Institutional Environment, Accrual-based and Real Earnings Management in Emerging Markets: Empirical Evidence from Chinese Listed Companies

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Abstract

Earnings management behavior is yet to be effectively explained as theoretical circles largely focus on accrual-based earnings management. Cohen et al (2003) shows that with the continuous improvement of the legal system, US companies are more inclined to adopt real earnings management rather than accrual-based earnings management. As legal systems in emerging capital markets are relatively weak, thus whether the results of Cohen et al. can be applied in emerging markets is yet to be fully investigated. Based on the existing uneven development of institutional environment in China, we apply the system Generalized Method of Moments (GMM) to test the effect of the institutional environment on accrual-based and real earnings management in listed companies and explore the role of the institutional environment in the strategic choices of earnings management. Results show that sound institutional environment suppresses accrual-based and increases real earnings management in listed companies. In addition, similar to the SOX legislation in the U.S., we find that improvement of the institutional environment in China also has an effective governance impact on earnings management.

Keywords: Institutional Environment, Accrual-based Earnings Management, Real Earnings Management, Earnings Management Strategy, System GMM Estimation

1. Introduction

On September 24, 2013, the first stock fraud case in China's growth enterprise board (GEB), Wanfu Biotechnology (Hunan) Agricultural Development Co., Ltd. (Wanfu Biotechnology, code: 300268) was investigated by China's Securities Regulatory Commission (CSRC)[1]. It has left a fraudulent blot on the development of the Chinese capital market, giving rise to more attention in real earnings management in listed companies. According to the information disclosed by the CSRC and the press, Wanfu Biotechnology manipulated real earnings by falsely increasing sales revenue, underestimating the cost of sales, and omitting expenses, among other things. Earnings management in listed companies includes accrual-based earnings management and real earnings management (Schipper, 1989). Accrual-based earnings management manipulates proceeds by changing accounting policies and accounting estimates, while real earnings management operates by manipulating real operating activities to deviate from the true business situation of a company. Real earnings management plays an important role in financial fraud in listed companies and thus has great adverse impacts on future firm value and performance (Altamuro et al., 2003; Cohen and Zarowin, 2010). However, theoretical studies largely focus on accrual-based earnings management while ignoring the role of real earnings management in the economy. In particular, there is still not enough understanding regarding the motivation, effects, and prevention of real earnings management.

As a set of basic political, social, and legal rules to establish the production, exchange, and distribution systems, the institutional environment significantly impacts the operations of a company (North, 1990). Therefore, relative to the ownership structure, board mechanism, and information disclosure, the institutional environment is more fundamental to a company. With the increase of research on law and finance, many studies focus on the effect of the institutional environment on firm value (La porta et al., 2002; Hughes, 2009), performance (Fan et al., 2007; Agrawal, 2013), financing (Sapienza, 2004; Dinc, 2005), investment (Johnson et al., 2002; Mclean et al., 2012), stock price (Beny, 2007; Ding et al., 2007), internal control (Goh, 2009; Gong et al., 2012), etc., while few directly investigate its effect on earnings management. Some studies focus on how the legal environment and shareholder protection impact earnings management (Leuz et al., 2003; Ball et al., 2008; Francis and Wang, 2008), but there is little evidence on the effect of the institutional environment on real earnings management. Cohen et al. (2008) find that U.S. firms are more likely to choose real earnings management following the enactment of the Sarbanes-Oxley Act (SOX). With the improvement of legislation and investor protection in China, the issue of new accounting standards also brings China's accounting system more in line with international conventions and restricts accrual-based earnings management. Although China lacks legislation

similar to SOX in the U.S., it would be interesting to test whether listed companies in the emerging capital markets, such as China, prefer real earnings management.

The significant variation in the institutional environment across regions in China provides us with an opportunity to conduct empirical research. In this study, the sample consists of 700 companies listed on the Shanghai and Shenzhen stock exchanges from 2002 through 2013, and we employ the dynamic panel data methodology. To measure accrual-based earnings management, we apply the Healy model (Healy, 1985), the DeAngelo model (DeAngelo, 1986), the Jones model (Jones, 1991), and the cross-sectional modified Jones model (Dechow et al., 1995). We follow Roychowdhury (2006) to estimate real earnings management. The effects of the institutional environment on accrual-based and real earnings management is examined by using the system generalized method of moments (GMM) estimation.

This paper contributes to the literature in the following ways. First, it introduces a methodology to mitigate the endogeneity problem in institutional environment research. Most studies on institutional environment ignore the endogeneity problem while only a few studies use lagged institutional environment as an instrumental variable to overcome this problem. However, there are some limitations in this method. On the one hand, as the institutional environment is relatively stable over time[2], lagged variables are also likely to be endogenous. On the other hand, the endogeneity problem in institutional environment research arises mainly from the omitted variable bias rather than the reverse causality running from the dependent variable to the independent variable[3.] Therefore, controlling for lagged independent variables cannot solve the omitted variable bias. This paper introduces system GMM estimation to effectively overcome the endogeneity problem, and it also provides an effective test method for future investigation. Second, based on the existence of uneven development across China, the study borrows international comparisons from the literature on law and finance and compares regional differences in China. Analyzing the impact of the institutional environment, such as government intervention and legislation level, on the two earnings management methods in listed companies clarifies the mechanism of the institutional environment with regard to earnings management. It also enriches the empirical evidence on law and finance and earnings management issues in a country that undergoes economic transition, which provides a reference for relevant regulatory authorities. Third, with the gradual improvement of the institutional environment, we find that firms prefer to use real earnings management rather than accrual-based earnings management. This is consistent with the findings of Cohen et al. (2008), suggesting that the improvement in the institutional environment in China has similar effects on the earnings management selection of listed companies as the U.S. SOX legislation. This study also adds to the understanding of earnings management in emerging economies.

The rest of this paper is organized as follows. In section two, we demonstrate the research background and hypothesis development; section three introduces the methodology; section four describes the model and estimation method, while section five touches on the method selection; section six displays empirical results and analyses; and finally, section five concludes and discusses policy implications.

2. Literature review and hypothesis development

2.1 Literature review

Based on whether it affects cash flows, Schipper (1989) argues that earnings management can be achieved by either manipulating accruals or real business activities. A large number of studies also affirm that accrual-based and real earnings management are the two methods of earnings management in publicly traded companies (Graham et al., 2005; Cohen et al., 2008; Zang, 2012), which sheds some light on earnings management research. Real earnings management changes the nature of corporate business activities and the changed businesses are confirmed, measured, and reported according to accounting principles. This operation does not violate generally accepted accounting principles (GAAP) and it is well hidden. Graham et al. (2005) find that firms intend to manipulate earnings through real business activities, and in order to achieve the profit expectations, 80% of interviewed CFOs would reduce R&D, advertisement, and maintenance costs, and 55% would defer new projects. The current concerns of accrual-based and real earnings management research include the following. First, the research concerns the economic consequences of earnings management. Bhojraj et al. (2009) argue that relative to the firms without earnings management, those who employ either accrual-based or real earnings management to satisfy analysts' expectations always have poor operating and stock market performance. Moreover, Kim et al. (2010) find that for external investors, real earnings management has more information uncertainty than accrual-based management. Thus, it has adverse impacts on future cash flows and even the long-term performance of a company. However, Gunny (2010) proposes a contrary argument suggesting that, to achieve the earnings expectation, firms that use real earnings management will in three years' time perform better than those that do not. Second, the sequential character of earnings management is a concern. A great number of studies hypothesize that managers choose earnings management without considering the sequential issue. Graham et al. (2005) point out that real earnings management exists over the whole fiscal year while accrual-based earnings management only happens between the end of the fiscal year and the annual report disclosure. The findings of Matsuura (2008) also show the timing selection of these two earnings management methods. However, Badertscher (2011) finds managers initially use accrual-based earnings

management followed by real earnings management instead of using non-GAAP earnings management as the final remedy. Third, the research concerns the choices of earnings management. Some studies find that corporate earnings management changes from accrual-based to real earnings management and managers are more likely to choose real earnings management to manipulate earnings (Graham et al., 2005; Roychowdhury, 2006). Some findings also show that managers weigh the accrual-based and real earnings management based on their relative costs (Badertscher, 2011; Coehn and Zarowin, 2012; Zang, 2012).

