Multiple large shareholders and corporate investment: Evidence from China☆

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ABSTRACT

This study investigates the governance role of multiple large shareholders (MLS hereafter) in firms' investment decisions. Using a sample of 1640 Chinese firms listed on the Shanghai or Shenzhen stock markets, we compare the investment efficiency of firms having MLS with that of firms having a single large shareholder and find that the presence and power of MLS are associated with significantly higher investment efficiency. The results are robust after we address endogeneity and sample selection concerns. Further tests show that MLS exert governance mainly through "voice." MLS tend to lower potential overinvestment and increase future investment performance. The impact of MLS on investment efficiency does not vary with a firm's access to resources and is less prominent in firms with stronger governance and less information asymmetry. Our results imply that MLS play a governance role and alleviate a firm's agency costs and information asymmetry manifested in a firm's investment efficiency.

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1. Introduction

How well firms make investment decisions is a fundamental question in corporate finance. Extensive studies have documented that both information asymmetry and agency problems influence investment behavior (Stein, 2003). However, the empirical evidence on investment efficiency concerning agency problems has focused mainly on the manager-shareholder agency conflict (Berle and Means, 1932), overlooking the agency problem between controlling and minority shareholders (La Porta et al., 2000) and the potential governance role of blockholders, beyond the controlling shareholder.

There are a few studies that have examined the governance role of multiple large shareholders (MLS hereafter). For example, Maury and Pajuste (2005) and Laeven and Levine (2008) explore the impact of MLS on firm value, and Attig et al. (2008) show the governance role of MLS in the cost of equity financing. Cho (1998) suggests that the relationship between ownership and firm value can be viewed as a two-stage process, the first stage is the effect of ownership structure on investment and the second stage is the effect of investment on firm value.

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Although the relationship between a firm's investment decisions and corporate values has been well studied (e.g., McConnell and Muscarella, 1985; Chan et al., 1990; Blose and Shieh, 1997; Titman et al., 2004), prior study on the role of MLS on a firm's investments has been limited. Our study fills this gap by focusing on the first stage and examining whether the existence of MLS – as opposed to a single large shareholder – benefits or harms minority shareholders through a firm's investment decisions.

Ownership by MLS is common in the corporate landscape (La Porta et al., 1999; Barca and Becht, 2001). Laeven and Levine (2008) examine 1657 sample firms from 13 Western European countries and find that 34% of the firms have two or more large shareholders with at least 10% voting rights. Edmans and Manso (2011) find that 70% of U.S. firms have multiple blockholders with 5% or more of a firm's equity.

Not surprisingly, theorists have offered competing explanations for the effects of MLS. In one view, MLS monitor not only managers but also each other and, as a result, the firm implements better corporate policies (Shleifer and Vishny, 1986, 1997; Pagano and Roell, 1998). In the other view, MLS form controlling coalitions and collude to expropriate from minority shareholders (Pagano and Roell, 1998; Bennedsen and Wolfenzon, 2000). However, empirical evidence on the governance role of multiple blockholders in corporate decisions has been limited. Faccio et al. (2001) find that MLS tend to increase dividend rates and curb expropriation in Europe while decrease dividends and exacerbate expropriation in Asia. Since a controlling shareholder's expropriation of minority shareholders could take different forms than redistribution, for example, a controlling shareholder might decide to undertake bad investment projects or forgo profitable projects. Our study uses a sample of firms listed on the Shanghai or Shenzhen stock exchanges that had one or more large shareholders to examine the two competing arguments and explore the empirical relationship between MLS and a firm's investment efficiency.[1]

We study Chinese listed firms for three reasons. First, their ownership structure typically is concentrated – either with a single controlling shareholder or with several large shareholders. The large shareholders usually are big enough to either exert monitoring or form controlling coalitions (Jiang and Kim, 2015), so that their role in making corporate policies remains an empirical question. Second, the China Securities Market and Accounting Research (CSMAR) database provides rich data on the characteristics of blockholders, including the names and holdings of the top 10 blockholders, whether the firm is state owned and whether some of the blockholders are related parties.

Third, compared with other countries, our Chinese ownership data exhibit relatively high time-series variations and cover the period of a quasi-natural experiment – the split-share structure reform in China – which allowed us to address potential endogeneity by using DID tests on firms with ownership structure transitions from multiple blockholders to a single blockholder during the lockup period of the reform. Prior to the reform which began in April 2005, Chinese A-shares were split into tradable and non-tradable shares. Non-tradable shares typically represented about two-thirds of the shares outstanding and typically were held by the state and legal persons,[2] while tradable shares were usually held by domestic and foreign individual investors as well as domestic institutional investors. The reform allowed the non-tradable shareholders to trade their shares on the stock market after implementing a negotiated compensation plan with the tradable shareholders. For example, additional shares (30% of shareholdings on average, Li et al., 2011) passed from the holders of the non-tradable shares to the holders of tradable shares.[3] As a result, some large shareholders did not meet the 10% shareholdings threshold and were not large shareholders after the reform. There was a required lockup period of 12 months for each firm's non-tradable shares after the reform's effective day. Therefore, when firms with MLS became firms with one single large shareholder within the lockup period, the transition of the ownership structure tended to be exogenous since it was not due to a large shareholder's voluntary sell off. According to The Companies Law of the People's Republic of China,[4] shareholders with <10% of shareholdings did not have the right to call for interim shareholders' meetings (Jiang and Kim, 2015), and they lost an important mechanism through which to monitor the controlling shareholder. Therefore, our sample of Chinese listed firms from 2000 through 2014 provided a unique setting to address the endogeneity concerns by using a DID test around an exogenous shock in the ownership structure.

Using a sample of 1640 firms (12,990 firm-years) listed on China's stock exchanges from 2000 to 2014, we classify our sample firms into two groups: firms with a single blockholder who holds >10%[5] – but <50%[6] – of the shares, and firms with more than one such blockholder. Then we test the governance role of MLS in corporate investment by comparing the investment efficiency (measured as the sensitivity of investment expenditures to investment opportunities) of the two groups of firms, and we find that the presence of multiple blockholders increases investment efficiency. The empirical results are robust after controlling for firm-

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[1] We follow Stein's (2003) survey article on the corporate investment literature and define investment efficiency as the sensitivity of a firm's investment expenditures to growth opportunities or Tobin's q (1969).

[2] The state is defined as the central or local governments and government affiliates, for example, state-owned asset management companies and state-owned enterprises. Legal persons include domestic business agencies or enterprises of local government, which either permit the listed firm to operate or provide the startup company resources under their control (Sun and Tong, 2003; Li et al., 2011).

[3] For more details on the split-share structure reform in China and the compensation plans, read Li et al. (2011) and Liao et al. (2014).

[4] The Companies Law of the People's Republic of China can be found at http://www.csrc.gov.cn/pub/csrc_en/laws/rfdm/statelaws/200904/t20090428_102712.html.

[5] We also use 5% shareholdings as the threshold to define large shareholders and the results are robust.

[6] We delete firms with a controlling shareholder owning >50% of the shares because in such cases, other shareholders lack either the power or the incentive to contest and monitor the controlling shareholder's decisions (Bennedsen and Wolfenzon, 2000). Our study focuses on the potential role of multiple large shareholders on the controlling shareholder based on the agency problem between controlling and minority shareholders, where the controlling shareholder tends to expropriate wealth from minority shareholders. If the controlling shareholder owns >50% shares of the firm, his or her incentives to extract the private benefit from minority shareholders diminish, which is the alignment-of-interest effect (Jiang et al., 2017). Moreover, the role that other large shareholders could play on the controlling shareholder with 50% or more shareholdings is limited, since most company decisions (including investment decisions) could be voted on and determined by the controlling shareholders. We later include these firms in our tests, and the results are robust.

and year-fixed effects, which suggest that the positive effect of MLS on investment efficiency is probably not the result of differences in firm or year characteristics between firms with MLS and firms with one large shareholder.

The positive association between MLS and a firm's investment efficiency may have been driven by endogeneity problems. For example, potential investors may be attracted to invest in the company because of its high investment efficiency. We would still observe a positive association between MLS and investment efficiency, but it wouldn't necessarily mean that MLS enhance corporate governance and, therefore, investment efficiency. It simply could mean that the investors pick good firms to own. To mitigate endogeneity, we conduct difference-in-differences (DID) around a quasi-natural experiment – the split-share structure reform in China. Our sample of Chinese listed firms from 2000 and 2014 provide a unique setting to address endogeneity by using the DID test around an exogenous shock in the ownership structure. Meanwhile, we also use a variety of the Heckman two-step approach – the treatment effects model – to address potential problems caused by self-selection. The results from both methods are consistent with our main findings and seem to confirm that MLS tend to increase a firm's investment efficiency.

Furthermore, we find that investment efficiency increases with the relative power of other large shareholders to the controlling shareholder and with the total number of large shareholders, which is consistent with the monitoring role of MLS. To investigate the channels through which MLS exercise their governance role, we examine the change in impact of MLS on investment efficiency before and after the split-share reform; we find that the effect from MLS on investment efficiency decreases after the reform, suggesting the direct intervention ("voice") channel. We also follow Biddle et al. (2009) and Richardson (2006) to measure deviations of investment from the expected investment and find that MLS tend to decrease overinvestment.

