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# Mutual funds, tunneling and firm performance: evidence from China

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## Abstract

In contrast to US companies, Chinese firms have concentrated ownership with the effect that the central agency problem emanates from controlling shareholders expropriating minority shareholders, a phenomenon referred to as ‘tunneling’. This study examines the monitoring effect of mutual funds on the tunneling behavior of controlling shareholders. Due to the distinctive institutional settings in China, including a high level of ownership concentration, underdeveloped legal system in the stock markets and weak governance mechanisms in the mutual fund industry, we find that an increase in mutual fund ownership effectively mitigates the tunneling behavior of controlling shareholders thus improving firm performance. Nonetheless, after the mutual fund ownership reaches a certain threshold, an increase in concentrated mutual fund ownership is associated with heavier tunneling and lower firm performance. This may suggest that concentrated mutual funds collude with controlling shareholders in order to preserve their private interests. Moreover, the above effects are found to be more pronounced for firms with heavier tunneling activities. Our finding of the non-monotonic monitoring role of mutual funds brings attention to the private interest theory for mutual funds, an aspect that has been largely ignored in previous studies on mutual funds.

**Keywords** Mutual funds · Corporate governance · Tunneling · Firm performance · Nonlinearity · Ownership concentration

**JEL Classification** G15 · G18 · G23 · G32 · G34 · G38

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## 1 Introduction

The governance role of institutional investors, particularly mutual funds, in monitoring managerial actions and improving firm performance has been well documented in the literature that covers developed countries (e.g., Cornett et al. 2007; Del Guercio and Hawkins 1999; McConnell and Servaes 1990; Nesbitt 1994; Smith 1996), however, limited work has been devoted to major emerging economies such as China. The few studies that have been carried out to examine the monitoring role of mutual funds in China provide mixed evidence. Yuan et al. (2008) and Firth et al. (2016) report that mutual funds may enhance firm value and reduce agency costs in China. Nonetheless, using the split share structure reform<sup>1</sup> as a research setting, Firth et al. (2010) show that mutual funds work together with the Chinese government to assist state-owned firms to complete the reform more quickly and at a relatively lower cost, instead of acting to maximize the returns to their unit holders. Ding et al. (2016) suggest that the presence of mutual funds hampers earnings informativeness of Chinese listed companies. Both Firth et al. (2010) and Ding et al. (2016) indicate that mutual funds are not yet capable of acting as an effective monitor in the Chinese stock markets. Such evidence is in sharp contrast to the effective monitoring role of mutual funds in developed countries as documented in the extant literature.

In the US, firms are normally characterized by dispersed ownership, a trait that has been observed to lead to the agency problem between firm managers and shareholders (e.g., Berle and Means 1932; Gul et al. 2010; Jensen and Meckling 1976). In contrast to the US situation, Chinese firms normally have concentrated ownership and, therefore, the central agency problem emanates from the controlling shareholders using their power to expropriate minority shareholders, a phenomenon commonly referred to as ‘tunneling’ (Johnson et al. 2000) or ‘self-dealing’ (Djankov et al. 2008). Such tunneling activities have been observed to have a significant detrimental effect on Chinese firms’ performance (see Cheung et al. 2006; Jiang et al. 2010; Wang and Xiao 2011).

Since 2000, the major regulatory efforts have been made by China to spur the development of mutual funds, hoping to strengthen corporate governance and help stabilize the Chinese stock markets (China Securities Regulatory Commission (CSRC) 2000). Consequently, mutual funds have been promoted as the largest and most important type of institutional investor in the Chinese stock markets. As pointed out earlier, improvements in corporate governance including the eradication of tunneling behavior could be made through the active involvement of mutual funds. However, our knowledge on whether this is actually the case in China is still limited. Although two commendable studies that attempt to fill this void are by Yuan et al. (2008) and Gao and Kling (2008), they do not consider the possible entrenched effects arising from mutual fund ownership concentration and only examine the monotonic predictions on the monitoring role of mutual funds.

In our study, we conjecture that the monitoring effects of mutual funds on constraining tunneling behavior of controlling shareholders and improving firm performance are

<sup>1</sup> Historically, the Chinese domestic A shares are separated into tradable and non-tradable shares with the latter mainly being held by the state. This split share structure leads to conflicts between tradable and non-tradable shareholders, although both types of shares have the same cash flow and voting rights. To help solve this fundamental corporate governance problem, the Chinese government implemented a split share structure reform programme in April 2005 with the aim of converting non-tradable shares into tradable shares. Non-tradable shareholders need to compensate tradable shareholders in exchange for the listing rights of their shares. See Sect. 2.1 for more information on the Chinese stock market and the split share structure reform.

non-linear. Our argument is based on two theoretical lenses, namely shareholder activism theory and the private benefits hypothesis. We also consider the distinctive institutional features in China, including a high level of ownership concentration, underdeveloped legal system and weak governance mechanisms in the mutual fund industry.

Below we structure our motivations in three aspects. First, motivated by Mehran and Stulz's (2007) argument that financial institutions including mutual funds have complex incentives, face conflicts of interests and political pressure, and thus do not always serve as an effective monitor, we base our prediction on two competing arguments about mutual funds. On the one hand, mutual funds have the investment expertise, sophisticated skills and incentives to monitor managerial behavior and act as the representatives of minority shareholders, with the goal to maximize the value of the shares they hold (e.g., Yuan et al. 2008, 2009). Relative to other institutional shareholders such as banks, insurance companies and securities companies, mutual funds have a greater exit threat of selling their shares (Aggarwal et al. 2015; Duan and Jiao 2016; Firth et al. 2016). Therefore, mutual funds act as an effective external corporate governance mechanism in their invested firms. On the other hand, mutual funds with concentrated ownership in their invested firms may care more about their own interests and wealth (Barclay et al. 1993), and are passive in playing a monitoring role (Bhojraj and Sengupta 2003; Kim 1993; Velury and Jenkins 2006). As they would face higher exit costs, they are more likely to collude with the managers or controlling shareholders in order to preserve their private interests instead of threatening to exit.<sup>2</sup> Similarly, Firth et al. (2010) argue that mutual funds are more prone to agency problems in China relative to their counterparts in the US, and suggest that mutual funds do not act as a guardian to protect individual (minority) investors during the split share structure reform. We assume that the above two competing views are not mutually exclusive, and conjecture that the monitoring role of mutual funds is likely to vary as mutual fund ownership increases.

Second, China has a unique ownership structure where the presence of the dominant/controlling shareholder in corporations is prevalent.<sup>3</sup> Moreover, contrary to the developed countries' context, the legal environment in China is underdeveloped and the protection of minority shareholders is weak, which leads to the controlling shareholders gaining large private benefits from tunneling (Allen et al. 2005; Firth et al. 2007b; Shleifer and Vishny 1997).<sup>4</sup> In addition, the existence of the split share structure of Chinese firms further promotes the tunneling activities of controlling shareholders as the movement of share prices has little effect on the wealth of controlling shareholders who hold non-tradable shares (Berkman et al. 2009; Jiang et al. 2010; Li 2010). As a consequence, the prevalence of tunneling is a distinct feature in China (Jiang et al. 2010). Given that the Chinese stock markets have significantly different institutional environments (e.g., on the aspects of ownership concentration, legal systems and investor protection) from those of developed

<sup>2</sup> The mutual fund ownership in a Chinese firm can be large. For example, Firth et al. (2016) report that the largest mutual fund ownership in a firm in their sample is 66.5%. In this firm, the largest 10 shareholders include nine mutual funds. Also, Firth et al. (2010) point out that mutual funds frequently appear among the top 10 shareholders of many listed firms in China.

<sup>3</sup> Highly concentrated ownership is prevalent among Chinese listed firms, with 40% of shares held by the largest shareholders (Allen et al. 2005).

<sup>4</sup> La Porta et al. (1998) emphasize the importance of the legal system for protecting minority shareholders from expropriation by controlling shareholders.

countries, conclusions drawn from previous research using the US data may not be directly applicable to China.<sup>5</sup>

Third and most importantly, compared with the mutual funds industry in the US, the governance mechanism in the Chinese mutual funds industry is much weaker. In developed countries, it is generally believed that mutual funds represent an effective monitoring party that fights hard to maximize firm performance and benefit the small individual investors. Although China has developed a thriving mutual funds industry that does not exist in many other developing countries; nonetheless, the mutual fund industry in China lacks the necessary governance structure as well as voting right policy of mutual funds to ensure strong legal protection for minority investors (Firth et al. 2010; Huang 2006). More specifically, different from the mutual fund industry in the US, fund investors in China are simply the contractual and beneficial owners of mutual funds with few voting rights. It is difficult to remove a fund manager as no board of directors is in place to act as a fund governance mechanism in the Chinese mutual fund industry. Additionally—and more importantly—mutual funds in China are not required to disclose the information regarding their votes.<sup>6</sup> Given the institutional environment setting of the Chinese stock markets and much weaker governance system in the Chinese mutual fund industry, we postulate that after a concentrated shareholding of mutual funds reaches a certain level, Chinese mutual funds may shift their attention to their own private interests. The effectiveness of their monitoring over controlling shareholders can be weakened as they may need to collude with controlling shareholders in order to pursue their own interests. Barclay et al. (1993) document a wide range of private benefits that are peculiar to mutual funds in various forms including pecuniary benefits (e.g., below-market transfer prices, preventing the opening of closed-end funds, etc.), underwriting or advisory contracts, and non-pecuniary benefits (e.g., access to private information, the influence on the political, social, or environmental policies of the firms, etc.). Consequently, we conjecture that the relationship between mutual fund ownership and tunneling of controlling shareholders is nonlinear (i.e. concave).

For these reasons, we take a novel approach in explaining the governance role of mutual funds in Chinese firms. Moreover, we investigate the moderating effect of mutual fund ownership on the relationship between tunneling and performance of Chinese public listed companies. We conduct our empirical investigation using 15,131 firm-year observations over the sample period between 2003 and 2014. Following Jiang et al. (2010), Li (2010) and Liu and Lu (2007), tunneling behavior is measured by other receivables divided by total assets, which allows us to obtain a large number of observations. However, we also follow Ye (2006) and Wang and Xiao (2011) and use a more conservative measure of tunneling activities—i.e. other receivables of controlling shareholders divided by total assets, as a robustness check. Regarding firm performance, we employ five different measures including return on assets (ROA), return on equities (ROE), Tobin's Q, returns on sales (ROS) and an operating performance indicator (OPINC\_MV).

As opposed to the linear relationship discovered in the previous literature, we find a U-shaped association between mutual fund ownership and tunneling activities of controlling shareholders, and an inverted U-shaped association between mutual fund ownership and firm performance. The non-linear relationships imply that mutual funds can play a monitoring role by effectively constraining controlling shareholders' tunneling behavior

<sup>5</sup> The differences of institutional environments between Chinese stock markets and US stock markets are also well documented in prior literature (e.g., Lai and Tam 2017; Guo 2016).