2.2 Hypothesis development

North (1990) argues that the institutional environment is a set of basic political, social, and legal rules to establish a production, exchange, and distribution system. It constitutes the incentive mechanism for human beings' political or economic transactions. Different institutions lead to different transaction costs and thus affect operating decisions. Since the late 1970s, China has been transitioning from a planned to a market economy, and the process of marketization has achieved great successes. In the current stage, the institutional environment in China has two distinctive features. First, during the process of economic transformation, the central government implemented an uneven development strategy of developing coastal and eastern areas first, followed by inland areas and the west. This strategy resulted in significantly different institutional environments across the country. In addition, the varying speeds of economic development exerted varying impacts on the institutional environment across different regions. Under these circumstances, both regional differences and developments in the institutional environment have had a great influence on listed companies' earnings management strategies. The existing literature offers no clear evidence regarding whether these influences exhibit any pattern, and further investigation is needed.

Extant studies mainly focus on government intervention and legislation level, and examine the effect of the institutional environment on accrual-based earnings management. With respect to the institutional environment, Makar and Alam (1989) find that government intervention impacts a company's earnings management behavior, and earnings management is used to avoid risks from political costs. However, Bushman et al. (2004) argue that the influence of government intervention is not clear. In one respect, based on the political cost hypothesis, the government may have predatory incentives to make firms hide real financial information, thus government intervention and earnings management are positively related. However, based on the rational economic man hypothesis, the government would require firms to disclose real accounting information; therefore, the relationship between government intervention and earnings management becomes negative. During this special period of economic transition, the Chinese government plays an important role in allocating market resources. To capture the resources of capital markets, local governments take part in earnings management decisions in listed companies by actively offering tax preferences and financial subsidies. Chen et al. (2008) argue that local governments in China play a significant role in earnings management in listed companies and find evidence that local governments assist listed companies in accrual-based earnings management, which is consistent with the findings of Li et al. (2012).

In terms of legislation level, Che and Qian (1998), through international comparisons, find that it is common in developing countries with relatively lower legislation levels to disguise profits. Defond and Huang (2004) argue that the extent of accrual-based earnings management decreases as the enforcement of the existing laws on investor protection strengthens. Furthermore, Leuz et al. (2003) propose that the legislation level of a country greatly influences the quality of the financial reports of a company, and the improvement in investor protection and legislation restricts accrual-based earnings management, consistent with the findings of Lang et al. (2006) and Francis and Wang (2008). These factors all lead to a negative relationship between the institutional environment and accrual-based earnings management. Therefore, we form the following hypotheses.

Hypothesis 1: Institutional environment is positively associated with the magnitude of accrual-based earnings management in Chinese listed firms.

Hypothesis 1a: Government intervention is positively associated with the magnitude of accrual-based earnings management in Chinese listed firms.

Hypothesis 1b: Legislation level is positively associated with the magnitude of accrual-based earnings management in Chinese listed firms.

Development of the research on real earnings management started relatively late as it is a new way to manipulate earnings. As a result, there is little research on the influence of the institutional environment on real earnings management. Ewert and Wagenhofer (2005) show through a theoretical model that accrual-based earnings management decreases and real earnings management increases with tightened accounting standards and/or strengthened legislation. Chi et al. (2011) argue that firms are more likely to choose real earnings management when they are suffering higher litigation risks and stricter external audits since real earnings management is not illegal under the conditions for satisfying information disclosure principles. Zang (2012) also suggests that tougher enforcement of external supervision leads to more real earnings management.

The earnings management strategy of listed companies is mainly decided based on two types of earnings management costs: namely, operating costs and fines imposed by regulators. Relative to the accrual-based

earnings management by changing accounting policies and accounting estimates, real earnings management by manipulating real operating activities incurs higher costs. The institutional environment in China has, however, seen improvement in recent years under the government's watch, and with the legislative improvement on investor protection, the enhancement of market surveillance, and reduced manipulability of accounting standards, accrual-based earnings management is more likely to be detected by regulators. Real earnings management, which is based on actual business activities, is more concealed, and thus more difficult for regulators to detect. It is obvious that real earnings management is less likely to be investigated and punished by regulators than accrual-based earnings management. As the cost of penalties is a product of the probability of an offense being punished and the amount of the fine imposed, and because the specified penal code for earnings management offenses in China does not differentiate between the types of earnings management, the costs of punishment for real earnings management are much lower than those for accrual-based earnings management. Therefore, the level of real earnings management is higher in regions with a better institutional environment, i.e., an improved institutional environment leads to greater real earnings management in listed companies. With the improvement of the institutional environment, the strategy of earnings management in listed companies has shifted from the easy-to-detect accrual-based earning management to the currently hard-to-detect real earnings management.

Hypothesis 2: Institutional environment is negatively associated with the magnitude of real earnings management in Chinese listed firms.

Hypothesis 2a: Government intervention is negatively associated with real earnings management in Chinese listed firms.

Hypothesis 2b: Legislation level is negatively associated with the magnitude of real earnings management in Chinese listed firms.

Hypothesis 3: With the improvement of the institutional environment, the strategy of earnings management in listed companies changes from accrual-based to real earnings management.

3. Sample and research design

3.1 Sample

The sample consists of all A-shares companies listed on the Shanghai and Shenzhen stock exchanges in the period 2002–2013, and the following requirements are employed to ensure the accuracy of results. First, we exclude ST (Special Treatment firms: the firm is labeled as an ST firm by the stock exchanges in accordance with certain guidelines put forward by China's securities regulatory authority when it falls into serious financial problems) and PT (Particular Transfer firms: firms downgraded from ST status due to continuous losses for one more year; this level entails a virtual suspension of trading of the particular downgraded firm's shares as well as a significant danger of de-listing) companies. Second, we remove listed financial companies. Third, we remove listed firms with missing financial data. After sifting, the final dynamic panel data consists of 700 listed companies, over a 12-year period (2002–2013) with 8,400 firm-year observations. All the financial and governance data are obtained from the CSMAR and RESSET databases. Institutional environment data are from the "NERI INDEX of Marketization of China's Provinces (2011) Report" (marketization report) by Fan et al. (2011).

3.2 Variable definitions and measurement

3.2.1 Dependent variables

Accrual-based earnings management: The accrual method measures non-discretionary accruals by dividing the estimated total accruals by regression into discretionary and non-discretionary accruals and uses discretionary accruals as a proxy for earnings management. This method is widely accepted by academics. Stubben (2010) finds that among the top international accounting journals, *The Accounting Review*, the *Journal of Accounting and Economics*, and the *Journal of Accounting Research*, more than 40 papers used the accrual method to identify earnings management during the period between 2005 and 2008. This method includes four models as follows:

(a) Healy model (Healy, 1985)

$$NDA_{it} = \frac{1}{T}\sum_{t=1}^{T}TA_{it} \qquad (1)$$

Where: *NDA* is non-discretionary accruals; *TA* is total accruals (the difference between net profits and net operating cash flows); $t=1, 2 \dots T$; and *i* stands for various firms.

(b) DeAngelo model (DeAngelo, 1986)

$$NDA_{it} = TA_{i,t-1} \qquad (2)$$

(c) Jones model (Jones, 1991)

$$\frac{NDA_{it}}{A_{i,t-1}} = \alpha_1 \frac{1}{A_{i,t-1}} + \alpha_2 \frac{\Delta REV_{it}}{A_{i,t-1}} + \alpha_3 \frac{PPE_{it}}{A_{i,t-1}} \tag{3}$$

Where: ΔREV is the change in revenues; *PPE* is gross property (plant and equipment); and *A* is total accruals.

