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Government ownership and the capital structure of firms: Analysis of an institutional context from China☆

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ABSTRACT

Emerging economies provide interesting scenarios for examining how institutional context influences the financing behavior of firms. In this study, we examine the capital structure of Chinese listed firms following the Split-Share Structure Reform of 2005. This reform allowed a reduction of government ownership by making government shares tradable. We find that the impact of government ownership on leverage is dependent on whether the government is the largest shareholder in a firm and whether the government ownership is through a parent state-owned enterprise. In addition, we document that the largest non-government shareholder positively influences leverage. Overall, our results reveal that the largest controlling shareholder, either government or non-government, has a significant impact on the capital structure of Chinese firms.

1. Introduction

Capital structure decisions are influenced by firm-specific, industry-specific and institutional factors. Rajan and Zingales's (1995) seminal analysis of seven developed countries shows the importance of these three types of factors. Although the variables that influence financing decisions in developed countries are also influential in emerging economies, Booth et al. (2001) show that distinctive institutional features in emerging countries also play important roles. Emerging countries therefore provide interesting scenarios for studying a variety of institutional characteristics.

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Throughout the last decade, academics have become increasingly interested in studying the distinctive institutional context of China—the world's largest emerging economy. Studies of the financing behavior of Chinese firms (Chen, 2004; Allen et al., 2005; Zou and Xiao, 2006; Huang and Song, 2006; Bhabra et al., 2008) report that these firms rely on informal financing channels, prefer short-term finance and use substantially lower amounts of long-term debt than similar firms in developed markets. Ayyagari et al. (2010) document that Chinese firms obtain 20% of their funds from banks and 80% from channels such as retained earnings, informal sources, loans from family and friends, trade credits, investment funds and equity. Chen (2004) and Zou and Xiao (2006) find that the well-documented firm-specific determinants of leverage such as firm size, profitability, growth opportunity and asset tangibility are also relevant in China. Yet, the low explanatory power of these determinants calls for more research into the impact of institutional features on capital structure in China.

A notable institutional context in China is that the ownership of publicly traded firms is highly concentrated, and the government is a major player in corporate financing (Sun and Tong, 2003). Government ownership can induce firms to borrow more through preferential loan policies and loan guarantees and an intention to maintain state control. Alternately, it can lead to less borrowing due to opportunistic managerial behavior and the higher likelihood of approval of equity issues.[1] Among a handful of studies of the effect of government ownership on capital structure, Huang and Song (2006) and Zou and Xiao (2006) observe no impact of government ownership on the leverage of Chinese firms, whereas Bhabra et al. (2008) and Li et al. (2009) document a positive impact on long-term debt. Pessarossi and Weill (2013) show that government ownership facilitates the issuance of corporate bonds.

The Split-Share Structure Reform (hereafter, Reform) was introduced in 2005 to increase privatization in China.[2] The Reform set the stage for reducing the government ownership of Chinese listed firms and allowing government shares to be tradable at market prices. It improved the alignment of interest between the government and other shareholders (Firth et al., 2010; Hou et al., 2012). It also dampened the government's intention to maintain state control. Thus, it is interesting to evaluate the role of government ownership in firms' financing decisions in the post-Reform period. This is the primary contribution of our study.

In discussing the impact of government ownership on capital structure, we consider not only classic capital structure theories like tradeoff theory and pecking order theory, but also supply side theory (Faulkender and Petersen, 2006; Baker, 2009), as it reflects the specific institutional features of China's banking sector. In China, the four dominant national banks that are controlled by the government provide more credit to state-owned enterprises (SOEs) than to non-SOEs.

In the very few studies covering the post-Reform period, information on government ownership is almost always collected from the China Stock Market and Accounting Research (CSMAR) database (Chan et al., 2013; Liu et al., 2011; Yu, 2013). The database reports government ownership as the holdings in the form of non-tradable shares or shares with trading restrictions.[3] The CSMAR database does not identify government holdings of tradable shares, and thus underestimates the actual amount of government ownership of Chinese listed firms. Our study contributes to the literature by correcting this oversight; it considers both tradable and non-tradable shares when measuring government holdings.

Government shares are held by government agencies and SOEs. Parent SOEs tend to use their listed subsidiaries to raise funds from the stock market (Bradford et al., 2013; Ying and Wang, 2013), which they then make available for internal financing. We contribute to the literature by examining the differential impact of government ownership on firms with or without parent SOEs.

In studying the differential impact of government ownership on firm leverage, we find that the impact is dependent on whether the government is the largest shareholder. When the government is the largest shareholder, government ownership is non-linearly associated with leverage; however, when it is not the largest shareholder, this association disappears. Moreover, we observe that when the parent SOE is the largest controlling shareholder, government ownership is associated with lower leverage. When the government is *not*

[1] Equity issues are bureaucratic in China and listed firms are required to obtain approval from the China Securities Regulation Committee (Ying and Wang, 2013).

[2] It is officially named the Non-Tradable Share Reform. In this study, we denote it simply as the Reform.

[3] See the user's manual of China Listed Firm's Shareholders Research Database of CSMAR (version 2013).

the largest shareholder, we find that the non-government largest shareholding positively influences firm leverage.

The rest of the paper is organized as follows. Section 2 briefly presents the recent institutional arrangement of stock ownership and financing of Chinese firms. In Section 3, the theoretical arguments on the impact of stock ownership on capital structure are reviewed and the hypotheses are presented. Section 4 describes the methodology and the data. Section 5 discusses the empirical results. Section 6 concludes the paper.

2. Institutional features related to ownership and financing in China

Since the start of China's economic reform in the late 1970s, there have been continuous attempts to reduce government ownership in Chinese corporations. When the two Chinese stock exchanges (Shanghai Stock Exchange and Shenzhen Stock Exchange) were established in the early 1990s, the first lot of IPO firms were large or medium-sized state-owned enterprises. This so-called share issue privatization by the Chinese government in the 1990s, which transferred some corporate ownership to private hands, was aimed at reforming its SOEs. Yet, the ideology of the socialist market economy meant that the state still retained a substantial percentage of the ownership of privatized enterprises (Sun and Tong, 2003). The predominance of government ownership appears to have obstructed the development of the Chinese stock market (Beltratti et al., 2012).

State control is maintained by creating different classes of shares. In China, common shares are mainly classified into two categories: A- and B-shares. A-shares can only be sold to domestic investors and include state, legal person, employee and public shares.[4] These shares constitute the largest part of the stock market. B-shares are traded only by foreign investors. Other categories of shares (H-, N- and S-shares) are shares listed outside mainland China (respectively on the Hong Kong, New York and Singapore exchanges). Before 2005, state and legal person shares were not tradable at market prices; they were priced at the book value of assets. Thus, the government could not benefit from any capital gains. The incentive to improve firm performance was almost absent for government agencies. To solve this issue, the 2005 Reform lifted the trading restrictions on state and legal person shares, making these shares publicly tradable. At a practical level, the holders of non-tradable shares compensated the holders of tradable shares by providing them with a portion of their shares at mutually agreed prices. By the end of 2007, the Reform was completed by the majority of the firms concerned (CSRC, 2008; Firth et al., 2010; Li et al., 2011; Liao et al., 2014; Megginson et al., 2014). After the Reform, the non-tradable shares were not immediately tradable, but were gradually phased into tradable shares over a 36-month period. During these 36 months, the shares still carried the name of non-tradable or restricted shares.

The Reform diluted government ownership because additional shares were granted to the former tradable shareholders to compensate them for the influx of tradable government shares into the market. Tradability means that shares are priced at market value, and this incentivizes government agencies to be as concerned with share price movements as other shareholders.[5] This improved incentive mechanism mitigates agency conflicts between management and a government owner. The impact of government shareholdings on firms' financing pattern after the Reform has not yet been examined.

The public capital market has played an increasingly important role in financing Chinese corporations since the promulgation of the Securities Law in 1999 (CSRC, 2008). With a nascent stock market and an underdeveloped small public debt market, Chinese listed firms have relied heavily on bank borrowing. World Bank statistics for 2012 show that the domestic credit provided by banks as a percentage of the country's GDP is 134% for China, 50% for the U.S. and 88% for the world. According to the National Bureau of Statistics of China, total stock market capitalization rose from 18% of the GDP in 2005 to 42% in 2013 in China. This growing stock market makes the financing choices of Chinese listed firms an interesting topic to analyze.

[4] Legal person shares are held by domestic enterprises or institutions with a legal person status that represents not only state interests, but also private and collective interests. State, legal person and employee shares are non-tradable. Public shares issued to the public are also tradable A-shares.

[5] Since the Reform, some of the government holdings have been transferred to national social security funds, which are evaluated by their stock market investment performance.

3. Capital structure and government ownership

Capital structure decisions are usually explained in the literature by tradeoff theory or pecking order theory. Tradeoff theory argues that debt usage is determined by trading off the costs and benefits of debt. Costs are the cost of financial distress and the agency costs between shareholders and debt-holders. Benefits include tax benefits and the agency benefits of debt monitoring. Pecking order theory ranks financing sources from internal to external sources based on information asymmetry. Both theories identify a few firm-specific determinants of leverage, such as firm size, profitability, growth opportunity and asset tangibility, that are found to be relevant for Chinese firms in studies such as Bhabra et al. (2008), Chen (2004), Huang and Song (2006) and Zou and Xiao (2006). These studies also indicate the important role of government ownership for Chinese firms.

Government ownership is often associated with higher leverage. For example, to avoid the dilution of state control, SOEs tend to borrow rather than issue stocks (Dewenter and Malatesta, 2001). Additionally, SOEs enjoy implicit or explicit loan guarantees, allowing them to borrow at favorable rates, which lowers their risk of financial distress. Tradeoff theory predicts a positive relation between government ownership and leverage.

Government ownership can also negatively affect the leverage of Chinese firms for three reasons. First, severe owner-management conflict arises in SOEs, and the government has no incentive to monitor and control its managers due to double delegation and the segregation of voting and cash flow rights (Lin et al., 2011; Zou and Xiao, 2006).[6] This gives managers the chance to actually control the firm and tunnel resources from the firm for other uses. For example, they can issue equity and direct the raised funds to firms benefiting their personal interests. Debt, as a disciplinary tool, can constrain managers' overspending behavior by imposing debt covenants. Thus, firms with high government ownership and speculative managers tend to avoid debt financing. Second, SOEs in China tend to protect government tax revenues by avoiding aggressive tax planning, as their largest shareholder is the government. Thus, the incentive to use debt for tax benefits is not strong for firms with high government ownership (Chan et al., 2013). Third, pecking order theory prescribes debt before equity financing due to the negative signaling effect of issuing equity. However, the stock market in China is characterized by a government-controlled listing process that favors SOEs, particularly those in strategic industries and in regions with strong political connections (Li et al., 2008, 2012). This market friction nullifies pecking order theory, and suggests that government ownership is associated with equity financing. When the government owner is a firm's parent SOE, the listed firm is often used to raise capital for the parent firm.

The Reform required the government to reduce its shareholdings, allowing firms to respond to market forces. When the incentive to retain government control is dampened in this way, there is less need to provide firms with debt financing to maintain state control. In the post-Reform period, corporate governance is improved by the alignment of government owner and management interests, so debt can be used as a disciplinary tool. These developments offset the effect of government on debt use, and a clear-cut effect is then more dependent on the magnitude of the government ownership.

We envisage three alternate scenarios in which the government continues to be the largest shareholder in a firm in the post-Reform period. First, the government may simply choose to retain its ownership of quality firms that have good prospects. As government ownership is valued at market prices in the post-Reform period, government owners benefit from any capital gains in the stock market. Under these circumstances, the government will be willing to ensure good corporate governance by using debt to discipline the managers. Second, the government might retain control of firms in strategically important sectors, such as the energy and financial sectors (Yu, 2013). To facilitate the growth of these industries, the government can provide them with more resources through more bank lending. Third, the government might remain the largest owner of firms for which implementing the Reform would have created financial difficulties. Equity financing is unavailable to troubled firms, and bank loans are the only capital available to solve their financing problems. All three scenarios involve the government in funding firms via government-controlled banks.

[6] Under the double delegation system, Chinese citizens are the ultimate owners of government shares. They delegate the management of state assets to government agencies, which further delegate the authority to managers. The segregation of voting and cash flow rights means that government agencies have the control rights but not the cash flow rights, which are received by the Ministry of Finance. Government agency staff members receive civil servant salaries, which are independent of firm performance. Thus, government agencies have no incentive to monitor and control managers who are more inclined to serve their private interest.

The positive impact of government ownership on debt financing is also in line with the predictions of supply side theory proposed by Faulkender and Petersen (2006) and Baker (2009). They argue that the capital structure of firms is determined by the supply of funds. If it is cheaper and easier to obtain a certain type of financing, firms will preferentially use this type of financing. In China, the banking sector is dominated by four state banks that favor SOEs when extending credit. Bhabra et al. (2008), Li et al. (2009), Liu et al. (2011) and Zou and Xiao (2006) document the positive role of government ownership in helping Chinese firms to obtain bank financing.

Therefore, we put forward our first hypothesis as follows.

H1. Government ownership has a positive impact on a firm's leverage when the government is its largest shareholder.

Government ownership includes shareholding by government agencies and SOEs. SOEs can be parent SOEs or non-parent SOEs (Hope, 2013; Liao and Young, 2012). Many listed firms were originally spun off from their unlisted parent SOEs and floated on the stock market. For some listed firms, their parent SOEs remain the controlling shareholder and tend to tunnel resources out of subsidiary firms (Bradford et al., 2013; Ying and Wang, 2013). In China, gaining and maintaining listed status is very important. Controlling shareholders tend to support their listed firms by providing credit guarantees and capital injections to maintain the firm's financing and refinancing eligibility (Ying and Wang, 2013). Thus, we hypothesize that when parent SOEs are the largest shareholder, they tend to use their listed subsidiaries to raise capital from the stock market and then make it available for internal financing. Our second hypothesis is as follows.

H2. Ownership by parent SOEs has a negative impact on a firm's leverage.

When the government is *not* the largest shareholder, it can be the result of a deliberate choice by the government to reduce its ownership. We expect the government to exert little influence on these firms, as they are operating under market forces. In listed firms that originated as private firms, the government has too small shareholdings to have a significant impact on leverage. In either case, government ownership has no impact on leverage. Thus, we formulate the following hypothesis.

H3. Government ownership has no impact on leverage when the government is not a firm's largest shareholder.

4. Methodology and data

4.1. Methods

To study the impact of government ownership on leverage across firms over the study period, we undertake pooled ordinary least squares regressions and time-averaged ordinary least squares regressions. As government ownership is rather stable throughout our sample period, the fixed effect panel regression technique is not appropriate.[7] To mitigate problems related to the potential endogeneity of the independent variables with respect to leverage, the independent variables are all lagged by one year. We add a squared term of government ownership to account for the non-linear effect of government ownership on leverage.

Leverage is measured using two robust definitions: total debt (TD), which is the sum of long- and short-term debt, and long-term debt (LD). Both are scaled by the book value of total assets. Ownership variables include government and non-government ownership. Government ownership (GOV) is measured as the proportion of shares held by all government agencies and SOEs out of the total number of issued shares. We identify the ownership proportion of parent SOEs by looking into the history of the listed firms. We also estimate the proportion of shares held by the largest owner (LARG).

In addition to leverage and ownership variables, we consider well-documented determinants of capital structure, such as firm size, liquidity, profitability, growth opportunity, tangibility and industries as control

[7] We apply the fixed effect regression method only as a robustness test.

Table 1
Definition of variables.

Variable	Notation	Definition
Leverage	TD	Total debt (sum of long- and short-term debt) divided by the book value of total assets
	LD	Long-term debt divided by the book value of total assets
Largest ownership	LARG	Number of shares held by the largest shareholder divided by the total number of shares
	$LARG^2$	Square of LARG
State ownership	GOV	Number of shares held by the government divided by the total number of shares
	GOV^2	Square of GOV
Parent SOE ownership	Parent SOEs	Number of shares held by the parent SOE divided by the total number of shares
	Parent $SOEs^2$	Square of Parent SOEs
Firm size	SIZE	Book value of total assets, in million Chinese RMB
Liquidity	LIQ	Current assets divided by current liabilities
Profitability	PROF	Earnings before interest and tax divided by total assets
Growth opportunity	Q	(Equity market value + Liabilities book value)/(Book value of total assets)
Tangibility	TANG	Fixed assets divided by total assets

variables (Huang and Song, 2006; Zou and Xiao, 2006). We use the book value of total assets to measure firm size. Liquidity is measured as the ratio of current assets to current liabilities. Profitability is defined as the ratio of earnings before interest and tax divided by total assets. Q-ratio is used to measure growth opportunities. Tangibility is measured as the ratio of fixed assets to total assets. All of the variables and their measurements are summarized in Table 1.

4.2. Data

We compile a large dataset of domestic Chinese firms listed on the Shanghai and Shenzhen Stock Exchanges between 2007 and 2012. The start year is chosen because Chinese listed firms began complying with the International Financial Reporting Standards when the new Chinese GAAP came into effect in January 2007. The data are drawn from the China Stock Market and Accounting Research (CSMAR) database and the annual reports of listed firms. The mainland Chinese stock market consists of three separate boards: the Main Board (MB), Small and Medium Enterprises Board (SME) and Growth Enterprise Market (GEM). The MB includes large mature corporations with large-scale operations, whereas the SME and GEM comprise small and fast-growing innovative firms. Due to differences in the boards' supervisory and financial reporting systems, we focus on MB listed firms on the Shanghai and Shenzhen Stock Exchanges.

Financial firms like banks, insurance agencies and securities companies are excluded from the sample. As we focus on domestic listed Chinese firms, firms cross-listed on Hong Kong and overseas stock exchanges are excluded, due to the potential institutional differences and different investor bases.[8] We also exclude firms that do not have complete data or have negative equity.

We observe that government ownership as defined by data from the commonly used CSMAR database includes non-tradable shares only. Therefore, we search company annual reports and hand-collect ownership data to determine the top 10 shareholders of all firms in the database. This top 10 list includes both tradable and non-tradable shareholdings. We check each owner on this list to identify firms' ownership types. We follow Delios et al. (2008) to define government ownership as state shares and legal person shares that are held by the central and local government, government agencies (such as the State-Owned Assets Supervision and Administration Commission and state asset management bureaus) and SOEs. Many Chinese listed firms were carved out of SOEs and listed on the stock market. For example, Sinopec Limited, listed on the Shanghai Stock Exchange, is a major subsidiary of China Petrochemical Corporation, a state-owned oil company. To differentiate the impact of different types of government ownership, we also identify whether the government owners are the parent SOEs.

[8] These firms are subject to different accounting and tax rules, and have access to international financial market. Their investors also have a different risk return preference. Therefore, the capital structure decision for this group of firms differs from their domestic peers. These firms are excluded from our sample.

Table 2
Descriptive statistics. The table provides descriptive statistics of the variables. The sample includes Chinese Main Board listed firms with A-shares from 2007 to 2012. For the dependent variables TD and LD, the statistics are based on the 2008–2012 period. For the independent variables, the statistics are based on the 2007–2011 period. All variables are defined in Table 1. Panels B and C present the descriptive statistics for the two sub-samples. Panel B is for firms in which the government is the largest owner, and Panel C is for firms in which the government is *not* the largest owner.

Panel A Full sample (5075 firm-year observations)

Variables	Mean	Median	St. Dev.	Minimum	Maximum
TD	0.246	0.239	0.169	0	0.692
LD	0.087	0.038	0.113	0	0.523
LARG	0.359	0.337	0.156	0.079	0.781
GOV	0.292	0.300	0.233	0	0.814
Parent SOEs	0.096	0	0.194	0	0.74
SIZE (mill. RMB)	6340	2760	11,700	190	105,000
LIQ	1.426	1.201	0.950	0.158	6.451
PROF	0.056	0.052	0.065	−0.250	0.296
Q	1.966	1.589	1.221	0.745	8.991
TANG	0.270	0.236	0.189	0.001	0.822

Panel B Firms in which the government is the largest owner (3285 firm-year observations)

Variables	Mean	Median	St. Dev.	Minimum	Maximum	Mean Difference from Panel C
TD	0.255	0.247	0.176	0	0.692	0.027***
LD	0.095	0.047	0.119	0	0.523	0.022***
LARG	0.385	0.382	0.154	0.079	0.781	0.074***
GOV	0.435	0.443	0.156	0.036	0.814	0.407***
SIZE (mill. RMB)	7690	3190	13,800	190	105,000	3850***
LIQ	1.349	1.15	0.894	0.158	6.451	−0.218***
PROF	0.055	0.051	0.062	−0.25	0.296	0.002
Q	1.83	1.513	1.054	0.745	8.991	−0.385***
TANG	0.291	0.257	0.193	0.001	0.822	0.060***

Panel C Firms in which the government is not the largest owner (1790 firm-year observations)

Variables	Mean	Median	St. Dev.	Minimum	Maximum
TD	0.229	0.227	0.153	0	0.692
LD	0.073	0.025	0.099	0	0.523
LARG	0.311	0.273	0.150	0.079	0.781
GOV	0.028	0	0.053	0	0.269
SIZE (mill. RMB)	3850	2000	5690	190	81,300
LIQ	1.567	1.297	1.029	0.158	6.451
PROF	0.057	0.054	0.07	−0.25	0.296
Q	2.216	1.763	1.448	0.745	8.991
TANG	0.231	0.196	0.176	0.001	0.822

The final sample consists of 1207 firms (5075 firm-year observations). These firms are distributed across 12 different industries: farming; mining; manufacturing; electricity, gas and water supply; civil engineering and construction; transportation and storage; information technology; wholesale and retail sale; real estate; public service; publishing, broadcasting and media; and conglomerates.

5. Empirical results

5.1. Descriptive statistics

Table 2 provides the summary statistics of all variables.[9] Panel A presents the descriptive statistics of the entire sample consisting of 5075 firm-year observations. The mean (median) total debt ratio (TD) of the

[9] All variables are winsorized at the 0.5% level at both tails to eliminate the impact of outliers.

Table 3
Correlation matrix.

	TD	LD	LARG	GOV	SIZE	LIQ	PROF	Q	TANG
Panel A Full sample									
TD	1								
LD	0.366	1							
LARG	0.060	0.124	1						
GOV	0.079	0.120	0.548	1					
SIZE	0.296	0.387	0.319	0.294	1				
LIQ	−0.512	−0.096	−0.005	−0.096	−0.122	1			
PROF	−0.230	−0.013	0.149	0.035	0.163	0.152	1		
Q	−0.303	−0.249	−0.175	−0.167	−0.445	0.169	0.133	1	
TANG	0.012	0.190	0.038	0.153	0.047	−0.397	−0.028	−0.052	1
Panel B Sample of firms in which the government is the largest owner									
TD	1								
LD	0.384	1							
LARG	−0.016	0.061	1						
GOV	0.008	0.102	0.866	1					
SIZE	0.308	0.392	0.276	0.256	1				
LIQ	−0.541	−0.163	0.009	−0.007	−0.134	1			
PROF	−0.273	−0.030	0.139	0.122	0.146	0.143	1		
Q	−0.307	−0.259	−0.088	−0.107	−0.385	0.196	0.198	1	
TANG	0.021	0.256	0.046	0.070	0.042	−0.404	−0.004	−0.081	1
Panel C Sample of firms in which the government is not the largest owner									
TD	1								
LD	0.318	1							
LARG	0.144	0.208	1						
GOV	0.023	−0.069	−0.112	1					
SIZE	0.242	0.345	0.290	−0.133	1				
LIQ	−0.457	0.058	0.041	−0.017	−0.045	1			
PROF	−0.160	0.026	0.186	−0.043	0.216	0.162	1		
Q	−0.284	−0.225	−0.230	−0.012	−0.497	0.109	0.057	1	
TANG	−0.046	−0.007	−0.081	−0.051	−0.051	−0.365	−0.068	0.043	1

sample firms is 24.6% (23.9%), lower than in other developing countries such as Brazil and India (Céspedes et al., 2010; Chakraborty, 2010).[10] The mean (median) long-term debt ratio (LD) is only 8.7% (3.8%), notably lower than in developing and developed countries (Booth et al., 2001).

Government ownership varies across listed firms, ranging from 0% to 81.4%. The mean (median) government ownership is 29.2% (30%), significantly lower than that reported in studies of the pre-Reform period.[11] In the post-Reform period, shares are no longer concentrated in government hands. Private shareholding by institutions, families and individuals is the most common type of ownership. In our sample, the largest shareholder (LARG) owns, on average, over one third of a firm's outstanding shares, suggesting a high level of ownership concentration in China.

To distinguish the effect of government ownership, we split the sample into two subsamples: firms in which the government is the largest shareholder (Panel B) and firms in which the government is *not* the largest shareholder (Panel C). A comparison of the two subsamples shows that firms that have the government as the largest shareholder tend to be larger, less liquid and less market-valued. These firms are more leveraged and have more tangible assets.

Table 3 presents the Pearson correlation coefficients between the major variables in the full sample and two subsamples. The two measures of leverage are, as expected, positively correlated with each other. The correlations between the explanatory variables are relatively low. The correlation for the government-concentrated

[10] Chakraborty (2010) reports an average total debt ratio of 35.5% in India. Céspedes et al. (2010) report an average of 35.85% in Brazil.
[11] Bhabra et al. (2008) and Zou and Xiao (2006) find about 61% ownership by state and legal persons in a pre-Reform sample period.

Table 4
Impact of government ownership on leverage when the government is the largest shareholder. This table presents the OLS regression results on the impact of government ownership on leverage. The sample includes only those firms in which the government is the largest shareholder. All variables are defined in Table 1. GOV^2 is the squared term of GOV. The sample period is 2007–2012. Industry and year dummies are included in all regressions. ***, ** and * refer to significance levels at 1%, 5% and 10%, respectively. Figures reported in parentheses are t-statistics.

	(1) TD	(2) TD	(3) LD	(4) LD
GOV	−0.098***	0.249***	−0.034***	0.138***
	(−5.89)	(3.28)	(−3.03)	(2.89)
GOV^2		−0.396***		−0.197***
		(−4.61)		(−3.57)
SIZE	0.040***	0.042***	0.032***	0.034***
	(15.04)	(15.93)	(18.46)	(18.80)
LIQ	−0.053***	−0.053***	−0.001	−0.001
	(−16.47)	(−16.38)	(−0.46)	(−0.38)
PROF	−0.354***	−0.353***	−0.108***	−0.108***
	(−6.88)	(−6.86)	(−3.46)	(−3.45)
Q	−0.016***	−0.015***	−0.005***	−0.005***
	(−5.84)	(−5.63)	(−3.31)	(−3.14)
TANG	0.162***	0.166***	0.107***	0.109***
	(8.93)	(9.15)	(7.87)	(8.02)
Adj. R^2	0.37	0.37	0.35	0.35
N	3285	3285	3285	3285

subsample presented in Panel B shows that the largest shareholder (LARG) and government ownership (GOV) are, as expected, highly correlated (0.866). In Panel C, we present the correlations for the non-government-concentrated subsample. We observe that the largest shareholder variable (LARG) is more correlated with leverage than the government ownership (GOV), indicating that the largest private shareholder, not government ownership, is more related to the financing mix of these firms.

5.2. Regression results

Table 4 reports the impact of government ownership in firms where the government is the largest shareholder. Models (1) and (3) show a negative and statistically significant impact of government ownership on leverage. These two models do not consider the non-linear effect of government ownership. When we include the squared term of government ownership, Models (2) and (4) show a significant non-linear effect of government ownership on total and long-term debt. The coefficient estimates suggest that up to a threshold of 31.4% for the total debt regression and 35% for the long-term debt regression government ownership has a positive effect on leverage.[12] This positive effect reverses once these high threshold levels are exceeded. The finding partially supports the first hypothesis, as it indicates that firms with more government ownership use more debt. The finding affirms the prediction of supply side theory that firms with government ownership enjoy better access to credit. It is also consistent with the prediction related to the agency benefits of debt: in the post-Reform period, the government uses debt to discipline managers (Bhabra et al., 2008; Li et al., 2009).

The observed impact of the control variables on leverage is consistent with prior studies (Bhabra et al., 2008; Chen, 2004; Huang and Song, 2006; Zou and Xiao, 2006). Large size, high asset tangibility and low growth opportunity are associated with high leverage, consistent with the predictions of tradeoff theory. High profitability and liquidity are associated with low leverage, as predicted by pecking order theory.

We also perform a similar analysis segregating a few industries that are essential to the economy and therefore highly regulated (Liao and Young, 2012): farming; electricity, gas and water supply; and civil engineering and construction. The results presented in Table 5 show that the addition of government ownership in Models

[12] Based on the estimates of Model (2), the turning point is computed as $0.249/(2 * 0.396)$.

Table 5
Impact of government ownership on leverage: Sub-sample analysis of three industries. This table presents the OLS regression results on the impact of government ownership on leverage for firms in three industries: farming; electricity, gas and water supply; and civil engineering and construction. The sample includes only those firms in which the government is the largest shareholder. All variables are defined in Table 1. GOV^2 is the squared term of GOV. The sample period is 2007–2012. Year dummies are included in all regressions. ***, ** and * refer to significance levels at 1%, 5% and 10%, respectively. Figures reported in parentheses are t-statistics.

	(1) TD	(2) TD	(3) TD	(4) LD	(5) LD	(6) LD
GOV		−0.452***	0.059		−0.226***	0.336
		(−8.55)	(0.19)		(−5.02)	(1.22)
GOV^2			−0.523*			−0.575**
			(−1.71)			(−2.17)
SIZE	0.014	0.030***	0.027***	0.039***	0.047***	0.044***
	(1.56)	(3.44)	(3.13)	(5.06)	(6.18)	(5.75)
LIQ	−0.056***	−0.052***	−0.050***	−0.020***	−0.018***	−0.016***
	(−7.70)	(−6.39)	(−6.53)	(−3.47)	(−2.86)	(−2.62)
PROF	−0.535***	−0.526***	−0.489***	−0.446***	−0.442***	−0.402***
	(−2.71)	(−2.94)	(−2.73)	(−2.90)	(−2.97)	(−2.73)
Q	−0.053***	−0.056***	−0.060***	−0.025**	−0.027**	−0.030**
	(−3.95)	(−3.63)	(−3.72)	(−2.43)	(−2.33)	(−2.51)
TANG	0.119***	0.166***	0.160***	0.120***	0.144***	0.137***
	(2.65)	(3.63)	(3.47)	(3.06)	(3.62)	(3.44)
Adj. R^2	0.28	0.40	0.40	0.22	0.26	0.27
N	303	303	303	303	303	303

(2), (3), (5) and (6) increases the explanatory power of the models compared with Models (1) and (4). This finding reflects the influential role played by the government ownership in accessing debt for these regulated industries, supporting the prediction of supply side theory.

We distinguish the impact of government ownership held through parent SOEs to test the second hypothesis, and present the results in Table 6. Models (2) and (4) show that the impact of parent SOEs on long-term and total debt is non-linear. Below an ownership level of 18.7% (20.8%), parent SOEs positively influence the long-term (total) debt. It suggests that although Chinese listed firms can benefit from government ownership

Table 6
Impact of ownership by parent SOEs on leverage. This table presents the OLS regression results on the impact of ownership by parent SOEs on leverage. The sample includes only those firms in which the government is the largest shareholder. All variables are defined in Table 1. Parent $SOEs^2$ is the squared term of Parent SOEs. The sample period is 2007–2012. Industry and year dummies are included in all regressions. ***, ** and * refer to significance levels at 1%, 5% and 10%, respectively. Figures reported in parentheses are t-statistics.

	(1) TD	(2) TD	(3) LD	(4) LD
Parent SOEs	−0.03**	0.10**	−0.03***	0.06**
	(−2.54)	(2.41)	(−3.48)	(2.29)
Parent $SOEs^2$		−0.24***		−0.16***
		(−3.27)		(−3.46)
SIZE	0.04***	0.04***	0.03***	0.03***
	(14.29)	(14.77)	(18.49)	(18.75)
LIQ	−0.05***	−0.05***	−0.00	0.00
	(−16.37)	(−16.34)	(−0.40)	(−0.39)
PROF	−0.37***	−0.36***	−0.11***	−0.11***
	(−7.24)	(−7.13)	(−3.67)	(−3.53)
Q	−0.01***	−0.01***	−0.00***	−0.00***
	(−5.54)	(−5.50)	(−3.01)	(−2.96)
TANG	0.16***	0.17***	0.11***	0.11***
	(9.01)	(9.07)	(7.98)	(8.02)
Adj. R^2	0.36	0.36	0.35	0.35
N	3285	3285	3285	3285

Table 7
Impact of ownership on leverage when the government is *not* the largest shareholder. This table presents the OLS regression results on the impact of ownership on leverage. The sample includes only those firms in which the government is *not* the largest shareholder. All variables are defined in Table 1. $LARG^2$ is the squared term of LARG. The sample period is 2007–2012. Industry and year dummies are included in all regressions. ***, ** and * refer to significance levels at 1%, 5% and 10%, respectively. Figures reported in parentheses are t-statistics.