<sup>6</sup> More detailed discussion is given in Sect. 2.2.

and in turn enhancing firm performance. However, beyond a certain level of mutual fund ownership, where mutual funds are more likely to collude with the controlling shareholders of their invested firms in order to preserve their private interests, mutual fund ownership is positively associated with tunneling and negatively associated with firm performance. These are consistent with our expectation and may result from the distinctive institutional features in China, including a high level of ownership concentration, underdeveloped legal system, and weak governance mechanisms in the mutual fund industry.

In addition, we investigate the moderating effect of mutual fund ownership and find that mutual funds enhance firm value more when a firm suffers from heavier tunneling, while concentrated mutual fund ownership elevates agency issues including tunneling and diminish firm performance. Our results are robust to alternative performance and tunneling measures, and a variety of approaches to deal with endogeneity. Therefore, we conclude that mutual funds are an effective guardian of minority investors to mitigate tunneling behavior and enhance firm value, as long as their ownership does not exceed a certain threshold, while concentrated mutual fund ownership may increase agency costs and weaken firm performance in the emerging market context.

Our research contributes to the literature by directly and comprehensively examining the roles that mutual funds play in restraining the controlling shareholders' tunneling behavior and whether mutual funds can improve firm performance via their impact on tunneling activities. Our non-linear theoretical predictions on the monitoring role of mutual funds extend the prior literature that is based upon the linear predictions. Our study also contributes to the debate about the promotion of mutual funds as an external monitor in China. It is timely given that the Chinese government has made a great deal of regulatory effort to develop mutual funds, and continues to do so. Our finding of the non-linear monitoring role of mutual funds provides new insights to policy makers and regulators on the corporate governance role of mutual funds in China. The study can lend empirical evidence to other emerging markets where the agency issue of tunneling arises from similar market features to those of China.<sup>7</sup>

## 2 Institutional background

### 2.1 Tunneling in China

In the early 1990s, the Chinese government established Shanghai and Shenzhen Stock Exchanges in order to privatize its state-owned enterprises (SOEs) and to introduce some elements of market discipline on top management of these firms. In the meantime, the government retained substantial ownership and maintained its control in many of these listed firms (Chen et al. 2008). As such, common stocks are classified into tradable and non-tradable shares. Most of the shares owned by the controlling shareholders belong to the non-tradable shares category. As the trading of these shares is highly restricted, the controlling shareholders enjoy limited benefits of share price appreciation, and thus, are motivated to seek benefits through other channels. In addition to the fact that the Chinese stock markets have under-developed legal and regulatory systems and lack effective corporate governance

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<sup>7</sup> The examples for the studies examining other emerging markets that share similar market features to those of China include Tee et al. (2019) and Ting (2013).

mechanisms to protect individual investors from insider misconduct, the Chinese stock market environment is highly conducive to tunneling (e.g., Jiang et al. 2010). Berkman et al. (2009) report that the controlling shareholders in the Chinese listed firms expropriate wealth from minority shareholders through loan guarantees to related parties. Jiang et al. (2010) suggest that inter-corporate loans are used by controlling shareholders as a tool to tunnel from listed companies in China.

To solve the issue of non-tradable shares, the Chinese government initiated the split share structure reform in 2005 to transfer non-tradable shares to tradable shares.<sup>8</sup> This reform is expected to reduce the tunneling behavior of the controlling shareholders as they will be able to profit from capital gains and their wealth will be subject to the movement of their share prices after the reform. However, controlling shareholders in the SOEs still have strong incentives to engage in tunneling after the reform. Instead of the pure profit maximization focus, the SOEs have other social objectives such as to provide job opportunities, to directly control strategically important industries, and to divert private benefits. As a consequence, controlling shareholders in the SOEs have a natural tendency to tunnel from their listed firms (Peng et al. 2011). Moreover, Liu and Tian (2012) suggest that for the non-SOEs, the controlling shareholders with excess control rights conduct tunneling rather than investing in new positive NPV projects, although the degree of tunneling has lessened after the split share structure reform. Huang (2016) finds that Chinese listed firms increase tunneling after the enterprise income tax reform in 2008.

## 2.2 Mutual funds in China

Most Chinese public firms have a dominant controlling shareholder (either state or private),<sup>9</sup> leaving minority shareholders little opportunity to have a direct influence on managerial actions. By pooling the investments of diffuse individual investors, mutual funds become a potentially important corporate governance mechanism to protect minority investors from expropriation by controlling shareholders. In light of this, the CSRC has made substantial regulatory efforts since 2000 to promote mutual funds. According to the CSRC statistics, the mutual funds industry has experienced explosive development, with the number of mutual funds increasing from 218 in 2005 to 1897 in 2014, and the net asset value of the mutual fund industry increasing from around RMB 469 billion in 2005 to around RMB 4535 billion in 2014.<sup>10</sup> The level of mutual fund ownership in China is also comparable to that in the US (Yuan et al. 2008).

Huang (2006) and Firth et al. (2010) discuss the ways mutual funds are organized and governed in China and how this differs from their US counterparts. The main features are summarized below. Unlike the corporate-form mutual funds that prevail in the US markets, in the Chinese markets, all mutual funds are contractual-form funds whereby investors sign a contract with a fund management firm such that fund investors (i.e., unit holders) become the beneficial owners of the fund (Lu 2006). In contrast to the US, there is no board of

<sup>8</sup> Firms were selected in batches to conduct the conversion at different times.

<sup>9</sup> Chinese listed firms initially had a state entity (e.g., central government, local government or government agencies) as a dominant controlling shareholder. Over time, through merger and acquisitions, private/family entities or individuals have become the controlling shareholders in many Chinese listed firms (e.g., Firth et al. 2010).

<sup>10</sup> See the website (available online at: <http://www.amac.org.cn/tjsj/xysj/jjgssj/387824.shtml>) of the Asset Management Association of China (AMAC, an affiliated agency for CSRC).

directors to act as a fund governance body in China, which makes it difficult to remove a mutual fund manager. In addition, fund investors have fewer voting rights in China. In the situation that fund investors enjoy the voting rights, in reality, the rights are difficult to exercise due to stringent conditions that have to be met according to the law. Also, contrary to their counterparts in the US, Chinese mutual funds are not required to disclose information relating to their votes. Hence, it is not transparent whether the mutual funds vote in a way that suits the best interests of the fund investors. Despite the explosive growth of the mutual funds industry in China, the interests of mutual funds may not always align with those of the minority shareholders, and sometimes the two may diverge significantly. Consequently, mutual funds are more prone to agency problems in China than in the US.

### 3 Theories and hypothesis development

Drawing on two contrasting theoretical lenses, the corporate governance role of institutional ownership has been studied extensively for many years. First, under the shareholder activism theory, Shleifer and Vishny (1986), Smith (1996), and Aggarwal et al. (2011), amongst many other studies, link (certain types of) institutional ownership to various measures for corporate performance, and report that a high level of institutional ownership can increase shareholders' wealth. In the same vein, Chung et al. (2002), Ramalingegowda and Yu (2012) and Sakaki et al. (2017) find that firms with higher institutional ownership shareholdings or stability conduct less earnings management, or report their accounts in a more conservative manner.<sup>11</sup> The monitoring role of institutional investors is also documented in the contexts of auditing (e.g., Lim et al. 2013) and the price informativeness (e.g., Luo et al. 2014).

Second, a relatively smaller body of literature, drawing on the private benefit hypothesis, suggests that concentrated institutional ownership (block ownership) promotes rather than mitigates agency issues. Heflin and Shaw (2000) find that concentrated institutional ownership is positively associated with information asymmetry, and Bhojraj and Sengupta (2003) report that concentrated institutional ownership has a negative impact on bond ratings and yields. Velury and Jenkins (2006) argue that concentrated institutional ownership may reduce earnings quality. Barclay et al. (1993) document a wide range of private benefits that are peculiar to mutual funds in various forms including pecuniary benefits (e.g., below-market transfer prices, preventing the opening of closed-end funds, etc.), underwriting or advisory contracts, and non-pecuniary benefits (e.g., access to private information, the influence on the political, social, or environmental policies of the firms, etc.). Therefore, despite being in a powerful position to influence managers or controlling shareholders, in order to preserve their private benefits, mutual funds with concentrated ownership are likely to collude with managers or controlling shareholders when facing agency issues.

Consequent to the aforementioned arguments, our initial hypotheses test the non-linear monitoring role of mutual funds by combining the shareholder activism theory and the private benefit hypothesis, which infers that mutual funds are an effective corporate governance mechanism when their ownership is below a certain threshold. However, due

<sup>11</sup> In line with these findings, Liu et al. (2017) shows that mutual funds may be able to acquire private information by communicating with the managers of Chinese listed firms, and thus improve firm transparency. A number of other studies that examine the similar research question include Lin and Manowan (2012) and Sakaki et al. (2017).



to the distinctive institutional settings in China, including a high level of ownership concentration, underdeveloped legal system, and weak governance mechanisms in the mutual fund industry, when mutual fund ownership passes above the threshold, mutual funds are more likely to collude with controlling shareholders in order to preserve their self-interests instead of protecting minority shareholders in the Chinese stock markets. In light of the above arguments, we propose the following associations between mutual fund ownership, tunneling, and firm performance. First, we investigate the impact of mutual fund ownership on tunneling behavior. We conjecture that greater mutual fund ownership is associated with less tunneling of controlling shareholders, but greater concentrated mutual fund ownership is associated with more tunneling.

**H1** The association between mutual fund ownership and tunneling follows a convex relation (U shape), as the level of mutual fund ownership increases.

Second, we examine the association between mutual funds and firm performance. We argue that, under (above) certain thresholds for mutual fund ownership, a positive (negative) association is expected between mutual fund ownership and firm performance.

**H2** The association between mutual fund ownership and firm performance follows a concave (inverted-U) relation, as the level of mutual fund ownership increases.

Third, we examine the interaction effects of mutual funds and tunneling on firm performance. If mutual funds are an effective corporate governance mechanism, it will play a bigger role in firms that suffer from heavier tunneling, as reflected by a stronger association between mutual fund ownership and firm performance within such firms relative to others. However, concentrated mutual fund ownership will elevate the agency issue of tunneling activities of controlling shareholder but diminish firm performance, as reflected by a weaker association between mutual fund ownership and firm performance for firms with more tunneling activities. Therefore, we propose the following hypotheses:

**H3 (a)** The incremental effect of mutual fund ownership on firm performance is stronger for firms with heavier tunneling behavior.

**H3 (b)** The incremental effect of mutual fund ownership on firm performance is weaker for firms with heavier tunneling behavior when mutual fund ownership is higher than a certain level (i.e., follows a concave (inverted-U) relation), as the level of mutual fund ownership increases.

