
**Board Governance and Earnings Management
of Chinese Listed Companies**

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Preface

With this master thesis, my study in Department of Economics, University of Oslo ends. However, what I have learned and experienced here will become an invaluable treasure in my whole life. In this very moment, I want to thank all those who have helped me during my campus life.

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Summary

This paper systematically presents theoretical and empirical research on board governance and earnings management of Chinese listed companies, trying to provide references for improving accounting information disclosure and corporate governance of listed companies.

The whole paper includes six chapters. The first chapter is the introduction and introduces the background and contributions, the innovations and research framework of my study.

The second chapter is the literature review on board governance and earnings management, in which I analyze and summarize existing literatures from different theoretical and empirical perspectives.

The third chapter measures the extent of earnings management of Chinese listed companies by using the Modified-Jones Model, which is based on the reviewing of measurement of earnings management and different research models.

The fourth chapter comprehensively evaluates board governance variables, namely, board size, board independence, board duality and board meetings by using descriptive statistics method.

The fifth chapter proposes theoretical hypotheses and conducts empirical examination on the relationship between board governance and earnings management of Chinese listed companies. In this chapter panel date model is introduced and Hausman test is conducted to determine which effect—fixed effect or random effect can better explain the regression model.

The sixth chapter is the conclusion and the main research findings are shown as follows:

1. Earnings management of Chinese listed companies

Among Chinese listed companies sorted by industries, 9 industries out of 12 exaggerate the profits through upward earnings management, 3 industries hide the profits through downward earnings management. Social Services Industry shows the highest earnings management level, while Communication and Culture Industry show the lowest earnings management level.

From 2002 to 2009, the average earnings management of Chinese listed companies gradually declined in fluctuation. The result indicates the quality of accounting information of Chinese listed companies has improved obviously in recent years.

2. Board governance of Chinese listed companies

The descriptive statistics of the four board governance variables show: the average number of board members in Chinese listed companies is 10; while the average number of independent directors is 4; only less than one tenth of Chinese listed companies have board chair also serves as CEO, and this situation tends to decrease.

3. Empirical findings on board governance and earnings management

By using Panel Data Model and controlling for corporate size, return on equity and other factors, the empirical findings on board governance and earnings management are:

- (1) Earnings management of Chinese listed companies is positively correlated to board size;
- (2) Earnings management of Chinese listed companies is negatively correlated with board independence;
- (3) Earnings management is negatively correlated to the separation of the roles of CEO and board chair.

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1. Introduction

1.1 Thesis background and contributions

1.1.1 Thesis background

Institutional setting of Chinese stock market

The Chinese stock market was organized by the government as a vehicle for State Owned Enterprises (SOEs) to raise capital and improve operating performance (Green, 2003). Since the primary objective of developing equity markets is to help SOEs relax external financing constraints, regulations introduced have been asymmetrically in favor of SOEs or the companies with close ties to the government. A fundamental dilemma of the above administrative approach stems from the state policy of maintaining a full or controlling ownership in firms¹. The state wants the firms it owns to be run efficiently, but not solely for the purpose of wealth maximization, which creates conflicts of interest between the state as controlling shareholder and other shareholders. Even worse, the state is playing two roles at the same time—the controlling shareholder and the regulator (Clarke, 2003; Firth et al., 2006). The state representatives dominate corporate boards, which greatly compromise the independence of corporate boardrooms (Liu, 2006).

Tunneling in the Chinese listed companies

The Chinese institutional set-up in the stock market results in pervasive tunneling activities among the listed firms. In most cases, local governments appoint the management of listed firms. As a result, the management often takes action to benefit the largest shareholders (the local government in most cases). It is noted that such practice may add social values in other ways that offset the social costs it imposes through tunneling—e.g., it may help reduce external financing constraints and transaction costs. However, outside investors almost always lose when the

¹ The state takes direct control of important industries such as banking, energy and telecommunication

controlling shareholders tunnel (Cheung et al., 2005). Tunneling activities in China mainly take the form of granting loans to majority shareholders, and related-party transactions. A number of studies have examined the tunneling activities in the Chinese stock markets. Cheung et al. (2005) study a sample of related-party transactions between Chinese listed firms and their controlling shareholders. They provide evidence that related-party transactions are not typically beneficial for minority shareholders. Jiang et al. (2005) document the widespread use of corporate loans by controlling shareholders to extract funds from the listed firms in China.

Earnings management in the Chinese listed companies

Due to the administrative governance approach adopted in China, the regulators often rely on accounting numbers to govern the listed companies. the China Securities Regulatory Commission (CSRC) requires listed companies to meet certain return on equity (ROE) criteria before they can apply for permission to issue additional shares to existing shareholders. Therefore, listed firms have strong incentives to manage earnings above necessary thresholds.

Earnings management tends to be pervasive in China also because private benefits of control are large but the level of corporate governance is poor and the protection of minority investors is weak. To enjoy these private control benefits, controlling shareholders have strong incentives to manage earnings to avoid de-listing, especially when de-listing decision is relied on certain accounting numbers. To controlling shareholders and other insiders, being de-listed implies the loss of private control benefits and future rent-seeking opportunities. Therefore, doing whatever it takes to avoid net loss for three consecutive years provides the Chinese listed companies with another incentive to manage earnings.