	(1) TD	(2) TD	(3) TD	(4) LD	(5) LD	(6) LD
GOV	−0.08	−0.06	−0.07	−0.04	−0.02	−0.02
	(−1.36)	(−1.03)	(−1.15)	(−0.98)	(−0.64)	(−0.47)
LARG		0.07***	0.20**		0.05***	−0.07
		(3.25)	(2.41)		(3.06)	(−1.10)
$LARG^2$			−0.17			0.16*
			(−1.63)			(1.94)
SIZE	0.03***	0.03***	0.03***	0.03***	0.03***	0.03***
	(8.3)	(7.81)	(7.97)	(12.76)	(12.18)	(11.9)
LIQ	−0.04***	−0.03***	−0.04***	0.01***	0.01***	0.01***
	(−9.35)	(−9.27)	(−9.33)	(2.73)	(2.78)	(2.88)
PROF	−0.13**	−0.16***	−0.16***	−0.05*	−0.07**	−0.06**
	(−2.44)	(−2.84)	(−2.95)	(−1.74)	(−2.27)	(−2.06)
Q	−0.01***	−0.01***	−0.01***	−0.00***	−0.00**	−0.00**
	(−4.83)	(−4.50)	(−4.41)	(−2.72)	(−2.28)	(−2.42)
TANG	0.08***	0.08***	0.08***	0.08***	0.08***	0.08***
	(3.01)	(3.11)	(3.12)	(5.04)	(5.12)	(5.13)
Adj. R^2	0.20	0.21	0.21	0.24	0.24	0.24
N	1790	1790	1790	1790	1790	1790

through better access to financing and a lower cost of borrowing, when the shareholding of parent SOEs exceeds 18.7% (20.8%), signaling that it has become a controlling shareholder, firms use less long-term debt (total debt). This indicates that firms use more equity financing when they are controlled by their parent SOEs. The result is consistent with the argument that listed firms are used by their parent SOEs to raise equity capital from the stock market. Hypothesis 2 is partially supported.

Table 7 reports the impact of government and non-government ownership when the government is *not* the largest shareholder. The results for all of the regression models show that government ownership has no significant impact on leverage. Hypothesis 3 is supported. We also find a positive impact of concentrated ownership when the largest shareholder is a non-government entity. Models (2) and (5) show a linear positive impact of ownership concentration on long-term and total debt. We do not find a very significant non-linear effect in Models (3) and (6). The positive linear impact of non-government ownership on leverage supports the arguments for disciplinary debt use and indicates a reluctance to dilute ownership among large non-government shareholders.

5.3. Robustness tests

The results in Table 7 describing the impact of government ownership when the government is not the largest shareholder may be driven by firms that have no government ownership at all. We therefore perform an analysis excluding these firms without any government ownership. Panel A of Table 8 shows that when the government is not the largest shareholder, government ownership of these firms ranges from 0.1% to 26.9%, with an average of 7%, which is a non-trivial shareholding. The regression results presented in Panel B confirm the insignificant impact of government ownership reported in Table 7.

The Reform was initiated in 2005 and completed at the end of 2007. Our sample may contain some firms that did not convert government shares to tradable shares as part of the Reform. We therefore exclude observations from 2007 from the sample and re-run the tests. The results, reported in Table 9, are consistent with the major results presented in Tables 4 and 6.

Table 8
Robustness test of the impact of ownership on leverage when the government is *not* the largest shareholder. This table presents the robustness test of the major results presented in Table 7; we exclude the firms without any government ownership. Panel A shows the summary statistics of this sub-sample, and Panel B shows the OLS regression results. The results are based on the pooled sub-sample for the 2007 to 2012 period (724 firm-year observations). Industry and year dummies are included in all regressions. All variables are defined in Table 1. ***, ** and * refer to significance levels at 1%, 5% and 10%, respectively. Figures reported in parentheses are t-statistics.

Panel A: Summary statistics

Variables	Mean	St. Dev.	Minimum	Maximum
TD	0.220	0.150	0.000	0.718
LD	0.066	0.096	0.000	0.494
LARG	0.292	0.138	0.037	0.894
GOV	0.070	0.063	0.001	0.269
SIZE (mill. RMB)	21.373	1.123	18.284	25.121
LIQ	1.536	1.079	0.138	9.686
PROF	0.050	0.096	−1.094	0.545
Q	2.199	1.730	0.477	21.896
TANG	0.224	0.175	0.000	0.823

Panel B: Regression results

	(1) TD	(2) TD	(3) TD	(4) LD	(5) LD	(6) LD
GOV	−0.015	−0.003	−0.005	0.018	0.022	0.020
	(−0.19)	(−0.03)	(−0.07)	(0.37)	(0.44)	(0.39)
LARG		0.113***	0.147		0.033	0.064
		(2.82)	(1.01)		(1.27)	(0.64)
$LARG^2$			−0.048			−0.043
			(−0.26)			(−0.33)
SIZE	0.015**	0.012**	0.012**	0.027***	0.026***	0.026***
	(2.54)	(2.03)	(2.01)	(7.66)	(7.45)	(7.12)
LIQ	−0.043***	−0.043***	−0.043***	0.002	0.002	0.002
	(−7.06)	(−6.98)	(−6.99)	(0.65)	(0.66)	(0.65)
PROF	−0.005	−0.038	−0.040	−0.082**	−0.092**	−0.094**
	(−0.06)	(−0.48)	(−0.50)	(−1.97)	(−2.17)	(−2.13)
Q	−0.012**	−0.010**	−0.010**	−0.003	−0.002	−0.002
	(−2.57)	(−2.20)	(−2.18)	(−0.93)	(−0.73)	(−0.69)
TANG	0.154***	0.152***	0.152***	0.124***	0.123***	0.124***
	(3.63)	(3.56)	(3.56)	(4.48)	(4.45)	(4.45)
Adj. R^2	0.19	0.20	0.20	0.25	0.25	0.25
N	724	724	724	724	724	724

We also run fixed effect regressions and find no significant effect of government ownership. This result is mainly driven by the lack of significant chronological variation in government ownership in the post-Reform period. The results in Table 10 show that the mean and median government shareholdings remain at around 44% throughout the post-Reform period. That government-owned shares are now tradable creates an incentive for the government to follow share price movements and monitor the performance of managers, just like any other shareholder. This incentive is expected to be stronger for firms with high government holdings than for firms with low government holdings. We expect firms with high government ownership to use more debt to discipline their managers. This effect can exist across firms and within a firm over time. However, the stability of government shareholding over our sample period only shows this effect across firms.

We create a time-averaged sample and run the analysis again. The results (not reported) are qualitatively similar to those obtained from the pooled sample. The Reform converted non-tradable shares into tradable shares, but these shares could only be traded after a 36-month delay. Therefore, we perform an additional analysis using observations from 2012, the year when all of the shares become freely tradable on the market. The results (not reported) are similar to the major results reported above.

Table 9
Impact of government ownership and parent SOEs ownership on leverage: 2008–2012 period. This table presents the OLS regression results on the impact of government ownership and parent SOEs ownership on leverage, for the 2008–2012 period. The sample includes only those firms in which the government is the largest shareholder. All variables are defined in Table 1. Industry and year dummies are included in all regressions. ***, ** and * refer to significance levels at 1%, 5% and 10%, respectively. Figures reported in parentheses are t-statistics.

Panel A: Impact of government ownership					*Panel B: Impact of parent SOEs ownership*				
	(1) TD	(2) TD	(3) LD	(4) LD		(1) TD	(2) TD	(3) LD	(4) LD
GOV	−0.094***	0.269***	−0.036***	0.145***	Parent SOEs	−0.03**	0.10**	−0.03***	0.08**
	(−5.14)	(3.20)	(−2.81)	(2.73)		(−2.30)	(2.17)	(−3.18)	(2.49)
GOV^2		−0.413***		−0.206***	Parent $SOEs^2$		−0.24***		−0.19***
		(−4.37)		(−3.38)			(−2.97)		(−3.62)
SIZE	0.041***	0.043***	0.032***	0.034***	SIZE	0.04***	0.04***	0.03***	0.03***
	(13.82)	(14.68)	(16.19)	(16.54)		(13.2)	(13.66)	(16.32)	(16.62)
LIQ	−0.052***	−0.052***	−0.003	−0.002	LIQ	−0.05***	−0.05***	0	0
	(−15.29)	(−15.18)	(−0.98)	(−0.91)		(−15.10)	(−15.06)	(−0.94)	(−0.92)
PROF	−0.419***	−0.419***	−0.136***	−0.136***	PROF	−0.44***	−0.43***	−0.14***	−0.14***
	(−7.22)	(−7.22)	(−3.72)	(−3.72)		(−7.54)	(−7.46)	(−3.94)	(−3.84)
Q	−0.015***	−0.014***	−0.005**	−0.004**	Q	−0.01***	−0.01***	−0.00**	−0.00**
	(−4.88)	(−4.71)	(−2.38)	(−2.24)		(−4.75)	(−4.68)	(−2.17)	(−2.06)
TANG	0.169***	0.173***	0.107***	0.109***	TANG	0.17***	0.17***	0.11***	0.11***
	(8.13)	(8.34)	(6.96)	(7.11)		(8.22)	(8.3)	(7.09)	(7.16)
Adj. R^2	0.38	0.38	0.35	0.35	Adj. R^2	0.37	0.37	0.35	0.35
N	2621	2621	2621	2621	N	2621	2621	2621	2621

Table 10
Descriptive statistics of government ownership over time for firms in which the government is the largest shareholder. This table presents the descriptive statistics of government ownership per year for firms in which the government is the largest shareholder.

Year	No. of firms	Mean	Median	Std. Dev.	Min	Max
2008	664	0.432	0.446	0.147	0.082	0.814
2009	647	0.434	0.447	0.153	0.089	0.814
2010	642	0.434	0.437	0.153	0.079	0.814
2011	640	0.432	0.430	0.158	0.079	0.814
2012	692	0.442	0.448	0.166	0.036	0.814

6. Conclusions

We examine the impact of government ownership on the new institutional context in the period after the implementation of China's Split-Share Structure Reform of 2005. The Reform has reshaped the government's position in the ownership structure of Chinese listed firms. Analyzing a large sample of firms listed on the Shanghai and Shenzhen Stock Exchanges in the 2007–2012 period, we find that government ownership has a variable impact on the capital structure of two groups of firms. For firms in which the government is the largest shareholder, government ownership is non-linearly associated with borrowing. Yet caution should be exercised in identifying the underlying mechanism. In contrast, ownership by parent SOEs negatively influences leverage, and the negative effect occurs when the parent SOEs own a high proportion of shares, revealing the role played by parent SOEs in firms' choice of equity financing.

When the government is *not* the largest shareholder, government ownership has no impact on a firm's capital structure. Instead, we observe that non-government ownership concentration increases the use of leverage. This finding demonstrates that large shareholders use debt to discipline managers and retain control.

Our study shows a positive result of China's privatization process. In the post-Reform period, government ownership declines and has little impact on firms' leverage decisions, although the government continues to hold an average of 7% of outstanding shares. This is an appealing outcome for the Chinese regulators who are trying to cede government control and let the firms operate according to capital market principles.

However, for firms heavily owned by the government, the government still plays a significant role in their financing policies. Particular attention should be given to the role of a firm's parent SOE. If a firm's dominant shareholder is a parent SOE, the firm uses more equity financing. Is this beneficial to the firm, or simply a tactic to tunnel resources? Future research can examine this type of firm to see how the impact of a parent SOE is reflected in firm performance.

Our study documents a significant impact of government ownership, which can be driven by several forces, such as the incentive and capital supply effects. Due to the limitations of our sample period, we cannot identify the precise effect at work. The Reform introduced the incentive to discipline managers via debt use. Future studies could test the force of this incentive effect by comparing the government impact before and after the Reform. The capital supply effect refers to the better access to credit by SOEs. Our sample period overlaps with the period when China introduced an economic stimulus plan to fight the 2008 economic slowdown. Ample and cheaper credit was injected into the economy, and SOEs experienced a larger increase in borrowing than private firms (Cong et al., 2017). Future research using a more stable period can separate the impact of the economic stimulus plan from the usual supply effect.

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Annual report readability and corporate agency costs☆

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ABSTRACT

Annual reports are the main sources of information for outside investors' investment decisions and enable shareholders to supervise the management. Difficulties with the readability of these reports may therefore have serious consequences. Using 19,221 firm-year observations of Chinese A-share listed firms from 2001 to 2015, we investigate the association between annual report readability and corporate agency costs, where readability is proxied by report file length and/or file size. We find that firms with better annual report readability experience lower agency costs, and the negative association between readability and agency costs is more pronounced in firms with higher external audit quality, internal control quality or analyst coverage. These results hold after several robustness checks. The positive effect of annual report readability is stronger in private firms than in state-owned enterprises, and becomes stronger after the implementation of new accounting standards in 2007. Readable annual reports can help in monitoring corporate insiders' opportunistic behavior and thus reduce agency costs.

1. Introduction

Readability is an important attribute of textual information and has been examined extensively in various fields. Research into the importance of readability has been conducted in areas including the military,

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medicine and law (Bonsall and Miller, 2017; DuBay, 2004). The value of the information in the text can only be fully realized with a high level of readability. The issue of readability has increasingly become a focus in capital markets in recent years. The changes in requirements for corporate information disclosure have resulted in a significant increase in the quantity of information disclosed and attracted the attention of regulators and investors. In 1998, the U.S. Securities and Exchange Commission (SEC) issued the *Plain English Disclosure* and *A Plain English Handbook: How to Create Clear SEC Disclosure Documents*, which aim to help public firms improve the readability of their disclosed information and to help investors better understand the information.

Theoretically, information disclosure announcements such as annual reports are an important communication bridge between management and outside stakeholders (e.g., shareholders) in joint-stock companies due to the separation of ownership and management. Outside investors and minority shareholders can learn about a company's financial status, performance and cash flow through its annual reports and thus evaluate the prospects for corporate growth and management competence. However, the increasing deterioration in levels of readability has adversely affected the communication function of corporate annual reports in recent years. One consequence of the improvements in the information disclosure systems of capital markets is that the information disclosed in annual reports includes many professional terms and specific notes and also much non-financial information, which makes them increasingly complicated and hard to understand in listed companies, particularly those in China. One major trend is that the length of corporate annual reports is increasing (see Fig. 1), and thus the readability of these reports has become an intractable problem, particularly considering the current explosion in the volume of information and shallow network reading. The economic consequences of annual report readability have therefore attracted the attention of scholars and regulators alike.

Many studies find that annual report readability can affect the quality of resulting information. For example, poor readability may result in serious earnings management problems, poor earnings persistence, low analyst forecast quality, weak market reactions to annual reports and a high risk of stock price crashes (Ertugrul et al., 2017; Kim et al., 2017a, 2017b; Lang and Stice-Lawrence, 2015; Lawrence, 2013; Li, 2008; Lo et al., 2017; Rennekamp, 2012). Most of these studies are based on the context of the U.S. or other English-speaking countries, and few have explored the economic consequences of annual report readability in China. You and Yi (2010) and Ji et al. (2016) initially discuss the readability problem of internal control reports and corporate social responsibility reports in China. Studies also mainly focus on the direct effects of annual report readability, such as the transmission or hiding of information, and few have explored the potential impact of readability on stakeholders in achieving their economic goals. In terms of the usefulness of annual reports in decision making, their core value is to help investors make scientific economic decisions. These reports are the main information sources through which shareholders learn about management competence and firm performance, so they can better supervise and motivate the management. The question then emerges of

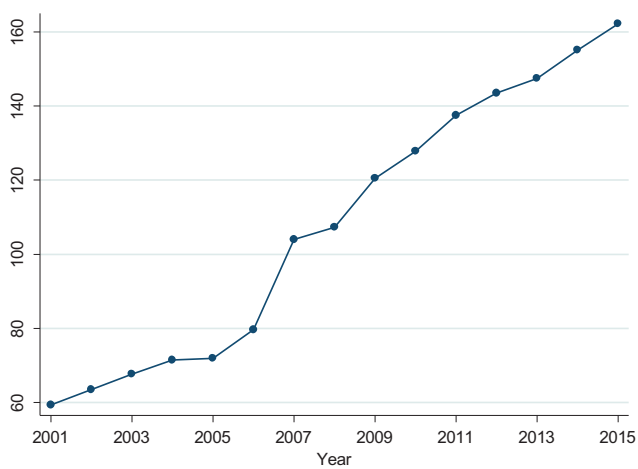

Fig. 1. The average number of pages of the annual reports of China's listed companies between 2001 and 2015.

whether and how annual report readability plays a role in governance, but few studies, if any, investigate this issue.

Using 19,221 firm-year observations of Chinese A-share listed firms from 2001 to 2015, this study investigates the association between annual report readability and corporate agency costs, where readability is proxied by hand-collected file length and/or the digital file size of annual reports. We find that (1) firms with higher levels of readability in their annual reports suffer from lower agency costs resulting from interest conflicts both between shareholders and managers and between large and minority shareholders, indicating that annual report readability contributes to the improvement of monitoring corporate insiders; and (2) the positive governance effect of annual report readability is more pronounced in firms with higher external audit quality/internal control quality or analyst coverage, suggesting that external auditors, internal control system and professional analysts can strengthen the effect of annual report readability on reducing agency costs. These findings hold for a series of robustness checks, including the adoption of simultaneous and firm fixed effects models to tackle endogeneity problems and alternative measurements for key variables. Furthermore, we find that the governance role of annual report readability is stronger in private firms than in state-owned enterprises and becomes stronger after the implementation of the new accounting standards in 2007.

This study makes several contributions to the literature. First, to the best of our knowledge, our study is among the first to take advantage of a large sample to examine the effect of annual report readability on corporate agency costs, thereby contributing to the literature on annual report readability, the economic consequences of which have become a recent focus. Second, most research on the readability of annual reports originates from English-speaking countries such as the U.S., and our study extends this research into the Chinese context. In this study, we construct readability indexes of Chinese annual reports, which can be a valuable reference for future research into readability in China. Third, we find that the readability of annual reports is significant in corporate agency problems. Alleviating agency problems and improving corporate governance have long been concerns in China's capital markets, and thus our study contributes to and extends the field of corporate governance. Finally, plain disclosure has become an important reform direction when disclosing information in capital markets worldwide, so our findings have implications for this reform and provide insights for regulators.

2. Literature review and hypotheses development

2.1. Literature review

According to Chall (1958), readability refers to a combination of various factors involving interest, legibility and ease of understanding for readers. Yan and Sun (2002) argue that readability refers to the level of reading difficulty of an article. Readers can generate interest from readable articles and *vice versa*. In addition to the application of the text analysis method in corporate finance, recent empirical studies use large sample data to investigate the economic consequences of annual report readability (Loughran and McDonald, 2014).

Annual reports are one of the main channels through which companies communicate with external stakeholders, and readability is an important feature. Many scholars have explored potential determinants of annual report readability in recent years. Unlike previous studies based on small volumes of sample data (e.g., Baker and Kare, 1992; Barnett and Leoffler, 1979; Courtis, 1986; Smith and Smith, 1971; Subramanian et al., 1993), Li (2008) is the first to explore the association between annual report readability and corporate current and future performance by using a large volume of sample data from U.S. capital markets. He finds that the annual reports of firms with lower current earnings are less readable, and firms providing annual reports that are more readable are linked to more earnings persistence. Ajina et al. (2016) further find that companies with earnings manipulation tend to issue less readable annual reports to hide their manipulation behavior. Similarly, Lo et al. (2017) focus on the readability of the management and discussion and analysis (MD&A) of annual reports, and find that firms with strong motivations to manipulate earnings have more complex MD&A. These findings suggest that management can strategically manipulate the readability of annual reports, which contributes to the literature on strategic disclosure theory (Kim et al., 2017a; Schrand and Walther, 2000). In addition, Nelson and Pritchard (2007) investigate the effect of litigation risk to firms on

information readability and find that firms with higher risk of shareholder lawsuits have more readable disclosure documents.

Many scholars have explored the economic consequences of readability. Biddle et al. (2009) find a positive relationship between annual report readability and corporate investment efficiency, indicating that firms with better annual report readability face less serious problems of overinvestment and underinvestment. Kim et al. (2017a) and Hwang and Kim (2017) find that readability can significantly affect firm value. The trust investors place in the information disclosed by firms decreases if annual reports are less readable, thereby doing harm to firm value. Bonsall and Miller (2017) and Ertugrul et al. (2017) find that firms with less readable 10-K files have lower credit ratings, stricter loan contract terms and greater risk of stock price crashes. Similarly, Kim et al. (2017b) provide evidence that firms with poorer readability of their annual reports have a higher risk of future stock price crashes. Unlike studies that use the Fog Index or other related indexes as their measurement of readability, Loughran and McDonald (2014) use the digital file size of 10-K filings. They demonstrate that larger file sizes are linked to higher earnings volatility and lower accuracy of earnings forecasts. Asay et al. (2016) extend the literature by conducting an experimental study and find that investors search for information from outside resources when corporate disclosed documents are less readable. Lang and Stice-Lawrence (2015) use a large volume of sample data from non-American companies and find that improving information disclosure quality is beneficial to focal firms.

In addition to consequences at the firm level, the readability of annual reports also has significant market-level effects. For example, You and Zhang (2009), Miller (2010), Rennekamp (2012), Lee (2012) and Lawrence (2013) reveal that investors react more weakly to less readable disclosure announcements, indicating that readability may affect capital market efficiency. If investors need more time and cost to extract value-related information from longer and more complex documents disclosed by firms, less trading volume and slower market responses will result (Bloomfield, 2002; Grossman and Stiglitz, 1980; Hirshleifer and Teoh, 2003). Lehavy et al. (2011) and Bozanin and Thevenot (2015) investigate the effect of readability on analysts' behavior and find that analysts need more time and energy to follow less readable annual reports and provide forecast reports with lower forecast accuracy and higher forecast volatility. Likewise, Qiu et al. (2016) find that in China, even if analysts pay more attention to firms with less readable annual reports, they cannot improve the information content or quality of their forecast reports for these firms. Bonsall and Miller (2017) find that annual report readability also affects the behavior of bond rating agencies, as less readable annual reports result in higher divergence in the rating scores of bond rating agencies. De Franco et al. (2015) focus on the readability of analyst forecast reports and find that better readability can help investors reduce their costs of information collection and thus affect the stock trading volume. Tan et al. (2015) use the experimental research method to examine the effect of readability on investors' judgment. They find that better readability can improve investors' understanding of current performance, if the performance is not consistent with earnings preannouncements, and thus improves the investors' judgment of corporate future performance. In addition, Tan et al. (2014) find that investors are more subject to the tone of management when the readability of information disclosure announcements is poorer.

Taken together, studies suggest that serious economic consequences for shareholders can result if management strategically manipulates the readability of annual reports, such as by deliberately reducing readability to obfuscate and hide bad news. These types of strategic disclosure behavior are in essence managerial opportunism, and thus inevitably result in agency costs to the focal firms. However, few studies, if any, have investigated the effect of annual report readability on agency costs. In this study, we therefore aim to investigate the effect of annual report readability on corporate agency costs in the context of China.

2.2. Hypotheses development

In emerging markets such as China, concentrated ownership structures are common in listed companies. This can lead to two main types of agency problem: agency conflicts between shareholders and managers and between large and minority shareholders (Shleifer and Vishny, 1997). In this study, we argue that annual report readability can help to alleviate both types of agency problem and thus reduce the respective agency costs.

First, firms with annual reports that are more readable have higher levels of information disclosure quality, which can reduce the degree of information asymmetry faced by shareholders and help them better supervise management. The fundamental cause of agency problems is the information asymmetry between the principals and agents, which prevents the principals from properly evaluating the agents' competence and efforts. Therefore, various information disclosure mechanisms need to be set up to alleviate the problem of information asymmetry faced by both parties (Akerlof, 1970; Hart, 1995). Information announcements (e.g., annual reports) are the main communication channels and mechanisms for revealing information in listed firms. Outside (minority) shareholders usually depend on annual reports to supervise and motivate management (Healy and Palepu, 2001; Jensen and Meckling, 1976). However, if corporate annual reports are less readable, shareholders spend more time and costs on processing the information, which impedes them in extracting value-related information from the reports (Rennekamp, 2012). Shareholders may then have less exact knowledge of the competence and performance of management, which may weaken management supervision and exacerbate agency conflicts between principles and agents. Similarly, as majority shareholders can override the interests of minority shareholders, mainly through unfair related party transactions (Jiang et al., 2010), less readable annual reports may hamper minority shareholders in extracting accurate information about such transactions, thus reducing their abilities to effectively supervise the expropriation of majority shareholders.

Second, highly readable annual reports facilitate the transmission of valuable information to potential investors, which in turn may bring about strong market pressure on corporate insiders. According to the (weak) efficient market hypothesis, value-related information from disclosure announcements (e.g., annual reports) is quickly reflected in the stock price, which may lead investors' trading behavior and thus optimize the resource allocation in capital markets (Malkiel and Fama, 1970). This market mechanism can put significant market supervision pressure on corporate insiders and thus help to constrain their shirking and other opportunistic behaviors. Otherwise, poor performance will result in management turnover and even hostile takeover threats from the market (Parrino et al., 2003). Studies show that if annual reports are less readable, the quality of analyst forecasts is lower and investors will reduce their dependence on the reports and are less willing to purchase stocks of firms providing less readable annual reports (Lawrence, 2013; Lehavy et al., 2011; Rennekamp, 2012; Qiu et al., 2016). Poor readability thus prevents annual reports from effectively transmitting value-related information to the market, thereby weakening the market pressure faced by corporate insiders and exacerbating corporate agency costs.

In summary, annual reports that are more readable are beneficial in reducing the information asymmetry faced by shareholders and potential investors, and thus can improve the supervision of corporate insiders and reduce agency costs. Therefore, we put forward our first testable hypothesis as follows:

Hypothesis 1. *Ceteris paribus*, firms with higher annual report readability have lower corporate agency costs.

Li (2008) suggests that the quality of information disclosed by companies can be divided into disclosure quality and earnings quality. The readability of annual reports belongs to disclosure quality, while the value of disclosure quality depends on earnings quality. Therefore, we anticipate that the earnings quality of annual reports will reinforce the effect of annual report readability on corporate agency costs. In listed companies, an external independent audit is a main mechanism for guaranteeing the earnings quality of annual reports. External auditors provide professional auditing service and issue audit reports to reflect the earnings quality of their client firms' annual reports. Many studies have shown that higher external audit quality is associated with weaker earnings management based on accruals and/or real activities and with higher annual report earnings quality (Becker et al., 1998; Francis and Yu, 2009). We thus put forward our second hypothesis as follows:

Hypothesis 2. External audit quality strengthens the negative relationship between annual report readability and corporate agency costs.

In addition to external independent audit, internal control system is another important mechanism to ensure the earnings quality of corporate annual reports. This mechanism has increasingly become a focus of attention, particularly since the passing of the Sarbanes–Oxley Act in the U.S. in 2002. Regulators worldwide have issued a series of standards on the establishment of corporate internal control system, aiming to both improve corporate internal control and exert effective control over the production of financial reports,

thereby improving the quality of corporate disclosed information. In China, both the Shanghai and Shenzhen Stock Exchanges issued "*Internal Control Guidelines for Listed Companies*" in 2006, and the Ministry of Finance along with five other ministries and commissions jointly issued the "*Basic Rules of Enterprise Internal Control*" in 2008. Studies provide consistent evidence that internal control system can inhibit earnings management and improve earnings persistence and earnings quality (Doyle et al., 2007; Ashbaugh-Skaife et al., 2008; Ye et al., 2015). Therefore, as firms with higher internal control quality are likely to have higher earnings quality, we predict a stronger effect of annual report readability on reducing corporate agency costs in these firms. We thus put forward the third hypothesis:

Hypothesis 3. Internal control quality strengthens the negative relationship between annual report readability and corporate agency costs.

Given their earnings quality and disclosure quality characteristics, the information value of annual reports is only relevant when stakeholders use the information to make business decisions. Annual reports can thus only help reduce corporate agency costs if their users play a governance role. Security analysts are important information intermediaries in capital markets and are primary users of corporate annual reports. External minority investors and institutional investors usually acquire information regarding target companies' performance and development prospects from analyst reports (Healy and Palepu, 2001; Yezegel, 2015; Zhu et al., 2007). A higher level of analyst coverage then represents a higher probability that focal firms' annual reports will be used by analysts, and that they will be used more frequently. The readability of annual reports, which improves the efficiency of information transmission, then becomes more significant. Studies also find that annual report readability may affect analysts' forecast behavior. Analysts need to invest more time and effort to interpret less readable annual reports, but still fail to provide high quality earnings forecasts (Lehavy et al., 2011; Qiu et al., 2016). Accordingly, we put forward our fourth hypothesis:

Hypothesis 4. Analyst coverage strengthens the negative relationship between annual report readability and corporate agency costs.

3. Research design

3.1. Sample and data

Our initial sample includes 27,550 firm-year observations of all Chinese A-share listed companies during the period 2001–2015. To reduce the influence of abnormal observations, we successively exclude 2254 firm-year observations where the focal firms also issued B- or H-share stocks, 1751 where the focal firms have ST or *ST status, 228 for financial firms, 74 for firms issuing debts exceeding asset value and 4032 firm-year observations for firms with missing data. We thus have a final sample of 19,211 firm-year observations, and the sample distribution by year and industry is shown in Table 1.

We hand-collected data on the file length and file size of corporate annual reports from the CNINFO website (www.cninfo.com.cn), the officially designated disclosure website for information announcements of listed companies in China. The data on internal control quality comes from the DIB Internal Control and Risk Management database (www.ic-erm.com). All other data including agency costs, financial indicators and corporate governance comes from the China Stock Market & Accounting Research (CSMAR) database.

3.2. Measures

3.2.1. Dependent variables

Self-serving managers tend to maximize their utility through opportunistic behavior including inefficient investment and excessive perk consumption, so we follow the method of Ang et al. (2000) and use the operating expense ratio, denoted by *Agency_cost1*, to measure the agency costs between shareholders and managers. This can capture managerial perk consumption and thus reflects the efficiency in controlling agency costs between shareholders and managers. Specifically, the operating expense ratio equals the ratio of the

Table1
Sample distribution by year and industry.

Industry code	Year															Total
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	
A	12	24	22	24	29	26	23	23	24	29	41	41	46	45	48	457
B	4	11	10	12	15	17	16	18	21	22	29	34	31	30	32	302
C0	21	36	42	42	42	45	39	48	52	52	67	78	83	84	83	814
C1	25	40	39	39	49	50	46	54	52	50	71	81	79	79	100	854
C2	1	2	2	1	1	2	1	2	4	4	6	10	12	12	30	90
C3	8	18	15	17	20	18	19	24	27	32	40	43	49	49	98	477
C4	69	101	98	111	118	117	115	118	138	135	179	213	241	235	241	2229
C5	15	21	24	28	31	34	34	48	52	55	91	111	130	132	133	939
C6	50	72	78	84	92	92	82	92	98	105	134	159	167	167	170	1642
C7	74	118	123	135	149	144	140	171	185	200	306	385	435	433	434	3432
C8	30	53	53	56	69	70	60	64	69	75	100	117	127	129	129	1201
C9	7	12	10	12	13	12	13	16	17	21	26	29	28	31	30	277
D	18	35	34	38	43	52	45	44	46	44	54	55	59	50	49	666
E	9	12	12	15	15	19	23	23	31	29	36	46	48	46	45	409
F	15	21	22	24	27	37	37	37	40	41	52	53	54	54	41	555
G	33	50	51	56	55	51	50	60	70	89	131	167	201	200	198	1462
H	56	69	66	70	75	70	72	70	78	82	91	99	106	105	102	1211
J	18	31	32	32	35	34	32	34	39	40	40	42	42	39	40	530
K	13	29	30	30	30	29	32	39	37	45	51	61	64	64	64	618
L	4	7	6	6	6	5	6	7	7	8	15	21	23	23	25	169
M	46	61	57	58	58	57	51	51	54	56	61	64	66	65	72	877
Total	528	823	826	890	972	981	936	1043	1141	1214	1621	1909	2091	2072	2164	19,211

Industry codes from A to M represent Agribusiness (A), Mining (B), Manufacturing (C), Public utilities (D), Construction (E), Transportation (F), Information technology (G), Wholesale, retail and trade (H), Real estate (J), Social service (K), Communication and culture (K) and Conglomerate (M) respectively.

sum of administrative expense and sales expense over revenue. The higher the ratio, the higher the agency costs between shareholders and managers.