## 4 Methodology

### 4.1 Logistic models

To investigate our first hypothesis (H1) on the association between mutual fund ownership and tunneling, we adopt the following logistic model:

$$DTUL_{i,t} = \alpha_1 INS\_PER_{i,t} + \alpha_2 INS\_PER\_2_{i,t} + \alpha_3 TOP\_1_{i,t} + \alpha_4 STATE_{i,t} + \alpha_5 ROA_{i,t-1} + \alpha_6 LEVERAGE_{i,t} + \alpha_7 BM_{i,t} + \alpha_8 FIRMSIZE_{i,t} \quad (1)$$

The dependent variable, *DTUL*, is the likelihood of heavy tunneling behavior conducted by the controlling shareholders. It is equal to 1 if a firm's tunneling activities, *TUL*, are equal to or above the average value of *TUL* of all firms in the current year, and 0 otherwise. Following Jiang et al. (2010) and Li (2010), *TUL* is measured by other receivables divided by total assets. Following Yuan et al. (2008), mutual fund ownership *INS\_PER* is measured in two ways: the percentage of mutual funds in total common shares at the year-end (i.e., *MF\_PER*) and the ratio of the market value of mutual funds-held shares to the total market value of a firm at the year-end (i.e., *MF\_MV\_PER*). *INS\_PER\_2* is the squared value of *INS\_PER*. We expect a negative coefficient on *INS\_PER* ( $\alpha_1 < 0$ ) and a positive coefficient on *INS\_PER\_2* ( $\alpha_2 > 0$ ) if a convex association between mutual fund ownership and the tunneling behavior holds as the level of mutual fund ownership increases.

Based upon the findings of Berkman et al. (2009), Jiang et al. (2010), and Wang and Xiao (2011), we include a set of control variables such as the lag value of return-on-assets (*ROA\_LAG*), leverage (*LEVERAGE*), the book-to-market ratio (*BM*), and firm size (*FIRM-SIZE*). We further control for two items in Eq. (1) including the percentage of shares held by controlling shareholders (*Top\_I*)<sup>12</sup> and a dummy indicating whether a firm's largest shareholder is the state or not (*STATE*).<sup>13</sup>

## 4.2 Multivariate models

To test our second hypothesis (H2) on the association between mutual fund ownership and firm performance, we estimate the following regression:

$$\begin{aligned} Firm\ Performance_{i,t} = & \alpha_0 + \alpha_1 INS\_PER_{i,t} + \alpha_2 INS\_PER\_2_{i,t} + \alpha_3 PAY_{i,t} \\ & + \alpha_4 TOP\_1_{i,t} + \alpha_5 IND_{i,t} + \alpha_6 DSUP\_NUM_{i,t} \\ & + \alpha_7 BIG4_{i,t} + \alpha_8 TS_{i,t-1} + \alpha_9 REFORM_{i,t} \\ & + \alpha_{10} RET\_ADJ_{i,t-1} + \alpha_{11} STATE_{i,t} \\ & + \alpha_{12} LEVERAGE_{i,t-1} + \alpha_{13} SGR_{i,t} + \alpha_{14} BM_{i,t} \\ & + \alpha_{15} FIRMSIZE_{i,t} \end{aligned} \quad (2)$$

Regarding our hypotheses (H3 (a) and H3 (b)) on the incremental effect of mutual fund ownership on the relationship between tunneling and firm performance, we construct the following regression model:

<sup>12</sup> The evidence regarding the impact of controlling shareholder ownership on tunneling is mixed in the literature. La Porta et al. (2002) and Claessens et al. (2002) suggest that controlling shareholders with higher cash-flow rights engage in less tunneling than others. Berkman et al. (2009) and Peng et al. (2011) do not report a significant coefficient on the controlling shareholder ownership in their study of China.

<sup>13</sup> Jian and Wong (2010) demonstrate that state-owned firms are more likely to pursue their own benefits by expropriating from minority shareholders. On the contrary, Jiang et al. (2010) find that state-owned firms are less likely to tunnel. In addition, Jiang et al. (2010) and Wang and Xiao (2011) report that the state dummy has no significant impact on tunneling.

$$\begin{aligned}
FirmPerformance_{i,t} = & \alpha_0 + \alpha_1 INS\_PER_{i,t} + \alpha_2 INS\_PER\_2_{i,t} + \alpha_3 TUL_{i,t} \\
& + \alpha_4 TUL_{i,t} \times INS\_PER_{i,t} + \alpha_5 TUL_{i,t} \times INS\_PER\_2_{i,t} \\
& + \alpha_6 PAY_{i,t} + \alpha_7 TOP\_1_{i,t} + \alpha_8 IND_{i,t} + \alpha_9 DSUP\_NUM_{i,t} \\
& + \alpha_{10} BIG4_{i,t} + \alpha_{11} TS_{i,t-1} + \alpha_{12} REFORM_{i,t} \\
& + \alpha_{13} RET\_ADJ_{i,t-1} + \alpha_{14} STATE_{i,t} + \alpha_{15} LEVERAGE_{i,t-1} \\
& + \alpha_{16} SGR_{i,t} + \alpha_{17} BM_{i,t} + \alpha_{18} FIRMSIZE_{i,t}
\end{aligned} \tag{3}$$

We adopt five firm performance measures that are commonly used in the literature; these are (1) *ROA* (earnings before interests and tax divided by total assets), (2) *ROE* (total profit divided by book value of equity), (3) *Tobin's Q* (market value of assets over book value of assets), (4) *ROS* (earnings before interests and tax divided by net sales), and (5) *OPINC\_MV* (operating income divided by market value of assets).<sup>14</sup>

We expect a positive coefficient on *INS\_PER* ( $\alpha_1 > 0$ ) and a negative coefficient on *INS\_PER\_2* ( $\alpha_2 < 0$ ) in Eqs. (2)–(3) to support our hypothesis (H2) that the impacts of mutual fund ownership on firm performance follow a concave (inverted-U) shape. To test our hypotheses (H3 (a) and (b)) on the incremental effects of mutual fund ownership over tunneling on firm performance, we interact the tunneling proxy *TUL* with the mutual fund ownership measures *INS\_PER* and their squared values (*INS\_PER\_2*). We expect a positive coefficient on the interaction term  $TUL \times INS\_PER$  ( $\alpha_4 > 0$ ) and a negative coefficient on the interaction term  $TUL \times INS\_PER\_2$  ( $\alpha_5 < 0$ )—i.e., a concave (inverted-U) shape of association.

We account for the effects of five corporate governance variables comprising: executive compensation (*PAY*), largest shareholder ownership (*TOP\_1*), the percentage of independent director (*IND*), a dummy capturing firms with a larger supervisory board (*DSUP\_NUM*), and a dummy capturing the use of Big 4 auditors (*BIG4*) in our analysis. We take the natural logarithm of total compensation received by board of directors, supervisors and executives as a proxy for executive compensation. Consistent with agency theory, we expect executive compensation to be positively associated with firm performance in China (e.g., Conyon and He 2011; Firth et al. 2006). Shleifer and Vishny (1986) argue that the substantial shareholding of large shareholders can constrain managerial opportunism and improve performance in corporations with a large number of minority shareholders. Following Gul et al. (2010), we include the largest shareholder ownership as measured by the percentage of shares held by the top shareholder (*TOP1*). Based upon the literature on the possible monitoring role of independent directors on executive board-level directors (e.g., Masulis and Mobbs 2014), we control for the percentage of independent directors on the board (*IND*). Listed firms in China have a supervisory board in addition to the main board of directors. Nonetheless, whether supervisory boards play an active and effective monitoring role in practice is inconclusive (e.g., Firth et al. 2007b; Jia et al. 2009; Xi 2006). To control for the possible impact of supervisory board on firm performance, we include a dummy equal to 1 if the number of supervisors in a firm is greater than the median value of our sampled firms in the current year (*DSUP\_NUM*). Fan and Wong (2005) and Gul et al. (2010) find that Big 4 auditors help to protect minority shareholders in emerging

<sup>14</sup> All of these five variables have been widely used in the literature to measure firm performance (e.g., Yuan et al. 2008; Chen et al. 2008, 2009, among many others).

markets where firms normally have concentrated shareholding ownership structures, as Big 4 auditors may push their clients to disclose more detailed, higher-quality and timely firm-specific information. Therefore, we include a dummy indicating the use of Big 4 auditors by a firm to capture their monitoring effects (*BIG4*).

We further control for, and briefly describe below, eight firm-specific variables in Eqs. (2)–(3); these are the percentage of tradable shares (*TS*), a split share structure reform dummy (*REFORM*), market-adjusted stock returns (*RET-ADR*), a state dummy (*STATE*), leverage (*LEVERAGE*), sales growth rate (*SGR*), book-to-market ratio (*BM*), and firm size (*SIZE*). We use the percentage of tradable shares of a firm (*TS*) to measure the firm's free-float shares in the stock market. The movement of share prices in the capital market matters more to firms with a larger proportion of free-float shares and, thus, might encourage controlling shareholders to improve firm performance (e.g., Kuo et al. 2014; Li et al. 2011). As a consequence, Hou et al. (2012) and Kuo et al. (2014) find that the split share structure reform induces an incentive alignment effect of shifting the controlling shareholders' attention from maximizing their own benefits to maximizing firm value. Therefore, we control for the effects of the split share reform by including the *REFORM* dummy which is set to one for the period after a listed firm was chosen to complete the reform. Following Cornett et al. (2007) and Yuan et al. (2008), we control for prior year's market-adjusted stock returns (*RET-ADR*) that reflect the market's expectation of future firm performance and the likelihood that mutual funds select well-performing firms to invest in. Previous studies find that state ownership contributes to corporate operational inefficiency and thus is negatively associated with firm performance (e.g., Dewenter and Malatesta 2001; Gul 1999; Yuan et al. 2008).<sup>15</sup> Accordingly, we include a state dummy variable (*STATE*) to capture its effects on firm performance.

Whether and how leverage affects firm performance is inclusive in empirical findings for China (e.g., Qi et al. 2000; Sun and Tong 2003; Yuan et al. 2008), and thus we control for any possible impact of leverage by using total debt divided by total assets (*LEVERAGE*). Sales growth, which captures a firm's future growth prospects and investment opportunities, is found to be positively associated with firm performance for Canadian, European, and East Asian markets (Claessens et al. 2002; King and Santor 2008; Maury 2006). As such, we include sales growth rate (*SGR*) as a determinant for firm performance, and we compute the ratio of changes in sales between year  $t$  and  $t-1$  divided by sales in year  $t$  as the proxy for sales growth rate. We also include the book-to-market ratio (*BM*) to account for the effect of market prospects, following Lie (2005) and Fan et al. (2007). Firm size is found to have a negative impact on firm performance in China as larger firms may suffer from more agency problems, attract more bureaucratic intervention, and operate less efficiently than small firms (e.g., Sun and Tong 2003; Yuan et al. 2008). Accordingly, we control for firm size (*SIZE*) as measured by the natural logarithm of total assets in our models. Definitions of the variables used in this study are given in the "Appendix".

