a given year; Market share is calculated by the sum of all assets under management by each company divided by all assets under management in the fund industry; Expense is the funds' weighted average expense ratio; the financial crisis period from 2007 to 2009 is a series of year dummy variables and is not reported in this table, for instance, the year of 2007 which takes the value of 1 if the year is 2007 and the value of 0 otherwise, we also consider the impact of Chinese split-share reform in the year of 2006 which will be as a year dummy variable and is not reported in this table. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; ** significance at the 5% level; *** significance at the 1% level.

Table 17: Dynamic panel regressions for funds' market share

Dependent variable	Market share		
Model	Model 1	Model 2	Model 3
L.market share	0.629***	0.660***	0.423***
	(0.162)	(0.174)	(0.0868)
Log(company assets)	0.00617**	0.00520*	0.00883***
	(0.00277)	(0.00277)	(0.00202)
Company experience	-0.000990*	-0.000945**	-0.00129***
	(0.000555)	(0.000455)	(0.000349)
No. of funds started	-0.000243	-0.000131	-0.000251
	(0.000203)	(0.000200)	(0.000270)
Return	0.00539**	0.00540**	0.00262
	(0.00219)	(0.00206)	(0.00200)
Expense	0.00194	0.00127	0.00180***
	(0.00124)	(0.00125)	(0.000575)
Board size	-0.00186*		
	(0.00109)		
Board structure		0.0437	
		(0.0287)	
Ownership			0.0273**
			(0.0104)
Constant	-0.119*	-0.129**	-0.193***
	(0.0622)	(0.0568)	(0.0453)
Observations	637	637	637
AR(2)	0.262	0.291	0.229
Hansen p-value	0.454	0.497	0.203

Note: The table reports results of the two-step system GMM estimator investigating the contractual mutual fund governance on funds' market share for the period 2005 to 2015. The dependent variable is funds' market share. Market share is the total net assets under management by each fund management company divided by sum of total net assets under management in the fund industry. For the independent variables the paper adopts board size: it is the number of directors on the board of the fund management company; Board structure is the percentage of independent directors on the board of the fund management company; Ownership is the managerial ownership including board ownership; L.market share is the one year lagged of market share; Log (company assets) is the logarithm of fund management company asset; Company experience is the number of years for a fund management company exists in the industry; No. of funds started is total number of new funds started by a fund management company in a given year; Expense is the funds' weighted average expense ratio; the financial crisis period from 2007 to 2009 is a series of year dummy variables and is not reported in this table, for instance, the year of 2007 which takes the value of 1 if the year is 2007 and the value of 0 otherwise, we also consider the impact of Chinese split-share reform in the year of 2006 which will be as a year dummy variable and is not reported in this table. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; ** significance at the 5% level; *** significance at the 1% level.

3.4.7 The interaction between risk and corporate governance

We report findings for the interaction term between risk and corporate governance on funds' market share in Tables 18 and 19. In Table 18, the fixed effect result shows that the coefficient on the interaction term of risk and board size is significantly positive at the 10% significance level (Table 18, Model 4). This finding suggests that board size has a positive impact on funds' market share only in the case of the fund management company with a high level of risk. Similarly, the dynamic panel analysis exerts a positive relationship between the interaction term of risk and board size and funds' market share at the 10% level of significance (Model 1 in Table 19). Moreover, Table 18 reveals that the interaction term of risk and board structure has an insignificant impact on funds' market share (Models 2 in Table 18). Similarly, we also find that the interaction term of risk and ownership has an insignificant impact on funds' market share (Model 3 in Table 18). The dynamic panel regression presents that the interaction term of risk and board structure and the interaction term of risk and ownership are not related to funds' market share (see Models 2 and 3 in Table 19).

Table 18: Interaction terms between risk and corporate governance on funds' market share-panel fixed effects

Dependent variable	Market share		
Model	Model 1	Model 2	Model 3
Log(company assets)	0.00850***	0.00856***	0.00910***
	(0.00193)	(0.00198)	(0.00201)
Company experience	-0.00317***	-0.00314***	-0.00335***
	(0.000656)	(0.000673)	(0.000670)
No. of funds started	9.25e-05	6.95e-05	5.92e-05
	(0.000122)	(0.000123)	(0.000121)
Return	0.00571***	0.00539**	0.00585**
	(0.00214)	(0.00219)	(0.00223)
Expense	0.00118***	0.00120***	0.00115***
	(0.000400)	(0.000417)	(0.000402)
Risk	-0.00173**	-0.000814	-0.000473
	(0.000807)	(0.00119)	(0.000305)
Board size	-0.00228***		
	(0.000731)		
Risk*Board size	0.000142*		
	(7.25e-05)		
Board structure		0.0108	
		(0.0149)	
Risk*Board structure		0.000816	
		(0.00301)	
Ownership			0.00739**
			(0.00298)
Risk*Ownership			-0.000182
			(0.000760)
Constant	-0.138***	-0.163***	-0.170***
	(0.0385)	(0.0404)	(0.0410)
Observations	731	731	731
R-squared	0.362	0.349	0.367

Note: The table reports results of the fixed effect models investigating the contractual mutual fund governance on funds' market share for the period 2005 to 2015. The dependent variable is funds' market share. For the independent variables the paper adopts board size: it is the number of directors on the board of the fund management company; Board structure is the percentage of independent directors on the board of the fund management company; Ownership is the managerial ownership including board ownership; Log(company assets) is the logarithm of fund management company asset; Company experience is the number of years for a fund management company exists in the industry; No. of funds started is total number of new funds started by a fund management company in a given year; Risk is the funds' return volatility is calculated by the weighted average of return volatility across all funds within the fund management company; Return is the weighted average return computed across all the fund within the management company; Risk*Board size is the interaction term between risk and board size; Risk *Board structure is the interaction term between risk and board structure; Risk*Ownership is the interaction term between risk and ownership; the financial crisis period from 2007 to 2009 is a series of year dummy variables and is not reported in this table, for instance, the year of 2007 which takes the value of 1 if the year is 2007 and the value of 0 otherwise, we also consider the impact of Chinese split-share reform in the year of 2006 which will be as a year dummy variable and is not reported in this table. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; ** significance at the 5% level; *** significance at the 1% level.

Table 19: Interaction terms between risk and corporate governance on funds' market share-Dynamic panel effects

Dependent variable	Market share		
Model	Model 1	Model 2	Model 3
L.market share	0.549***	0.401***	0.436***
	(0.0743)	(0.0967)	(0.0711)
Log(company assets)	0.00409**	0.00791***	0.00645*
	(0.00183)	(0.00196)	(0.00350)
Company experience	-0.000259	-0.00112**	-0.000525
	(0.000207)	(0.000455)	(0.000601)
No. of funds started	-0.000253	-0.000412*	-0.000536
	(0.000319)	(0.000220)	(0.000329)
Return	-0.00241	0.00482	0.000953
	(0.00335)	(0.00561)	(0.00552)
Expense	0.00129	0.00176***	0.00183
	(0.000849)	(0.000595)	(0.00111)
Risk	-0.00252	-3.53e-05	0.000178
	(0.00191)	(0.00165)	(0.000997)
Board size	-0.00202		
	(0.00137)		
Risk*Board size	0.000320*		
	(0.000178)		
Board structure		0.0232	
		(0.0382)	
Risk*Board structure		0.000116	
		(0.00444)	
Ownership			0.0206
			(0.0248)
Risk*Ownership			-0.000590
			(0.00853)
Constant	-0.0732**	-0.179***	-0.143*
	(0.0345)	(0.0478)	(0.0748)
Observations	637	637	637
AR(2)	0.314	0.253	0.244
Hansen p-value	0.936	0.662	0.786

Note: The table reports results of the dynamic panel effect models investigating the contractual mutual fund governance on funds' market share for the period 2005 to 2015. The dependent variable is funds' market share. For the independent variables, the paper adopts board size: it is the number of directors on the board of the fund management company; Board structure is the percentage of independent directors on the board of the fund management company; Ownership is the managerial ownership including board ownership; L.market share is the one year lagged of funds' market share; Log(company assets) is the logarithm of fund management company asset; Company experience is the number of years for a fund management company exists in the industry; No. of funds started is total number of new funds started by a fund management company in a given year; Risk is the funds' return volatility is calculated by the weighted average of return volatility across all funds within the fund management company; Return is the weighted average return computed across all the fund within the management company; Risk*Board size is the interaction term between risk and board size; Risk *Board structure is the interaction term between risk and board structure; Risk*Ownership is the interaction term between risk and ownership; the financial crisis period from 2007 to 2009 is a series of year dummy variables and is not reported in this table, for instance, the year of 2007 which takes the value of 1 if the year is 2007 and the value of 0 otherwise, we also consider the impact of Chinese split-share reform in the year of 2006 which will be as a year dummy

variable and is not reported in this table. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; ** significance at the 5% level; *** significance at the 1% level.

3.5. Conclusion

This study investigates the interplay between various board characteristics and risk-taking behavior of Chinese mutual funds by using manually collected data from the period between 2005 and 2015. We adopt two different measurements of funds' risk-taking behavior, proxied by total risk and concentration risks which including stock concentration risk and bond concentration risk.

Our evidence suggests that a larger board size leads to a lower stock concentration risk. This result implies that a larger board size tends to result in less effective group communication and more difficulties in achieving consensus on the decision-making process, thereby leading to lower risk. We further show that a greater number of independent directors are associated with a lower bond concentration risk. In addition, the presence of female directors on a board not only increases funds' total risk, but also increases its concentration risk. Regarding external governance-represented by the percentage of institutional investors' holding, we find that a higher level of institutional investors would reduce total risk and concentration risk, because institutional investors are more sensitive to risk level than individual investors. Furthermore, when we examine for the effects of education (board directors with PhDs) on fund management companies, we find that an increase in the number of better-educated directors would reduce funds' total risk.

This chapter also shows that fund management companies with larger board size are associated with smaller market share. Also, we find that the board size exerts a positive impact on funds' return. And there is a positive relationship between ownership and funds' market share. Finally, this chapter discovers that fund management company-specific characteristics have a significant impact on contractual fund governance, for instance, the company size, the company experience and the number of funds started.

With increased competitive pressures as a result of the participation of masses of institutional investors in financial markets, Chinese mutual fund management companies need to improve and strengthen management quality, especially in relation to risk management. The findings of this chapter could have possible policy implication for investors and policy makers. We argue that if regulators are concerned about risk related to higher concentration, we show that a higher percentage of independent directors in the board or a larger number of board directors would lower concentration risk. Regulators should actively encourage better-educated directors to compete in the mutual fund director market.

Moreover, appointing female directors on a board would increase concentration level. This is because a higher concentration ratio will contribute to an unstable financial system. Furthermore, this chapter also reveals the importance of institutional investors' holding on governance effectiveness, as institutional investors with their substantial holding in funds are more able to have greater incentive to monitor the management team than individual investors.

Chapter 4: Does ownership structure affect funds' return and market share? Evidence from Chinese mutual funds

4.1. Introduction

Over the past three decades, China's capital market has experienced rapid growth and has become the second largest in the world, moving from a predominantly centrally planned economy towards a market-oriented economy. In order to promote the stock exchange, and market related activism and oversight, the Chinese authorities have fostered the presence of institutional investors (Jiang and Kim 2015), especially in the case of mutual funds. The number of mutual funds has increased significantly since the first mutual fund was founded in China, in September 2001. The total net value of mutual funds increased from 470 to 1797 billion Chinese yuan from 2005 to 2007 (Yuan et al. 2008). Up to 2015, the total net value had soared to 8.4 trillion Chinese yuan (based on our data).

This chapter comes in a timely manner as it draws information from hand-collected data on Chinese mutual funds to explore the underlying relationships between funds' performance and ownership structure. There are some studies that review China's legal and financial system, especially with regard to corporate governance, investor protection and financial stability in general (Allen et al. 2008), though to date there is no evidence for mutual funds despite their prominent importance, if anything, due to their significant growth in recent years but also due to changes in the regulatory environment and the structure of this financial industry. Our chapter covers this gap.

Moreover, some regulation reforms have been implemented through the years. The China Securities Regulatory Commission (CSRC) made a strategic decision to implement the rules of an establishment of joint venture fund management companies in 2002 in order to improve corporate governance and financial transparency in the mutual fund industry. These changes have allowed foreign institutions to invest in fund management companies that are controlled by government agencies. In light of this, the number of fund management companies with foreign investor has increased significantly to 46 at the end of 2015, accounting for almost half of fund management companies in the market. Such changes lead to changes in the ownership structure as government ownership is being transferred to foreign investors. This raises an interesting question on whether different types of ownership would affect fund's performance, as having different types of owners could lead to different investment behaviors.

To date, the literature on corporate governance is largely focused on banks (Berker-Blease and Irani 2008; Brown and Caylor 2009; Boateng et al. 2017) whilst there are some studies on mutual funds (Kong and Tang 2008 and Gong et al. 2016). For China, Gong et al. (2016) is one of the very few studies that examine the impact of organizational structure on funds' return. Our study builds and extends on Gong et al. (2016) by investigating the impact of ownership structure on funds' return and market share. We argue that funds' market share represents the culmination of all the decisions made by the fund management company and the investors' response to those decisions, in line with the seminal paper of Khorana and Servaes (2012).

To analyze the impact of ownership type on funds' return and market share, we follow previous studies (Iannotta et al. 2007; Boubakri et al. 2013; Chen et al. 2017) and focus on two dimensions of a mutual fund management company's ownership. Firstly, we look at the background of the owners, which in this case is either the government or foreign investors. This distinction in ownership structure is of importance and has been rarely being studied though it would provide significant information regarding heterogeneity across fund management companies. For example, the background of the owners, two companies with the same degree of ownership concentration may differ in performance if one of them has high government ownership. Secondly, we examine the degree of ownership concentration, as companies may differ because their ownership is more or less dispersed (Iannotta et al. 2007). In line with recent fund performance studies (Kong and Tang. 2008; Cremers et al. 2009; Gong et al. 2016), we use the funds' return to represent its performance. In addition, we follow the study by Khorana and Servaes (2012) and include in our analysis the market share.

This chapter contributes to the literature in several ways. First, the literature on ownership structure regarding mutual fund management companies in developing countries, and in particular China, is limited and some related studies have largely focused on the banking sector and non-financial firms. We argue herein that mutual fund management companies differ in many respects from banks and thereby one should provide modeling for the former. Such modeling should take into account regulations, the multitude of stakeholders and the complex management structure. Also, it is extremely difficult to collect information and thereby data for Chinese fund management companies, other than hand-collected data as it does the present study. Thus, we manually assemble a unique dataset of Chinese fund management companies

that identify ownership structure in the form of government ownership, foreign ownership and ownership concentration from 2005 and 2015. This data set provides unique information for studying the effect of ownership structure on funds' return and market share, as none of its mutual fund management companies are publicly traded companies. Third, we employ panel regression analysis that takes into account the heterogeneity of the funds, whilst we also model persistence in funds' return and market share with dynamic panel estimation. Lastly, as endogeneity has been frequently quoted as an issue in similar studies we employ GMM estimations where we deal with such criticism.

Our findings show that government ownership asserts a positive effect on a mutual funds' return. Alas, foreign ownership is not only linked to lower funds' return, but also tends to reduce funds' market share. Government-controlled fund management companies are negatively associated with their market share, whereas funds' return and market share are positively correlated with government ownership in highly concentrated in terms of ownership.

The rest of the chapter is structured as follows. Section 4.2 explores related studies on the corporate governance of mutual fund management companies and presents the hypotheses development. Section 4.3 reveals the methodology and introduces the data. Section 4.4 discusses the findings of the empirical study. Section 4.5 presents the conclusion and makes some policy suggestions.

4.2 Related literature and hypothesis development

4.2.1 Ownership types and fund performance

Although there are numerous studies of ownership types and performance in the academic literature, most studies in the academic literature focus on listed companies and banks rather than mutual funds (see, e.g. Leech and Leahy, 1991; Lehmann and Weigand, 2000; Chen et al. 2006; Ferri 2009; Lin and Zhang, 2009; Liang et al. 2013; Chen et al. 2013; Lee and Hsieh, 2014; Jameson et al. 2014; Huang and Zhu, 2015; Lin et al. 2016; Lin et al. 2017; Lin and Fu, 2017; Abdallah and Ismail, 2017 and Singla et al. 2017). Only a few studies examine the relationship between ownership types and mutual funds' performance. Berkowitz and Qiu (2003) examine the impact of the type of ownership of mutual fund management companies on their performance and risk-taking behavior during the sample period between 1985 and 1998 in Canada. Berkowitz and Qiu document that publicly-traded management companies do not perform better than private-owned management companies and on average publicly-traded management companies would charge higher fees than private-owned management companies.

Using a time-series data from 2002 to 2005 on the UK unit trust industry, Shinozawa (2007) investigates the differences between mutual and public limited companies and finds that unit trusts managed by the public limited companies do not perform better than unit trusts managed by mutual rivals in terms of risk-adjusted returns and concludes that the capital markets are efficient for a long run. Shinozawa (2010) further assesses the effectiveness of organizational forms between the mutual and proprietary forms of organization using the DEA technique and finds that there is clear evidence

that neither organizational form exhibits better performance in the UK unit trust industry. Furthermore, Ferris and Yan (2009) investigate the impact of ownership structure on the level of agency costs in the fund management companies using a sample of 750 fund families over the period from 1992 to 2004. They suggest that public fund management companies tend to perform worse than private fund management companies and conclude that public fund management companies have more agency coast than private fund management companies.

With respect to ownership types in the Chinese context, we focus on the impact of government ownership and foreign ownership on performance. On the one hand, firms with high level of government ownership weaken the corporate governance mechanisms, because managers of these firms are not subject to market pressures such as those found in financial, goods, and labour markets (Chen et al. 2017). Chen et al. (2006) find that government ownership is positively associated with corporate fraud although only in relation to the univariate analysis. Fan et al. (2007) claim that state-controlled companies with politically connected CEOs have worse performance than companies without politically connected CEOs. In addition, they state that companies with politically connected CEOs prefer to appoint current or former government bureaucrats who often lack professionalism. In support of this argument, Fan et al. (2013) claim that companies with a higher degree of government ownership tend to perform relatively poorly in China, especially in the case of distressed companies.

On the other hand, to some extent, it is possible to observe the benefits of government-controlled companies as a high level of government ownership results in effective monitoring on corporate governance and improved financial transparency, because

governments have a monopoly on the use of coercive power. Sun et al. (2002) find that government ownership has a positive association with the company's performance in China. They also point out that too little government ownership may not be good for firm performance.

Furthermore, based on corporate governance literature, in general, foreign ownership is positively associated with the quality of corporate governance (Djankov and Murrell 2002; Gillan and Starks 2003). In the case of emerging financial markets, the entry of foreign institutional investors enhances human capital, skills and knowledge transfer. Levine (1996) claims that foreign participation in emerging countries' financial market may provide high quality financial services and exert downward pressure on the prices of financial services. Li et al. (2011) find a negative correlation between foreign ownership and stock return volatility in 31 emerging stock markets and the results are robust even after controlling for potential endogeneity. Chen et al. (2016) investigate the relationship between ownership structure and innovation and find a negative correlation between foreign ownership and firm innovation as measured by technological diversity strategies using panel data from 138 Taiwanese firms.

According to the above, it is clear that different ownership structure has a different impact on funds' performance. Hence, we propose the following null hypothesis:

Hypothesis 1a: government ownership would impact upon funds' return.
Hypothesis 1b: government ownership would impact upon funds' market share.
Hypothesis 1c: foreign ownership would impact upon funds' return.
Hypothesis 1d: foreign ownership would impact upon funds' market share.

4.2.2 Ownership concentration and fund performance

Turning to the ownership concentration, Iannotta et al. (2007) highlight the importance of ownership dispersion for performance. Shleifer and Vishny (1986) argue that there might issue between controlling shareholders and minority shareholders, possible conflicts of interest that could constitute agency problem. In general, a high ownership concentration is beneficial for large shareholders and might damage the financial performance of the firm, as large shareholders seek to reap benefits of control at the expense of outside or minority shareholders (Goergen 2014). In addition, ownership concentration is related to the separation of ownership from management (Jensen and Meckling, 1976) that could also raise concerns about possible conflicts.

In the Chinese context, using a sample of 145 equity-type mutual funds under 57 fund management companies in China during the period from 2004 to 2009, Gong et al. (2016) claim that concentrated ownership tends to improve the performance of funds, as they find if a top1 shareholder holds a larger stake in a company, it has a positive impact on fund performance. It means that high concentration in ownership may have positive effects on firm value due to the additional monitoring imposed on firms by large shareholders to mitigate principal-agent problems associated with dispersed ownership.[23] As a consequence, highly concentrated ownership results in better firm performance and profitability. Moreover, Gong et al. (2016) also reveal that the presence of multiple large shareholders decrease fund performance using a governance data covering Chinese mutual funds. By contrast, Li et al. (2015) find a different outcome and point out that a high ownership concentration reduces board effectiveness

[23] This finding is similar to studies by Kaplan and Minton (1994); Hartzell and Starks (2003) and Maury (2006).

and decreases the level of internal monitoring of company management in Chinese companies.

Based on the above discussion, we propose the following hypothesis:

Hypothesis 2a: an increase in ownership concentration would positively affect the funds' return.

Hypothesis 2b: an increase in ownership concentration would positively affect the funds' market share.

4.3. Data and Methodology

4.3.1. Data and sample selection

Our sample consists of the major 94 fund management companies in China. Our unbalanced panel dataset includes 731 observations over the period from 2005 to 2015. The mutual fund data is mainly collected from the China Securities Market & Accounting Research (CSMAR) database, which provides detailed information on both at the fund management company level and at the individual fund level in China. Also, data about the fund management companies' ownership structure have been manually collected from each fund management company' website. Table 1 presents the definitions of variables used in our regressions.

Table 1. Definitions of Variables

Variable	Description	Sources
Government ownership	The percentage of shares owned by government agencies	Fund prospectus
GCCs	A dummy variable that equal to 1 if the largest (controlling) shareholder is a government agency and 0 otherwise	Fund prospectus
Foreign ownership	The percentage of shares owned by foreign strategic investors	Fund prospectus
FICs	A dummy variable that equal to 1 if a fund management company has foreign investment and 0 otherwise	Fund prospectus
OC1	Herfindahl index based on the ownership held by the shareholders of the mutual fund management company	Fund prospectus
OC2	The percentage of shares owned by the largest shareholder	Manual collection
Expense ratio	Expense ratio is calculated by the weighted average of expense ratios across all funds within the fund management company	CSMAR
Return	Funds' return is calculate by the weighted average of returns across all funds within the fund management company	CSMAR
Company Size	The logarithm of total net assets managed by the fund management company	CSMAR
No. of funds started	The total number of new funds started by a fund management company in a given year	CSMAR
Company top1	A dummy variable that equal to 1 if the fund management company has at least on fund operating in the top 1 of a given category in a given year	CSMAR
Company focus	Herfindahl index based on investment objective in a fund management company	CSMAR
Company experience	The number of years for a fund management company exists in the industry	CSMAR

4.3.2. Return and market share

We collect data on fund annual net asset value (NAV) to calculate funds' returns from the CSMAR database (Kong and Tang 2008 and Cremers et al. 2009). The funds' return is calculated by the weighted average of returns across all funds within the fund management company, where the weight is the size of the fund within the same fund

management company. To measure funds' market share, we follow the previous study by Khorana and Servaes (2012). Market share is computed by the sum of all assets managed by each fund management company divided by all assets in the mutual fund industry.