Following Jiang et al. (2010), we measure agency costs between majority and minority shareholders based on the ratio of other receivables over total assets, denoted by *Agency_cost2*. Large shareholders tend to expropriate the interest of minority shareholders through the occupation of listed firms' funds in China. Such expropriation is usually in the form of the receivable of related sales and other receivables of temporary borrowing in financial statements. Due to their disguised feature, other receivables are the main means for large shareholders to expropriate the interest of minority shareholders (Jiang et al., 2010). Therefore, the magnitude of other receivables can capture and reflect the extent to which large shareholders expropriate the interest of minority shareholders. In other words, the higher the proportion of other receivables, the higher the agency costs between majority and minority shareholders.

3.2.2. Independent variables

Most studies of annual report readability cover the context of English-speaking countries. Due to the features of the English language, scholars typically use the Fog Index, Flesch Reading Ease, Flesch–Kincaid Indices and other similar indexes to measure annual report readability based on the number of sentences, average sentence length and the proportion of complex words (Hwang and Kim, 2017; Li, 2008; Lo et al., 2017). However, Loughran and McDonald (2014) point out that these measures may fail to measure the readability of business documents (e.g., financial statements) because average sentence length and the proportion of complex words are not significant factors of readability in many situations. The findings based on these measurements are thus biased. Accordingly, the authors recommend that the file size of annual reports should be a better proxy of annual report readability. In China, research on annual report readability has only just emerged, and there is not a generally accepted proxy to measure the readability of Chinese annual reports (Ji et al., 2016; Yan and Sun, 2002; You and Yi, 2010). Considering the distinct differences between Chinese

and English, we cannot directly use the Fox Index or Flesh–Kincaid indices to measure the readability of annual reports in Chinese.

According to Loughran and McDonald (2014) and the measurements of Li (2008) and De Franco et al. (2015), we take the length of Chinese annual reports to measure their readability. The efficiency of information transmission largely depends on how easy it is for users to obtain the information. The magnitude of information disclosed in annual reports is directly reflected in the length of those reports. The more information is disclosed in annual reports, the more difficult it is for users to extract value-related information. However, the interest of readers is an important factor of readability (Chall, 1958). The content of annual reports as a type of commercial document is relatively boring and difficult to understand. Long annual reports are unlikely to arouse the reading interest of users, particularly with the current availability of mass information and shallow reading networks. We generate three independent variables, that is, *Pages, Words* and *Characters*, to measure the length of annual reports.[1] For better understanding and interpretation, we take the natural logarithm of the above three variables, measure their respective reciprocals and then adjust them according to range standardization. Finally, we get *Readability1, Readability2* and *Readability3*, respectively, as the proxies of annual report readability. A greater value of each variable represents a higher readability of annual reports.

3.2.3. Moderating variables

To test Hypotheses 2–4, we construct three moderating variables: the quality of external audit, the quality of internal control and analyst coverage. Following Becker et al. (1998) and Francis and Yu (2009), we generate a dummy variable, *BIG4*, to measure the quality of external audit, which equals 1 if a focal firm's external auditor belongs to the Big 4 auditors and 0 otherwise. According to the method of Ye et al. (2015), we take the natural logarithm of the sum of the Internal Control Index of listed companies from the DIB Internal Control and Risk Management database and one to measure the quality of internal control, denoted by *INTERNAL*. We follow Zhu et al. (2007) to measure analyst coverage, $ANALYST$, as the natural logarithm of the number of analysts (team) following a focal listed firm. If data are missing, we set $ANALYST$ to be 0.

3.2.4. Control variables

Following previous studies (e.g., Jiang et al., 2010), we control a set of factors that may systematically relate to corporate agency costs. Specifically, we include firm size ($SIZE$, measured as the natural logarithm of total assets), financial leverage ($LEVERAGE$, measured as the ratio of total liabilities over total assets), fixed assets ($TANGIBLE$, measured as the ratio of fixed assets over total assets), sales growth ($GROWTH$, measured as the sales growth rate from year t − 1 to year t), firm age ($LISTAGE$, measured as the number of years since IPO), ownership concentration ($TOP1$, measured as the ratio of the shares held by the largest shareholder to total shares), multiple large shareholder structure ($BLOCKS$, equal to 1 if the shareholding held by the second largest shareholder is no less than 5% and 0 otherwise), board size ($BSIZE$, measured as the natural logarithm of the number of directors on the board), board independence ($INDBOARD$, measured as the ratio of independent directors on the board), executive compensation ($COMP$, measured as the natural logarithm of the compensation of top three executives), managerial ownership ($MSHARE$, measured as the ratio of the shares held by executives over total shares) and CEO duality ($DUALITY$, equal to 1 if one person serves as both the chairman and CEO and 0 otherwise). In addition, we include industry and year dummy variables to control for industry and time fixed effects, respectively. The definitions of all variables are listed in Table 2.

3.3. The models

To test our Hypotheses 1–4, we construct the following four regression models:

$$Agency\_cost_{t+1} = \alpha_0 + \alpha_1 Readability_t + \sum control_t + \sum Industry + \sum Year + \varepsilon \quad (1)$$

[1] The initial document format of annual reports is the portable document format (PDF). We cannot obtain the information of total words or characters of annual reports in PDF. Therefore, we use the Solid Converter PDF software to convert PDF file format into WORD document format. The annual reports in WORD format can then calculate the number of words or characters automatically.

Table 2
Variable definitions.

Variable	Definition
Agency_cost1	The ratio of the sum of administrative expense and sales expense to revenue in year t + 1
Agency_cost2	The ratio of other receivables to total assets in year t + 1
Pages	The natural logarithm of total pages of annual report in year t
Words	The natural logarithm of total words of annual report in year t
Characters	The natural logarithm of total characters of annual report in year t
Readability1	The range standardization of the reciprocal of the natural logarithm of pages of annual reports in year t
Readability2	The range standardization of the reciprocal of the natural logarithm of words of annual reports in year t
Readability3	The range standardization of the reciprocal of the natural logarithm of characters of annual reports in year t
BIG4	An indicator variable that equals 1 if a firm is audited by Big 4 auditors in year t, and 0 otherwise
INTERNAL	The natural logarithm of the sum of internal control index and 1 in year t
ANALYST	The natural logarithm of the number of analysts following a focal firm in year t; the missing value is replaced by 0
SIZE	The natural logarithm of total assets in year t
LEVERAGE	The ratio of liabilities to assets in year t
TANGIBLE	The ratio of fixed-assets to total assets in year t.
GROWTH	The sales growth rate from year t − 1 to year t
LISTAGE	The natural logarithm of the number of years since IPO in year t
TOP1	The ratio of the shares held by the first shareholder to total shares in year t
BLOCKS	An indicator variable that equals 1 if the shares held by the second shareholder beyond 5% in year t, and 0 otherwise
BSIZE	The natural logarithm of the board membership in year t
INDBOARD	The ratio of the number of independent directors to total directors in year t
COMP	The natural logarithm of the compensation of the top three executives in year t
MSHARE	The ratio of the shareholdings held by executives to total shares
DUALITY	An indicator variable that equals 1 if the chairman and general manager are one person, and 0 otherwise
Industry	Each indicator variable corresponds to an industry and equals 1 if a firm belongs to this industry, and 0 otherwise
Year	Each indicator variable corresponds to a sample year and equals 1 if an observation comes from this year, and 0 otherwise
Readabiltiy4	The range standardization of the reciprocal of the natural logarithm of file size of annual reports in year t
Ab_readability1	The range standardization of the reciprocal of the natural logarithm of pages of annual reports in year t, where pages is divided by the natural logarithm of focal firms' total assets
Ab_readability2	The range standardization of the reciprocal of the natural logarithm of words of annual reports in year t, where pages is divided by the natural logarithm of focal firms' total assets
Ab_readability3	The range standardization of the reciprocal of the natural logarithm of characters of annual reports in year t, where pages is divided by the natural logarithm of focal firms' total assets
Ab_Agency_cost1	The difference between *Agency_cost1* and its industry-year mean in year t + 1
Ab_Agency_cost2	The difference between *Agency_cost2* and its industry-year mean in year t + 1
Cost1_1	The ratio of business entertainment expense to revenue in year t
Cost1_2	The ratio of the sum of office, travelling, business entertainment, communication, overseas training, director, car and conference expenses to revenue in year t
Cost1_3	The ratio of the sum of business entertainment and other expenses to revenue in year t
Cost2_1	The ratio of funds occupied by controlling shareholders to total assets in year t
Cost2_2	The ratio of the amount of debt guarantee provided by listed companies to their controlling shareholders to total assets
Cost2_3	The ratio of the total amount of related party transactions between listed companies and their controlling shareholders to total assets in year t
MEDIANREAD	The year-industry median of corresponding variable of annual report readability in year t
MKT	The marketization index of the province where a focal firm is registered, compiled by Fan et al. (2011)
STATE	An indicator variable that equals 1 if the ultimate controlling shareholders is the state, and 0 otherwise
NEW	An indicator variable that equals 1 if a firm-year observation comes from the years after 2007, and 0 otherwise

$$Agency\_cost_{t+1} = \beta_0 + \beta_1 Readability_t + \beta_2 Readability_t * BIG4_t + \beta_3 BIG4_t + \sum control_t + \sum Industry + \sum Year + \varepsilon \quad (2)$$

$$Agency\_cost_{t+1} = \gamma_0 + \gamma_1 Readability_t + \gamma_2 Readability_t * INTERNAL_t + \gamma_3 INTERNAL_t + \sum control_t + \sum Industry + \sum Year + \varepsilon \quad (3)$$

$$Agency\_cost_{t+1} = \lambda_0 + \lambda_1 Readability_t + \lambda_2 Readability_t * ANALYST_t + \lambda_3 ANALYST_t + \sum control_t + \sum Industry + \sum Year + \varepsilon \quad (4)$$

Agency_cost represents either *Agency_cost1* or *Agency_cost2*. *Readability* represents any one of the three variables of annual report readability, that is, *Readability1*, *Readability2* or *Readability3*. *Control* represents all control variables. α_0, β_0, γ_0, λ_0 is the constant of the corresponding model and ε is the stochastic disturbance item of the models. According to the expectation of H1, the coefficient α_1 in model (1) should be significantly negative. According to the expectations of H2–H4, the coefficient β_2, γ_2, λ_2 in models (2)–(4) should also be significantly negative. To control for the potential endogeneity problem of reverse causality, we lag all independent, moderating and control variables. In addition, we winsorize the top and bottom 1% of each continuous variable to control the influence of outliers.

4. Results

4.1. Descriptive statistics

Table 3 reports the descriptive statistics of the main variables used in this study. As Table 3 shows, the mean and standard deviation of *Agency_cost1* are 0.170 and 0.147, respectively, and the mean and standard deviation of *Agency_cost2* are 0.027 and 0.046, respectively, showing a huge difference in the extent of agency costs across listed firms, thereby providing considerable variation for regression estimation. After the transformation of the logarithm, *Ln_Pages*, *Ln_Words* and *Ln_Characters* are equal to 113.296 ($=e^{4.730}$), 65,512.750 ($=e^{11.090}$) and 93,901.350 ($=e^{11.450}$), respectively. These values indicate that the annual reports of listed companies are relatively long on average, and the readability of annual reports has become a significant practical problem due to the current shallow reading behavior in China. Of the sample firms, 3.0% are audited by Big 4 auditors. The mean and standard deviation of *INTERNAL* are 6.469 and 0.387, respectively, which means the construction of the internal control system of listed companies displays convergence. The

Table 3
Descriptive statistics of main variables.

Variables	*N*	Mean	S.D.	Min	P25	Median	P75	Max
Agency_cost1	19,211	0.170	0.147	0.016	0.080	0.129	0.206	0.910
Agency_cost2	19,211	0.027	0.046	0.000	0.004	0.011	0.028	0.291
Pages	19,211	4.730	0.386	3.091	4.443	4.812	5.024	5.908
Words	19,211	11.090	0.383	8.428	10.850	11.180	11.370	13.620
Characters	19,211	11.450	0.356	9.319	11.230	11.520	11.710	13.920
Readability1	19,211	0.159	0.093	0.041	0.090	0.127	0.212	0.445
Readability2	19,211	0.070	0.032	0.030	0.048	0.059	0.084	0.168
Readability3	19,211	0.117	0.049	0.051	0.083	0.102	0.140	0.273
BIG4	19,211	0.030	0.171	0	0	0	0	1
INTERNAL	19,211	6.469	0.387	2.876	6.452	6.525	6.572	6.823
ANALYST	19,211	1.052	1.160	0	0	0.693	2.079	3.584
SIZE	19,211	21.650	1.076	19.550	20.870	21.520	22.270	24.880
LEVERAGE	19,211	0.454	0.201	0.052	0.301	0.460	0.610	0.871
TANGIBLE	19,211	0.255	0.173	0.003	0.121	0.226	0.364	0.746
GROWTH	19,211	0.194	0.444	−0.594	−0.020	0.125	0.301	2.823
LISTAGE	19,211	2.026	0.674	0.693	1.609	2.079	2.565	3.091
TOP1	19,211	0.371	0.157	0.092	0.245	0.350	0.488	0.750
BLOCKS	19,211	0.566	0.496	0	0	1	1	1
BSIZE	19,211	2.180	0.205	1.609	2.079	2.197	2.197	2.708
INDBOARD	19,211	0.350	0.0780	0.000	0.333	0.333	0.375	0.556
COMP	19,211	13.690	0.894	11.210	13.150	13.780	14.300	15.690
MSHARE	19,211	0.081	0.171	0	0	0	0.022	0.668
DUALITY	19,211	0.182	0.386	0	0	0	0	1

All variables are defined in Table 2.

mean and standard deviation of *ANALYST* are 1.052 and 1.160, respectively, suggesting that the average number of analysts following a focal listed firm is 2.863 (=$e^{1.052}$). The values of all other variables have a good distribution without abnormal outliers.

4.2. Pearson correlation matrix

Table 4 displays the Pearson correlation coefficients of the variables included in the regression models. As Table 4 shows, *Agency_cost1* and *Agency_cost2* are highly correlated ($r = 0.251$, $p < 0.01$). Firms with weak

Table 4
Pearson correlation matrix.

Variables	1	2	3	4	5	6	7
1 *Agency_cost1*	1						
2 *Agency_cost2*	0.251***	1					
3 *Readability1*	−0.004	0.298***	1				
4 *Readability2*	0.008	0.301***	0.915***	1			
5 *Readability3*	0.024***	0.289***	0.908***	0.985***	1		
6 *BIG4*	−0.034***	−0.025***	−0.030***	−0.013*	−0.023***	1	
7 *INTERNAL*	−0.106***	−0.075***	0.039***	0.031***	0.020***	0.027***	1
8 *ANALYST*	−0.019***	−0.239***	−0.428***	−0.439***	−0.446***	0.080***	0.142***
9 *SIZE*	−0.291***	−0.154***	−0.362***	−0.379***	−0.433***	0.184***	0.097***
10 *LEVERAGE*	−0.265***	0.172***	0.041***	0.011	−0.023***	0.028***	−0.070***
11 *TANGIBLE*	−0.146***	−0.098***	0.209***	0.210***	0.207***	0.012	−0.013*
12 *GROWTH*	−0.109***	−0.047***	−0.014*	−0.020***	−0.022***	−0.009	0.109***
13 *LISTAGE*	−0.073***	0.039***	−0.091***	−0.120***	−0.142***	0.032***	−0.052***
14 *TOP1*	−0.165***	−0.055***	0.143***	0.152***	0.144***	0.111***	0.085***
15 *BLOCKS*	0.106***	0.013*	−0.081***	−0.077***	−0.060***	−0.033***	−0.024***
16 *BSIZE*	−0.094***	0.019***	0.122***	0.096***	0.076***	0.048***	0.058***
17 *INDBOARD*	−0.008	−0.198***	−0.440***	−0.449***	−0.443***	0.020***	−0.020***
18 *COMP*	−0.026***	−0.270***	−0.614***	−0.627***	−0.639***	0.110***	0.060***
19 *MSHARE*	0.134***	−0.127***	−0.301***	−0.270***	−0.247***	−0.053***	0.004
20 *DUALITY*	0.091***	−0.087***	−0.189***	−0.178***	−0.162***	−0.029***	−0.013*

Variables	8	9	10	11	12	13	14
8 *ANALYST*	1						
9 *SIZE*	0.413***	1					
10 *LEVERAGE*	−0.100***	0.404***	1				
11 *TANGIBLE*	−0.080***	0.011	0.059***	1			
12 *GROWTH*	0.084***	0.053***	0.062***	−0.060***	1		
13 *LISTAGE*	−0.087***	0.335***	0.361***	0.028***	−0.056***	1	
14 *TOP1*	0.017**	0.172***	0.020***	0.092***	0.037***	−0.131***	1
15 *BLOCKS*	0.053***	−0.161***	−0.130***	−0.065***	0.038***	−0.256***	−0.369***
16 *BSIZE*	0.036***	0.172***	0.139***	0.151***	0.006	0.038***	0.026***
17 *INDBOARD*	0.203***	0.134***	−0.019***	−0.093***	0.005	0.097***	−0.081***
18 *COMP*	0.471***	0.451***	−0.023***	−0.221***	0.021***	0.154***	−0.095***
19 *MSHARE*	0.213***	−0.167***	−0.326***	−0.173***	0.034***	−0.486***	−0.133***
20 *DUALITY*	0.107***	−0.084***	−0.150***	−0.107***	0.002	−0.159***	−0.077***

Variables	15	16	17	18	19	20
15 *BLOCKS*	1					
16 *BSIZE*	0.003	1				
17 *INDBOARD*	0.016**	−0.299***	1			
18 *COMP*	0.061***	−0.021***	0.334***	1		
19 *MSHARE*	0.262***	−0.193***	0.170***	0.149***	1	
20 *DUALITY*	0.096***	−0.170***	0.149***	0.130***	0.272***	1

All variables are defined in Table 2.
*** Significance at the 1% level (two-sided).
** Significance at the 5% level (two-sided).
* Significance at the 10% level (two-sided).

corporate governance thus appear to suffer from agency costs both between shareholders and managers and between large and minority shareholders simultaneously. None of the three variables of readability, that is, *Readability1*, *Readability2* or *Readability3*, are consistently and significantly correlated with *Agency_cost1*; however, they are positively and significantly correlated with *Agency_cost2*, which is not in accordance with our expectations in the hypotheses. Thus, we should depend more on multiple regression analysis to test our hypotheses. The three moderators, that is, *BIG4*, *INTERNAL* and *ANALYST*, are significantly and negatively correlated with both *Agency_cost1* and *Agency_cost2*, which means that combining external audit, internal control and analyst coverage as a governance mechanism could help to alleviate corporate agency problems. In addition, most of the correlation coefficients for the control variables are less than 0.5, implying that the problem of multicollinearity is weak in the regression analysis when these variables are included in the models.

4.3. Multiple regression results

Table 5 reports the OLS regression results for testing the association between annual report readability and corporate agency costs for Hypothesis 1. When *Agency_cost1* is taken as the dependent variable, all three variables of annual report readability, including *Readability1*, *Readability2* and *Readability3*, produce negative regression coefficients at the 1% significance level (Model 1: $\beta = -0.111$, $t = -4.626$; Model 2: $\beta = -0.418$, $t = -5.730$; Model 3: $\beta = -0.240$, $t = -5.364$). Furthermore, we calculate that the standardized regression coefficient of *Readability1* in Model 1 is −0.070, suggesting that a one-standard-deviation increase in *Readabiltiy1* reduces agency costs between shareholders and managers by 0.070 standard deviation. Similarly, when *Agency_cost2* is taken as the dependent variable, all three variables of annual report readability also produce negative coefficients at the 1% significance level (Model 4: $\beta = -0.038$, $t = -4.382$; Model 5: $\beta = -0.124$, $t = -4.773$; Model 6: $\beta = -0.089$, $t = -5.566$). Likewise, we calculate that the standardized regression coefficient on *Readability1* in Model 4 is −0.076, suggesting that a one-standard-deviation increase in *Readability1* reduces agency costs between large and minority shareholders by 0.076 standard deviation. Together, these results suggest that annual report readability has a statistically and economically negative effect on corporate agency costs.

In conclusion, high levels of annual report readability can help to curb agency costs between not only shareholders and managers, but also large and minority shareholders, providing good support for Hypothesis 1. That is, annual reports with high readability can better alleviate the extent of information asymmetry faced by stakeholders including shareholders and improve corporate information transparency, thereby promoting the power and efficiency of their supervision on corporate insiders' opportunistic behavior.

Table 6 reports the OLS regression results for testing the moderating effect of external audit quality for Hypothesis 2. As shown in Table 6, all three variables of annual report readability consistently produce significant and negative coefficients in all of the models. More importantly, regardless of whether *Agency_cost1* or *Agency_cost2* is taken as the dependent variable, the coefficients on the three interactions, including *Readability1*BIG4*, *Readability2*BIG4* and *Readability3*BIG4*, are negative at the 1% significance level. These results suggest that annual report readability has a stronger effect on reducing corporate agency costs if focal firms' annual reports are audited by Big 4 auditors. Therefore, Hypothesis 2 is fully supported, which indicates that the effect of annual report readability on alleviating information asymmetry and improving information transparency may be stronger owing to the improved earnings quality of Big 4 audited annual reports.

Table 7 reports the OLS regression results for testing the moderating effect of internal control quality for Hypothesis 3. As shown in Table 7, regardless of whether *Agency_cost1* or *Agency_cost2* is taken as the dependent variable, the coefficients on the three interactions, including *Readability1*INTERNAL*, *Readability2*INTERNAL* and *Readability3* INTERNAL*, are negative at the 1% significance level, indicating that the quality of internal control intensifies the effect of annual report readability on reducing corporate agency costs, consistent with the expectation of Hypothesis 3. These results suggest that high-quality internal control can improve corporate earnings quality and enhance the effect of annual report readability on enabling annual report users to get access to earnings information and monitor corporate insiders' opportunistic behavior (Doyle et al., 2007; Ye et al., 2015).

Table 8 reports the OLS regression results for testing the moderating effect of analyst coverage for Hypothesis 4. As Table 8 shows, regardless of whether *Agency_cost1* or *Agency_cost2* is taken as the

Table 5
OLS regression results for the association between annual report readability and corporate agency costs.

	Dependent variable: *Agency_cost1*			Dependent variable: *Agency_cost2*		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Readability1	−0.111***			−0.038***		
	(−4.626)			(−4.382)		
Readability2		−0.418***			−0.124***	
		(−5.730)			(−4.773)	
Readability3			−0.240***			−0.089***
			(−5.364)			(−5.566)
BIG4	0.019***	0.020***	0.020***	−0.000	0.000	0.000
	(3.434)	(3.641)	(3.688)	(−0.267)	(0.042)	(0.109)
INTERNAL	−0.028***	−0.028***	−0.028***	−0.006***	−0.006***	−0.006***
	(−7.073)	(−7.070)	(−7.075)	(−6.048)	(−6.055)	(−6.072)
ANALYST	0.011***	0.011***	0.011***	0.000	0.000	0.000
	(10.434)	(10.383)	(10.442)	(1.493)	(1.440)	(1.481)
SIZE	−0.033***	−0.033***	−0.034***	−0.005***	−0.005***	−0.005***
	(−20.970)	(−21.079)	(−21.169)	(−10.278)	(−10.425)	(−10.991)
LEVERAGE	−0.084***	−0.085***	−0.085***	0.043***	0.043***	0.043***
	(−11.882)	(−12.079)	(−12.066)	(19.698)	(19.676)	(19.559)
TANGIBLE	−0.057***	−0.056***	−0.056***	−0.041***	−0.041***	−0.041***
	(−8.369)	(−8.167)	(−8.195)	(−19.882)	(−19.824)	(−19.731)
GROWTH	−0.030***	−0.030***	−0.030***	−0.007***	−0.007***	−0.007***
	(−9.601)	(−9.676)	(−9.611)	(−8.416)	(−8.447)	(−8.434)
LISTAGE	0.014***	0.015***	0.014***	0.006***	0.006***	0.006***
	(7.303)	(7.396)	(7.295)	(10.278)	(10.370)	(10.417)
TOP1	−0.077***	−0.077***	−0.076***	−0.020***	−0.020***	−0.019***
	(−11.112)	(−11.111)	(−10.974)	(−8.839)	(−8.869)	(−8.672)
BLOCKS	0.001	0.001	0.001	0.002***	0.002***	0.002***
	(0.633)	(0.515)	(0.640)	(2.969)	(2.877)	(2.969)
BSIZE	−0.006	−0.008	−0.007	−0.006***	−0.006***	−0.006***
	(−1.125)	(−1.369)	(−1.312)	(−3.150)	(−3.354)	(−3.376)
INDBOARD	0.017	0.016	0.017	−0.003	−0.004	−0.004
	(0.823)	(0.745)	(0.799)	(−0.491)	(−0.538)	(−0.532)
COMP	−0.002	−0.003	−0.003	−0.004***	−0.005***	−0.005***
	(−1.295)	(−1.574)	(−1.630)	(−8.457)	(−8.683)	(−8.912)
MSHARE	0.018**	0.018***	0.018**	0.004**	0.004***	0.004**
	(2.553)	(2.594)	(2.559)	(2.550)	(2.672)	(2.525)
DUALITY	0.007**	0.007**	0.007**	−0.001*	−0.001*	−0.001*
	(2.526)	(2.529)	(2.557)	(−1.934)	(−1.931)	(−1.891)
Constant	1.235***	1.268***	1.278***	0.296***	0.303***	0.314***
	(26.812)	(26.817)	(26.905)	(20.389)	(20.701)	(21.141)
Observations	19,211	19,211	19,211	19,211	19,211	19,211
F value	121.780	122.108	123.489	55.892	55.770	55.966
Adj. R^2	0.252	0.253	0.253	0.253	0.254	0.254

The industry and year indicators are included in all regression models but omitted from the table to save space. T-statistics, based on standard errors adjusted for Huber-White, are in parentheses. All variables are defined in Table 2.
*** Significance at the 1% level (two-sided).
** Significance at the 5% level (two-sided).
* Significance at the 10% level (two-sided).

dependent variable, the coefficients on the three interactions, including *Readability1*ANALYST*, *Readability2*ANALYST* and *Readability3*ANALYST*, are negative at the 1% significance level. These results suggest that higher analyst coverage may enhance the negative association between annual report readability and corporate agency costs, thereby supporting Hypothesis 4. That is, as high analyst coverage increases the frequency of use and effect of corporate annual reports, the value of annual report readability may be better reflected, thereby strengthening the negative association between annual report readability and corporate agency costs.

Table 6
OLS regression results for the moderating effect of external audit quality.

	Dependent variable: *Agency_cost1*			Dependent variable: *Agency_cost2*		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Readability1	−0.107***			−0.036***		
	(−4.467)			(−4.217)		
Readability2		−0.415***			−0.122***	
		(−5.673)			(−4.716)	
Readability3			−0.234***			−0.086***
			(−5.213)			(−5.390)
*Readability1*BIG4*	−0.299***			−0.103***		
	(−6.066)			(−6.489)		
*Readability2*BIG4*		−0.756***			−0.322***	
		(−4.571)			(−6.290)	
*Readability3*BIG4*			−0.495***			−0.194***
			(−5.324)			(−6.218)
BIG4	0.014***	0.018***	0.017***	−0.002	−0.001	−0.001
	(2.727)	(3.413)	(3.214)	(−1.326)	(−0.432)	(−0.707)
INTERNAL	−0.028***	−0.028***	−0.028***	−0.006***	−0.006***	−0.006***
	(−7.009)	(−7.025)	(−7.020)	(−5.950)	(−5.965)	(−5.971)
ANALYST	0.011***	0.011***	0.011***	0.000	0.000	0.000
	(10.354)	(10.286)	(10.339)	(1.373)	(1.265)	(1.306)
Control variables	Included	Included	Included	Included	Included	Included
Constant	1.234***	1.269***	1.276***	0.296***	0.303***	0.313***
	(26.797)	(26.832)	(26.875)	(20.368)	(20.738)	(21.090)
Observations	19,211	19,211	19,211	19,211	19,211	19,211
F value	119.721	119.813	121.210	55.003	54.906	55.095
Adj. R^2	0.253	0.254	0.254	0.255	0.255	0.256

The industry and year indicators and all control variables are included in all regression models but omitted from the table to save space. The interaction terms are mean-centered before they are included in the regression models. T-statistics, based on standard errors adjusted for Huber–White, are in parentheses. All variables are defined in Table 2.
*** Significance at the 1% level (two-sided).
** Significance at the 5% level (two-sided).
* Significance at the 10% level (two-sided).

Taken together, the OLS regression results of Tables 5–8 provide empirical evidence to support Hypotheses 1–4. The results suggest that annual report readability helps to alleviate corporate agency costs. Firms with more readable annual reports have higher information transparency and weaker information asymmetry, thereby improving stakeholders' supervision over corporate insiders' opportunistic behavior. External audit, internal control system and analyst coverage can also strengthen the effect of annual report readability on reducing corporate agency costs.

4.4. Robustness checks

4.4.1. Tests for endogeneity concerns

A major concern in this study is that our findings may be subject to the problem of endogeneity. The regression results demonstrate only a statistical relationship and not a causal relationship between annual report readability and corporate agency costs. Corporate agency costs may have an impact on annual report readability (Li, 2008). Our findings may thus be affected by the problem of reverse causality. Meanwhile, we may miss factors or variables that potentially affect the relationship between annual report readability and agency costs. It means that our findings may be also affected by the problem of endogeneity resulting from missing variables. Therefore, we use the simultaneous-equations and firm fixed-effects models to address the above two endogeneity problems, respectively. The analysis results are shown in Tables 9 and 10.

Table 9 displays the regression results of the 3SLS simultaneous-equations model. To improve the recognition and estimation validity of this model, we introduce two variables, that is, the year-industry median of

Table 7
OLS regression results for the moderating effect of internal control quality.

	Dependent variable: *Agency_cost1*			Dependent variable: *Agency_cost2*		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Readability1	−0.105***			−0.036***		
	(−4.436)			(−4.193)		
Readability2		−0.393***			−0.115***	
		(−5.396)			(−4.442)	
Readability3			−0.238***			−0.088***
			(−5.343)			(−5.527)
*Readability1*INTERNAL*	−0.671***			−0.222***		
	(−8.043)			(−6.096)		
*Readability2*INTERNAL*		−1.856***			−0.634***	
		(−5.211)			(−4.791)	
*Readability3*INTERNAL*			−1.056***			−0.329***
			(−5.507)			(−4.713)
INTERNAL	−0.056***	−0.053***	−0.048***	−0.015***	−0.014***	−0.012***
	(−8.814)	(−6.956)	(−7.245)	(−5.902)	(−5.082)	(−5.087)
BIG4	0.019***	0.020***	0.021***	−0.000	0.000	0.000
	(3.581)	(3.744)	(3.854)	(−0.176)	(0.114)	(0.247)
ANALYST	0.010***	0.010***	0.010***	0.000	0.000	0.000
	(9.580)	(9.466)	(9.523)	(0.252)	(0.062)	(0.231)
Control variables	Included	Included	Included	Included	Included	Included
Constant	1.347***	1.362***	1.356***	0.333***	0.335***	0.338***
	(25.657)	(24.525)	(25.329)	(18.076)	(17.764)	(18.989)
Observations	19,211	19,211	19,211	19,211	19,211	19,211
F value	120.456	121.385	122.775	57.473	57.212	56.868
Adj. R^2	0.266	0.265	0.264	0.268	0.267	0.265

The industry and year indicators and all control variables are included in all regression models but omitted from the table to save space. The interaction terms are mean-centered before they are included in the regression models. T-statistics, based on standard errors adjusted for Huber–White, are in parentheses. All variables are defined in Table 2.
*** Significance at the 1% level (two-sided).
** Significance at the 5% level (two-sided).
* Significance at the 10% level (two-sided).

annual report readability (*MEDIANREAD*) and regional market environment (*MKT*), as instrumental variables. The variable *MKT* equals the marketization index of the province where a focal firm is registered, which is compiled byFan et al. (2011). As Table 9 shows, after controlling for the effect of agency costs between shareholders and managers on annual report readability, *Readability1* still gets a negative coefficient at the 5% significance level (Model 1: $\beta = -0.453$, $t = -2.209$). Similarly, after controlling for the potential influence of agency costs between large and minority shareholders on annual report readability, *Readability1* still gets a negative coefficient at the 1% significance level (Model 3: $\beta = -0.327$, T = −4.830). The results based on the other two variables of annual report readability, that is, *Readability2* and *Readability3*, are highly similar and not reported here to save space. These results together suggest that our findings hold after using the simultaneous-equations model to address the endogeneity problem of reverse causality.