1.1.2 Contributions

Enrich the research on board governance and earnings management of Chinese listed companies

Based on current stage of China's capital market development, this paper attempts to do systematic empirical research on board structure of listed companies and earnings management. We expect our research outcome can provide effective evidence for understanding board monitoring mechanisms will impose constraint on earnings management and enrich the research on board governance and earnings management.

Promote listed companies to improve board governance, effectively imposing constraint on earnings management, and improving transparency of listed companies' accounting information

We hope our research helps to understand the practical situation of board governance and earnings management of Chinese listed companies, in order to promote listed companies to improve board governance, effectively imposing constraint on earnings management, and improving transparency of accounting information of listed companies.

1.2 Innovations

Existing domestic empirical studies mainly focus on earnings management of listed companies in order to avoid regulatory constraints and market regulation. The studies aim to discover the motivation of earnings management of listed companies, and try to provide evidence for government regulation or provide references for the supervision of securities markets transactions.

On board governance side, the majority of articles study the impact of board structure on performance of listed companies. Systematic empirical research on board governance and earnings management is not sufficient, especially lacking the analysis of constraints on earnings management from each aspect of board structure. We will conduct in-depth research in this paper.

1.3 Research framework

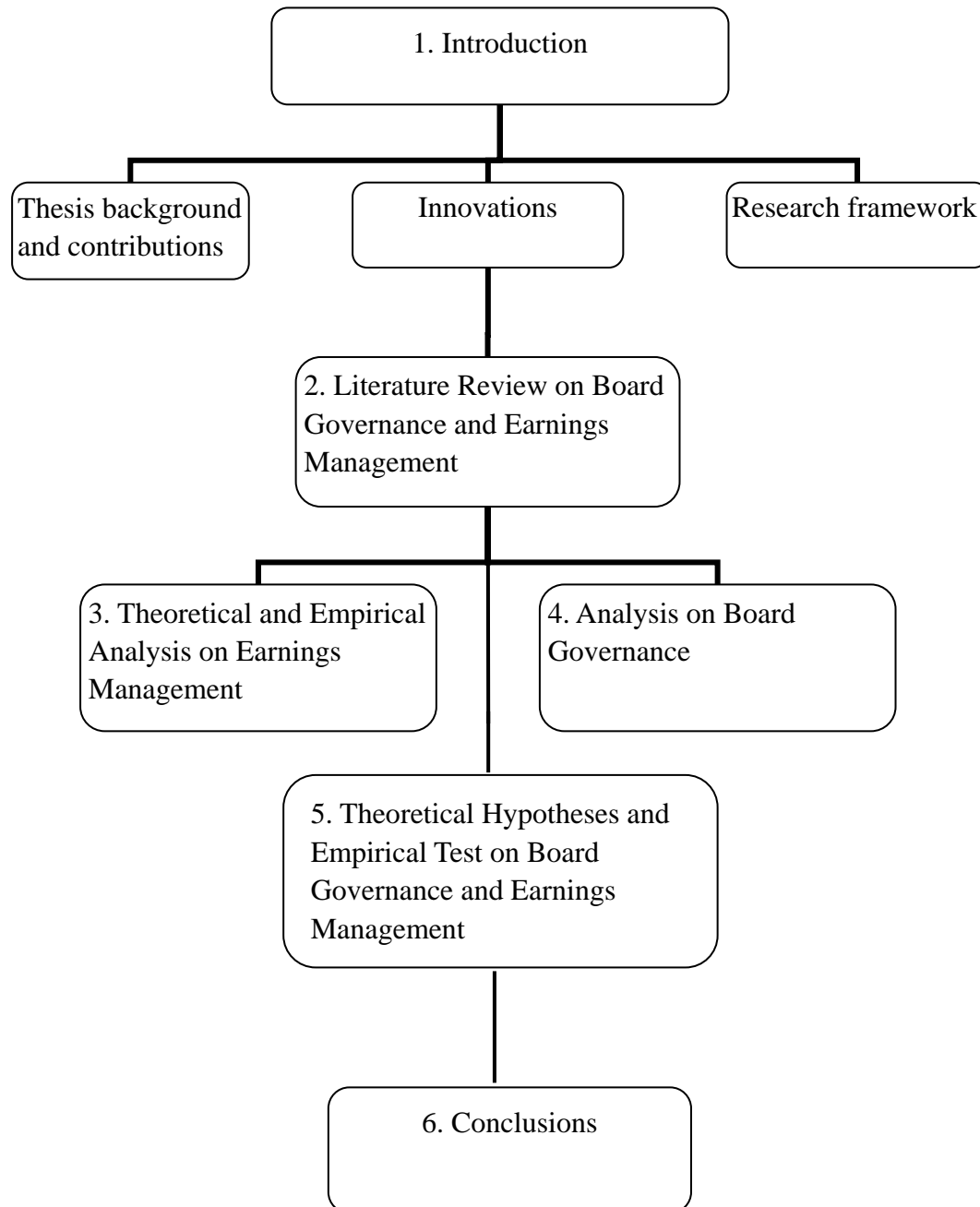


Figure 1: Research framework of board governance and earnings management of Chinese listed companies

2. Literature Review on Board Governance and Earnings Management

The prevalence of earnings management reduces the reliability of accounting information. Users may find it difficult to make fair assessment of corporate performance, managers' ability and effort based on earnings information. Worse still, it may mislead investors to make wrong investment decisions.