It is possible to have a positive relationship between MLS and investment efficiency without any monitoring by the MLS, since it is likely that the firms with MLS have more access to capital and other resources compared to firms with a single large shareholder. Although this alternative explanation is not consistent with the evidence that MLS lower the likelihood of overinvesting, we investigate this possibility by including measures of a firm's financial constraints and the regional Financial Market Development (FMD) index. Even with these considerations, we find no variation in the impact of MLS on investment efficiency, which seems to refute the "more access to resources" explanation.

We also find that the positive relationship between MLS and investment efficiency is less prominent for firms with less severe information asymmetry and agency problems. This finding is consistent with the argument that the monitoring role of MLS works more effectively when the information environment and governance are weak. Lastly, we examine the economic consequences of increased investment efficiency and explore whether MLS enhance long-term investment performance from one to three years after the investment. The evidence shows that MLS increase investment performance, which is consistent with their monitoring role.

Our study contributes to the growing literature on the governance role of MLS by examining the relationship between MLS and investment efficiency. Previous studies have examined the impact of MLS on firm value (Lehmann and Weigand, 2000; Volpin, 2002; Maury and Pajuste, 2005; Attig et al., 2009), cost of equity capital (Attig et al., 2008) and dividend rate (Faccio et al., 2001), but no research to our knowledge has investigated the impact of MLS on investment efficiency. The relationship between ownership and investment could be viewed as having two stages: the first concerns the effects of ownership on firm value (Cho, 1998), while the second focuses on the relationship between investment and firm value (McConnell and Muscarella, 1985; Chan et al., 1990; Blose and Shieh, 1997; Titman et al., 2004). Our study extends the literature on the impact of MLS on firm value by focusing on the first stage of the relationship. Since a firm's controlling shareholder could choose to invest in less profitable projects or forgo profitable projects for the benefits of control, it is important to examine the role of MLS in the controlling shareholder's investment behaviors.

This study also complements Attig et al. (2008), who document that the presence, number and control size of other large shareholders – beyond the controlling shareholder – can reduce the cost of equity financing. Firms' investments may be inefficient when they face a high cost of equity financing and are, therefore, resource constrained (Fazzari et al., 1988; Stein, 2003). There are a few studies (Guiso et al., 2002; Gilchrist and Zakrajsek, 2007) reporting a negative relationship between corporate investment and the cost of capital. Our study of the impact of MLS on investment efficiency seems to confirm Attig et al. (2008) and extends it by focusing on one of the economic consequences of a reduced cost of equity financing, i.e., a firm's investment efficiency.

The rest of the paper is organized as follows. In Section 2, we review related literature and develop testable hypotheses. In Section 3, we describe the data and the main variables. We present our empirical results in Section 4, and we conclude in Section 5.

2. Literature review and hypothesis development

In a perfect world as described by Modigliani and Miller (1958), capital would be efficiently allocated to the right projects so that the marginal product of capital on every project would be the same. But in the real world, investment efficiency is substantially affected by frictions such as information asymmetry and agency problems (Stein, 2003). In this study, we focus on how ownership structure affects these frictions, as manifested in investment efficiency. Specifically, we examine how the presence of MLS affects the agency problem and information asymmetry between a controlling shareholder and minority shareholders, and how they affect a firm's investment efficiency.

Firms with concentrated ownership usually have controlling shareholders who have the power to appoint managers and executives or take these positions themselves (Pagano and Roell, 1998). They have the ability – and sometimes incentive – to expropriate from minority shareholders and enjoy private benefits of control. This conflict of interest between controlling and

minority shareholders may affect firms' investment decisions, since the controlling shareholders can forgo profitable projects to preserve private benefits or undertake unprofitable projects to divert resources to other companies owned by them.

The existence of MLS could either mitigate or exacerbate the potential expropriation. One strand of studies has suggested that MLS either compete for control (Bloch and Hege, 2001) or monitor the controlling shareholder (Winton, 1993; Pagano and Roell, 1998; Bolton and Thadden, 1998), reducing information asymmetry and agency problems and thus increasing investment efficiency. Another strand of literature indicates that multiple blockholders form controlling coalitions to share private benefits (Zwiebel, 1995; Pagano and Roell, 1998; Gomes and Novaes, 2006), intensifying information asymmetry and agency problems that lower investment efficiency.

There are quite a few empirical studies on the governance role of MLS. Many studies (Volpin, 2002; Maury and Pajuste, 2005; Laeven and Levine, 2008; and Attig et al., 2009) have shown a positive impact of MLS on firm value, suggesting a reduction of expropriation of private benefits in the presence of more contestable large shareholders. Attig et al. (2013) report a positive relationship between MLS and the valuation of cash holdings. The presence and control size of MLS may tend to reduce the cost of equity financing (Attig et al., 2008), enhance earnings informativeness (Boubaker and Sami, 2011) and increase corporate risk taking (Mishra, 2011) – all of which seem to indicate a mitigated agency problem and reduced information asymmetry between the controlling shareholder and minority shareholders. Faccio et al. (2001) find that the existence of MLS increases dividend rates and constrains expropriation in Europe, while reduces the dividend rates and colludes with the largest shareholder to extract private benefits in Asia.

Our study on the relationship between ownership and a firm's investments also extends Cho (1998), who focuses on the agency problems between managers and shareholders. He suggests that the relationship between ownership and firm value could be divided into the impact of ownership on investment and the effect of investment on firm value. Thus we explore the relationship between ownership and investment by focusing on the agency problems between a controlling shareholder and minority shareholders, which is a typical problem since most public firms in the world have a concentrated ownership structure (La Porta et al., 1999). Based on theoretical predictions and mixed empirical evidence on the governance role of MLS, the impact of MLS on firms' investment efficiency remains an empirical question. Hence we develop the following, competing hypotheses:

Monitoring Hypothesis: Firms with multiple large shareholders have higher investment efficiency than firms with a single large shareholder.

Collusion Hypothesis: Firms with multiple large shareholders have lower investment efficiency than firms with a single large shareholder.

3. Data and main variables

3.1. Sample selection and data sources

We start by selecting all listed A-share[7] companies in the China Securities Market and Accounting Research (CSMAR) database from 2000 to 2014. Following previous studies on investment efficiency, we remove financial firms (China Securities Regulatory Commission [CSRC] code I) because their investment activities differ in nature. We further exclude widely held firms – that is, firms with every shareholder having <10% of the shares outstanding – since they do not have the agency conflict between controlling owners and minority shareholders that we wish to examine. We also discard firms with a controlling shareholder who own >50% of the shares because in that case, other shareholders lack either the power or the incentives to contest and monitor the controlling shareholder's decisions (Bennedsen and Wolfenzon, 2000). We also exclude firms with missing or incomplete financial or governance data. The final sample consists of 12,990 firm-year observations representing 1640 listed firms. Appendix B presents the sample selection process.

Following previous studies (Maury and Pajuste, 2005; Laeven and Levine, 2008; Attig et al., 2008, 2009), we define a large shareholder as one holding 10%[8] or more of the shares outstanding. The ownership data also come from CSMAR, which specifies share ownership of the top 10 largest shareholders for all listed firms in each year. We manually group parties related to the controlling shareholder and sum their shareholdings by using the financial statement disclosures on related parties.[9] Our final sample contains 8450 observations with one large shareholder (≥10% but <50% of shareholdings), 3791 observations with two large shareholders, 681 observations with three large shareholders and 68 observations with four or more large shareholders. We define *MULTIPLE* as an indicator variable that equals 1 if a listed company has two or more large shareholders in a given year (and 0 otherwise).

3.2. Model specification

We examine the relationship between MLS and investment efficiency with the following model:

$$
\begin{aligned}
INVESTMENT_{i,t} = {}& \alpha_t + \alpha_i + \beta_1 MULTIPLE_{i,t-1} * INVESTMENT\ OPPORTUNITIES_{i,t-1} + \beta_2 MULTIPLE_{i,t-1} \\
& + \beta_3 INVESTMENT\ OPPORTUNITIES_{i,t-1} + CONTROLS_{i,t-1} + \varepsilon_{i,t},
\end{aligned}
\tag{1}
$$

where $INVESTMENT_{i,t}$ represents the investment expenditures of firm i in year t, calculated as the sum of the annual change in net fixed assets, depreciation and amortization, scaled by beginning-of-year total assets (INVEST1). Alternatively, we measure investment expenditures as the annual change in net fixed assets divided by beginning-of-year total assets (INVEST2).[10] INVESTMENT OPPORTUNITIES are measured as Tobin's q (TQ), the sum of the market value of tradable shares and book value of non-tradable shares divided by the book value of total assets. We also follow Chen et al. (2011a) and measure investment opportunities by the annual growth rate in total assets (GROWTH).[11] Investment decisions are typically made at the beginning of the year based on investment opportunities at the end of the prior year. Therefore, we use lagged TQ and lagged GROWTH as a proxy for the prior year's investment opportunities, while investment is measured contemporaneously.