Table 10 reports the regression results of the firm fixed-effects model. As Table 10 shows, when *Agency_cost1* is taken as the dependent variable in Models 1–3, *Readability1* consistently has significant and negative coefficients in all of the models, and the coefficients on the interactions, including *Readability1***BIG4*, *Readability1***INTERNAL* and *Readability1***ANALYST*, are significantly negative. When *Agency_cost2* is used as the dependent variable in Models 4–6, although *Readability1* does not show significant coefficients, its interactions with each of the three moderating variables produce negative coefficients at the 1% significance level, consistent with the predictions in Hypotheses 2–4. The results based on the other two variables of annual report readability, that is, *Readability2* and *Readability3*, are highly similar and not reported here to save space. Overall, these results suggest that there is still a significant and negative association between annual report readability and corporate agency costs after controlling for the endogeneity problem of missing

Table 8
OLS regression results for the moderating effect of analyst coverage.

	Dependent variable: *Agency_cost1*			Dependent variable: *Agency_cost2*		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Readability1	−0.139***			−0.057***		
	(−5.903)			(−7.090)		
Readability2		−0.501***			−0.177***	
		(−7.097)			(−7.242)	
Readability3			−0.303***			−0.121***
			(−6.996)			(−8.171)
*Readability1*ANALYST*	−0.059***			−0.041***		
	(−4.687)			(−10.819)		
*Readability2*ANALYST*		−0.195***			−0.125***	
		(−4.980)			(−10.120)	
*Readability3*ANALYST*			−0.147***			−0.076***
			(−5.957)			(−9.870)
ANALYST	0.008***	0.008***	0.007***	−0.001***	−0.001***	−0.001***
	(7.628)	(7.131)	(6.755)	(−4.015)	(−4.324)	(−4.065)
BIG4	0.018***	0.019***	0.019***	−0.001	−0.000	−0.000
	(3.246)	(3.536)	(3.505)	(−0.859)	(−0.264)	(−0.326)
INTERNAL	−0.028***	−0.028***	−0.028***	−0.006***	−0.006***	−0.006***
	(−7.077)	(−7.079)	(−7.088)	(−6.041)	(−6.057)	(−6.059)
Control variables	Included	Included	Included	Included	Included	Included
Constant	1.230***	1.262***	1.274***	0.293***	0.299***	0.312***
	(26.692)	(26.648)	(26.818)	(20.127)	(20.355)	(20.943)
Observations	19,211	19,211	19,211	19,211	19,211	19,211
F value	120.794	121.169	122.497	55.566	55.393	55.644
Adj. R^2	0.253	0.254	0.254	0.257	0.257	0.257

The industry and year indicators and all control variables are included in all regression models but omitted from the table to save space. The interaction terms are mean-centered before they are included in the regression models. T-statistics, based on standard errors adjusted for Huber–White, are in parentheses. All variables are defined in Table 2.
*** Significance at the 1% level (two-sided).
** Significance at the 5% level (two-sided).
* Significance at the 10% level (two-sided).

variables using the firm fixed-effects model. This negative association is still stronger in firms with higher external audit quality, higher internal control quality or higher analyst coverage than in their counterparts.

4.4.2. Tests for estimation methods

The sample data in this study are classical unbalanced panel data. The panel data may suffer from cross-sectional correlation and time series autocorrelation, which may bias the OLS regression estimations, so we follow Petersen's (2009) method to run regressions by clustering firm and year dimensions simultaneously. The results are shown in Table 11. Similar to the results of Tables 5–8, regardless of whether *Agency_cost1* or *Agency_cost2* is taken as the dependent variable, *Readability1* has negative coefficients in all of the models at the 5% significance level at least, and its interactions with each of the three moderating variables consistently have negative coefficients at the 1% significance level. The results based on the other two variables of annual report readability, that is, *Readability2* and *Readability3*, are highly similar and not reported here to save space. Therefore, our findings are robust to a different estimation method.

4.4.3. Tests for the measurement of annual report readability

Annual report readability is a key variable in this study. Due to the lack of generally accepted measurements of readability in the Chinese context, we must use other measurements to enhance the robustness of our findings. Loughran and McDonald (2014) recommend a 10-k file size as the best measure of readability after comparing the various readability measures. File size is straightforward, is easily replicated and suffers less from measurement errors. More importantly, it is closely related to alternative readability measures and

Table 9
Regression results of the simultaneous-equations model.

	Model 1 *Agency_cost1*	Model 2 *Readability1*	Model 3 *Agency_cost2*	Model 4 *Readability1*
Agency_cost1		−0.287***(−9.312)		
Agency_cost2				−0.087(−1.043)
Readability1	−0.453**(−2.209)		−0.327***(−4.830)	
BIG4	0.011*(1.864)	−0.007***(−3.028)	−0.004**(−1.995)	−0.012***(−6.236)
INTERNAL	−0.029***(−11.645)	−0.008***(−5.813)	−0.006***(−6.684)	−0.000(−0.136)
ANALYST	0.009***(8.271)	0.001**(2.060)	−0.000(−0.954)	−0.002***(−5.929)
SIZE	−0.040***(−15.136)	−0.022***(−17.867)	−0.008***(−9.547)	−0.012***(−17.357)
LEVERAGE	−0.084***(−12.334)	−0.037***(−10.471)	0.039***(17.308)	−0.011**(−2.502)
TANGIBLE	−0.044***(−5.740)	0.008**(2.277)	−0.033***(−13.057)	0.022***(5.322)
GROWTH	−0.032***(−13.643)	−0.014***(−10.438)	−0.009***(−11.067)	−0.006***(−6.016)
LISTAGE	0.023***(7.058)	0.019***(24.364)	0.011***(9.933)	0.016***(22.171)
TOP1	−0.050***(−7.712)		−0.019***(−8.400)	
BLOCKS	0.004**(2.210)		0.002***(3.183)	
BSIZE	−0.009*(−1.729)	−0.009***(−4.111)	−0.008***(−4.583)	−0.009***(−4.653)
INDBOARD	0.003(0.142)	−0.029***(−3.733)	−0.014**(−2.152)	−0.036***(−5.661)
COMP	0.007***(3.758)		−0.004***(−5.686)	
MSHARE	0.033***(4.879)		0.006**(2.152)	
DUALITY	0.004**(1.995)		−0.001(−1.506)	
MEDIANREAD		0.471***(9.937)		0.534***(13.118)
MKT		0.000(0.398)		0.000(1.320)
Observations		19,211		19,211
Chi2 value	40643.90***	43651.18***	5976.81***	312204.41***

The industry and year indicators are included in all regression models but omitted from the table to save space. Z-statistics, based on standard errors adjusted for Huber–White, are in parentheses. The regression results based on *Readability2*, *Readability3* are highly similar and consistent but not reported here for saving space. All variables are defined in Table 2.

*** Significance at the 1% level (two-sided).

** Significance at the 5% level (two-sided).

* Significance at the 10% level (two-sided).

thus is a better measure of readability in a given information environment. Therefore, we follow Loughran and McDonald (2014) and take file size as another proxy of annual report readability, *Readability4*, which is calculated as the range standardization of the reciprocal of the natural logarithm of the digital file size of the annual report. The results of the regression analysis are shown in Table 12. Those based on *Readability4* are consistent with those in Tables 5–8. Therefore, our findings hold to an alternative measurement of annual report readability.

Significant differences in business complexity and operating activities are found between large and small firms, so the magnitude of information included in annual reports should vary considerably across firms of different sizes. That is, large firms' annual reports are generally longer than those of small firms. The firm size effect should thus be eliminated when calculating the length of corporate annual reports. We thus further adjust the length of annual reports, that is, *Pages*, *Words* and *Characters*, by dividing the natural logarithm of the focal firms' total assets before calculating our three variables of annual report readability. We then get three new variables of annual report readability, including *Ab_Readability1*, *Ab_Readability2* and *Ab_Readability3*, and rerun the related regression models. The regression analysis results are shown in Table 13. Similar to those in Tables 5–8, *Ab_Readability1* consistently has negative coefficients at the 1% significance level in all of the models, and its interactions with each of the three moderating variables also have negative coefficients at the 1% significance level, regardless of whether *Agency_cost1* or *Agency_cost2* is taken as the dependent variable. The results based on the other two variables of annual report readability, that is, *Ab_Readability2* and *Ab_Readability3*, are highly similar and not reported here to save space. These results suggest that our findings still hold after eliminating the effect of firm size in the measurement of annual report readability.

Table 10
Regression results of firm fixed-effects model.

	Dependent variable: *Agency_cost1*			Dependent variable: *Agency_cost2*		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Readability1	−0.088***	−0.086***	−0.107***	0.007	0.006	−0.012
	(−4.198)	(−4.113)	(−4.820)	(0.824)	(0.783)	(−1.451)
*Readability1*BIG4*	−0.105**			−0.097***		
	(−2.294)			(−5.574)		
*Readability1*INTERNAL*		−0.436***			−0.177***	
		(−14.994)			(−16.007)	
*Readability1*ANALYST*			−0.027**			−0.027***
			(−2.223)			(−5.909)
BIG4	−0.002	−0.002	−0.004	−0.006**	−0.007***	−0.008***
	(−0.312)	(−0.382)	(−0.620)	(−2.526)	(−2.972)	(−3.297)
INTERNAL	−0.011***	−0.029***	−0.011***	−0.004***	−0.011***	−0.004***
	(−5.402)	(−12.674)	(−5.408)	(−5.108)	(−13.024)	(−5.113)
ANALYST	0.002**	0.002*	0.001	0.002***	0.001***	0.001
	(2.148)	(1.658)	(1.240)	(3.866)	(3.360)	(1.567)
Control variables	Included	Included	Included	Included	Included	Included
Constant	0.772***	0.884***	0.785***	0.086***	0.132***	0.100***
	(17.221)	(19.592)	(17.380)	(5.070)	(7.721)	(5.822)
Observations	19,211	19,211	19,211	19,211	19,211	19,211
F value	37.097	44.662	37.085	122.498	131.387	122.649
Adj. R^2	0.1523	0.1813	0.1562	0.2724	0.2986	0.2814

The year indicators and all control variables are included in all regression models but omitted from the table to save space. The interaction terms are mean-centered before they are included in the regression models. T-statistics, based on standard errors adjusted for Huber–White, are in parentheses. The regression results based on *Readability2*, *Readability3* are highly similar and consistent but not reported here for saving space. All variables are defined in Table 2.

*** Significance at the 1% level (two-sided).

** Significance at the 5% level (two-sided).

* Significance at the 10% level (two-sided).

4.4.4. Tests for the measurement of agency costs

In the preceding analyses, we measure agency costs between shareholders and managers based on the operating expense ratio, and those between large and minority shareholders based on the ratio of other receivables to total assets. These measurements may vary significantly across firms and industries. For example, high-tech firms have a high operating expense ratio due to high R&D investment rather serious agency conflicts between shareholders and managers. Similarly, firms in highly competitive industries or downstream firms may have a high ratio of other receivables over total assets, due to fierce market competition or low market positions rather serious agency conflicts between majority and minority shareholders. We therefore generate two new variables, including the abnormal operating expense ratio (*Ab_Agency_cost1*) and abnormal ratio of other receivables over total assets (*Ab_Agency_cost2*), to measure corporate agency costs. Specifically, *Ab_Agency_cost1* equals the difference between *Agency_cost1* and its industry-year mean, and *Ab_Agency_cost2* equals the difference between *Agency_cost2* and its industry-year mean. We then rerun the related regression models based on these two new dependent variables. The results are shown in Table 14. Similar to those in Tables 5–8, regardless of whether *Ab_Agency_cost1* or *Ab_Agency_cost2* is taken as the dependent variable, *Readability1* has negative coefficients at the 1% significance level in all of the models, and its interactions with each of the three moderating variables also have negative coefficients at the 1% significance level. The results based on the other two variables of annual report readability, that is, *Readability2* and *Readability3*, are highly similar and not reported here to save space. These results again give good support to our four hypotheses, suggesting that our findings hold to the firm size-adjusted measurements of agency costs.

Neither the operating expense ratio nor the ratio of other receivables to total assets is a direct measure of agency costs, and thus they may be biased in measurement due to noise. To reduce this bias risk, we use several specific items of operating expenses and other receivables to measure agency costs. Business entertainment,

Table 11
OLS regression results by clustering both firm and year dimensions.

	Dependent variable: *Agency_cost1*			Dependent variable: *Agency_cost2*		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Readability1	−0.107***	−0.105***	−0.139***	−0.036**	−0.036**	−0.057***
	(−3.020)	(−2.892)	(−3.472)	(−2.454)	(−2.356)	(−3.568)
*Readability1*BIG4*	−0.299***			−0.103***		
	(−3.234)			(−4.896)		
*Readability1*INTERNAL*		−0.671***			−0.222***	
		(−4.809)			(−2.994)	
*Readability1*ANALYST*			−0.059***			−0.041***
			(−2.740)			(−4.275)
BIG4	0.014	0.019	0.018	−0.002	−0.000	−0.001
	(1.151)	(1.496)	(1.366)	(−0.738)	(−0.106)	(−0.501)
INTERNAL	−0.028***	−0.056***	−0.028***	−0.006**	−0.015***	−0.006**
	(−3.440)	(−5.889)	(−3.450)	(−2.128)	(−2.916)	(−2.163)
ANALYST	0.011***	0.010***	0.008***	0.000	0.000	−0.001
	(5.272)	(5.376)	(3.587)	(0.379)	(0.082)	(−1.223)
Control variables	Included	Included	Included	Included	Included	Included
Constant	1.234***	1.347***	1.230***	0.296***	0.333***	0.293***
	(10.497)	(13.409)	(10.300)	(4.783)	(5.818)	(4.665)
Observations	19,211	19,211	19,211	19,211	19,211	19,211
F value	119.721	120.456	120.794	55.003	57.473	55.566
Adj. R^2	0.253	0.266	0.253	0.255	0.268	0.257

The industry and year indicators and all control variables are included in all regression models but omitted from the table to save space. The interaction terms are mean-centered before they are included in the regression models. T-statistics are in parentheses. The regression results based on *Readability2*, *Readability3* are highly similar and consistent but not reported here for saving space. All variables are defined in Table 2.

*** Significance at the 1% level (two-sided).

** Significance at the 5% level (two-sided).

* Significance at the 10% level (two-sided).

traveling, overseas training and car expenses are identified as the main forms of corporate resource abuse that management may use to benefit themselves (Chen et al., 2005). As such, we generate three new variables, including *Cost1_1*, *Cost1_2* and *Cost1_3*, to measure the agency costs between shareholders and managers. *Cost1_1* equals the ratio of business entertainment expense to revenue. *Cost1_2* equals the ratio of the sum of office, traveling, business entertainment, communication, overseas training, car, conference and directors' expenses to revenue. *Cost1_3* equals the ratio of the sum of business entertainment and other expenses to revenue. As large shareholders expropriate minority shareholders mainly through fund occupation, debt guarantee and other related party transactions, we follow previous studies (Zheng, 2009) to generate three new variables, *Cost2_1*, *Cost2_2* and *Cost2_3*, to measure the agency costs between large and minority shareholders. *Cost2_1* equals the ratio of funds occupied by controlling shareholders to total assets. *Cost2_2* equals the ratio of the amount of debt guarantee provided by listed companies to their controlling shareholders over total assets. *Cost2_3* equals the ratio of the total amount of related party transactions between listed companies and their controlling shareholders to total assets. We then rerun the related regression models using these new specific measurements of agency costs. The results are given in Table 15. *Readability1* has negative coefficients in all of the models at the 1% significance level regardless of whether any of the new specific measurements of agency costs is taken as the dependent variable. The results based on the other two variables of annual report readability, that is, *Readability2* and *Readability3*, are highly similar and not reported here to save space. Therefore, our findings are robust after controlling for the measurement bias of agency costs.

Table 12
OLS regression results for alternative measurement of annual report readability.

	Dependent variable: *Agency_cost1*			Dependent variable: *Agency_cost2*		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Readability4	−0.093***	−0.084***	−0.105***	−0.035***	−0.032***	−0.044***
	(−3.102)	(−2.762)	(−3.640)	(−3.100)	(−2.783)	(−4.174)
*Readability4*BIG4*	−0.284***			−0.140***		
	(−3.561)			(−5.548)		
*Readability4*INTERNAL*		−0.713***			−0.246***	
		(−5.851)			(−5.213)	
*Readability4*ANALYST*			−0.055***			−0.041***
			(−3.332)			(−7.807)
BIG4	0.021***	0.020***	0.020***	0.001	0.000	0.000
	(3.842)	(3.672)	(3.690)	(0.405)	(0.098)	(0.187)
INTERNAL	−0.028***	−0.049***	−0.028***	−0.006***	−0.013***	−0.006***
	(−7.072)	(−7.691)	(−7.112)	(−6.023)	(−5.486)	(−6.104)
ANALYST	0.011***	0.010***	0.010***	0.000	0.000	−0.000
	(10.526)	(10.036)	(9.218)	(1.525)	(0.810)	(−1.543)
Control variables	Included	Included	Included	Included	Included	Included
Constant	1.135***	1.211***	1.133***	0.235***	0.261***	0.234***
	(25.174)	(24.087)	(25.132)	(16.940)	(15.405)	(16.852)
Observations	19,199	19,199	19,199	19,199	19,199	19,199
F value	118.933	119.767	119.729	54.634	56.430	54.859
Adj. R^2	0.252	0.259	0.252	0.254	0.262	0.255

The industry and year indicators and all control variables are included in all regression models but omitted from the table to save space. The interaction terms are mean-centered before they are included in the regression models. T-statistics, based on standard errors adjusted for Huber–White, are in parentheses. All variables are defined in Table 2.
*** Significance at the 1% level (two-sided).
** Significance at the 5% level (two-sided).
* Significance at the 10% level (two-sided).

4.5. Further analysis

4.5.1. Effect of the nature of property rights[2]

The literature shows that agency problems in state-owned enterprises (SOEs) are substantially different from those in non-SOEs (NSOEs) in China. SOEs mainly suffer from agency problems between shareholders and managers due to the absence of actual owners and the problem of insider control, while NSOEs mainly suffer agency problems between majority and minority shareholders due to the widespread tunneling behavior of controlling shareholders (Lei et al., 2013). Agency problems vary greatly depending on the nature of property rights, so the association between annual report readability and corporate agency costs may also differ according to property rights. We therefore further investigate the moderating effect of the nature of property rights. The results are shown in Table 16.

When *Agency_cost1* is taken as the dependent variable, for both SOEs and NSOEs, *Readability1* has significant and negative coefficients (Model 1: $\beta = -0.062$, $t = -2.501$; Model 2: $\beta = -0.183$, $t = -3.389$), while the difference in coefficients between SOEs and NSOEs is statistically significant (*Chi2* = 4.15, $p < 0.05$). When *Agency_cost2* is taken as the dependent variable, *Readability1* also has negative coefficients at the 1% significance level (Model 3: $\beta = -0.034$, $t = -3.248$; Model 4: $\beta = -0.058$, $t = -3.563$), while the difference in coefficients between SOEs and NSOEs is statistically insignificant (*Chi2* = 1.53, $p > 0.10$). The results based on the other two variables of annual report readability, that is, *Readability2* and *Readability3*, are highly similar and not reported here to save space. These results suggest that the effect of annual report readability on reducing corporate agency costs holds in both SOEs and NSOEs. Regardless of whether the agency costs are between

[2] The sample period of the regression results of the moderating effect of the nature of property rights is from 2003 to 2015, because the data is judged by the ultimate controlling shareholder from ownership structure chats of listed companies. These ownership structure chats have been mandatorily disclosed since 2003 in China.

Table 13
OLS regression results based on the firm size-adjusted measurement of annual report readability.

	Dependent variable: *Agency_cost1*			Dependent variable: *Agency_cost2*		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Ab_Readability1	−0.116***	−0.107***	−0.140***	−0.045***	−0.042***	−0.061***
	(−4.711)	(−4.385)	(−5.839)	(−5.002)	(−4.677)	(−7.370)
*Ab_Readability1*BIG4*	−0.312***			−0.101***		
	(−5.889)			(−6.165)		
*Ab_Readability1*INTERNAL*		−0.733***			−0.259***	
		(−8.317)			(−6.776)	
*Ab_Readability1*ANALYST*			−0.045***			−0.036***
			(−3.347)			(−9.013)
BIG4	0.017***	0.019***	0.018***	−0.001	−0.000	−0.001
	(3.167)	(3.646)	(3.296)	(−0.803)	(−0.113)	(−0.739)
INTERNAL	−0.028***	−0.058***	−0.028***	−0.006***	−0.016***	−0.006***
	(−6.994)	(−9.129)	(−7.063)	(−5.926)	(−6.382)	(−6.024)
ANALYST	0.011***	0.010***	0.009***	0.000	0.000	−0.001***
	(10.319)	(9.719)	(8.470)	(1.310)	(0.355)	(−2.809)
Control variables	Included	Included	Included	Included	Included	Included
Constant	1.204***	1.324***	1.199***	0.285***	0.328***	0.280***
	(26.596)	(25.879)	(26.400)	(19.647)	(17.877)	(19.250)
Observations	19,211	19,211	19,211	19,211	19,211	19,211
F value	119.581	120.177	121.214	55.066	57.672	55.591
Adj. R^2	0.254	0.265	0.253	0.255	0.270	0.256

The industry and year indicators and all control variables are included in all regression models but omitted from the table to save space. The interaction terms are mean-centered before they are included in the regression models. T-statistics, based on standard errors adjusted for Huber–White, are in parentheses. The regression results based on *Ab_Readability2*, *Ab_Readability3* are highly similar and consistent but not reported here for saving space. All variables are defined in Table 2.
*** Significance at the 1% level (two-sided).
** Significance at the 5% level (two-sided).
* Significance at the 10% level (two-sided).

shareholders and managers or between large and minority shareholders, the effect is stronger in NSOEs than in SOEs. Stakeholders probably depend more on fundamental information disclosed in annual reports when investing in NSOEs than in SOEs. NSOEs survive and develop by establishing their competitiveness from their operation efficiency and innovative products or brands, while SOEs mainly rely on their monopoly status and preferential policies to develop and establish their competitive advantages in the market. In short, as the information disclosed in NSOE annual reports is more relevant than that in SOE annual reports, the effect of annual report readability is more pronounced in NSOEs than in SOEs.

4.5.2. Effects of the implementation of new accounting standards

On January 1, 2007, the Chinese Ministry of Finance implemented the new Accounting Standards, which are broadly convergent with international accounting standards. The requirements and specifications for the financial reporting of Chinese listed companies have thus been adapted and refined since 2007. As Fig. 1 shows, between 2006 and 2007 the length of annual reports increased remarkably. The association between annual report readability and corporate agency costs might have been influenced by this exogenous institutional shock. Therefore, we further investigate the moderating effect of the adoption of the new accounting standards. We generate an indicator variable, *New*, which equals 1 if a focal firm-year observation comes from the years after 2007, and 0 otherwise. We then introduce its interactions with each of the three variables of annual report readability into the regression model. The results are shown in Table 17.

As Table 17 shows, no matter whether *Agency_cost1* or *Agency_cost2* is taken as the dependent variable, the three interactions, including *Readability1*NEW*, *Readability2*NEW* and *Readability3*NEW*, have negative coefficients at the 5% significance level at least in all of the models except Model 1, indicating that the effect of annual report readability on reducing corporate agency costs became stronger after the

Table 14
OLS regression results based on industry-adjusted measurement of agency costs.

	Dependent variable: *Ab_Agency_cost1*			Dependent variable: *Ab_Agency_cost2*		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Readability1	−0.102***	−0.100***	−0.134***	−0.034***	−0.033***	−0.055***
	(−4.302)	(−4.279)	(−5.719)	(−3.951)	(−3.904)	(−6.930)
*Readability1*BIG4*	−0.316***			−0.087***		
	(−6.336)			(−5.387)		
*Readability1*INTERNAL*		−0.656***			−0.218***	
		(−7.784)			(−6.040)	
*Readability1*ANALYST*			−0.058***			−0.043***
			(−4.599)			(−11.404)
BIG4	0.015***	0.020***	0.018***	−0.002	−0.001	−0.002
	(2.794)	(3.679)	(3.354)	(−1.482)	(−0.546)	(−1.244)
INTERNAL	−0.028***	−0.055***	−0.028***	−0.006***	−0.015***	−0.006***
	(−6.978)	(−8.640)	(−7.049)	(−6.180)	(−5.935)	(−6.263)
ANALYST	0.011***	0.010***	0.009***	0.000	0.000	−0.001***
	(10.915)	(10.169)	(8.183)	(1.487)	(0.352)	(−4.248)
Control variables	Included	Included	Included	Included	Included	Included
Constant	1.003***	1.112***	1.001***	0.219***	0.255***	0.216***
	(21.746)	(21.127)	(21.689)	(14.991)	(13.884)	(14.848)
Observations	19,211	19,211	19,211	19,211	19,211	19,211
F value	46.258	46.789	46.54	26.898	27.458	31.361
Adj. R^2	0.120	0.134	0.119	0.087	0.104	0.091

The industry and year indicators and all control variables are included in all regression models but omitted from the table to save space. The interaction terms are mean-centered before they are included in the regression models. T-statistics, based on standard errors adjusted for Huber–White, are in parentheses. The regression results based on *Readability2*, *Readability3* are highly similar and consistent but not reported here for saving space. All variables are defined in Table 2.
*** Significance at the 1% level (two-sided).
** Significance at the 5% level (two-sided).
* Significance at the 10% level (two-sided).

Table 15
OLS regression results for alternative measurement of agency costs.

	Cost1_1	*Cost1_2*	*Cost1_3*	*Cost2_1*	*Cost2_2*	*Cost2_3*
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Readability1	−0.004***	−0.013***	−0.018***	−0.013***	−0.054***	−0.253***
	(−8.738)	(−5.984)	(−8.694)	(−3.324)	(−6.473)	(−5.002)
BIG4	−0.000	−0.000	0.000	0.000	−0.011***	0.015
	(−0.666)	(−0.068)	(0.578)	(0.258)	(−5.509)	(1.012)
INTERNAL	−0.000	−0.003***	−0.001***	−0.002**	−0.002	−0.031***
	(−1.579)	(−4.790)	(−2.737)	(−2.331)	(−1.572)	(−4.070)
ANALYST	0.000	0.001***	0.001***	−0.001***	−0.002***	−0.008***
	(1.528)	(4.627)	(6.801)	(−3.535)	(−3.939)	(−3.398)
Control variables	Included	Included	Included	Included	Included	Included
Constant	0.016***	0.087***	0.095***	−0.010	−0.012	0.235***
	(14.036)	(13.445)	(16.652)	(−1.532)	(−0.737)	(2.709)
Observations	19,211	19,211	19,211	19,211	19,211	19,211
F value	135.116	207.587	175.463	10.980	22.745	52.85
Adj. R^2	0.282	0.305	0.367	0.024	0.063	0.110

The industry and year indicators and all control variables are included in all regression models but omitted from the table to save space. T-statistics, based on standard errors adjusted for Huber–White, are in parentheses. The regression results based on *Readability2*, *Readability3* are highly similar and consistent but not reported here for saving space. All variables are defined in Table 2.
*** Significance at the 1% level (two-sided).
** Significance at the 5% level (two-sided).
* Significance at the 10% level (two-sided).

Table 16
OLS regression results in sample firms with different natures of property rights.

	Dependent variable: *Agency_cost1*		Dependent variable: *Agency_cost2*	
	Model 1 *STATE* = 1	Model 2 *STATE* = 0	Model 3 *STATE* = 1	Model 4 *STATE* = 0
Readability1	−0.062**(−2.501)	−0.183***(−3.389)	−0.034***(−3.248)	−0.058***(−3.563)
BIG4	0.007(1.247)	0.043***(3.740)	−0.001(−0.584)	0.000(0.093)
INTERNAL	−0.013***(−3.023)	−0.033***(−5.574)	−0.003***(−3.389)	−0.005***(−3.694)
ANALYST	0.008***(6.254)	0.009***(5.679)	−0.000(−0.960)	−0.001(−1.486)
Control variables	Included	Included	Included	Included
Constant	1.002***(18.364)	1.242***(15.669)	0.229***(11.988)	0.265***(11.053)
Observations	9118	8729	9118	8729
F value	58.611	65.993	25.519	22.800
Adj. R^2	0.239	0.269	0.214	0.247
Difference test on coefficients		*Chi2* = 4.15**		*Chi2* = 1.53

The industry and year indicators and all control variables are included in all regression models but omitted from the table to save space. T-statistics, based on standard errors adjusted for Huber–White, are in parentheses. The regression results based on *Readability2*, *Readability3* are highly similar and consistent but not reported here for saving space. All variables are defined in Table 2.
*** Significance at the 1% level (two-sided).
** Significance at the 5% level (two-sided).
* Significance at the 10% level (two-sided).

Table 17
OLS regression results for the moderating effect of the adoption of new accounting standards.

	Dependent variable: *Agency_cost1*			Dependent variable: *Agency_cost2*		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Readability1	−0.101***			−0.015		
	(−3.120)			(−1.167)		
Readability2		−0.295***			−0.055	
		(−3.054)			(−1.494)	
Readability3			−0.169***			−0.045**
			(−2.883)			(−1.977)
*Readability1*NEW*	−0.027			−0.063***		
	(−0.601)			(−4.212)		
*Readability2*NEW*		−0.343***			−0.190***	
		(−2.584)			(−4.244)	
*Readability3*NEW*			−0.201**			−0.124***
			(−2.471)			(−4.518)
NEW	−0.072***	−0.054***	−0.052***	−0.046***	−0.044***	−0.043***
	(−4.395)	(−3.172)	(−3.064)	(−7.817)	(−7.077)	(−6.957)
BIG4	0.019***	0.020***	0.020***	−0.001	0.000	0.000
	(3.399)	(3.636)	(3.647)	(−0.521)	(0.041)	(0.014)
INTERNAL	−0.028***	−0.028***	−0.028***	−0.006***	−0.006***	−0.006***
	(−7.065)	(−7.024)	(−7.023)	(−5.990)	(−5.963)	(−5.946)
ANALYST	0.011***	0.010***	0.010***	0.000	0.000	0.000
	(10.395)	(10.167)	(10.226)	(1.108)	(0.967)	(0.906)
Control variables	Included	Included	Included	Included	Included	Included
Constant	1.225***	1.253***	1.266***	0.287***	0.293***	0.306***
	(26.203)	(26.039)	(26.317)	(19.014)	(19.175)	(19.814)
Observations	19,211	19,211	19,211	19,211	19,211	19,211
F value	119.87	120.205	121.76	55.731	55.97	56.274
Adj. R^2	0.252	0.253	0.253	0.254	0.254	0.255

The industry and year indicators and all control variables are included in all regression models but omitted from the table to save space. The interaction terms are mean-centered before they are included in the regression models. T-statistics, based on standard errors adjusted for Huber–White, are in parentheses. All variables are defined in Table 2.
*** Significance at the 1% level (two-sided).
** Significance at the 5% level (two-sided).
* Significance at the 10% level (two-sided).

implementation of the new accounting standards. The information environment improved in capital markets after the implementation of the standards, and investors might have thus paid more attention to the basic information disclosed by listed companies. Corporate annual reports became more relevant than before, which strengthened the effect of annual report readability. However, listed companies might have passively disclosed more information to satisfy the requirements of the new accounting standards without considering the usefulness of the information, which might have significantly reduced the readability of corporate annual reports. The effect of annual report readability might have then increased. Although we cannot be entirely sure which of these views is correct, our results show strong evidence that the negative association between annual report readability and corporate agency costs became more pronounced after the implementation of the new accounting standards in 2007.