Board of Directors of listed companies exercises their monitoring functions to reduce earnings management in two ways: on one hand is to prevent managers from abusing their power against the interests of shareholders through earnings management; on the other hand is to prevent controlling shareholders from undermining corporate resources against the interests of minority shareholders for their own benefits. Therefore, board governance will impose effective constraints on earnings management.

2.1 Earnings management

A growing numbers of literatures abroad have examined corporate earnings management behavior in China's infant stock market. Aharony et al. (2000) identify evidence of earnings manipulation among the Chinese listed firms prior to their Initial Public Offers (IPOs). Chen and Yuan (2004) find that the Chinese listed firms manage earnings to satisfy the ROE requirements for rights issues. Jian and Wong (2005) present evidence that the listed manufacturing firms in China use related-party transactions to manage earnings. Chen et al. (2006) find that various aspects of corporate governance (e.g., boardroom characteristics and ownership) are associated with the incidence of corporate financial fraud.

Domestic researches on earnings management mainly focus on earnings management of listed companies in order to avoid regulatory constraints and market regulation. Lu Jianqiao (1999) takes the sample of listed companies facing losses before the end of 1997 and finds that these companies generally adopted earnings management to reduce or increase earnings in the loss year and the year before and

after, in order to avoid three consecutive year loss which will be regulated by securities regulatory authorities. Zhang Zongyi and Huang Xinjian (2003) conduct empirical study on IPOs of Chinese listed companies from 1998 to 2000 and find that there is significant earnings management in the listing year and the year prior to and after listing. Zhang Yanling and Peng Haoran (2004) empirical study on motivations of earnings management and earnings forecast error find that listed companies with over-estimated earnings will increase earnings through managing the operating income and working capital in the first year after listing, indicating there is strong motivation for listed companies to manipulate earnings in order to avoid punishment on earnings forecast error. Wang Yaping et al (2005) present evidence that from 1995 to 2003, there were earnings management by Chinese listed companies in order to avoid reporting loss.

2.2 Board governance

2.2.1 Board size and earnings management

The Board of directors has direct monitoring responsibility on the management, and obligations to impose constraints on earnings management. Board size (number of board members) is an important factor to the efficiency of board governance. A large number of empirical studies have provide evidence that there is relation between board size and corporate performance, but current studies do not give consistent research findings on the relationship between board size and corporate performance. However, empirical researches on board size and earnings management are rare.

Some scholars believe that to a certain corporate size, a too large board of directors cannot function to the best. This view is based primarily on the Agency Theory and Organizational Behavior Theory. Lipton and Lorsch (1992) present although board monitoring capacity increases with the number of directors increasing, the larger the board of directors, the severer is the free-rider problem (agency problem). The loss from coordination and organization will surpass the profit brought from increasing numbers of directors. Jensen (1993) indicates that the larger the board

of directors, the lower is the efficiency. The “hatred and revenge” between directors may weaken the board's monitoring and evaluation on CEO. While the board will be more easily controlled and influenced by CEO. Yermack (1996) identifies evidence from an empirical test. He takes "Fortune 500" companies as a sample and finds that a small board of directors is more efficient than a large one. Eisenberg et al (1998) take the sample of small and medium companies in Finland, and prove that there is a significant correlation between a smaller board of directors and higher firm performance. Wu (2000) studies changes in board size from 1991 to 1995. She finds that the overall size of board shows a reducing trend during this time, and the pressure from active investors can partially explain the phenomenon. She identifies that the market participants believe that small board of directors is doing better than relatively large board of directors in monitoring managers.

Resource Dependence Theory is the main theoretical foundation for the view that relatively large board of directors is more conducive to improve governance efficiency. More directors may bring more knowledge, experience and external resources to the board, making knowledge and experience within the board play complementary roles better, which to some extent reduces the company risk. In addition, it is easier to coordinate interests of different stakeholders in the board with different stakeholder representatives. Dalton et al (1999) present evidence based on the analysis of 131 different samples that there is significant positive correlation between corporate performance and board size, and the larger board of directors is able to provide better external resources and is more professional. Coles et al (2005) show that small board size does not apply to all kinds of companies, for those cross-industries, large-scale and high-debt companies, who need help and experience from more directors, board size and company performance are positively correlated.

From domestic perspective, Wang Liyan and Liu Junxia (2003) find that earnings management is negatively correlated with board size. Cai Ning (2003) finds that there is a significant positive correlation between board size and financial fraud.