4.3.3. Ownership structure

The ownership structure variables include the government ownership ratio, government-controlled companies, foreign ownership ratio and foreign invested companies. Government ownership (GO) ratio is the percentage of shares owned by government agencies (Chen et al. 2006; Liang et al. 2013; Fan et al. 2013; Lin et al. 2016). Gong et al. (2016) state that the percentage of government ownership would be extraordinarily high as a large number of government-controlled enterprises in China's economy. For the identifying the government-controlled companies (GCCs), we opt for a dummy variable that is equal to 1 if the largest shareholder is a government agency and 0 otherwise (Fan et al. 2007). The impact of government ownership on funds' return and market share may be twofold. On the one hand, fund management companies with high level of government ownership weaken the corporate governance mechanisms and decrease funds' performance, because managers of these firms are not subject to market pressures (Chen et al. 2017). On the other hand, to some extent, it is possible to observe the benefits of government-controlled fund management companies as high level of government ownership results in effective monitoring on corporate governance and improved financial transparency, because governments have a monopoly on the use of coercive power. Therefore, government-controlled companies may enhance funds' return and market share.

With respect to foreign ownership (FO), we count the percentage of shares owned by foreign investors (Ferreira and Motas, 2008; Aggarwal et al. 2011; Chen et al. 2013; Chen et al. 2016; Lin and Fu, 2017; Singla et al. 2017). Lastly, the foreign-invested companies (FICs) is a dummy variable that is equal to 1 if a fund management company has foreign investors and 0 otherwise. In the case of the Chinese financial markets, the entry of foreign institutional investors enhances human capital, skills and knowledge transfer. Levine (1996) claims that foreign participation in emerging countries' financial market may provide high quality financial services. Thus, foreign investors may be more incentive to monitor fund management. Hence, foreign ownership is expected to have a positive impact on funds' return and market share.

Table 2.1 shows the descriptive statistics of the ownership structure and ownership changes over time. The sample mean of state ownership in Panel A of Table 2 is 54.54 percent, which is greater than that of 27.3 percent found in Dong et al (2014) and 23.89 percent calculated by Chen et al (2017). Moreover, the sample mean of 70 percent for state-controlled companies is comparable to that of Dong et al. (2014). Turning to foreign ownership, the sample mean of foreign ownership is 18.56 percent, while that of fund management companies with foreign investment is 49%, which is similar to the figures of Dong et al. (2014) and 33% by Lassoued et al. (2016). This means that almost half of Chinese mutual fund management companies have foreign investors. In Panel B of Table 2.1, we find that the mean of government-controlled companies was increased sharply from 65% in 2005 to 75% in 2008. At the same time, the average percentage of foreign ownership ratio (FO) was increased from 12.86% to 21.4%. This increase is attributed to the regulation reforms in 2002.

In order to examine the impact of ownership concentration on funds' return and market share, we use ownership concentration 1 (OC1), and ownership concentration 2 (OC2). Ownership concentration1 is measured by the Herfindahl index which is equal to the sums of the squared ownership shares (Dong et al. 2014). High Herfindahl index would indicate the more concentrated the ownership of the mutual fund management company. Ownership concentration 2 is defined as the percentage of share owned by the largest shareholder (Dong et al. 2014). The impact of ownership concentration on funds' return and market share is mixed. On the one hand, a high ownership concentration is beneficial for large shareholders and might damage the financial performance of the firm, as large shareholders seek to reap benefits of control at the expense of outside or minority shareholders (Goergen 2014). In addition, ownership concentration is related to the separation of ownership from management (Jensen and Meckling, 1976) that could also raise concerns of possible conflicts. On the other hand, high concentration in ownership may have positive effects on firm value due to the additional monitoring imposed on firms by large shareholders to mitigate principal-agent problems associated with dispersed ownership. As a consequence, highly concentrated ownership results in better funds' return and higher market share.

Table 2.1 presents that the mean of the ownership concentration ratio is 0.425. The mean of the largest shareholder's holding is 50.17 percent. In addition, we observe an upward trend in the average ratio of ownership concentration 1 during the sample period, with a stable increase from 0.38 to 0.47.

Table 2.1 Descriptive statistics of the ownership structure

Variables	Mean	SD	MIN	MAX	Median
Panel A: Ownership structure					
GO (%)	54.54	27.59	0	100	52
GCCs (Dummy)	0.7	0.457	0	1	1
FO (%)	18.56	20.44	0	49	0
FICs (Dummy)	0.49	0.5	0	1	0
OC1	0.425	0.13	0.2	1	0.39
OC2	50.17	13.22	20	100	49
Panel B: Year by year ownership structure variables					
Year	GO	GCCs	FO	FICs	OC1
2005	55.0	0.65	12.86	0.36	0.38
2006	56.2	0.69	14.05	0.38	0.37
2007	55.7	0.74	18.97	0.47	0.41
2008	59.0	0.75	21.4	0.54	0.42
2009	54.0	0.7	21.5	0.55	0.42
2010	54.3	0.7	21.4	0.57	0.42
2011	53.3	0.72	21.64	0.58	0.41
2012	53.5	0.69	19.47	0.53	0.41
2013	52.7	0.67	19.11	0.52	0.43
2014	53.8	0.7	17.42	0.48	0.46
2015	55.0	0.71	16.01	0.43	0.47

Note: This table presents summary statistics the mean, standard deviation, minimum, maximum and median values for the variables used in analyzing funds' performance and market share from 2005 to 2015. GO: Government ownership is the percentage of shares owned by a government agency; GCCs: Government–controlled companies is a dummy variable that equal to 1 if the largest shareholder agency and 0 otherwise; FO: Foreign ownership is the percentage of shares owned by foreign strategic investors; FICs: Foreign invested companies is a dummy variable that is equal to 1 if a fund management company has foreign investors and 0 otherwise; OC1: ownership concentration1 is the ownership Herfindahl index (HHI) based on the ownership held by the shareholders of the mutual fund management company; OC2: ownership concentration2 is the percentage of shares owned by the largest shareholder.

4.3.4. Descriptive statistics

The descriptive statistics for fund management company characteristic variables are provided in Table 2.2. Regarding the governance proxy shown in Panel A of Table 2.2, the sample mean of the market share is 1.44%, which is greater than the figures of 0.36%

obtained by Khorana and Servaes (2012) for their U.S. sample. The mean of funds' return is 16%.

In Panel B, we show some descriptive statistics of mutual fund management company specific variables, for instance, expense ratio, company experience, top-1 funds, company size, the number of funds started and company focus. The average fund management company's expense ratio is 1.9%. The sample mean of a fund management company's risk is 5.48%, which is slightly higher than that of 3% obtained by Kong and Tang (2008). Furthermore, the average size of a fund management company is 36 billion Chinese Yuan. The average number of new funds started is 3.33. Meanwhile, the average age of a fund management company is 7.41 years. The sample mean of top-1 funds and company focus are 0.08 and 0.44, respectively.

Table 2.2 Summary statistics

Variables	Mean	SD	MIN	MAX	Median
Panel A: Dependent variables					
Market share (%)	1.44	1.72	0.003	7.8	0.75
Return (%)	16	34.96	-60.76	158.27	6.99
Panel B: Company-specific					
Expense ratio (%)	1.9	1.3	0.01	19.66	1.76
Risk (%)	5.48	3.51	0.05	22.08	4.89
Company experience	7.41	4.23	1	18	7
Top-1 fund	0.08	0.28	0	1	0
Company focus	0.44	0.24	0.13	1	0.36
Company size (in billions)	36	62.4	0.012	684	15.2
No. of funds stated	3.33	4.23	0	34	2

Note: This table presents summary statistics the mean, standard deviation, minimum, maximum and median values for the variables used in analyzing funds' return and market share from 2005 to 2015. Market share is calculated by the sum of all assets under management by each company divided by all assets under management in the fund industry; funds' return is calculate by the weighted average of returns across all funds within the fund management company; Company size is the logarithm of fund management company asset; Expense ratio is calculated by the weighted average of expense ratios across all funds within the fund management company; Risk is the funds' return volatility is calculate by the weighted average of return volatility across all funds within the fund management company; Company experience is the number of years for a fund management company exists in the industry; Company top1 is a dummy variable that equal to 1 if the fund management company has at least one fund operating in the top1 of a given category in a given year; Company focus is the Herfindahl index based on investment objective in a fund management company; No. of funds started is total number of new funds started by a fund management company in a given year.

4.3.5. Control variables

Turning to control variables, we opt for the following: fund management company size, expense ratio, fund management company experience, top-1 fund, company focus and the number of funds started. More specifically, the fund management company size is measured by the logarithm of total net assets managed by the fund management company. Larger fund management companies tend to perform better because of better concessions on trading commissions and more resources for research (Chen et al. 2004). The expense ratio is calculated by the weighted average of expense ratios across all funds within the same fund management company.

Company experience is the number of years that a fund management company has existed in the industry. Fund management companies with greater experience tend to have better performance. Top-1 fund is a dummy variable that is equal to 1 if the fund management company has at least one fund operating in the top-1 of a given category in a given year. Nanda et al. (2004) find that top-1 (or otherwise called star fund performer) contribute to greater cash inflow to the fund. This means that funds in top-1 might have a positive impact on fund management company market share. The company focus is measured by the Herfindahl index based on a fund management company's investment objective. More focused fund management companies are easier to monitor and to develop expertise in one specific asset class or investment style, leading to superior performance (Siggelkow, 2003 and Massa, 2003) and higher market share (Khorana and Servaes 2012). Lastly, we also include the number of funds started in our regression.

Furthermore, Table 2.3 reports the entire correlation matrix of the independent variables. It is clear that almost all of the correlation coefficients are below the value of 0.6. This finding implies that the independent variables in chapter four are not highly correlated, suggesting no serious multicollinearity problems.

Table 2.3. Correlation matrix of independent variables

	1	2	3	4	5	6
1-Government ownership	1					
2-GCCs	**0.76**	1				
3-Foreign ownership	-0.29	-0.05	1			
4-FICs	-0.22	-0.01	**0.92**	1		
5-OC1	0.09	0.1	0.3	0.28	1	
6-OC2	0.18	0.14	0.1	0.17	**0.87**	1
7-Expense	-0.15	-0.15	0.07	0.04	-0.02	-0.07
8-Company size*	0.14	0.16	0.08	0.14	0.02	0.03
9-Company experience	0.12	0.1	-0.001	0.03	-0.19	-0.19
10-No. of funds started	0.06	0.05	0.004	0.06	-0.02	0.01
11-Company top1	-0.06	-0.04	0.05	0.06	-0.04	-0.05
12-Company focus	-0.08	-0.11	-0.11	-0.16	0.05	0.08

(*Continued*)

	7	8	9	10	11	12
7-Expenses	1					
8-Company size*	-0.22	1				
9-Company experience	-0.02	0.65	1			
10-No. of funds started	-0.23	0.58	0.44	1		
11-Company top1	0.03	0.03	0.02	0.04	1	
12-Company focus	0.05	-0.59	-0.69	-0.46	-0.04	1

Notes: Pearson correlation coefficients for independent variables from 2005 to 2015. The variable with an asterisk (*) is measured in logarithmic; Independent variables with high correlation coefficients are marked boldface.

4.3.6. Research design

This chapter opts for a fixed effect panel estimation to examine the impact of ownership structure on funds' return and market share. We control for omitted heterogeneous mutual fund management company-specific effects. Hence, the general model for

measuring the relationship between a mutual fund management company's ownership structure and funds' return and market share is:

$$Return_{i,t} \; or \; Market \; share_{i,t} = \alpha_{0,t} + \sum_{j=1}^{6} \beta_j \, Ownership \; Structure_{i,t} + \sum_{k=1}^{6} \beta_k \, Control_{i,t} + \varepsilon_{i,t} \quad (1)$$

where *t* and *i* denote time period and mutual fund management companies and funds' return is the dependent variable; market share is the other dependent variable and reflects the ratio of assets managed by the fund management company to all the assets managed by the open-ended mutual fund industry. Ownership structure represents the government ownership ratio (GO), government-controlled companies (GCCs), foreign ownership (GO), foreign invested companies (FICs), ownership concentration1 (OC1) and ownership concentration2 (OC2). CONTROL represents the control variables, namely the fund management company's size, funds' expense ratio, fund management company's experience, top-1 fund, company focus and number of funds started, while $\varepsilon_{i,t}$ denotes the error term.

4.4. Empirical analysis and results

4.4.1. Ownership structure and funds' risk-taking

We examined the impact of governance variables on funds' risk-taking at previous chapter. In this chapter, we will first examine the impact of ownership structure on funds' risk-taking, as the effect of ownership structure on funds' return and market share would be affected by the risk preference of funds. Hence, the general model for measuring the relationship between ownership structure and funds' risk-taking can be expressed as follows:

$$Risk_{i,t} = \alpha_0 + \beta_1 Ownership\ structure_{i,t} + \beta_2 Control_{i,t} + \varepsilon_{i,t} \quad (2)$$

where *t* and *i* denote time period and mutual fund management companies and Funds' risk-taking which is measured by total return volatility. Ownership structure represents the government ownership ratio (GO), government-controlled companies (GCCs), foreign ownership (GO), foreign invested companies (FICs), ownership concentration1 (OC1) and ownership concentration2 (OC2). CONTROL represents the control variables, namely the fund management company's size, funds' expense ratio, fund management company's experience, top-1 funds, company focus and number of funds started, while $\varepsilon_{i,t}$ denotes the error term.

The results are reported in Table 3. We find that the government ownership has a positive and statistically insignificant impact on a funds' risk-taking behavior in Model 1. The result is similar when the government-controlled companies (GCCs) variable is employed in Model 2. The relationship between risk-taking behavior and government-controlled companies (GCCs) is positive but statistically insignificant. The insignificant results for government ownership suggest that government shareholders cannot help fund management companies to improve their level of risk control.

Furthermore, with regard to foreign ownership, Table 3 reveals that the coefficient on the ownership ratio of foreign shareholders is significantly negative in Model 3, suggesting that a higher level of foreign ownership in a fund management company means that the company tends to take fewer risks. We also find that foreign investment (FICs) has a negative impact on a funds' risk-taking behavior at the 5% (Table 3, Model 4) significance level. This is in line with several previous studies (Umutlu et al. 2010; Li et al. 2011; Lassoued et al. 2016), but contradicts the findings of Chen et al. (2013) and partially contradicts with the findings of Lee et al. (2014). Lee et al. (2014) offer evidence that foreign ownership has an inverse U-shaped impact on stability in the banking industry.

We present next the empirical results relating to whether Chinese mutual fund management company's ownership structure would affect funds' return and market share after controlling for different mutual fund management company characteristics, such as, company size, company experience, expense ratio, number of funds started and the degree of fund management company focus.

Table 3 The relationship between ownership structure and risk-taking-Fixed effect

Dependent variable	Risk-taking			
Model	Model 1	Model 2	Model 3	Model 4
Expenses	0.824***	0.826***	0.874***	0.862***
	(0.258)	(0.261)	(0.252)	(0.252)
Company assets	1.496***	1.473***	1.563***	1.551***
	(0.201)	(0.209)	(0.211)	(0.209)
Company experience	-2.577***	-2.516***	-2.623***	-2.632***
	(0.459)	(0.470)	(0.438)	(0.432)
No. of funds started	-2.432***	-2.439***	-2.377***	-2.377***
	(0.483)	(0.483)	(0.485)	(0.488)
Top1	-0.167	-0.170	-0.175	-0.169
	(0.270)	(0.270)	(0.273)	(0.272)
Company Focus	1.205	1.295	1.269	1.088
	(1.121)	(1.103)	(1.085)	(1.022)
Government ownership	0.0134			
	(0.0189)			
GCCs		1.145		
		(1.336)		
Foreign Ownership			-0.0442**	
			(0.0210)	
FICs				-1.607**
				(0.761)
Constant	-26.53***	-26.22***	-26.60***	-26.24***
	(3.996)	(3.993)	(4.514)	(4.477)
Observations	731	731	731	731
R^2	0.254	0.255	0.264	0.263

Note: The table reports results of the fixed effect models investigating the contractual mutual fund management company's ownership structure on risk for the period 2005 to 2015. The dependent variable is the funds' risk-taking. The funds' risk taking is the funds' return volatility which is calculated by the weighted average of return volatility across all funds within the fund management company For the independent variables the paper adopts government ownership: it is the percentage of share owned by a government agency; GCCs is the government-controlled companies and equal to 1 if the largest shareholder is a government agency and 0 otherwise; Foreign ownership is the percentage of share owned by foreign investors; FICs is the foreign invested companies and equals to 1 if a fund management company has foreign investments and 0 otherwise; Expense is the funds' expense ratio; Company size the log of total net assets managed by the fund management company; Company experience is the number of years of a fund management company exists in the industry; No of funds started is the total number of funds started by a fund management company in a given year; Top 1 is a dummy and equals to 1 if the fund management company has at least on fund operating in the top 1 of a given category in a given year; Company focus is the Herfindahl index of investment objective in a fund management company and is the sum of squared fractions of each investment objective's share in total fund management company value; the financial crisis period from 2008 to 2009 is a series of year dummy variables and is not reported in this table, for instance, the year of 2008 which takes the value of 1 if the year is 2008 and the value of 0 otherwise. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; **significance at the 5% level; *** significance at the 1% level.

4.4.2. Ownership, funds' return and market share

Table 4 reports the regression results of the relationship between ownership structure and funds' return, such as, Models 1 and 2 for government ownership and government-controlled companies (GCCs) respectively. Models 3 and 4 examine the relationship between funds' return and the ownership ratio of foreign ownership and foreign invested companies (GICs) respectively.

The estimated coefficient for the ownership ratio of government ownership is positive and significant in Model 1. The result remains robust at the 10% level of significance, indicating that a higher level of government ownership could promote funds' return. This means that an increase of one unit in the percentage of government ownership is associated with an increase of approximately 0.2% in the funds' return. Results show government-controlled companies (GCCs) assert a positive impact (Table 4, Model 2). This implies that government-controlled companies tend to improve their return, through the use of controlling benefits to monitor managers effectively and to collect important information (Shleifer and Vishny 1986; Grossman and Hart 1980; Borisova et al. 2012). Our finding is consistent with previous studies (Faccio et al. 2006; Chahrumiind et al. 2006; Chaney et al. 2011; Ben-Nasr 2016; Lin et al. 2016).

Furthermore, in Models 3 and 4, we disaggregate the foreign ownership structure into the percentage of foreign ownership and the percentage of companies with foreign investment (FICs). Table 4 reports that foreign ownership asserts a negative effect on funds' at the 1% level of significance (Table 4, Model 3), as in the previous study Chen et al. (2016). Similarly, we find that funds with foreign investment (FICs) would assert

a negative impact on funds' return. The result remains robust at the 1% level of significance (Table 4, Model 4). One of possible explanation is that local fund company invested by foreign firms may be forced or prefer to invest in less risky assets. We investigated the relationship between foreign ownership and risk-taking behavior in the previous section. We find that foreign ownership would reduce funds' risk-taking.

In addition, Choi et al. (2012) and Douma et al. (2006) conclude that foreign companies have relational resources and networks abroad and may prefer to focus on the overseas market, especially as the investment is correlated with their core business. Therefore, local fund management companies with foreign ownership may prefer or be forced by foreign firms to invest more resources in overseas markets. However, we notice that fund management companies have relatively poor performance in the global market than the local market.[24] Our finding is opposite to that of Wei et al. (2005); Dong et al. (2016), Chen et al. (2017), Bena et al. (2017) and Lin and Fu (2017) as they find that foreign ownership results in excellent performance, especially in less developed countries.

[24] According to CSMAR database, we calculate the average return of investments in global equities for all fund management companies which is much lower than the average fund management company return in our sample period.

Table 4 The relationship between ownership and funds' return-Fixed effects

Dependent variables	Return			
Model	Model 1	Model 2	Model 3	Model 4
Expenses	0.000299	0.000645	0.00565	0.00473
	(0.0114)	(0.0111)	(0.0119)	(0.0119)
Company size	0.0991***	0.0966***	0.106***	0.105***
	(0.0138)	(0.0142)	(0.0147)	(0.0148)
Company experience	-0.205***	-0.197***	-0.209***	-0.210***
	(0.0382)	(0.0386)	(0.0352)	(0.0352)
No. of funds started	-0.281***	-0.281***	-0.275***	-0.274***
	(0.0420)	(0.0419)	(0.0425)	(0.0434)
Top1	-0.0696**	-0.0695**	-0.0700**	-0.0694**
	(0.0305)	(0.0304)	(0.0296)	(0.0293)
Company Focus	0.189**	0.201**	0.198**	0.178**
	(0.0828)	(0.0825)	(0.0809)	(0.0759)
Government ownership	0.00244*			
	(0.00137)			
GCCs		0.122*		
		(0.0677)		
Foreign Ownership			-0.0047***	
			(0.00178)	
FICs				-0.187***
				(0.0662)
Constant	-1.847***	-1.762***	-1.802***	-1.768***
	(0.271)	(0.264)	(0.305)	(0.303)
Observations	731	731	731	731
R^2	0.442	0.441	0.449	0.451

Note: The table reports results of the fixed effect models investigating the contractual mutual fund management company's ownership structure on funds' return for the period 2005 to 2015. The dependent variable is the funds' return. For the independent variables the paper adopts government ownership: it is the percentage of share owned by a government agency; GCCs is the government-controlled companies and equal to 1 if the largest shareholder is a government agency and 0 otherwise; Foreign ownership is the percentage of share owned by foreign investors; FICs is the foreign invested companies and equals to 1 if a fund management company has foreign investments and 0 otherwise; Expenses is the funds' expense ratio; Company size the logarithm of total net assets managed by the fund management company; Company experience is the number of years of a fund management company exists in the industry; No of funds started is the total number of funds started by a fund management company in a given year; Top1 is a dummy and equals to 1 if the fund management company has at least on fund operating in the top 1 of a given category in a given year; Company focus is the Herfindahl index of investment objective in a fund management company and is the sum of squared fractions of each investment objective's share in total fund management company value; the financial crisis period from 2008 to 2009 is a series of year dummy variables and is not reported in this table, for instance, the year of 2008 which takes the value of 1 if the year is 2008 and the value of 0 otherwise. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; **significance at the 5% level; *** significance at the 1% level.

Table 5 presents results with market share as the dependent variable. As reported in Table 5, foreign ownership has a negative impact on funds' market share (Table 5, Model 1), but it is statistically insignificant. In Model 2, we find that the coefficient of GCCs is statistically significant and negative, indicating that government-controlled companies are associated with a lower market as in the earlier study by Chen et al. (2014). This implies that government-controlled mutual fund management companies are less competitive than the non-government funds.