5. Summary and conclusions

The problem of annual report readability has recently attracted much attention from regulators and scholars, but little is known about its economic consequences. We investigate the governance role of annual report readability from the perspective of agency costs by using 19,221 firm-year observations of Chinese A-share listed firms from 2001 to 2015, measuring readability based on hand-collected file length and file size data. We find that firms with higher annual report readability have lower agency costs both between shareholders and managers and between majority and minority shareholders, and the negative association between annual report readability and corporate agency costs is stronger in focal firms with higher external audit quality, higher internal control quality or higher analyst coverage. These findings stand up to a series of robustness checks including the simultaneous-equations model, the firm fixed-effects model, the two-way cluster regression model and alternative measurements of readability and agency costs. These results indicate that more readable annual reports may help to improve corporate information transparency and reduce the extent of information asymmetry facing external stakeholders, which enables them to evaluate corporate performance and value more accurately and monitor corporate insiders' opportunistic behavior more efficiently. In addition, external audit and internal control are important mechanisms for improving the quality of focal firms' accounting earnings, and security analysts are the main users of corporate annual reports. These governance mechanisms help to strengthen the effect of annual report readability on reducing corporate agency costs. We further find that the effect of annual report readability is more pronounced in NSOEs and after the implementation of the new accounting standards in 2007.

This study has several theoretical and practical implications. First, although there is a broad consensus among regulators worldwide on plain disclosure, the problem of corporate annual report readability is worsening. The effects of this on corporate agency problems must therefore be emphasized. Our findings suggest that improving the readability of annual reports can assist investors in evaluating and supervising corporate insiders. Second, our results show that soon after the implementation of new accounting standards the length of annual reports increases, while the effect of annual report readability on reducing corporate agency costs becomes stronger. Regulators should thus carefully consider writing plain disclosure into relevant laws and requirements when reforming corporate information announcement systems, to create a reasonable trade-off between integrity and the readability of disclosed information. Finally, earnings quality and use value are based on the premise that annual report readability may have economic consequences. As external audit and internal control can improve the quality of earnings, and high levels of analyst coverage can guarantee the use value of corporate annual reports, regulators should continue to encourage corporations to improve their internal control system, expand the external audit services market and develop the professional security analyst industry.

Our study may suffer from limitations. The readability of annual reports is a very abstract concept, and we recognize that our measurements are relatively rough, as they are based simply on the length of annual reports. Constructing more accurate measurements of readability in the Chinese context is essential for future studies. Research into the economic consequences of readability is still in its infancy and deserves more attention in the future.

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Government integrity and corporate investment efficiency

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ABSTRACT

We explore the relation between government integrity and firms' investment efficiency in the context of China's deepening reforms and its strengthening the social credit system. We find that government integrity is positively associated with the investment efficiency of listed companies in China. Government integrity is negatively related to corporate underinvestment, but insignificantly related to corporate overinvestment. Higher government integrity reduces underinvestment in non-state-owned firms, but this relation is not significant in state-owned firms. Furthermore, we find that the negative relation between government integrity and underinvestment is only significant for firms in industries that receive supportive government policies. This study enriches research on corporate investment by adopting the perspective of government integrity, and supplements the literature on government integrity and its economic consequences. Our study also provides micro-level empirical evidence that strengthening government integrity will promote the economic transformation of China.

1. Introduction

In recent years, as China has developed economically, integrity has become increasingly important in the social value system and of increasing interest to researchers and policy makers. The report of the Eighteenth National Congress of the Communist Party of China (CPC) points out that education and governance are

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needed to address serious ethical problems, and that it is essential to enhance government integrity, business integrity, social integrity and judiciary credibility. In addition, the Third Plenary Session of the Eighteenth CPC Central Committee called on the public and government to establish a sound social credit system to encourage ethical behavior, punish dishonesty, promote the transformation of government, greatly reduce administrative examination and approval, make government's decision-making more reasonable, and strive for a transparent government. Chinese Premier Keqiang Li emphasized in the State Council Executive Meeting that "a promise is a promise for the government." It is important for the government to keep its word, because foreign investors and citizens will choose to invest in local areas only if they believe in the government's policies and regard the government as trustworthy (Zhang, 2015). A government with integrity contributes to a good investment environment, which is essential for local economic development. To optimize the investment environment for private capital investment, the Chinese government has focused on speeding up the transformation of government function and on improving the efficiency of government operations; however, several problems still exist. For example, some of the government's policies are opaque or change frequently, and favorable promises made by the government are not always fulfilled. These problems threaten the government's image, and make enterprises less enthusiastic about investments.

Some studies have discussed the relations between enterprises' investment behavior and formal institutions such as the legal, government control or official assessment systems (e.g., Shleifer and Vishny, 1994; La Porta et al., 1998; Li and Zhou, 2005; Yang and Hu, 2007). However, as Chen et al. (2013) emphasize, researchers who focus on the formal system should note that countries with similar legal systems may have great differences in areas such as social and economic development, which are not determined by the formal system. In countries undergoing economic transformation or countries with unsound formal systems, attention should be paid to the influence of the informal system (Greif, 1994; North, 2005). Given China's economic transformation, researchers limiting themselves to studying the formal system, as absorbed and improved by China, will not understand China's social and economic issues well (Allen et al., 2005; Chen et al., 2013). They should consider the informal systems that have been shaped over thousands of years and have a far-reaching influence on Chinese society (Allen et al., 2005; Chen et al., 2013). Today, as China works to strengthen government integrity and strives to construct a transparent government, government integrity,[1] as an informal system that plays an important role in the development of China, is attracting growing attention from researchers.

In the political principal-agent relationship between the public and the government, the latter makes a commitment to protect the public's interests the moment it accepts the public's commission to exercise power. As an important aspect of a responsible government in a modern democratic society, government integrity is the cornerstone and the soul of social integrity, and governments play an important role in leading and promoting the construction of the social integrity system. In China, the government plays a double role: participant and regulator (Zou, 2004). Due to the government's monopoly and authority, government integrity is, undoubtedly, the core of social integrity in China (Zou, 2004). If the level of government integrity is high, it has a positive influence on social integrity (Du, 2010), and thus contributes to both market integrity and local comprehensive competitiveness (Wang, 2003). In contrast, if the level of government integrity is low, it is likely to lead to unfair practices between the government and the enterprises it manages (Wang, 2003). These unfair practices include official corruption, as demonstrated by the government's illegal possession of personal assets (Wang, 2003). Such occurrences damage the government's authority and create a credibility gap between the government and the market. In this situation, the lawful rights and interests of enterprises are barely guaranteed and the whole market-oriented economy becomes chaotic. Therefore, it is essential for the government to strengthen the integrity of the administrative process.

[1] Narrowly defined, integrity is a behavioral characteristic. However, more generally, integrity is part of the process of people's long-term social interactions. The definition of integrity as a core value of Chinese socialism is "integrity is honesty and trustworthiness. It is a moral norm which is passed down for hundreds of years. Integrity is the main part of socialist morality, and focuses on working honestly, keeping promises and treating everyone sincerely." This definition of integrity is general. Zhang (2002) argues that the informal system includes social norms, business culture and all parts of the social organization system. North (1990) points out that the informal system includes conventions, regulations and codes of conduct. Therefore, as a type of value or moral norm, integrity belongs to the informal system.

Corporate investment efficiency is directly related to enterprises' operating positions, because investment is necessary for an enterprise to survive and expand. However, inefficient investment has been very common for a long time. Methods for improving corporate investment efficiency have attracted the attention of many researchers. Recent studies have examined the effect of agency problems, free cash flow, and the quality of financial information on corporate investment efficiency (e.g., Jensen, 1993; Biddle and Hilary, 2006; Beatty et al., 2010); they find that Chinese listed companies experience extensive overinvestment and underinvestment (Zhang and Song, 2009). Compared to governments in developed countries, the Chinese government plays a more prominent and important role in some aspects of investment, such as enterprise operations and social development. In the context of the current deepening reforms in China, there is an urgent need to change the government's inhibition of efficient investment. The government influences the behavior of enterprises during periods of economic transformation (Hou et al., 2015). As part of the informal system of behavior, government integrity may play an important role in enterprise investment. Government integrity can lead the way for individuals, enterprises and society, and thus exert great influence on enterprises' external environment, which affects corporations' investment behavior. If government officials enact preferential investment policies just to pursue their own interests, corporations may find it difficult to benefit from the policies and will fail to obtain the expected investment returns. Furthermore, if the policies are not stable or the officials' work is inefficient, the government will fail to fulfill its commitment to protect corporate interests, and corporations will lose their trust in the government.[2]

In general, higher government integrity means that a government can fulfill its commitment to protect the interests of investors, and thus satisfy corporations' expectations of investment returns. This observation raises several questions. What is the relationship between government integrity and corporate investment efficiency? Is the relationship between government integrity and underinvestment different from the relationship between government integrity and overinvestment? Does the relationship between government integrity and corporate investment efficiency vary in enterprises with different types of share ownership? There have been few studies of these issues. Thus, we use a sample of Chinese non-financial listed firms in the A-share market from 2011 to 2014 to examine the relationship between government integrity and enterprises' investment efficiency. The results show that government integrity is negatively related to inefficient investments. When government integrity is higher, corporate underinvestment is lower, but there is no significant change in overinvestment. In terms of types of share ownership, the negative relationship between government integrity and corporate underinvestment is mainly manifested in non-state-owned enterprises, not in state-owned enterprises. Further analysis shows that, compared to industries without supportive policies, the relationship between government integrity and corporate investment efficiency is stronger in industries with supportive policies.

Our study makes several contributions to the literature. First, unlike most previous studies, which discuss the relation between the formal system and corporate investment, this study examines the relationship between government integrity, an informal system, and corporate investment (e.g., La Porta et al., 1998; Biddle and Hilary, 2006; Beatty et al., 2010). We find that higher government integrity is associated with less inefficient investment, which provides empirical evidence of the importance of government integrity for the "new normal" of the Chinese economy.

Second, we find that the relationship between government integrity and corporate investment efficiency mainly exists in non-state-owned enterprises. This finding has practical implications for policy makers seeking to enhance the investment efficiency of non-state-owned enterprises and to accelerate the economic transformation of China.

Third, by discussing government integrity and corporate investment efficiency, we not only provide a new perspective on the relationship between government integrity and corporate investment, we also call for more

[2] At a news conference on the franchise management of infrastructure and public utilities in May 2015, Kang Li, director of the Department of Laws and Regulations of the National Development and Reform Commission, said: "In practice, some local governments didn't fulfill price adjustment commitments in accordance with the franchise agreement. Some local governments did not fulfill their promise to guarantee interests because of a change in persons chiefly in charge after several years, which led the original franchise agreements to be modified and adjusted. Some local governments outright defaulted."

research on government integrity (especially, government integrity during a period of economic transformation) and its economic consequences. We also expand research on the government-enterprise relationship.

The remainder of this paper is organized as follows. Section 2 presents a review of the literature. Section 3 provides the theoretical analysis and hypotheses. The research design and data sources are presented in Section 4, and the results of the empirical tests and analyses are presented in Section 5. Our conclusions are discussed in Section 6.

2. Literature review

Previous studies have discussed the factors that influence government integrity. For example, Fukuyama (1996) argues that trust between citizens and a government is an interactive and cooperative relationship, which is based on citizens' reasonable expectations and the government's response. Goodsell (2006) discusses the causes of the lack of government integrity and its effect on society. Chang and Chu (2006) find that political corruption in Asian countries can seriously damage government integrity. Keele (2007) argues that the quality of public services provided by the government affects the public's trust in the government. Christensen and Legreid (2005) point out that citizens' trust in one governmental institution may extend to other governmental institutions. The most important factor influencing citizens' assessment of government integrity is satisfaction, and citizens who are satisfied with specific public services tend to trust the government more (Christensen and Legreid, 2005).

A few studies have explored the economic consequences of government integrity. Chanley et al. (2000) find that the public will strongly support the government's activities when public trust in the government is high. Kim (2005) and Cooper et al. (2008) find that the public's trust in government can effectively mitigate the conflict between the government and the public. Based on the theory of fair government institutions, Rothstein and Teorell (2008) argue that government integrity is closely related to the quality of government. Park and Blenkinsopp (2011) find that in South Korea, the relationship between corruption and public satisfaction is largely influenced by government transparency and government integrity.

There are also some discussions in the Chinese literature about government integrity. Liu (2003) points out that government integrity means that the government must be kind and loyal to the public, rather than deceitful and immoral. Zou (2004) points out that government integrity is the core of social integrity, and government departments should take measures to enhance government integrity and lead the way to social integrity. E (2005) argues that government integrity is positively related to the degree to which the government's exercise of power supports the public's responsibility and interests. When the government loses its integrity, the public's responsibility and interests are destroyed, which result in the loss of the government's authority and the appearance of political crises and social unrest (E, 2005). Sheng (2014) analyzes the reasons a government lacks integrity, and suggests a strategy for constructing a government with integrity. Li et al. (2014) argue that the degree of citizens' trust in the government affects their judgments about the effectiveness of the government's macroeconomic regulations and controls, which in turn affects their expectations for inflation. In addition, some researchers find that the level of integrity of Chinese local governments is low at present (Fan and Jiang, 2005). In their systematic review of the literature on government integrity, Fan and Zhang (2011) note that studies of government integrity, especially at the local level, are still rare. In sum, although the literature has broadly discussed government integrity, there are few empirical studies on the effect of government integrity on corporate investment. Government integrity is the foundation of the social credit system. Therefore, it is important for policy makers to understand the economic consequences of government integrity in the current environment of ongoing reforms and the construction of the social credit system.

There are many studies of the factors influencing corporate investment. Jensen (1986, 1993) explores the effect of agency problems on firms' investment efficiency. Giroud and Mueller (2010) find that firms with poor corporate governance are more likely to make inefficient investments. However, effective incentive contracts can suppress the problem of inefficient investment (Aggarwal and Samwick, 2006). Some studies examine corporate investment behavior from the perspective of information asymmetry, which is related to the quality of accounting information or corporate transparency, and argue that the most influential factor on corporate investment efficiency is the agency problem, which causes information asymmetry between investors and managers; thus, high quality accounting information can improve corporate investment efficiency by reducing

information asymmetry (e.g., Healy and Palepu, 2001; Biddle and Hilary, 2006). Moreover, an increase in corporate transparency can also reduce information asymmetry and thus improve corporate investment efficiency (Francis et al., 2009).

Some studies from China focus not only on agency problems, information asymmetry and accounting information quality, but also on corporate governance, government intervention and the external environment. For the influence of agency problems on corporate investment efficiency, Tong and Lu (2005) find that corporate debt financing can alleviate the overinvestment caused by agency problems, but may lead to underinvestment. Zhou (2009) finds that an improvement in earnings quality can reduce agency costs, and thus promote the investment efficiency of listed companies. For the influence of accounting information quality and information disclosure on corporate investment efficiency, Li (2009) shows that high quality accounting information can improve the efficiency of investments. High quality information disclosure can alleviate information asymmetry, and thus restrain corporate overinvestment (Zhang and Lv, 2009). The results of studies on the effects of corporate governance on investment efficiency are mixed. Some find that good corporate governance helps to improve the efficiency of investment. Wei and Liu (2007) find that improvements in governance structure and governance environment can inhibit state-owned enterprises' over-investment. Li et al. (2011) show that improvements in the quality of internal controls can inhibit inefficient investment. Both Yang et al. (2010) and Zhang and Lu (2012) support the positive effect of corporate governance on the efficiency of investment. However, others have come to different conclusions. Liu (2006) believes that the inhibitory effect of corporate governance on investment inefficiency is not significant. Yu and Tian (2009) find that a high quality of internal control does not effectively inhibit inefficient investment. Jian et al. (2011) even find that monetary incentives exacerbate inefficient investment. As for the influence of government intervention on the efficiency of investment, recent studies show that local government officials influence listed companies' investments (Yang and Hu, 2007), and excessive intervention from the local government leads local state-owned enterprises to overinvest (Zhang and Wang, 2010). For the influence of the external environment on investment efficiency, Jin et al. (2012) find that loose monetary policy eases financing constraints, and thus improves the investment efficiency of enterprises with good investment opportunities. Yu et al. (2014) point out that in industries with stronger dependence on external financing, there is a greater gap in investment efficiency between state-owned and non-state-owned enterprises.

In conclusion, although some studies have examined government integrity, and enterprises' investment efficiency has been studied from many perspectives, few studies have considered the influence of government integrity on corporate investment efficiency. How is government integrity related to corporate investment efficiency? Is this relationship different in enterprises with different types of share ownership? These questions need to be answered. Therefore, by testing the relationship between government integrity and corporate investment efficiency, our study not only contributes to the literature on government integrity and its economic consequences (especially government integrity in the context of Chinese economic transformation), it also helps to enrich the literature on corporate investment.

3. Theoretical analysis and hypotheses

To live safely and enjoy equal rights, people are willing to give some power to an organization that will exert its power in accordance with the desire of the public (Locke, 1690). This is the way that a government comes into being (Locke, 1690). People give their own power to the government, and in exchange the government protects their interests, such as life, liberty and property. Similarly, the social contract theory points out that as a country is created by people forming a contract with a government, the people are the true masters of state power (Rousseau, 1762). As an agent and executor of power, the government exerts public power in the name of the people, to defend their wealth (Rousseau, 1762). When the government exerts power as an agent of the people, it makes promises to serve the public, to protect the interests of the people and to satisfy the public's expectations through a variety of methods. In the process of exercising power, the government has the responsibility to fulfill its promises to the people. Therefore, the relationship between the people and the government is actually a political principal-agent relationship (Ni, 2002; Ying and Yang, 2004). Obviously, the public is the principal and the government is the agent of the power. This principal-agent relationship is based on the public's trust in the government; the public is willing to entrust administrative power to the

government because they believe and expect the government will promote their interests, through public products such as the maintenance of peace and security, property protection, laws and regulations, and the supply of public facilities (Ma and Chen, 2005).[3] Thus, safeguarding the interests of the public is the commitment that a government makes. Government integrity means that the government must fulfill its commitment to the public, and keep its word as an agent in the political principal-agent relationship. These actions create a unity between a government's words and deeds.[4]

An enterprise's fundamental goal is to make a profit. According to the definition of government integrity, if a government cannot protect the profits that enterprises gain from investments, the enterprises will believe that the government has not fulfilled its commitment, and thus lacks integrity. For example, if the government makes frequent changes in policies or newly appointed officials ignore the arrangements made by their predecessors, it may be difficult for enterprises to achieve the expected return from their investments. In this situation, enterprises experience low investment efficiency and are likely to perceive the government as dishonest, because it has not protected their interests. In addition, to attract more investment from enterprises, local governments may "open the door to greet, and then close the door to hit." That is, a government may make many commitments and issue a variety of preferential policies to attract more corporate investment—but once the investment project is in operation, the government may then act according to its private interests, and may practice bribery or extortion. Many promises are greatly discounted or even forgotten. Enterprises find themselves in the situation where they have been tricked into believing they were closing a good deal, but are in fact trapped in a non-profitable deal that allows the government to extract personal benefits through bribery or other means. Thus, their return on investment is low. In this scenario, the government has no integrity because it has failed to fulfill the commitments it made to the enterprises, and thus the enterprises cannot get optimal investment returns. In this scenario, corporate investment is inefficient. Based on this analysis, we present the first hypothesis.

Hypothesis 1. When government integrity is higher, corporate investment is less inefficient.

When policies are obscure and opaque, or government officials make policies arbitrarily, property may be disputed. Corporate interests are infringed on by the government if the government fails to fulfill its commitment to create a stable environment. A government without integrity will create many difficulties for enterprises trying to form stable and accurate expectations about the future investment environment. Enterprises cannot make accurate judgments about expected returns on investments in unstable situations. For example, when policies are changed frequently, so that what is legal today is not legal tomorrow, and things you own today are not yours tomorrow, investors lack stable expectations and the confidence to invest in the future (Zhang, 2015). In this environment, the optimal investment decision made by enterprises in the current investment environment will not be optimal in the future. Investment efficiency is not likely to achieve the optimal level. However, we need to note that the local government's integrity is relatively stable over short periods. Enterprises can reasonably expect potential over-investment due to low government integrity. Therefore, enterprises are very cautious to invest in advance, or may even reduce their investment when government integrity is low, which will result in underinvestment. In brief, enterprises tend to underinvest due to their rational expectations when government integrity is low. However, these same rational expectations will help enterprises to avoid overinvestment in the future. Therefore, government integrity should have an insignificant effect on corporate overinvestment. Based on this analysis, we propose the second hypothesis.

[3] As an agent, a government needs some returns. As Locke wrote in "Two Treatises of Government": "Given that government cannot afford to maintain operation without enough funds, people who enjoy the protection from the government should pay to maintain government's operation."

[4] There are essential differences between government integrity and government quality. A government with high quality is not the same as a government with high integrity. For example, if we examine the quality of government from a legal perspective, a government with a high quality and well-implemented legal system is not necessarily an honest government. If officials deny they made informal commitments to support an enterprise's investment, it is difficult for enterprises to sue these government officials for losses due to unfulfilled commitments, even though legal system is sound and has a good implementation. In such cases, dishonest government officials do not reflect government quality. If they achieve a good performance in other areas, they can even be viewed as clean and efficient.

Hypothesis 2. Government integrity is negatively related to corporate under-investment, but insignificantly related to corporate over-investment.

We examine whether the relation between government integrity and corporate investment efficiency is different for different types of share ownership. Specifically, we look at the difference in state-owned enterprises (*SOEs*) and non-state-owned enterprises (non-*SOEs*). The government, as the ultimate shareholder of state-owned enterprises, plays an important role in guiding their investment. Therefore, the investment behavior of state-owned enterprises is mostly a reflection of the government's will. As businesses are oriented by government's policies, state-owned enterprises have many social tasks, such as solving employment problems, maintaining social stability, increasing fiscal revenues and cooperating with national development strategies (Lin et al., 2004). As a result, state-owned enterprises pay more attention to whether their investment is in harmony with the government's development strategy and less attention to the external environment. If state-owned enterprises' investments are contrary to the government's development strategies, it is difficult for enterprises to obtain the government's approval and resources. Even if the government is honest, it is difficult for such enterprises to carry out such investment activities. In contrast, when state-owned enterprises invest in compliance with the government's will, the government is willing to provide rich resources to support enterprises' investments regardless of the level of government integrity. Therefore, there should be no significant relation between the investment efficiency of state-owned enterprises and government integrity. Unlike state-owned enterprises, non-state-owned enterprises see economic benefits as the fundamental goal of investments. If the government lacks integrity, non-state-owned enterprises risk overinvestment. In this environment, to avoid future losses, non-state-owned enterprises will be very careful when making investments or may even decrease investments. In other words, compared to state-owned enterprises, the investment efficiency of non-state-owned enterprises is more sensitive to government integrity. Based on this analysis, we advance a third hypothesis.

Hypothesis 3. The negative relationship between government integrity and insufficient corporate investment is more prominent in non-state-owned enterprises than in state-owned enterprises.

4. Research design and data source

4.1. Sample selection and data source

We begin with the population of Chinese non-financial firms listed in the A-share market between 2011 and 2014. Companies with special treatments are deleted. The data on government integrity come from a survey that the China Securities Regulatory Commission (hereinafter referred to as the CSRC) sent out to Chinese A-share listed companies on the Shanghai and Shenzhen Stock Exchange in September 2014. The main purpose of this survey was to understand the then current implementation of internal controls in listed companies. Enterprises, media and society had been paying more and more attention to government integrity at that time, and this may have been an important influence on the construction and implementation of corporate internal controls. This survey examined corporations' views of the level of government integrity. The question about government integrity was "In dealing with government agencies, what do you think of the level of government integrity? (1) Very low. (2) A little low. (3) Neutral. (4) A little high. (5) Very high.". CEOs in listed companies were required to respond to this question in the survey.

The CSRC sent the questionnaire to 2564 A-share listed companies, and received 2173 responses, giving a total response rate of 85%. Specifically, the CSRC sent the questionnaire to 970 companies listed on the main board of the Shanghai Stock Exchange and received 748 responses, giving a response rate of 77%. The CSRC sent the questionnaire to 479 companies listed on the main board of the Shenzhen Stock Exchange and received 411 responses, giving a response rate of 86%. The CSRC sent the questionnaire to 723 companies listed on the small and medium board of the Shenzhen Stock Exchange and received 702 responses, giving a response rate of 97%. The CSRC sent the questionnaire to 392 companies listed on the growth-enterprise-market (GEM) board and received 312 responses, giving a response rate of 80%. We use ANOVA to analyze the variation in government integrity between the different provinces. The results show that the

p-value corresponding to the F-statistic is less than 0.000, indicating that the level of government integrity significantly and statistically varies between different provinces. Table 1 reports the detailed variations between the provinces.

We also examine the differences in perceptions of government integrity for different types of share ownership, and find that the mean government integrity for non-state-owned enterprises is equal to 3.92, which is lower than the mean government integrity (equal to 3.96) for state-owned enterprises. The p-value corresponding to the T-statistic is 0.020, indicating that state-owned enterprises have a significantly higher perception of government integrity than non-state-owned enterprises.

In addition, we also use ANOVA to examine differences in the perceptions of government integrity in different industries. The results show that the p-value corresponding to the F-statistic equals 0.000, meaning that the perception of government integrity is significantly different between industries. Table 2 presents the detailed variations between industries.

Graham et al. (2013) argue that in questionnaire survey respondents tend to provide answers that appeal to researchers rather than answers that represent their own ideas. Alesina and Ferrara (2002) point out that with survey data one has to be aware that responses may not reflect actual behavior. A respondent may feel "good" about themselves if they answer a question about trusting others affirmatively, even if their actual behavior may not be trusting (Alesina and Ferrara, 2002). As a result, the number of affirmative answers is upwardly biased. This motivates us to categorize a "neutral" response as non-trusting. As the survey is subjective, we set the variable of government integrity as a dummy variable in a way that is consistent with previous studies (e.g., Alesina and Ferrara, 2002; Guiso et al., 2008; Qiu et al., 2007; Li et al., 2008; Huang and Deng, 2012; Hu and Zhou, 2013). If a respondent chooses "very high" or "a little high", the government integrity variable is set as 1. If a respondent chooses "very low", "a little low" or "neutral", the government integrity variable is set as 0. For each province, we average the individual enterprise evaluations of government integrity, to get a

Table 1
Differences in government integrity between provinces.

Province vs. Province	Diff.	Province vs. Province	Diff.	Province vs. Province	Diff.
Fujian vs. Beijing	−0.23***	Guizhou vs. Anhui	0.55***	Guizhou vs. Fujian	0.58***
Guizhou vs. Guangxi	0.49**	Hainan vs. Beijing	−0.38***	Hainan vs. Guangdong	−0.29*
Hebei vs. Beijing	−0.35***	Hebei vs. Guangdong	−0.25***	Hebei vs. Guizhou	−0.70***
Heilongjiang vs. Beijing	−0.48***	Heilongjiang vs. Gansu	−0.43**	Heilongjiang vs. Guangdong	−0.39***
Heilongjiang vs. Henan	−0.39***	Hubei vs. Guizhou	−0.51***	Hunan vs. Guizhou	−0.45***
Jilin vs. Hainan	0.37*	Jilin vs. Hebei	0.33*	Jiangxi vs. Heilongjiang	0.42**
Liaoning vs. Guizhou	−0.65***	Liaoning vs. Jiangsu	−0.22*	Neimenggu vs. Guizhou	−0.51***
Shandong vs. Guizhou	−0.46***	Shandong vs. Heilongjiang	0.37***	Shanxi vs. Guizhou	−0.55***
Shanxi vs. Hebei	0.36**	Shanxi vs. Heilongjiang	0.50***	Shanghai vs. Guizhou	−0.46***
Shanghai vs. Heilongjiang	0.38***	Sichuan vs. Beijing	−0.21**	Sichuan vs. Guizhou	−0.56***
Tianjin vs. Fujian	0.47***	Tianjin vs. Guangdong	0.33***	Tianjin vs. Hainan	0.62***
Tianjin vs. Henan	0.32**	Tianjin vs. Heilongjiang	0.72***	Tianjin vs. Hubei	0.40***
Tianjin vs. Jiangsu	0.31***	Tianjin vs. Liaoning	0.53***	Tianjin vs. Neimenggu	0.39*
Tianjin vs. Shanxi	0.44***	Tianjin vs. Shanghai	0.34***	Tianjin vs. Sichuan	0.44***
Xinjiang vs. Guizhou	−0.69***	Xinjiang vs. Jiangsu	−0.27*	Xinjiang vs. Shanxi	−0.36*
Yunnan vs. Guizhou	−0.57***	Yunnan vs. Tianjin	−0.45***	Zhejiang vs. Guizhou	−0.46***
Zhejiang vs. Heilongjiang	0.38***	Zhejiang vs. Tianjin	−0.34***	Chongqing vs. Guizhou	−0.53***
Guizhou vs. Guangdong	0.45***	Ningxia vs. Guizhou	−0.62**	Tianjin vs. Shandong	0.35***
Hainan vs. Guizhou	−0.73***	Shanxi vs. Hainan	0.40**	Xinjiang vs. Beijing	−0.34***
Henan vs. Guizhou	−0.44***	Shanghai vs. Hebei	0.24*	Xinjiang vs. Beijing	−0.58***
Heilongjiang vs Guizhou	−0.83***	Tianjin vs. Anhui	0.43***	Zhejiang vs. Hebei	0.24**
Hunan vs. Heilongjiang	0.39***	Tianjin vs. Hebei	0.58***	Chongqing vs. Tianjin	−0.41**
Liaoning vs. Beijing	−0.30***	Tianjin vs. Hunan	0.33**		

Note: Due to length limitations, we only present the significant differences between provinces.
* Statistical significance at 10% level.
** Statistical significance at 5% level.
*** Statistical significance at 1% level.

Table 2
Differences in government integrity between different industries.

Industry vs. Industry	Diff.	Industry vs. Industry	Diff.
D vs. B	0.24**	D vs. C1	0.19*
I vs. B	0.27***	I vs. C1	0.22***
I vs. C2	0.15**	I vs. C3	0.18***
M vs. A	−0.55***	M vs. C1	−0.42*
M vs. C2	−0.49***	M vs. C3	−0.46**
M vs. H	−0.62***	M vs. E	−0.45*
M vs. F	−0.51***	M vs. G	−0.53***
M vs. I	−0.64***	M vs. K	−0.48**
Q vs. B	0.71**	Q vs. C1	0.71*
Q vs. C4	0.68*	Q vs. H	0.76*
Q vs. M	1.09***	R vs. B	0.42***
R vs. C1	0.37***	R vs. C2	0.31**
R vs. C3	0.34***	R vs. C4	0.39**
R vs. E	0.35**	R vs. K	0.32**
R vs. M	0.80***	S vs. I	0.07***
S vs. N	0.29***		

Note: Due to length limitations, we only present the significant differences between industries. Following the 2012 CSRC industry classifications, we use the two-digit code for manufacturing industries and the one-digit code for other industries.
* Statistical significance at 10% level.
** Statistical significance at 5% level.
*** Statistical significance at 1% level.

Table 3
Variable definitions and descriptions.

Variable	Definition	Measurement
Inv	The scale of investment	The difference between the cash paid for purchasing fixed assets, intangible assets and other long-term assets, and the cash received from disposal of fixed assets, intangible assets and other long-term assets, divided by total assets
Abs	Inefficient investment	The absolute value of the regression residuals in model (2)
Overinv	The degree of overinvestment	The positive residuals of the regression in model (2)
Underinv	The degree of underinvestment	The negative residuals of the regression in model (2)
Integrity	The level of government integrity	The measurement is described in the paper
Growth	The growth rate of revenues	The difference between revenues in year t and revenues in year *t-1*, divided by revenues in year $t-1$
Tq	Investment opportunity	The sum of the price per share multiplied by tradable shares, net assets per share multiplied by non-tradable shares and the book value of liabilities, divided by total assets
Lev	Leverage	Total liabilities divided by total assets
Cash	Cash flow	Cash and cash equivalents divided by total assets
Listage	The age of listing	Years of listing
Size	Firm size	The natural logarithm of total assets
Return	Stock annual return rate	The yearly return rate of per share, considering the cash dividend's reinvestment
Adm	Administrative expense ratio	Administrative expenses divided by revenues
Orec_Ratio	The ratio of capital occupied by large shareholders	The difference between other receivables and other payables, divided by total assets
Dual	Duality	Dummy variable, Taken as 1 if the positions of chairman and CEO are occupied by one person, and 0 otherwise
Independentratio	The ratio of independent directors	The number of independent directors, divided by the number of board members
Bsize	Board size	The natural logarithm of the number of board members
Year FE	Year fixed effects	Controlling for the effect of macroeconomic factors or other unobservable factors during the sample period
Industry FE	Industry fixed effects	Controlling for the effect of industry characteristics during the sample period

measurement of the local government's integrity. To insure the reliability and creditability of the survey data, the researchers in the CSRC proofread and verified the responses several times.