(d) Modified Jones model

$$\frac{NDA_{it}}{A_{i,t-1}} = \alpha_1 \frac{1}{A_{i,t-1}} + \alpha_2 \frac{\Delta REV_{it} - \Delta REC_{it}}{A_{i,t-1}} + \alpha_3 \frac{PPE_{it}}{A_{i,t-1}} \tag{4}$$

Where: ΔREC is the change in accounts receivable.

As a large number of empirical research studies use the modified Jones model with cross-sectional data, the resulting cross-sectional modified Jones model has gradually become the main method for measuring earnings management (Dechow et al., 1995). Coefficients for different years and different sectors can be estimated as this model is regressed by year and by sector. Finally, the level of earnings management can be obtained.

Real earnings management: The main means of real earnings management include: sales manipulation (Roychowdhury, 2006), production manipulation (Roychowdhury, 2006), discretionary expenditure manipulation (Roychowdhury, 2006), asset sales (Edelstein et al., 2008; Zang, 2012), and stock repurchase (Hribar et al., 2006). Based on the sales, production, and discretionary expenditure manipulation, Roychowdhury (2006) first established the real earnings management model, creating a way to measure real earnings management. It is held in high esteem by Taylor and Xu (2010), Zhao et al. (2012), and other academics and is the most authoritative real earnings management model. This paper follows Roychowdhury to measure annual abnormal cash flow from operations, cost of production, and discretionary expense[4], and establish a total real earning management model to estimate the level of real earnings management.

(e) Cash flow from operations estimation model

$$\frac{CFO_{it}}{A_{i,t-1}} = \alpha_1 \frac{1}{A_{i,t-1}} + \alpha_2 \frac{Sales_{it}}{A_{i,t-1}} + \alpha_3 \frac{\Delta Sales_{it}}{A_{i,t-1}} + \varepsilon_{it} \tag{5}$$

Where: *CFO* is cash flow from operations; $\Delta Sales$ is change in sales; and *A* is total assets. By regressing model (5), we can obtain the expected *CFO* for each firm in our sample and the abnormal *CFO* (*REM_CFO*) is the difference between actual and expected *CFO*.

(f) Production costs estimation model

$$\frac{PROD_{it}}{A_{i,t-1}} = \alpha_1 \frac{1}{A_{i,t-1}} + \alpha_2 \frac{Sales_{it}}{A_{i,t-1}} + \alpha_3 \frac{\Delta Sales_{it}}{A_{i,t-1}} + \alpha_3 \frac{\Delta Sales_{i,t-1}}{A_{i,t-1}} + \varepsilon_{it} \tag{6}$$

Where: *PROD* is production costs, defined as the cost of goods sold plus the change in inventory. The expected costs of production can be estimated from model (6) and the abnormal production costs (*REM_PROD*) equal the difference between actual and expected production costs[5].

(g) Discretionary expense estimation model[6]

$$\frac{DISEXP_{it}}{A_{i,t-1}} = \alpha_1 \frac{1}{A_{i,t-1}} + \alpha_2 \frac{Sales_{i,t-1}}{A_{i,t-1}} + \varepsilon_{it} \tag{7}$$

Where: *DISEXP* is discretionary expenses, calculated as the sum of sales expenses and management expenses. The expected discretionary expenses can be measured by regressing model (7), and the abnormal discretionary expenses (*REM_DISEXP*) are the difference between actual and expected discretionary expenses[7].

(h) Total real earnings management model

Given that Roychowdhury's three measures of real earnings management have an inconsistent influence on normal cash flows, to avoid the resulting adverse effects and obtain the overall effects of real earnings management, this paper establishes a total earnings management model to estimate the level of real earnings management. Total real earnings management (*REM_PROXY*) can be obtained by abnormal production costs (*REM_PROD*) minus the sum of abnormal cash flow from operations (*REM_CFO*) and abnormal discretionary expenses (*REM_DISEXP*). Model (8) is as follows:

$$REM\_PROXY_{it} = REM\_PROD_{it} - REM\_CFO_{it} - REM\_DISEXP_{it} \tag{8}$$

3.2.2 Explanatory variables

Institutional environment: In this paper, it consists of two proxies, government intervention and legislation level. Specifically, we use the "relationship between government and market" index in the marketization report as a proxy for government intervention (*Gov*). It is a negative indicator, i.e., the level of government intervention is lower for a stronger relationship between government and market. The "service level of agencies (lawyers and accountants)" index in the marketization report is used as a proxy for legislation level (*Law*). It is a positive indicator, i.e., the legislation level is higher for a higher service level of agencies.

3.2.3 Control variables

The control variables consist of variables reflecting the features of a firm's characteristics and governance that may impact corporate earnings management. In terms of characteristics of a firm, McNichols (2000) argues that larger firms always have better corporate governance mechanisms, and thus better restrain earnings management. Chung et al. (2005) find that agency costs resulting from substantial free cash flows lead to managers' earnings management. In terms of corporate governance, Cornett et al. (2009) find that small-scale boards of directors monitor and restrain earnings management more effectively. Klein (2002), Benke (2006), and Petra (2007) find that an independent director plays an important role in constraining earnings management. Firth et al. (2007) also find some empirical evidence that the introduction of a board of supervisors provides effective restriction on earnings management. Moreover, Chin et al. (2009) present that firms with higher ownership concentrations are more likely to experience earnings manipulation. The definitions of each variable are shown in Table 1.

Table 1. Variable definitions and measures

Types	Variables	Symbols	Definitions and measurement
Dependent variables	Accrual-based earnings management	AEM	Accrual-based earnings management
		AEM_Healy	The absolute value of AEM from the Healy model
		AEM_DeAngelo	The absolute value of AEM from the DeAngelo model
		AEM_Jones	The absolute value of AEM from the Jones model
		AEM_CMJones	The absolute value of AEM from the cross-sectional modified Jones model
	Real earnings management	REM	Real earnings management
		REM_PROXY	The REM from the total real earnings management model
		REM_CFO	The REM by sales manipulation from cash flow from the operations estimation model
		REM_PROD	The REM by production manipulation from the production costs estimation model
		REM_DISEXP	The REM by expenditure manipulation from the discretionary expense estimation model
Explanatory variables	Government intervention	Gov	"The relationship between government and market" index in the marketization report, a negative indicator
	Legislation	Law	"The service level of agencies (lawyers and accountants)" index in the marketization report, a positive indicator
Control variables	Firm size	Size	Natural logarithm of total assets
	Agency costs	Age	Management expenses/total assets
	Cash flow from operations	CFO	Net cash flow from operations/total assets
	Board of directors' size	BDS	Natural logarithm of the number of directors
	Percentage of independent directors	PID	The ratio of the number of independent directors to all directors
	Board of supervisors' size	BSS	Natural logarithm of the number of supervisors
	Ownership concentration	H1	The ownership of the largest shareholder

4. Model and estimation method

We establish model (10) to examine the impact of institutional environment on accrual-based earnings management. Here, we use the lagged AEM as an independent variable for two reasons. First, since earlier earnings management greatly impacts later earnings management[8], introducing a lagged variable will reduce biases from an omitted variable. Second, earnings management methods, such as changing accounting policies and accounting estimates or manipulating real activities, are continuous and cumulative. The inertia feature of earnings management can be found by adding this lagged variable. The model is as follows.

$$AEM_{it} = \alpha_0 + \alpha_1 AEM_{i,t-1} + \alpha_2 Gov_{it} + \alpha_3 Law_{it} + \alpha_4 Size_{it} + \alpha_5 Age_{it} + \alpha_6 CFO_{it} + \alpha_7 BDS_{it}$$
$$+ \alpha_8 PID_{it} + \alpha_9 H1_{it} + \mu_{it} + \xi_{it} \tag{10}$$

Where: *AEM* is accrual-based earnings management, which consists of *AEM_Healy$_{it}$*, *AEM_DeAngelo$_{it}$*, *AEM_Jones$_{it}$*, and *AEM_CMjones$_{it}$*; *AEM$_{i,t-1}$* is one-period lagged accrual-based earnings management; $\hat{\imath}_{it}$ is unobservable individual effect that is used to control for the omitted characteristic variables; and $\hat{\imath}_{it}$ is a disturbance term. There are no sector and year dummy variables in this model as they are controlled when measuring earnings management. Introducing these dummies into model (10) will result in a significant deviation. According to hypothesis 1, the coefficients α_2 and α_3 on *Gov$_{it}$* and *Law$_{it}$* should be negative, which suggests a negative relationship between institutional environment and accrual-based earnings management.