$MULTIPLE_{i,t-1}$ is a dummy variable that equals one if firm i has at least two large shareholders in year $t − 1$ (and zero otherwise). The coefficient of INVESTMENT OPPORTUNITIES is investment efficiency, which measures the sensitivity of investment expenditures to investment opportunities (e.g., Fazzari et al., 1988; McLean et al., 2012). Under the Modigliani and Miller (1958) framework, a positive relationship between investment opportunities and investment expenditures is expected. Therefore, we expect β_3 to be positive.

To test our hypotheses on the role of MLS in investment efficiency, we examine the coefficient of the interaction between MULTIPLE and INVESTMENT OPPORTUNITIES. If MLS monitor the controlling shareholder and urge him/her to make better investment decisions, we expect a positive β_1. If MLS collude with the controlling shareholder and make inefficient investment decisions, we expect a negative β_1.

We also include several control variables following previous studies (e.g., Chen et al., 2011b): SIZE, CFO, LONGDEBT, LIST, SOE, DUALITY and INDEP. All of the firm-specific control variables are from year t-1 to minimize endogeneity concerns. Appendix A describes all the variables in detail. The variables α_t and α_i represent year and firm fixed effects, respectively, which are included in the regressions to control for unobservable, time-invariant characteristics and firm variables that may have affected the firm's investments. To reduce the influence of outliers, we winsorize all continuous variables at the 1st and 99th percentiles.

3.3. Summary statistics

Table 1 describes the sample with summary statistics and shows that 34.9% of the firms in our sample have at least two blockholders, similar to the proportion in Europe and East Asia reported by other studies. For instance, Boubaker (2007), Laeven and Levine (2008), and Ben-Nasr et al. (2015) report that MLS are present in 34%, 36.6%, and 34.1% of French firms, respectively. Attig et al. (2009) find that firms with MLS accounted for 33.2% in East Asia. Our average firm's annual investment expenditures measured by INVEST1 is 5.6%, and the median is 3%; these figures are similar to those reported by Chen et al. (2013). Of the sample firms, 58.7% are state-owned. The other firm characteristics are similar to those reported by Chen et al. (2011b), Firth et al. (2012), Chen et al. (2013) and Jiang et al. (2015) – all of whom examine the corporate investments of Chinese firms.

4. Empirical results

4.1. Baseline regression results

Table 2 presents the baseline regression results of the impact of MLS on investment efficiency. The empirical model (1) is specified in Section 3.2, and all the variables are defined in Appendix A.

Table 2 shows that the coefficients of MULTIPLE * TQ in columns (1)–(3) are positive and statistically significant – regardless of the investment expenditures measured by INVEST1 or INVEST2. This evidence suggests that firms with MLS tend to have higher investment efficiency. The coefficient of 0.004 indicates that when TQ increases by one standard deviation (1.235), the investment expenditures of firms with MLS is going to increase 0.5% (=0.004 * 1.235) more than those of firms with a single large shareholder. This incremental effect accounts for approximately 8.9% of the average firm investment (5.6%). When investment opportunities are proxied by GROWTH, the results shown in columns (4)–(6) are consistent with those in columns (1)–(3). When GROWTH increases by one standard deviation (0.263), firms with MLS spend 0.3% (=0.012 * 0.263) more on investments than firms with a single large shareholder, which is approximately 5.4% of the average firm investment (5.6%). This result is consistent with the monitoring hypothesis and clearly refutes the collusion hypothesis.

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[10] Following Chen et al. (2011b), we also use cash payments for fixed assets, intangible assets and other long-term assets from the cash flow statement minus cash receipts from selling these assets – scaled by beginning total assets – to measure investment (INVESTMENT3). We further follow Biddle et al. (2009) and include acquisition expenditures as INVESTMENT4. The results using INVESTMENT3 and INVESTMENT4 are similar to the baseline regression. Results are available upon request.

[11] Alternatively, we use annual growth rate in sales as GROWTH; the results remain the same and are available upon request.

Table 1
Summary statistics.
This table presents summary characteristics for the sample firms listed on the Shanghai or Shenzhen Stock Exchanges that are contained in the Chinese Securities Market and Accounting Research (CSMAR) database. The sample consists of 12,990 firm-year observations (1640 unique firms) from 2000 to 2014. Definitions of the variables are provided in Appendix A.

Variable	N	Mean	Std Dev	P5	P25	P50	P75	P95
MULTIPLE	12,990	0.349	0.477	0	0	0	1	1
INVEST1	12,990	0.056	0.096	−0.04	0.008	0.03	0.078	0.242
INVEST2	12,990	0.027	0.092	−0.072	−0.013	0.003	0.045	0.202
TQ	12,990	1.960	1.235	0.988	1.183	1.529	2.249	4.438
GROWTH	12,990	0.141	0.263	−0.162	−0.004	0.088	0.22	0.611
SIZE	12,990	20.68	1.372	18.41	19.82	20.7	21.52	23.03
CFO	12,990	0.049	0.092	−0.099	0.002	0.046	0.097	0.2
LONGDEBT	12,990	0.071	0.102	0	0	0.027	0.104	0.286
LIST	12,990	8.609	4.852	2	5	8	12	17
SOE	12,990	0.587	0.492	0	0	1	1	1
DUALITY	12,990	0.158	0.365	0	0	0	0	1
INDEP	12,990	0.329	0.104	0	0.333	0.333	0.375	0.444

The coefficients on control variables are generally consistent with the findings of previous researchers (e.g., Chen et al., 2011b; Chen et al., 2013). The coefficients on *TQ* and *GROWTH* are positive and statistically significant at the 1% level for all regressions, indicating that more investment expenditures are associated with better investment opportunities. The significantly positive coefficients on *CFO* and *LONGDEBT* suggest that investment expenditures increase with cash flows from operations and the proportion of long-term debt. We also find that larger firms have larger investments than smaller firms, as shown by the significantly positive coefficients on *SIZE* in columns (1) and (4) when firm fixed effects are not included. We do not find any predictive effects of *LIST*, *SOE*, *DUALITY* or *INDEP* on firms' investment expenditures.

Table 2
A baseline regression of multiple large shareholders and investment efficiency.
This table presents estimates of model (1), with the dependent variable as the sum of annual change in net fixed assets and depreciation and amortization scaled by beginning of year total assets (INVEST1) in columns (1), (2), (4), and (5), and the sum of annual change in net fixed assets scaled by beginning of year total assets (INVEST2) in columns (3) and (6). Appendix A provides detailed variable descriptions. Numbers in parentheses are *t*-statistics based on standard errors clustered by firm when we control for year and industry effects. *, ** and *** denote statistical significance at 10%, 5% and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
MULTIPLE * TQ	0.004**	0.004**	0.004***			
	(2.16)	(2.43)	(2.61)			
MULTIPLE * GROWTH				0.012*	0.012**	0.012**
				(1.67)	(2.12)	(1.97)
MULTIPLE	−0.009**	−0.001	−0.002	−0.003*	0.002	0.002
	(−2.32)	(−0.18)	(−0.35)	(−1.75)	(0.67)	(0.68)
TQ	0.004***	0.008***	0.007***			
	(3.78)	(6.60)	(5.90)			
GROWTH				0.051***	0.028***	0.043***
				(12.47)	(8.12)	(11.01)
SIZE	0.005***	−0.006***	−0.006***	0.002***	−0.006***	−0.007***
	(6.10)	(−3.91)	(−3.81)	(2.80)	(−4.92)	(−5.58)
CFO	0.115***	0.043***	0.028***	0.105***	0.034***	0.046***
	(11.05)	(4.15)	(2.69)	(12.21)	(3.98)	(4.43)
LONGDEBT	0.128***	0.072***	0.071***	0.088***	0.049***	−0.011
	(10.49)	(5.78)	(5.77)	(9.60)	(4.71)	(−1.58)
LIST	−0.003***	−0.005	−0.007	−0.002***	−0.008	−0.001
	(−12.66)	(−0.65)	(−0.86)	(−11.89)	(−1.24)	(−0.17)
SOE	0.002	−0.002	−0.002	0.004**	−0.000	−0.000
	(0.98)	(−0.59)	(−0.63)	(2.51)	(−0.07)	(−0.14)
DUALITY	−0.002	−0.001	−0.001	−0.001	−0.000	0.016
	(−0.75)	(−0.36)	(−0.19)	(−0.53)	(−0.19)	(1.08)
INDEP	0.005	0.022	0.022	0.002	0.015	0.156***
	(0.28)	(1.21)	(1.25)	(0.15)	(0.99)	(6.59)
INTERCEPT	−0.053***	0.172***	0.142***	−0.006	0.162***	0.023***
	(−2.97)	(5.68)	(4.74)	(−0.46)	(6.95)	(2.78)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed	Yes	No	No	Yes	No	No
Firm fixed effects	No	Yes	Yes	No	Yes	Yes
# of obs.	12,990	12,990	12,990	12,990	12,990	12,990
Adjusted R^2	0.092	0.026	0.024	0.117	0.033	0.040

4.2. Robustness tests

Although the positive association between MLS and investment efficiency shown in Table 2 is consistent with the monitoring hypothesis, the results may have been affected by omitted variables or reverse causality. Specifically, there could have been observable – or unobservable – firm characteristics affecting both investment efficiency and ownership structure. Furthermore, large shareholders might be attracted to invest in the company because of its high investment efficiency. We would still observe a positive association between MLS and investment efficiency, but it may not mean that MLS enhance corporate governance and, therefore, investment efficiency; instead, they simply may have picked good firms to own.