Although the data on government integrity are taken from a single-year survey, government integrity can be considered consistent in a province over long periods. To avoid bias that may be generated by evaluating inefficient investment based on an one-year sample, which would further affect the reliability of the conclusions, we assume a steady level of government integrity for each year and each province. The data for the other variables in our study are taken from the CSMAR database. We winsorize continuous variables at 1% and 99% to mitigate the effect of outliers.

4.2. Research design

We use model (1) to test our hypotheses:

$$\begin{aligned} Abs_{it}/Overinv_{it}/Underinv_{it} = {} & \beta_0 + \beta_1 Integrity_{it} + \beta_2 Size_{it} + \beta_3 Lev_{it} + \beta_4 Tq_{it} + \beta_5 Adm_{it} \\ & + \beta_6 Independentratio_{it} + \beta_7 Orec\_Ratio_{it} + \beta_8 Dual_{it} + \beta_9 Bsize_{it} \\ & + Industry\ FE + \varepsilon_{it}, \end{aligned} \tag{1}$$

where *Integrity* represents the level of government integrity, which is the independent variable. Our dependent variables are *Abs*, *Overinv* and *Underinv*, representing the degree of inefficient investment, overinvestment and underinvestment, respectively. Following Xin et al. (2007), Fang and Jin (2013) and Lei et al. (2014), we control some variables including company size (*Size*), leverage (*Lev*), investment opportunity (*Tq*), administrating expense ratio (*Adm*), the ratio of capital occupied by large shareholders (*Orec_Ratio*), a dummy variable

Table 4
Descriptive statistics: the underinvestment group.

Panel A: mean, 25% quantile, median, 75% quantile and standard deviation

Variable	Mean	25% quantile	Median	75% quantile	Standard deviation
Underinv	−0.120	−0.153	−0.084	−0.039	0.119
Integrity	0.781	0.750	0.797	0.819	0.065
Size	21.680	20.780	21.530	22.420	1.323
Lev	0.453	0.254	0.431	0.627	0.254
Tq	3.098	1.573	2.395	3.744	2.303
Adm	0.124	0.052	0.089	0.142	0.139
Independentratio	0.373	0.333	0.333	0.429	0.053
Bsize	2.141	1.946	2.197	2.197	0.201
Orec_Ratio	0.020	0.004	0.009	0.021	0.034
Dual	0.234	0.000	0.000	0.000	0.423

Panel B: Pearson correlation coefficient matrix

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. *Underinv*	1									
2. *Integrity*	0.089***	1								
3. *Size*	0.329***	−0.002	1							
4. *Lev*	0.053***	−0.032	0.334***	1						
5. *Tq*	−0.557***	0.003	−0.522***	−0.179***	1					
6. *Adm*	−0.298***	−0.011	−0.369***	−0.169***	0.388***	1				
7. *Independentratio*	−0.097***	−0.015	−0.039**	−0.017	0.123***	0.076***	1			
8. *Bsize*	0.114***	−0.042**	0.309***	0.176***	−0.185***	−0.121***	−0.512***	1		
9. *Orec_Ratio*	−0.123***	−0.075***	−0.094***	0.189***	0.138***	0.123***	0.015	−0.015	1	
10. *Dual*	−0.068***	0.041**	−0.157***	−0.156***	0.085***	0.075***	0.131***	−0.197***	−0.009	1

* Statistical significance at 10% level.
** Statistical significance at 5% level.
*** Statistical significance at 1% level.

representing whether the positions of CEO and chairman are taken up by one person (*Dual*), the ratio of independent directors (*Independentratio*), board size (*Bsize*) and industry fixed effects.

We use Richardson's (2006) methods to measure corporate investment efficiency. Richardson (2006) argues that corporate investment expenditure includes capital maintenance expenditure and new project investment, and that the residuals generated by establishing a regression model of new project investment with positive NPV can be considered unexpected investment. Currently, many authors, such as Xin et al. (2007), Zhong et al. (2010), Liu and Ye (2013) and Dou et al. (2014), follow Richardson's (2006) method for evaluating corporate investment efficiency. Specifically, the model adopted in our study is as follows:

$$Inv_{it} = \alpha_0 + \alpha_1 Tq_{it-1} + \alpha_2 Lev_{it-1} + \alpha_3 Cash_{it-1} + \alpha_4 Listage_{it-1} + \alpha_5 Size_{it-1} + \alpha_6 Return_{it-1} + \alpha_7 Inv_{it-1} + Industry\ FE + Year\ FE + \varepsilon_{it}. \quad (2)$$

Following Richardson (2006), we use model (2) to first estimate corporate optimal investment. Then, we take the actual investment minus the estimated optimal investment as the measure of inefficient investment. Our results would have been biased if we estimated the inefficient investment using all of the samples at the same time, as state-owned and non-state-owned enterprises have different relationships with the government (e.g., Chen et al., 2011). Therefore, we estimate the inefficient investment for state-owned enterprises and non-state-owned enterprises separately. If the inefficient investment is greater than 0, it can be seen as overinvestment represented by *Overinv*. If the inefficient investment is lower than 0, it can be seen as underinvestment represented by *Underinv*. We also take the absolute value of the inefficient investment, which is represented by *Abs*. A larger *Abs* is associated with a lower investment efficiency. See Table 3 for definitions of all of the variables in models (1) and (2).

Table 5
Descriptive statistics: the over-investment group.

Panel A: Mean, 25% quantile, median, 75% quantile and standard deviation

Variable	Mean	25% quantile	Median	75% quantile	Standard deviation
Overinv	0.091	0.035	0.070	0.122	0.080
Integrity	0.785	0.754	0.797	0.816	0.060
Size	21.840	20.920	21.650	22.530	1.297
Lev	0.409	0.226	0.395	0.574	0.228
Tq	2.209	1.390	1.861	2.515	1.403
Adm	0.098	0.050	0.079	0.118	0.097
Independentratio	0.372	0.333	0.333	0.429	0.054
Bsize	2.153	2.079	2.197	2.197	0.193
Orec_Ratio	0.014	0.003	0.007	0.015	0.024
Dual	0.294	0.000	0.000	1.000	0.455

Panel B: Pearson correlation coefficient matrix

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. *Overinv*	1									
2. *Integrity*	−0.041**	1								
3. *Size*	−0.068***	−0.018	1							
4. *Lev*	0.040**	−0.083***	0.493***	1						
5. *Tq*	0.092***	0.055***	−0.425***	−0.263***	1					
6. *Adm*	0.057***	0.042***	−0.333***	−0.109***	0.376***	1				
7. *Independentratio*	0.002	0.052***	0.024*	0.003	0.018	0.007	1			
8. *Bsize*	−0.048***	−0.044***	0.296***	0.132***	−0.141***	−0.073***	−0.477***	1		
9. *Orec_Ratio*	0.020	−0.0230	0.031**	0.236***	0.061***	0.136***	0.020	0.011	1	
10. *Dual*	0.033*	0.014	−0.239***	−0.173***	0.137***	0.071***	0.083***	−0.162***	−0.049***	1

* Statistical significance at 10% level.
** Statistical significance at 5% level.
*** Statistical significance at 1% level.

5. Empirical test and analysis

5.1. Descriptive statistics

We first evaluate inefficient investment using model (2). Tables 4 and 5 report the descriptive statistics for the underinvestment group and the overinvestment group, respectively. In Panel A of Table 4, we find that the mean value of government integrity is 0.781, and the 25% and 75% quantiles are 0.750 and 0.819, respectively, indicating that there is a variation in government integrity in the underinvestment group. The average ratio of independent directors is 0.373 and the median is 0.333, indicating that the ratio of independent directors varies in companies with underinvestment. The mean value of *Dual* equals 0.234, indicating that the positions of chairman and CEO are occupied by one person in 23.4% of the companies with underinvestment. Panel B of Table 4 shows that the correlation coefficient between *Integrity* and *Underinv* is significantly positive at the 1% level (equal to 0.089), meaning that higher government integrity is associated with less corporate underinvestment.

In Panel A of Table 5, we see that the mean value of government integrity in the overinvestment group is 0.785, which is greater than the mean value of government integrity in the underinvestment group. The 25% quantile of *Adm* is 0.050, and the 75% quantile of *Adm* is 0.118, indicating that administrative expenses vary between companies. In addition, we find that there is a significantly negative correlation between *Integrity* and *Overinv*. Nevertheless, whether this relationship remains significant after controlling for other factors needs to be further tested.

5.2. Empirical analysis

5.2.1. Government integrity and corporate inefficient investment

We use model (1) to test how government integrity affects the investment efficiency of enterprises and whether government integrity affects both underinvestment and overinvestment.

Table 6
Government integrity and corporate investment inefficiency.

	Abs	*Underinv*	*Overinv*
Integrity	−0.120***	0.150***	−0.035
	(−4.10)	(3.60)	(−1.16)
Size	−0.004***	0.004	−0.009***
	(−2.64)	(1.65)	(−4.35)
Lev	0.061***	−0.027**	0.083***
	(5.73)	(−2.34)	(5.90)
Tq	0.027***	−0.029***	0.008***
	(15.36)	(−16.55)	(3.04)
Adm	0.083***	−0.087***	−0.002
	(3.58)	(−3.66)	(−0.09)
Independentratio	0.071*	−0.109*	0.007
	(1.86)	(−1.93)	(0.18)
Bsize	−0.002	−0.017	−0.014
	(−0.19)	(−1.09)	(−1.21)
Orec_Ratio	−0.023	−0.021	−0.076
	(−0.31)	(−0.22)	(−0.86)
Dual	0.005	−0.008	0.003
	(1.36)	(−1.40)	(0.71)
Constant	0.171***	−0.128**	0.293***
	(3.56)	(−1.99)	(5.32)
Industry	Yes	Yes	Yes
Observations	4832	2364	2468
Adj-R^2	0.210	0.314	0.041

Note: We present the *t*-statistics in parenthesis below the coefficients, which are adjusted by clustering at the firm level.
* Statistical significance at 10% level.
** Statistical significance at 5% level.
*** Statistical significance at 1% level.

The results in Table 6 show that the coefficient of *Integrity* is negative and significant at the 1% level when the dependent variable is inefficient investment (*Abs*), indicating that government integrity is significantly negatively related to inefficient investment. That is, firms have less inefficient investments in provinces with better government integrity. Hypothesis 1 is verified. At the same time, we find that the coefficient of *Integrity* on *Underinv* is positive and significant at the 1% level, which means that higher government integrity is associated with less corporate underinvestment. However, the coefficient of *Integrity* on *Overinv* is negative but not statistically significant. Therefore, there is no convincing evidence that government integrity is related to listed companies' over-investment.

5.2.2. Government integrity and inefficient investment: SOEs vs. non-SOEs

To examine how government integrity affects the investment efficiency of companies with different types of share ownership, we divide our sample into *SOEs* and non-*SOEs*, and then run the regression of model (1) separately for each subsample. Table 7 shows that government integrity only has a significant negative correlation with inefficient investment in the non-*SOEs* sample (the coefficient is equal to −0.174 and significant at the 1% level). For the non-*SOEs* subsample, the coefficient of *Integrity* on *Underinv* is significantly positive at the 1% level, which indicates that higher government integrity is associated with less underinvestment by non-*SOEs*. The coefficient of *Integrity* on *Overinv* is negative but not significant for non-*SOEs*, meaning that government integrity is not significantly correlated with non-*SOEs*' over-investment. We also find that there is no evidence to support a significant relationship between government integrity and inefficient investment for *SOEs*. In other words, the relationship between government integrity and corporate investment efficiency is not the same for different types of share ownership. The significant and negative relationship between government integrity and corporate underinvestment is most evident in non-*SOEs*, which supports Hypothesis 3.

Table 7
Government integrity and corporate investment inefficiency: *SOEs* vs. non-*SOEs*.

	Non-*SOEs*			*SOEs*		
	Abs	*Underinv*	*Overinv*	*Abs*	*Underinv*	*Overinv*
Integrity	−0.174***	0.199***	−0.054	−0.020	0.054	0.009
	(−3.69)	(3.11)	(−1.22)	(−0.69)	(1.18)	(0.32)
Size	−0.000	−0.001	−0.008***	−0.004**	0.007***	−0.000
	(−0.15)	(−0.33)	(−2.72)	(−2.18)	(3.11)	(−0.06)
Lev	0.060***	0.016	0.141***	0.073***	−0.109***	−0.060***
	(4.36)	(0.92)	(8.92)	(5.00)	(−7.57)	(−3.16)
Tq	0.025***	−0.026***	0.007**	0.033***	−0.034***	0.003
	(11.37)	(−11.65)	(2.48)	(11.57)	(−12.03)	(0.60)
Adm	0.090***	−0.105***	0.001	0.073**	−0.019	0.010
	(2.96)	(−2.98)	(0.05)	(2.15)	(−0.57)	(0.22)
Independentratio	0.056	−0.145	−0.002	0.094**	−0.054	0.057
	(0.92)	(−1.62)	(−0.04)	(2.35)	(−1.02)	(1.13)
Bsize	0.001	−0.025	−0.005	0.014	−0.021	0.004
	(0.04)	(−1.05)	(−0.35)	(1.11)	(−1.35)	(0.24)
Orec_Ratio	−0.050	−0.053	−0.141*	−0.024	0.002	−0.022
	(−0.49)	(−0.36)	(−1.74)	(−0.27)	(0.03)	(−0.12)
Dual	0.002	−0.003	0.001	−0.007	0.005	−0.009
	(0.38)	(−0.46)	(0.20)	(−1.09)	(0.56)	(−1.57)
Constant	0.147*	−0.068	0.248***	0.013	−0.075	0.063
	(1.83)	(−0.65)	(3.22)	(0.25)	(−1.09)	(0.94)
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2984	1439	1545	1848	925	923
Adj-R^2	0.172	0.258	0.097	0.320	0.512	0.046

Note: We present the *t*-statistics in parenthesis below the coefficients, which are adjusted by clustering at the firm level.
* Statistical significance at 10% level.
** Statistical significance at 5% level.
*** Statistical significance at 1% level.

Table 8
Government integrity and corporate investment inefficiency: Robust analysis I.

	Abs	*Underinv*			*Overinv*		
		All samples	*SOEs*	Non-*SOEs*	All samples	*SOEs*	Non-*SOEs*
Integrity_firm	−0.007**	0.012**	0.000	0.018**	−0.005	−0.006	−0.001
	(−2.02)	(2.05)	(0.07)	(2.42)	(−1.34)	(−1.09)	(−0.21)
Size	−0.002*	0.004*	0.001	0.005	−0.002	−0.008***	0.002
	(−1.80)	(1.81)	(0.69)	(1.49)	(−1.53)	(−3.47)	(0.79)
Lev	0.056***	−0.038***	0.016	−0.068***	0.041***	0.116***	0.013
	(6.02)	(−3.37)	(1.16)	(−3.99)	(3.85)	(6.52)	(1.07)
Tq	0.028***	−0.028***	−0.032***	−0.026***	0.004	0.009**	0.003
	(16.85)	(−16.89)	(−12.65)	(−13.02)	(1.47)	(2.07)	(1.04)
Adm	0.062***	−0.055**	−0.071**	−0.049	−0.017	−0.042	0.031
	(2.83)	(−2.31)	(−2.45)	(−1.51)	(−0.73)	(−1.01)	(1.14)
Independentratio	0.075**	−0.058	−0.029	−0.126*	0.034	0.080*	−0.004
	(2.41)	(−1.20)	(−0.58)	(−1.72)	(1.10)	(1.72)	(−0.10)
Bsize	0.010	−0.025*	−0.002	−0.034	−0.000	0.018	−0.013
	(1.14)	(−1.73)	(−0.15)	(−1.63)	(−0.00)	(1.30)	(−0.96)
Orec_Ratio	0.035	−0.102	−0.089	−0.068	−0.157**	−0.070	−0.201***
	(0.51)	(−1.02)	(−0.79)	(−0.57)	(−2.25)	(−0.43)	(−3.31)
Dual	0.003	−0.003	−0.006	−0.004	0.004	−0.000	0.002
	(0.82)	(−0.62)	(−0.61)	(−0.73)	(1.21)	(−0.05)	(0.42)
Constant	0.005	−0.013	−0.031	0.015	0.100**	0.124**	0.061
	(0.14)	(−0.23)	(−0.57)	(0.18)	(2.54)	(2.17)	(1.10)
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4832	2364	925	1439	2468	923	1545
Adj-R^2	0.260	0.389	0.439	0.396	0.0406	0.0982	0.0288

Note: We present the *t*-statistics in parenthesis below the coefficients, which are adjusted by clustering at the firm level.
* Statistical significance at 10% level.
** Statistical significance at 5% level.
*** Statistical significance at 1% level.

5.3. Robustness analysis

The data on government integrity in our study are from a survey distributed to listed companies, and measure CEOs' perceptions of local government integrity. Although CEOs' perceptions may not reflect the local government's real integrity, these perceptions are probably the determinants of corporate actions, rather than the actual government integrity. We conduct a robustness test using government integrity as perceived by CEOs (*Integrity_firm*) as the independent variable. Table 8 shows that our conclusions do not substantively change.

In addition to measuring the scale of investment by the cash paid for purchasing fixed assets, intangible assets and other long-term assets minus the cash received from the disposal of fixed assets, intangible assets and other long-term assets, we use as an alternate measure of the scale of corporate investment—the change in the original value of fixed assets in the current period. As shown in Table 9, we find that when we rerun the model using this alternative measure, the conclusions are unchanged.

The market environment can influence corporate investment. Previous studies show that it is hard for companies to obtain outside financing when laws protecting investors' benefits are weak (La Porta et al., 1998). In this situation, companies have to give up investment opportunities when the NPV is positive. At the same time, local governments might engage in a high level of intervention in the market by forcing companies to make inefficient investments to achieve their social or political goals. To exclude the influence of the market environment, we use an index to control for the development of intermediary organizations and the legal system (*Law*), an index of the relationship between the government and the market (*Govmarket*) and an index of the reduction of government's intervention in enterprises (*Intervention*). These three indices are drawn from Fan et al. (2011). As shown in Table 10, after controlling for these factors, there is still a negative relationship between government integrity and underinvestment for non-*SOE*s.

Table 9
Government integrity and corporate investment inefficiency: Robust analysis II.

	Abs	*Underinv*			*Overinv*		
		All samples	*SOEs*	Non-*SOEs*	All samples	*SOEs*	Non-*SOEs*
Integrity	−0.037*	0.051**	0.024	0.032*	0.020	0.024	−0.005
	(−1.73)	(2.19)	(1.04)	(1.67)	(0.64)	(0.87)	(−0.16)
Size	−0.003**	0.001	0.006***	−0.002**	−0.011***	−0.000	−0.009***
	(−2.21)	(1.19)	(4.45)	(−2.13)	(−5.68)	(−0.21)	(−5.02)
Lev	0.020**	−0.031***	−0.047***	0.025***	0.065***	−0.017	0.065***
	(2.06)	(−3.62)	(−5.71)	(4.45)	(5.39)	(−1.15)	(6.10)
Tq	0.011***	−0.014***	−0.012***	−0.009***	0.006**	0.003	0.004***
	(9.74)	(−12.99)	(−9.21)	(−14.60)	(2.49)	(1.06)	(2.73)
Adm	0.017	−0.027	0.028	−0.009	−0.073***	−0.065	−0.041*
	(0.77)	(−1.54)	(1.22)	(−0.84)	(−2.61)	(−1.44)	(−1.92)
Independentratio	0.028	−0.006	−0.016	−0.004	0.050	−0.010	0.059
	(1.13)	(−0.23)	(−0.64)	(−0.22)	(1.28)	(−0.24)	(1.55)
Bsize	0.010	−0.011	−0.010	−0.002	0.009	−0.004	0.019*
	(1.47)	(−1.52)	(−1.28)	(−0.32)	(0.74)	(−0.30)	(1.72)
Orec_Ratio	−0.036	−0.038	−0.121***	−0.021	−0.242**	−0.016	−0.109
	(−0.67)	(−0.72)	(−2.67)	(−0.63)	(−2.50)	(−0.15)	(−1.30)
Dual	−0.000	−0.003	−0.000	−0.003	−0.005	−0.004	−0.002
	(−0.11)	(−1.18)	(−0.09)	(−1.53)	(−1.20)	(−0.62)	(−0.55)
Constant	0.092***	−0.055*	−0.121***	−0.019	0.227***	0.080	0.181***
	(2.83)	(−1.67)	(−3.15)	(−0.69)	(4.25)	(1.33)	(3.35)
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5168	3019	1190	1829	2149	934	1215
Adj-R^2	0.081	0.191	0.318	0.199	0.058	0.189	0.071

Note: We present the *t*-statistics in parenthesis below the coefficients, which are adjusted by clustering at the firm level.
* Statistical significance at 10% level.
** Statistical significance at 5% level.
*** Statistical significance at 1% level.

5.4. Further discussion

Government integrity may have different effects on different industries, as not all industries are supported by government policies. Industrial policies are the policies that the government uses to steer the direction of industrial investment, adjust the structure of the economy, promote industry upgrading and achieve economic objectives. In the industries supported by industrial policies, preferential policies' provided by government can stimulate these enterprises to increase their investment due to the potential for large profits. Therefore, enterprises supported by industrial policies should be willing to invest more than enterprises not supported by industrial policies. However, if government integrity is low, enterprises supported by industrial policies may decide that the policy bonuses will be difficult to achieve after investing. A government without integrity is unlikely to fulfill its promises or implement preferential policies on time. Dishonest officials intentionally make things difficult for enterprises by expecting bribes (e.g. free meals or free accommodation) or by extorting them, delaying the approval of requests and preventing enterprises from meeting approval criteria. Based on these rational expectations, enterprises supported by industrial policies offered by governments with low integrity are very cautious when investing, and this results in underinvestment. In contrast, enterprises that are not supported or strongly encouraged by industrial policies do not enjoy the benefits of such policies regardless of government integrity. Therefore, we expect that the relationship between government integrity and corporate investment efficiency exists mainly in industries with supportive policies, rather than in industries with non-supportive policies.

Based on "the CPC Central Committee on the proposal of national economy and social development in the twelfth five-year plan (2011–2015)", we divide listed companies into industries with supportive policies and industries with non-supportive policies, following Zhu et al. (2015). Table 11 reports the results for both subsamples. For the industries with supportive policies, the coefficient of *Integrity* on *Abs* is significantly negative

Table 10
Government integrity and corporate investment inefficiency: Robust analysis III.

	Dependent variable: *Underinv*					
	All samples	All samples	All samples	Non-SOEs	Non-SOEs	Non-SOEs
Integrity	0.141***	0.152***	0.150***	0.179***	0.198***	0.197***
	(3.19)	(3.62)	(3.52)	(2.62)	(3.05)	(2.95)
Size	0.002	0.002	0.002	−0.007*	−0.007*	−0.007*
	(0.79)	(0.81)	(0.82)	(−1.89)	(−1.84)	(−1.84)
Lev	−0.024**	−0.025**	−0.024**	0.021	0.021	0.021
	(−2.01)	(−2.10)	(−2.09)	(1.26)	(1.21)	(1.21)
Tq	−0.029***	−0.029***	−0.029***	−0.027***	−0.027***	−0.027***
	(−16.46)	(−16.45)	(−16.45)	(−11.90)	(−11.87)	(−11.88)
Adm	−0.101***	−0.101***	−0.101***	−0.110***	−0.111***	−0.111***
	(−4.68)	(−4.67)	(−4.66)	(−3.52)	(−3.48)	(−3.48)
Independentratio	−0.097*	−0.101*	−0.100*	−0.128	−0.132	−0.132
	(−1.72)	(−1.78)	(−1.77)	(−1.44)	(−1.50)	(−1.50)
Bsize	−0.012	−0.013	−0.013	−0.020	−0.020	−0.020
	(−0.82)	(−0.85)	(−0.85)	(−0.83)	(−0.83)	(−0.83)
Orec_Ratio	−0.029	−0.030	−0.029	−0.060	−0.063	−0.063
	(−0.30)	(−0.31)	(−0.30)	(−0.39)	(−0.42)	(−0.42)
Dual	−0.009	−0.009	−0.009	−0.004	−0.004	−0.004
	(−1.52)	(−1.47)	(−1.48)	(−0.59)	(−0.53)	(−0.53)
Law	0.000			0.001		
	(0.80)			(0.81)		
Govmarket		0.000			0.000	
		(0.13)			(0.07)	
Intervention			0.000			0.000
			(0.30)			(0.14)
Constant	−0.101	−0.105	−0.104	0.052	0.040	0.041
	(−1.50)	(−1.53)	(−1.54)	(0.47)	(0.36)	(0.37)
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2364	2364	2364	1439	1439	1439
Adj-R^2	0.313	0.312	0.313	0.260	0.260	0.260

Note: We present the *t*-statistics in parenthesis below the coefficients, which are adjusted by clustering at the firm level.
* Statistical significance at 10% level.
** Statistical significance at 5% level.
*** Statistical significance at 1% level.

and the coefficient of *Integrity* on *Underinv* is significantly positive, indicating that higher government integrity is associated with less inefficient corporate investment and less underinvestment. However, for industries with non-supportive policies, the relation between government integrity and corporate investment efficiency is weak. These results are in line with our expectations.

6. Conclusions

As one of the main focuses of major financial theories, investment is an important part of enterprises' development and the macro-economy. Previous studies show that inefficient investment is common in Chinese listed companies. How to improve corporate investment efficiency is a practical problem that urgently needs a solution. Many studies have argued that corporate investment depends on two basic types of agency conflicts. However, in transforming markets (Stulz, 2005), the agency conflict between government and enterprises also plays an important role in enterprises' investment decision-making. As trust is the lubricant of a social system (Arrow, 1974), government integrity can also have an important and positive effect on corporate investment. However, few studies have examined corporate investment from the perspective of government integrity.

Based on China's institutional background, we investigate the relation between the investments of listed companies and government integrity from the informal system perspective. We find that government integrity is negatively correlated with inefficient corporate investment. Higher government integrity is associated with less corporate underinvestment. However, government integrity has no obvious effect on overinvestment. In

Table 11
Government integrity and corporate investment inefficiency: Industries with supportive policies vs. industries with non-supportive policies.

	Industries with supportive policies			Industries with non-supportive policies		
	Abs	*Underinv*	*Overinv*	*Abs*	*Underinv*	*Overinv*
Integrity	−0.097**	0.139**	0.303	−0.081	0.047	−0.080
	(−2.55)	(2.29)	(0.70)	(−0.84)	(0.66)	(−0.50)
Size	−0.004**	0.009***	−0.045	0.008	−0.006	0.002
	(−2.00)	(2.59)	(−1.29)	(1.14)	(−0.86)	(0.22)
Lev	0.051***	−0.067***	0.438	0.100***	−0.097***	0.108**
	(3.84)	(−2.60)	(1.32)	(4.13)	(−3.13)	(2.34)
Tq	0.026***	−0.034***	0.013	0.041***	−0.046***	0.014
	(12.67)	(−9.80)	(0.49)	(6.19)	(−5.51)	(1.56)
Adm	0.057*	−0.056	−0.382	0.192**	−0.240**	−0.029
	(1.76)	(−1.13)	(−0.99)	(2.16)	(−2.08)	(−0.46)
Independentratio	0.098**	−0.108	1.238	0.036	−0.068	−0.033
	(2.27)	(−1.51)	(1.09)	(0.42)	(−0.81)	(−0.26)
Bsize	−0.000	−0.008	−0.141	0.004	−0.008	−0.006
	(−0.01)	(−0.39)	(−1.25)	(0.22)	(−0.23)	(−0.26)
Orec_Ratio	0.123	−0.086	−3.325	−0.111	−0.070	−0.219**
	(1.07)	(−0.56)	(−1.21)	(−1.41)	(−0.59)	(−2.38)
Dual	−0.005	0.011	−0.083	0.026*	−0.041**	0.017
	(−1.13)	(1.35)	(−1.14)	(1.81)	(−2.50)	(0.71)
Constant	0.122**	−0.223**	0.606	−0.183*	0.236*	0.052
	(2.07)	(−2.04)	(1.32)	(−1.87)	(1.66)	(0.56)
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2771	1425	1346	2061	939	1122
Adj-R^2	0.246	0.364	0.046	0.106	0.411	−0.010

Note: We present the *t*-statistics in parenthesis below the coefficients, which are adjusted by clustering at the firm level.
* Statistical significance at 10% level.
** Statistical significance at 5% level.
*** Statistical significance at 1% level.

terms of types of share ownership, the negative relationship between government integrity and corporate investment is significant only in non-*SOE*s. There is no convincing evidence to prove that government integrity is significantly related to the investment efficiency of *SOE*s. Furthermore, we find that the positive relationship between government integrity and investment efficiency of enterprises lies mainly in industries with supportive government policies.

This study provides empirical evidence that government integrity can improve corporate investment efficiency. We not only help to enrich the empirical literature on corporate investment, also provide a new perspective for research in this field, and address the lack of attention paid to government integrity and its economic consequences. In particular, this study offers three insights. First, we should pay attention not only to the two traditional types of agency conflict, but also to the agency conflict between the government and enterprises. As the Chinese government plays an important role in enterprises' development and in the macroeconomy, government integrity also modifies the government's influence on the market. Second, non-*SOE*s are an important platform for social employment, technological innovation and economic growth (Allen et al., 2005). As higher government integrity is associated with less corporate underinvestment in non-*SOE*s, developing government integrity has practical importance. Third, it is necessary for the government to create an external environment that is good for rational and efficient corporate investment. During China's current period of deepening reform, the government should develop its integrity to create a good investment environment for enterprises, which will provide a sustainable platform for economic development.

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Monetary policy, government control and capital investment: Evidence from China

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ABSTRACT

This study examines how the relationships between local governments and local enterprises moderate the effect of targeted monetary policies through different action-propagating mechanisms. First, we investigate the impact of monetary policies on enterprise investment in areas with different institutional environments. Second, we investigate the impact of monetary policies on state-owned enterprises (SOEs) with different property rights structures. Third, we examine how political connections can influence the action-propagating mechanism of monetary policies. We conclude that in China monetary policies have different effects on SOEs and on private enterprises with or without political connections. Specifically, local government interventions can significantly weaken and distort the effects of monetary policies, such that the intended reduction in investment is noticeably alleviated for SOEs and private enterprises with close links to local governments.

1. Introduction

Over the past 30 years, China's reform and opening-up policy has led to continuous high-speed economic growth, which has attracted global attention. During this period of economic transition, the government's aim has been to establish a market mechanism to allocate resources. In recent years, the Chinese government has gradually established and continuously improved its monetary policy, which is actively used to regulate the

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economy. Monetary policy not only affects the development of the macro-economy, but also has important effects on the micro-economic environments in which enterprises make decisions.

China's monetary policy is still undergoing a transformation into a fully market-based model, and its effectiveness has been the focus of academic discussion. Research has revealed that there is a time lag in the monetary policy transmission process that reduces the efficiency of the monetary policy (Zhou and Jiang, 2002; Dickinson and Liu, 2007; Fu and Liu, 2015). When the central bank loosens or tightens its monetary policy, the funds do not always flow to or from the industry or enterprise that the central bank intended to control. As local governments focus on promoting economic growth that optimizes local and regional development and investment, the central bank's monetary policy can encounter local failures in its transmission mechanism (Sun, 2004; Song and Zhong, 2006).

Research on the impact of macro policy on firms' decision making at the micro level (Jiang and Rao, 2011) is still scarce. Although some studies (Hao et al., 2014) have explained macro-level economic growth problems from the micro perspective of enterprise investment, there are no studies examining how the monetary policy transmission mechanism affects micro enterprise investment behavior and capital structure in different institutional environments and under different property rights. In this study, we use an integrative perspective to investigate the interplay between macro-level monetary policy and micro-level investment and financing actions by enterprises. We aim to attain a better understanding of the mechanisms through which monetary policy influences the economic actions of enterprises.