In order to test the impact of institutional environment on real earnings management, model (11) is established as follows.

$$REM_{it} = \alpha_0 + \alpha_1 REM_{i,t-1} + \alpha_2 Gov_{it} + \alpha_3 Law_{it} + \alpha_4 Size_{it} + \alpha_5 Age_{it} + \alpha_6 CFO_{it} + \alpha_7 BDS_{it}$$
$$+ \alpha_8 PID_{it} + \alpha_9 H1_{it} + \mu_{it} + \xi_{it} \qquad (11)$$

Where: *REM$_{it}$*, is real earnings management, which consists of: *REM_PROXY$_{it}$*, *REM_CFO$_{it}$*, *REM_PROD$_{it}$*, and *REM_DISEXP$_{it}$*; and *REM$_{i,t-1}$* is one-period lagged real earnings management. According to hypothesis 2, the coefficients β_2 and β_3 on *Gov$_{it}$* and *Law$_{it}$* should be positive, which suggests a positive relationship between institutional environment and real earnings management.

The following model (12) is constructed for examining the strategic transformation of earnings management in Chinese listed companies.

$$REM_{it} - AEM_{it} = \gamma_0 + \gamma_1 (REM_{i,t-1} - AEM_{i,t-1}) + \gamma_2 Gov_{it} + \gamma_3 Law_{it} + \gamma_4 Size_{it} + \gamma_5 Age_{it}$$
$$+ \gamma_6 CFO_{it} + \gamma_7 BDS_{it} + \gamma_8 IND_{it} + \gamma_9 BSS_{it} + \gamma_{10} H1_{it} + \mu_{it} + \xi_{it} \qquad (12)$$

Where: *REM$_{it}$—AEM$_{it}$* is the difference between real and accrual-based earnings management, and a larger difference means a preference of listed companies for real earnings management. For the ease of calculation, *REM$_{it}$* is used as the total real earnings management, *REM_PROXY$_{it}$*, instead of the other three indicators. *AEM$_{it}$* consists of four measures of accrual-based earnings management: *AEM_Healy$_{it}$*, *AEM_DeAngelo$_{it}$*, *AEM_Jones$_{it}$*, and *AEM_CMJones$_{it}$*. According to hypothesis 3, the coefficients γ_2 and γ_3 should be positive, which suggests a positive relationship between institutional environment and the difference between the two types of earnings management, i.e., the difference between real and accrual-based earnings management is larger when the institutional environment is better. It suggests that with the improvement of the institutional environment, the hard-to-detect real earnings management is more preferable than accrual-based earnings management in listed companies.

5. Method selection

Our sample consists of 700 cross-sectional units (N=700) and 12 units of time series (T=12), which is consistent with the feature of "large N and small T" in Roodman (2005). As lagged dependent variables are used as an independent variable in this model, the estimates would be biased and inconsistent if we used OLS, random effect, or fixed effect to test this model. Therefore, we apply dynamic panel GMM estimation. As difference GMM is prone to biases with a finite sample, most researchers employ system GMM to avoid biases from weak instrumental variables so as to obtain unbiased and consistent results. Furthermore, with a finite sample, the standard deviation of two-step system GMM estimates is seriously biased downward (Bond, 2001). Although the finite-sample correction presented by Windmeijer (2005) can be used for reducing this bias, it also makes the asymptotic distribution approximations less reliable. Therefore, one-step system GMM is widely preferred in empirical research. Thus, we use the one-step system GMM in this paper.

6. Empirical results and analysis

6.1 Summary statistics

Table 2 reports the summary statistics of the variables used in the model. The average of government intervention is 8.375 and legislation level is 5.292. It can be seen from the minimum and maximum values and standard deviations that both of them show significant regional differences. Due to various reasons such as resource endowments, geographic positions, history, and culture, the marketization reform in China, the existing policies lead to the regional differences in the transition from a planned to a market economy. This imbalance in growth strategy results in distinctive regional features in privileged areas. For instance, there is an unbalanced institutional environment across China where east is superior, followed by the central and western regions, which are near the bottom.

Table 2. Summary statistics

Variables		Mean	Median	S.D.	Min.	Max.
Independent variables	*AEM_Healy*	0.081	0.050	0.104	0.000	1.482
	AEM_DeAngelo	0.061	0.040	0.074	0.000	0.852
	AEM_Jones	0.076	0.048	0.094	0.000	0.966

	AEM_CMJones	0.076	0.048	0.095	0.000	1.194
	REM_PROXY	0.007	0.005	0.786	-1.545	1.132
	REM_CFO	-0.005	-0.001	0.112	-1.109	0.943
	REM_PROD	0.001	-0.006	0.774	-1.065	1.211
	REM_DISEXP	-0.001	-0.014	0.073	-0.533	1.607
Explanatory variables	Gov	8.375	8.670	1.565	-4.660	10.530
	Law	5.292	5.450	2.757	-12.270	10.940
Control variables	Size	21.704	21.574	1.095	18.147	26.660
	Age	0.065	0.033	0.105	0.001	0.723
	CFO	-0.039	-0.003	0.336	-1.415	1.695
	BDS	2.460	2.485	0.398	0.000	3.807
	PID	0.304	0.300	0.105	0.000	1.000
	BSS	1.607	1.609	0.490	0.000	2.944
	H1	0.176	0.132	0.141	0.000	0.726

6.2 Correlations

Table 3 shows Pearson and Spearman correlations between variables. *AEM* represents the *AEM_CMJones* from the cross-sectional modified Jones model and *REM* is the *REM_PROXY* from the total earnings management model. The correlations between four accrual-based earnings management measures and four real earnings management measures are not reported in this paper due to space constraints. As can be seen from Table 3, all the correlations satisfy the multicollinearity criterion except that both the Pearson and Spearman correlations between government intervention and legislation are larger than 0.6 (0.645 and 0.673, respectively). This indicates the existence of multicollinearity. In order to avoid the influence of multicollinearity on regression, we separately regress the government intervention and legislation variables.

Table 3. Correlation matrix

Variables	AEM	REM	Gov	Law	Size	Age	CFO	BDS	PID	BSS	H1
AEM	1.000	0.014	-0.018***	-0.011***	-0.031***	-0.002	-0.030***	0.027**	-0.01	0.013	0.024**
REM	0.019*	1.000	0.015**	0.019***	-0.056**	0.025**	-0.008	0.031***	0.013	0.003	-0.027**
Gov	-0.011***	0.049***	1.000	0.645***	0.106***	0.053***	-0.029**	0.064***	0.061***	-0.004	-0.030***
Law	-0.002***	0.070***	0.673***	1.000	0.112***	0.062***	-0.023**	0.126***	0.131***	0.039***	-0.030***
Size	-0.023**	0.020*	0.107***	0.121***	1.000	-0.163***	0.034***	0.096***	0.116***	0.045***	0.047***
Age	0.018	-0.028**	0.040***	0.071***	-0.419***	1.000	0.134***	0.050***	0.034***	0.046***	0.065***
CFO	-0.044***	-0.009	-0.053***	-0.041***	0.026**	-0.029***	1.000	-0.031***	0.000	0.003	0.016
BDS	0.014	0.032***	0.059***	0.109***	0.084***	0.040***	0.001	1.000	-0.201***	0.456***	-0.128***
PID	-0.003	0.050***	0.086***	0.116***	0.116***	0.050***	0.000	-0.171***	1.000	-0.068***	-0.058***
BSS	0.014	0.005	-0.014	0.029**	0.042***	0.053***	0.005	0.419***	-0.072***	1.000	-0.086***
H1	-0.011	-0.018	0.030***	-0.040***	0.026**	-0.038***	0.062***	-0.119***	-0.053***	-0.070***	1.000

Notes: This table reports the Pearson correlations above the diagonal and Spearman correlations below. ***, **, and * represent the significance at the 1%, 5%, and 10% levels, respectively. Two-tailed test.