Concerning the impact of the foreign ownership structure on the market share, we show that the ownership ratio of foreign shareholders has a negative impact on funds' market share at the 10% level of significance (Table 5, Model 3). A similar pattern is observed in Model 4, as the coefficient of companies with foreign investments (FICs) is statistically negative at the 1% level of significance. One of possible explanation is that domestic fund management companies invested by foreign investors may be forced or prefer to invest in less risky assets. I investigated the relationship between foreign ownership and risk-taking behavior. I find that foreign ownership would reduce funds' risk-taking. Secondly, an increase in foreign ownership in a fund management company would also cause more conflicts of interest between domestic shareholders and foreign shareholders. Thus, foreign shareholders might not effectively improve the company's management skills and governance quality. Thirdly, foreign institutional investors might misunderstand (or not be aware of) the financial and institutional environment in China. For instance, anecdotal evidence claims that a dominant investment strategy in China is short-term investment strategies, at least as supported by large domestic Chinese funds. Finally, due to data limitation, I cannot provide other robustness check.

Overall, the above discussed findings suggest that fund management companies with foreign ownership are linked with a lower market share and a lower funds' return than those of without foreign ownership. These results would support our hypothesis (H1c and d) which states that foreign ownership would impact on funds' return and market share. In addition, these results are also in line with Hypothesis H1a and H1b as it claims that government ownership would impact upon return and market share.

Table 5. The relationship between ownership structure and market share-Fixed effects

Dependent variable	Market share			
Model	Model 1	Model 2	Model 3	Model 4
Expense	-0.0123	-0.0131	-0.00523	-0.00559
	(0.0383)	(0.0400)	(0.0393)	(0.0402)
Company size	0.446***	0.460***	0.457***	0.458***
	(0.0958)	(0.0979)	(0.0999)	(0.0995)
Company experience	-0.607***	-0.640***	-0.626***	-0.631***
	(0.171)	(0.172)	(0.167)	(0.168)
No. of funds started	-0.133	-0.128	-0.124	-0.122
	(0.161)	(0.160)	(0.158)	(0.157)
Top 1	-0.0636	-0.0606	-0.0680	-0.0673
	(0.0759)	(0.0765)	(0.0763)	(0.0762)
Company Focus	0.0956	0.0468	0.0888	0.0528
	(0.472)	(0.441)	(0.460)	(0.463)
Government ownership	-0.00515			
	(0.00826)			
GCCs		-0.708*		
		(0.384)		
Foreign Ownership			-0.00716*	
			(0.00408)	
FICs				-0.332**
				(0.163)
Constant	-7.481***	-7.516***	-7.868***	-7.827***
	(1.975)	(1.973)	(2.261)	(2.245)
Observations	731	731	731	731
R-squared	0.218	0.230	0.220	0.222

Note: The table reports results of the fixed effect models investigating the contractual mutual fund management company's ownership structure on market share for the period 2005 to 2015. The dependent variable is market share. For the independent variables the paper adopts government ownership: it is the percentage of share owned by a government agency; GCCs is the government-controlled companies and equal to 1 if the largest shareholder is a government agency and 0 otherwise; Foreign ownership is the percentage of share owned by foreign investors; FICs is the foreign invested companies and equals to 1 if a fund management company has foreign investments and 0 otherwise; Expense is the funds' expense ratio; Company size the log of total net assets managed by the fund management company; Company experience is the number of years of a fund management company exists in the industry; No of funds started is the total number of funds started by a fund management company in a given year; Top 1 is a dummy and equals to 1 if the fund management company has at least on fund operating in the top 1 of a given category in a given year; Company focus is the Herfindahl index of investment objective in a fund management company and is the sum of squared fractions of each investment objective's share in total fund management company value; the financial crisis period from 2008 to 2009 is a series of year dummy variables and is not reported in this table, for instance, the year of 2008 which takes the value of 1 if the year is 2008 and the value of 0 otherwise. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; **significance at the 5% level; *** significance at the 1% level.

4.4.2. Concentration of ownership, funds' return and market share

In this section, we focus on the concentration of ownership. Chen et al. (2013) argue that highly concentrated ownership structure to the government would make it difficult for foreign investors to become the controlling party. In the descriptive, see Table 2, we show that on average more than 70% of Chinese fund management companies are controlled by government agencies.

Table 6 presents the results of the regressions that examine how the ownership concentration affects funds' return and market share. The coefficient on OC1 is negative in the regression of funds' return (Table 6, Model 1), while the coefficient on OC1 is significantly positive in the regression of the market share (Table 6, Model 3) at the 1% level of significance. In addition, we find that OC2 has a positive impact of on funds' market share at the 10% level of significance (Table 6, Model 4). However, the impact of OC2 on funds' return is statistically insignificant (Table 6, Model 2).

Table 6 The relationship between ownership concentration and funds' return and market share-fixed effects

Dependent variable	Return		Market share	
Model	Model 1	Model 2	Model 3	Model 4
Expense	0.000745	0.000582	-0.0191	-0.0157
	(0.0113)	(0.0112)	(0.0395)	(0.0388)
Company size	0.0993***	0.0989***	0.429***	0.439***
	(0.0146)	(0.0144)	(0.100)	(0.0979)
Company experience	-0.201***	-0.202***	-0.641***	-0.631***
	(0.0371)	(0.0372)	(0.159)	(0.163)
No. of funds started	-0.281***	-0.280***	-0.115	-0.130
	(0.0422)	(0.0421)	(0.147)	(0.152)
Top 1	-0.0687**	-0.0686**	-0.0602	-0.0701
	(0.0306)	(0.0307)	(0.0762)	(0.0758)
Company Focus	0.195**	0.195**	0.0875	0.0932
	(0.0825)	(0.0828)	(0.455)	(0.453)
OC1	-0.0480		2.239***	
	(0.192)		(0.761)	
OC2		0.000176		0.0156*
		(0.00145)		(0.00911)
Constant	-1.711***	-1.728***	-8.240***	-8.324***
	(0.290)	(0.290)	(2.273)	(2.321)
Observations	731	731	731	731
R-squared	0.438	0.438	0.240	0.229

Note: The table reports results of the fixed effect models investigating the contractual mutual fund management company's ownership concentration on funds' return and market share for the period 2005 to 2015. The dependent variable is the funds' return and market share. For the independent variables the paper adopts OC1: it is herfindahl index based on the ownership held by the shareholders of the mutual fund management company; OC2 is the percentage of shares owned by the largest shareholder; Expense is the funds' expense ratio; Company size the logarithm of total net assets managed by the fund management company; Company experience is the number of years of a fund management company exists in the industry; No of funds started is the total number of funds started by a fund management company in a given year; Top 1 is a dummy and equals to 1 if the fund management company has at least on fund operating in the top 1 of a given category in a given year; Company focus is the Herfindahl index of investment objective in a fund management company and is the sum of squared fractions of each investment objective's share in total fund management company value; the financial crisis period from 2008 to 2009 is a series of year dummy variables and is not reported in this table, for instance, the year of 2008 which takes the value of 1 if the year is 2008 and the value of 0 otherwise. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; **significance at the 5% level; *** significance at the 1% level.

Overall, ownership concentration is positively related to market share in line with Hypothesis 2a and 2b. This means that a higher ownership concentration would increase the incentive for, and power of, large shareholders to monitor management and alleviate the potential free-rider problem within small shareholders, thus helping to increase funds' market share. This result is supported by previous studies by Dong et al. (2014), Nguyen et al. (2015) and Dong et al. (2016) as they report that highly concentrated ownership promotes the quality of corporate governance and improves monitoring of management. In addition, since we observe government-controlled companies assert a positive impact on funds' return in Table 4 (Model 2), it appears to capture some ownership concentration effect.

4.4.3. The interaction between government and foreign ownership

In this section, we extend our analysis to investigate the impact of the interaction terms between government ownership and foreign ownership on funds' return and market share. In other words, we are interested to examine whether the impact of foreign ownership on funds' return and market share is changed by the extent of government control. Chen et al (2017) present that the impact of foreign ownership is influenced by the extent of government control.

Table 7 shows that the coefficients of ownership variables such as FICs and GCCs are consistent with findings in Table 4. It presents that FICs has a negative and significant impact on funds' return and market share in all columns. The result reveals a negative relationship between GCCs and funds' market share at the 10% level of significance (Table 7, Model 4). However, we find that the positive relationship between

government ownership and funds' return is statistically insignificant (see Model 1 in Table 7).

In addition, Table 7 indicates that the coefficient of the interaction term of the ownership ratio of government shareholders and foreign invested companies (FICs) is significantly positive at the 5% significance level (see Model 1). In addition, the interaction term of government-controlled companies (GCCs) and foreign invested companies (FICs) has a positive impact on funds' return (see Table 7, Model 2) at the 5% significance level. These findings suggest that funds' return is positively associated with government ownership and government-controlled companies (GCCs) in the presence of some foreign ownership in those funds. Similarly, foreign investment has a positive impact on funds' return only in the case of companies with a high level of government ownership or companies controlled by a government agency. In contrast, Chen et al. (2017) find that if the government holds a majority equity stake, the effect of foreign ownership on investment efficiency is declined.

The positive impact of the interaction term between government ownership and foreign invested companies on funds' return indicates that the impact of foreign ownership on funds' return is conditioned by the level of government ownership. More specifically, I find that the higher funds' return associated with foreign ownership holds only when the fund management companies with higher government ownership or controlled by government agencies. One of possible explanation is that there is less conflict of interest between domestic shareholders and foreign shareholders, as the government agencies have a higher stake in those fund management companies. This finding is consistent with previous results that fund management companies with higher government

ownership or controlled by government agencies will have higher funds' return. In addition, I find that the effect of government ownership is larger in magnitude than that of previous results (Table 4, Model 1 and 2), indicating that foreign shareholders can improve the company's management skills and governance quality in some degree. Furthermore, this finding indicates that foreign invested fund management companies without higher government ownership would result in lower funds' return and confirms previous results that funds with foreign ownership will have poor performance.

As reported in Model 3 in relation to a funds' market share, the coefficient on the interaction term of government ownership and foreign invested companies (FICs) is positive, but it is statistically insignificant. We also find that funds' market share is not statistically significantly related to the interaction term of government-controlled companies (GCCs) and foreign invested companies (FICs).

Table 7 Interaction term between government ownership and foreign ownership

Dependent variable	Return		Market share	
Model	Model 1	Model 2	Model 3	Model 4
Expenses	0.00588	0.00608	-0.00131	-0.00537
	(0.0125)	(0.0122)	(0.0388)	(0.0405)
Company size	0.107***	0.104***	0.462***	0.472***
	(0.0150)	(0.0153)	(0.0977)	(0.0987)
Company experience	-0.218***	-0.211***	-0.630***	-0.657***
	(0.0359)	(0.0364)	(0.167)	(0.171)
No. of funds started	-0.281***	-0.279***	-0.126	-0.118
	(0.0433)	(0.0436)	(0.156)	(0.157)
Top1	-0.0665**	-0.0684**	-0.0605	-0.0616
	(0.0294)	(0.0295)	(0.0765)	(0.0764)
Company Focus	0.163**	0.170**	0.0500	0.0125
	(0.0772)	(0.0761)	(0.461)	(0.441)
Government ownership	0.000935		-0.00800	
	(0.00124)		(0.00812)	
FICs	-0.348***	-0.345***	-0.597*	-0.372*
	(0.0932)	(0.0652)	(0.359)	(0.206)
Government ownership*FICs	0.00354**		0.00401	
	(0.00162)		(0.00625)	
GCCs		0.0892		-0.720*
		(0.0769)		(0.382)
GCCs*FICs		0.219**		0.0471
		(0.0852)		(0.231)
Constant	-1.833***	-1.800***	-7.456***	-7.595***
	(0.280)	(0.282)	(1.913)	(1.957)
Observations	731	731	731	731
R^2	0.455	0.457	0.228	0.237

Note: The table reports results of the fixed effect models investigating the contractual mutual fund management company's ownership structure on funds' return and market share for the period 2005 to 2015. The dependent variable is the funds' return and market share. For the independent variables the paper adopts government ownership: it is the percentage of share owned by a government agency; GCCs is the government-controlled companies and equal to 1 if the largest shareholder is a government agency and 0 otherwise; Foreign ownership is the percentage of share owned by foreign investors; FICs is the foreign invested companies and equals to 1 if a fund management company has foreign investments and 0 otherwise; Government ownership*FICs is the interaction term between government ownership and foreign invested companies; GCCs*FICs is the interaction term between government-controlled companies and foreign invested companies; Expense is the funds' expense ratio; Company size the logarithm of total net assets managed by the fund management company; Company experience is the number of years of a fund management company exists in the industry; No of funds started is the total number of funds started by a fund management company in a given year; Top 1 is a dummy and equals to 1 if the fund management company has at least on fund operating in the top 1 of a given category in a given year; Company focus is the Herfindahl index of investment objective in a fund management company and is the sum of squared fractions of each investment objective's share in total fund management company value; the financial crisis period from 2008 to 2009 is a series of year dummy variables and is not reported in this table, for instance, the year of 2008 which takes the value of 1 if the year is 2008 and the value of 0 otherwise. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; **significance at the 5% level; *** significance at the 1% level.

Table 8.1 reports the results for the interaction terms of ownership concentration and government ownership. The result indicates that the coefficients on OC1 are negative in the regression of funds' return (Table 8.1, Models 1 and 2), but the estimated coefficients are insignificant. Similarly, we find that there is no relationship between OC2 and funds' return. The results are consistent with prior findings.

With regarding to the interaction terms, we find evidence that a high degree of ownership concentration might improve the return of government-controlled companies (GCCs), as the coefficient on ownership concentration 2 and government-controlled companies (GCCs) is significantly positive (see Table 8.1, Model 4) at the 5% significance level. This result further confirms our first hypothesis (H1) and suggests that a highly concentrated government ownership could promote funds' return. By contrast, Gunasekarage et al. (2007) find that highly concentrated government-controlled company has a negative and significant impact on its performance. Moreover, while we find that the interaction term between ownership concentration 1 and government-controlled companies is positively related to funds' return, the result is not robust (Model 2 in Table 8.1).

Table 8.1 Interaction term between government ownership and ownership concentration

Dependent variable	Return			
Model	Model 1	Model 2	Model 3	Model 4
Expenses	0.00107	0.000687	0.000513	0.000431
	(0.0114)	(0.0111)	(0.0114)	(0.0111)
Company size	0.0999***	0.0968***	0.0982***	0.0956***
	(0.0142)	(0.0145)	(0.0140)	(0.0144)
Company experience	-0.200***	-0.197***	-0.203***	-0.198***
	(0.0376)	(0.0379)	(0.0380)	(0.0384)
No. of funds started	-0.280***	-0.281***	-0.278***	-0.278***
	(0.0424)	(0.0427)	(0.0425)	(0.0428)
Top 1	-0.0724**	-0.0732**	-0.0685**	-0.0694**
	(0.0304)	(0.0309)	(0.0306)	(0.0309)
Company Focus	0.192**	0.200**	0.189**	0.198**
	(0.0812)	(0.0803)	(0.0818)	(0.0806)
Government ownership	-0.000961		-0.000295	
	(0.00295)		(0.00278)	
OC1	-0.974	-0.783		
	(0.622)	(0.638)		
Government ownership*OC1	0.00991			
	(0.00654)			
GCCs		-0.187		-0.261
		(0.243)		(0.200)
GCCs*OC1		0.844		
		(0.650)		
OC2			-0.00509	-0.00604
			(0.00405)	(0.00371)
Government ownership*OC2			5.76e-05	
			(4.46e-05)	
GCCs*OC2				0.00798*
				(0.00406)
Constant	-1.512***	-1.473***	-1.589***	-1.452***
	(0.318)	(0.328)	(0.327)	(0.319)
Observations	731	731	731	731
R^2	0.445	0.444	0.443	0.444

Note: The table reports results of the fixed effect models investigating the contractual mutual fund management company's ownership structure on funds' return for the period 2005 to 2015. The dependent variable is the funds' return. For the independent variables the paper adopts government ownership: it is the percentage of share owned by a government agency; GCCs is the government-controlled companies and equal to 1 if the largest shareholder is a government agency and 0 otherwise; Foreign ownership is the percentage of share owned by foreign investors; FICs is the foreign invested companies and equals to 1 if a fund management company has foreign investments and 0 otherwise; Ownership concentration1 is Herfindahl index based on the ownership held by the shareholders of the mutual fund management company; Ownership concentration2 is the percentage of shares owned by the largest shareholder; Government ownership*OC1 is the interaction term between government ownership and ownership concentration1; GCCs*OC1 is the interaction term between government-controlled companies and ownership concentration1; Government ownership*OC2 is the interaction term between government ownership and ownership

concentration2; GCCs*FICs is the interaction term between government-controlled companies and foreign invested companies; Expense is the funds' expense ratio; Company size the logarithm of total net assets managed by the fund management company; Company experience is the number of years of a fund management company exists in the industry; No of funds started is the total number of funds started by a fund management company in a given year; Top 1 is a dummy and equals to 1 if the fund management company has at least on fund operating in the top 1 of a given category in a given year; Company focus is the Herfindahl index of investment objective in a fund management company and is the sum of squared fractions of each investment objective's share in total fund management company value; the financial crisis period from 2008 to 2009 is a series of year dummy variables and is not reported in this table, for instance, the year of 2008 which takes the value of 1 if the year is 2008 and the value of 0 otherwise. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; **significance at the 5% level; *** significance at the 1% level.

Furthermore, according to Models 5 and 7 of Table 8.2, we find that the estimated coefficients on the interaction term between ownership concentration and government ownership are positive. The results remain robust at the 1% level of significance. It means that the market share of companies with increased ownership concentration is higher for fund management companies that have a greater proportion of government ownership. In addition, we also find a significantly positive relationship between market share and the interaction term of ownership concentration and government-controlled companies in Models 6 and 8 of Table 8.2. The results remain robust at the 10% and 5% level of significance, respectively. Thus, a higher level of ownership concentration would increase the market share. In other words, fund management company's quality of governance is positively correlated with government ownership in the case of those companies with highly concentrated ownership. This finding would support our second hypothesis (H2).

With respect to the effect of control variables, we find that the expense ratio has no impact on funds' return and market share. This result does not support the findings of Gong et al.' (2016) study, which claims that the expense ratio has a positive and highly significant impact on funds' return. Additionally, the coefficients on fund management company size are significantly positive for both funds' return and market share across

all models. The possible explanation for this positive relationship would be economy of scale and large trading volumes. Also, this finding is consistent with the previous study by Chou et al. (2011) and Ferreira et al. (2013).

Turning now to the impact of company experience, it has a negative impact on funds' return and market share in all models. The results remain robust at the 1% significance level. These results illustrate that an increase in a fund management company's age does not improve return and market share. In addition, the number of new funds stated has a negative effect on funds' return and market share. However, the results are only statistically significant for funds' return. The negative effect could be caused by the extra expenses involved in opening new funds or the dilution in management focus as a result of establishing new funds. This finding is not in line with the study by Khorana and Servaes (2012).

Additionally, we find that the top-performing fund has a negative impact on funds' return. This finding means that the presence of a top-performing fund in a fund management company's portfolio reduces the funds' return. However, the negative coefficient on the top-performing fund is not statistically significant with regard to funds' market share. This result is not consistent with the study by Khorana and Servaes (2012), as they state that the presence of a top-performing fund has a positive and significant impact. Finally, we also find that the Herfindahl index across objectives (Company focus) has a positive and significant impact on funds' return, while its influence on funds' market share is insignificant. This finding shows that more focused fund management companies are able to deliver higher returns in the Chinese mutual fund market (Siggekow 2003).

Table 8.2 Interaction term between government ownership and ownership concentration

Dependent variable	Market share			
Model	Model 5	Model 6	Model 7	Model 8
Expenses	-0.0176	-0.0202	-0.0147	-0.0167
	(0.0377)	(0.0407)	(0.0373)	(0.0399)
Company size	0.419***	0.442***	0.426***	0.450***
	(0.0915)	(0.0985)	(0.0922)	(0.0980)
Company experience	-0.608***	-0.671***	-0.607***	-0.661***
	(0.155)	(0.161)	(0.159)	(0.167)
No. of funds started	-0.0971	-0.107	-0.106	-0.114
	(0.145)	(0.146)	(0.148)	(0.150)
Top 1	-0.0649	-0.0699	-0.0604	-0.0644
	(0.0784)	(0.0786)	(0.0763)	(0.0772)
Company Focus	0.143	0.0416	0.124	0.0454
	(0.447)	(0.424)	(0.452)	(0.430)
Government ownership	-0.0350***		-0.0309**	
	(0.0120)		(0.0144)	
OC1	-1.495	-0.786		
	(1.128)	(0.832)		
Government ownership*OC1	0.0561***			
	(0.0157)			
GCCs		-2.133***		-2.071***
		(0.650)		(0.724)
GCCs*OC1		3.704***		
		(0.956)		
OC2			-0.00754	-0.00504
			(0.0100)	(0.00678)
Government ownership*OC2			0.000392*	
			(0.000220)	
GCCs*OC2				0.0278**
				(0.0135)
Constant	-5.923***	-6.811***	-6.363***	-7.024***
	(1.709)	(1.842)	(2.030)	(2.103)
Observations	731	731	731	731
R^2	0.267	0.265	0.249	0.252

Note: The table reports results of the fixed effect models investigating the contractual mutual fund management company's ownership structure on market share for the period 2005 to 2015. The dependent variable is the funds' performance and market share. For the independent variables the paper adopts government ownership: it is the percentage of share owned by a government agency; GCCs is the government-controlled companies and equal to 1 if the largest shareholder is a government agency and 0 otherwise; Foreign ownership is the percentage of share owned by foreign investors; FICs is the foreign invested companies and equals to 1 if a fund management company has

foreign investments and 0 otherwise; Ownership concentration1 is Herfindahl index based on the ownership held by the shareholders of the mutual fund management company; Ownership concentration2 is the percentage of shares owned by the largest shareholder; Government ownership*OC1 is the interaction term between government ownership and ownership concentration1; GCCs*OC1 is the interaction term between government-controlled companies and ownership concentration1; Government ownership*OC2 is the interaction term between government ownership and ownership concentration2; GCCs*FICs is the interaction term between government-controlled companies and foreign invested companies; Expense is the funds' expense ratio; Company size the logarithm of total net assets managed by the fund management company; Company experience is the number of years of a fund management company exists in the industry; No of funds started is the total number of funds started by a fund management company in a given year; Top 1 is a dummy and equals to 1 if the fund management company has at least on fund operating in the top 1 of a given category in a given year; Company focus is the Herfindahl index of investment objective in a fund management company and is the sum of squared fractions of each investment objective's share in total fund management company value; the financial crisis period from 2008 to 2009 is a series of year dummy variables and is not reported in this table, for instance, the year of 2008 which takes the value of 1 if the year is 2008 and the value of 0 otherwise. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; **significance at the 5% level; *** significance at the 1% level.