### 4.3 Unexplained tunneling behavior: the two-stage least squares (2SLS) analysis

We also adopt a two-stage regression procedure to mitigate the endogeneity concern that tunneling, mutual fund ownership, and firm performance might be affected by some

<sup>15</sup> However, Jiang et al. (2010) suggest that state-owned firms in the Chinese market are likely to engage in fewer tunneling activities.

common factors such as ownership structure and firm characteristics. In particular, we examine whether mutual fund ownership is effective in improving performance for firms engaging in unexplained tunneling behavior. To do so, we examine whether mutual fund ownership remains effective in improving performance for firms engaging in unexplained tunneling behavior *after controlling for common factors*. Following Wang and Xiao (2011), we first model tunneling as a function of its determinants as proposed by Jiang et al. (2010) and Jian and Wong (2010), including largest shareholder ownership ( $TOP\_1$ ), state ownership ( $STATE$ ), prior year's return-on-assets ( $ROA$ ), leverage ( $LEVERAGE$ ), book-to-market ratio ( $BM$ ), firm size ( $FIRMSIZE$ ), and lagged value of tunneling ( $TUL$ ). The corresponding regression is:

$$TUL_{i,t} = \alpha_0 + \alpha_1 TOP\_1_{i,t} + \alpha_2 STATE_{i,t} + \alpha_3 ROA_{i,t-1} + \alpha_4 LEVERAGE_{i,t} + \alpha_5 BM_{i,t} + \alpha_6 FIRMSIZE_{i,t} + \alpha_7 TUL_{i,t-1} \quad (4)$$

The residuals from Model (4) capture the unexplained tunneling behavior conducted by controlling shareholders. In the second stage, we construct a dummy variable ( $UNEXP\_TUL$ ), which equals to 1 if the unexplained tunneling is greater than the mean value of the sampled observations, and 0 otherwise. We re-estimate our Model (3) by replacing  $TUL$  with  $UNEXP\_TUL$ , and re-examine our hypotheses.

#### 4.4 Data and sample

Our sample comprises 15,131 firm-year observations, which represents 2430 listed firms on Shanghai and Shenzhen stock exchanges from 2003 to 2014. Our sample period starts from 2003 when the shareholder information became comprehensively available. The data used in our study are collected from the China Securities Market and Accounting Research (CSMAR) databases. In particular, we use the China Funds Market Research Database-Open-end-Funds and Close-end-Funds, a part of CSMAR, to collect data for mutual fund ownership which we define as the sum of open-end-fund ownership and close-end-fund ownership for each listed company. As mentioned above, we follow Jiang et al. (2010) to use 'other receivables' deflated by total assets to measure the tunneling through intercorporate lending. As a robustness check, we also adopt an alternative definition of tunneling based upon Wang and Xiao (2011) which is the cash transferred from listed firms to their controlling shareholders ( $TUL\_LAR$ ). The data for this variable is collected from China Listed Firms' Related Party Transactions Research Database in CSMAR.

Table 1 provides descriptive statistics for all variables used in this study. In Panel A, we report similar mean and median values for the performance indicators  $ROA$ ,  $ROE$ ,  $ROS$  and *Tobin's Q* to those found in other studies on the Chinese markets that also adopt these performance measures (i.e., Jiang et al. 2010; Peng et al. 2011). Additionally, we report an average value of 0.029 on our additional operating performance indicator  $OPINC\_MV$ . The mean value for our tunneling proxy ( $TUL$ ), 0.027, is lower than the annual mean figures reported by Jiang et al. (2010). This could be explained by different sample periods examined in these two studies. The CSRC acknowledged the severity of the tunneling problem and has issued a series of corresponding rules and regulations since 2001. In particular, one rule issued in 2005 targets controlling shareholders and requests all the loans reported

in ‘other receivables’ from controlling entities and affiliates to be repaid by December 31, 2006.<sup>16</sup> Consequently, we expect tunneling to fall after 2005. Different from Jiang et al. (2010) and other prior studies on tunneling in China whose sample periods stop before or in 2005, our study investigates a much longer period to reflect the existence of tunneling activities after 2005 though at a smaller scale. However, the mean value of other receivables of firms’ controlling shareholders (*TUL\_LAR*) is 0.014, close to the results reported by Wang and Xiao (2011). The average aggregate mutual fund holding is 4.7% of the total shares in issue (i.e., tradable plus non-tradable shares).<sup>17</sup> More than half of Chinese listed firms in our sample are state-owned enterprises, as the average of *STATE* is 0.558. The largest shareholder’s ownership, *TOP\_1*, has a mean (median) value of 38% (36%), suggesting the prevalence of the concentrated ownership structure amongst Chinese listed firms.

Panel B of Table 1 presents year-by-year summary statistics for the variable *TUL* which shows a declining trend of tunneling from 0.061 in 2005 to 0.023 in 2014. This confirms the effectiveness of the regulations on reducing tunneling. However, Jiang et al. (2010) conjecture that, in an environment with concentrated ownership structure and weak legal enforcement, regulations alone are not enough to prohibit tunneling. We show evidence supporting this argument.

Table 2 reports the Pearson correlation coefficients for the variables used in the study. The results imply that the two mutual fund ownership measures (*MF\_PER* and *MF\_MV\_PER*) are both positively correlated with each of our adopted firm performance measures. Consistent with Yuan et al. (2008), we also find a significantly positive correlation between mutual fund ownership and firms’ market-adjusted returns (*RET\_ADJ*). This indicates that mutual funds either invest in firms with good future performance prospects or can improve firm performance. Furthermore, the tunneling proxy, *TUL*, has a significant and negative correlation with all firm performance measures except for *Tobin’s Q*, which is consistent with Gao and Kling (2008), Berkman et al. (2009), and Jiang et al. (2010). In addition, there is a significant and negative correlation between mutual fund ownership and the tunneling proxy; this implies that mutual funds play a corporate governance role to restrict tunneling activities of Chinese firms. Overall, the correlation coefficients do not alert us to potential multicollinearity issues in our regression analysis.

## 5 Empirical results

### 5.1 Tunneling behavior and mutual fund ownership

Table 3 provides the results of logistic regression models that we use to test whether mutual fund ownership can effectively mitigate the tunneling behavior of controlling shareholders in the Chinese listed firms. The dependent variable in these models is a dummy capturing whether a firm conducts heavy tunneling activities or not, *DTUL*. We report significantly negative coefficients on mutual fund ownership variables (*MF\_PER* and *MF\_MV\_PER*), and significantly positive coefficients on the squared value of mutual fund ownership

<sup>16</sup> Some of the top management of controlling entities who failed to resolve their loans by the deadline were arrested (Jiang et al. 2010).

<sup>17</sup> Firth et al. (2010) show that mutual fund is the largest institutional investor in tradable shares (i.e., the average aggregate mutual fund holding is about 76% of all the institutional tradable shareholdings).

**Table 1** Summary statistics and tunneling

Variable	Obs.	Mean	Median	SD	Min	P25	P75	Max
<i>Panel A: summary statistics</i>								
ROA	15,131	0.039	0.036	0.053	-0.184	0.014	0.065	0.156
ROA_ADJ	15,131	0.004	0.002	0.052	-0.215	-0.019	0.030	0.122
ROE	15,075	0.069	0.073	0.108	-0.437	0.031	0.121	0.278
ROE_ADJ	15,075	0.001	0.004	0.106	-0.497	-0.035	0.052	0.209
ROS	15,131	0.115	0.094	0.155	-0.589	0.047	0.172	0.589
ROS_ADJ	15,131	0.014	0.001	0.147	-0.689	-0.044	0.069	0.443
TOBIN_Q	15,131	1.662	1.298	1.074	0.414	0.998	1.979	5.404
TOBIN_Q_ADJ	15,131	0.230	-0.012	0.972	-1.034	-0.284	0.450	3.679
OPNIC	15,131	0.029	0.028	0.043	-0.131	0.010	0.050	0.122
OPNIC_ADJ	15,131	0.003	0.003	0.042	-0.156	-0.015	0.023	0.093
MF_PER	15,131	0.047	0.015	0.068	0.000	0.002	0.063	0.267
MF_MV_PER	15,131	0.047	0.014	0.072	0.000	0.002	0.060	0.290
TUL	15,131	0.027	0.011	0.046	0.000	0.004	0.028	0.318
DTUL	15,131	0.282	0.000	0.450	0.000	0.000	0.000	1.000
TUL_LAR	7504	0.014	0.001	0.039	0.000	0.000	0.008	0.305
PAY	15,131	8.080	12.562	6.608	0.000	0.014	13.667	16.794
TOP_1	15,131	0.377	0.361	0.155	0.119	0.250	0.497	0.708
IND	15,131	0.363	0.333	0.054	0.000	0.333	0.375	0.800
DSUP_NUM	15,131	0.951	1.000	0.217	0.000	1.000	1.000	1.000
BIG4	15,131	0.075	0.000	0.263	0.000	0.000	0.000	1.000
TS	15,131	0.672	0.650	0.269	0.025	0.431	0.997	1.000
REFORM	15,131	0.587	1.000	0.492	0.000	0.000	1.000	1.000
RET_ADJ	15,131	0.056	-0.027	0.447	-0.776	-0.199	0.228	1.423
STATE	15,131	0.558	1.000	0.497	0.000	0.000	1.000	1.000
LEVERAGE	15,131	0.471	0.481	0.203	0.080	0.317	0.624	0.970
SGR	15,131	0.084	0.123	0.340	-2.852	0.003	0.236	0.817
BM	15,131	0.443	0.390	0.283	-0.381	0.243	0.581	5.000
FIRMSIZE	15,131	21.922	21.759	1.209	18.806	21.054	22.603	25.985
MAK	6298	8.236	8.330	2.053	0.380	6.610	10.180	11.800
Year	Obs.	Mean	Median	Std		P25	P75	
<i>Panel B: tunneling behavior by year</i>								
2003	1253	0.060	0.025	0.083		0.006	0.074	
2004	1341	0.060	0.021	0.087		0.005	0.072	
2005	1342	0.061	0.022	0.089		0.005	0.070	
2006	1414	0.050	0.017	0.081		0.004	0.053	
2007	1522	0.042	0.013	0.071		0.004	0.042	
2008	1574	0.038	0.013	0.065		0.004	0.038	
2009	1727	0.032	0.012	0.060		0.004	0.031	
2010	2072	0.027	0.009	0.053		0.003	0.026	
2011	2305	0.026	0.010	0.050		0.004	0.024	
2012	2425	0.024	0.010	0.043		0.004	0.024	
2013	2471	0.023	0.010	0.041		0.004	0.024	
2014	2590	0.023	0.010	0.041		0.005	0.023	