6.3 Univariate test

To test the impact of institutional environment on earnings management, we conduct a univariate analysis for both accrual-based and real earnings management by using the t-test for averages and the Wilcoxon rank-sum test for medians. We divide our sample into high-level and low-level groups by the average government intervention index in each year from 2002 to 2013. Those with a lower-than-average intervention index are regarded as part of the high-intervention group; otherwise, they are part of the low-intervention group. For instance, the average government intervention index in 2002 is 6.601. With an intervention index lower than 6.601, 334 observations are assigned to high-intervention group, and with an intervention index higher than 6.601, 366 are assigned to the low-intervention group. It is worth noting that this paper does not follow Wei and Liu (2007) in using total sample average as a cut-off point as it ignores the time-varying character of institutional environment, since, as time passes, institutional environment improves. Most observations in earlier years are assigned to the high-level group, and more recent ones to the low-level group, which may result in biases. Similarly, based on the average legislation index in each year, from 2002 to 2013, our sample is divided into low and high legislation groups.

Table 4 reports the differences of accrual-based earnings management between government intervention groups and between legislation groups using the t-test and the Wilcoxon rank-sum test. Taking *AEM-Healy* for instance, the difference of average accrual-based earnings management between high and low government intervention groups is 0.011, which is significant at the one percent (1%) level in the t-test. The difference of medians is 0.002, which is significant at the five percent (5%) level in the Wilcoxon rank-sum test. It suggests that with a higher government intervention level, the extent of accrual-based earnings management in listed companies is higher, which is consistent with our hypothesis 1a. The differences of averages and medians between the low and high legislation level groups are 0.013 and 0.001, respectively, and both are significant at the five percent (5%) level in the t-test and the Wilcoxon rank-sum test. This indicates that with a lower legislation level, the extent of accrual-based earnings management in listed companies is higher, which is consistent with our hypothesis 1b. It demonstrates that the extent of accrual-based earnings management is lower in firms with a better institutional environment. Difference tests are also applied for the accrual-based earnings management measured by the DeAngelo model, the Jones model, and the cross-sectional modified Jones model, and the results are consistent with this conclusion, which provides supportive evidence for hypothesis 1.

Table 4. Difference tests of accrual-based earnings management sub-samples

Panel A: Government intervention and accrual-based earnings management

Variables	High intervention		Low intervention		T-test		Wilcoxon rank-sum test	
	Mean	Median	Mean	Median	Difference of mean	T value	Difference of median	Z value
AEM_Healy	0.086	0.051	0.075	0.049	0.011	4.700***	0.002	2.545**
AEM_DeAngelo	0.064	0.041	0.058	0.039	0.006	3.907***	0.002	1.847*
AEM_Jones	0.079	0.049	0.072	0.047	0.007	3.499***	0.002	2.194**
AEM_MSJones	0.079	0.048	0.072	0.046	0.007	3.197***	0.002	1.388

Panel B: Legislation and accrual-based earnings management

Variables	Low legislation		High legislation		T-test		Wilcoxon rank-sum test	
	Mean	Median	Mean	Median	Difference of mean	T value	Difference of median	Z value
AEM_Healy	0.089	0.050	0.076	0.051	0.013	5.513***	0.001	2.725***
AEM_DeAngelo	0.064	0.040	0.059	0.039	0.006	3.214***	0.001	1.646*
AEM_Jones	0.079	0.048	0.074	0.047	0.005	2.498**	0.001	1.860*
AEM_MSJones	0.079	0.048	0.074	0.047	0.005	2.241**	0.001	0.084

Notes: This table reports the difference of accrual-based earnings management between high and low intervention sub-samples in panel A and between low and high legislation sub-samples in panel B. Our sample is divided into two sub-samples by the mean values of government intervention and legislation level. *AEM* represents accrual-based earnings management. *AEM_Healy*, *AEM_DeAngelo*, *AEM_Jones*, and *AEM_CMJones* are the absolute value of *AEM* from the Healy, DeAngelo, Jones, and cross-sectional modified Jones models, respectively. ***, **, and * represent the significance at the 1%, 5%, and 10% levels, respectively. Two-tailed test.

Table 5 demonstrates differences of real earnings management between two government intervention groups and between two legislation groups by using the t-test and the Wilcoxon rank-sum test. Taking *REM_PROXY* for example, the differences of average and median real earnings management between the high and low government intervention groups are -0.01 and -0.011. Both are significant at the one percent (1%) level in the t-test and the Wilcoxon rank-sum test. This means that the extent of real earnings management is higher in listed companies located in regions with lower government intervention, which is consistent with hypothesis 2a. For the low and high legislation groups, the difference of means and medians are -0.029 and -0.011, respectively, and both are significant at the one percent (1%) level in both tests, indicating that with a higher legislation level, the extent of real earnings management is higher as well. This is consistent with hypothesis 2b. In summary, observations with a better institutional environment suffer higher levels of real earnings management. This paper also tests three other measures of real earnings management, *REM_CFO*, *REM_PROD*, and *REM_DISEXP*, and the results are also consistent with hypothesis 2.

Table 5. Difference tests of real earnings management sub-samples

Panel A: Government intervention and real earnings management

Variables	High intervention		Low intervention		T-test		Wilcoxon rank-sum test	
	Mean	Median	Mean	Median	Difference of mean	T value	Difference of median	Z value
REM_PROXY	0.001	-0.010	0.011	0.001	-0.010	-6.410***	-0.011	-6.184***
REM_CFO	-0.002	0.003	-0.007	-0.002	0.005	1.968**	0.005	3.056***
REM_PROD	-0.001	-0.009	0.002	-0.003	-0.003	-0.090	-0.006	-5.040***
REM_DISEXP	0.001	-0.012	-0.003	-0.016	0.004	2.310**	0.004	3.598***

Panel B: Legislation and real earnings management

Variables	Low legislation		High legislation		T-test		Wilcoxon rank-sum test	
	Mean	Median	Mean	Median	Difference of mean	T value	Difference of median	Z value
REM_PROXY	-0.026	0.001	0.003	0.012	-0.029	-5.184***	-0.011	-6.355***
REM_CFO	-0.003	0.002	-0.007	-0.005	0.004	1.681*	0.007	4.495***
REM_PROD	0.000	0.003	0.001	0.007	-0.001	-0.121	-0.004	-3.798***
REM_DISEXP	0.000	-0.013	-0.003	-0.016	0.003	2.246**	0.003	3.324***

Notes: This table reports the difference of real earnings management between high and low intervention sub-samples in panel A and between low and high legislation sub-samples in panel B. Our sample is divided into two sub-samples by the mean values of government intervention and legislation level. *REM* represents real earnings management. *REM_PROXY*, *REM_CFO*, *REM_PROD*, and *REM_DISEXP* are the *REM* from the total real earnings management model, the cash flow from operations estimation model, the production costs estimation model, and the discretionary expense estimation model, respectively. ***, **, and * represent the significance at the 1%, 5%, and 10% levels, respectively. Two-tailed test.

6.4 Institutional environment vs. accrual-based earnings management

Table 6 reports the one-step system GMM estimates of model (10), which displays the relationship between institutional environment and accrual-based earnings management. To alleviate multicollinearity between the two proxies for institutional environment, only one of them is included in model (10) at a time. Taking the accrual-based earnings management measured by the cross-sectional modified Jones model as an explanatory variable as an example, the relationship between government intervention and accrual-based earnings management (*AEM_CMJones*) is significantly positive at the one percent (1%) level. As government intervention is a negative indicator, this result means that the extent of accrual-based earnings management is higher in firms facing stronger government intervention, which is consistent with hypothesis 1a. Legislation level also has a significant negative relationship with accrual-based earnings management (*AEM_CMJones*) at the one percent (1%) level. However, as legislation level is a positive indicator, it means that the extent of accrual-based earnings management in firms located in regions with a lower legislation level is higher, which supports hypothesis 1b. In summary, the relationship between institutional environment and accrual-based earnings management is significantly negative, i.e., in regions with a better institutional environment the local firms have less accrual-based earnings management. This indicates that the claim of Leuz et al. (2006) also applies to China's capital market, and it is consistent with hypothesis 1. This paper also uses three other measures of accrual-based earnings management with the Healy model, the DeAngelo model, and the Jones model in model (10) to conduct robustness tests. The results are consistent with our hypothesis, confirming the robustness of our findings.