2.2.2 Board independence and earnings management

From an agency perspective, the ability of the board to act as an effective monitoring mechanism is dependent upon its independence from management.

A large number of literatures abroad have conducted empirical research on independent directors' monitoring function on earnings management. Beasley (1996) finds that the presence of independent directors on the board reduces the likelihood of financial statement fraud. Klein A. (2002) suggests that boards structured to be more independent from CEO are more effective in monitoring the corporate financial accounting process and earnings management. Xie et al. (2003) finds that earnings management is less likely to occur in companies whose boards include both more independent outside directors and directors with corporate experience. But the level of earnings management may influence the subsequent selection of board. Davidson et al.(2005) find that, based on a broad cross-sectional sample of 434 listed Australian firms, a majority of non-executive directors on the board are significantly associated with a lower likelihood of earnings management. Peasnell et al. (2005) examines whether the incidence of earnings management by UK firms depends on board monitoring. Results indicate that the likelihood of managers making income-increasing abnormal accruals is negatively related to the proportion of outsiders on the board. Cornett (2009) finds that earnings management and corporate governance are endogenously determined. Thus, OLS estimation can lead to biased coefficients and a simultaneous equations approach is used. Based on 593 largest bank holding companies head-quartered in US, the paper indicates earnings, board independence, and capital are negatively related to earnings management.

From the domestic point of view, Zhang and Chen (2006) shows that the higher percentage of independent directors in the board, the lower level of earnings management, which suggests independent directors of Chinese listed companies are playing an important role. Zhang et al. (2006) indicates there is a significant "U" shaped relationship between the proportion of independent directors and earnings management.

However, Cai (2007) indicates that there is no significant correlation between independent directors and earnings management. Wang (2007) tests the relation between independent directors and earnings quality based on the listed companies' data from 2002-2004. The result is, in general, independent directors have not performed an efficient role yet in China.

2.2.3 Board duality and earnings management

Board duality, that is, whether the chairman of the board is the same person as general manager, is the focus of academic debate. **Modern Stewardship Theory argues that chairman of the board and general manager should be the same person.** Boyd (1995) points out that this mode helps to improve the efficiency of communication and decision-making.

However, **Agency Theory actively advocates chairman of the board and general manager should be different persons.** In order to prevent moral hazard and adverse selection problems generated by managers, an effective monitoring mechanism is necessary. If the manager is the same person as the chairman, then the monitoring mechanism will collapse. Lipton and Lorsch (1992), Jensen (1993) suggest that chairman and general manager is the same person will lead to a low efficient board, because the board would be difficult to carry out its monitoring function. Dechow et al (1996) find that if the board is controlled by general manager, earnings management is more likely to occur. Beasley (1996) points out, CEO serves as chairman of the board will lead to power concentration and conflict of interests, thus undermine board monitoring function.

From domestic view, CEO serves as chairman of the board is often seen as hindering corporate performance improvement. However, it has not yet reached a clear conclusion that chairman and general manager is the same person will increase the possibility of earnings management. This paper will conduct empirical research in this area in order to clarify the relation between board duality and earnings management.

2.2.4 Board meetings and earnings management

The frequency of board meetings may reflect whether the board is active or not. It is generally believed that an active board is more effective in monitoring the management, so decisions made are more in line with the interests of majority shareholders, thus is conducive to enhance corporate performance.

Lipton and Lorsch (1992) suggest that increasing board meeting time will improve the efficiency of the board. The more frequent board meeting is, directors are more willing to perform their duties which are consistent with the interests of shareholders. On the contrary, Jensen (1993) finds that most of the board meetings are not very effective. The board is often forced to engage in high-frequency activities to resolve corporate matters. Therefore, a higher frequency of board activities may be the response to poor corporate performance.

The literature on board meetings and earnings management are rare and mainly from abroad. Vafeas (1999) finds that the more frequent the board meeting, the lower degree of earnings management and the more transparency is corporate financial information. Xie et al (2003) suggest that board meeting is an important factor to restrict earnings management activities of managers.

2.3 Literature review summary

From the above literature review, we find there are few papers making profound theoretical and empirical analysis on the relationship between board governance of Chinese listed companies and earnings management. And the relevant empirical studies show quite different results. So in the following parts, we will first give theoretical and empirical analysis of earnings management in Chinese listed companies, then followed by examination on the relations between board governance of Chinese listed companies and earnings management.

3. Theoretical and Empirical Analysis on Earnings Management

The setting up of corporate board is to coordinate the conflicts of interest between shareholders and managers, aimed at maximizing the shareholders' interests by dispensing constraints and incentives to managers. Therefore, a perfect governance structure of the board will compress manager's implementation space of earnings management and manipulation.

In this part, we will first study the quantitative analysis of earnings management through reviewing and summarizing the existing quantitative research models, and then by comparing the models, we will determine a suitable model for earnings management measurement of Chinese listed companies.

3.1 Measurement of earnings management

Theorists have been attempting to deliver an accurate and objective measurement for earnings management in order to do a better quantitative research. The existing measuring models of earnings management can be divided into three categories: accruals model, specific accruals model and accruals distribution model.