We then address the endogeneity issue by focusing on firms with ownership transitions from MLS to a single large shareholder, around the split-share structure reform in China. Many studies (Li et al., 2011; Liao et al., 2014) have documented the process and the compensation plans associated with the split-share structure reform in China. They suggest that the ownership transitions from MLS to a single large shareholder during the lockup period is likely due to the compensation plan of the firm, but not due to a voluntary sell off by a large shareholder. We focus on these firms with exogenous ownership transitions to address the endogeneity concerns. Furthermore, we use a treatment effects model – which fits in the framework of Heckman's two-step approach – to address potential sample selection bias.

4.2.1. Difference-in-differences analysis

To establish a causal relationship between MLS and investment efficiency, we examine how investment efficiency changes around an exogenous shock in a firm's ownership structure. We focus on firms with ownership transitions from MLS to a single large shareholder within the lockup period of the split-share structure reform. Prior to the split-share reform, blockholders typically hold non-tradable shares, which are prohibited in the secondary market but give the same cash flow rights and voting rights as tradable shares. The split-share reform allows them to trade their shares if they negotiate a compensation plan with tradable shareholders. Li et al. (2011) document that the average compensation is about 30% increase in the shares of tradable shareholders transferred from non-tradable shareholders. As a result of this transfer, some large shareholders no longer hold at least 10% of the shares and hence are not classified as large shareholders after the reform. A 12-month lockup period is required for non-tradable shares in each firm after the reform effective day to stabilize the stock market. This ownership transition happens within the lockup period of the reform and tend to be exogenous because of the dilution effect of the compensation plan. Since the only large shareholders with 10% or more shares could call for interim shareholder meetings (Jiang and Kim, 2015), shareholders who drop below the 10% threshold due to the compensation plan lose an important mechanism – the interim shareholder meetings – to monitor the controlling shareholder. Therefore, if the monitoring hypothesis were true, we expect the investment efficiency to decline after this ownership transition.

Following previous studies (e.g., Slaughter, 2001; Chen et al., 2011b; Chen et al., 2013; Jiang et al., 2015), we employ a difference-in-differences (DID) test. Specifically, we compare the changes in investment efficiency around firm's ownership transitions from MLS to a single controlling shareholder within the lockup period with the investment efficiency change of firms with the same multiple large shareholders' ownership structure before and after the reform.

We first gather data from sample firms with IPOs before 2004 to ensure they have the split-share structure, since the reform begins in 2005. The treatment group is comprised of firms with MLS before the split-share reform which were left with only one large shareholder during the lockup period of the reform. We require this ownership transition to happen in the lockup period of the reform to ensure the exogeneity of the ownership transition. This transition of ownership structure is not due to the sell-off of shares by large shareholders, but due to the compensation in the split-share reform, i.e., the transfer of shares from non-tradable shareholders to tradable shareholders. The control group is firms with MLS. We also require firms in both control and treatment groups to have two-year observations before and after the reform. There are 104 firms with 1075 firm-year observations in the treatment group, and 206 firms with 2025 firm-year observations in the control group.

We estimate the following model to test our hypotheses:

$$
\begin{aligned}
INVESTMENT_{i,t} = {} & \alpha_J + \alpha_t + \beta_1 TREAT_i * POST_{i,t} * INVESTMENT\ OPPORTUNITIES_{i,t-1} + \beta_2 TREAT_i \\
& * INVESTMENT\ OPPORTUNITIES_{i,t-1} + \beta_3 POST_{i,t} * INVESTMENT\ OPPORTUNITIES_{i,t-1} + \beta_4 TREAT_i * POST_{i,t} \\
& + \beta_5 INVESTMENT\ OPPORTUNITIES_{i,t-1} + \beta_6 POST_{i,t} + CONTROLS_{i,t-1} + \varepsilon_{i,t},
\end{aligned}
\tag{2}
$$

where $INVESTMENT_{i,t}$ and $INVESTMENT\ OPPORTUNITIES_{i,t-1}$ are defined as in model (1). $POST_{i,t}$ is an indicator variable that equal one for firm i in year t and afterward if firm i has the split-share structure reform in year t (and zero otherwise). $TREAT_i$ is an indicator variable that equals one for firm i if firm i switches from MLS to a single large shareholder during the lockup period of the split-share reform (and zero otherwise). We pay close attention to the coefficient on the interaction term $TREAT * POST * INVESTMENT\ OPPORTUNITIES$, which captures the difference in the changes in investment efficiency between firms with ownership transition and firms without a transition. Firm and year fixed effects are included. All the other variables are defined as in model (1).

The regression results are reported in Table 3. The coefficients on $TREAT * POST * TQ$ and $TREAT * POST * GROWTH$ are significantly negative, indicating that investment efficiency decreases when a firm's ownership structure has an exogenous change from MLS to a single large shareholder. This result supports the monitoring hypothesis after controlling for the endogeneity concern.

Table 3
Difference-in-differences tests.

This table presents estimates of difference-in-differences regressions in which the dependent variable is *INVEST1*. The sample consists of 3066 firm-year observations (310 unique firms) from 2000 to 2014. *POST* is an indicator variable that equals one for firm i in year t as well as afterward if firm i has the split-share structure reform in year t (and zero otherwise). *TREAT* is an indicator variable that equals one for firm i if firm i switches from multiple large shareholders to a single large shareholder during the lockup period of the split-share reform (and zero otherwise). Other variable descriptions are provided in Appendix A. Numbers in parentheses are *t*-statistics based on standard errors clustered by firm. *, ** and *** denote statistical significance at 10%, 5% and 1%, respectively.

	Multiple to single	
TREAT * POST * TQ	−0.023**	
	(−2.08)	
TREAT * POST * GROWTH		−0.041**
		(−2.15)
TREAT * TQ	0.018	
	(1.61)	
POST * TQ	0.007	
	(0.85)	
TREAT * GROWTH		0.019
		(1.42)
POST * GROWTH		0.034***
		(3.83)
TQ	0.003	
	(0.35)	
GROWTH		0.003
		(1.07)
TREAT * POST	0.053***	0.016**
	(2.68)	(2.39)
POST	−0.002	0.003
	(−0.11)	(0.29)
SIZE	−0.008***	−0.008***
	(−2.85)	(−3.39)
CFO	0.100***	0.076***
	(4.77)	(4.59)
LONGDEBT	0.073***	0.050**
	(2.70)	(2.37)
LIST	0.014	0.004
	(0.35)	(0.11)
SOE	0.007	0.005
	(0.95)	(0.81)
DUALITY	0.011	0.007
	(1.62)	(1.30)
INDEP	0.115***	0.074**
	(2.81)	(2.29)
INTERCEPT	0.167*	0.178***
	(1.95)	(2.72)
Year fixed effects	Yes	Yes
Firm fixed effects	Yes	Yes
# of obs.	3066	3066
Adjusted R^2	0.046	0.049

4.2.2. Heckman two-step model

We further explore a variety of the Heckman (1979) two-step approach – the treatment effect model – to test for self-selection bias. In the first step, we use a probit model to estimate the probability of a firm having MLS. Specifically, we regress a firm's ownership structure $MULTIPLE_{i,t}$ in year t on the average *MULTIPLE* of all other firms in the same industry (*IND_MULTIPLE*) up to year t-1, along with other variables potentially determining the MLS structure – including *SIZE*, *CFO*, *LONGDEBT*, *LIST*, *SOE*, *DUALITY* and *INDEP* – to estimate the inverse Mill's ratio (*LAMBDA*). As previous studies have suggested (Laeven and Levine, 2009; Mishra, 2011; Paligorova and Xu, 2012; Ben-Nasr et al., 2015), the average *MULTIPLE* of all other firms in the same industry (*IND_MULTIPLE*) is a reasonable instrument for a firm's ownership structure. We expect that a firm's ownership structure would be correlated with the industry average – but unlikely that a firm's investment efficiency would affect the industry average ownership structure. That is, this instrumental variable attains the inclination of firms within the same industry to have MLS.

In the second step, we include *LAMBDA* estimated from the first-step regression as an additional independent variable in the baseline regression (model (1)). The results, shown in panel B of Table 4, are statistically consistent with the baseline regression results in Table 2; that is, both coefficients on the interaction terms of *MULTIPLE * TQ* and *MULTIPLE * GROWTH* are positive and statistically significant, indicating that the presence of MLS raise a firm's investment efficiency.