To ensure the reliability of our findings, this paper tests the validity of the model design and the effectiveness of instrumental variables. To satisfy the consistency of the GMM estimation, there is no second-order autocorrelation between residuals; otherwise, the model would be biased. Table 6 also reports the p-value of the residuals' autocorrelation test AR (2), which indicates that we cannot reject the null hypothesis that the stochastic error in model (10) has no autocorrelation. Therefore, model (10) makes sense and the estimates are effective. The p-value of the Sargan test is greater than 0.1 indicating that we cannot reject the null hypothesis that instrumental variables are effective. It confirms that the instrumental variables in this paper are not over-identified.

Table 6. One-step system GMM estimation of the relationship between institutional environment and accrual-based earnings management

Variables	AEM_Healy		AEM_DeAngelo		AEM_Jones		AEM_CMJones	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$AEM_{i,t-1}$	0.036*** (2.951)	0.194*** (5.323)	0.514*** (45.941)	0.512*** (45.708)	0.028** (2.024)	0.032** (2.266)	0.032** (2.411)	0.031** (2.288)
Gov_{it}	-0.018** (-2.456)		-0.011*** (-4.405)		-0.024*** (-9.694)		-0.020*** (-7.872)	
Law_{it}		-0.002** (-1.954)		-0.005*** (-4.065)		-0.005*** (-4.272)		-0.005*** (-3.854)
$Size_{it}$	0.001 (0.499)	0.000 (0.249)	-0.002* (-1.795)	-0.002 (-1.435)	0.004*** (3.335)	0.002 (1.480)	0.003** (2.145)	0.001 (0.762)
Age_{it}	-0.009 (-0.558)	-0.013 (-1.379)	-0.017 (-1.357)	-0.012 (-1.004)	0.010 (0.829)	-0.012 (-0.966)	-0.001 (-0.119)	-0.017 (-1.439)
CFO_{it}	-0.015*** (-3.992)	-0.009*** (-3.705)	-0.009*** (-2.731)	-0.010*** (-2.876)	-0.004 (-1.242)	-0.003 (-0.987)	-0.004 (-1.384)	-0.004 (-1.170)
BDS_{it}	-0.005 (-0.929)	0.010*** (4.434)	0.009** (2.203)	0.011*** (2.939)	0.019*** (4.962)	0.010*** (2.746)	0.018*** (4.776)	0.013*** (3.125)
IND_{it}	-0.004 (-0.247)	0.022** (2.226)	0.016 (1.177)	0.022* (1.755)	0.074*** (5.931)	0.044*** (3.631)	0.073*** (5.690)	0.050*** (4.044)
BSS_{it}	0.006* (1.828)	0.002 (1.073)	0.003 (1.070)	0.002 (0.877)	0.004 (0.165)	0.002 (0.849)	0.002 (0.573)	0.003 (1.116)
$H1_{it}$	0.010 (1.031)	0.019*** (3.025)	0.038*** (4.675)	0.034*** (4.305)	-0.011 (-1.135)	-0.002 (-0.241)	0.000 (0.003)	0.007 (0.952)
Constant	-0.173*** (-3.854)	-0.001 (-0.071)	-0.046* (-1.647)	0.009 (0.329)	0.128*** (4.846)	0.024 (0.974)	0.116*** (4.306)	0.031 (1.227)
AR(1)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AR(2)	0.132	0.127	0.776	0.793	0.387	0.435	0.887	0.919
Sargan	0.217	0.212	0.518	0.512	0.112	0.198	0.166	0.186
N	8400	8400	8400	8400	8400	8400	8400	8400

Notes: This table reports the one-step system GMM estimation of the relationship between institutional environment and real earnings management. *AEM* represents accrual-based earnings management. *AEM_Healy*, *AEM_DeAngelo*, *AEM_Jones*, and *AEM_CMJones* are the absolute value of *AEM* from the Healy, DeAngelo, Jones, and cross-sectional modified Jones models, respectively. *Gov* is "the relationship between government and market" index in the marketization report. *Law* is "the service level of agencies (lawyers and accountants)" index in the marketization report. *Size* is the natural logarithm of total assets. *Age* stands for agency costs, calculated as management expenses divided by total assets. *CFO* represents cash flow from operations, calculated as net cash flow from operations divided by total assets. *BDS* is the size of the board of directors, computed as the natural logarithm of the number of directors. *PID* (percentage of independent directors) is the ratio of the number of independent directors to all directors. *BSS* is the size of the board of supervisors, computed as the natural logarithm of the number of supervisors. *H1* is the ownership proportion of the largest shareholder. T-statistics are shown in parentheses below the coefficients. The imbedded program "xtabond2" in Stata12.0 is used to do one-step system GMM estimation and the robust option is chosen. The first-order lagged dependent variable is the instrumental variable in this paper. *AR(1)* and *AR(2)* are used for examining the first-order and second-order autocorrelation in the GMM estimation. *Sargan* is used for testing whether the

instrumental variable is over-identified. ***, **, and * represent the significance at the 1%, 5%, and 10% levels, respectively. Two-tailed test.

6.5 Institutional environment vs. real earnings management

Table 7 reports results of the relationship between institutional environment and real earnings management. For example, taking the total real earnings management level (*REM_PROXY*) as a dependent variable, the relationship between institutional environment and real earnings management is significantly positive. Government intervention has a significant positive relationship with total real earnings management (*REM_PROXY*) at the one percent (1%) level. This means that the extent of real earnings management is higher in firms facing lower government intervention, which is consistent with hypothesis 2a. Legislation also has a significant positive relationship with total real earnings management (*REM_PROXY*) at the one percent (1%) level, indicating that the extent of real earnings management is higher in firms located in regions with a higher legislation level. This is consistent with hypothesis 2b. Moreover, results from the one-step system GMM estimates using the three other proxies for real earnings management are also consistent with our hypotheses. Institutional environment has a negative impact on the real earnings management manipulated in sales (*REM_CFO*) and expenditures (*REM_DISEXP*) at the one percent (1%) significance level[9]. It positively impacts the real earnings management by production manipulation, but is insignificant. The results generally confirm our hypothesis 2. The AR (2) and Sargan tests are applied to test the rationality of modeling and the validity of the instrumental variables. From the results reported in Table 7, we can see that model (11) is logical and the instrumental variables are not over-identified, indicating the reliability of our conclusions.

Combining the findings from Table 6, we find that institutional environment plays an important role in the earnings management policy decisions in listed companies. In the regions with a better institutional environment, real earnings management is preferable to accrual-based earnings management. In China, accrual-based earnings management is more likely to be identified and eliminated with improved regulations and laws, stronger market supervision, and more competent investors. This will force firms with earnings management incentives into changing their means. With the improvement in the institutional environment, more real earnings management will be implemented to achieve a certain earnings expectation. This switch of earnings management in China is in line with the argument of Cohen et al. (2008). Although there are no regulations or laws like SOX in the U.S., in China, earnings management also experiences the same effects from the improved institutional environment.