4.4.4. Robustness Check

As robustness we measure funds' performance as the abnormal return. Abnormal return is the difference between the funds' return and market return. Table 9 indicates the findings of the panel fixed effect, where funds' return is replaced by funds' abnormal return. Results remain relatively consistent with the prior main findings, indicating that foreign ownership has a negative impact at the 10% level of significance on funds' abnormal return (Table 9, Model 3). It means that a one unit increase in foreign ownership would reduce funds' abnormal return by 0.002. In addition, Table 13 reveals a negative relationship between foreign invested companies and funds' abnormal return at the 10% level of significance (Table 9, Model 4). This result suggests that a one unit increase in FICs would decrease funds' abnormal return by 0.08. While we find a positive relationship between government ownership and funds' abnormal return, the finding is not robust (Model 1 in Table 9). Moreover, the fixed effect results indicate that the GCCs may have no significant impact on funds' abnormal return (Model 2 in Table 9).

The findings mean that this positive relationship is weakened when we take into account abnormal market return into the model. In addition, this finding is comparable with a study by Berkowitz and Qiu (2002), as they state that ownership structure of mutual fund management companies is irrelevant with funds' performance. This finding also helps to explain the negative relationship between government ownership and market share, as government-controlled fund management companies might perform inferior compared to the capital market.

Table.9 The relationship between ownership structure and funds' abnormal return (Robustness Check)

Dependent variable	Abnormal return			
Model	Model 1	Model 2	Model 3	Model 4
Expenses	0.00245	0.00259	0.00483	0.00436
	(0.0112)	(0.0111)	(0.0114)	(0.0113)
Company size	0.0422***	0.0411***	0.0453***	0.0449***
	(0.0109)	(0.0110)	(0.0112)	(0.0114)
Company experience	0.00977	0.0132	0.00820	0.00755
	(0.0301)	(0.0300)	(0.0287)	(0.0290)
No. of funds started	-0.104***	-0.104***	-0.101***	-0.101***
	(0.0258)	(0.0258)	(0.0259)	(0.0260)
Top 1	-0.0689***	-0.0688***	-0.0691***	-0.0688***
	(0.0235)	(0.0235)	(0.0236)	(0.0233)
Company Focus	0.0831	0.0882	0.0871	0.0780
	(0.0685)	(0.0674)	(0.0675)	(0.0654)
Government ownership	0.00103			
	(0.000947)			
GCCs		0.0528		
		(0.0583)		
Foreign Ownership			-0.00210*	
			(0.00117)	
FICs				-0.0807*
				(0.0441)
Constant	-1.020***	-0.984***	-1.003***	-0.987***
	(0.234)	(0.231)	(0.245)	(0.245)
Observations	731	731	731	731
R^2	0.115	0.115	0.120	0.121

Note: The table reports results of the fixed effect models investigating the contractual mutual fund management company's ownership structure on funds' abnormal return for the period 2005 to 2015. The dependent variable is funds' abnormal return. For the independent variables the paper adopts government ownership: it is the percentage of share owned by a government agency; GCCs is the government-controlled companies and equal to 1 if the largest shareholder is a government agency and 0 otherwise; Foreign ownership is the percentage of share owned by foreign investors; FICs is the foreign invested companies and equals to 1 if a fund management company has foreign investments and 0 otherwise; Expense is the funds' expense ratio; Company size the logarithm of total net assets managed by the fund management company; Company experience is the number of years of a fund management company exists in the industry; No of funds started is the total number of funds started by a fund management company in a given year; Top 1 is a dummy and equals to 1 if the fund management company has at least on fund operating in the top 1 of a given category in a given year; Company focus is the Herfindahl index of investment objective in a fund management company and is the sum of squared fractions of each investment objective's share in total fund management company value; the financial crisis period from 2008 to 2009 is a series of year dummy variables and is not reported in this table, for instance, the year of 2008 which takes the value of 1 if the year is 2008 and the value of 0 otherwise. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; **significance at the 5% level; *** significance at the 1% level.

4.4.5. Dealing with endogeneity: the GMM estimation

To address endogeneity issues and consider the short-run relationship between ownership structure and funds' return and market share, we follow Wintoki et al. (2012) and adopt the two-step system dynamic GMM estimators (Arellano and Bover 1995; Blundell and Bond 2000) with bias-corrected robust standard errors, which was introduced by Windmeijer (2005). [25] The endogeneity issue might arise as ownership structure may be determined by funds' return or market share. In order to apply the dynamic GMM approach, we include one lag of dependent variable as an independent variable in the regression. According to Arellano and Bond (1991), we present two goodness-of fit tests for our results of the two-step system GMM estimator. The first test examines the null hypothesis of the validity of instruments using Hansen's diagnostic test. The second test examines for second-order autocorrelation of the error terms. The null hypothesis is no serial correlation in second differences (AR(2)). As shown in the model presented in equations (2), we regress the performance and market share on a set of ownership structure and control variables, as follows:

$$Return_{i,t} \; or \; Market \; share_{i,t} =$$

$$\alpha_0 + \beta_1 Performance_{i,t-1} + \sum_{j=1}^{6} \beta_j \, Ownership \; structure_{i,t} +$$

$$\sum_{k=1}^{6} \beta_k \, Control_{i,t} + \varepsilon_{i,t} \qquad (3)$$

[25] This chapter employs Roodman's (2009) "Xtabond2" specification in Stata.

Tables 10, 11 and 12 address the endogeneity issue by employing the two-step 'system' dynamic GMM approach. This chapter presents that the basic diagnostics test (AR (2)) for second-order serial correlations in all corresponding models are insignificant. Also, the Hansen test indicates that our instruments are valid, as the Hansen J-statistics of over-identifying restrictions are insignificant in all corresponding models (see Tables 10, 11 and 12). The instrument variables are the lags of independent variables.

The two-step system dynamic GMM estimation results for the impact of ownership structure on funds' return are presented in Table 10. We find that the coefficient on government ownership is positive and statistically significant at the 5% (see Table 10, Model 1) level. The result suggests that a one unit increase in government ownership would improve funds' return by 0.004. The result also indicates a positive relationship between GCCs and funds' return at the 1% level of significance (Table 10, Model 2). It implies that a one unit increase in GCCs would improve funds' return by 0.4. However, the coefficients on foreign ownership and foreign invested companies are both statistically negative at the 1% (see Table 10, Models 3 and 4) significance level. Thus, a one unit increase in foreign ownership and FICs would decrease funds' return by 0.009 and 0.3 respectively. In addition, the results are in line with the previous studies by Chen et al. (2013) and Chen et al. (2016).

With regard to a fund's market share, see Table 11, the results indicate that government-controlled companies (GCCs) are negatively associated with funds' market share. This association is statistically significant at the 5% (see Table 11, Model 2) level. It implies that government-controlled companies are associated with a lower market share and suggests that a one unit increase in GCCs would reduce funds' market share by 0.8. We also find a negative relationship between funds' market share and government

ownership, but the result is not robust (Table 11, Model 1). This finding implies that government-controlled mutual fund management companies are less competitive than the non-government fund management companies.

In Model 3, we find that foreign ownership has a negative impact on funds' market share at the 5% level of significance. Moreover, the estimated coefficient of foreign invested companies (FICs) load negatively at the 5% level (Table 11, Model 4), suggesting that foreign participation could reduce a funds' market share. The results suggest that a one unit increase in foreign ownership and FICs would decrease funds' market share by 0.02 and 0.5 respectively.

Table 10 The relationship between ownership structure and return-GMM

Dependent variable	Return			
Model	Model 1	Model 2	Model 3	Model 4
L. return	0.255***	0.205***	0.264***	0.263***
	(0.051)	(0.0588)	(0.058)	(0.0606)
Expenses	-0.0330*	-0.141***	-0.0380	-0.0368
	(0.0191)	(0.0464)	(0.0243)	(0.0258)
Company size	0.0499**	0.0683*	0.0411	0.0414
	(0.0241)	(0.0364)	(0.0300)	(0.0292)
Company experience	-0.0147	-0.137	0.0385	0.0513
	(0.0603)	(0.110)	(0.0619)	(0.0602)
No. of funds started	-0.313***	-0.232***	-0.310***	-0.310***
	(0.0538)	(0.0839)	(0.0524)	(0.0675)
Top1	-0.0687*	-0.425**	-0.0717*	-0.0623
	(0.0391)	(0.163)	(0.0387)	(0.0390)
Company Focus	0.598***	0.944***	0.614***	0.614***
	(0.129)	(0.220)	(0.126)	(0.125)
Government ownership	0.00408**			
	(0.00166)			
GCCs		0.443***		
		(0.163)		
Foreign Ownership			-0.009***	
			(0.00308)	
FICs				-0.375***
				(0.0979)
Constant	-1.237**	-1.459*	-0.754	-0.762
	(0.519)	(0.801)	(0.636)	(0.622)
Observations	637	637	637	637
AR (2)	0.235	0.508	0.277	0.351
Hansen p value	0.357	0.446	0.564	0.42

Note: The table reports results of the GMM estimator investigating the contractual mutual fund management company's ownership structure on funds' return for the period 2005 to 2015. The dependent variable is the funds' return. For the independent variables the chapter adopts government ownership: it is the percentage of share owned by a government agency; GCCs is the government-controlled companies and equal to 1 if the largest shareholder is a government agency and 0 otherwise; Foreign ownership is the percentage of share owned by foreign investors; FICs is the foreign invested companies and equals to 1 if a fund management company has foreign investments and 0 otherwise; L.return is the one year lagged of funds' return; Expense is the funds' expense ratio; Company size the logarithm of total net assets managed by the fund management company; Company experience is the number of years of a fund management company exists in the industry; No of funds started is the total number of funds started by a fund management company in a given year; Top 1 is a dummy and equals to 1 if the fund management company has at least on fund operating in the top 1 of a given category in a given year; Company focus is the Herfindahl index of investment objective in a fund management company and is the sum of squared fractions of each investment objective's share in total fund management company value; the financial crisis period from 2008 to 2009 is a series of year dummy variables and is not reported in this table, for instance, the year of 2008 which takes the value of 1 if the year is 2008 and the value of 0 otherwise. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; **significance at the 5% level; *** significance at the 1% level.

Table 11 The relationship between ownership structure and market share-GMM

Dependent variable	Market share			
Model	Model 1	Model 2	Model 3	Model 4
L.Market share	0.621***	0.492***	0.535***	0.525***
	(0.0798)	(0.0868)	(0.0852)	(0.0843)
Expenses	-0.510***	-0.0982	-0.0704	-0.0725
	(0.156)	(0.0765)	(0.0732)	(0.0721)
Company size	0.107	0.392***	0.308***	0.306***
	(0.111)	(0.0632)	(0.0669)	(0.0656)
Company experience	0.0108	0.0845	-0.0290	0.00919
	(0.162)	(0.168)	(0.157)	(0.151)
No. of funds started	-0.228	-0.692***	-0.192	-0.198
	(0.170)	(0.216)	(0.151)	(0.148)
Top1	0.0209	-0.0468	0.00562	0.0227
	(0.101)	(0.0970)	(0.0835)	(0.0806)
Company Focus	0.150	0.654	0.488	0.522
	(0.543)	(0.438)	(0.402)	(0.396)
Government ownership	-0.00132			
	(0.00439)			
GCCs		-0.889**		
		(0.444)		
Foreign Ownership			-0.0160**	
			(0.00720)	
FICs				-0.535**
				(0.236)
Constant	-0.921	-7.789***	-6.165***	-6.21***
	(2.704)	(1.365)	(1.523)	(1.481)
Observations	637	637	637	637
AR (2)	0.407	0.992	0.939	0.943
Hansen p value	0.339	0.393	0.27	0.301

Note: The table reports results of the GMM estimator investigating the contractual mutual fund management company's ownership structure on funds' market share for the period 2005 to 2015. The dependent variable is funds' market share. For the independent variables the paper adopts government ownership: it is the percentage of share owned by a government agency; GCCs is the government-controlled companies and equal to 1 if the largest shareholder is a government agency and 0 otherwise; Foreign ownership is the percentage of share owned by foreign investors; FICs is the foreign invested companies and equals to 1 if a fund management company has foreign investments and 0 otherwise; L.Market share is the one year lagged of fund management company's market share; Expense is the funds' expense ratio; Company size the logarithm of total net assets managed by the fund management company; Company experience is the number of years of a fund management company exists in the industry; No of funds started is the total number of funds started by a fund management company in a given year; Top 1 is a dummy and equals to 1 if the fund management company has at least on fund operating in the top 1 of a given category in a given year; Company focus is the Herfindahl index of investment objective in a fund management company and is the sum of squared fractions of each investment objective's share in total fund management company value; the financial crisis period from 2008 to 2009 is a series of year dummy variables and is not reported in this table, for instance, the year of 2008 which takes the value of 1 if the year is 2008 and the value of 0 otherwise. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; **significance at the 5% level; *** significance at the 1% level.

Table 12 reports the dynamic panel results for how the ownership concentration ratio affects funds' return and market share. The dynamic panel results reveal that the ownership concentration ratio1 has no impact on funds' return. We also find that the relationship between ownership concentration ratio1 and funds' return is positive, but the estimated coefficient is statistically insignificant. Furthermore, we find that the coefficient on ownership concentration1 is significantly positive at the 1% significance level (see Table 12, Model 3). It implies that a higher ownership concentration improves funds' market share. The dynamic panel analysis also reveals a positive impact of ownership concentration2 in funds' market share at the 10% level of significance (see Table 12, Model 4), indicating that a further increase in ownership concentration would promote the growth of a fund management company in the Chinese market (Dong et al. 2014; Nguyen et al. 2015; Dong et al. 2016). Overall, these findings are generally consistent with the main findings from the fixed effect models (from Table 4 to Table 6).

Table 13 presents the dynamic panel regressions for the interaction term of government ownership and foreign ownership. The result shows that the interaction term of government ownership and FICs has a positive impact on funds' return at the 10% level of significance (Table 13, Model 1). In addition, we find a positive correlation between funds' return and the interaction term of GCCs and FICs at the 10% level of significance. The results confirm our prior findings in fixed effect regressions, suggesting that funds' return is positively associated with government ownership and government-controlled companies (GCCs) in the presence of some foreign ownership in those funds.

Furthermore, the dynamic panel analysis reports that the interaction term of GCCs and FICs has a positive impact on funds' market share at the 10% level of significance (Table 13, Model 4). We also find a positive relationship between funds' market share and the interaction term of government ownership and FICs, but the result is not statistically significant. This finding is not consistent with study Chen et al. (2017).

Tables 14 and 14.1 show the findings for the interaction terms of ownership concentration and government ownership in the dynamic panel regressions. Table 14 presents an insignificant relationship between the interaction term of government ownership and ownership concentration and funds' return. We only find that the interaction term of GCCs and OC2 has a positive impact on funds' return at the 10% level of significance (Table 14, Model 4). The result further confirms our previous results in fixed effect regressions and indicates that a highly concentrated government ownership may improve funds' return. Table 14.1 reports that the interaction term of government ownership and OC1 has a positive impact on funds' market share at the 5% level of significance (Model 5). Similarly, we find a positive relationship between interaction term of government ownership and OC2 and funds' market share. The result remains robust at the 5% level of significance (Table 14.1, Model 7). Furthermore, the dynamic panel analysis also finds a significantly positive relationship between market share and the interaction term of ownership concentration and GCCs (Table 14.1, Model 6 and 8). Thus, we conclude that fund management companies with a greater percentage of government ownership would improve funds' market share in the presence of higher ownership concentration.

Table 12 The relationship between ownership concentration and return and market share-GMM

Dependent variable	Return		Market share	
Model	Model 1	Model 2	Model 3	Model 4
L. Return	0.259***	0.282***		
	(0.0537)	(0.0643)		
L.Market share			0.886***	0.878***
			(0.0828)	(0.0884)
Expenses	-0.0360*	-0.190***	-0.160*	-0.156**
	(0.0203)	(0.0407)	(0.0838)	(0.0776)
Company size	0.0558**	0.0504	-0.104	-0.0874
	(0.0268)	(0.0341)	(0.154)	(0.161)
Company experience	0.00175	-0.112	0.0505	0.0529
	(0.0543)	(0.101)	(0.179)	(0.198)
No. of funds started	-0.298***	-0.281***	0.444**	0.395
	(0.0389)	(0.0762)	(0.220)	(0.244)
Top 1	-0.0776*	-0.668***	-0.0539	0.217
	(0.0399)	(0.221)	(0.100)	(0.498)
Company Focus	0.670***	0.759***	0.634*	0.688
	(0.116)	(0.169)	(0.358)	(0.501)
Ownership concentration1	-0.502		1.744***	
	(0.437)		(0.637)	
Ownership concentration2		0.000857		0.0158*
		(0.00377)		(0.00877)
Constant	-1.007*	-0.618	1.674	1.206
	(0.537)	(0.669)	(3.311)	(3.462)
Observations	731	731	731	731
AR (2)	0.306	0.365	0.835	0.803
Hansen p value	0.378	0.355	0.254	0.195

Note: The table reports results of the GMM estimator investigating the contractual mutual fund management company's ownership structure on funds' return and market share for the period 2005 to 2015. The dependent variable is the funds' return and market share. For the independent variables the paper adopts ownership concentration1: it is herfindahl index based on the ownership held by the shareholders of the mutual fund management company; Ownership concentration2 is the percentage of shares owned by the largest shareholder; L.Return is the one year lagged of funds' return; L.Market share is the one year lagged of fund management company's market share; Expense is the funds' expense ratio; Company size the logarithm of total net assets managed by the fund management company; Company experience is the number of years of a fund management company exists in the industry; No of funds started is the total number of funds started by a fund management company in a given year; Top 1 is a dummy and equals to 1 if the fund management company has at least on fund operating in the top 1 of a given category in a given year; Company focus is the Herfindahl index of investment objective in a fund management company and is the sum of squared fractions of each investment objective's share in total fund management company value; the financial crisis period from 2008 to 2009 is a series of year dummy variables and is not reported in this table, for instance, the year of 2008 which takes the value of 1 if the year is 2008 and the value of 0 otherwise. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; **significance at the 5% level; *** significance at the 1% level.

Table 13 Interaction term between government ownership and foreign ownership-GMM

Dependent variable	Return		Market share	
Model	Model 1	Model 2	Model 3	Model 4
L. Return	0.273***	0.265***		
	(0.0639)	(0.0656)		
L.Market share			0.550***	0.542***
			(0.0890)	(0.0887)
Expense	-0.101**	-0.102**	-0.0580	-0.0670
	(0.0498)	(0.0450)	(0.0862)	(0.0937)
Log(Company assets)	0.0320	0.0307	0.338***	0.347***
	(0.0320)	(0.0388)	(0.0711)	(0.0677)
Company experience	0.0443	0.0367	-0.0583	-0.0240
	(0.0674)	(0.0725)	(0.144)	(0.145)
No. of funds started	-0.396***	-0.394***	-0.221	-0.252
	(0.0733)	(0.0816)	(0.154)	(0.156)
Top 1	-0.0426	-0.0367	0.0330	0.0406
	(0.0388)	(0.0477)	(0.0925)	(0.0820)
Company Focus	0.509***	0.520***	0.443	0.490
	(0.145)	(0.173)	(0.432)	(0.537)
Government ownership	-0.00200		-0.00312	
	(0.00232)		(0.00456)	
FICs	-0.628***	-0.744***	-1.212**	-1.506**
	(0.192)	(0.251)	(0.560)	(0.702)
Government ownership*FICs	0.00540*		0.0158	
	(0.00309)		(0.00966)	
GCCs		-0.140		-0.928*
		(0.186)		(0.541)
GCCs*FICs		0.516*		1.408*
		(0.277)		(0.737)
Constant	-0.222	-0.188	-6.738***	-6.480***
	(0.713)	(0.807)	(1.644)	(1.676)
Observations	637	637	637	637
AR (2)	0.418	0.355	0.983	0.974
Hansen p value	0.937	0.899	0.87	0.861

Note: The table reports results of the dynamic panel analysis investigating the contractual mutual fund management company's ownership structure on performance and market share for the period 2005 to 2015.

Table 14 Interaction term between government ownership and ownership concentration-GMM

Dependent variable	Return			
Model	Model 1	Model 2	Model 3	Model 4
L. Return	0.218***	0.259***	0.219***	0.206***
	(0.0579)	(0.0600)	(0.0557)	(0.0607)
Expense	-0.0285	-0.0317	-0.0292	-0.0437**
	(0.0195)	(0.0223)	(0.0208)	(0.0209)
Log(Company assets)	0.0563*	0.0527*	0.0567*	0.0542*
	(0.0295)	(0.0270)	(0.0286)	(0.0284)
Company experience	-0.0567	0.00822	-0.0505	0.0463
	(0.0609)	(0.0537)	(0.0594)	(0.0684)
No. of funds started	-0.300***	-0.292***	-0.282***	-0.280***
	(0.0491)	(0.0456)	(0.0518)	(0.0559)
Top 1	-0.0592*	-0.0745*	-0.0469	-0.0449
	(0.0353)	(0.0376)	(0.0404)	(0.0407)
Company Focus	0.572***	0.673***	0.606***	0.964***
	(0.126)	(0.126)	(0.128)	(0.192)
Government ownership	-0.000710		-0.000225	
	(0.00594)		(0.00510)	
Ownership concentration1(OC1)	-1.661*	-0.768		
	(0.966)	(1.014)		
Government ownership*OC1	0.0111			
	(0.0128)			
GCCs		-0.136		-1.113*
		(0.485)		(0.668)
GCCs*OC1		0.269		
		(1.145)		
Ownership concentration2 (OC2)			-0.0166**	-0.0268**
			(0.00745)	(0.0134)
Government ownership*OC2			8.81e-05	
			(9.08e-05)	
GCCs*OC2				0.0246*
				(0.0138)
Constant	-0.601	-0.831	-0.530	-0.129
	(0.736)	(0.613)	(0.738)	(0.801)
Observations	637	637	637	637
AR (2)	0.307	0.279	0.477	0.848
Hansen p value	0.941	0.933	0.951	0.922

Note: The table reports results of the dynamic panel analysis investigating the contractual mutual fund management company's ownership structure on funds' return for the period 2005 to 2015.