Table 4
Heckman's two-step model.
This table presents estimates of Heckman's two-step model. The sample consists of 12,990 firm-year observations (1640 unique firms) from 2000 to 2014. Panel A shows the results from the first-step probit regressions in which the dependent variable is *MULTIPLE*, an indicator variable that equals one if the firm has at least two large shareholders (and zero otherwise). Panel B presents the results of the second-step regressions in which the dependent variable is *INVEST1*. We use average *MULTIPLE* within industry (*IND_MULTIPLE*) as the instrument for *MULTIPLE* in the first-stage regression. The inverse Mills' ratio (*LAMBDA*) estimated from the first-step regression is used to control for self-selection bias. Appendix A provides detailed variable descriptions. The *t*-statistics are in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1%, respectively.

Panel A: First stage regression	
IND_MULTIPLE	0.632**
	(2.41)
Control	Yes
# of obs.	12,990
Adjusted R^2	0.066

Panel B: Second stage regression	(1)	(2)
MULTIPLE * TQ	0.004**	
	(2.38)	
MULTIPLE * GROWTH		0.008*
		(1.73)
MULTIPLE	0.067**	0.049*
	(2.06)	(1.87)
TQ	0.007***	
	(6.43)	
GROWTH		0.023***
		(7.76)
LAMBDA	−0.041**	−0.028*
	(−2.08)	(−1.80)
SIZE	−0.004***	−0.004***
	(−2.71)	(−3.83)
CFO	0.030***	0.022**
	(2.64)	(2.41)
LONGDEBT	0.061***	0.042***
	(4.88)	(4.23)
LIST	−0.004	−0.006
	(−0.54)	(−0.91)
SOE	0.002	0.002
	(0.43)	(0.55)
DUALITY	0.003	0.002
	(0.90)	(0.76)
INDEP	0.022	0.015
	(1.33)	(1.16)
INTERCEPT	0.100**	0.112***
	(2.40)	(3.49)
Year fixed effects	YES	YES
Firm fixed effects	YES	YES
# of obs.	12,990	12,990
Adjusted R^2	0.028	0.034

4.3. Control contestability

Thus far, the evidence supports the monitoring hypothesis. So we further examine whether the power ratio between other large shareholders and the controlling shareholder affect a firm's investment efficiency. Various studies have suggested that the relative power of large shareholders matters to firm value (e.g. Zwiebel, 1995; Bennedsen and Wolfenzon, 2000; Maury and Pajuste, 2005; Laeven and Levine, 2008; Attig et al., 2013).[12] According to the monitoring hypothesis, greater control contestability would increase the winning coalition's equity holdings and better align its members' interests with those of minority shareholders (Bennedsen and Wolfenzon, 2000); relative power, therefore, would enhance other large shareholders' monitoring of the largest shareholder and increase a firm's investment efficiency. However, under the collusion hypothesis, the diversion of a firm's resources would be proportional to all large shareholders' assets. Hence greater contestability would be associated with lower investment efficiency.

Specifically, we measure the ability to contest control by *OTHERS/TOP1* and *NLARGE*, where *OTHERS/TOP1* is the sum of holdings of all large shareholders other than the largest shareholder divided by the holdings of the largest shareholder, and *NLARGE* is the

[12] There also are studies documenting a concave relationship between relative power of large shareholders and firm value (e.g., Cai et al., 2016). We consider the potential non-linear relationship by including a squared term of the relative power in model (Attig et al., 2013). Coefficients on the squared term of relative power are not significantly different from zero, which refute the non-linear relationship between the relative power of large shareholders and investment efficiency. These results are available upon request.

number of large shareholders. The higher the *OTHERS/TOP1* ratio, the higher the relative power of the other shareholders in relationship to the largest shareholder. Similarly, for higher values of *NLARGE*, the larger the contestability of the largest shareholder by the coalition of other large shareholders. Then we estimate the following model (and the results are shown in Table 5):

$$INVESTMENT_{i,t} = \alpha_t + \alpha_i + \beta_1 POWER_{i,t-1} * INVESTMENT\ OPPORTUNITIES_{i,t-1} + \beta_2 POWER_{i,t-1}$$
$$+ \beta_3 INVESTMENT\ OPPORTUNITIES_{i,t-1} + CONTROLS_{i,t-1} + \varepsilon_{i,t}, \tag{3}$$

where $POWER_{i,t-1}$ is proxied by the contestability measures *OTHERS/TOP1* or *NLARGE*, and all other variables are the same as in model (1). For firms with a single large shareholder, *OTHERS/TOP1* would be zero and *NLARGE* would be one.

Panel A of Table 5 shows that all the coefficients on *NLARGE * TQ*, and *NLARGE * GROWTH*, and *MULTIPLE * OTHERS/TOP1 * GROWTH* are positive and statistically significant, indicating that a higher voting power of other large shareholders enhance their abilities to monitor the largest shareholder, resulting in higher investment efficiency.

We further investigate the heterogeneous nature of large shareholders and explore whether different types of large shareholders behave differently in terms of monitoring the controlling shareholder and resulting in different investment efficiencies. There are quite a few studies documenting that different types of large shareholders may have different incentives and, therefore, different monitoring effects on the controlling shareholder. For example, Wahal and McConnell (2000) find a significantly positive relationship between institutional ownership and capital expenditures on long-term projects. This relationship is benchmarked against individual investors, which suggests that institutional investors may serve as a buffer between managers and shortsighted individual investors. Ferreira and Matos (2008) argue that firms with foreign investors often have better corporate governance.

Table 5
Control contestability.

This table examines the impact on firms' investment efficiency of the relative power of other large shareholders vis-à-vis the controlling shareholder (panel A) and the heterogeneity of large shareholders (panel C). Panel B shows the descriptive statistics of the heterogenous nature of large shareholders. The sample consists of 12,990 firm-year observations (1640 unique firms) from 2000 to 2014. Variables are described in Appendix A. The *t*-statistics are reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1%, respectively.

Panel A: Relative power of other large shareholders vis-à-vis the controlling shareholder.				
	(1)	(2)	(3)	(4)
NLARGE * TQ	0.004***			
	(3.10)			
NLARGE * GROWTH		0.010**		
		(2.20)		
OTHER/TOP1 * TQ			0.002	
			(0.82)	
OTHER/TOP1 * GROWTH				0.018**
				(2.21)
Other variables	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
# of obs.	12,990	12,990	12,990	12,990
ADJUSTED R^2	0.029	0.038	0.030	0.026

Panel B: Summary statistics of types of large shareholders.		
	Observation	Percentage
INST = 0	12,784	98.41%
INST = 1	206	1.59%
	Observation	Percentage
FOREIGN = 0	12,454	95.87%
FOREIGN = 1	536	4.13%

Panel C: Heterogeneity of large shareholders.				
	(1)	(2)	(3)	(4)
MULTIPLE * INST * TQ	0.005			
	(1.03)			
MULTIPLE * INST * GROWTH		−0.006		
		(−0.36)		
MULTIPLE * FOREIGN * TQ			0.002	
			(0.39)	
MULTIPLE * FOREIGN * GROWTH				0.069***
				(4.10)
Other variables	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
# of obs.	12,990	12,990	12,990	12,990
Adjusted R^2	0.027	0.039	0.028	0.034

Panel B of Table 5 provides a sample description of the nature of large shareholders, including the controlling shareholder and other large shareholders. *INST* is a dummy variable; if a firm has at least one large institutional shareholder (at the 10% threshold), its value is one (and zero otherwise). There are 206 firm-year observations (1.59%) with institutional investors as large shareholders in China from 2000 to 2014. This is not surprising given that institutions are not allowed to hold 10% or more shares in a company under the Measures for the Administration of Operation of Securities Investment Fund, which was issued by the China Securities Regulatory Commission (CSRC) on July 1, 2004. *FOREIGN* is also a dummy variable, which equals one if there is a foreign large shareholder in the firm (and zero otherwise). About 4% of the firm-year observations have large, foreign shareholders.

Panel C of Table 5 investigates whether some types of large shareholders could better monitor the controlling shareholder relative to other types of large shareholders, resulting in higher investment efficiency. The results show that among firms with multiple large shareholders, the presence of institutional large shareholders does not enhance investment efficiency. However, due to the limited observations with institutional investors as large shareholders, we couldn't draw a reliable conclusion on the monitoring role of institutional investors. Further, our test compares an institutional investor as a large shareholder with non-institutional investors as a large shareholder, and we find no differences in investment efficiency. However, this result is not a rejection of Wahal and McConnell (2000), who compare institutional investors with individual investors but focus only on capital expenditures on long-term projects.

Panel C of Table 5 also show that among firms with multiple large shareholders, the presence of large foreign shareholders tends to increase the investment efficiency. This is consistent with Ferreira and Matos (2008) who find that foreign investors play better monitoring roles.

Table 6
Channel analysis ("voice" vs. "exit").
This table reports the changes in the effect of multiple large shareholders on investment efficiency after the split-share reform. The dependent variable is *INVEST1*. The sample consists of 12,990 firm-year observations (1640 unique firms) from 2000 to 2014. Variables are described in Appendix A. The *t*-statistics are reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1%, respectively.