An interesting situation should also be noted. Among the institutional environment factors, the impact of government intervention on earnings management is generally greater than legislation level. As a dominant option to manage market failure, government intervention is ubiquitous during this particular period of economic transition in China and its important impact on earnings management can be explained in two aspects. First, the government has the ability and motives to influence corporate earnings management. The government imposes its influence on the operation of business enterprises using administrative rules and support policies as it plays an important role in the allocation of market resources. For example, the government is involved in earnings management in listed companies through tax preferences and financial subsidies (Chen and Li, 2001) and it is difficult for a judge to extricate government intervention when there is litigation (Glaeser et al., 2004), which shows how outrageous the intervention can be. Moreover, the number of listed companies under the government's direct watch is a key factor. To reduce the probability of a company being desisted, the government has incentives to participate in earnings management in listed companies. In addition, the vulnerable legal system in China is also a reason for the impact of government intervention on earnings management. Allen et al. (2005) argue that the total number of registered lawyers in China is roughly the same as that in California in the U.S. This indicates the defective construction of the legal system in China, especially the absence of laws in investor protection, and thus, the legal system is ineffective under the strong administrative power of the government.

Table 7. One-step system GMM estimation of the relationship between institutional environment and real earnings management

Variables	REM_PROXY		REM_CFO		REM_PROD		REM_DISEXP	
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
$REM_{i,t-1}$	0.008	0.010	0.074***	0.058***	0.012	0.013	0.697***	0.696***
	(0.697)	(0.816)	(7.765)	(6.311)	(1.035)	(1.153)	(70.736)	(70.373)
Gov_{it}	0.096**		-0.030***		0.073		-0.008***	
	(2.565)		(-6.876)		(1.379)		(-2.579)	
Law_{it}		0.060***		-0.009***		0.025		-0.006***
		(2.778)		(-4.011)		(0.947)		(-3.3430)
$Size_{it}$	0.026**	0.027**	0.002*	0.002	0.032***	0.037***	0.004***	0.004***
	(2.202)	(2.370)	(1.897)	(0.203)	(12.591)	(3.181)	(5.738)	(6.055)
Age_{it}	0.630***	0.626***	0.026**	0.009	0.777***	0.812***	0.077***	0.079***
	(5.418)	(5.400)	(2.132)	(0.735)	(6.377)	(6.945)	(11.380)	(11.677)
CFO_{it}	-0.044	-0.050	0.014***	0.015***	-0.024	-0.027	0.001	0.002
	(-1.470)	(-1.631)	(4.543)	(5.035)	(-0.794)	(-0.904)	(0.840)	(1.059)
BDS_{it}	-0.099***	-0.088**	0.016***	0.009**	-0.075*	-0.058	0.004	0.003
	(-2.674)	(-2.489)	(4.247)	(2.525)	(-1.899)	(-1.616)	(1.595)	(1.608)
PID_{it}	-0.199	-0.174	0.032**	0.009	-0.151	-0.099	0.014*	0.016**
	(-1.518)	(-1.429)	(2.436)	(0.748)	(-1.291)	(-0.804)	(1.865)	(2.129)
BSS_{it}	0.001	-0.002	-0.006**	-0.004*	-0.014	-0.019	-0.002	-0.002
	(0.028)	(-0.085)	(-2.445)	(-1.674)	(-0.552)	(-0.745)	(-1.416)	(-1.394)
$H1_{it}$	-0.157**	-0.177**	0.007	0.018**	-0.176**	-0.200***	-0.024***	-0.022***
	(-2.073)	(-2.388)	(0.927)	(2.355)	(-2.282)	(-2.709)	(-5.380)	(-5.300)
Constant	-1.097***	-0.660***	0.163***	0.024	-1.090***	-0.753***	-0.032	-0.066***
	(-3.790)	(-2.761)	(5.209)	(1.016)	(-3.148)	(-3.157)	(-1.615)	(-4.874)
AR(1)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AR(2)	0.551	0.974	0.072	0.140	0.269	0.214	0.133	0.124
Sargan	0.165	0.158	0.121	0.137	0.788	0.789	0.214	0.210
N	8400	8400	8400	8400	8400	8400	8400	8400

Notes: This table reports the one-step system GMM estimation of the relationship between institutional environment and accrual-based earnings management. *REM* represents real earnings management. T-statistics are shown in parentheses below the coefficients. The imbedded program "xtabond2" in Stata12.0 is used to do one-step system GMM estimation and the robust option is chosen. The first-order lagged dependent variable is the instrumental variable in this paper. *AR(1)* and *AR(2)* are used for examining the first-order and second-order autocorrelation in the GMM estimation. *Sargan* is used for testing whether the instrumental variable is over-identified. ***, **, and * represent the significance at the 1%, 5%, and 10% levels, respectively. Two-tailed test.

6.6 Empirical analysis on the transformation of earnings management strategy in Chinese listed companies
Table 8 shows the estimates of one-step system GMM for analyzing the transformation of earnings management strategy in Chinese listed companies. A significant and positive relationship between institutional environment and the difference between the two types of earnings management can be found in Table 8. Taking the empirical results for the difference between total real earnings management and accrual-based earnings management calculated by the cross-sectional modified Jones model as an example (23rd and 24th columns), there is a significant positive relationship between the level of government intervention and the difference between the two types of earnings management (*REM—AEM_CMJones*) at the 1% significance level, with the coefficient of 0.164. There is also a significant positive relationship between the level of legislation and the difference between the two types of earnings management (*REM—AEM_CMJones*) at the 1% significance level, with the coefficient of 0.036. It can be seen that the improvement of the institutional environment, the reduction in government interventions, and the rise in legislation results in the increasing widening of the difference between the two types of earnings management. Alternatively, the constantly improving institutional environment forces listed companies to apply real earnings management instead of accrual-based earnings management, which is consistent with hypothesis 3. With the improvement of the institutional environment, the possibility of accrual-based earnings management happening will further be squeezed as it is more verifiable to regulators due to the enhanced market supervision and the strengthened ability of investors to identify it. All listed companies have incentives to manage earnings and are forced to change their approaches to adjust earnings. They will do more real earnings management and apply less accrual-based earnings management. This conversion is the optimal choice for the listed companies in a particular institutional environment. The conversion of earnings management strategy in Chinese listed companies also confirms the argument in Cohen et al. (2008). Although China lacks

legislation similar to SOX in the U.S., the same economic consequences due to the influence of SOX on earnings management will exist in China as a result of the improved institutional environment.

Table 8. One-step system GMM estimation of the earnings management strategy evolution in Chinese listed companies

Variables	REM－AEM_Healy		REM—AEM_DeAngelo		REM－AEM_Jones		REM－AEM_CMJones	
	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
$REM_{i,t-1}-AEM_{i,t-1}$	-0.007 (-0.635	-0.005 (-0.432)	-0.003 (-0.285)	-0.002 (-0.142)	0.008 (0.654)	0.010 (0.898)	0.667 (0.586)	0.010 (0.854)
Gov_{it}	0.125*** (2.878)		0.089** (2.033)		0.147*** (3.182)		0.164*** (3.607)	
Law_{it}		0.040** (2.041)		0.023 (1.296)		0.030* (1.749)		0.036*** (2.921)
$Size_{it}$	0.023* (1.917)	0.032*** (2.826)	0.028** (2.262)	0.035*** (3.057)	0.019 (1.533)	0.032*** (2.812	0.017 (1.407)	0.021*** (2.737)
Age_{it}	0.586*** (4.861)	0.658*** (5.706)	0.622*** (5.146)	0.685*** (6.001)	0.561*** (4.601)	0.679* (5.890)	0.540*** (4.460)	0.663*** (5.772)
CFO_{it}	-0.032 (-1.068)	-0.037 (-1.244)	-0.030 (-1.003)	-0.34 (-1.123)	-0.037 (-1.210)	-0.042 (-1.401)	-0.036 (-1.177)	-0.042 (-1.386)
BDS_{it}	-0.118*** (-3.121)	-0.088** (-2.512)	-0.110*** (-2.904)	-0.087** (-2.479)	-0.126*** (-3.295)	-0.084** (-2.389)	-0.135*** (-3.537)	-0.090** (-2.547)
PID_{it}	-0.232* (-1.827)	-0.147 (-1.221)	-0.200 (-1.567)	-0.129 (-1.084)	-0.284** (-2.206)	-0.151 (-1.261)	-0.317** (-2.470)	-0.175 (-1.458)
BSS_{it}	0.001 (0.042)	-0.007 (-0.287)	-0.002 (-0.085)	-0.009 (-0.344)	0.002 (0.935)	-0.010 (-0.385)	0.003 (0.102)	-0.011 (-0.414)
$H1_{it}$	-0.152** (-1.988)	-0.194*** (-2.621)	-0.192** (-2.506)	-0.224*** (-3.021)	-0.135* (-1.752)	-0.192*** (-2.584)	-0.138* (-1.792)	-0.200*** (-2.691)
Constant	-1.288*** (-4.162)	-0.713*** (-2.982)	-1.108*** (-3.558)	-0.696*** (-2.912)	-1.358*** (-4.254)	-0.676*** (-2.828)	-1.433*** (-4.507)	-0.668*** (-2.794)
AR(1)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AR(2)	0.418	0.449	0.320	0.308	0.708	0.785	0.478	0.406
Sargan	0.326	0.329	0.180	0.138	0.630	0.604	0.214	0.210
N	8400	8400	8400	8400	8400	8400	8400	8400