In-depth examinations of the interactions between macro- and micro-economic environments have shown that the impact of monetary policy on a firm's investment and financing activities depends on the firm's ownership arrangement and governance structure. China is the largest country in the world with a transitional economy. Since 1978, its market-oriented reform has been focused on decentralization. Economic decentralization motivates all levels of local governments to develop their local economies. As the growth of the local GDP is the benchmark for China's performance evaluation systems, decentralization also directly drives and strengthens local governments' interventions in local business investment activities (Blanchard and Shleifer, 2001; Leuz et al., 2003; Li and Zhou, 2005; Wang et al., 2007). To achieve rapid GDP growth, local governments resist strict financial regulations that might slow the development of the local economy. They directly intervene in local financial institutions through deregulation or alternative policies to provide guarantees for enterprises' financing and investment activities. The impact of local government on local enterprises' investment behaviors depends on the enterprises' ownership structures and governance modes (Huimin and Mak, 2002; Lee, 2003; Michael et al., 2012). These processes affect the mechanism through which the central bank's monetary policy influences micro-level investment decisions.

The continuous improvement in marketization caused by the expanding reform and opening-up policy has greatly reduced the government's direct control over the economy. Although the government initiated the market-oriented reform, it still directly dominates the reform process and the standardization of the market mechanism. As both a ''referee'' and a ''player'' in the reform process, the government has a strong influence on all enterprises, and a non-market economic system still exists. As it is intensively controlled by the government, the market cannot play a dominant role in resource allocation. In capital-scarce areas, capital investment has a significant effect on the promotion of economic development through SOEs, whose concentrated property rights are controlled by the government. Therefore, the government has a strong ability to intervene in local economies (Chen and Wong, 2013). These interventions, often conducted through property rights control and business investment intervention, achieve short-term economic goals, but have a negative effect on the government's monetary policy goals (Dewatripont and Maskin, 1995; Hansona and Steina, 2015). The unique property rights arrangement of China's SOEs is an important corporate governance characteristic related to this special investment phenomenon. The frequent changes in government policy and regulations and the fluctuating levels of government control of the economy increase the uncertainty of the economic environment. Private enterprises with political connections can more easily access long-term bank loans than other enterprises. The ability to obtain credit loans and other financial resources strongly depends on political relationships (Bartels and Brady, 2003; Faccio, 2006; Gulen and Ion, 2016). As SOEs are by definition connected to the government, research on the role of political connections has mainly focused on private enterprises. These studies have shown that political connections have a significant positive correlation

with the overinvestment of listed private companies (Du et al., 2011) and that local political connections have more influence on overinvestment than connections with the central government.

In our study, we examine the interactions of enterprises' macro- and micro-economic environments. We find that the impact of monetary policy on enterprises' investment and financing activities depends on the enterprise's ownership arrangement and governance structure. We systematically analyze how institutional environment, property rights characteristics and political connection affect the relationship between local governments and local enterprises. Specifically, we examine how a local government's own objectives distort and modify the impact of the central government's monetary policy at the local and micro levels. We explain the reasons for the low efficiency and significantly weakened impact of macro monetary policy on the capital investment decisions of local enterprises. By analyzing the multiple objectives of local governments and their influence on the implementation of macro monetary policy, it is possible to better appreciate the multiple mechanisms that effect macro monetary policy. These insights should help government officials to develop more effective macro-level monetary policies that direct economic investment configurations toward the desired objectives.

The rest of this paper proceeds as follows. We first introduce our hypotheses in Section 2. We then describe the relevant data and variable construction in Section 3 and conduct our main empirical tests in Section 4. Finally, we present our conclusions in Section 5.

2. Literature review and hypothesis development

This study examines how local government objectives affect the success of macro monetary policies. We examine the effect of institutional environment, property rights structures and political connections on the mode and intensity of the government's implementation of its macro monetary policies. After reviewing recently published studies of institutional economics, monetary theory, financial theory and corporate governance theory, we develop three hypotheses.

2.1. Institutional environment and investment

In recent years, both central and local governments in China have frequently adjusted their roles and responsibilities with regard to fiscal revenues, taxation and the ownership of state-owned assets. Market reforms have increased decentralization, which not only has mobilized local governments to develop local economies, but also directly drives and strengthens local governments' intervention in investment activities (Blanchard and Shleifer, 2001; Leuz et al., 2003; Li and Zhou, 2005; Wang et al., 2007). A high regional GDP growth rate improves local officials' chances of promotion (Li and Zhou, 2005). Provincial-level data from the market reform period confirm the significant association between local economic performance and the promotion of local officials. As investment is the most direct way to promote economic growth, local officials are motivated to use financing, taxes and other policy tools to support expanding enterprises, and so drive and maintain a high regional economic growth rate.

Over the past 10 years, the average annual growth of China's GDP has been about 10%, and the average investment growth rate has been 37.3%. Over the same period, the average annual social consumption and export growth have been only 14.1% and 12.7%, respectively. The average contribution rate of the whole society's fixed assets investment to GDP growth has been 36.3%, contributing 3.9% to GDP growth. Obviously, China's GDP growth has largely depended on investment for a long time. To maintain this high-speed local GDP growth, local governments intervene in local SOEs, resulting in overinvestment (Tang et al., 2010). In regions where the GDP growth is weak, local governments have very strong incentives to intervene, making the overinvestment problem of such regions' SOEs even worse. Thus, to win the GDP growth competition, local governments intervene in enterprises to increase capital expenditure and maintain economic growth even when monetary policy is tight.

In fact, given the GDP-based promotion system for officials, local governments are reluctant to follow monetary policy regulations that slow down investment. In periods of tight monetary policy, many local governments actively intervene in enterprises and insist on moving ahead with projects and investments. Due to the competition between local governments to grow their local GDPs, the effect of monetary policy

is weakened and regulatory effects are distorted. In such an interventionist environment, the transmission mechanisms and the implementation of monetary policy inevitably deviate from the original macro objectives. Local governments help local SOEs to obtain credit through policy incentives, local protection, resource matching, financial subsidies, etc. They use local financial platforms to provide enterprises with investment funds in periods of tightening monetary policy. Such intervention directly inhibits or alienates the transmission mechanism of the central government's monetary policy.

Accordingly, we put forward our first hypothesis.

H1. The negative effect of a tight monetary policy on investment is weaker in regions with strong government intervention.

2.2. Property rights and investment

Due to deficiencies in their legal systems, market transactions, property protections, etc., transition economies have suboptimal systems for ensuring efficient resource allocation through the government control of enterprise property rights (Pistor and Xu, 2005). Private enterprises have the single goal of maximizing value, whereas SOEs, in addition to seeking economic efficiency, need to achieve social targets such as stability, employment and public services set by local governments (Glaeser and Shleifer, 2003). SOEs assume many social functions, which become policy burdens (Lin and Tan, 1999). Policy burdens incur additional costs to SOEs, and the cost of SOEs in terms of market competition is high. In a financial crisis, a local government provides financing support to its local SOEs. The state-owned banks and local financial institutions prioritize the allocation of credit resources to SOEs. As such, even when monetary policy is tightening, SOEs maintain their access to financing.

Furthermore, because of the information asymmetry between the principal and the agent of SOEs, the government is unable to determine exactly the loss caused by principal-agent risk or policy burdens. To maintain the political function of SOEs, the government has to provide credit guarantees, financial subsidies and financing support to enterprises facing losses, which leads to a soft budget constraint. When the monetary policy changes, soft budget constraints mean the state-owned banks are unable to adjust the credit requirements according to the SOEs' risk level (He and Chen, 2009; Vithessonth et al., 2017). Thus, monetary policies do not affect SOEs and private enterprises in the same way. During the process of economic transformation, a large number of bank loans have been provided to inefficient SOEs, instead of being used to support emerging enterprises (Berglof and Bolton, 2002; Fisher et al., 2016). The soft budget constraints of SOEs are the reason for the low influence of China's debt leverage. Accordingly, the regulatory effect of monetary policy on the SOE financing costs derived from both interest rates and credit is inevitably affected. The budget constraints of SOEs destroy the credit contract established between financial institutions and enterprises that are based on financial market supply and demand, resulting in a mismatch between bank credit resources and investment.

Accordingly, we put forward our second hypothesis.

H2. Tightening monetary policy has no significant impact on SOEs' investment.

2.3. Political connections and investment

In most transition economies, as the government controls a large percentage of the economic resources, an enterprise can gain an advantage by establishing political connections, which may lead to preferential policies (Hu and Shi, 2008) such as tax policies and loan policies (Faccio, 2006; Luo and Zhen, 2009). Enterprises with political connections can get loans more easily from state-owned banks, overcoming or reducing the credit discrimination between SOEs and private enterprises. In regions with low marketization, political connections are an effective way to obtain bank loans, which are otherwise very difficult to obtain. To a certain extent, political connections change an enterprise's financing environment and conditions. Furthermore, when the monetary policy changes, enterprises with political connections have a different sensitivity to financing constraints than enterprises without such connections.

For the Central Bank of China, tightening credit to slow the growth rate and the scale of investment is an important aspect of macro-control. Tightening monetary policy reduces economic overheating and prevents asset bubbles. As credit channels tighten, enterprises reduce borrowing; this, together with existing debts, places limits on their investment activities (Angelini et al., 2014). When the monetary policy is tight, it is generally difficult for enterprises to obtain loans from banks. In such poor financing environments, the impact of monetary policy on corporate investment activities varies at the micro level according to the enterprise's political connections.

The "helping hand" view of political connections suggests that when asymmetric information and tight monetary policy exist, political connections may signal an enterprise's good development prospects and social reputation. Chinese enterprises with political connections can obtain state-owned bank loans and achieve a higher level of investment. However, the "grabbing hand" view of political connections suggests that in weak institutional environments with poor legal protections, enterprises able to obtain financing loans through political connections have significant non-market characteristics, and the allocation of financing capital has non-operating rent-seeking characteristics (Shleifer and Vishny, 1994). Thus, compared with enterprises without political connections, enterprises with political connections can get more loans from state-owned banks even if there is a higher default rate, which leads to an increase in non-operating expenses. However, the non-operating expenditures of politically connected enterprises tend to be focused on communications, meeting government performance requirements and meeting the individual objectives and needs of the individuals who can influence the financing loans, rather than on meeting the needs of an enterprise's operating investment. Therefore, the role of political connections in the allocation of resources not only affects the effectiveness of monetary policy on the micro enterprise investment, but also distorts the macro transmission mechanism of monetary policy.

Accordingly, we put forward our third hypothesis.

H3. Tightening monetary policy has no significant impact on the investment of politically connected companies.

3. Data and descriptive statistics

3.1. Measuring monetary policy

We first define monetary policy and then develop a measure of tightness. We divide monetary policy into two types: loose and tight. As there are no agreed-upon criteria for distinguishing loose and tight monetary policies, we measure them using both qualitative and quantitative methods.

For the qualitative definition of monetary policy, we mainly rely on two annual reports issued by the People's Bank of China (China's central bank). One is the Monetary Policy Report, which has an in-depth analysis of the country's macro-economic and financial situations and the specific operations of current monetary policy; the second is the National Bankers Survey Report, which is produced by the headquarter bankers (including foreign commercial banking institutions) and discloses their evaluation of the overall demand for loans and their sentiment index for monetary policy tightness. Based on the content and indexes published in the above two reports, we determine whether the annual monetary policies for each year in the 2005–2012 period are loose or tight.

China's monetary policy is adjusted according to the country's economic development. In 2005 and 2006, the monetary policy was cautious. At the end of 2006, the policy began to tighten. In 2007, the central bank raised the deposit reserve ratio of financial institutions 23 times, and the monetary policy index fell from 68% to 37.5%, making this a very tight year. In 2008, monetary policy continued tightening. The rapid escalation of the international financial crisis and the credit crunch at the end of 2008 significantly impacted China's economy. At that time, the central bank carried out a moderately loose monetary policy, which continued through 2009 and 2010. In 2011, to maintain steady and rapid economic development, adjust the economic structure and manage inflation expectations, China implemented a relatively tight monetary policy by raising the deposit reserve ratio of financial institutions, the benchmark deposit and lending rates several times. In 2012, in accordance with the slowdown in domestic economic growth, the central bank adopted a loose

monetary policy. To sum up, in our sample, 2005, 2006, 2009, 2010 and 2012 are loose monetary policy years, and 2007, 2008 and 2011 are tight monetary policy years.

For our quantitative measure of monetary policy, we first identify the main intermediate targets of monetary policy, and then use econometric regression to find the weight of monetary policy variables, which we use to construct a comprehensive index of monetary policy. Intermediate target variables are mainly related to the quantity and price of money. To measure the quantity of money, we use the net growth rate in money supply (M2) given the contemporary economic growth and inflation, and the growth rate of the balance of renminbi loans of financial institutions to measure the increase in loan growth rate. To the measure the price of money, we choose the interbank offered rate and pledged repo rate, which are the market interest rates.

We apply the quantitative regression method to the above four policy indicators to build a single policy indicator. The steps are as follows.

(1) Calculate the change rates of the four monetary policy indicators in the various periods.
(2) Regress the four policy indicators with and investment, respectively. [This step is unclear.]
(3) Use the regression coefficient of each indicator as the weight of the policy.
(4) Complete the comprehensive indicator using the yearly weighted average of our policy indicators.

The regression model is as follows:

$$Inv_{i,t} = \rho_0 + \rho_1 MPolicy_{i,t} + \sum Control + \varepsilon_{i,t},$$

where the weight of synthetic index θ_i is $\theta_i = \rho_i / \sum_{j=1}^{4} \rho_j$ and the weighted comprehensive index M is $M = M_i \sum \theta_i$.

3.2. Measuring underinvestment and overinvestment

Following Richardson (2006), we divide each enterprise's new investment in each period into two parts: expected new investment $Investment\_e_{i,t}$ and unanticipated new investment $Investment\_\varepsilon_{i,t}$. Expected new investment is normal investment, whereas unanticipated new investment is inefficient investment, such as overinvestment and underinvestment. We use the following model to estimate the inefficient investment:

$$Inv\_n_{i,t} = \beta_0 + \beta_1 TobinQ_{i,t-1} + \beta_2 Lev_{i,t-1} + \beta_3 Cash_{i,t-1} + \beta_4 Age_{i,t-1} + \beta_5 Size_{i,t-1} + \beta_6 \mathrm{Ret}s_{i,t-1} + \beta_7 Inv_{i,t-1} + YearD + IndustryD + \varepsilon$$

where $Inv\_n_{i,t}$ denotes the new investment for firm i in year t. The definitions of the other control variables are shown in Table 1. *YearD* and *IndustryD* are year and industry dummies, respectively. We calculate a residual from the regression of the above model. A positive residual indicates overinvestment; a negative residual indicates underinvestment.

3.3. Data

The sample consists of firms listed on the Shanghai and Shenzhen Stock Exchanges. All of the corporate accounting data are drawn from the annual financial reports from the 2005–2012 period. We use several databases to construct our sample. All of the accounting data are from the Chinese Stock Market and Accounting Research (CSMAR) database, constructed by the University of Hong Kong and Shenzhen GTA Company, following the format of CRSP and COMPUSTAT. For the monetary policy data, the interbank interest rate data are from the Reset database; the pledged bond repurchase rate data are from the People's Bank of China's database; and the M2, GDP and CPI and the renminbi loan balance of financial institutions data are from the National Bureau of Statistics database. The property rights data are from the SINOFIN database. We use senior executives, such as chairmen and chief executive officers who had served as government officials, as a proxy for political connections. We select these data manually from Internet information disclosures and online resumes. Firm-years with missing data on any of the control variables and dependent variables are deleted. Financial firms and utilities are excluded. The final sample consists of 7932 firm-year observations

Table 1
Variable definitions.

Variables	Definition
Inv	Investment level. The cash paid for fixed assets, intangible assets and other long-term assets minus cash obtained from disposing fixed assets, intangible assets and other long-term assets, scaled by book assets
OverINV	Overinvestment. The residuals of the regression results greater than 0 (Richardson, 2006)
UnderINV	Underinvestment. The absolute value of the regression results less than 0 (Richardson, 2006)
Mpolicy	Monetary policy. The synthesis policy indicator obtained with the quantitative regression method introduced in Section 3
TMP	Tight monetary policy. Dummy variable, drawn from two reports by the People's Bank of China: the Monetary Policy Report and National Bankers Survey Report. In tight monetary policy years (2007, 2008 and 2011) TMP = 1, otherwise 0
LMP	Loose monetary policy. A dummy variable. In loose monetary policy years (2005, 2006, 2009, 2010 and 2012) LMP = 1, otherwise 0
STATE	Nature of property rights. A dummy variable that equals 1 for SOEs and 0 otherwise
GOV	Government governance. Provincial market index from market process reports
Tobin Q	Investment opportunity. Q = Market price/replacement cost
CF	Operating cash flow. Operating cash flow scaled by total assets
LEV	Financial leverage. Debt asset ratio
SIZE	Firm size. The logarithm of the book value of assets
ROA	Profitability. Return on assets last year
AGE	Firm age. Current year–registered year
IND	Industry dummy. When the observed value belongs to industry j, it takes a value of 1 and 0 otherwise
YEAR	Year dummy. When the observed value belongs to year k, it takes a value of 1 and 0 otherwise

for the tests of government control through property rights, and 3658 firm-year observations for the tests of government control through political connections.

As property rights are the most direct way for the government to control SOEs, we use property rights to measure the degree of government control of an SOE. We set a dummy variable STATE equal to 1 when the ultimate controller of a listed company is the state; otherwise the dummy variable is equal to 0. The political connections of senior executives are a micro channel through which the government intervenes in the management of private enterprises. We create the proxy variable CONNECT, which is set equal to 1 if the chairman or CEO of the enterprise had served as a government official and 0 otherwise. We create two subsamples of political connections: Connect 1 indicates the chairman or CEO has served as a government official, and Connect 2 indicates the official has served in the National People's Congress (NPC) or Chinese People's Political Consultative Conference (CPPCC). In an additional test, we classify the samples according to the degree of competition in the market using the Herfindahl–Hirschman Index (HHI).

The variable definitions are provided in Table 1. All of the regressions include year and industry fixed effects, where the industry is defined at the 2-digit SIC level. All of the control variables are lagged by one period and winsorized at the 1% level in both tails.

3.4. Descriptive statistics

To examine government control through property rights, we divide the sample into two subsamples by the percentage of shares held by the largest shareholder: greater than or equal to 50% for one subsample, and less than 50% for the other subsample. Table 2 presents the mean, median and standard deviation of the variables

Table 2
Descriptive statistics of the property rights variables. This table presents the descriptive statistics for the variables Inv, Mpolicy and STATE (see Table 1 for definitions). This table provides the results for the full sample and two subsamples divided according to the percentage of shares held by the largest shareholder.

Variables	Full sample			Share concentration					
				≥50% (Subsample 1)			50% (Subsample 2)		
	Mean	Median	Std	Mean	Median	Std	Mean	Median	Std
Inv	0.092	0.066	0.083	0.100	0.073	0.087	0.088	0.060	0.081
Mpolicy	0.025	0.023	0.009	0.025	0.023	0.009	0.025	0.023	0.009
STATE	0.569	1	0.495	0.723	1	0.447	0.526	1	0.499

Table 3
Descriptive statistics of the political connections variables. This table presents the descriptive statistics for the political connections variables used in the empirical analysis. It presents the results for the full sample and two subsamples divided according to strength of government intervention as indicated by the provincial market index. There are two types of political connections: chairmen or CEOs who served as government officials (Connect 1) and chairmen or CEOs who served as NPC or CPPCC members (Connect 2).

Variables	Full sample			Degree of government intervention (GOV)					
				Strong			Weak		
	Mean	Median	Std	Mean	Median	Std	Mean	Median	Std
Inv	0.094	0.066	0.081	0.179	0.152	0.093	0.049	0.046	0.022
Mpolicy	0.025	0.023	0.009	0.026	0.027	0.009	0.027	0.027	0.009
Connect	0.189	0	0.339	0.191	0	0.394	0.189	0	0.391
Connect 1	0.072	0	0.268	0.077	0	0.267	0.069	0	0.253
Connect 2	0.117	0	0.321	0.114	0	0.318	0.120	0	0.325

measuring investment level, monetary policy tightness and property rights. The mean investment rate (Inv) of the full sample is 0.092 and the median is 0.066. The mean investment rate of subsample 1, which includes firms in which the largest shareholder holds greater than 50% of the shares, is 0.100 and the median is 0.073. The mean investment rate of subsample 2, which includes firms in which the largest shareholder holds less than 50% of the shares, is 0.088 and the median is 0.060. The equity structure of subsample 1 indicates that the largest shareholder, who has over 50% of the shares, has absolute control of the company; the average investment rate of these enterprises is greater than that of enterprises with less concentrated ownership. Thus, the concentrated ownership companies are more likely to overinvest. The statistical results of monetary policy tightness (Mpolicy) show the same results in the full sample and subsamples. The dummy variable for property rights (STATE) has a mean of 0.569 in the full sample and a median of 1, indicating that SOEs account for the vast majority of the enterprises. The mean of subsample 1 is 0.723, which is higher than that of the full sample (0.569) and subsample 2 (0.526), indicating that absolute government control of SOE property rights is common.

To examine government control through political connections, we use the variable Connect as a proxy for political connections. To clarify the types of political connection, we divide the sample into two subsamples: if the chairman or CEO of the enterprise has served as a government official, the enterprise is in subsample Connect 1, and if they served as an NPC deputy or a CPPCC member, the enterprise is in subsample Connect 2. We further divide the sample into two subsamples according to the degree of government intervention in the region, which is measured by the provincial market index in the market process report. Table 3 shows the mean, median and standard deviation of the variables indicating investment level, monetary policy tightness and connections. The average investment rate (Inv) of the full sample is 0.094 and the median is 0.066. In regions with weak government intervention, the mean investment rate is 0.049 and the median is 0.046; however, in regions with strong government intervention, the mean investment rate is 0.179 and the median is 0.152. This demonstrates that strong government intervention promotes overinvestment.

For Connect, the average is 0.189 for the full sample, 0.192 for the strong government intervention subsample and 0.181 for the weak government intervention subsample, indicating that enterprises in strong govern-

Table 4
Summary statistics. This table shows the summary statistics for the main variables (see Table 1 for definitions) used in this study. The main sample consists of firm-year observations from China for the 2005–2012 period.

Variables	Obs.	Mean	Std	Min.	Median	Max.
Inv	7932	0.092	0.085	0.011	0.065	0.811
Mpolicy	7932	0.025	0.008	0.011	0.023	0.034
Tobin Q	7932	1.830	1.105	0.607	1.488	15.113
CF	7932	0.055	0.076	–0.565	0.052	0.482
LEV	7932	0.464	0.199	0.007	0.477	1.183
SIZE	7932	21.831	1.236	18.950	21.646	28.405
ROA	7932	0.045	0.061	–0.371	0.038	1.939
AGE	7932	8.710	5.100	0.190	8.760	22.050

Table 5
Correlation table. This table presents the Spearman correlations. The lower triangle reports the Pearson correlations.

Variables	Inv	MPolicy	TobinQ	CF	LEV	SIZE	ROA	AGE
Inv		–0.601***	0.040***	0.117***	–0.035**	0.106***	0.196***	–0.201***
MPolicy	–0.704***		–0.074***	–0.001	–0.083	–0.001	–0.054***	–0.042***
TobinQ	0.045***	–0.111		0.124***	–0.261***	–0.396**	0.355***	0.028**
CF	0.090***	–0.007	0.177***		–0.107***	0.052***	0.337***	0.046***
LEV	0.011**	–0.100**	–0.229**	–0.116*		0.246**	–0.154**	0.344
SIZE	0.104***	0.010	–0.300***	0.053***	0.425**		–0.025**	0.309
ROA	0.135***	–0.050***	0.314***	0.329***	–0.380***	–0.005		–0.223***
AGE	–0.143***	–0.034***	0.038**	0.043***	0.343***	0.248***	–0.142***	

* Indicate significance at the 10% level.
** Indicate significance at the 5% level.
*** Indicate significance at the 1% level.

ment intervention areas have more political connections. The Connect 1 and Connect 2 variables show that the number of connections made by former government officials is smaller than the number made by former NPC deputies or CPPCC members. Furthermore, SOEs with strong government ownership have higher levels of political connection.

The summary statistics of all of the samples are provided in Table 4. Table 5 presents the results of the Pearson and Spearman correlation tests for all of the variables. The correlation coefficients between the variables are small—less than 0.5.

4. Results

4.1. Monetary policy, institutional environment and investment

In the first analysis, we use the government intervention index (the provincial market index from market process reports) as a proxy for the institutional environment and divide the sample into subsamples based on these data. We can also use this variable to measure government control of enterprises and to examine the impact of the institutional environment on the mechanism that transmits monetary policy. We hypothesize that in areas with strong government intervention, tight monetary policy is negatively correlated with enterprises' investment rate. That is to say, tighter monetary policy reduces the number of investments, resulting in overinvestment. To test this hypothesis, we use two subsamples categorized by type of property rights: central SOEs, which are owned by the central government, and local SOEs, which are owned by the local government. Our main regression is as follows:

$$Inv_{i,t} = \beta_0 + \beta_1 MPolicy_{t-1} + \beta_2 GOV_{i,t} + \beta_3 MPolicy_{t-1} \times GOV_{i,t} + \beta_4 TobinQ_{i,t-1} + \beta_5 CF_{i,t-1} + \sum Control + \sum Industry + \varepsilon_{i,t} \quad (1)$$

The results are shown in Table 6. The results for the full sample, presented in Column 1, show that the tightness of monetary policy and investment have a correlation coefficient of –0.648, which is significantly negative. The government intervention index (GOV) has a significant positive correlation (0.057). The interaction item (Mpolicy × GOV) has a significant positive correlation coefficient of 0.118. Although a tight monetary policy inhibits corporate investment, in China, listed companies are often controlled by local governments, which somewhat distorts this relationship and interferes with the regulating effect of monetary policy. Columns 2 and 3 present the regression results of the two subsamples, respectively. In the sample of central SOEs, the impact of monetary policy on enterprise investment has a significant negative correlation, with a correlation coefficient of –0.688, and the interaction term has a negative but not significant correlation. However, in the local SOE sample, the interaction item has a positive correlation, with a correlation coefficient of 0.095. Therefore, for local SOEs, the effect of monetary policy on enterprises' investment is suppressed. Furthermore,

Table 6
Regression results of investment level model with the government intervention proxy. This table shows the estimated coefficients for the OLS regressions of investment on government intervention. Column 1 presents the regression results for the full sample and columns 2 and 3 present the results for the two types of SOEs. Column 2 only tests centrally owned SOEs and column 3 only tests locally owned SOEs. The sample runs from 2005 through 2012. All of the specifications include year and industry dummies.

	Dependent variable = Inv		
	Full sample (1)	Central SOEs (2)	Local SOEs (3)
MPolicy	–0.648***	–0.688***	–0.587**
	(–3.093)	(–3.261)	(–2.058)
GOV	0.057**	0.001	0.062**
	(1.999)	(0.735)	(2.010)
MPolicy × GOV	0.118**	–0.076	0.095**
	(2.126)	(–0.861)	(2.035)
Tobin Q	0.082***	0.068***	0.088***
	(2.985)	(2.620)	(3.482)
CF	0.086**	0.139***	0.042**
	(2.535)	(5.192)	(2.388)
LEV	0.024***	–0.006	0.025***
	(4.170)	(–0.968)	(4.165)
SIZE	0.003***	0.003***	0.004***
	(3.129)	(2.843)	(3.380)
ROA	0.244***	0.054**	0.245***
	(11.530)	(2.562)	(11.592)
AGE	–0.002***	–0.002***	–0.003***
	(–15.338)	(–9.312)	(–15.307)
Constant	–0.033*	0.099	–0.035*
	(–1.689)	(0.840)	(–1.764)
Industry	Yes	Yes	Yes
Year	Yes	Yes	Yes
Adj. R^2	0.232	0.224	0.261
Obs.	8768	836	7932

Standard errors are corrected for the clustering of observations at the firm level (t statistics in parentheses).
* Measure significance at the 10% level.
** Measure significance at the 5% level.
*** Measure significance at the 1% level.

we find that the investment of central SOEs is more negatively correlated with monetary policy, and this relationship is more sensitive. When monetary policy tightens, local governments increase investment in local SOEs, weakening and distorting the policy's significant negative correlation with investment.

4.2. Monetary policy, property patterns and investment

We use property rights to examine how governments control enterprises' investments. We measure the strength of government control by share concentration, and examine the transmission of monetary policy at the micro level. We hypothesize that a tight monetary policy does not reduce the investment rate of SOEs or significantly inhibit overinvestment. When monetary policy is loosened, the underinvestment of SOEs is significantly improved. Therefore, we examine the relationship between monetary policy and the investment level of SOEs. Our main regression is as follows:

$$Inv_{i,t} = \beta_0 + \beta_1 Mpolicy_{t-1} + \beta_2 STATE_{i,t} + \beta_3 Mpolicy_{t-1} \times STATE_{i,t} + \beta_4 TobinQ_{i,t-1} + \beta_5 CF_{i,t-1} + \sum Control + \sum Year + \sum Industry + \varepsilon_{i,t} \quad (2)$$

The results are shown in Table 7. We hypothesize that tightening monetary policy does not significantly inhibit the overinvestment of SOEs, but loosening monetary policy significantly improves the underinvestment of SOEs. Therefore, we examine the relationship between monetary policy and investment inefficiency of SOEs using the following main regressions:

$$OverINV_{i,t} = \beta_0 + \beta_1 LMP_{t-1} + \beta_2 STATE_{i,t} + \beta_3 LMP_{t-1} \times STATE_{i,t} + \sum Control + \sum Year + \sum Industry + \varepsilon_{i,t} \quad (3)$$

$$UnderINV_{i,t} = \beta_0 + \beta_1 LMP_{t-1} + \beta_2 STATE_{i,t} + \beta_3 LMP_{t-1} \times STATE_{i,t} + \sum Control + \sum Year + \sum Industry + \varepsilon_{i,t} \quad (4)$$

The results are presented in Table 8. The full sample is divided into subsamples based on the share concentration of the largest shareholder, as described above. Column 1 in Table 7 presents the results of the regression of the effect of monetary policy on the investment level of SOEs for the full sample. The results show a

Table 7
Regression results of investment level Model 2. This table presents the estimated coefficients for the OLS regressions of investment on monetary policy. Column 1 presents the regression results for the full sample and columns 2 and 3 present the results for the subsamples divided according to share concentrations. Column 2 shows the results for the subsample of enterprises where the largest shareholder has 50% or more shares. Column 3 shows the results for the subsample of enterprises where the largest shareholder owns less than 50% of the shares. These three specifications first present the regressions of only the main variables and then add the other control variables. The sample runs from 2005 through 2012. All of the specifications include year and industry dummies.

	Dependent variable = Inv					
	Full sample		Share concentration			
	(1)		≥50% (2)		<50% (3)	
Mpolicy	–0.341**	–0.166**	–0.230*	–0.145	–0.478***	–0.580**
	(–2.423)	(–1.939)	(–1.641)	(–0.976)	(–2.916)	(–2.427)
STATE	0.011**	0.010**	0.043***	0.023***	0.006*	0.002*
	(1.972)	(1.901)	(3.224)	(2.811)	(1.731)	(1.653)
Mpolicy × STATE	0.066**	0.089*	0.938**	0.415**	–0.074	0.043
	(1.836)	(1.689)	(1.965)	(1.908)	(–0.341)	(1.203)
Tobin Q		0.003		0.006		0.002*
		(1.278)		(1.047)		(1.929)
CF		0.085***		0.074***		0.088***
		(6.968)		(2.763)		(6.363)
LEV		0.021***		0.048***		0.014**
		(3.885)		(3.883)		(2.247)
SIZE		0.006***		0.003*		0.009***
		(7.816)		(1.861)		(8.583)
ROA		0.134***		0.266***		0.104***
		(7.759)		(6.162)		(5.462)
RET		0.001		0.002		0.000
		(0.646)		(1.119)		(0.156)
AGE		–0.002***		–0.002***		–0.003***
		(–14.505)		(–4.750)		(–14.262)
Constant	0.095***	–0.046**	0.100***	0.013	0.094***	–0.096***
	(27.136)	(–2.416)	(14.241)	(0.396)	(23.042)	(–4.013)
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	7932	7932	1630	1630	6302	6302
Adj. R^2	0.121	0.235	0.147	0.285	0.111	0.196

Standard errors are corrected for the clustering of observations at the firm level (t statistics in parentheses).
* Indicate significance at the 10% level.
** Indicate significance at the 5% level.
*** Indicate significance at the 1% level.

Table 8
Regression results of investment efficiency Models 3 and 4. This table shows the estimated coefficients for the OLS regressions of investment efficiency on STATE and monetary policy. The regressions in Panel A include the relations between overinvestment and STATE and TMP (for both). Column 1 shows the results for the full sample and columns 2 and 3 show the results for the subsamples defined by degree of government intervention. The regressions in Panel B include the relations between underinvestment and STATE and LMP (for both). Column 4 shows the results for the full sample and columns 5 and 6 show the results for the subsamples defined by degree of government intervention. The sample runs from 2005 through 2012. All of the specifications include year and industry dummies.