Table 14.1 Interaction term between government ownership and ownership concentration-GMM

Dependent variable	Market share			
Model	Model 5	Model 6	Model 7	Model 8
L.Market share	0.421***	0.483***	0.474***	0.514***
	(0.0894)	(0.0945)	(0.0833)	(0.0825)
Expense	-0.0495	-0.0661	-0.0707	-0.0907
	(0.0666)	(0.0861)	(0.0735)	(0.0695)
Log(Company assets)	0.339***	0.365***	0.318***	0.331***
	(0.0858)	(0.0736)	(0.0676)	(0.0696)
Company experience	-0.279	-0.147	-0.222	-0.0616
	(0.201)	(0.187)	(0.188)	(0.184)
No. of funds started	-0.179	-0.229	-0.130	-0.209
	(0.172)	(0.151)	(0.166)	(0.190)
Top 1	0.0481	0.0151	0.0827	0.0451
	(0.0944)	(0.0877)	(0.0787)	(0.0960)
Company Focus	0.181	0.235	0.299	0.351
	(0.454)	(0.473)	(0.483)	(0.487)
Government ownership	-0.0451**		-0.0311	
	(0.0207)		(0.0194)	
Ownership concentration1(OC1)	-12.45***	-8.293**		
	(4.650)	(3.854)		
Government ownership*OC1	0.137**			
	(0.0538)			
GCCs		-3.813**		-4.144**
		(1.602)		(1.845)
GCCs*OC1		8.544**		
		(4.219)		
Ownership concentration2 (OC2)			-0.0838**	-0.0751**
			(0.0324)	(0.0302)
Government ownership*OC2			0.000834**	
			(0.000382)	
GCCs*OC2				0.0767**
				(0.0343)
Constant	-1.954	-3.803*	-2.605	-2.944
	(2.527)	(1.960)	(2.162)	(1.901)
Observations	637	637	637	637
AR (2)	0.897	0.878	0.832	0.931
Hansen p value	0.963	0.927	0.938	0.921

Note: The table reports results of the dynamic panel analysis investigating the contractual mutual fund management company's ownership structure on funds' market share for the period 2005 to 2015.

In addition, Table 15 shows the results for the impact of ownership structure on funds' risk-taking in the dynamic panel regressions. Results remain consistent with the main findings above in Table 3. Note that there is a significant dynamic adjustment as indicated by the coefficient of lagged risk. Moreover, we find that the coefficient on the ownership ratio of foreign shareholders is significantly negative at the 5% level of significance (Table 15, Model 3). The result suggests that a higher level of foreign ownership in a fund management company means that the company tends to take fewer risks. Similarly, the coefficient of FICs, indicating funds with foreign investment, is highly significant and negative, whilst also it carries a big magnitude. It seems indeed that foreign investors are not keen to invest in risky funds.

Table 16 presents the results of robustness check in the dynamic panel regressions. We find that the dynamic panel regressions provide evidence of the negative correlation between funds' abnormal return and foreign ownership (Model 3 and 4 in Table 16). This result reveals that fund management companies with greater percentage of foreign ownership ratio would hamper funds' performance. In addition, the dynamic panel analysis reports that government ownership has an insignificant impact on funds' abnormal return.

Table 15 The relationship between ownership structure and risk-taking-GMM

Dependent variable	Risk-taking			
Model	Model 1	Model 2	Model 3	Model 4
L. Risk	0.310**	0.210*	0.337**	0.341**
	(0.150)	(0.107)	(0.140)	(0.135)
Expenses	0.368	0.375	0.388	0.446
	(0.402)	(0.407)	(0.342)	(0.298)
Company size	1.168***	1.616***	1.119***	1.146***
	(0.391)	(0.419)	(0.413)	(0.355)
Company experience	-0.217	-2.019**	-0.158	-0.188
	(0.656)	(0.801)	(0.602)	(0.621)
No. of funds started	-3.794***	-2.721***	-3.520***	-3.545***
	(0.735)	(0.957)	(0.691)	(0.741)
Top1	-0.117	0.116	-0.0641	-0.108
	(0.439)	(0.449)	(0.399)	(0.411)
Company Focus	5.627***	7.304***	5.670***	5.358***
	(2.016)	(1.856)	(1.561)	(1.680)
Government ownership	0.0115			
	(0.0253)			
GCCs		2.527		
		(1.789)		
Foreign Ownership			-0.0669**	
			(0.0328)	
FICs				-2.848**
				(1.205)
Constant	-24.73***	-33.58***	-22.08**	-22.45***
	(7.969)	(8.712)	(8.618)	(7.539)
Observations	637	637	637	637
AR(2)	0.129	0.188	0.118	0.119
Hansen p value	0.31	0.503	0.362	0.273

Note: The table reports results of the GMM estimator investigating the contractual mutual fund management company's ownership structure on funds' risk-taking for the period 2005 to 2015. The dependent variable is funds' risk-taking. For the independent variables the paper adopts government ownership: it is the percentage of share owned by a government agency; GCCs is the government-controlled companies and equal to 1 if the largest shareholder is a government agency and 0 otherwise; Foreign ownership is the percentage of share owned by foreign investors; FICs is the foreign invested companies and equals to 1 if a fund management company has foreign investments and 0 otherwise; L.risk is the one year lagged of funds' risk-taking; Expense is the funds' expense ratio; Company size the logarithm of total net assets managed by the fund management company; Company experience is the number of years of a fund management company exists in the industry; No of funds started is the total number of funds started by a fund management company in a given year; Top 1 is a dummy and equals to 1 if the fund management company has at least on fund operating in the top 1 of a given category in a given year; Company focus is the Herfindahl index of investment objective in a fund management company and is the sum of squared fractions of each investment objective's share in total fund management company value; the financial crisis period from 2008 to 2009 is a series of year dummy variables and is not reported in this table, for instance, the year of 2008 which takes the value of 1 if the year is 2008 and the value of 0 otherwise. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; **significance at the 5% level; *** significance at the 1% level.

Table. 16 The relationship between ownership structure and abnormal return-GMM (Robustness Check)

Dependent variable	Abnormal return			
Model	Model 1	Model 2	Model 3	Model 4
L. abnormal return	-0.111**	-0.106**	-0.104**	-0.100**
	(0.0477)	(0.0413)	(0.0469)	(0.0427)
Expenses	0.0167	0.0181	0.0214	0.0194
	(0.0170)	(0.0167)	(0.0214)	(0.0158)
Company size	0.0607***	0.0576***	0.0629***	0.0621***
	(0.0168)	(0.0134)	(0.0162)	(0.0157)
Company experience	-0.00773	-0.00844	-0.0137	-0.0124
	(0.0256)	(0.0282)	(0.0321)	(0.0283)
No. of funds started	-0.149***	-0.142***	-0.141***	-0.141***
	(0.0353)	(0.0337)	(0.0332)	(0.0330)
Top 1	-0.0458	-0.0469*	-0.0495*	-0.0501**
	(0.0276)	(0.0253)	(0.0268)	(0.0249)
Company Focus	0.102	0.103	0.0971	0.0943
	(0.0885)	(0.0951)	(0.0906)	(0.0951)
Government ownership	0.000526			
	(0.00151)			
GCCs		0.0889		
		(0.0893)		
Foreign Ownership			-0.00262*	
			(0.00146)	
FICs				-0.101*
				(0.0559)
Constant	-1.406***	-1.372***	-1.378***	-1.355***
	(0.379)	(0.307)	(0.353)	(0.348)
Observations	637	637	637	637
AR (2)	0.393	0.37	0.347	0.349
Hansen p value	0.678	0.651	0.447	0.484

Note: The table reports results of the GMM estimator investigating the contractual mutual fund management company's ownership structure on funds' abnormal return for the period 2005 to 2015. The dependent variable is the funds' abnormal return. For the independent variables the paper adopts government ownership: it is the percentage of share owned by a government agency; GCCs is the government-controlled companies and equal to 1 if the largest shareholder is a government agency and 0 otherwise; Foreign ownership is the percentage of share owned by foreign investors; FICs is the foreign invested companies and equals to 1 if a fund management company has foreign investments and 0 otherwise; L.Performance is the one year lagged of funds' performance; Expense is the funds' expense ratio; Company size the logarithm of total net assets managed by the fund management company; Company experience is the number of years of a fund management company exists in the industry; No of funds started is the total number of funds started by a fund management company in a given year; Top 1 is a dummy and equals to 1 if the fund management company has at least on fund operating in the top 1 of a given category in a given year; Company focus is the Herfindahl index of investment objective in a fund management company and is the sum of squared fractions of each investment objective's share in total fund management company value; the financial crisis period from 2008 to 2009 is a series of year dummy variables and is not reported in this table, for instance, the year of 2008 which takes the value of 1 if the year is 2008 and the value of 0 otherwise. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; **significance at the 5% level; *** significance at the 1% level.

4.5. Conclusions

The Chinese financial sector has undergone several important reforms during the recent decades, particularly in the mutual fund industry. The mutual fund industry is characterized by a highly concentrated corporate ownership structure and a high number of joint venture fund management companies. Against this background of ownership structure, we investigate the impact of ownership structure on funds' return and market share over the period 2005-2015, employing manually collected data.

Our evidence suggests that government ownership tends to have a greater influence on funds' return than market share, as we find that government ownership is positively related with funds' return and find that insignificant relationship between government ownership and market share. These results are in line with our hypotheses and are consistent with previous studies (Faccio et al. 2006; Chahrumiind et al. 2006; Chaney et al. 2011; Chen et al. 2014; Ben-Nasr 2016; Lin et al. 2016).

In addition, we find that foreign ownership and fund management companies with foreign investors are not only linked to a lower level of funds' return but also to a lower market share. This finding is consistent with the previous study Chen et al. (2016). Further investigation reveals that fund management companies with foreign investors have also lower risk level. The result suggests that the negative relationship between foreign ownership and funds' return and market share is contributed by foreign shareholders prefer to invest in less risky assets.

We also find that government-controlled companies have a statistically positive association with funds' return. This is consistent with the findings of Faccio et al. (2006), Chahrumiind et al. (2006), Chaney et al. (2011), Ben–Nasr (2016) and Lin et al. (2016) but is in contrast to the findings of Chen et al. (2017). However, the opposite is true for the relationship between government-controlled fund management company and market share. What is more, highly concentrated ownership tends to enhance market share. We find an insignificant relationship between concentrated ownership and funds' return. This result is supported by previous studies by Dong et al. (2014), Nguyen et al. (2015) and Dong et al. (2016) as they report that highly concentrated ownership promotes the quality of corporate governance and improves monitoring of management.

Furthermore, when we examine the effects of the interaction terms on government ownership and foreign ownership, we find that there is a positive relationship between funds' return and government-controlled companies in the presence of foreign ownership. Moreover, we discover that the funds' return and market share are positively correlated with government ownership in the case of highly concentrated ownership. Finally, these results are robust under GMM estimations.

Our findings are of importance for policymakers. We argue that concentrated ownership in a government-controlled company would improve funds' return and increase market share, suggesting that regulators should be cautious about dispersing ownership. In addition, although we find that government ownership has a positive impact on funds' return, an ever-higher level of government ownership will reduce its market share, especially in the case of government-controlled companies.

Chapter 5: Mutual fund performance, managerial attributes and the role of corporate governance

5.1. Introduction

Since the first two mutual funds (e.g., Kaiyuan and Jintai) were established and sold to the public in 1998, the mutual fund industry has experienced tremendous growth in China. According to statistics from the CSRC, the total amount of open-end mutual funds has increased from 218 in 2005 to 1552 at the end of 2013, with total net asset value increasing from 469 billion Chinese Yuan to 3 trillion Chinese Yuan. Moreover, total net assets invested in mutual funds were almost 13% of the Chinese stock market value in 2013. Given the explosive growth of mutual funds in the Chinese financial market, Tang et al. (2012) conclude that mutual funds' risk-adjusted performance on average is better than the market over the sample period 2004-2010. Therefore, it would give rise to a considerable interest in why Chinese mutual funds succeed in the market.

Some researchers have analyzed mutual fund performance by focusing on fund characteristics (including fund size, expense ratio, fees, and turnover ratio) that are observed to have a significant impact on the fund's risk-adjusted performance. For instance, some studies have looked at: the impact on mutual fund performance of fund size and the book-to-market ratio (Jan and Hung, 2003; Otten and Bams, 2004; Lai and Lau, 2010, or Pastor et al. 2015); the active share in the portfolio (Cremers and Patajisto 2009, and Cremers and Pareek, 2016); the role of incentive fees (Elton et al. 2003); the flows of money into and out of funds (Shu et al. 2002 and Berggrun and Lizarzaburu, 2015); the portfolio turnover and expense ratio (Walker and Droms, 1996, Wermers,

2000, Morey, 2003 and Pastor et al. 2016) and portfolio concentration (Fulkerson and Riley, 2019).

However, there are fewer studies have examined the relationship between the fund managerial attributes and risk-adjusted fund performance. The main reason for the scarce of such research is the availability of data regarding manager characteristics, for instance, gender and education, especially for the emerging market. Hence, this chapter fills a gap in the literature by investigating the relationship between the fund managerial attributes and fund performance. In this chapter, we focus on management structure, the manager's tenure, and education and as drivers of the fund performance. We emphasize management structure because mutual funds, as different to corporations that adopt a hierarchical management structure, are unique and have two extreme types of management structures which are team-managed funds and individual-managed funds. Existing studies in the literature present mixed results on the performance of team-managed funds. Some researchers reveal that team-managed funds perform similarly to their individual-managed counterparts (Dass et al. 2013 and Bliss et al. 2008), while others find that team-managed funds underperform their individual-managed counterparts (Bar et al. 2005; Karaginnidis, 2010 and Han et al. 2017). We focus on the length of the manager’s tenure and education. Schmidt et al. (1986) claim that the more time managers spend on an activity, the better performance they will have. Also, managers with a high level of education should have more knowledge and better professional skills. Empirical evidence on the impact of the length of the manager’s tenure and education is mixed as well.

Furthermore, with regards to the mutual fund performance measurements, most of the studies use risk-adjusted returns to evaluate mutual fund performance (Almazan et al. 2004; Bliss et al. 2008; Gong et al. 2016 and Adams et al. 2018). There are several studies (Annaert et al, 2003; Santo et al, 2005; Gregoriou et al, 2005; Zhao and Wang, 2007; Babalos et al, 2015; and Matallin-Saez et al, 2014) that use frontier analysis techniques approach to evaluate fund performance. There are two broad frontier-based methodologies, such as, a parametric (Stochastic Frontier Approach-SFA) and a non-parametric approach (Data Environment Analysis-DEA). However, there is no consensus on which method is the most appropriate estimation methodology. In this study, we opt for the parametric approach frontier analysis-the Stochastic Frontier Analysis (SFA) and risk-adjusted returns in order to strengthen the robustness of our results.

This chapter differs from the existing literature on mutual fund performance in the following ways. First, it is the first study to examine the impact of fund managerial attributes on mutual fund performance by considering the role of corporate governance. Secondly, we use a comprehensive set of fund managerial attributes that includes fund manager's tenure, education, and management structure. Thirdly, we employ both the SFA approach and the risk-adjusted returns to proxy for mutual fund performance, in order to provide additional evidence for the validity of our results.

Our findings show that team-managed funds perform poorly relative to individual-managed funds. However, in the presence of a large number of supervisors on the board and a high proportion of institutional investors, team-managed fund structures generate superior returns compared with individual-managed fund structures. In addition, a

manager's length of tenure is positively linked with equity fund performance. We find that fund managers with Ph.D. degree achieve a better overall comprehensive performance relative to fund managers without Ph.D. degree.

The reminder of the chapter is organized as follows: Section 5.2 discusses the related literature on managerial attributes and develops the hypotheses. Section 5.3 describes some descriptive statistics and presents the methodology and data employed. Section 5.4 presents the empirical results and offers further discussion. Finally, Section 5.5 concludes key findings.

5.2. Literature review and development of Hypotheses

5.2.1. Management structure and fund performance

Many studies in the team management literature document that team management can result in delays in decision-making (Sah and Stiglitz, 1988) and team management can lead to coordination problems and interpersonal conflicts due to the competition between team members (Hackman, 2002). Also, Stein (2002) documents a theory of organizational diseconomies which states that a single manager is more effective than multiple managers due to individual managers in a team are required to persuade other managers. Chen et al. (2004) examine this theory in the mutual fund management structures and find that funds are managed by one manager are perform better than funds managed by many managers. Using a database of 63 real estate mutual funds between 2001 and 2003, Philpot and Peterson (2006) examine the effects of fund manager characteristics on performance, finding that team-managed funds

underperform solo-managed funds. Moreover, Karagiannidis (2010) shows that multiple-manager funds perform worse than their solo-manager counterparts in terms of risk-adjusted fund performance for the bear market over the period between 1997 and 2000. In addition, the result reveals that the CRSP mutual fund database and Morningstar have differences in team management structure reporting and thus may cause contradicting outcomes. Similarly, Bar et al. (2011) investigate fund performance differences between teams and single managers in the context of the diversification of opinion theory versus the group shift theory. Their findings reveal that single fund managers are more likely to achieve abnormal performance than teams. Also, the results show that single-managed funds are riskier than team-managed funds.

In a more recent paper, Han et al. (2017) study differences in the fund performance between team-managed and single-managed funds for the 1993-2014 period. They observe a positive relationship between team management and fund performance as estimated by the Capital Asset Pricing Model (CAPM), Fama-French 3-factor and Carhart 4-factor models. Adams et al. (2018) conclude that there exists a positive and significant relationship between team-managed funds and performance in the presence of strong board monitoring coving the period 1998-2007. The reason being that funds with a higher proportion of independent directors and smaller boards can alleviate the potential free-rider problems within the team-managed funds.

Furthermore, Prather and Middleton (2002) indicate that there is an insignificant difference in terms of risk-adjusted returns between individually-managed funds and team-managed funds by using a sample of 377 funds. In support of this argument, Prather and Middleton, (2006) and Bliss et al (2008) show that funds managed by teams

have a similar performance compared to individually managed funds in terms of risk-adjusted returns in the U.S. mutual fund industry.

According to the information provided above, it is clear that no consensus exists in the performance of team versus solo-managed mutual funds. Therefore, we propose the following null hypothesis:

Hypothesis 1: the team management structure has a significant impact on mutual fund performance

5.2.2. The length of tenure and fund performance

There have been mixed findings in the mutual fund industry regarding the relationship between the manager's tenure and fund performance. Using a sample of 530 mutual funds from Morningstar database, Golec (1996) find that tenure is the most critical predictor of fund performance. However, Prather et al. (2004) and Switzer and Huang (2007) reveal that there is an insignificant relationship between tenure and risk-adjusted performance. In addition, Costa and Porter (2003) investigate the performance of 1042 mutual funds during the period from 1986 to 1995, analyzing the relationship between manager tenure and performance. They find that fund manager with a longer tenure do not generate higher excess returns than managers with less tenure, concluding that tenure should not be a factor in selecting mutual funds. Furthermore, Porter and Trifts (2012) indicate an inverse relationship between the fund manager's tenure and performance by using a survivorship-bias-free dataset. In more recent studies, Fang et al. (2014) notice that superior performance is achieved by fund managers with short tenure.

Clare (2017) observes that fund managers over the ten years have poor risk-adjusted performance on average.

With respect to studies in Chinese mutual fund industry, Zeng et al. (2006) show that fund managers with short tenure perform better than those with long tenure by using a sample between 2001 and 2004. By contrast, Wang and Ko (2017) find that a takeover of a fund by experienced fund managers is more likely to generate superior performance relative to inexperienced fund managers during the period from 2004 to 2013.

Therefore, it is possible to predict that managerial tenure has an impact on fund performance.

Hypothesis 2: the fund managers' length of tenure has a significant impact on equity fund performance

5.2.3. Education and fund performance

Shukia and Singh (1994) examine the impact of a fund manager’s professional education on fund performance and argue that fund managers with CFA designation outperform those without. Using a sample of 2029 mutual funds during the period from 1988 to 1994, Chevalier and Ellison (1999) show that the average student SAT score of the undergraduate institution has an impact on fund performance. The result also reveals that managers with MBAs are unrelated to mutual fund performance. However, Golec (1996) investigates the effect of manager education on mutual fund performance and documents that managers with MBAs outperform those without. In addition, Gottesman

and Morey (2006) find that fund managers with MBA perform better than managers without MBA degrees and managers holding MBAs from unranked programs. Their findings also show that other education variables are insignificant to fund performance, for instance, Ph.D. degree, Master degree, and CFA designation. Li et al. (2011) state that fund managers from higher-SAT scores of the institutions would generate superior raw and risk-adjusted returns. More recently, Andreu and Puetz (2017) find that fund manager with both an MBA degree and a CFA designation would achieve less extreme performance than fund managers with only one of these qualifications. Clare (2017) finds no evidence of superior performance for managers with an MBA or a Ph.D. degree.

With respect to China mutual fund industry, Fang and Wang (2015) find that having an MBA degree or a CFA qualification is positively related to fund performance using a sample of 287 funds from January 2008 to June 2011. In addition, they find that fund manager with a Ph.D. degree have better stock picking ability. Our analysis will mainly focus on the effects of having a Ph.D. degree in fund performance, as almost all of the fund managers have a master degree in our sample. We also examine the impact of business degrees (e.g., whether the manager holds an MBA or a CFA) on fund performance. Hence, it is possible to infer that fund manager who holds a higher degree have a significant impact on fund performance.

Hypothesis 3: fund managers who hold a higher degree have a significant impact on equity fund performance.

5.3. Data and Methodology

5.3.1. Data

We focus our empirical analysis on mutual fund performance during the period from 2005 to 2013. We collect mutual fund data from the China Securities Market & Accounting Research (CSMAR) database. In this chapter, we only focus on the performance of open-ended equity funds and exclude bonds, currency and index funds. Therefore, we have an unbalanced panel dataset with 1,592 annual observations of 325 distinct equity funds.

5.3.2. Fund Performance

There are two different types of approaches to evaluate mutual fund performance. The first approach is to employ frontier analysis technique- the Stochastic Frontier Analysis (SFA) to measure fund performance. The second approach is to employ risk factor model to measure fund performance by using the Capital Asset Pricing Model (CAPM) and Fama-French three-factor model.

5.3.2.1. The capital asset pricing model

In this chapter, fund performance is measured as the risk-adjusted return using Jensen's Alpha (See Jensen, 1968) from Capital Asset Pricing Model (CAPM). The CAPM model has been widely employed in many empirical researches and is the most basic single factor model. The performance measure of Jensen's Alpha is computed by estimating the following model:

$$R_{it} - R_{ft} = \alpha_i + \beta_m(R_{mt} - R_{ft}) + \epsilon \quad (1)$$

where R_{it} is the return of an equity mutual fund i over period t; R_{ft} is the one year fixed deposit rate over period t; α_i is the Jensen's Alpha for fund i; β_m is the systematic risk of the security in the Chinese market; R_{mt} is the market return over period t; $R_m - R_{ft}$ is the market risk premium; and ϵ is an error term. Under the efficient market hypothesis, alpha should be zero. When security exhibits excellent performance, the value of alpha is positively and statistically significant.

5.3.2.2. Fama-French three-factor model

We extend the Capital asset pricing model considering the additional risk factors proposed by Fama-French (1993) as follows:

$$R_{i,t} - R_{f,t} = \alpha_i + \beta_1(RMRF_t) + \beta_2(SMB_t) + \beta_3(HML_t) + \varepsilon_{i,t} \quad (2)$$

where R_{it} is the return of an equity mutual fund i over period t; R_{ft} is the one year fixed deposit rate over period t; $RMRF_t$ is the excess return on all listed stocks traded in the Shanghai and Shenzhen stock exchange; SMB_t is the size factor and captures market capitalization; HML_t is the stock returns of value firms relative to growth firms. In line with studies Almazan et al (2004), Bliss et al (2008) and Adams et al (2018), we apply the monthly return on NAV of a fund to calculate yearly alpha.