3.1.1 Accruals model

Accrual model is currently the mainstream measuring of earnings management. This method points out that total accruals of a listed company is composed of accruals by earnings management, namely discretionary accruals, and accruals by different accounting methods, namely non-discretionary accruals. Therefore, from measuring non-discretionary accruals by constructing a regression model, discretionary accruals is calculated as the difference between total accruals and non-discretionary accruals, which measures the degree of earnings management.

3.1.2 Specific accruals model

As accrual method depends on some subjective assumptions, there is some limitation in practical application. Researchers choose to study accruals models case

by case and put forward the specific accruals model. They try to make analysis and calculation of specific accrued items to determine the degree of earnings management. But the drawbacks of specific accruals model often confines to a small sample or specific industry, which makes the research results impossible to popularize.

3.1.3 Accruals distribution model

Accruals distribution model is a more practical method. This method firstly need to determine specific earnings index, then through testing distribution of reporting earnings around the specific index to judge the existence of earnings management. Existing researches find that around specific earnings index, there are more or less observations than expected, indicating around these specific earnings index earnings management exists. But the shortcoming is that by using this method, one cannot get the information on means and degrees of earnings management hence cannot further do a quantitative study.

3.1.4 Measurement of earnings management

According to existing empirical researches home and abroad, we find that accruals models get the most extensive applications in quantitative study of earnings management, and the theoretical research on earnings management through accruals model is relatively mature.

In this paper, we will conduct empirical test on the relationship between board structure and earnings management, so quantitative measurement of earnings management is necessary. In addition, the realized quantitative measurement should support large sample. In this respect, accruals model has the advantage over the other two models, therefore we will adopt accruals model for measuring earnings management.

3.2 Earnings management models under accruals method

Healy (1985) suggests that the net income of firms can be divided into two parts: operating cash flow and accruals, and notices that accrued items can change the confirming time for reported earnings and allow managers to transfer earnings between each period. The measurement of earnings management under accruals model is based on decomposition of total accruals (TAC) into non-discretionary accruals and discretionary accruals. Non-discretionary accrual is calculated through regression model and discretionary accrual is the difference between total accruals and non-discretionary accruals, which is a measure of earnings management. By reviewing existing research on earnings management models, representative econometric models basically are as follows:

3.2.1 Jones Model

Jones (1991) relaxes the assumption that non-discretionary accruals can only be constant numbers and puts forward an earnings management model aimed at controlling the influence of economic environment change on non-discretionary accruals. The model calculating non-discretionary accruals is demonstrated below:

$$NDA_t = a_1(1/A_{t-1}) + a_2\Delta REV_t/A_{t-1} + a_3PPE_t/A_{t-1}$$

Where:

ΔREV_t = change in sales revenue between year t -1 and t,

PPE_t = gross property, plant and equipment in year t,

A_{t-1} = total assets at the end of the previous year t-1,

a_1 , a_2 and a_3 are industry-specific coefficients estimated from the following cross-sectional regression:

$$TA_t = \alpha_1(1/A_{t-1}) + \alpha_2\Delta REV_t/A_{t-1} + \alpha_3PPE_t/A_{t-1} + V_t$$

Where α_1 , α_2 and α_3 are the OLS regression estimates of a_1 , a_2 and a_3 respectively, TA_t = total accruals in year t divided by total assets in year t-1.

A hidden hypothesis of Jones model is that sales revenue cannot be manipulated. But if earnings management is realized through manipulation of sales revenue, then the model will make the part of earnings management removed from discretionary accruals.

3.2.2 Industry Model

Dechow and Sloan (1991) present industry model which also eases the assumption that non-discretionary accruals are constants as Jones model does. But the difference is that industry model assumes that influence factors of non-discretionary accruals are the same between different enterprises in the same industry. Industry model is as follows:

$$NDA = r_1 + r_2 \text{ median (TA)}$$

Where median (TA) is the median of total accruals divided by total assets in year $t-1$, r_1 and r_2 are industry-specific coefficients estimated from OLS model.

Industry model eliminates the difference of non-discretionary accruals within different enterprises in the same industry, but if the changes of non-discretionary accruals are rendered by enterprise specific environment factors, the industry model cannot separate non-discretionary accruals and discretionary accruals accurately.

3.2.3 Modified-Jones Model

Assume account sale also can become a source of earnings management. Dechow (1995) presents Modified-Jones Model by deducting accounts receivable from sales revenue. The model is as follows:

$$NDA_t = a_1(1/A_{t-1}) + a_2(\Delta REV_t - \Delta REC_t)/A_{t-1} + a_3 PPE_t/A_{t-1}$$

Where, ΔREC_t = change in accounts receivable between year $t-1$ and t , industry-specific coefficients a_1 , a_2 and a_3 and non-discretionary accruals come from the original Jones Model.

So the only adjustment of Modified-Jones Model is that it deducts change in accounts receivable from change in sales revenue. The underlying assumption is that all the change in accounts receivable is caused by earnings management. This is based

on the following reasoning, for managers, it is much easier to manage earnings from accounts receivable than from cash sale income.