To be comparable with other studies, we report the tunneling of all listed firm in the Chinese market year by year





**Table 3** Relation between mutual fund ownership and tunneling behavior

Dependent variable	DTUL	DTUL
MF_PER	-4.573*** (-4.748)	
MF_PER_2	12.909*** (3.323)	
MF_MV_PER		-3.424*** (-3.689)
MF_MV_PER_2		8.530** (2.469)
TOP_1	-1.768*** (-12.389)	-1.745*** (-12.284)
STATE	0.167*** (3.730)	0.168*** (3.738)
ROA_LAG	-5.830*** (-11.590)	-5.922*** (-11.739)
LEVERAGE	1.780*** (13.367)	1.771*** (13.155)
BM	-0.450*** (-3.617)	-0.431*** (-3.425)
FIRMSIZE	-0.223*** (-8.004)	-0.234*** (-8.424)
Year dummy	Y	Y
Industry dummy	Y	Y
Observations	15,129	15,129

All variables are as defined in the “Appendix”. The sample period is between 2003 and 2014. The dependent variable is the likelihood of expropriation of the minority shareholder’s interest by the controlling shareholder. This paper uses industry dummies to control for the industry effect according to the CSRC industrial codes, and controls for the year dummy as well. The coefficients and t-stats are computed using heteroscedasticity consistent standard errors. T statistics are in parentheses; \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

(*MF\_PER\_2* and *MF\_MV\_PER\_2*) in these models.<sup>18</sup> These results support H1 that mutual funds monitor controlling shareholders’ behavior by preventing them from expropriating minority shareholders, whereas concentrated mutual funds are more likely to collude with controlling shareholders to conduct tunneling for their private interests.<sup>19</sup>

Given the estimated values for the coefficients of the mutual fund ownership variables (*MF\_PER* and *MF\_PER\_2*), we calculate the turning points of the relation between

<sup>18</sup> In untabulated results, we also replace the two mutual fund ownership variables and their squared values by their lagged values to avoid the potential endogeneity, and the results remain consistent. We also use the standardised value of the mutual fund ownership variable and rerun the estimations as a robustness check. The results remain materially unchanged.

<sup>19</sup> We also replace the heavy tunneling dummy, *DTUL*, with value of tunneling, *TUL*, for the dependent variable. The results remain materially unchanged. For brevity, the results are not reported here but are available upon request.

mutual fund ownership and the heavy tunneling dummy, *DTUL*, and find the values of the turning points to be within a range of 15–20% across different model specifications.<sup>20</sup> Nonetheless, the estimated ‘turning point’ should not be over-interpreted, as no theoretical prediction exists in relation to the specific ownership level at which this will occur. Rather, it is an empirical outcome by assuming the co-existence of the monitoring and private interest incentives of mutual funds. More importantly, the existence of the turning points supports the prediction of this study and provides evidence contrary to the linear prediction of monitoring effects of mutual funds as documented in prior literature.

Table 3 shows that the estimated coefficients on the ownership of largest shareholder (*TOP\_1*) are significantly negative at the 1% level. This is consistent with Jiang et al. (2010) and implies that a firm with larger controlling shareholder ownership is less likely to engage in heavy tunneling. The coefficients on the dummy capturing state-owned firms (*STATE*) are positive and significant at the 1% level. This evidence is consistent with state-owned firms being more likely to tunnel large resources out of a company as reported by Jian and Wong (2010). Also, similar to Jiang et al. (2010) and Wang and Xiao (2011), controlling shareholders’ tunneling decreases with prior firm performance (*ROA\_LAG*) and size (*FIRMSIZE*), but increases with firm leverage (*LEVERAGE*) and growth prospects (e.g., lower *BM*).

## 5.2 Mutual fund ownership, tunneling and firm performance

Table 4 shows the results of the regression models used to test our H2 when *MF\_PER* is employed as the measure of mutual fund ownership. The results show that the positive coefficients of mutual fund ownership are significant at the 1% level across all regressions and the negative coefficients of their squared values are significant across all the firm performance measures adopted, except for *TOBIN\_Q*. The finding supports our H2 of a concave relationship between mutual fund ownership and firm performance. The results suggest that an increase in mutual funds can enhance the effectiveness of their monitoring effect and in turn improve firm performance, while concentrated mutual funds collude with corporate controlling shareholders and in turn reduce their firm’s value when their shareholding is higher than a threshold level.<sup>21</sup> We also calculate the turning points of this concave relationship across various model specifications, and find that the value ranges from 16% to 26% of mutual fund ownership.<sup>22</sup>

Regarding the results of the control variables, the coefficient of CEO compensation (*PAY*) is positive and significant for all performance measures except for Tobin’s *Q*. This is consistent with prior studies (e.g., Conyon and He 2011; Firth et al. 2006, 2007a; Ozkan 2011; Shleifer and Vishny 1997) and implies that CEO compensation serves as an effective motivation for the CEO to improve firm performance. We find that, consistent with the

<sup>20</sup> In our sample, approximately 22% (14%) of companies have a mutual fund ownership of 15% (20%) or above.

<sup>21</sup> On page 476 of Petersen (2009), it gives suggestions on how to identify whether firm/time/both effect(s) exist in dataset before choosing a suitable estimation approach. Following these suggestions, in untabulated results, we find that standard errors clustered by firm are larger than white standard errors. This indicates the existence of firm effect and thus it is suitable to use firm fixed effect estimation approach or standard errors clustered by firm, as the Fama–MacBeth standard errors would be biased.

<sup>22</sup> In our sample, approximately 8.5% of companies have a mutual fund ownership of 26% or above.

**Table 4** Relation between mutual fund ownership and firm performance

Dependent variable	ROA	ROE	ROS	TOBIN_Q	OPINC
MF_PER	0.346*** (20.888)	0.698*** (19.470)	0.587*** (11.256)	3.087*** (9.570)	0.282*** (20.399)
MF_PER_2	-0.675*** (-10.455)	-1.390*** (-10.393)	-1.608*** (-7.917)	0.181 (0.137)	-0.865*** (-16.788)
PAY	0.010*** (14.717)	0.022*** (14.271)	0.015*** (6.693)	-0.008 (-0.910)	0.007*** (13.537)
TOP_1	0.039*** (14.547)	0.082*** (13.773)	0.028*** (3.215)	0.140*** (3.211)	0.031*** (13.022)
IND	-0.017** (-2.233)	-0.028* (-1.716)	-0.024 (-0.994)	0.639*** (5.449)	-0.010 (-1.564)
DSUP_NUM	0.006*** (2.655)	0.010** (2.119)	0.018** (2.548)	0.057** (2.399)	0.005*** (2.847)
BIG4	0.006*** (3.656)	0.008** (2.523)	0.004 (0.708)	0.149*** (6.080)	0.007*** (4.243)
TS	-0.007*** (-4.124)	-0.020*** (-5.154)	-0.044*** (-7.484)	0.200*** (5.722)	-0.008*** (-4.858)
REFORM	0.009*** (8.496)	0.020*** (8.926)	0.044*** (12.969)	-0.020 (-1.079)	0.012*** (12.434)
RET_ADJ	0.013*** (13.312)	0.027*** (12.610)	0.025*** (8.388)	0.280*** (15.747)	0.008*** (10.442)
STATE	-0.005*** (-5.866)	-0.012*** (-6.012)	-0.015*** (-5.350)	-0.042*** (-3.054)	-0.005*** (-6.579)
LEVERAGE	-0.091*** (-36.410)	-0.066*** (-11.194)	-0.201*** (-23.231)	-1.409*** (-28.288)	-0.048*** (-24.013)
SGR	0.035*** (18.470)	0.072*** (16.475)	0.073*** (8.570)	-0.021 (-0.952)	0.028*** (20.156)
BM	-0.010*** (-4.651)	-0.016*** (-3.534)	0.002 (0.359)	-1.177*** (-16.696)	0.015*** (7.436)
FIRMSIZE	0.003*** (6.174)	0.008*** (6.551)	0.017*** (9.254)	-0.257*** (-20.866)	0.007*** (14.539)
Intercept	-0.008 (-0.759)	-0.106*** (-4.311)	-0.194*** (-5.432)	7.571*** (32.911)	-0.110*** (-11.825)
Year dummy	Y	Y	Y	Y	Y
Industry dummy	Y	Y	Y	Y	Y
R-squared	0.374	0.277	0.241	0.601	0.277
Observations	13,962	13,905	13,962	13,962	13,962

All variables are as defined in the “Appendix”. The sample period is between 2003 and 2014. The dependent variables are the proxies of firm performance, which are represented by ROA, ROE, ROS, TOBIN\_Q and OPINC, respectively. To reduce the effects of multicollinearity, the component variables of the interaction terms are standardized before being entered into the regression analysis. This paper uses industry dummies to control for the industry effect according to the CSRC industrial codes, and controls for the year dummy as well. The coefficients and t-stats are computed using heteroscedasticity consistent standard errors. T statistics are in parentheses; \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

literature, the ownership of the largest shareholder (*TOP\_1*) is positively associated with firm performance.<sup>23</sup> We report mixed findings for the impact of independent directors on firm performance, as the signs and significance of coefficients on the percentage of independent directors (*IND*) are sensitive to the definition of firm performance. The existence of a larger supervisory board and the recruitment of Big 4 auditing firms are, in general, positively associated with firm performance. More tradable shares (*TS*) in the ownership structure are positively associated with Tobin's *Q*, implying the possibility of overvaluation for these shares, but are negatively associated with all other firm performance measures. The reform dummy is positively associated with firm performance measures except for Tobin's *Q*, implying that the reform improves firm performance by converting non-tradable shares to tradable shares. Consistent with Yuan et al. (2008), firms with a higher market-adjusted return in prior year (*RET\_ADJ*) is more likely to show a better performance for all measures. Accordingly, the inclusion of prior year's stock return could mitigate the concern that mutual funds choose to invest in firms with good prospects (Yuan et al. 2008). In addition, we find that state-owned firms and firms with higher leverage are less likely to achieve a better performance, whereas firms with good growth and market prospects, as captured by higher sales growth rate and lower book-to-market ratio are more likely to realise a better performance than other firms in general. Similar to the findings of Chen et al. (2009), Firth et al. (2006) and Wu et al. (2012), firm size is positively and significantly associated with all firm performance measures except for Tobin's *Q*.

Table 5 displays the results of the regression models that we use to test H2 and H3 (a) and (b). To reduce the effects of multicollinearity, the component variables of the interaction terms between the tunneling measure (*TUL*) and the mutual fund ownership measures are standardized before being entered to the regression analysis, following Jaccard et al. (1990).