	(1)	(2)
POST * MULTIPLE * TQ	−0.003*	
	(−0.67)	
POST * MULTIPLE * GROWTH		−0.023**
		(−2.01)
MULTIPLE * TQ	0.005	
	(1.11)	
MULTIPLE * GROWTH		0.023***
		(2.66)
POST * TQ	−0.001	
	(−0.24)	
POST * GROWTH		0.006
		(0.84)
MULTIPLE * POST	0.002	0.002
	(0.24)	(0.48)
MULTIPLE	−0.003	0.001
	(−0.39)	(0.31)
TQ	0.005	
	(1.54)	
GROWTH		0.023***
		(3.63)
POST	0.016**	0.012**
	(2.20)	(2.34)
SIZE	−0.002	−0.006***
	(−1.63)	(−4.78)
CFO	0.032***	0.032***
	(3.79)	(3.73)
LONGDEBT	0.069***	0.051***
	(6.47)	(4.80)
LIST	−0.009	−0.009
	(−1.30)	(−1.30)
SOE	0.000	0.000
	(0.01)	(0.12)
DUALITY	−0.000	−0.001
	(−0.16)	(−0.39)
INDEP	0.013	0.015
	(0.83)	(1.02)
INTERCEPT	0.117***	0.195***
	(4.09)	(7.18)
Year fixed effects	YES	YES
Firm fixed effects	YES	YES
# of obs.	12,990	12,990
Adjusted R^2	0.029	0.037

Table 7

Overinvestment or underinvestment.

This table presents the results from multinomial logit pooled regressions. The dependent variable in panel A is a dummy variable, which equals one if the deviation from the expected investment is in the top tercile (overinvestment) and zero if it were in the middle tercile. Panel B shows the results with the dependent variable as one if the deviation from expected investment were in the bottom tercile (underinvestment) and zero if it were in the middle tercile. The firm-specific expected investment is measured by a function of *growth* or *TQ* (Biddle et al., 2009), or a function of lagged firm characteristics such as $Size_{t-1}$, $Leverage_{t-1}$, $Cash_{t-1}$, $List_{t-1}$, $Stock\ Returns_{t-1}$, $Investment_{t-1}$, TQ_{t-1}, year and industry fixed effect (Richardson, 2006). Other variables are described in Appendix A. The *t*-statistics are reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1%, respectively.

	A: Overinvestment vs. normal investment			B: Underinvestment vs. normal investment		
	(1)	(2)	(3)	(4)	(5)	(6)
MULTIPLE	−0.096*	−0.068	−0.104**	0.025	0.049	0.095
	(−1.95)	(−1.33)	(−1.96)	(0.45)	(0.91)	(1.38)
SIZE	0.002	0.009	0.190***	0.028	−0.617***	−0.486***
	(0.06)	(0.32)	(8.26)	(0.93)	(−20.12)	(−18.22)
CFO	2.578***	2.652***	2.250***	−1.001***	−0.988***	−0.922***
	(8.53)	(9.07)	(7.57)	(−3.62)	(−3.28)	(−2.62)
LONGDEBT	2.559***	3.198***	2.506***	0.475	−0.049	−1.599***
	(8.72)	(10.31)	(8.34)	(1.41)	(−0.15)	(−4.56)
LIST	−0.056***	−0.054***	−0.163***	0.028***	0.056***	0.243***
	(−9.80)	(−9.28)	(−19.73)	(4.13)	(8.58)	(24.57)
SOE	−0.047	−0.146***	−0.055	−0.246***	−0.211***	−0.142**
	(−0.92)	(−2.87)	(−1.00)	(−4.22)	(−3.91)	(−2.12)
DUALITY	−0.078	−0.033	0.025	−0.025	−0.015	0.083
	(−1.22)	(−0.51)	(0.36)	(−0.38)	(−0.22)	(1.03)
INDEP	−0.472	−0.260	−0.395	−0.149	0.303	0.200
	(−1.08)	(−0.63)	(−0.92)	(−0.34)	(0.72)	(0.42)
INTERCEPT	0.065	−0.132	0.906*	−0.036	13.715***	3.939***
	(0.11)	(−0.22)	(1.70)	(−0.06)	(21.04)	(3.78)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
# of obs.	8508	8859	7994	8944	8693	8600
Adjusted R^2	0.051	0.095	0.111	0.045	0.168	0.295

4.4. Channels through which large shareholders exert governance

Edmans (2014) suggests that large shareholders can exercise their governance role through two main mechanisms: direct intervention ("voice") or selling a firm's shares ("exit"). In order to differentiate between the MLS's governance roles of "voice" and "exit," we examine the role of MLS on investment efficiency before and after the split-share reform. If the impact of MLS on investment efficiency is the same or stronger before the split-share reform, it would most likely be due to "voice," Otherwise, it would most likely be due to both "voice" and "exit." This is because prior to the split-share reform, it was difficult for large shareholders to exit the company through open market trading. We test the changes in the effect of MLS on investment efficiency around the split-share reform by including a dummy variable, *POST*, which equals one after the split-share reform (and zero otherwise), as well as the interaction terms of *POST*, *MULTIPLE* and measures of investment opportunities (*TQ* or *GROWTH*).

Table 6 shows that the coefficient on the interaction term *MULTIPLE * POST * TQ* is not significant, while the coefficient on *MULTIPLE * POST * GROWTH* is significantly negative. This appears to suggest that the effect of MLS on investment efficiency reduces after the split-share reform, consistent with the "voice" channel.

4.5. Overinvestment or underinvestment

So far, we have documented that the presence of MLS enhances investment efficiency for the firms in our study. But how do MLS reduce the investment deviation from the expected level of investment? We use three models to measure the expected level of investment. Following Biddle et al. (2009), we estimate firm-specific investment as a function of *Growth* or *TQ*, respectively. Then we follow Richardson (2006) and estimate a firm's investment as a function of lagged firm characteristics, such as $Size_{t-1}$, $Leverage_{t-1}$, $Cash_{t-1}$, Age_{t-1}, $Stock\ Returns_{t-1}$, $Investment_{t-1}$, TQ_{t-1}, year and industry fixed effects.[13] Definitions of the variables are described in Appendix A.

We then classify firms based on the magnitude of the residuals (i.e., deviations from predicted investment). Specifically, we sort firms by the end of each year – based on the residuals – into three groups. Firm-year observations in the bottom tercile (i.e., the smallest residuals, most likely negative) are classified as underinvestment; observations in the top tercile (i.e., the largest residuals, most likely positive) are classified as overinvestment; and observations in the middle tercile are classified as the benchmark group. We estimate a multinomial logit model that predicts the likelihood that a firm would be in one of the extreme terciles as opposed to the middle tercile.

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[13] Size is defined as the natural logarithm of total sales at the end of the year. Leverage is defined as total debt divided by total assets. Cash is defined as cash divided by total assets. Stock return is the annual return of a stock. List is the number of years since the firm was first listed. Other variables are defined in Appendix A.

Table 7 presents the results from the multinomial logit pooled regression. The dependent variable in panel A is a dummy variable, which equals one if the firm-year observation is in the top tercile (overinvestment) and zero if it is in the middle tercile. Panel B shows the results with the dependent variable as one if the firm-year observation is in the bottom tercile (underinvestment) and zero if it is in the middle tercile.

Columns (1) and (4) in Table 7 are based on the expected investment from a function of *Growth*, columns (2) and (5) are based on the expected investment from a function of *TQ*, while columns (3) and (6) are based on the expected investment from a function of lagged firm characteristics. The result shows that MLS are significantly negatively related to the likelihood of overinvestment (columns (1) and (3)), while they do not have a significant impact on the likelihood of underinvestment (panel B). This result suggests that the presence of MLS mitigates overinvestment but not underinvestment. This is consistent with the monitoring role of MLS on the controlling shareholder since it is easier for other large shareholders to kill a proposed investment project by the controlling shareholder (correcting for overinvestment) than it is to urge him or her to start one (correcting for underinvestment).

4.6. Alternative explanation

We interpret the positive impact of MLS on investment efficiency as evidence that MLS monitor the controlling shareholder and lead to better investment efficiency. Alternatively, firms with MLS may have greater access to capital and other resources, which may result in better investment efficiency. To address this concern, we include firm-level financial constraints (*H_KZ*) and provincial-level Financial Development Index (*H_FMD*) in the regressions to control for a firm's access to resources and cross-provincial differences in financial development.

The financial constraint measure – the KZ index – is inspired by Kaplan and Zingales (1997), Lamont et al. (2001) and Guariglia and Yang (2016) who perform an ordered logit estimation of the categories of constraints on the following five financial ratios: cash flow, dividends, cash and cash equivalents all deflated by capital at the beginning of the year, Tobin's q, and debt to total capital. We use the estimated coefficients from the logit estimation to construct the KZ index of financial constraints. A firm with a high KZ index would have high financial constraints. *H_KZ* is one if a firm's KZ index is above sample median (and zero otherwise).