Notes: This table reports the one-step system GMM estimation of the earnings management strategy evolution in Chinese listed companies. T-statistics are shown in parentheses below the coefficients. The imbedded program "xtabond2" in Stata12.0 is used to do one-step system GMM estimations and the robust option is chosen. The first-order lagged dependent variable is the instrumental variable in this paper. *AR(1)* and *AR(2)* are used for examining the first-order and second-order autocorrelation in the GMM estimation. *Sargan* is used for testing whether the instrumental variable is over-identified. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively, Two-tailed test.

6.7 Sensitivity tests
The following sensitivity tests are applied to test the reliability of our results. First, we remove the effect of accounting standard changes. The changes in accounting standards have a great influence on corporate earnings management. To prevent the effect of implementation of new accounting standards since 2007 on our results, we

divide our sample into 2001–2006 and 2007–2012 sub-samples by year, and the results are consistent with our previous findings with the full sample. Second, we differentiate directions of earnings management. For accrual-based earnings management, we have positive and negative earnings management sub-samples, which we regress separately, and also get consistent results. Finally, we remove the data selection effect of environmental variables. The marketization report by Fan et al. (2011) is the most authoritative source of institutional environment data. However, the report updates slowly due to restricted resources and time, which hinders development of the research on institutional environment. As this report only covers data from 1997 to 2009, we use institutional environment data in 2009 in place of the data for 2010 through 2013. This may ignore the time-varying effect of institutional environment on our results. We apply two robustness tests to eliminate this effect. One is to remove the 2010 through 2013 data and only use 2002–2009 data to do empirical tests, and another is to forecast the 2010 and 2013 data by using the average growing rate of the institutional environment during the period of 1997–2009. Results from the robustness tests show no significant difference from our previous findings.

7. Conclusion

With a set of dynamic panel data on 700 companies listed on the Shanghai and Shenzhen stock exchanges over a period of 12 years, this paper uses system GMM estimation to examine the impact of the institutional environment on accrual-based earnings management and real earnings management. The findings are: (1) institutional environment and accrual-based earnings management have a significant negative relationship, and the extent of accrual-based earnings management is lower with less government interventions and a higher level of legislation; (2) there is a significant positive relationship between institutional environment and real earnings management, and listed companies are more likely to engage in real earnings management when government intervention decreases and legislation improves; and (3) institutional environment has a great influence on the selection of earnings management strategy. With the improvement of the institutional environment in China, more real earnings management, rather than accrual-based earnings management, will be applied in listed companies in the country.

This paper provides a reference and guidance for the capital market supervision departments in China. First, the government has to establish an excellent institutional environment for the long-run capital market by improving the institutional environment of business and operations, cooperating well with the market to achieve the transformation of government functions, and promoting an effective legal system and investor protections. Second, regulators should enhance their supervision on the accrual-based earnings management in listed companies, minimize it, and improve the quality of financial reporting. Last, but not least, given the transformation of earnings management, regulators should also enhance their supervision of the real activities of managing earnings to increase the cost of real earnings management, and hence restrain it.

Compared with existing studies on earnings management, this paper combines the effect of institutional environment on both accrual-based and real earnings management and finds that the means of earnings management in China are gradually changing from accrual-based to real earnings management. It confirms that the argument of Cohen et al. (2008) can also be applied to the emerging Chinese capital market and has great theoretical and practical significance. Nonetheless, a few shortcomings exist in this paper. First, earnings management is impacted by complicated factors, but this paper only focuses on the effect of the external institutional environment of firms and does not take into account other important factors such as internal control, characteristics of managers, and stakeholders. These will be taken into account in our future studies. Second, the motivation of earnings management is not examined in this paper. Different motivations lead to different choices regarding earnings management, and we expect to include this as one of the study areas in our future research on earnings management. Third, this paper examines the influence of the institutional environment on accrual-based and real earnings management, but does not involve its resultant effect on the capital market. Whether investors can effectively identify accrual-based and real earnings management and act rationally will be addressed in our future studies.

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Notes

Note 1. Reference on Wanfu Biotech Company Ltd on China Securities Regulatory Commission (CSRC) official homepage: http://www.csrc.gov.cn/pub/csrc_en/

(http://www.csrc.gov.cn/pub/csrc_en/newsfacts/release/201311/t20131120_238602.html)

Note 2. The "NERI INDEX of Marketization of China's Provinces (2011) Report" by Fan et al. (2011) assesses the institutional environment in Chinese provinces. The authors find that the institutional environment is relatively steady in the provinces during the period between 2002 and 2009. For instance, with regard to the level of marketization, 21 regions changed their rankings by three levels during this period, six regions (Jiangxi, Xinjiang, Hebei, Anhui, Yunnan, and Shanxi provinces) changed four positions, one region (Guangxi province) changed one position, two regions (Hunan and Hainan provinces) changed seven positions, and one region (Henan province) changed nine positions.

Note 3. Relative to the ownership structure, board of directors, information disclosure, and audit systems, the external governance environment is a more fundamental institutional background for corporate governance. As earnings management in listed companies has little effect on the external governance environment, there is no causal relationship between them.

Note 4. The asset sales and stock repurchase means of real earnings management are not involved in the total real earnings management model in this paper for the following two reasons. First, whether disposing of assets can be used as a way of real earnings management is uncertain as Zang (2012) did not find any evidence on the effect of asset sales on real earnings management. Second, Hribar et al. (2006) argue that stock repurchase is used for real earnings management by increasing the earnings per share (EPS). However, due to the complicated motivations of stock repurchase, i.e., both market and political motivations (Gong et al., 2008; Shen et al., 2011), we cannot extract that part of a stock repurchase aimed at earnings management.

Note 5. As the control of sales and production has a great influence on the cost of sales and inventory, Roychowdhury (2006) establishes the expected production cost model by using the expected sales cost and expected inventory models. The sales cost model is a linear function of current sales, while the inventory model is a linear function of current sales and the change in one-period lagged sales.

Note 6. As the residual of the linear model using the current sales to represent the cost of manipulation is small, the cost of manipulation is represented as a linear function of one-period lagged sales to avoid the statistical bias (Roychowdhury, 2006).

Note 7. It should be noted that the R&D and advertising costs are also important parts of discretionary costs. However, they are excluded from the calculation of discretionary costs in this paper for the following two reasons. First, we cannot obtain relevant data and materials as the details of R&D and advertising costs carried forward to current profit and loss are not forced disclosures. Second, according to the Chinese accounting standards, the financial account of R&D costs should be placed in the sub-account of management expenses, and advertising costs should be placed in the sub-account of selling expenses, i.e., most R&D and advertising costs have already been included in the management and selling expenses.

Note 8. Barton and Simko (2002) find that the elasticity of accounting restricts earnings management, and the previous level of earnings management has an impact on the current level.

Note 9. We can find from the total real earnings management model that total real earnings management is negatively related to the real earnings management manipulated by sales and expenditures.