5.3.2.3. Stochastic Frontier Analysis approach

In this study, we adopt the Stochastic Frontier Analysis[26] (SFA) in terms of the production function model to measure fund performance. The advantage of SFA is that it considers inefficiency and random error in a composite error term (Berger and Humphrey, 1997). There are numerous studies (Murthi et al. 1997; Basso and Funari 2001, 2005; Hu and Chang 2008; Matallin–Saez et al. 2014 and Babalos et al. 2015) that adopt frontier analysis techniques to evaluate fund performance. Following these studies, we summarize various inputs and outputs used to measure fund performance, namely expense ratio, the standard deviation of return, loads and turnover, whereas output is taken as the mean fund return. In our study, we opt for multiple inputs such as fund's expense ratio and risk (measured by the standard deviation of returns). A fund's expense ratio is estimated by the fund expenses divided by the total fund assets. Moreover, a fund's expense refers to the overall costs including management, administrative, operating, and advertising costs. However, we do not consider sales charges in the fund expense costs. Risk is an important input consideration for investors, measuring by the annualized standard deviation of returns. Finally, output is measured by the mean fund return.

The general model for examining the fund efficiency can be written as follows:

$$lnR_{it} = f(N_{it}Z_{it}) + v_{it} + u_{it} \quad (3)$$

[26] The method of SFA was first developed by Aigner et al. (1977) and Meeusen (1977). SFA is a parametric methodology and its stochastic frontier measures inefficiency

where R_{it} denotes the fund mean return for fund i at year t; N is vector of input prices and Z stands for control variables. In addition, N includes two inputs: the expense ratio; and risk; and one output mean return. Z presents the annualized standard deviation of the market return. The term v_{it} stands for the random variable and is assumed to be independent and identically distributed. u_{it} captures the fund's inefficiency relative to the stochastic frontier.

Furthermore, we adopt the translog specification, which results in empirical estimations. The specific model for examining the fund efficiency can be expressed as follows:

$$\ln(R_{it}) = \alpha_0 + \sum_i \alpha_i lnN_{i,t} + {}^1\!/_2 \sum_i \sum_j \alpha_{ij}\, lnN_{i,t} lnN_{j,t} + \sum_i \beta_i\, lnZ_{i,t} + {}^1\!/_2 \sum_i \sum_j \theta_{i,j}\, lnZ_{j,t} lnN_{i,t} + v_{i,t} + \mu_{i,t} \quad (4)$$

where R_{it} denotes the fund mean return for fund i at year t; N is vector of input prices and Z stands for the control variable. In addition, N includes two inputs: the expense ratio; and risk; and one output mean return. Z presents the annualized standard deviation of the market return. The term v_{it} stands for the random variable and is assumed to be independent and identically distributed. u_{it} captures the fund's inefficiency relative to the stochastic frontier. The restrictions of standard linear homogeneity and symmetry are imposed in this study. The value of efficiency score is calculated from the following equation: $Eff_{i,t} = \left[\exp(-\mu_{i,t})\right] - 1$. Therefore, a fund's efficiency score can vary from

0 to 1 where a value of 1 implies the fund is perfectly efficient, and deviations from 1 indicate the fund is relatively inefficient.

Furthermore, we concern that the efficiency score and risk-adjusted returns might be highly correlated, thus leading to similar findings. In Table 1, we find that the correlation between the efficiency score and risk-adjusted returns (CAPM-Alpha and Fama-French3-Alpha) is relatively low. This result reveals that these two performance measures might present a different type of information.

Table 1: Correlation of efficiency score and risk-adjusted returns

	Efficiency Score	CAPM-Alpha	Fama-French3-Alpha
Efficiency Score	1		
CAPM-Alpha	-0.0022	1	
Fama-French3-Alpha	0.0602	0.7065	1

Notes: The table shows the correlation of efficiency score and risk-adjusted returns for a sample of China mutual funds over the period from 2005 to 2015.

5.3.3. Fund managerial attributes

In line with previous studies Golec (1996), Gottesman and Morey (2006), Karaginnidis (2010) and Adams et al. (2018), we consider fund manager's attributes are proxied by manager tenure, team management structure, and education. The tenure is calculated as the number of years that a fund manager worked for a fund. When there is more than one manager in the fund, the more senior manager's tenure is used (Golec, 1996). The

impact of manager tenure on fund performance is mixed in the literature. On the one hand, some studies argue that managers with longer tenure would offer more investment experience and thus lead to better fund performance (Prather et al. 2004; Wang and Ko 2017). On the other hand, other studies present a negative relationship between manager tenure and fund performance (Porter and Trifts 2012 and Fang et al. 2014), which reveals that fund managers with longer tenure may get more bored and less incentive to manager portfolios (Ng and Feldman, 2013). Therefore, it is expected to find a positive relationship between tenure and fund performance.

The team management structure is a dummy variable which equals one if the fund has more than one manager (Adams et al. 2018). The conflicts between team members would result in coordination problems (Hackman, 2002) and ineffective in the decision-making process. Consequently, we expect to find a negative impact of the management structure on fund performance. Finally, with respect to the manager's educational degree, this chapter mainly focuses on whether the manager holds a Ph.D. Education is a dummy variable which takes the value of 1 if the fund is managed by a manager with a Ph.D. degree and the value of 0 otherwise (Clare, 2017). We consider that fund managers with a Ph.D. degree may have more knowledge and better professional skills. Thus, a higher degree may signal better investment quality. It is expected to have a positive relationship between education and fund performance. In addition, we also examine the impact of business degrees (e.g., whether the manager holds an MBA or a CFA) on fund performance in the Appendix.

Table 2 presents descriptive statistics for the managerial attributes. It indicates that 16% of funds are managed by a Ph.D. holder on average, which is higher than Fang and

Wang's (2015) average of 11.4% in their sample for Chinese mutual funds over the period between 2008 and 2011. The average of team-managed funds is 29%, a much lower percentage than the reported figure of 58.62% obtained by Adams et al. (2018) under US fund management structure. Meanwhile, the average number of fund manager tenure is 2.68, with a minimum and a maximum of 1 and 8 years, respectively. According to Clare (2017), the average manager tenure is 16 years, much longer than the average manager tenure in our sample.

Table 2. Summary statistics of fund managerial attributes

Variables	Mean	SD	MIN	MAX	Median
Team management structure (%)	29	45	0	100	0
Education (%)	16	37	0	100	0
Tenure	2.68	1.42	1	8	2

Notes: The table reports summary statistics the mean, standard deviation, minimum, maximum and median values for the variables used in analyzing equity fund performance from the sample period between 2005 and 2013. Team management structure is a dummy variable which takes the value of 1 if the fund is managed by a team and the value of 0 otherwise; Education is a dummy which takes the value of 1 if the fund is managed by a manager with Ph.D degree and the value of 0 otherwise; Tenure is the number of years that manager has been with a fund.

5.3.4. Control variables

By investigating the effect of fund managerial attributes on fund performance, we control for the following fund-specific variables in our study, fund size, turnover ratio, risk, funds under management, expense ratio and market return volatility. In this chapter, fund size is estimated by the logarithm of a fund's total net assets. Empirical studies present a mixed result for the impact of fund size on fund performance. Some studies show that large funds would result in lower expense and low transaction costs, leading to better fund performance (Otten and Bams, 2002; Annaert et al. 2003 and Ferreira et al. 2013). However, others find a negative impact of fund size on

performance (Prather et al. 2004; Chen et al. 2004; Yan, 2008; Nanda and Wang, 2008; Tang et al. 2012 and Ding et al. 2014). One possible explanation of this negative relationship is the liquidity effect.

With respect to the variable of funds under management, it helps to measure the number of funds under a single-manager or a team. Management effectiveness might be deteriorated when fund managers attempt to cover more funds (Prather et al. 2004). Therefore, funds under management might have a negative correlation with funds' performance. The risk is the standard deviation of fund return. We expect a positive relationship between funds' performance and risk as a higher risk should generate a higher average return.

Furthermore, the turnover rate is used to measure trading activities and is estimated by the minimum annual sales or purchase divided by average annual total net assets (Adams et al. 2018). Adams et al. (2018) find that turnover is negatively related to fund performance. In contrast, Ippolito, (1989), Droms and Walker, (1994) and Gottesman and Morey, (2006) demonstrate that there is an insignificant relationship between turnover and fund performance.

Following studies Qureshi et al. (2017) and Cao et al. (2008), market return volatility is calculated by the standard deviation of market return. In this chapter, market return is estimated by 40% of the Shenzhen composite index, 20% of the Shanghai Government bond index, and 40% of the Shanghai Composite index. Furthermore, this chapter uses the GDP growth rate and inflation rate as the macroeconomic control variables. High inflation rate presents a decrease in real GDP growth rate, which implies a lower stock

return. In addition, Krishnamurthy et al. (2018) find that inflation is negatively associated with aggregate equity mutual fund flows. Hence, the high inflation rate would reduce the funds' performance. We summarize the definition of all the variables which we adopted in this study in Table 2.1.

5.3.5. Descriptive statistics

Table 3 contains a summary statistics of fund-specific variables in this chapter. The sample mean of efficiency in Panel A of Table 3 is 69 percent, which is less than that of 81.2 percent found in Babalos et al. (2015) during the period from 2002 to 2010. The sample mean of CAPM-alpha and Fama-French3-alpha are 0.26% and 0.53% respectively, which reveals that the mutual funds gain positive risk-adjusted returns in our sample period from 2005 to 2013. Moreover, this result is similar to the figure of 0.483% by Gong et al. (2016) for their Carhart4-alpha for China sample.

Regarding the fund specific characteristics shown in Panel B of Table 3, the sample mean of fund mean return is 5.8%. The average fund expense ratio is 2.9%. The sample mean of market return volatility is 5.99%, which is slightly higher than that of fund risk of 5.01%. Additionally, the sample mean of fund size is 3.92 billion Chinese Yuan. The average turnover and funds under management are 2.75 and 1.65, respectively. Regarding the macroeconomic variables shown in Panel C in Table 3, the sample mean of the GDP growth rate and inflation rate are 9.26% and 4.15%, individually.

Table 3. Summary statistics

Variables	Mean	SD	MIN	MAX	Median
Panel A: Fund performance					
Efficiency Score	69%	12%	48%	99%	66%
CAPM-Alpha	0.26%	1.48%	-4.8%	29.38%	0.06%
Fama-French3-Alpha	0.53%	1.98%	-4.1%[27]	28.5%	-0.05%
Panel B: Funds specific characteristics					
Mean return	5.80%	38.40%	-84%	175.88%	3.50%
Expense ratio	2.90%	1.15%	0.20%	12.71%	2.65%
Risk	5.01%	2.27%	0.05%	23.07%	5.00%
Market return volatility	5.99%	1.59%	4.04%	9.28%	5.65%
Fund size (in Billions)	3.92	4.9	0.01	4.14	
Turnover	2.75	3.44	0.07	86.23	2.14
Funds under management	1.65	1.04	1	10	1
Panel C: Macroeconomic variables					
GDPg	9.26	1.78	7.65	14.16	9.2
Inflation	4.15	3.05	0.61	6	1.99

Notes: The table reports summary statistics the mean, standard deviation, minimum, maximum and median values for the variables used in analyzing equity fund performance from the sample period between 2005 and 2013. Efficiency score is estimated from Stochastic Frontier Analysis approach; CAPM-Alpha is estimated from the Capital Asset Pricing model; Fama-French3-Alpha is estimated from the Fama-French three-factor model; mean return is average of raw return in a given year; expense ratio is calculated by dividing the fund expenses by the total fund assets. Risk is the annualized standard deviation of fund returns; Market return volatility is the standard deviation of market return; Fund size is measured by total net asset (TNA) which is equal to total assets minus total liabilities; Turnover is the ratio of the minimum of annual purchase or sales stocks divided by the average annual amount of fund wealth; Funds under management presents the number of funds under a sole manager or team of managers; GDP growth rate is the rate of growth in gross domestic product of China in a given year; Inflation is the inflation rate in a given year.

5.3.6. Research design

This chapter opts for a panel regression estimation to investigate the effect of managerial attributes on mutual fund performance. We adopt simple panel fixed effect analysis that control for omitted heterogeneous fund-specific effects. Hence, the model

[27] We find this negative value alpha in studies Gong et al. (2016) and Ghoul and Karoui (2017).

for measuring the relationship between fund managerial attributes and performance can be expressed as follows:

$$PERF_{i,t} = \alpha + \beta_1 MA_{i,t} + \beta_2 control\ variables_{i,t} + \varepsilon_{i,t} \quad (5)$$

where $PERF_{i,t}$ is the dependent variable and reflects fund performance, as estimated by the Efficiency Score, the CAPM-Alpha, and the Fama-French3-Alpha; $MA_{i,t}$ is team management structure, manager tenure and educational factor (Ph.D degree); $control\ variables_{i,t}$ represents the fund-specific characteristics variables that may affect fund performance, including fund size, turnover ratio, funds under management; $\varepsilon_{i,t}$ is the error term.

5.4. Empirical results

In this chapter, we report empirical findings as to whether the fund managerial attributes can affect fund performance, as estimated by the efficiency score and risk-adjusted returns. We first employ the fixed effect analysis to control for omitted heterogeneous fund-specific characteristics, such as fund size, turnover ratio, funds under management and expense ratio.

5.4.1 Fixed effects analysis

5.4.1.2 The impact of the team management structure

Table 3 reports the results for the fixed effect regressions, where fund performance is a function of fund-specific and macroeconomic variables. As discussed in section 4.3.3, we use the fund manager's tenure, education and team management structure to represent for fund managerial attributes. Table 3 reveals a negative relationship between the team management structure and CAPM-alpha (Table 3, Model 3). However, the result is not significant. Consistent with Chen et al. (2004), Philpot and Pererson, (2006), Karaginnidis (2010), Bar et al. (2011) and Liu et al. (2014), Table 3 shows a negative association between the team management structure and Fama-French3-Alpha at the 10% level of significance (Table 3, Model 2). The result implies that sole-managed funds perform better than team-managed funds. Also, it is shown that when a fund managed by a team, a fund's Fama-French3-alpha could be significantly reduced by 0.3. In addition, while we find that the team management structure has a negative impact on fund efficiency score, the result is not significant (Table 3, Model 1).

Thus, our results suggest that the team management structure negatively affects fund performance and would confirm previous empirical work (Chen et al. 2004; Baer et al. 2005; Philpot and Pererson. 2006; Karaginnidis. 2010 and Bar et al. 2011). In particular, team management can result in delays in decision-making (Sah and Stiglitz, 1988) and team management can lead to coordination problems and interpersonal conflicts due to the competition between team members (Hackman, 2002). Moreover, this negative relationship between team management structure and fund performance might be caused by the existence of the potential free-rider problems within team-managed funds. Hence, the results would confirm our first Hypothesis (H1) suggesting that team management structure would affect on mutual fund performance. Additionally, Adams et al. (2018) find that team-managed funds can provide excellent performance compared to individual-managed funds under strong board governance. Hence, we will further examine the impact of team management structure on fund performance by considering the fund management company's corporate governance in the next section.

Table 3. The relationship between team management structure and fund performance (Fixed effects)

Dependent variable	Efficiency	FF3-alpha	CAPM-alpha
Model	Model 1	Model 2	Model 3
Fund size	-0.0162***	-0.154	0.0726
	(0.00497)	(0.0988)	(0.0903)
FundUM	-0.00146	0.136**	0.0325
	(0.00313)	(0.0674)	(0.0398)
GDPg	0.0134***	0.0495	0.192***
	(0.00187)	(0.0317)	(0.0263)
Inflation	-0.00781***	-0.0715***	-0.0824***
	(0.000766)	(0.0174)	(0.00835)
Turnover		-0.133***	-0.0935***
		(0.0377)	(0.0235)
Team	0.00406	-0.260*	-0.107
	(0.00661)	(0.147)	(0.110)
Constant	0.950***	3.861*	-2.494
	(0.104)	(2.012)	(1.829)
Observations	1,592	1,592	1,592
R-squared	0.089	0.022	0.045

Note: The table reports results of the fixed effect models investigating the fund management structure on equity fund performance for the period 2005 to 2013. The dependent variables are CAPM-Alpha which is estimated from the Capital Asset Pricing Model; Fama-French3-Alpha is estimated from the Fama-French three-factor Model and the efficiency score is estimated by the Stochastic Frontier Analysis approach. For the independent variables the paper adopts fund size: it is measured by total net asset (TNA) which is equal to total assets minus total liabilities; FundUM presents the number of funds under a sole manager or team of managers; Turnover is the ratio of the minimum of annual purchase or sales stocks divided by the average annual amount of fund wealth; Team: dummy which takes the value of 1 if the fund is managed by a team and the value of 0 otherwise; GDPg: it is the rate of growth in gross domestic product of China in a given year; Inflation: it is the inflation rate in a given year; The numbers in the parentheses are corrected standard errors, *significance at the 10% level; **significance at the 5% level; ***significance at the 1% level.

Table 4 The relationship between manager's tenure and fund performance (Fixed effects)

Dependent variable	Efficiency	FF3-alpha	CAPM-alpha
Model	Model 1	Model 2	Model 3
Fund size	-0.0172***	-0.233**	0.0372
	(0.00499)	(0.0941)	(0.0843)
FundUM	-0.00115	0.0754	0.00678
	(0.00303)	(0.0662)	(0.0381)
GDPg	0.0143***	0.115***	0.222***
	(0.00210)	(0.0332)	(0.0285)
Inflation	-0.00782***	-0.0723***	-0.0828***
	(0.000768)	(0.0173)	(0.00848)
Turnover		-0.140***	-0.0968***
		(0.0378)	(0.0240)
Tenure	0.00275	0.215***	0.0966***
	(0.00201)	(0.0466)	(0.0354)
Constant	0.957***	4.399**	-2.252
	(0.104)	(1.983)	(1.792)
Observations	1,592	1,592	1,592
R-squared	0.090	0.036	0.050

Note: The table reports results of the fixed effect models investigating the fund manager's tenure on equity fund performance for the period 2005 to 2013. The dependent variables are CAPM-Alpha which is estimated from the Capital Asset Pricing Model; Fama-French3-Alpha is estimated from the Fama-French three-factor Model and the efficiency score is estimated by the Stochastic Frontier Analysis approach. For the independent variables the paper adopts fund size: it is measured by total net asset (TNA) which is equal to total assets minus total liabilities; FundUM presents the number of funds under a sole manager or team of managers; Turnover is the ratio of the minimum of annual purchase or sales stocks divided by the average annual amount of fund wealth; Tenure is the number of years that manager has been with a fund; GDPg: it is the rate of growth in gross domestic product of China in a given year; Inflation: it is the inflation rate in a given year; The numbers in the parentheses are corrected standard errors, *significance at the 10% level; **significance at the 5% level; ***significance at the 1% level.

Table 5 The relationship between fund manager's education and fund performance (Fixed effects)

Dependent variable	Efficiency	FF3-alpha	CAPM-alpha
Model	Model 1	Model 2	Model 3
Fund size	-0.0165***	-0.151	0.0733
	(0.00513)	(0.0995)	(0.0908)
FundUM	-0.00231	0.110	0.0197
	(0.00297)	(0.0668)	(0.0384)
GDPg	0.0132***	0.0497	0.192***
	(0.00189)	(0.0318)	(0.0263)
Inflation	-0.00772***	-0.0718***	-0.0825***
	(0.000765)	(0.0175)	(0.00835)
Turnover		-0.129***	-0.0928***
		(0.0383)	(0.0239)
Education (Ph.D.)	0.0298***	-0.251	-0.0601
	(0.00999)	(0.164)	(0.104)
Constant	0.955***	3.797*	-2.509
	(0.107)	(2.023)	(1.837)
Observations	1,592	1,592	1,592
R-squared	0.098	0.021	0.044

Note: The table reports results of the fixed effect models investigating the fund manager's education on equity fund performance for the period 2005 to 2013. The dependent variables are CAPM-Alpha which is estimated from the Capital Asset Pricing Model; Fama-French3-Alpha is estimated from the Fama-French three-factor Model and the efficiency score is estimated by the Stochastic Frontier Analysis approach. For the independent variables the paper adopts fund size: it is measured by total net asset (TNA) which is equal to total assets minus total liabilities; FundUM presents the number of funds under a sole manager or team of managers; Education is a dummy which takes the value of 1 if the fund is managed by a manager with Ph.D degree and the value of 0 otherwise; GDPg: it is the rate of growth in gross domestic product of China in a given year; Inflation: it is the inflation rate in a given year. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; **significance at the 5% level; ***significance at the 1% level.

5.4.1.2 The impact of the fund manager's tenure

Table 4 presents the results for the impact of the fund manager's tenure on fund performance. It is shown that the length of the fund manager's tenure has a positive impact on CAPM-Alpha at the 1% level of significance (Model 3 in Table 4). It implies that when the fund manager's tenure increases by one unit, a fund's CAPM-Alpha would be increased by 0.1 approximately. Similarly, we find a positive relationship between tenure and fund's Fama-French3-Alpha at the 1% level of significance (Model 2 in Table 4). A one unit increase in manager's tenure would improve a fund's Fama-French3-Alpha by 0.2. Thus, our results indicate that longer tenure would increase a fund's risk-adjusted returns. The results are in line with previous studies (Golec. 1996 and Philpot et al. 2000). Moreover, we also find that fund manager's tenure is positively related to fund efficiency score (Model 1 in Table 4). However, the result is not statistically significant.

Thus, our findings reveal that, fund managers with longer tenure will perform better than those whose managers are relatively new to a fund. The result also implies that tenure would be a good predictor of fund performance, as longer tenure would signal that fund managers have more fund investment experience, leading to better fund performance. Additionally, our finding is opposite to that of Zeng et al. (2006); Porter and Trifts (2012); Fang et al. (2014) and Clare (2017), as they suggest that the more time managers spend on an activity, the worse performance they will have. Therefore, according to these findings, Hypothesis 2 is supported as it states that fund managers' length of tenure has an impact on equity fund performance.

5.4.1.3 The impact of the fund manager's education

Table 5 reports the regression results about the impact of the fund manager's education on fund performance. We find that the coefficient on education is negative in the regression of fund performance-CAPM-Alpha (Table 5, Model 3), but the coefficient on education is statistically insignificant. Moreover, we find that the fund manager with a Ph.D. degree have a negative effect on Fama-French3-Alpha (Model 2 in Table 5). The findings demonstrate that the fund manager with a Ph.D. degree is unrelated to fund risk-adjusted returns. This result is in line with studies Gottesman and Morey (2006) and Clare (2017), as they state that no evidence of superior performance for fund managers with an MBA or a Ph.D. degree.

By contrast, Table 5 shows that education (Ph.D.) has a positive impact on fund efficiency score at the 1% level of significance (see Model 1). The result means that fund managers with Ph.D. degree outperform fund managers without a Ph.D. degree in terms of fund efficiency score. The result also suggests that a one unit increase in fund education would improve fund efficiency score by 0.03.