Our second hypothesis (H2) is supported by the significantly positive coefficients of the mutual fund ownership variables and the significantly negative coefficients of their squared values across all adopted firm performance measures. The non-linear association between mutual fund ownership and firm performance is consistent with our expectations that mutual funds have the ability and incentives to monitor corporate management and thus to improve firm performance; but that concentrated mutual funds would be more likely to collude with corporate management or controlling shareholders rather than playing a guardianship role to protect minority shareholders, which leads to a decline of firm value.

In line with previous studies, we find that the tunneling severity is negatively associated with firm performance, as the coefficients of *TUL* are significantly negative at the 1% level across all employed models except for Tobin's *Q*. Moreover, consistent with our conjecture, we report significantly positive coefficients on the interaction terms of *TUL* and mutual fund ownership measures, and significantly negative coefficients on the interaction terms of *TUL* and the squared values of mutual fund ownership indicators. The results are robust for all adopted firm performance measures, and thus support our H3 (a)—that the external monitoring of mutual fund ownership is exogenous and generates more improvement in performance for firms with more tunneling activities, and H3 (b)—that the incremental effect of mutual fund ownership over a firm's tunneling activities on a firm's performance

<sup>23</sup> We also include the Herfindahl index calculated as the sum of the squared percentage of shares held by the top 10 shareholders (*HERF*) in the regressions, as used by Aggarwal et al. (2015) and Firth et al. (2016). The results are materially unchanged. For brevity, the results are not reported but available upon request.

**Table 5** Relation between mutual fund ownership, tunneling behavior and firm performance

Dependent variable	ROA	ROE	ROS	TOBIN_Q	OPNIC
MF_PER	0.332*** (19.365)	0.683*** (17.558)	0.562*** (10.535)	3.353*** (10.084)	0.275*** (19.570)
MF_PER_2	-0.663*** (-9.524)	-1.403*** (-9.516)	-1.627*** (-7.623)	-0.922 (-0.670)	-0.849*** (-16.064)
TUL	-0.110*** (-5.232)	-0.179*** (-3.074)	-0.229*** (-3.457)	1.611*** (4.396)	-0.053*** (-3.668)
TUL*MF_PER	0.003** (2.351)	0.013*** (3.509)	0.014*** (3.582)	0.043** (2.198)	0.005*** (5.565)
TUL*MF_PER_2	-0.002*** (-2.614)	-0.006*** (-3.669)	-0.008*** (-3.601)	-0.029** (-2.518)	-0.002*** (-3.911)
PAY	0.010*** (14.567)	0.021*** (13.915)	0.014*** (6.339)	-0.008 (-0.881)	0.007*** (13.198)
TOP_1	0.035*** (13.367)	0.073*** (12.589)	0.017** (1.995)	0.160*** (3.659)	0.028*** (12.020)
IND	-0.016** (-2.192)	-0.027* (-1.727)	-0.023 (-0.974)	0.622*** (5.318)	-0.010 (-1.569)
DSUP_NUM	0.005** (2.220)	0.008* (1.680)	0.014** (2.120)	0.063*** (2.634)	0.004** (2.426)
BIG4	0.006*** (3.658)	0.008** (2.534)	0.004 (0.705)	0.150*** (6.151)	0.007*** (4.210)
TS	-0.006*** (-3.407)	-0.017*** (-4.423)	-0.040*** (-6.893)	0.193*** (5.509)	-0.007*** (-4.260)
REFORM	0.009*** (8.601)	0.020*** (8.799)	0.043*** (13.178)	-0.020 (-1.037)	0.012*** (12.213)
RET_ADJ	0.012*** (13.127)	0.026*** (12.345)	0.024*** (8.121)	0.280*** (15.809)	0.008*** (10.019)
STATE	-0.006*** (-6.496)	-0.013*** (-6.528)	-0.016*** (-5.892)	-0.041*** (-2.972)	-0.005*** (-6.980)
LEVERAGE	-0.084*** (-33.914)	-0.051*** (-8.877)	-0.182*** (-21.167)	-1.454*** (-30.193)	-0.043*** (-21.333)
SGR	0.033*** (17.917)	0.066*** (15.284)	0.066*** (7.882)	-0.008 (-0.360)	0.025*** (18.358)
BM	-0.013*** (-6.165)	-0.023*** (-4.842)	-0.007 (-1.123)	-1.162*** (-16.473)	0.012*** (6.035)
FIRMSIZE	0.003*** (4.928)	0.007*** (5.320)	0.015*** (8.388)	-0.252*** (-21.082)	0.006*** (13.561)
Intercept	0.010 (0.875)	-0.063** (-2.517)	-0.037 (-1.035)	7.483*** (33.470)	-0.095*** (-9.827)
Year dummy	Y	Y	Y	Y	Y
Industry dummy	Y	Y	Y	Y	Y
R-squared	0.393	0.299	0.259	0.603	0.291
Observations	13,960	13,904	13,960	13,960	13,960

All variables are as defined in the “Appendix”. The sample period is between 2003 and 2014. The dependent variables are the proxies of firm performance, which are represented by ROA, ROE, ROS, TOBIN\_Q and OPNIC, respectively. To reduce the effects of multicollinearity, the component variables of the interaction terms are standardized before being entered into the regression analysis. This paper uses industry

**Table 5** (continued)

dummies to control for the industry effect according to the CSRC industrial codes, and controls for the year dummy as well. The coefficients and t-stats are computed using heteroscedasticity consistent standard errors. T statistics are in parentheses; \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

is concave.<sup>24</sup> As a result, below a certain threshold, mutual funds have a more positive effect on firm performance when firms suffer from heavier tunneling. However, when passing the threshold, mutual funds have a more negative effect on firm performance if these firms engage in more severe tunneling activities.<sup>25</sup>

### 5.3 Unexplained tunneling

In this section, we discuss our results based upon the two-stage least-squares (2SLS) approach to mitigate the endogeneity concern that tunneling, mutual fund ownership, and firm performance might be affected by some unobservable factors. Panel A of Table 6 reports the first stage estimation results based upon Model (4), with the residual capturing the unexplained tunneling (*UNEXP\_TUL*). The coefficient on *TUL\_LAG* is significantly positive, suggesting that controlling shareholders conduct tunneling persistently over time. In panel B of Table 6, we report the second-stage estimation results based upon Model (3) by replacing *TUL* with unexplained tunneling. The coefficients on the mutual fund ownership measure (*MF\_PER*) are positive and significant, and the coefficients on the squared value of mutual fund ownership variable (*MF\_PER\_2*) are in general negative and significant (except when using Tobin's Q to measure firm performance). The coefficients on the interaction term between *UNEXP\_TUL* and *MF\_PER* are significantly positive across all firm performance indicators, while the coefficients on the interaction term between *UNEXP\_TUL* and *MF\_PER\_2* are consistently negative, but significant when using *ROA*, *ROE* and *OPNIC* as firm performance measures.<sup>26</sup> Overall, these results support our conclusion that mutual fund ownership can be effective in monitoring firm management and thus improving firm performance, and this effect is stronger within firms with severe tunneling, as long as mutual fund ownership does not pass a certain threshold.

## 6 Other robustness checks

In this section, we adopt several checks to examine the robustness and sensitivity of our results. These include the adoption of an alternative proxy for tunneling, the employment of industry-adjusted firm performance measures, the use of firm fixed effects, the inclusion

<sup>24</sup> For a robustness check, we use an alternative measure of mutual fund ownership which is computed as the market value of mutual fund shares divided by the total market value of the listed firm. The results are highly consistent with those in Table 5 and support our H2 and H3 (a) and (b) about the effect of mutual fund ownership on promoting firm performance. The results are not reported for brevity, but are available upon request.

<sup>25</sup> We also estimate the regressions in Table 5 by replacing the tunneling measure (*TUL*) with the likelihood of heavy tunneling activities (*DTUL*), and the results remain materially unchanged. These results are not reported for brevity, but are available upon request.

<sup>26</sup> We also use the alternative measure for mutual fund ownership (*MF\_MV\_PER*) and industry-adjusted firm performance proxies in our 2SLS analysis. The results are materially unchanged. For brevity, the results are available upon request.

**Table 6** 2SLS sensitivity tests

Dependent variable	TUL				
<i>Panel A: the determinants of tunneling behavior</i>					
TOP_1					-0.003*
					(-1.933)
STATE					-0.001**
					(-2.085)
ROA_LAG					-0.038***
					(-4.235)
LEVERAGE					0.017***
					(7.957)
BM					-0.001
					(-0.846)
FIRMSIZE					-0.003***
					(-9.381)
TUL_LAG					0.761***
					(48.614)
Intercept					0.062***
					(11.192)
R-squared					0.622
Observations					14,742
Dependent variable	ROA	ROE	ROS	TOBIN_Q	OPNIC
<i>Panel B: relation between mutual fund ownership, tunneling behavior and firm performance (evidence from unexplained tunneling)</i>					
MF_PER	0.268***	0.565***	0.462***	2.760***	0.227***
	(13.985)	(13.182)	(7.662)	(7.437)	(13.897)
MF_PER_2	-0.457***	-0.943***	-1.394***	0.288	-0.668***
	(-6.078)	(-5.785)	(-6.046)	(0.187)	(-10.782)
UNEXP_TUL	-0.004***	-0.012***	-0.019***	0.081***	-0.003***
	(-3.186)	(-4.300)	(-4.524)	(4.739)	(-2.841)
UNEXP_TUL*MF_PER	0.214***	0.363***	0.345***	1.009*	0.147***
	(6.459)	(5.217)	(3.271)	(1.685)	(5.395)
UNEXP_TUL*MF_PER_2	-0.618***	-1.221***	-0.648	-0.962	-0.536***
	(-4.565)	(-4.461)	(-1.499)	(-0.361)	(-5.019)
PAY	0.010***	0.022***	0.015***	-0.008	0.007***
	(14.739)	(14.235)	(6.734)	(-0.921)	(13.479)
TOP_1	0.039***	0.082***	0.028***	0.140***	0.031***
	(14.616)	(13.785)	(3.287)	(3.243)	(12.987)
IND	-0.018**	-0.029*	-0.024	0.622***	-0.011*
	(-2.374)	(-1.800)	(-1.006)	(5.340)	(-1.678)
DSUP_NUM	0.006***	0.011**	0.018**	0.060**	0.006***
	(2.719)	(2.161)	(2.541)	(2.506)	(2.901)
BIG4	0.005***	0.008**	0.004	0.139***	0.006***
	(3.379)	(2.486)	(0.715)	(5.736)	(4.128)
TS	-0.007***	-0.020***	-0.044***	0.199***	-0.008***
	(-4.007)	(-5.044)	(-7.376)	(5.725)	(-4.781)