3.3 Earnings management of Chinese listed companies

3.3.1 Modified-Jones Model for earnings management

From Chinese listed companies operating situations and accounting procedures, corporate non-discretionary accruals will definitely change with the economic environment. Although the original Jones Model is trying to explain the influence of economic environment change on non-discretionary accruals, it does not take into account that different industries have different influence factors on non-discretionary accruals of the listed companies. And if most of non-discretionary accruals changes are caused by enterprise specific environment factors, then the industry model, which ignores differences in enterprises within the same industry, cannot separate non-discretionary accruals and discretionary accruals accurately. To sum up, we will adopt the Modified-Jones Model to measure earnings management in Chinese listed companies.

$$EDA_t = TA_t/A_{t-1} - [a_1(1/A_{t-1}) + a_2(\Delta REV_t - \Delta REC_t)/A_{t-1} + a_3 PPE_t/A_{t-1}]$$

Where:

ΔREV_t = change in sales revenue between year t -1 and t,

ΔREC_t = change in accounts receivable between year t -1 and t,

PPE_t = gross property, plant and equipment in year t,

A_{t-1} = total assets at the end of the previous year t-1,

a_1 , a_2 and a_3 are industry-specific coefficients estimated from the following cross-sectional regression:

$$TA_t = \alpha_1(1/A_{t-1}) + \alpha_2(\Delta REV_t - \Delta REC_t)/A_{t-1} + \alpha_3 PPE_t/A_{t-1} + v_t$$

Where α_1 , α_2 and α_3 are the OLS regression estimates of a1, a2 and a3

$$TA_t = \text{NetIncomet} - \text{CFOt},$$

Where CFOt = Net Cash flow from operating activities in year t.

3.3.2 Sample selection

Due to measurement of earnings management need to differentiate research samples of various industries, we differentiate various industries according to *Industry Classification of Listed Companies Guidelines* issued by China Securities Regulatory Commission.

Our empirical test are conducted using data for all the listed firms in Shanghai Stock Exchange (A Share) with fiscal year ends between 2001 and 2009 as a primary sample, making the following screening:

- 1) Eliminating listed companies in financial and insurance industry, because compared with other sectors, companies in financial and insurance sector have special accounting rules;
- 2) Removing all ST companies;
- 3) Removing companies with incomplete financial data between 2001 and 2009.

In order to make a comprehensive research on earnings management of Shanghai A-share listed companies, same number of listed companies are selected as samples from each industry, and altogether 93 listed companies are finally chosen, covering 12 industries (see table 1 below):

Table 1: 2001-2009 Shanghai Stock Exchange 93 A-share sample companies sorted by industry

No.	Securities Code	Corporate Name	Industry	No.	Securities Code	Corporate Name	Industry	
1	600508.SH	SHANGHAI DATUN ENERGY RESOURCES CO.,LTD.	MINING AND QUARRYING INDUSTRIES	48	600438.SH	TONGWEI CO.,LTD	FARMING, FORESTRY, ANIMAL HUSBANDRY AND FISHERY INDUSTRIES	
2	600028.SH	CHINA PETROLEUM & CHEMICAL CORPORATION		49	600075.SH	XINJIANG TIANYE CO.,LTD.		
3	600188.SH	YANZHOU COAL MINING CO., LTD.		50	600975.SH	HUNAN NEW WELLFUL CO.LTD.		
4	600489.SH	ZHONGJIN GOLD CO., LTD.		51	600108.SH	GANSU YASHENG INDUSTRIAL (GROUP) CO.,LTD		
5	600395.SH	GUIZHOU PANJIANG REFINED COAL CO.,LTD.		52	600093.SH	SICHUAN HEJIA CO.LTD.		
6	600583.SH	OFFSHORE & OIL ENGINEERING CO.,LTD		53	600097.SH	SHANGHAI KAICHUANG MARINE INTERNATIONAL CO.,LTD		
7	600547.SH	SHANDONG GOLD MINING CO.,LTD.		54	600631.SH	SHANGHAI BAILIAN GROUP CO.,LTD.		WHOLESALE AND RETAIL TRADE INDUSTRIES
8	600123.SH	SHANXI LANHUA SCI-TECH VENTURE CO.,LTD		55	600826.SH	SHANGHAI LANSHENG CORPORATION		
9	600037.SH	BEIJING GEHUA CATV NETWORK CO., LTD.		56	600859.SH	BEIJING WANGFUJING DEPARTMENT STORE (GROUP)CO.,LTD.		
10	600088.SH	CHINA TELEVISION MEDIA LTD.		57	600755.SH	XIAMEN INTERNATIONAL TRADE GROUP CO., LTD.		
			COMMUNICAION AND CULTURE INDUSTRIES					