The Financial Market Development (FMD) index measures the annual progress of institutional transformation in every province. It indicates the differences in institutions and economic policies across provinces, which is part of the Marketization Index for China's Provinces from the National Economic Research Institute (NERI). The marketization index was first constructed and published by Fan and Wang (2001) and then updated by Fan et al. (2003, 2004, 2007, 2010, 2011). *H_FMD* is a dummy variable, which equals one if a firm's FMD is above the sample median (and zero otherwise).

Results shown in Table 8 suggest that the impact of MLS on a firm's investment efficiency does not vary with a firm's financial constraints nor with the local financial market development. These findings seem to refute the alternative explanation of MLS having more access to capital and, therefore, leading to higher investment efficiency.

4.7. The roles of information and governance

Rediker and Seth (1995) and Agrawal and Knoeber (1996) find that various governance mechanisms play interdependent roles in monitoring managers or controlling shareholders. Therefore, if the monitoring hypothesis is correct, the monitoring role of MLS should be affected by the strength of other governance mechanisms as well as information environments. We expect that the positive relationship between MLS and investment efficiency is less pronounced in firms with stronger governance and/or less information asymmetry.

Prior studies (e.g., Fan and Wong, 2005; Guedhami et al., 2014) have suggested that high-quality auditors exert a corporate governance role and provide better monitoring. Jiang et al. (2010) find that SOEs tend to have less tunneling than other firms. Firms tend to have more pronounced agency problems when there is a divergence between control rights and cash flow rights of the largest controlling shareholders (e.g., Claessens et al., 2002; Faccio and Lang, 2002; Jiang et al., 2011). La Porta et al. (1998) show that a strong legal enforcement system can help protect minority shareholders from exploitation by the controlling shareholder. Therefore, the agency problem between the controlling shareholder and minority shareholders should be less severe if the firm is audited by "Big 4" audit firms (*BIG4*), is owned by the state (*SOE*), has a controlling shareholder with no divergence between control rights and cash flow rights (*SEPARATION = 0*), or locates in a region with a well-developed market and institutions to protect investors (*LAW*). All four variables are described in detail in Appendix A. We add the interaction among governance measures and the interaction of *MULTIPLE* and *INVESTMENT OPPORTUNITIES* to model (1) and present the estimation results in Table 9.

Panel A of Table 9 presents that the positive impact of MLS on investment efficiency is less salient for firms with *BIG4* auditors and for SOEs. We interpret this to mean that there is less need for MLS to monitor the controlling shareholder for firms with *BIG4* auditors or in SOEs because potential expropriation of the minority shareholders is small.

Columns (5) and (6) in panel A of Table 9 show that the effect of MLS on investment efficiency is more prominent when firm's controlling shareholders enjoy higher control rights than cash flow rights (*SEPARATION = 1*). Again, this evidence is consistent with the monitoring hypothesis.

Columns (7) and (8) in panel A of Table 9 show that the effect of multiple blockholders on investment efficiency is attenuated in regions with better market development and investor protection, in accord with the monitoring hypothesis.

If multiple blockholders monitor the controlling shareholder's investment decisions, one would expect this monitoring to be affected by a firm's information environment. The information asymmetry in firms with a concentrated ownership structure is

Table 8

Alternative explanation.

This table reports the OLS regression results of model (1) with two additional control variables – firms' financing constraints (*H_KZ*) in panel A and regional financial market development (*H_FMD*) – in panel B. The dependent variable is *INVEST1*. Variables are described in Appendix A. The *t*-statistics are reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1%, respectively.

Panel A: Multiple large shareholder and investment efficiency: financing constraints				
	(1)	(2)	(3)	(4)
MULTIPLE * TQ	0.005***	0.006**		
	(2.93)	(2.24)		
MULTIPLE * GROWTH			0.013**	0.012
			(2.38)	(1.47)
H_KZ * MULTIPLE * TQ		−0.001		
		(−0.40)		
H_KZ * MULTIPLE * GROWTH				−0.001
				(−0.07)
H_KZ * TQ	−0.001	−0.000		
	(−0.38)	(−0.04)		
H_KZ * GROWTH			−0.009*	−0.008
			(−1.70)	(−1.32)
Other variables	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
# of obs.	12,990	12,990	12,990	12,990
Adjusted R^2	0.025	0.026	0.040	0.044

Panel B: Multiple large shareholder and investment efficiency: financial market development				
	(1)	(2)	(3)	(4)
MULTIPLE * TQ	0.004**	0.006		
	(2.55)	(1.51)		
MULTIPLE * GROWTH			0.015**	0.016
			(2.46)	(1.31)
H_FMD * MULTIPLE * TQ		−0.002		
		(−0.44)		
H_FMD * MULTIPLE * GROWTH				−0.002
				(−0.11)
H_FMD * TQ	−0.002	−0.001		
	(−1.09)	(−0.52)		
H_FMD * GROWTH			−0.005	−0.004
			(−0.71)	(−0.44)
Other variables	Yes	Yes	Yes	Yes
Year fixed	Yes	Yes	Yes	Yes
Firm fixed	Yes	Yes	Yes	Yes
# of obs.	12,703	12,703	12,703	12,703
Adjusted R^2	0.027	0.027	0.039	0.040

most severe between large shareholders and outside investors or minority shareholders. If the information environment of the firm were bad, outside investors or minority shareholders would have more difficulties in evaluating the potential investment projects. In other words, when information symmetry is high, the controlling shareholder would be more likely to extract a private benefit of control through investment projects and other means. Therefore, the gain from monitoring the controlling shareholder should be higher in a high information asymmetry environment. We investigate this possibility by including the interaction of information asymmetry measures with *MULTIPLE* and investment opportunity measures (*TQ* and *GROWTH*) in model (1).

We measure firms' information asymmetry by three proxies. The first is the total risk of the firm (*TRISK*), measured by the standard deviation of daily stock returns over the previous 12-month period, following Boone et al. (2007). The dummy variable *L_TRISK* equals one if a firm's *TRISK* is below the sample median (and zero otherwise). Stock return volatility is commonly used to measure fundamental uncertainty (Kang et al., 2017). A higher value of *TRISK* would suggest more pronounced information asymmetry and higher monitoring costs. Therefore, *L_TRISK* represents firms with low information asymmetry and monitoring costs. The second measure is the diversification of a firm's product lines (*DIVHHI*), which is the sum of squared market shares for the product categories within a firm, again following Kang et al. (2017). A higher value of *DIVHHI* suggests lower information asymmetry and monitoring costs (Best et al., 2004). The third measure is the number of analysts covering the firm (*ANALYST*), since analyst coverage tends to alleviate the information asymmetry between insiders and outsiders (Jensen and Meckling, 1976). A higher value of *ANALYST* would indicate low information asymmetry and monitoring costs. All three measures are defined in Appendix A.

Panel B of Table 9 reports the results. Columns (1)–(2) show the results with *L_TRISK*, while columns (3)–4) and (5)–(6) show the results with *DIVHHI* and *ANALYST*, respectively. The effect of MLS on a firm's investment efficiency is less prominent when firms' information asymmetry and monitoring costs are lower, where the potential expropriation of minority shareholders is

Table 9
A further test of the effects of the governance and information environments.
This table investigates the impact of the governance environment (panel A) and the information environment (panel B) on the relationship between multiple large shareholders and investment efficiency. We proxy a firm's governance environment by whether it were audited by a "Big 4" auditing firm (BIG4), whether it were owned by the state (SOE), whether the controlling shareholder had more control rights than cash flow rights (SEPARATION) and the marketization index of the firm's location province (LAW). In panel B, we proxy a firm's information environment by whether a firm's TRISK were below the sample median (L_TRISK), the diversification of a firm's product lines (DIVHHI) and the number of analysts covering the firm (ANALYST). Appendix A provides detailed variable descriptions. The t-statistics are reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1%, respectively.

Panel A: Governance environment

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
BIG4 * MULTIPLE * TQ	−0.021** (−2.03)							
BIG4 * MULTIPLE * GROWTH		−0.010 (−0.35)						
SOE * MULTIPLE * TQ			−0.006** (−2.03)					
SOE * MULTIPLE * GROWTH				−0.024* (−1.81)				
SEPERATION * MULTIPLE * TQ					−0.002 (−0.73)			
SEPERATION * MULTIPLE * GROWTH						0.024** (1.97)		
LAW * MULTIPLE * TQ							−0.000 (−0.28)	
LAW * MULTIPLE * GROWTH								−0.002** (−2.47)
Other variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of obs	12,990	12,990	12,990	12,990	9869	9869	12,709	12,709
Adjusted R^2	0.026	0.037	0.026	0.037	0.023	0.031	0.036	0.026

Panel B: Information environment

	(1)	(2)	(3)	(4)	(5)	(6)
L_TRISK * MULTIPLE * TQ	−0.005* (−1.77)					
L_TRISK * MULTIPLE * GROWTH		−0.046*** (−3.47)				
DIVHHI * MULTIPLE * TQ			−0.010* (−1.69)			
DIVHHI * MULTIPLE * GROWTH				−0.033* (−1.70)		
ANALYST * MULTIPLE * TQ					−0.00031* (−1.71)	
ANALYST * MULTIPLE * GROWTH						0.00059 (0.64)
Other variables	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
# of obs.	12,990	12,990	10,405	10,405	12,990	12,990
Adjusted R^2	0.032	0.039	0.030	0.038	0.029	0.029

small and, therefore, the monitoring role of the MLS on the controlling shareholder is less important. The result is in accord with our monitoring hypothesis.