**Table 6** (continued)

Dependent variable	ROA	ROE	ROS	TOBIN_Q	OPNIC
REFORM	0.009*** (8.697)	0.020*** (8.849)	0.044*** (13.298)	-0.023 (-1.207)	0.012*** (12.348)
RET_ADJ	0.013*** (13.322)	0.027*** (12.608)	0.025*** (8.478)	0.278*** (15.720)	0.008*** (10.394)
STATE	-0.005*** (-6.077)	-0.012*** (-5.997)	-0.015*** (-5.459)	-0.045*** (-3.254)	-0.005*** (-6.601)
LEVERAGE	-0.089*** (-35.022)	-0.067*** (-10.757)	-0.203*** (-23.010)	-1.336*** (-26.398)	-0.047*** (-23.151)
SGR	0.036*** (19.031)	0.072*** (16.379)	0.073*** (8.676)	-0.012 (-0.546)	0.028*** (19.936)
BM	-0.009*** (-4.391)	-0.016*** (-3.536)	0.003 (0.384)	-1.158*** (-16.671)	0.015*** (7.509)
FIRMSIZE	0.003*** (5.603)	0.008*** (6.450)	0.017*** (9.370)	-0.269*** (-21.629)	0.007*** (14.202)
Intercept	-0.004 (-0.372)	-0.103*** (-4.000)	-0.092** (-2.484)	7.837*** (33.759)	-0.105*** (-10.828)
Year dummy	Y	Y	Y	Y	Y
Industry dummy	Y	Y	Y	Y	Y
R-squared	0.379	0.279	0.245	0.604	0.277
Observations	13,960	13,904	13,960	13,960	13,960

Panel A: All variables are as defined in the “Appendix”. The sample period is between 2003 and 2014. The dependent variable is the proxy of tunneling behavior, calculated by the other receivable deflated by total assets. This paper uses industry dummies to control for the industry effect according to the CSRC industrial codes, and controls for the year dummy as well. The coefficients and t-stats are computed using heteroscedasticity consistent standard errors. T statistics are in parentheses; \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Panel B: All variables are as defined in the “Appendix”. The sample period is between 2003 and 2014. The dependent variables are the proxies of firm performance, which are represented by ROA, ROE, ROS, TOBIN\_Q and OPNIC, respectively. This paper uses industry dummies to control for the industry effect according to the CSRC industrial codes, and controls for the year dummy as well. The coefficients and t-stats are computed using heteroscedasticity consistent standard errors. T statistics are in parentheses; \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

of a marketization index measure (*MKT*) in Model (4) when computing the unexpected tunneling and the implementation of panel-data Granger causality tests.

## 6.1 Alternative measurements of the tunneling proxy

Although Jiang et al. (2010) and Li (2010) suggest that firms’ overall other receivables obtained from the financial statement can approximately represent firms’ tunneling activities, a few other studies adopt alternative measures to capture such behavior. For example, Ye (2006) and Wang and Xiao (2011) manually collected other receivables of controlling shareholders and their affiliates from the footnotes of financial statements to proxy for tunneling. Therefore, we also adopt this definition of tunneling by using other receivables of controlling shareholder as identified by the China Listed Firms’ Related Party Transactions Research Database in CSMAR. The correlation matrix in Table 2 shows a significant



**Table 7** Relation between mutual fund ownership, tunneling behavior and firm performance (robustness tests with controlling shareholders' other receivables as tunneling proxy)

Dependent variable	ROA	ROE	ROS	TOBIN_Q	OPNIC
MF_PER	0.361*** (14.184)	0.810*** (13.412)	0.648*** (8.481)	2.825*** (6.514)	0.336*** (15.540)
MF_PER_2	-0.782*** (-7.488)	-1.875*** (-7.924)	-1.942*** (-6.314)	-0.510 (-0.268)	-1.070*** (-13.019)
TUL	-0.078** (-2.148)	-0.181* (-1.787)	-0.001 (-0.008)	1.523*** (2.784)	-0.039* (-1.700)
TUL*MF_PER	0.008*** (4.088)	0.017*** (3.244)	0.032*** (5.848)	0.061*** (2.629)	0.006*** (5.206)
TUL*MF_PER_2	-0.002*** (-2.670)	-0.007*** (-2.600)	-0.013*** (-5.366)	-0.020 (-1.411)	-0.003*** (-4.989)
PAY	0.010*** (10.306)	0.022*** (9.652)	0.017*** (5.795)	-0.001 (-0.092)	0.006*** (9.024)
TOP_1	0.040*** (10.921)	0.089*** (10.395)	0.044*** (3.623)	-0.009 (-0.185)	0.034*** (9.856)
IND	-0.021* (-1.896)	-0.039 (-1.565)	-0.038 (-1.066)	0.583*** (3.969)	-0.013 (-1.272)
DSUP_NUM	0.006** (2.180)	0.012* (1.909)	0.017* (1.944)	0.032 (1.256)	0.005** (2.020)
BIG4	0.008*** (3.883)	0.015*** (3.665)	0.012* (1.705)	0.055** (2.168)	0.010*** (5.161)
TS	-0.009*** (-3.642)	-0.022*** (-3.720)	-0.044*** (-5.093)	0.110** (2.274)	-0.008*** (-2.906)
REFORM	0.012*** (8.188)	0.029*** (8.408)	0.051*** (10.282)	-0.048* (-1.917)	0.012*** (8.408)
RET_ADJ	0.012*** (9.092)	0.028*** (8.922)	0.023*** (5.406)	0.267*** (11.255)	0.009*** (7.531)
STATE	-0.003*** (-2.686)	-0.009*** (-3.241)	-0.012*** (-3.103)	-0.023 (-1.280)	-0.004*** (-3.647)
LEVERAGE	-0.083*** (-24.055)	-0.057*** (-6.643)	-0.179*** (-14.991)	-1.149*** (-17.682)	-0.047*** (-16.399)
SGR	0.036*** (15.557)	0.075*** (12.792)	0.084*** (8.041)	-0.036 (-1.310)	0.027*** (15.380)
BM	-0.007*** (-2.874)	-0.006 (-0.944)	0.009 (1.104)	-0.853*** (-10.913)	0.012*** (4.939)
FIRMSIZE	0.002*** (2.915)	0.004** (2.468)	0.011*** (4.711)	-0.239*** (-16.469)	0.006*** (9.347)
Intercept	0.012 (0.842)	-0.307*** (-7.384)	-0.092* (-1.916)	7.074*** (25.297)	-0.094*** (-7.252)
Year dummy	Y	Y	Y	Y	Y
Industry dummy	Y	Y	Y	Y	Y
R-squared	0.401	0.304	0.286	0.576	0.320
Observations	7190	7144	7190	7190	7190

All variables are as defined in the “Appendix”. The sample period is between 2003 and 2014. The dependent variables are the proxies of firm performance, which are represented by ROA, ROE, ROS, TOBIN\_Q and OPNIC, respectively. To reduce the effects of multicollinearity the component variables of the inter-

**Table 7** (continued)

action terms are standardized before being entered into the regression analysis. This paper uses industry dummies to control for the industry effect according to the CSRC industrial codes, and controls for the year dummy as well. The coefficients and t-stats are computed using heteroscedasticity consistent standard errors. T statistics are in parentheses; \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

positive relation between other receivables from a firm as a whole and from controlling shareholders only. This implies a reasonable substitution for these two measures as the proxy of tunneling as documented in the literature. The results reported in Table 7 compare well to those reported in Table 5 and thus support our conjecture that the exogenous effect of mutual funds' monitoring can effectively constrain the tunneling behavior of controlling shareholders and in turn improve firms' performance. The improvement is seen more in firms with higher tunneling, but becomes weaker after a certain threshold level.

## 6.2 Re-estimating the unexplained tunneling

Jiang et al. (2010) and Wang and Xiao (2011) both test the determinants of tunneling behavior with the same set of factors: *ROA*, *STATE*, *SIZE*, *LEVERAGE*, *MARKETIZATION INDEX*, and *LARGEST SHAREHOLDER*. Following Fan and Wang (2011), Wang and Xiao (2011) include a marketization index as one of the determinants for tunneling to capture the development of the regional market in which the firm is located. As a robustness check, we add in this variable and redo the analysis by adopting a shorter sample period from 2003 to 2009, given that the index is only available until 2009. The results reported in Table 8 are generally consistent with our previous findings.<sup>27</sup>

## 6.3 Endogenous or exogenous effect of mutual fund ownership

Jiang et al. (2010) argue that mutual fund managers may select firms with fewer tunneling activities to be included in their investment portfolios to gain higher returns. As a consequence, we further examine the causal relationship between the tunneling behavior and mutual fund ownership over our whole sample period using panel vector autoregression with GMM estimation, although we already control for the impact of stock returns or tunneling at  $t-1$  in the previous regressions.<sup>28</sup> We use firm size and return-on-assets and their combinations with two or all of the following variables including *Top\_1*, *leverage*, and *Book-to-Market* ratio as various sets of control variables in the VAR system. The results reported in Table 9 show that the changes in mutual fund ownership would Granger-cause the changes in tunneling behavior, but the null hypothesis that tunneling does not Granger-cause mutual fund ownership is only rejected in one of the tests (based upon  $p < 0.05$ ).

<sup>27</sup> We also use the market value of mutual fund and industry-adjusted firm performance proxies together with *MARKETIZATION INDEX* to test our H2 and H3 (a) and (b) and the results are materially unchanged. For brevity, the results are not reported but available upon request.

<sup>28</sup> We use the value of AIC to decide the number of lags for the variables in the VAR system.