11	600551.SH	TIME PUBLISHING & MEDIA CO., LTD.		58	600628.SH	SHANGHAI NEW WORLD CO.,LTD.	
12	600831.SH	BROADCAST & TV NETWORK INTERMEDIARY (GROUP) CO.LTD		59	600827.SH	SHANGHAI FRIENDSHIP GROUP INCORPORATED COMPANY	
13	600880.SH	CHENGDU B-RAY MEDIA CO., LTD.		60	600056.SH	CNTIC TRADING CO., LTD.	
14	600236.SH	GUANGXI GUIGUAN ELECTRIC POWER CO.,LTD.		61	600500.SH	SINOCHEM INTERNATIONAL CORPORATION	
15	600795.SH	GD POWER DEVELOPMENT CO., LTD		62	600874.SH	TIANJIN CAPITAL ENVIRONMENTAL GROUP PROTECTION CO., LTD	
16	600027.SH	HUADIAN POWER INTERNATIONAL CO.,LTD.		63	600611.SH	DAZHONG TRANSPORTATION (GROUP) CO.,LTD.	
17	600116.SH	CHONGQING THREE GORGES WATER CONSERVANCY AND ELECTRIC POWER CO.,LTD.	POWER, GAS AND WATER PRODUCTION AND SUPPLY INDUSTRIES	64	600054.SH	HUANGSHAN TOURISM DEVELOPMENT CO., ,LTD.	
18	600021.SH	SHANGHAI ELECTRIC POWER CO.,LTD.		65	600754.SH	SHANGHAI JINJIANG INTERNATIONAL HOTELS DEVELOPMENT CO., LTD.	SOCIAL SERVICE INDUSTRY
19	600642.SH	SHENERGY CO.,LTD		66	600358.SH	CHINA UNITED TRAVEL CO., LTD.	
20	600780.SH	TOP ENERGY CO.,LTD		67	600662.SH	SHANGHAI QIANGSHENG HOLDING CO.,LTD.	
21	600292.SH	CHONGQING JIULONG ELECTRIC POWER CO.,LTD		68	600008.SH	BEIJING CAPITAL CO., LTD	
22	600185.SH	XI' AN GREE REAL ESTATE		69	600350.SH	SHANDONG EXPRESSWAY	

		CO.,LTD				CO.,LTD.	
23	600748.SH	SHANGHAI INDUSTRIAL DEVELOPMENT CO.,LTD.	REAL ESTATE INDUSTRY	70	600345.SH	WUHAN YANGTZE COMMUNICATION INDUSTRY GROUP CO., LTD	INFORMATION TECHNOLOGY INDUSTRY
24	600383.SH	GEMDALE CORPORATION		71	600601.SH	FOUNDER TECHNOLOGY GROUP CORP.	
25	600823.SH	SHANGHAI SHIMAO CO.,LTD		72	600654.SH	SHANGHAI FEILO CO.,LTD.	
26	600648.SH	SHANGHAI WAI GAOQIAO FREE TRADE ZONE DEVELOPMENT CO.,LTD.		73	600122.SH	JIANGSU HONGTU HIGH TECHNOLOGY CO.,LTD	
27	600246.SH	BEIJING VANTONE REAL ESTATE CO.,LTD		74	600850.SH	SHANGHAI EAST-CHINA COMPUTER CO.,LTD	
28	600376.SH	BEIJING CAPITAL DEVELOPMENT CO.,LTD.		75	600680.SH	SHANGHAI POTEVIO CO.,LTD.	
29	600724.SH	NINGBO FUDA CO.,LTD.		76	600734.SH	FUJIAN START GROUP CO. LTD.	
30	600266.SH	BEIJING URBAN CONSTRUCTION INVESTMENT& DEVELOPMENT CO.,LTD.	BUILDING INDUSTRY	77	600050.SH	CHINA UNITED NETWORK COMMUNICATION S LIMITED	MANUFACTURING INDUSTRIES
31	600068.SH	CHINA GEZHOUBA GROUP CO.,LTD.		78	600196.SH	SHANGHAI FOSUN PHARMACEUTICAL (GROUP) CO.,LTD.	
32	600477.SH	ZHEJIANG HANGXIAO STEEL STRUCTURE CO.,LTD		79	600597.SH	BRIGHT DAIRY & FOOD CO., LTD	
33	600853.SH	LONGJIAN ROAD & BRIDGE CO.,LTD.		80	600612.SH	LAO FENG XIANG CO.,LTD.	
34	600170.SH	SHANGHAI CONSTRUCTION GROUP CO., LTD		81	600186.SH	HENAN LIANHUA GOURMET POWDER CO., LTD.	
35	600039.SH	SICHUAN ROAD & BRIDGE CO.,LTD		82	600690.SH	QINGDAO HAIER CO., LTD	