Overall, we find a mixed result on fund performance by using different performance measurements. The results show that fund managers with a Ph.D. degree have no significant impact on a fund's CAPM-Alpha and Fama-French3-Alpha. This finding reveals that fund managers with Ph.D. degree achieve a better overall comprehensive performance, as the efficiency score is produced by Stochastic Frontier approach which considers more inputs to calculate fund performance. One possible explanation is that a fund manager with a high level of education would have better professional skills and

knowledge to have better overall performance. Therefore, this result supports Hypothesis 3 that education factor has a positive influence on fund performance.

In terms of the control variables, we find that the coefficients on fund size are significantly negative for both efficiency score and Fama-French3-Alpha across almost all models. This finding is in line with studies by Chen et al. (2004) and Yan (2008), as they state that a large fund tends to have higher coordination costs and liquidity constraints. Additionally, we find that funds under management have a negative impact on a fund's efficiency score, but the estimations are not statistically significant. By contrast, we find a positive relationship between funds under management and fund's risk-adjusted returns (see Table 3). This result does not support the findings of Prather et al. (2004) and Hu and Chang (2008), as they claim that the number of funds under management has a negative and significant impact on fund performance.

Turning now to the impact of turnover ratio, it has a negative impact on Fama-French3-Alpha in all models. The results remain robust at the 1% significance level. Moreover, we find a negative relationship between turnover ratio and CAPM-Alpha at the 1% level of significance (see Tables 3-5). This result is in line with Malkiel (1995) and Carhart (1997) and Haslem et al. (2008). However, Chevalier and Ellison (1997) indicate that turnover ratio is positively associated with fund performance. In addition, the GDP growth rate has a positive and statistically significant effect on equity fund performance. The inflation rate has a negative and statistically significant effect on equity fund performance.

5.4.2. The interaction between team management structure and corporate governance

In this section, we focus on the interaction term between team management structure and corporate governance. Adams et al. (2018) claim that the presence of strong board monitoring would enhance fund performance in team-managed fund structures. Therefore, we adopt the board of supervisor to represent the monitoring effectiveness of internal governance board and use institutional investor holding to represent the monitoring effectiveness of external governance. The board of supervisors is the number of supervisors on the board. The leading roles of the supervisory board are to monitor and to evaluate directors and senior managers and to oversee the financial affairs. Shleifer and Vishny (1997) state that the supervisory board has been viewed as one of the most useful governance mechanisms. The institutional investor holding is the percentage of shares held by the institutional investor for a fund management company (Gong et al. 2016). Institutional investors have incentive to monitor the operation of fund management, as they have large holdings in the fund.

According to Table 6, we use CAPM-Alpha, Fama-French3-Alpha and efficiency score as fund performance measurements. It is shown that the coefficients of team management structure are consistent with those in previous results. We find that team management structure only has a significant impact on a fund's Fama-French3-Alpha, indicating that a one unit increase in fund management structure would reduce fund's Fama-French3-Alpha by 0.8. Further, we find that supervisory boards have a positive impact on the fund's CAPM-Alpha at the 1% level of significance (Table 6, Model 3). We also find a positive relationship between supervisory boards and Fama-French3-

Alpha at the 1% level of significance (Table 6, Model 2). The results suggest that a one unit increase in the size of the supervisory board would increase the fund's CAPM-Alpha and fund's Fama-French3-Alpha by 0.4 and 0.5 respectively. The findings are in line with previous studies Firth et al. (2007) and Ding et al. (2010), suggesting that supervisory boards improve the monitoring on a management team.

Moreover, we find that the coefficient on the interaction term of team-managed fund structures and board of supervisor is significantly positive at the 10% significance level (Model 3 in Table 6). This finding suggests that supervisory boards improve Fama-French3-Alpha in team-managed fund structures. In addition, we find that the interaction term of team-managed fund structure and supervisory board has a positive impact on efficiency score, but the estimated coefficient is statistically insignificant (Model 1 in Table 6). Also, the result shows that interaction term of team-managed fund structure and the size of the supervisory board has an insignificant impact on a fund's CAPM-Alpha.

Table 6 Interaction term between team management structure and supervisory board (Fixed effects)

Dependent variable	Efficiency	FF3-alpha	CAPM-alpha
Model	Model 1	Model 2	Model 3
Fund size	-0.0162***	-0.145	0.0758
	(0.00499)	(0.0922)	(0.0844)
FundUM	-0.00155	0.130**	0.0269
	(0.00317)	(0.0655)	(0.0384)
GDPg	0.0139***	0.0941***	0.228***
	(0.00189)	(0.0302)	(0.0245)
Inflation	-0.00782***	-0.0724***	-0.0835***
	(0.000765)	(0.0174)	(0.00866)
Turnover		-0.143***	-0.101***
		(0.0373)	(0.0235)
Team	0.00139	-0.818***	-0.337
	(0.0163)	(0.311)	(0.218)
BOS	0.00615	0.486***	0.401***
	(0.00427)	(0.126)	(0.0947)
Team*BOS	0.000746	0.151*	0.0637
	(0.00372)	(0.0778)	(0.0504)
Constant	0.921***	1.412	-4.403**
	(0.102)	(2.151)	(2.007)
Observations	1,592	1,592	1,592
R-squared	0.091	0.044	0.068

Note: The table reports results of the fixed effect models investigating the fund managerial attributes on equity fund performance for the period 2005 to 2013. The dependent variables are CAPM-Alpha, Fama-French3-Alpha and efficiency score. For the independent variables the paper adopts fund size: it is measured by total net asset (TNA) which is equal to total assets minus total liabilities; FundUM presents the number of funds under a sole manager or team of managers; Turnover is the ratio of the minimum of annual purchase or sales stocks divided by the average annual amount of fund wealth; Team: dummy which takes the value of 1 if the fund is managed by a team and the value of 0 otherwise; BOS: it is the number of supervisors in a board; Team*Bos: it is the interaction term between team management structure and board of supervisor; GDPg: it is the rate of growth in gross domestic product of China in a given year; INF: it is the inflation rate in a given year; The numbers in the parentheses are corrected standard errors, *significance at the 10% level; **significance at the 5% level; ***significance at the 1% level.

Table 7 Interaction term between team management strucutre and external governance (Fixed effects)

Dependent variable	Efficiency	FF3-alpha	CAPM-alpha
Model	Model 1	Model 2	Model 3
Fund size	-0.0224***	-0.0486	0.123
	(0.00493)	(0.105)	(0.0907)
FundUM	-0.00157	0.139**	0.0335
	(0.00310)	(0.0670)	(0.0402)
GDPg	0.0140***	0.0352	0.184***
	(0.00184)	(0.0324)	(0.0269)
Inflation	-0.00831***	-0.0615***	-0.0768***
	(0.000780)	(0.0176)	(0.00838)
Turnover		-0.109***	-0.0792***
		(0.0384)	(0.0239)
Team	-0.0186*	0.00589	0.199
	(0.0109)	(0.258)	(0.197)
IIhold	-0.00148***	0.0227***	0.0134***
	(0.000321)	(0.00567)	(0.00416)
Team*IIhold	0.000949**	-0.0106	-0.0136
	(0.000417)	(0.0131)	(0.0120)
Constant	1.110***	1.129	-3.850**
	(0.107)	(2.247)	(1.911)
Observations	1,592	1,592	1,592
R-squared	0.114	0.032	0.051

Note: The table reports results of the fixed effect models investigating the fund managerial attributes on equity fund performance for the period 2005 to 2013. The dependent variables are CAPM-Alpha, Fama-French3-Alpha and efficiency score. For the independent variables the paper adopts fund size: it is measured by total net asset (TNA) which is equal to total assets minus total liabilities; FundUM presents the number of funds under a sole manager or team of managers; Turnover is the ratio of the minimum of annual purchase or sales stocks divided by the average annual amount of fund wealth; Team: dummy which takes the value of 1 if the fund is managed by a team and the value of 0 otherwise; IIhold: it is the percentage of share held by institutional investors for each fund management company; Team*IIhold: it is the interaction term between team management and institutional investor holding; GDPg: it is the rate of growth in gross domestic product of China in a given year; INF: it is the inflation rate in a given year; The numbers in the parentheses are corrected standard errors, *significance at the 10% level; **significance at the 5% level; ***significance at the 1% level.

Table 7 reports the results for the interaction terms of team-managed structure and external governance. We find that team management structure has a negative impact on fund efficiency score at the 10% level of significance (Table 7, Model 1). The result suggests that a one unit increase in team management structure is found to decrease fund efficiency score by 0.018. In addition, the result indicates IIhold exerts a negative impact on fund efficiency score at the 1% level of significance (Table 7, Model 1). By contrast, we find that a positive relationship between IIhold and fund risk-adjusted returns in terms of fund's CAPM-Alpha and fund's Fama-French3-Alpha at the 1% level of significance respectively (Models 2 and 3 in Table 7). The findings are consistent with studies James and Karceski (2006), Evans and Fahlenbrach (2012) and Gong et al. (2016), indicating that more institutional investors in a fund would improve fund performance.

Furthermore, we find evidence that a high degree of institutional investor holding could promote the efficiency score of team-managed funds, as the coefficient on team-managed funds and institutional investor holding is statistically significant at the 5% significance level (Table 7, Model 1). By contrast, we find a negative relationship between fund performance (CAPM-Alpha and Fama-French3-Alpha) and the interaction term of team-managed structure and institutional investor holding in Models 2 and 3. However, the estimated coefficients on the interaction term are statistically insignificant. Overall, these findings are consistent with study Adams et al (2018). In addition, in an unreported analysis, we notice that the effects of the interaction term between tenure and each of the two governance variables and the interaction term between education and each of the two governance variables on fund performance are less important.

5.4.3. Robustness check

This section provides the robustness check by repeating our analysis and using an alternative measurement of fund performance. Table 8 indicates the findings of the panel fixed effect analysis, where fund performance is replaced by the sharp ratio. We find that the results remain relatively consistent with prior outcomes, see Models 1 and 2.

Table 8 presents that team-managed fund structure has a negative impact on the sharp ratio. The result remains robust at the 10% significance level (Table 8, Model 1). The result implies that a one unit increase in team management structure will decrease the sharp ratio by 0.03 on average. This result indicates that team-managed funds decrease the quality of investment decisions and increase the conflicts within the group. Moreover, the fixed effect analysis reveals that the fund manager's tenure has a positive and statistically significant impact on the sharp ratio. The result remains robust at the 1% level of significance (Table 8, Model 2). It implies that a one unit increase in manager tenure would increase fund sharp ratio by 0.0234. Therefore, longer tenure may increase the fund manager’s investment experience and fund performance.

Furthermore, the fixed effect results show that fund managers with a Ph.D. degree have a negative impact on the sharp ratio, but it is statistically insignificant (Table 8, Model 3). Overall, we conclude that the previous findings are robust.

Table 8 The relationship between managerial attributes and Sharp ratio-Fixed effects (Robustness Check)

Dependent variable	Sharp ratio		
Model	Model 1	Model 2	Model 3
Fund size	0.0281**	0.0179	0.0282**
	(0.0109)	(0.0112)	(0.0110)
FundUM	0.0218**	0.0135	0.0168*
	(0.00876)	(0.00853)	(0.00903)
GDPg	0.246***	0.254***	0.246***
	(0.00371)	(0.00439)	(0.00374)
Inflation	-0.151***	-0.151***	-0.151***
	(0.00154)	(0.00159)	(0.00154)
Turnover	-0.0159***	-0.0169***	-0.0158***
	(0.00432)	(0.00433)	(0.00432)
Team	-0.0368**		
	(0.0165)		
Tenure		0.0278***	
		(0.00491)	
Education(Ph.D)			-0.0106
			(0.0250)
Constant	-2.217***	-2.147***	-2.220***
	(0.225)	(0.225)	(0.226)
Observations	1,592	1,592	1,592
R-squared	0.837	0.840	0.836

Note: The table reports results of the fixed effect models investigating the fund managerial attributes on equity fund performance for the period 2005 to 2013. The dependent variable is the Sharp ratio. For the independent variables the paper adopts fund size: it is measured by total net asset (TNA) which is equal to total assets minus total liabilities; FundUM presents the number of funds under a sole manager or team of managers; Turnover is the ratio of the minimum of annual purchase or sales stocks divided by the average annual amount of fund wealth; Team: dummy which takes the value of 1 if the fund is managed by a team and the value of 0 otherwise; Tenure is the number of years that manager has been with a fund; Education is a dummy which takes the value of 1 if the fund is managed by a manager with Ph.D degree and the value of 0 otherwise; GDPg: it is the rate of growth in gross domestic product of China in a given year; INF: it is the inflation rate in a given year; The numbers in the parentheses are corrected standard errors, *significance at the 10% level; **significance at the 5% level; ***significance at the 1% level.

5.4.4. Dynamic panel analysis

Furthermore, by taking into account endogeneity issues[28] and considering the short-run effect of fund managerial attributes on fund performance, we employ the two-step system generalized method of moments (GMM) estimator (Arellano and Bover, 1995; Blundell and Bond, 1998). We also apply Windmeijer's (2005) bias-corrected robust standard errors. In addition, we present two goodness-of-fit tests for our results of the two-step system GMM estimator. The first test examines the validity of instruments using Hansen's diagnostic test. The second test examines for second-order autocorrelation of the error terms introduced by Arellano and Bond (1991). Hence, the model includes one lag of the fund performance, a set of managerial attributes and control variables.

$$PERF_{i,t} = \alpha + \beta_1 PERF_{i,t-1} + \beta_2 MA_{i,t} + \beta_3 control\ variables_{i,t} + \varepsilon_{i,t} \qquad (6)$$

Tables 9, 10 and 11 address the endogeneity issue by employing the two-step 'system' dynamic GMM approach. This chapter reveals that the basic diagnostics test (AR (2)) for second-order serial correlations in all corresponding models are insignificant. Also, the Hansen test indicates that our instruments are valid, as the Hansen J-statistics of over-identifying restrictions are insignificant in all corresponding models (see Tables9, 10 and 11). In addition, lagged risk-adjusted returns are negatively associated with equity fund performance at the 1% significance level in terms of fund's CAPM-Alpha and Fama-French3-Alpha. By contrast, we find that the coefficient on lagged efficiency

[28] This chapter employs Roodman's (2009) "Xtabond2" specification in Stata.

score is positive and statistically significant at the 1% level of significance. This finding is consistent with Garcia-Vidal et al. (2016), as they find that short-term performance persistence in equity mutual funds worldwide.

The two-step system dynamic GMM estimation results for the impact of team management structure on fund performance are consistent with the results of the fixed effects estimations. We find that the estimated coefficient on the team-managed fund structure is negative and statistically significant at the 10% (see Table 9, Model 2) significance level. The result indicates that a one unit increase in team management structure would decrease the fund's Fama-French3-Alpha by 0.59. The finding is consistent with studies Chen et al. (2004), Philpot and Pererson, (2006), Karaginnidis (2010) and Bar et al. (2011). However, the effect of team-managed fund structure on efficiency score is statistically insignificant (Table 9, Model 1). Similarly, we find the relationship between team management structure and fund's CAPM-Alpha is insignificant (Table 9, Model 3). Overall, our finding lends support to Hypothesis 1 that team management structure would impact on equity fund performance.

Table 10 reports that the fund manager's length of tenure has a positive impact on the fund's efficiency score. The result remains robust at the 1 % significance level (see Model 1 in Table 10). It means that a one unit increase in manager's tenure would improve the fund's efficiency score by 0.057. In addition, we find a positive relationship between tenure and Fama-French3-Alpha at the 1% level of significance (Table 10, Model 2). The result also presents that fund manager's tenure has a positive impact on the fund's CAPM-Alpha at the 10% level of significance (Table 10, Model 3).

These findings suggest that a one unit increase in manager's tenure is found to improve fund's Fama-French3-Alpha and CAPM-Alpha by 0.2 and 0.1 respectively.

These findings confirm our previous evidence obtained from fixed effect estimations and are in line with previous studies by Golec (1996) and Philpot et al. (2000). Therefore, we conclude that Hypothesis 2 is supported as it states that fund managers' length of tenure has an impact on equity fund performance.

Finally, we find mixed results for the impact of education factor on fund performance by using different performance measurements. Table 11 presents that fund managers with the Ph.D. degree have a negative impact on fund's CAPM-Alpha and Fama-French3-Alpha (see Models 2 and 3 in Table 11), but the estimated coefficients are statistically insignificant. These findings are in line with previous studies Morey (2006) and Clare (2017), indicating that there is no relationship between managers with a Ph.D. degree and fund risk-adjusted returns. In addition, Table 11 reports that fund managers with Ph.D. degree have a positive impact on efficiency score at the 5% level of significance (Table 11, Model 1). The result implies that fund managers with a Ph.D. degree achieve a better overall comprehensive performance. We find that a one unit increase in education would improve the fund's efficiency score by 0.03. Overall, these findings are consistent with the main findings from the fixed effect models.

Table 9 The relationship between team management structure and fund performance-GMM

Dependent variable	Efficiency	FF3-alpha	CAPM-alpha
Model	Model 1	Model 2	Model 3
L.Performance	0.300***	-0.0840**	-0.0378*
	(0.0501)	(0.0350)	(0.0205)
Fund size	-0.0287***	-0.739***	-0.0385
	(0.00471)	(0.143)	(0.127)
FundUM	-0.00453	0.0445	0.0385
	(0.00315)	(0.153)	(0.0538)
GDPg	0.0234***	-0.142	-0.0578
	(0.00343)	(0.0931)	(0.0798)
INF	-0.0145***	-0.0430	-0.205***
	(0.00120)	(0.0877)	(0.0579)
Turnover		-0.00847	-0.0322
		(0.0354)	(0.0198)
Team	0.00230	-0.590*	-0.615**
	(0.00822)	(0.303)	(0.257)
Constant	0.950***	17.46***	3.146
	(0.109)	(2.883)	(2.450)
Observations	1,272	1,272	1,272
AR (2)	0.696	0.393	0.138
Hansen p value	0.119	0.145	0.104

Note: The table reports results of the two-step system GMM estimator investigating the fund managerial attributes on equity fund performance for the period 2005 to 2013. The dependent variables are CAPM-Alpha, Fama-French3-Alpha and efficiency score. CAPM-Alpha which is estimated from the Capital Asset Pricing Model. Fama-French3-Alpha is estimated from the Fama-French three-factor Model. The efficiency score is estimated by the Stochastic Frontier Analysis approach. For the independent variables the paper adopts L.CAPM-Alpha: it is the one year lagged of CAPM-Alpha; Fund size: it is measured by total net asset (TNA) which is equal to total assets minus total liabilities; FundUM presents the number of funds under a sole manager or team of managers; Turnover is the ratio of the minimum of annual purchase or sales stocks divided by the average annual amount of fund wealth; Risk: it is the standard deviation of fund returns; Team: dummy which takes the value of 1 if the fund is managed by a team and the value of 0 otherwise; GDPg: it is the rate of growth in gross domestic product of China in a given year; INF: it is the inflation rate in a given year; The numbers in the parentheses are corrected standard errors, *significance at the 10% level; **significance at the 5% level; ***significance at the 1% level.

Table 10 The relationship between fund manager's tenure and fund performance-GMM

Dependent variable	Efficiency	FF3-alpha	CAPM-alpha
Model	Model 1	Model 2	Model 3
L.Performance	0.570*	-0.0845***	-0.122***
	(0.327)	(0.0294)	(0.0257)
Fund size	-0.0540***	-0.853***	-0.0697
	(0.0170)	(0.132)	(0.0953)
FundUM	0.00691	-0.0408	-0.211
	(0.0101)	(0.116)	(0.140)
GDPg	0.0101	-0.121	-0.0420
	(0.0254)	(0.170)	(0.109)
INF	-0.00627	0.0208	-0.220**
	(0.00671)	(0.117)	(0.0858)
Turnover		-0.00461	-0.0143
		(0.0476)	(0.0251)
Tenure	0.0575***	0.228***	0.123*
	(0.0156)	(0.0567)	(0.0704)
Constant	1.184***	18.60***	3.676
	(0.404)	(2.548)	(2.223)
Observations	1272	1,272	1,272
AR (2)	0.554	0.11	0.451
Hansen p value	0.132	0.1	0.469

Note: The table reports results of the two-step system GMM estimator investigating the fund managerial attributes on equity fund performance for the period 2005 to 2013. The dependent variables are CAPM-Alpha, Fama-French3-Alpha and efficiency score. CAPM-Alpha which is estimated from the Capital Asset Pricing Model. Fama-French3-Alpha is estimated from the Fama-French three-factor Model. The efficiency score is estimated by the Stochastic Frontier Analysis approach. For the independent variables the paper adopts L.FF3-Alpha: it is the one year lagged of Fama-French3-Alpha; Fund size: it is measured by total net asset (TNA) which is equal to total assets minus total liabilities; FundUM presents the number of funds under a sole manager or team of managers; Turnover is the ratio of the minimum of annual purchase or sales stocks divided by the average annual amount of fund wealth;; Tenure is the number of years that manager has been with a fund; GDPg: it is the rate of growth in gross domestic product of China in a given year; INF: it is the inflation rate in a given year; The numbers in the parentheses are corrected standard errors, *significance at the 10% level; **significance at the 5% level; ***significance at the 1% level.

Table 11 The relationship between education and fund performance-GMM

Dependent variable	Efficiency	FF3-alpha	CAPM-alpha
Model	Model 1	Model 2	Model 3
L.Performance	0.190***	-0.0774***	-0.0697**
	(0.0702)	(0.0281)	(0.0282)
Fund size	-0.0348***	-0.358***	-0.296**
	(0.00564)	(0.135)	(0.125)
FundUM	-0.00412	-0.110	-0.0730
	(0.00404)	(0.0977)	(0.0836)
GDPg	0.0310***	-0.0893	-0.0570
	(0.00508)	(0.0973)	(0.0725)
INF	-0.0142***	-0.455***	-0.485***
	(0.00157)	(0.0804)	(0.0763)
Turnover		-0.0493**	-0.0401**
		(0.0204)	(0.0170)
Education(Ph.D)	0.0305**	-0.152	-0.215
	(0.0132)	(0.166)	(0.177)
Constant	1.085***	12.68***	11.42***
	(0.139)	(2.739)	(2.662)
Observations	1,272	1,272	1,272
AR(2)	0.196	0.365	0.672
Hansen p value	0.114	0.354	0.431

Note: The table reports results of the two-step system GMM estimator investigating the fund managerial attributes on equity fund performance for the period 2005 to 2013. The dependent variables are CAPM-Alpha, Fama-French3-Alpha and efficiency score. CAPM-Alpha which is estimated from the Capital Asset Pricing Model. Fama-French3-Alpha is estimated from the Fama-French three-factor Model. The efficiency score is estimated by the Stochastic Frontier Analysis approach. For the independent variables the paper adopts L.Efficiency score: it is the one year lagged of efficiency score; Fund size: it is measured by total net asset (TNA) which is equal to total assets minus total liabilities; FundUM presents the number of funds under a sole manager or team of managers; Education is a dummy which takes the value of 1 if the fund is managed by a manager with Ph.D degree and the value of 0 otherwise; GDPg: it is the rate of growth in gross domestic product of China in a given year; INF: it is the inflation rate in a given year. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; **significance at the 5% level; ***significance at the 1% level.