**Table 8** 2SLS sensitivity tests

Dependent variable	TUL				
<i>Panel A: the determinants of tunneling (robustness tests with MAK)</i>					
TOP_1	0.001 (0.338)				
STATE	−0.004*** (−3.246)				
ROA_LAG	−0.029** (−2.159)				
LEVERAGE	0.026*** (6.283)				
BM	−0.000 (−0.253)				
FIRMSIZE	−0.004*** (−7.587)				
TUL_LAG	0.787*** (41.070)				
MAK	−0.001*** (−3.278)				
Intercept	0.089*** (8.932)				
R-squared	0.646				
Observations	5915				
Dependent variable	ROA	ROE	ROS	TOBIN_Q	OPNIC
<i>Panel B: relation between mutual fund ownership, tunneling behavior and firm performance (evidence from unexplained tunneling)</i>					
MF_PER	0.326*** (10.498)	0.691*** (9.782)	0.601*** (6.470)	0.560 (1.207)	0.265*** (10.678)
MF_PER_2	−0.722*** (−6.164)	−1.532*** (−5.908)	−2.092*** (−6.011)	5.482*** (2.611)	−0.833*** (−9.069)
UNEXP_TUL	−0.013*** (−6.189)	−0.033*** (−6.965)	−0.042*** (−6.363)	−0.004 (−0.230)	−0.010*** (−6.035)
UNEXP_TUL*MF_PER	0.234*** (4.791)	0.397*** (3.748)	0.487*** (3.113)	−0.614 (−0.887)	0.226*** (5.836)
UNEXP_TUL*MF_PER_2	−0.587*** (−3.059)	−1.058*** (−2.636)	−0.788 (−1.258)	5.727* (1.755)	−0.764*** (−5.153)
PAY	0.010*** (11.963)	0.022*** (11.396)	0.018*** (6.460)	−0.002 (−0.195)	0.008*** (12.486)
TOP_1	0.029*** (6.009)	0.060*** (5.419)	−0.005 (−0.337)	0.061 (1.120)	0.027*** (6.665)
IND	0.003 (0.169)	0.010 (0.297)	−0.013 (−0.266)	0.004 (0.028)	−0.003 (−0.225)
DSUP_NUM	0.006** (2.542)	0.012** (2.134)	0.014* (1.871)	0.018 (1.090)	0.006*** (3.009)
BIG4	0.006** (2.509)	0.009* (1.709)	0.013* (1.727)	0.005 (0.222)	0.005** (2.372)

**Table 8** (continued)

Dependent variable	ROA	ROE	ROS	TOBIN_Q	OPNIC
TS	-0.026*** (-5.414)	-0.057*** (-5.347)	-0.090*** (-5.767)	0.536*** (8.303)	-0.023*** (-5.723)
REFORM	0.014*** (6.086)	0.034*** (7.005)	0.050*** (7.403)	0.012 (0.484)	0.016*** (8.289)
RET_ADJ	0.012*** (7.988)	0.024*** (7.014)	0.023*** (5.227)	0.196*** (9.778)	0.007*** (5.321)
STATE	-0.005*** (-3.483)	-0.009*** (-2.873)	-0.007 (-1.532)	-0.043** (-2.545)	-0.005*** (-4.061)
LEVERAGE	-0.089*** (-21.500)	-0.080*** (-8.270)	-0.222*** (-14.902)	-0.898*** (-16.648)	-0.066*** (-20.579)
SGR	0.038*** (14.259)	0.080*** (12.609)	0.089*** (7.930)	-0.016 (-0.727)	0.031*** (16.392)
BM	-0.004 (-1.035)	-0.011 (-1.268)	0.016 (1.254)	-0.779*** (-24.058)	0.001 (0.175)
FIRMSIZE	0.001 (0.886)	0.004** (2.267)	0.014*** (4.956)	-0.170*** (-15.720)	0.005*** (6.413)
Intercept	-0.077*** (-3.884)	-0.272*** (-6.279)	-0.201*** (-3.207)	5.370*** (23.060)	-0.138*** (-8.691)
Year dummy	Y	Y	Y	Y	Y
Industry dummy	Y	Y	Y	Y	Y
R-squared	0.408	0.319	0.305	0.606	0.358
Observations	5898	5858	5898	5898	5898

Panel A: All variables are as defined in the “Appendix”. The sample period is between 2003 and 2009. The dependent variable is the proxy of tunneling behavior, calculated by the other receivable deflated by total assets. This paper uses industry dummies to control for the industry effect according to the CSRC industrial codes, and controls for the year dummy as well. The coefficients and t-stats are computed using heteroscedasticity-consistent standard errors. T statistics are in parentheses; \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

Panel B: All variables are as defined in the “Appendix”. The sample period is between 2003 and 2014. The dependent variables are the proxies of firm performance, which are represented by ROA, ROE, ROS, TOBIN\_Q and OPNIC, respectively. This paper uses industry dummies to control for the industry effect according to the CSRC industrial codes, and controls for the year dummy as well. The coefficients and t-stats are computed using heteroscedasticity-consistent standard errors. T statistics are in parentheses; \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

## 6.4 Adjusted measurements of firm performance and firm fixed effects

Given that firm performance may systematically vary across different industries, we also control for the industry effects. Following Allayannis and Weston (2001), Woidtke (2002), and Yuan et al. (2008), we compute industry-adjusted firm performance proxies which are defined as the difference between a firm’s performance and its corresponding industry median in the same year. The results are consistent and support our hypotheses H2 and H3 (a) and (b). In addition, following Bond and Meghir (1994) and Harrison and McMillan (2003), we also estimate the multivariate panel regressions with firm fixed effects. The

**Table 9** Granger causality tests for the relation between mutual fund ownership and tunneling behavior

Null hypotheses	Chi2	Prob > chi2
Control variables: FIRMSIZE, ROA, TOP_1, LEVERAGE		
TUL do not Granger cause MF_PER	3.939	0.047
MF_PER do not Granger cause TUL	7.402	0.007
Control variables: FIRMSIZE, ROA, TOP_1, BM		
TUL do not Granger cause MF_PER	2.648	0.104
MF_PER do not Granger cause TUL	12.005	0.001
Control variables: FIRMSIZE, ROA, BM, LEVERAGE		
TUL do not Granger cause MF_PER	2.421	0.120
MF_PER do not Granger cause TUL	9.676	0.002
Control variables: FIRMSIZE, ROA, BM, LEVERAGE, TOP_1		
TUL do not Granger cause MF_PER	3.703	0.054
MF_PER do not Granger cause TUL	11.015	0.001

All variables are as defined in the “Appendix”. The sample period is between 2003 and 2014. The Granger causality tests are implemented using panel vector autoregression (VAR) with GMM estimation. The value of AIC is used to decide the number of lags for the variables in the VAR system

results do not alter our conclusions. For brevity, the results are not reported but available upon request.<sup>29</sup>

## 7 Conclusion

Extant studies indicate that mutual funds play an effective corporate governance role in protecting minority shareholders’ interests in the developed markets. However, the corporate governance role of mutual funds remains inconclusive and questionable in the emerging market context. Despite the fact that China experienced rapid growth of mutual funds in the last decade, whether and, if so, how mutual fund ownership improves firms’ performance in the Chinese market remains unclear. Since the Chinese market has a less developed legal system, weak investor protection and high ownership concentration, the main agency issue in such a market is the tunneling behavior conducted by controlling shareholders that expropriates minority shareholders. Unlike the situation in the US, the governance mechanisms of the mutual funds industry in China remain weaker. Consequently, our study finds that mutual funds can reduce the likelihood of tunneling behavior of controlling shareholders and enhance firm performance, and thus, serve as an effective external governance mechanism as long as the ownership of mutual funds does not exceed a certain point. In addition, we find that mutual fund managers with highly concentrated ownership are more likely to collude with controlling shareholders to expropriate minority shareholders for their own interests and, consequently, diminish firm performance. Furthermore, regarding the moderating effect of mutual fund ownership, our results show that the monitoring effects of mutual funds are stronger for firms that are more likely to suffer from

<sup>29</sup> We also estimate the multivariate panel regressions with standard errors clustered by firm, and the results are consistent. For brevity, the results are not reported but available upon request.

agency problems—i.e. firms experiencing more tunneling activities of controlling shareholders—but the monitoring effects of concentrated mutual funds are weakened.

Apart from the timeliness and relevance of the subject, our paper adds to the limited body of literature on the governance role of mutual funds in emerging economies in general and in China, in particular. Moreover, our findings offer useful insights and policy implications to policy makers and regulators for the development of mutual funds in China and other emerging markets. In particular, the authorities may consider setting policies or regulations that can strike a balance between promoting mutual funds as a corporate governance mechanism and achieving the monitoring effects while facing the challenges of high levels of ownership concentration, a less developed legal system, and weak minority shareholder protection. Finally, the question about whether the foreign mutual funds can have stronger monitoring effects than domestic mutual funds on controlling shareholders' expropriation in the emerging market context is beyond the scope of this study but could be of interest to future researchers.

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## Appendix

### Variable definition

<i>ROA</i>	Earnings before interests and tax divided by total assets
<i>ROA_ADJ</i>	Adjusted industry-median ROA, which is the difference between firm's ROA and industry-median
<i>ROE</i>	Total profit divided by book value of equity
<i>ROE_ADJ</i>	Adjusted industry-median ROE, which is the difference between firm's ROE and industry-median
<i>TOBIN_Q</i>	Market value of assets over book value of assets
<i>TOBIN_Q_ADJ</i>	Adjusted industry-median TOBIN_Q, which is the difference between firm's TOBIN_Q and industry-median
<i>ROS</i>	Earnings before interests and tax divided by net sales
<i>ROS_ADJ</i>	Adjusted industry-median ROS, which is the difference between firm's ROS and industry-median
<i>OPINC_MV</i>	Operating Income divided by market value of assets
<i>OPINC_MV_ADJ</i>	Adjusted industry-median OPINC_MV, which is the difference between firm's OPINC_MV and industry-median
<i>MF_PER</i>	Institutional investor's ownership, which is calculated by the ratio of the number of shares held by mutual funds to the total number of shares in issue
<i>MF_MV_PER</i>	Another institutional investor's ownership, which is calculated by the ratio of the market value of shares held by mutual funds to the total market value of a firm
<i>TUL</i>	Other receivables deflated by total assets
<i>DTUL</i>	A dummy variable assigned to 1 if the firm's TUL is over the average value in the current year, and 0 otherwise
<i>TUL_LAR</i>	Other receivables obtained from firm's controlling shareholders and its affiliates deflated by total assets

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<i>DTUL_LAR</i>	A dummy variable assigned to 1 if firm's TUL_LAR is over current year median value, and 0 otherwise
<i>PAY</i>	Natural logarithm of total compensation received by board of directors, supervisors and executives
<i>TOP_1</i>	Percentage of shareholdings held by the largest shareholder
<i>IND</i>	The ratio of independent directors on the board
<i>DSUP_NUM</i>	A dummy variable assigned to 1 if the number of supervisors in a firm is above the median value of our sampled firms in the current year and 0 otherwise
<i>BIG_4</i>	A dummy variable assigned to 1 if a listed firm is audited by one of the international Big Four audit firms or their joint ventures in China, and 0 otherwise
<i>TS</i>	The ratio of tradable shares divided by total shares
<i>REFORM</i>	Dummy variable equal to 1 for the period when a listed firm was chosen to complete the SSSREF, 0 otherwise
<i>RET_ADJ</i>	Market-adjusted annual stock return, which is the difference between firm's stock return and annual market stock return
<i>STATE</i>	A dummy variable equal to 1 if the state shareholder is the largest shareholder, and 0 otherwise
<i>LEVERAGE</i>	Leverage calculated as total debt divided by total assets
<i>SGR</i>	The ratio of change of sales divided by sales of current year
<i>BM</i>	Book-to-market ratio calculated as book value of common equity over market capitalization
<i>FIRMSIZE</i>	Firm size computed as the natural logarithm of total assets
<i>MAK</i>	A comprehensive index measuring the development of the regional market in which the firm is registered (see Fan and Wang 2011), where higher values indicate greater regional market development

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