4.8. Multiple large shareholders and firms' investment performance

So far, we have provided consistent evidence that the presence of MLS enhances firms' investment efficiency, i.e., the sensitivity of firms' investment expenditures to investment opportunities. But does it also increase investment performance? We explore this question with the following model:

$$DEBIT_{i,t+1;t+2;t+3} = \alpha_t + \alpha_i + \beta_1 MULTIPLE_{i,t-1} * INVEST1_{i,t-1} + \beta_2 MULTIPLE_{i,t-1} + \beta_3 INVEST1_{i,t-1} + CONTROLS_{i,t-1} + \varepsilon_{i,t}, \quad (4)$$

where $DEBIT_{i,\ t+1;\ t+2;\ t+3}$ is the change in earnings before interest and taxes (EBIT) from year t to $t + 1$, $t + 2$ and $t + 3$; the estimation results are reported in columns (1)–(3), respectively, of Table 10. All other variables are the same as in model (1). We measure investment performance by the sensitivity of the change in earnings before interest and taxes (DEBIT) to a firm's

Table 10

Multiple large shareholders and investment performance.

This table presents estimates of OLS regressions in which the dependent variables are the change in operating performance (*DEBIT*) from year 0 to year 1 in column (1), year 0 to year 2 in column (2) and year 0 to year 3 in column (3), where year 0 is the year a firm made investment expenditures. We require that the firms have stock return, merge data and financial data available from the Chinese Securities Market and Accounting Research (CSMAR) database. Appendix A provides detailed variable descriptions. The *t*-statistics are reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1%, respectively.

	(1)	(2)	(3)
	(0, 1)	(0, 2)	(0, 3)
MULTIPLE * INVEST1	0.024*	0.042**	0.036*
	(1.74)	(2.20)	(1.76)
MULTIPLE	−0.002*	−0.006***	−0.007***
	(−1.67)	(−2.61)	(−2.85)
INVEST1	−0.046***	−0.109***	−0.069***
	(−3.46)	(−7.90)	(−4.22)
SIZE	−0.002***	−0.006***	−0.008***
	(−4.50)	(−7.72)	(−8.93)
LONGDEBT	0.017***	0.017*	0.028**
	(2.73)	(1.69)	(2.42)
LIST	−0.000	−0.001	0.004**
	(−0.38)	(−0.55)	(2.28)
GROWTH	−0.022***	−0.030***	−0.049***
	(−5.02)	(−10.82)	(−8.76)
TANG	0.017*	0.049***	0.014*
	(1.92)	(3.72)	(1.71)
DUALITY	−0.003*	−0.003	0.000
	(−1.95)	(−1.30)	(0.05)
INDEPEND	0.004***	0.001	0.001
	(6.72)	(0.77)	(0.57)
SOE	0.004***	0.009***	0.010***
	(3.14)	(4.69)	(4.47)
INTERCEPT	0.019*	0.070***	0.115***
	(1.82)	(4.33)	(6.10)
Year fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
# of obs.	9825	9781	8568
Adjusted R²	0.097	0.103	0.133

investment expenditures – that is, β_3. Therefore, the impact of MLS on a firm's investment performance is measured by β_1. If the monitoring hypothesis is correct – that large shareholders tend to monitor the controlling shareholder and urge him/her to make good investment decisions – a positive β_1 would be expected.

Table 10 shows the estimation results of model (4). When a firm's performance was measured one to three years after the investment, the relationship was positive and significant as indicated by the coefficients of *MULTIPLE * INVEST1* in columns (1)–(3). The evidence suggests that firms with MLS tend to have higher investment performance – controlling for the level of investment – in accord with the monitoring hypothesis.

5. Conclusions

We find that firms with MLS typically have greater investment efficiency than firms with a single large shareholder. This finding remains strong after a battery of robustness tests (e.g., controlling for industry, firm and year fixed effects, difference-in-differences tests around an exogenous shock on ownership and a Heckman's two-step approach). Data from China with rich ownership details, high time-series variations and a split-share structure reform allow these robustness tests to address the endogeneity concerns that plague most corporate governance studies.

We also find that investment efficiency is enhanced by the relative power of large shareholders vs. the largest one (as measured by their number and the ratio of their holdings to the largest holding). This governance role of MLS on the controlling shareholder is more likely through "voice" rather than "exit." The enhanced investment efficiency of firms with MLS appears to have been due to their monitoring of the controlling shareholder and lowering potential overinvestment, but not due to their better access to financial resources. Furthermore, we find that MLS monitor the largest shareholder less in firms with "Big 4" auditors, state ownership, better regional market development and weak information asymmetry. The impact of MLS on investment efficiency is more prominent for firms with a separation between voting rights and cash flow rights of the controlling shareholder. That is, the more pronounced the agency problem and information asymmetry, the more important the governance role of MLS.

Finally, we find that the existence of MLS also increases a firm's overall investment performance one to three years after the investment. This evidence seems to confirm the other results and is consistent with the monitoring hypothesis.

In sum, our empirical results imply that MLS effectively monitor the largest shareholder and enhance the investment efficiency of firms in China.

Appendix A. Variable definitions

Variable	Description
ANALYST	The number of analysts covering the firm.
BIG4	A dummy variable if a firm's financial statement were audited by a "Big 4" accounting firm.
CFO	The ratio of operating cash flow to total assets at the end of the year.
DEBIT	The change in EBIT from the beginning of the year to the end of the year divided by the total assets at the beginning of the year.
DIVHHI	The sum of squared market shares for the product categories within a firm.
DUALITY	A dummy variable that equaled one if the board chair also served as CEO at the end of year.
FOREIGN	A dummy variable that equals one if the firm has at least one large foreign shareholder (at the 10% threshold) at the end of the year (and zero otherwise).
GROWTH	The growth rate in total assets from the beginning of the year to the end of year.
H_FMD	It is a dummy variable which equals one if a firm's FMD were above the sample median (and zero otherwise). FMD represents the Financial Market Development index, which is part of the marketization index of the firm's location province from the National Economic Research Institute (NERI). The marketization index was first constructed and published by Fan and Wang (2001) and then updated by Fan et al. in 2003, 2004, 2007, 2010 and 2011.
H_KZ	A dummy variable which equals one if a firm's KZ index were above the sample median (and zero otherwise). KZ index is motivated by Kaplan and Zingales (1997), Lamont et al. (2001) and Guariglia and Yang (2016) who perform an ordered logit estimation of the categories of constraints on the following five financial ratios: cash flow, dividends, cash and cash equivalents all deflated by beginning of year capital, Tobin's q and debt to total capital. We use the estimated coefficients from the logit estimation to construct the Kaplan and Zingales (KZ) index of financial constraints.
INDEPEND	The ratio of the number of independent directors to the total number of directors on the board.
INST	A dummy variable that equals one if the firm had at least one large institutional shareholder at the 10% threshold (and zero otherwise).
INVEST1	The change (from the beginning of the year to the end of the year) in net fixed assets and depreciation and amortization scaled by beginning-year total assets.
INVEST2	The change (from the beginning of the year to the end of the year) in net fixed assets scaled by the beginning-year total assets.
L_TRISK	A dummy variable which equals one if a firm's TRISK were below the sample median (and zero otherwise). TRISK is measured as the standard deviation of daily stock returns over the previous 12-month period.
LAW	The law index is part of the marketization index of the firm's location province from the National Economic Research Institute (NERI). The marketization index was first constructed and published by Fan and Wang (2001) and then updated by Fan et al. in 2003, 2004, 2007, 2010 and 2011.
LIST	The number of years the firm was listed.
LONGDEBT	The ratio of long-term debt to total assets at the end of year.
MIX	A dummy variable that equals one if the large shareholders represented different types of ownership, e.g., SOE, non-SOE, foreign and domestic institutions (and zero otherwise).
MULTIPLE	A dummy variable that equals one if the firm had at least two large shareholders (at the 10% threshold) at the end of the year.
POST	A dummy variable that equals one if the firm had finished the split-share structure reform (and zero otherwise).
NLARGE	The number of large shareholders.
OTHERS/TOP1	The ratio of the other large shareholder's ownership to those of the largest shareholder at the end of year.
SEPERATION	The divergence of control rights and cash flow rights of the largest shareholder.
SIZE	The natural logarithm of total sales at the end of year.
SOE	A dummy variable that equals one if the firm were a state-owned enterprise at the end of year.
TANG	The ratio of fixed assets to total assets.
TQ	The sum of the market value of tradable shares and book value of non-tradable shares scaled by the book value of total assets.

Appendix B. Sample selection process

Firm-year observations of non-financial A-share listed companies	21,234
Subtract:	
* Observations that don't have any large shareholders	172
* Observations where the largest shareholder hold >50% of the shares	6580
* Observations due to missing information for the main variables	1492
Final sample	12,990

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