Tables 12 and 13 report the results for the dynamic panel regressions regarding to the interaction term between team management structure and corporate governance. Table 12 presents the impact of the interaction term of team-managed structure and supervisory board. We find that the interaction term of team management structure and supervisory board has a positive impact on the fund's Fama-French3-Alpha at the 10% level of significance (Table 12, Model 2). This result implies that supervisory boards improve Fama-French3-Alpha in team-managed fund structure and is in line with studies by Firth et al. (2007) and Ding et al. (2010). In addition, the result reveals that the interaction term of team-managed fund structure and supervisory board has a positive impact on efficiency score, but the estimated coefficient is statistically insignificant (Table 12, Model 1). Also, we find that interaction term of team-managed fund structure and the size of the supervisory board has an insignificant impact on a fund's CAPM-Alpha (Table 12, Model 3). Therefore, we conclude that the coefficients of the interaction terms of between team management structure and supervisory board are consistent with those in fixed effect regressions.

Additionally, Table 13 shows the results of the interaction term of team-managed structure and institutional investor holding. Consistent with study Gong et al. (2016), we find a positive relationship between institutional investor holding and fund risk-adjusted returns in terms of fund's CAPM-Alpha and fund's Fama-French3-Alpha at the 5% level of significance respectively (Models 2 and 3 in Table 13). Moreover, the result reveals that more institutional investors in funds would decrease a fund's efficiency score, as we find that IIhold has a negative impact on fund efficiency score at the 10% level of significance (Table 13, Model 1). Overall, the results are consistent with those in the fixed effect regressions in Table 7.

Furthermore, Table 14 presents the findings of the dynamic panel analysis, where fund performance is replaced by the sharp ratio. We find the results are consistent with prior findings in Table 8. The result shows a positive relationship between team management structure and the sharp ratio at the 5% level of significance (see Model 1). The result also indicates that the fund manager's tenure has a positive and statistically significant impact on the sharp ratio at the 1% level of significance (Table 14, Model 2). However, the relationship between education and the sharp ratio is not statistically significant (Table 14, Model 3).

Table 12 Interaction term between team management and the board of supervisory-GMM

Dependent variable	Efficiency	FF3-alpha	CAPM-alpha
Model	Model 1	Model 2	Model 3
L.Performance	0.346***	-0.107***	-0.0699***
	(0.0364)	(0.0311)	(0.0228)
Team	-0.000511	-1.684**	-0.419
	(0.0186)	(0.769)	(0.388)
Bos	0.00239	0.0758	0.180
	(0.00339)	(0.168)	(0.160)
Team*Bos	0.00137	0.298*	0.0182
	(0.00404)	(0.179)	(0.117)
Fund size	-0.0259***	-0.824***	0.0359
	(0.00301)	(0.182)	(0.113)
FundUM	-0.00356	-0.0231	-0.0380
	(0.00271)	(0.174)	(0.0694)
GDPg	0.0153***	-0.221	0.110
	(0.00217)	(0.229)	(0.0691)
INF	-0.0125***	0.0171	-0.238***
	(0.000855)	(0.146)	(0.0557)
Turnover		-0.0231	-0.00789
		(0.0593)	(0.0179)
Constant	0.909***	18.83***	0.685
	(0.0762)	(3.462)	(2.519)
Observations	1,272	1,272	1,272
AR(2)	0.173	0.168	0.442
Hansen p value	0.731	0.548	0.781

Note: The table reports results of the two-step system GMM estimator investigating the fund managerial attributes on equity fund performance for the period 2005 to 2013. The dependent variables are CAPM-Alpha, Fama-French3-Alpha and efficiency score. For the independent variables the paper adopts L.Performance: it is the one year lagged of fund performance; Fund size: it is measured by total net asset (TNA) which is equal to total assets minus total liabilities; FundUM presents the number of funds under a sole manager or team of managers; Turnover is the ratio of the minimum of annual purchase or sales stocks divided by the average annual amount of fund wealth; Team: dummy which takes the value of 1 if the fund is managed by a team and the value of 0 otherwise; Bos: it is the number of supervisors in a board; Team*Bos: it is the interaction term between team management structure and board of supervisor; GDPg: it is the rate of growth in gross domestic product of China in a given year; INF: it is the inflation rate in a given year. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; **significance at the 5% level; ***significance at the 1% level.

Table 13 Interaction term between team management and external governance-GMM

Dependent variable	Efficiency	FF3-alpha	CAPM-alpha
Model	Model 1	Model 2	Model 3
L.Performance	0.355***	-0.153***	-0.0408***
	(0.0354)	(0.0301)	(0.0142)
Team	-0.0163	0.722	1.134
	(0.0135)	(0.929)	(0.868)
IIhold	-0.000606*	0.0482**	0.0562**
	(0.000319)	(0.0230)	(0.0249)
Team*IIhold	0.00107**	-0.0408	-0.0466
	(0.000509)	(0.0360)	(0.0285)
Fund size	-0.0263***	-0.589***	-0.186**
	(0.00318)	(0.119)	(0.0808)
FundUM	-0.00292	0.0406	-0.0684
	(0.00277)	(0.179)	(0.137)
GDPg	0.0152***	-0.0444	0.0686*
	(0.00219)	(0.0989)	(0.0412)
INF	-0.0127***	0.00567	0.104***
	(0.000884)	(0.0455)	(0.0308)
Turnover		-0.0422*	-0.0457***
		(0.0233)	(0.0111)
Constant	0.936***	12.44***	2.200
	(0.0772)	(2.512)	(1.999)
Observations	1,272	1,272	1,272
AR(2)	0.18	0.169	0.687
Hansen p value	0.815	0.189	0.122

Note: The table reports results of the two-step system GMM estimator investigating the fund managerial attributes on equity fund performance for the period 2005 to 2013. The dependent variables are CAPM-Alpha, Fama-French3-Alpha and Efficiency score. For the independent variables the paper adopts L.Performance: it is the one year lagged of fund performance; Fund size: it is measured by total net asset (TNA) which is equal to total assets minus total liabilities; FundUM presents the number of funds under a sole manager or team of managers; Turnover is the ratio of the minimum of annual purchase or sales stocks divided by the average annual amount of fund wealth; Team: dummy which takes the value of 1 if the fund is managed by a team and the value of 0 otherwise; IIhold: it is the percentage of share held by institutional investors for each fund management company; Team*IIhold: it is the interaction term between team management and institutional investor holding; GDPg: it is the rate of growth in gross domestic product of China in a given year; INF: it is the inflation rate in a given year. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; **significance at the 5% level; ***significance at the 1% level.

Table 14 The relationship between managerial attributes and Sharp ratio-GMM (Robustness Check)

Dependent variable		Sharp ratio	
Model	Model 1	Model 2	Model 3
L.Sharp ratio	0.144***	0.124***	0.124***
	(0.0216)	(0.0207)	(0.0329)
Fund size	0.0293**	0.00842	0.0578*
	(0.0149)	(0.0160)	(0.0326)
FundUM	0.0272	-0.000165	0.0476**
	(0.0211)	(0.0113)	(0.0226)
GDPg	0.0356***	0.0363*	0.0401
	(0.0137)	(0.0196)	(0.0391)
INF	0.119***	0.146***	0.258***
	(0.0113)	(0.0136)	(0.0446)
Turnover	-0.139***	-0.140***	-0.181***
	(0.00423)	(0.00482)	(0.0121)
Team	-0.123**		
	(0.0479)		
Tenure		0.0497***	
		(0.0126)	
Education(Ph.D)			-0.130
			(0.127)
Constant	-1.301***	-1.218***	-3.004***
	(0.300)	(0.320)	(0.595)
Observations	1,272	1,272	1,272
AR(2)	0.11	0.103	0.182
Hansen p value	0.154	0.383	0.121

Note: The table reports results of the two-step system GMM estimator investigating the fund managerial attributes on equity fund performance for the period 2005 to 2013. The dependent variable is Sharp ratio. For the independent variables the paper adopts L.Sharp ratio: it is the one year lagged of Sharp ratio; Fund size: it is measured by total net asset (TNA) which is equal to total assets minus total liabilities; FundUM presents the number of funds under a sole manager or team of managers; Turnover is the ratio of the minimum of annual purchase or sales stocks divided by the average annual amount of fund wealth; Team: dummy which takes the value of 1 if the fund is managed by a team and the value of 0 otherwise; Tenure is the number of years that manager has been with a fund; Education is a dummy which takes the value of 1 if the fund is managed by a manager with Ph.D degree and the value of 0 otherwise; GDPg: it is the rate of growth in gross domestic product of China in a given year; INF: it is the inflation rate in a given year. The numbers in the parentheses are corrected standard errors, *significance at the 10% level; **significance at the 5% level; ***significance at the 1% level.

5.5. Conclusion

In this chapter, we use fixed effect and dynamic panel analysis to examine the effect of fund managerial attributes on fund performance using a sample of equity-type mutual funds over the period from 2005 to 2013. We employ the Stochastic Frontier Analysis (SFA) approach, the Capital Asset Pricing Model (CAPM), and the Fama-French three-factor model to measure fund performance.

We find evidence that fund managerial attributes affect fund performance in the following ways. Our results present that team-managed funds bring ineffective decision-making process, leading to poor fund performance. In addition, the presence of free-rider problems in a team will also contribute to poor mutual fund performance (Sah and Stiglitz, 1988 and Adams et al. 2018). In the presence of a large number of supervisors on the board and a high proportion of institutional investors, we find that team-managed funds generate superior performance relative to individual-managed funds as the potential free-rider problems are alleviated.

Furthermore, this chapter reveals that tenure has a positive impact on fund performance. This result remains robust to alternative fund performance measurements. This suggests that an increase in the fund manager's tenure would bring superior fund performance. This finding leads to support to the human capital theory (Schmidt et al. 1986), that managers spend more time on an activity, the better their performance will have. Finally, we find that fund managers with Ph.D. degree achieve a better overall comprehensive performance relative to fund managers without Ph.D. degree. This positive impact of

education on the performance of funds could suggest that the importance of professional skills and knowledge to fund management.

Our findings are important for fund investors. First of all, fund investors should be aware that team-managed funds would not perform better than single-managed funds without strong governance monitoring. However, team management structure would benefit fund management companies, as more fund managers with a wider public social networks would attract more individual investors. Secondly, investors should be aware that fund manager's tenure and education background are important for fund performance.

Appendix

A1 Definitions of variables used in the fixed effects estimations

Variables	Description	Sources
CAPM-alpha	It is estimated from the Capital Asset Pricing Model	CSMAR
FF3-alpha	It is estimated from the Fama-French three-factor model	CSMAR
Efficiency score	It is estimated from the Stochastic Frontier Analysis approach	CSMAR
Management structure	A dummy variable which takes the value of 1 if the fund is managed by a team and the value of 0 otherwise	CSMAR
Tenure	The number of years that managers have been with a fund	CSMAR
Education	A dummy variable which takes the value of 1 if the fund managers have a Ph.D degree	CSMAR
Fund size	The logarithm of total net assets managed by a fund	CSMAR
Risk	The standard deviation of fund return	CSMAR
Market return volatility	The standard deviation of market return	CSMAR
Turnover	The ratio of the minimum of annual purchase of sales stocks divided by the average annual amount of fund wealth	CSMAR
Expense	The expense ratio is fund expense divided by the total fund assets	CSMAR
Supervisory Board size	The number of supervisors on the supervisory board of fund management company	Manual collect
IIhold	The percentage share held by institutional investors for each fund management company	CSMAR
GDP	It is the rate of growth in the gross domestic product of China in a given year	CSMAR
Inflation	It represents the level of prices for goods and services of China in a given year	CSMAR

A2. Correlation matrix of independent variables

	1	2	3	4	5	6
1-Team	1.00					
2-Tenure	0.03	1.00				
3-Education	0.09	-0.06	1.00			
4-Fund size*	0.05	0.18	-0.10	1.00		
5-FundUM	0.30	0.05	0.17	-0.06	1.00	
6-GDP	-0.01	-0.03	-0.02	0.30	-0.13	1.00
7-Inflation	0.001	-0.15	-0.03	0.15	-0.04	0.55
8-Expense	0.02	-0.10	0.07	-0.44	0.00	-0.12
9-Risk	0.03	-0.18	0.00	-0.04	-0.10	0.23
10- Market return volatility	0.03	-0.14	-0.02	0.33	-0.08	0.44
11-Turnover	-0.03	-0.12	0.08	-0.51	-0.01	-0.09

Continued

	7	8	9	10	11
7-Inflation	1.00				
8-Expense	0.20	1.00			
9-Risk	-0.07	0.11	1.00		
10- Market return volatility	0.04	0.11	0.39	1.00	
11-Turnover	-0.14	**0.60**	0.16	-0.08	1

Notes: Pearson correlation coefficients for persistence and fund characteristic and managerial attributes from 2005 to 2013; The variable with an asterisk (*) are measured in logarithmic; Independent variables with high correlation coefficients are marked boldface.

Table A3 The relationship between management education and equity fund performance (Fixed effects)

Dependent variable	Efficiency	FF3-alpha	CAPM-alpha
Model	Model 1	Model 2	Model 3
Fund size	-0.0163***	-0.155	0.0700
	(0.00499)	(0.0998)	(0.0908)
FundUM	-0.00103	0.0967	0.0115
	(0.00304)	(0.0668)	(0.0391)
GDPg	0.0134***	0.0486	0.192***
	(0.00187)	(0.0320)	(0.0263)
Inflation	-0.00782***	-0.0715***	-0.0827***
	(0.000767)	(0.0175)	(0.00831)
Turnover		-0.134***	-0.0940***
		(0.0379)	(0.0236)
Education (CFA)	0.00544	0.0274	0.167
	(0.0107)	(0.168)	(0.131)
Constant	0.952***	3.866*	-2.455
	(0.104)	(2.030)	(1.839)
Observations	1,592	1,592	1,592
R-squared	0.089	0.020	0.045

Note: The table reports results of the fixed effect models examining manager's education on equity fund performance for the period 2005 to 2013.

Table A4 The relationship between management education and equity fund performance (Fixed effects)

Dependent variable	Efficiency	FF3-alpha	CAPM-alpha
Model	Model 1	Model 2	Model 3
Fund size	-0.0163***	-0.154	0.0720
	(0.00497)	(0.0996)	(0.0906)
FundUM	-0.000745	0.0973	0.0174
	(0.00299)	(0.0656)	(0.0378)
GDPg	0.0133***	0.0487	0.191***
	(0.00186)	(0.0320)	(0.0264)
Inflation	-0.00780***	-0.0714***	-0.0823***
	(0.000761)	(0.0175)	(0.00837)
Turnover		-0.134***	-0.0941***
		(0.0379)	(0.0235)
Education (MBA)	0.0160	-0.0332	0.0900
	(0.0219)	(0.299)	(0.233)
Constant	0.952***	3.855*	-2.482
	(0.104)	(2.028)	(1.835)
Observations	1,592	1,592	1,592
R-squared	0.089	0.020	0.044

Note: The table reports results of the fixed effect models examining the manager's education on equity fund performance for the period 2005 to 2013.

Chapter 6: Conclusion

This thesis provides a comprehensive analysis of the impact of corporate governance on funds' return, market share and risk-taking in China mutual fund industry during the period between 2005 and 2015. In addition, we investigate the impact of fund managerial attributes on fund performance, as estimated by efficiency and risk-adjusted returns during the period from 2005 to 2013. The contribution of this thesis starts by investigating the impact of board characteristics on risk-taking behavior in the Chinese mutual fund industry, as the literature on fund management company corporate governance in emerging countries is typically limited. Specifically, we employ a variety of risk measures to examine risk-taking behavior, namely funds' total risk and concentration risk.

Moreover, we use a unique dataset hand-collected from fund prospectus and fund financial reports, which contains complete information about board size, structure and gender to construct indications of the composition of the board during the period between 2005 and 2015 for 731 companies, based on yearly observations of 94 mutual fund management companies. Most previous studies on the Chinese mutual fund industry focus on analysing the impact of ownership structure on fund performance (Gong et al., 2016), and our unique data enables us to fill the research gap by examining the impact of board characteristics on risk-taking behavior.

Our evidence indicates that board size has a negative impact on stock concentration risk. The percentage of independent directors is negatively associated with bond concentration risk. Moreover, the representation of female directors on board not only

increases funds' total risk, but also increases its stock concentration risk. This finding is not consistent with the abundance of studies from both the organizational psychology and economics literature (Levin et al, 1988; Byrnes et al, 1999 and Fehr–Duda et al., 2006), but it is consistent with studies by Farrell and Hersch (2005), Adams and Funk (2012) and Berger et al. (2014). Regarding external governance-represented by the percentage of institutional investors' holding, we find that having a higher level of institutional investors has a negative impact on funds' total risk and concentration risk, because institutional investors are more sensitive to risk level than individual investors. Furthermore, by examining the effects of education (board directors with PhDs) on fund management companies, we find that an increase in the number of better-educated directors decreases funds' total risk. This chapter also shows that fund management companies with larger board size are associated with smaller market share. We find that the board size exerts a positive impact on funds' return. And there is a positive relationship between ownership and funds' market share.

The outcomes of this chapter suggest potential regulatory improvements in the mutual fund industry. For instance, if regulators are concerned about a fund management company's concentration level, the findings regarding the relationship between concentration risk and board characteristics reveal that a form of contractual governance with a larger number of independent directors and no female director on a board leads to a lower concentration level. This is because a higher concentration ratio will contribute to an unstable financial system. Regulators should actively encourage better-educated directors to compete in the mutual fund director market.

Chapter 4, we examine the impact of ownership structure on funds' return and market share. However, the literature on ownership structure regarding mutual fund management companies in developing countries, and in particular China, is limited and some related studies are largely focused on the banking sector and non-financial firms. This is because mutual fund management companies differ in many respects from that in other firms. For instance in terms of regulations, a multitude of stakeholders and management structure. Also, it is extremely difficult to collect information and thereby data for Chinese fund management companies, other than hand-collected data as it does the present study. Thus, we manually assemble a unique dataset of Chinese fund management companies that identify ownership structure in the form of government ownership, foreign ownership and ownership concentration from 2005 and 2015. This data set provides unique information for studying the effect of ownership structure on fund management company performance, as none of its mutual fund management companies are publicly traded companies. Third, we employ panel regression analysis that takes into account the heterogeneity of the funds, whilst we also model persistence in funds' return and market share with dynamic panel estimation. Lastly, as endogeneity has been frequently quoted as an issue in similar studies we employ GMM estimations where we deal with such criticism.

Our evidence indicates that government ownership is positively related with funds' return. This finding is consistent with previous studies (Faccio et al. 2006; Chahrumiind et al. 2006; Chaney et al. 2011; Chen et al. 2014; Ben-Nasr 2016; Lin et al. 2016). We discover an insignificant relationship between government ownership and market share. In addition, we find that foreign ownership and fund management companies with

foreign investors are not only linked to a poorer funds' return but also to a lower market share.

With further investigation, we examine the relationship between funds' risk-taking and ownership structure. We find that a fund management company with foreign investors has lower funds' risk-taking. The result suggests that a negative relationship between foreign ownership and funds' return and market share is contributed by foreign shareholders prefer to invest in less risky assets. We also find that government-controlled companies have a statistically positive association with funds' return. However, we find a negative relationship between government-controlled fund management company and market share. What is more, highly concentrated ownership tends to enhance market share. We find an insignificant relationship between concentrated ownership and funds' return. This result is supported by previous studies by Dong et al. (2014), Nguyen et al. (2015) and Dong et al. (2016) as they report that highly concentrated ownership promotes the quality of corporate governance and improves monitoring of management.

Furthermore, investigating the effects of the interaction terms on government ownership and foreign ownership, we find that funds' return is positively associated with government-controlled companies in the presence of foreign ownership. Moreover, we discover that the funds' return and market share are positively correlated with government ownership in the case of highly concentrated ownership. Finally, we find that these results are robust under GMM estimations.

Our findings are of importance for policymakers. Firstly, concentrated ownership in a government-controlled company has been found to improve funds' return and market share, suggesting that regulators should be cautious about dispersing ownership. Secondly, although we find that government ownership has a positive impact on a fund management company performance, a high level of government ownership will reduce its market share, especially in the case of government-controlled companies.

Chapter 5 investigates the impact of managerial attributes on fund performance during the sample period from 2005 to 2013. The equity mutual fund performance is measured using the Stochastic Frontier Analysis (SFA) approach, Capital Asset Pricing Model and Fama-French three-factor model. This is the first study to examine the impact of fund managerial attributes on mutual fund performance by considering the role of corporate governance. Moreover, we use a comprehensive set of fund managerial attributes which includes fund manager's tenure, education and management structure. In this study, we employ both the SFA approach and the risk-adjusted returns to proxy for mutual fund performance in order to provide additional evidence for the validity of our results. We find evidence that fund managerial attributes affect fund performance. Our results present that team-managed funds brings ineffective decision-making process, leading to poor fund performance. We find that one potential reason is the presence of free-rider problems in a team. In the presence of a large number of supervisors on the board and a high proportion of institutional investors, we find that team-managed funds generate superior performance relative to individual-managed funds as the potential free-rider problems are alleviated.

Furthermore, this chapter also reveals that tenure has a positive impact on fund performance. This result remains robust to alternative fund performance measurements. This suggests that an increase in fund manager's tenure would bring superior fund performance. This finding leads to support to the human capital theory (Schmidt et al. 1986), that managers spend more time on an activity, the better their performance will have. Finally, we find that fund managers with Ph.D. degree achieve a better overall comprehensive performance relative to fund managers without Ph.D. degree. This positive impact of education on the performance of funds could suggest that the importance of professional skills and knowledge to fund management.

Our findings are of importance for fund investors. Firstly, fund investors should be aware that team-managed funds would not perform better than single-managed funds without strong governance monitoring. However, team management structure would benefit fund management companies, as more fund managers with a wider public social networks would attract more individual investors. Secondly, investors should be aware that fund manager's tenure and education background are important for fund performance.

This thesis has shown comprehensive research on the effect of mutual fund management company governance variables and fund managerial attributes on funds' performance, as proxied by return, efficiency and risk-adjusted returns, in the Chinese mutual fund industry, but there still remain some limitations and challenges for future research. Due to data limitation, we only focus on the impact of corporate governance on the Chinese mutual funds' return, market share and risk-taking behavior. Therefore, the findings of this thesis may not be universally valid in other countries. It would be

interesting to further analyze whether similar or different patterns exist in other countries, especially for the US. The reason is that China has a different type of mutual fund governance structure compared to the US. The main difference is that according to the Chinese corporate governance code a Chinese mutual fund management company provides contractual services to fund investors as opposed to providing equity shares, which is the case in the US.

Additionally, in this thesis, we employ a number of different fund management company's risk-taking measures including the volatility of funds' return and concentration risk on invested assets. In further research, it would be interesting research to incorporate other risk measurements using tracking risk[29] and downside risk and in turn provide the robustness of our results.

[29] Tracking risk or tracking error is the risk relative to benchmarks.

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