	Panel A: Dependent variable = OverINV			Panel B: Dependent variable = UnderINV		
	Full sample (1)	Degree of government intervention (GOV)		Full sample (4)	Degree of government intervention (GOV)	
		Strong (2)	Weak (3)		Strong (5)	Weak (6)
STATE	0.063**	0.073**	0.021	–0.013**	–0.007**	–0.014*
	(2.461)	(2.451)	(1.367)	(–1.957)	(–2.502)	(1.840)
TMP	–0.076	–0.046	–0.056**			
	(–0.098)	(–0.068)	(–2.698)			
TMP × STATE	0.030**	0.033**	–0.018*			
	(2.100)	(2.105)	(–1.751)			
LMP				–0.012***	–0.009***	–0.012***
				(–10.777)	(–5.547)	(–7.749)
LMP × STATE				–0.011*	–0.031***	–0.009
				(–1.633)	(–2.571)	(–1.479)
Tobin Q	0.014*	0.011*	0.001	0.001**	0.002***	0.001***
	(1.704)	(1.714)	(1.360)	(2.270)	(2.597)	(2.503)
CF	0.049	0.049	0.038	0.029***	0.034***	0.039***
	(1.138)	(1.158)	(1.140)	(3.387)	(5.034)	(5.489)
LEV	0.044**	0.043**	0.035**	0.013***	–0.001	0.013***
	(1.983)	(1.993)	(2.084)	(4.675)	(–0.228)	(4.149)
SIZE	0.001	0.001	–0.002	0.001***	0.002***	0.003***
	(0.168)	(0.178)	(–0.856)	(2.534)	(3.940)	(5.874)
ROA	0.132**	0.152**	0.047	0.004	–0.027***	0.002
	(2.135)	(2.145)	(1.185)	(0.222)	(–2.638)	(0.178)
RET	0.009***	0.009***	0.006**	0.001***	0.001***	0.002***
	(3.215)	(3.215)	(2.248)	(2.733)	(3.029)	(3.260)
AGE	0.001	0.001	–0.001**	–0.001***	–0.001***	–0.001***
	(0.198)	(0.198)	(–2.351)	(–8401)	(–5.626)	(–8.661)
Constant	0.081	0.080	0.112*	0.026***	0.024**	–0.016
	(1.097)	(1.087)	(1.925)	(3.672)	(2.178)	(–1.349)
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	3870	1300	1290	4026	1364	1334
Adj. R^2	0.203	0.263	0.204	0.214	0.287	0.213

Standard errors are corrected for the clustering of observations at the firm level (t statistics in parentheses).
* Indicate significance at the 10% level.
** Indicate significance at the 5% level.
*** Indicate significance at the 1% level.

significant negative correlation (–0.1660) between the tightness of monetary policy and the amount of investment (MPolicy). The type of SOE property rights (STATE) has a significant positive correlation with corporate investment (0.010). The interaction item Mpolicy × STATE has a significantly positive correlation coefficient of 0.089. Although tight monetary policy inhibits corporate investment, in China, local government control of listed companies is very common, which somewhat distorts the effect of monetary policy on enterprises' investment. Columns 2 and 3 present the regression results for the two subsamples. For enterprises where the largest shareholder holds over 50% of the shares, monetary policy is negatively but not significantly correlated with enterprise investment. The effect of government control on investment is significant and positive, with a correlation coefficient of 0.023. The interaction item is positively related, with a correlation

coefficient of 0.415. However, for enterprises where the largest shareholder holds less than 50% of the shares, the interaction item is not significantly related. Therefore, the effect of monetary policy on enterprises' investments is suppressed in SOEs, especially those with a very high concentration of property rights.

Table 8 shows the regression results for investment efficiency Models 3 and 4. To measure the local institutional environment (GOV), we use the provincial market index from market process reports. We divide the sample into three subsamples (strong, medium and weak government intervention) to investigate how regional differences in the strength of government intervention affect the impact of monetary policy on the investment efficiency of SOEs.

Panel A presents the regression results of overinvestment Model 3. Column 1 uses the full sample and Columns 2 and 3 present the results for the strong and weak government intervention subsamples, respectively. A tight monetary policy (TMP) has no significant effect on overinvestment (OverINV) in the strong GOV subsample and has a negative correlation in the weak GOV subsample. The government control variable (STATE) is significantly positively correlated with overinvestment in the strong GOV subsample, but has no significant correlation in the weak GOV subsample. The interaction item (TMP × STATE) is significantly positively correlated in the strong GOV subsample, with correlation coefficients of 0.030 and 0.033, respectively, but has a significantly negative correlation in the weak GOV subsample, with a correlation coefficient of –0.018. Thus, tight monetary policy inhibits enterprise overinvestment, but when the strength of government intervention increases, this effect is gradually weakened. These results indicate that local government intervention causes SOEs to overinvest, leading to a low efficiency of investment. Government control exercised through property rights also leads to overinvestment, which is more obvious in areas where government intervention is strong. A tight monetary policy generally weakly inhibits overinvestment by SOEs. However, in areas where government intervention is weak, the inhibitory effect is stronger, and the interactive item appears to have a negative correlation.

Panel B shows the regression results of underinvestment Model 4. Column 4 uses the full sample, and Columns 5 and 6 show the strong and weak government intervention subsamples. Loose monetary policy (LMP) has a significantly negative effect on underinvestment (UnderINV) in the full sample and in both GOV subsamples at the 1% level. The government control variable (STATE) has a significantly negative correlation with underinvestment in the full sample and in both GOV subsamples. The interaction item (LMP × STATE) is significantly negatively correlated in the full sample and the strong GOV sample, with correlation coefficients of –0.011 and –0.031, respectively, but has no significant effect in the weak GOV sample, indicating that a loose monetary policy significantly mitigates the enterprises' underinvestment. Furthermore, this effect increases as the intensity of government intervention increases. Due to the consistent effect of loose monetary policy and government intervention on underinvestment, government control of an enterprise makes the regulatory effect of monetary policy more obvious. These results also show that when the government's macro policy is consistent with an enterprise's financial target, the effect of the policy is stronger.

4.3. Monetary policy, political connections and investment

The political connections of senior executives in private enterprises are the micro channel through which governments intervene in an enterprise's management. We investigate how political connections moderate the influence of monetary policy on investment. We hypothesize that in enterprises with political connections, the inhibitory effect of a tight monetary policy on the enterprise's investment is not strong, and the political connections drive the enterprise to expand investment. Our main regressions for investigation are as follows:

$$Inv_{i,t} = \beta_0 + \beta_1 Mpolicy_{t-1} + \beta_2 Connect_{i,t} + \beta_3 Mpolicy_{t-1} \times Connect_{i,t} + \beta_4 TobinQ_{i,t-1} + \beta_5 CF_{i,t-1} + \sum Control + \sum Year + \sum Industry + \varepsilon_{i,t} \quad (5)$$

The results are presented in Table 9.

We hypothesize that for enterprises with political connections, tight monetary policy does not significantly inhibit overinvestment; however, loose monetary policy significantly improves underinvestment. The main regressions are as follows:

Table 9
Regression results of investment level model 5. This table shows the estimated coefficients for the OLS regressions of investment on a firm's political connections. Column 1 presents the results for the full sample and columns 2 and 3 present the results for the subsamples sorted by the degree of government intervention. Column 2 shows the results for the subsample of areas where government intervention is strong, and column 3 shows the results for the subsample of areas where government intervention is weak. These three specifications first present the regressions of only the main variables, and then add the other control variables. The sample runs from 2005 through 2012. All of the specifications include year and industry dummies.

	Dependent variable = Inv					
	Full sample		Degree of government intervention (GOV)			
	(1)		Strong		Weak	
			(2)		(3)	
MPolicy	–0.182**	–0.064**	–0.029*	–0.010**	–0.097***	–0.106***
	(–2.145)	(–1.997)	(–1.712)	(–1.976)	(–3.126)	(–2.662)
Connect	0.013***	0.010**	0.052***	0.011***	0.020**	0.007*
	(2.739)	(1.975)	(3.981)	(4.255)	(2.198)	(1.890)
MPolicy × Connect	0.026**	0.013*	0.039***	0.010***	0.017*	0.005*
	(2.008)	(1.790)	(2.923)	(3.222)	(1.887)	(1.758)
Tobin Q		0.010**		0.012*		0.009**
		(2.265)		(1.694)		(2.452)
CF		0.022***		0.045		–0.043
		(3.653)		(1.047)		(–0.951)
LEV		0.008***		0.094***		0.105***
		(3.044)		(4.684)		(5.346)
SIZE		0.001***		–0.003		0.003
		(3.336)		(–1.294)		(–1.257)
ROA		0.004		0.212***		0.442***
		(0.558)		(3.045)		(5.900)
RET		0.001**		0.011***		0.012***
		(2.587)		(4.380)		(4.208)
AGE		–0.001***		–0.000		–0.000
		(–9.732)		(–0.022)		(1.617)
Constant	0.101***	0.033***	0.081***	–0.106***	0.105***	–0.009
	(21.872)	(3.912)	(8.274)	(–2.863)	(22.572)	(–0.310)
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	3658	3658	1200	1200	1200	1200
Adj. R^2	0.132	0.227	0.126	0.243	0.119	0.249

Standard errors are corrected for the clustering of observations at the firm level (t statistics in parentheses).
* Measure significance at the 10% level.
** Measure significance at the 5% level.
*** Measure significance at the 1% level.

$$OverINV_{i,t} = \beta_0 + \beta_1 LMP_{t-1} + \beta_2 Connect_{i,t} + \beta_3 LMP_{t-1} \times Connect_{i,t} + \sum Control + \sum Year + \sum Industry + \varepsilon_{i,t} \quad (6)$$

$$UnderINV_{i,t} = \beta_0 + \beta_1 LMP_{t-1} + \beta_2 STATE_{i,t} + \beta_3 LMP_{t-1} \times STATE_{i,t} + \sum Control + \sum Year + \sum Industry + \varepsilon_{i,t} \quad (7)$$

The results are presented in Table 10.

Table 9 presents the regression results for the investment level Model 5. Column 1 shows the results for the full sample. In that sample, monetary policy and enterprise investment (MPolicy) are significantly negatively correlated, with a correlation coefficient of –0.064 at the 5% level. The political connection variable (Connect) is significantly positively correlated with investment, with a correlation coefficient of 0.010, at the 5% level. The interaction item (MPolicy × Connect) has a significantly positive correlation, with a correlation coefficient of 0.013, at the 10% level, showing that a tight monetary policy inhibits enterprises' investment and that

Table 10
Regression results of investment efficiency model 6 and 7. This table presents the estimated coefficients for the OLS regressions of investment efficiency on political connection and monetary policy. The regressions in Panel A include the relations between overinvestment and political connection and TMP (for both). Column 1 shows the results for the full sample and columns 2 and 3 present the results for the subsamples divided by degree of government intervention. The regressions in Panel B include the relations between underinvestment and political connections and LMP (for both). Column 4 presents the results for the full sample and columns 5 and 6 present the results for the subsamples. The sample runs from 2005 through 2012. All of the specifications include year and industry dummies.

	Panel A: Dependent variable = OverINV			Panel B: Dependent variable = UnderINV		
	Full sample (1)	Degree of government intervention (GOV)		Full sample (4)	Degree of government intervention (GOV)	
		Strong (2)	Weak (3)		Strong (5)	Weak (6)
Connect	0.010**	0.011**	0.008	–0.006**	–0.005**	–0.009
	(2.240)	(1.966)	(1.411)	(2.038)	(–2.245)	(–1.454)
TMP	–0.006**	–0.005*	–0.004***			
	(–2.058)	(–1.792)	(–2.650)			
TMP × Connect	0.010*	0.004*	0.011			
	(1.702)	(1.690)	(1.287)			
LMP				–0.013***	–0.012***	–0.014***
				(–10.322)	(–8.972)	(–11.898)
LMP × Connect				–0.006**	–0.007**	0.002
				(–1.964)	(–2.267)	(1.753)
Tobin Q	0.004**	0.005**	0.002**	0.001	0.000	0.000
	(2.175)	(1.776)	(1.730)	(1.010)	(1.511)	(1.467)
CF	0.127***	0.139***	0.128**	0.002***	0.049***	0.042***
	(3.435)	(3.009)	(2.262)	(4.422)	(6.079)	(5.688)
LEV	0.029**	0.052***	0.043**	0.009***	0.004	0.010***
	(1.967)	(2.569)	(2.529)	(3.598)	(1.077)	(2.908)
SIZE	0.007***	0.003	0.002	0.002***	0.002***	0.002***
	(3.113)	(0.796)	(0.604)	(5.821)	(3.138)	(3.586)
ROA	0.034	0.097	0.002	–0.010	–0.034***	–0.010
	(0.563)	(1.328)	(0.072)	(–1.305)	(–2.638)	(–0.827)
RET	0.014***	0.009**	0.007**	0.001***	0.002***	0.001***
	(2.649)	(2.558)	(2.441)	(3.457)	(3.163)	(3.410)
AGE	–0.001***	–0.000	–0.001**	–0.001***	–0.001***	–0.001***
	(–3.653)	(–1.158)	(–2.333)	(–8.974)	(–6.064)	(–6.878)
Constant	0.245***	–0.031	–0.007	0.012	0.008	0.005
	(4.623)	(–0.340)	(–0.099)	(1.502)	(0.491)	(0.334)
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	1630	550	550	2000	660	660
Adj. R^2	0.220	0.213	0.222	0.204	0.182	0.218

Standard errors are corrected for the clustering of observations at the firm level (t statistics in parentheses).
* Indicate significance at the 10% level.
** Indicate significance at the 5% level.
*** Indicate significance at the 1% level.

enterprises with political connections have a higher level of investment, as political connections help enterprises to obtain bank loans more easily. Therefore, when monetary policies are tight, enterprises with political connections can still obtain financing for investment projects. Thus, political connections interfere with the monetary policy transmission mechanisms. Columns 2 and 3 present the regression results for the two government intervention subsamples. In the strong government intervention subsample, monetary policy is negatively correlated with investment, with a correlation coefficient of –0.010 at the 10% level. The positive influence of political connections on corporate investment is very obvious, as the correlation coefficient is 0.011 at the 1% level, and the interaction item has a positive correlation, with a correlation coefficient of 0.010 at the 1% level. In contrast, in the strong government intervention group, the impact of monetary policy on investment is significant and negative reaching –0.106 at the 1% level. The positive influence of political connections on corporate investment is reduced, with a correlation coefficient of 0.007 at the 10% level,

Table 11
Regression results of investment efficiency model with different types of political connections. This table shows the estimated coefficients for the OLS regressions of investment efficiency on monetary policy under different types of political connections. The regressions in Panel A include the relations between overinvestment and monetary policy under different types of political connections and degrees of government intervention. Columns 1 and 2 present the results for the strong government intervention subsample and columns 3 and 4 present the results for the weak government intervention subsample. In addition, columns 1 and 3 present the results for the subsample of firms that have the first type of political connections and columns 2 and 4 are present the results for the subsample of firms that have the second type of political connections. The regressions in Panel B include the relations between underinvestment and monetary policy under different types of political connection and degrees of government intervention. Columns 5 and 6 present the results for subsample with strong government intervention and columns 7 and 8 present the results for the subsamples with weak government intervention. In addition, columns 5 and 7 present the results for the subsample of firms with the first type of political connection and columns 6 and 8 present the results for firms with the second type of political connection. The sample runs from 2005 through 2012. All of the specifications include year and industry dummies.

	Panel A: Dependent variable = OverINV			
	Strong GOV		Weak GOV	
	Connect 1	Connect 2	Connect 1	Connect 2
	(1)	(2)	(3)	(4)
TMP	–0.012**	–0.008**	–0.014**	–0.016**
	(–2.456)	(–2.197)	(–2.344)	(–2.409)
Connect 1	0.017***		0.006*	
	(4.198)		(1.939)	
TMP × Connect 1	0.009***		0.005*	
	(3.413)		(1.636)	
Connect 2		0.024**		0.005
		(2.540)		(1.622)
TMP × Connect 2		0.008**		0.010
		(2.563)		(1.047)
Tobin Q	0.009**	0.009**	0.003**	0.003**
	(2.365)	(2.285)	(2.005)	(2.099)
CF	0.015	0.020	0.004	0.007
	(0.493)	(0.674)	(0.176)	(0.277)
LEV	0.069***	0.070***	0.060***	0.060***
	(4.864)	(4.938)	(4.827)	(4.815)
SIZE	–0.002	–0.002	–0.000	–0.000
	(–1.051)	(–1.055)	(–0.305)	(–0.239)
ROA	0.179***	0.177***	0.109***	0.106***
	(3.573)	(3.534)	(3.259)	(3.159)
RET	0.010***	0.011***	0.009***	0.010***
	(4.915)	(5.181)	(4.795)	(4.891)
AGE	–0.001**	–0.001	–0.001***	–0.001***
	(–2.203)	(–1.319)	(–3.697)	(–3.371)
Constant	0.132***	0.131***	0.098***	0.094***
	(2.903)	(2.910)	(2.361)	(2.269)
Industry	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Obs.	203	182	186	190
Adj. R^2	0.215	0.229	0.202	0.218
	Panel B: Dependent variable = UnderINV			
	Strong GOV		Strong GOV	
	Connect 1	Connect 2	Connect 1	Connect 2
	(5)	(6)	(7)	(8)
LMP	–0.012***	–0.013***	–0.014****	–0.013***
	(–16.823)	(–15.726)	(–17.782)	(–17.938)
Connect 1	–0.007***		–0.006*	
	(–3.465)		(–1.719)	
LMP × Connect 1	–0.015***		–0.009*	
	(–2.790)		(1.832)	

Table 11 (*continued*)

	Panel B: Dependent variable = UnderINV			
	Strong GOV		Strong GOV	
	Connect 1 (5)	Connect 2 (6)	Connect 1 (7)	Connect 2 (8)
Connect 2		–0.005**		–0.004
		(–2.219)		(–1.472)
LMP × Connect 2		–0.011*		–0.007
		(–1.832)		(–1.510)
Tobin Q	0.001*	0.001*	0.000	0.000
	(1.953)	(1.918)	(1.595)	(1.640)
CF	0.033***	0.032***	0.035***	0.036***
	(6.713)	(6.706)	(7.151)	(7.217)
LEV	0.008***	0.008***	0.013***	0.013***
	(3.822)	(3.844)	(6.068)	(6.066)
SIZE	0.001***	0.001***	0.002***	0.002
	(4.899)	(4.903)	(6.729)	(6.725)
ROA	–0.008	–0.008	0.001	0.001
	(–1.252)	(–1.234)	(0.264)	(0.237)
RET	0.001***	0.001***	0.001***	0.001
	(4.050)	(4.007)	(4.516)	(4.606)
AGE	–0.001***	–0.001***	–0.001***	–0.001***
	(–11.119)	(–11.106)	(–12.650)	(–12.857)
Constant	0.023***	0.023***	0.001	0.001
	(3.333)	(3.348)	(0.264)	(0.238)
Industry	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Obs.	218	281	207	284
Adj. R^2	0.232	0.214	0.238	0.218

Standard errors are corrected for the clustering of observations at the firm level (t statistics in parentheses).
* Measure significance at the 10% level.
** Measure significance at the 5% level.
*** Measure significance at the 1% level.

and the interaction coefficient is 0.005 at the 10% level. Enterprises with political connections clearly have higher investment rates, especially in areas where government intervention is strong and the effects of monetary policy are relatively weak and restrained. When enterprises obtain investment financing through political connections, this leads to the misallocation of bank credit and the low efficiency of enterprise investment.

Table 10 shows the regression results for the investment efficiency Models 6 and 7. Political connections are an important form of government intervention. Therefore, to investigate the impact of tightness of monetary policy on the investment efficiency of private enterprises, we divide the full sample into three subsamples (strong, medium and weak government intervention).

Panel A presents the regression results for overinvestment Model 6. Column 1 presents the full sample and Columns 2 and 3 present the strong and weak government intervention subsamples, respectively. In the full sample, tight monetary policy (TMP) has a significant negative effect on overinvestment (OverINV), with a correlation coefficient of –0.006 at the 5% level. Overinvestment has a significant positive correlation with political connections (Connect), with a correlation coefficient of 0.010 at the 5% level. In addition, the interaction of tight monetary policy and government control (TMP × STATE) is positively correlated, with a correlation coefficient of 0.010 at the 5% level. This relationship shows a consistently negative correlation in both the strong and weak government intervention subsamples. In the strong government intervention subsample, the negative correlation between overinvestment and tight monetary policy is significant, and the positive correlation between overinvestment and political connection is significant, but the intervention is not significant. This indicates that a tight monetary policy inhibits the overinvestment of private enterprises, but this effect

weakens as government intervention intensifies. Political connections promote overinvestment, which causes low efficiency in investment, especially in areas where government intervention is high.

Panel B shows the regression results of underinvestment Model 7. Column 4 presents the full sample and Columns 5 and 6 present the strong government intervention and weak government intervention subsamples. Loose monetary policy (LMP) has a significantly negative effect on underinvestment (UnderINV) in the full sample and in both GOV subsamples at the 1% level. Political connections (Connect) have a significantly negative correlation with underinvestment in the full sample and strong GOV subsample, but this relationship is not significant in the weak GOV subsample. The interaction item (LMP × Connect) is significantly negatively correlated in the full sample and strong GOV subsample, with correlation coefficients of –0.006 and –0.007, respectively, but has no significant relationship in the weak GOV subsample, indicating that a loose monetary policy significantly mitigates the investment of private enterprises and that government intervention significantly enhances this effect. Enterprises with political connections have easier access to bank credit, which is the same advantage obtained through a loose monetary policy; thus, it promotes the regulatory effects of this monetary policy.

First, we set a dummy variable, Connect, as a proxy for a chairman or CEO who has served as a government official. However, government officials from different units have access to different political resources. To fully investigate the types of political connections, we identify two individuals: those who have served as government officials (Connect 1) and those who have served as NPC deputies or CPPCC members (Connect 2). We test the effect of monetary policy on the investment of enterprises with the two different types of political connections. The regression results are presented in Table 11.

Panel A presents the regression results of the overinvestment model. In all of the samples, tight monetary policy (TMP) is negatively related to overinvestment (OverINV). The two political connections variables (Connect 1 and Connect 2) are positively correlated with overinvestment (OverINV), but the correlation is stronger in the subsample of firms with executives who served as government officials (Connect 1) and in areas where government intervention is high. The interaction of tight monetary policy and political connections (TMP × Connect) is positively correlated for both types of political connections, although it is more significant for enterprises with executives who served as government officials and in areas where government intervention is high. These results suggest that as public officers have more control over credit resources than NPC deputies or CPPCC members, the private enterprise executives with such experience find it easier to access financing through political connections. When monetary policy is tight, enterprises can use such political connections to obtain funds, especially in areas with weak institutional environments and legal protections. Such loan financing has non-market characteristics and the financing of capital allocation has unproductive rent-seeking characteristics, resulting in a distorted macro regulation of the monetary policy.

Panel B shows the regression results for the underinvestment model. In all of the samples, loose monetary policy (LMP) is negatively related to underinvestment (UnderINV). The two political connections variables (Connect 1 and Connect 2) are negatively correlated with underinvestment (OverINV), but the relationship is more significant for enterprises with the executives who served as government officials (Connect 1) and in areas were government intervention is strong. The interaction between loose monetary policy and political connections (LMP × Connect) is negatively correlated for both types of political connections, although it is more significant for enterprises with executives who served as government officials and in areas were government intervention is strong. This shows that regardless of monetary policy, executives who have been government officials (Connect 1) can obtain more financing than those with other types of political connections. This distorts the effect of monetary policy on enterprises' investments.

4.4. Additional tests

Government control and industry competition are complementary market mechanisms. A government can control economic activity through property rights, whereas enterprises compete in the market economy and must survive with their own resources. SOEs are relatively more common in a strong monopoly market where the competition is weak. When monetary policy is tight, the total credit resources are reduced and monopoly enterprises can rely on the controlled status of the industry to get access to credit resources. They can take advantage of their strong position to get commercial credit and ease financing constraints, whereas private

Table 12
Regression results of the investment efficiency model with degree of industrial competition. This table presents the estimated coefficients for the OLS regressions of investment efficiency on monetary policy and STATE (for both) under different degrees of industrial competition. The regressions in Panel A include the relations between overinvestment and TMP and STATE (for both) under high, median and low HHI. Columns 1, 2 and 3 show the results under HHI high, median and low, respectively. The regressions in Panel B include the relations between underinvestment and LMP and STATE (for both) under high, median and low HHI. Columns 4, 5 and 6 show the results under HHI high, median and low, respectively. All of the specifications in Panels A and B first present the regressions of only the main variables and then add the other control variables. The sample runs from 2005 through 2012. All of the specifications include year and industry dummies.

	Panel A: Dependent variable = OverINV					
	HHI high (1)		HHI median (2)		HHI low (3)	
TMP	–0.006**	–0.003*	–0.011**	–0.008**	–0.011**	–0.007
	(–2.006)	(1.752)	(–2.153)	(–1.989)	(–2.182)	(–0.773)
STATE	0.010	–0.003	0.016**	0.010*	0.024***	0.012***
	(1.529)	(–0.132)	(1.983)	(1.876)	(2.887)	(2.554)
TMP × STATE	0.006	–0.001	0.008**	0.007*	0.017**	0.015**
	(1.497)	(–0.047)	(1.975)	(1.691)	(2.203)	(2.105)
Tobin Q		0.007**		0.004**		0.008*
		(2.489)		(2.367)		(1.855)
CF		–0.054*		0.086**		0.035
		(–1.778)		(2.208)		(0.866)
LEV		0.067***		0.051***		0.064***
		(3.336)		(2.665)		(3.445)
SIZE		–0.002		0.007**		0.006
		(–0.854)		(2.071)		(0.006)
ROA		0.269***		0.023		0.148**
		(4.182)		(0.564)		(2.071)
RET		0.008***		0.008***		0.014***
		(2.938)		(2.978)		(4.194)
AGE		–0.001***		–0.001		–0.000
		(–2.600)		(–1.634)		(–0.164)
Constant	0.077***	0.112**	0.083***	–0.087	0.083	–0.061
	(11.675)	(2.028)	(12.622)	(–1.050)	(13.353)	(–0.648)
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	1290	1290	1290	1290	1290	1290
Adj. R^2	0.092	0.157	0.113	0.198	0.115	0.202
	Panel B: Dependent variable = UnderINV					
	HHI high (4)		HHI median (5)		HHI low (6)	
LMP	–0.018***	–0.017***	–0.014***	–0.011***	–0.009***	–0.008***
	(–9.500)	(–9.371)	(–8.788)	(–7.025)	(–6.152)	(–5.673)
STATE	–0.011*	–0.008*	–0.009**	–0.007*	–0.005***	–0.003**
	(–1.708)	(–1.655)	(–2.135)	(–1.731)	(–3.395)	(–2.002)
LMP × STATE	–0.004*	–0.003*	–0.007**	–0.005**	–0.005***	–0.004**
	(–1.782)	(–1.668)	(–2.062)	(1.968)	(–2.549)	(–2.092)
Tobin Q		0.002**		0.003***		0.004**
		(2.094)		(2.596)		(2.240)
CF		0.027***		0.030***		0.044***
		(3.956)		(4.289)		(6.267)
LEV		0.011***		0.011***		0.002
		(3.274)		(3.608)		(0.870)
SIZE		0.001***		0.001***		0.002***
		(2.883)		(2.732)		(3.324)
ROA		0.012		–0.006		–0.014*
		(1.025)		(–0.539)		(–1.815)

Table 12 (*continued*)

	Panel B: Dependent variable = UnderINV					
	HHI high		HHI median		HHI low	
	(4)		(5)		(6)	
RET		0.001**		0.001*		0.002***
		(2.274)		(1.935)		(4.804)
AGE		–0.001***		–0.001***		–0.001***
		(–7.710)		(–9.398)		(–7.337)
Constant	0.055***	0.034***	0.051***	0.023*	0.049***	0.006
	(26.711)	(3.450)	(15.261)	(1.698)	(18.641)	(0.438)
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	1350	1350	1360	1360	1350	1350
Adj. R^2	0.134	0.232	0.123	0.199	0.103	0.231

Standard errors are corrected for the clustering of observations at the firm level (t statistics in parentheses).
* Measure significance at the 10% level.
** Measure significance at the 5% level.
*** Measure significance at the 1% level.

enterprises, operating outside the state-owned economic system, face entry barriers and strong market competition. Due to the different levels of competition, government control of enterprises is varied. In China's industrial structure, SOEs are concentrated in monopolistic fields. We further examine how market competition environments moderate the effects of monetary policy on the enterprises' investment. We create subsamples of high or low competition environments using the Herfindahl–Hirschman Index (HHI).

Table 12 presents the regression results of the investment efficiency model. It shows that the impact of tight monetary policy on enterprises' investment varies across industries. In a monopoly industry with weak competition, the SOEs under government control are more prone to overinvestment, but in highly competitive industries enterprise investment directly affected by government control is weak and the influence of monetary policy is more obvious. Loose monetary policy designed to ease underinvestment is more significant in weakly competitive industries, but the effect of a competitive industry environment on the relationship between loose monetary policy and government control of investment is not obvious.

5. Concluding remarks

China's monetary policy is still transitioning to a more market-oriented form. Monetary policy is an important tool that not only affects the development of the economy at the macro level, but also has a significant impact on the micro-economic environments in which enterprises make decisions. Under the reform and opening-up policy, China's economy has maintained continuous high-speed growth, but a non-market economic system still exists and the government still directly influences enterprises' decisions.

First, we investigate how the institutional environment moderates the effect of monetary policy on enterprise investment. We identify the mechanism that transmits China's macro monetary policy to investment decisions at the micro level. Tightening monetary policy significantly reduces business investment, whereas loosening monetary policy increases business investment. However, this effect varies between local governments due to different institutional environments, economic growth targets and degrees of economic control. In areas where local government intervention is high, business investment is significantly higher than otherwise. We find that monetary policy has a more effective regulatory impact on enterprises owned directly by the central government than on SOEs managed by local governments, as the central government SOEs are managed independent of the local governments and are less subject to interferences that tend to weaken and distort the effects of the monetary policy. This is particularly the case when the direction of monetary policy is not consistent with the local government's economic objectives; when the local government's intervention is strong, the effects of monetary policy on the investment decisions of local enterprises is more distorted.

Second, we examine how property rights affect the relationship between monetary policy and enterprise investment. We analyze the impact of monetary policy on the investment decisions of enterprises with different

property rights structures and find that tight monetary policy generally inhibits overinvestment. However, as China's governments (both central and local) generally control the ownership of listed SOE companies, the effect of monetary policy on enterprises' investment appears to be weak. The different property agency relationships interfere with the regulating effect of monetary policy. In particular, in SOEs in which the government owns a high share concentration, the effect of monetary policy on investment is suppressed.

Third, we examine how the political connections of private enterprises affect the relationship between monetary policy and private enterprises' investment decisions. We find that tight monetary policy generally inhibits their investment, but when the executives have political connections, they still have a relatively high investment rate. The regulatory effects of a monetary policy are restrained by political connections, especially in areas where government intervention is strong, and the effect on the investment is also weakened. Through political connections, enterprises can obtain investment financing, which leads to the misallocation of bank credit resources and low efficiency in enterprise investment. We also distinguish between two types of political connections: chairmen or CEOs who have served as government officials and chairmen or CEOs who have served as members of the NPC or CPPCC. We find that when monetary policy is tightened, it is easier for enterprises with political connections to obtain financing, particularly in areas where government intervention is strong.

This study systematically analyzes the effects of institutional environment, property rights characteristics and political connections on the relationships between local governments and enterprises, particularly the effect on how monetary policy is implemented at the local and micro levels. These relationships explain the low efficiency and variable impacts of macro monetary policy on the capital investment decisions of local enterprises. By analyzing the multiple objectives of local governments, one can better understand the different effects of macro monetary policies on local investment configurations and structures. The new theoretical and empirical insights gained in this study should help to improve the effectiveness and efficiency of the government's economic policy.

The study presents only some initial exploratory research. Due to the diversity and complexity of the macro-economic situation, we do not consider other macro-economic factors, such as the effects of fiscal and industrial policy, which should be more thoroughly investigated in future research.

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