36	600820.SH	SHANGHAI TUNNEL ENGINEERING CO., LTD.		83	600031.SH	SANY HEAVY INDUSTRY CO.,LTD	
37	600512.SH	TENGDA CONSTRUCTION GROUP CO., LTD.		84	600884.SH	NINGBO SHANSHAN CO.,LTD.	
38	600004.SH	GUANGZHOU BAIYUN INTERNATIONAL AIRPORT CO.,LTD.		85	600150.SH	CHINA CSSC HOLDINGS LIMITED	
39	600115.SH	CHINA EASTERN AIRLINES CO.,LTD.		86	600832.SH	SHANGHAI ORIENTAL PEARL(GROUP) CO., LTD	
40	600650.SH	SHANGHAI JIN JIANG INTERNATIONAL INDUSTRIAL INVESTMENT CO.,LTD		87	600624.SH	SHANGHAI FUDAN FORWAR D S&T CO., LTD	
41	600377.SH	JIANGSU EXPRESSWAY CO.,LTD		88	600622.SH	SHANGHAI JIABAO INDUSTRY & COMMERCE (GROUP) CO.,LTD	
42	600717.SH	TIANJIN PORT(GROUP) CO., LTD.	TRANSPORTATION AND STORAGE INDUSTRIES	89	600051.SH	NINGBO UNITED GROUP CO.,LTD.	INTEGRATED INDUSTRY
43	600125.SH	CHINA RAILWAY TIELONG CONTAINER LOGISTICS CO., LTD.		90	600790.SH	CHINA LIGHT&TEXTILE INDUSTRIAL CITY GROUP CO.,LTD.	
44	600897.SH	XIAMEN INTERNATIONAL AIRPORT CO.,LTD.		91	600846.SH	SHANGHAI TONGJI SCIENCE & TECHNOLOGY INDUSTRIAL CO.,LTD.	
45	600428.SH	COSCO SHIPPING CO.,LTD.		92	600895.SH	SHANGHAI ZHANGJIANG HI-TECH PARK DEVELOPMENT CO.,LTD.	

46	600598.SH	HEILONGJIANG AGRICULTURE CO.,LTD.	FARMING, FORESTRY, ANIMAL HUSBANDRY AND	93	600770.SH	JIANGSU ZONGYI CO., LTD
47	600257.SH	DAHU AGRICULTURE CO.,LTD.	FISHERY INDUSTRIES			

Data source: Wind database (Shanghai A-share Companies financial statement data)

3.3.3 Empirical test and results on earnings management

We adopt SUR (Seemingly Unrelated Regression Models) to conduct empirical test on the following model:

$$TA_t = \alpha_1(1/A_{t-1}) + \alpha_2(\Delta REV_t - \Delta REC_t)/A_{t-1} + \alpha_3 PPE_t/A_{t-1} + v_t \quad (1)$$

Regression results for parameter α_1 , α_2 and α_3 can be found in Appendix,

where:

$$ta_assi = TA_t/A_{t-1}$$

$$drvci = (\Delta REV_t - \Delta REC_t)/A_{t-1}$$

$$ppe_i = PPE_t/A_{t-1} \quad (i = 1.2....., 93)$$

The results show that the model is significant, hence indicates modified-Jones model can estimate sample enterprises' non-discretionary accruals.

According to the following equation:

$$EDA_t = TA_t/A_{t-1} - [a_1(1/A_{t-1}) + a_2(\Delta REV_t - \Delta REC_t)/A_{t-1} + a_3 PPE_t/A_{t-1}] \quad (2)$$

The expected discretionary accruals are residuals from the above regression (1), thus we can come to the conclusion that measurement results of discretionary accruals (EDA) of the above 93 companies are shown in Table 2.1-2.12.

Earnings Management of Companies in Mining and Quarrying Industries

From the table below, we can see from 2002 to 2009 there are 33 observations in Mining and Quarrying Industries with negative earnings management (EDA), meaning the enterprises made downward earnings management to hide profits by manipulating discretionary accruals, and the maximum extent is -0.11; while another 31 observations showing positive EDA, indicating sample enterprises made income-increasing earnings management by increasing discretionary accruals, and the maximum extent is 0.10.

During observation period the average earnings management of sample companies is 2.36E-07, showing that the whole industry executed an upward earnings management.

**Table 2.1: Earnings Management Measurement in Mining and Quarrying Industries
2002-2009**

Corporate Name	Year	EDA	Corporate Name	Year	EDA	Corporate Name	Year	EDA
SHANGHAI DATUN ENERGY RESOURCES CO.,LTD.	2002	0.02191	ZHONGJIN GOLD CO., LTD.	2002	0.079378	SHANDONG GOLD MINING CO.,LTD.	2002	0.0182915
	2003	-0.02845		2003	-0.01833		2003	-0.020303
	2004	0.046807		2004	-0.03762		2004	0.0336098
	2005	0.029892		2005	-0.02262		2005	0.0471396
	2006	-0.04498		2006	0.029524		2006	0.046281
	2007	-0.03905		2007	0.050364		2007	-0.00124
	2008	0.017668		2008	0.023211		2008	-0.01591
	2009	-0.0038		2009	-0.10391		2009	-0.10786
CHINA PETROLEUM & CHEMICAL CORPORATION	2002	0.00811	GUIZHOU PANJIANG REFINED COAL CO.,LTD.	2002	0.004291	SHANXI LANHUA SCI-TECH VENTURE CO.,LTD	2002	-0.02103
	2003	0.005634		2003	-0.05737		2003	-0.01906
	2004	-0.02783		2004	0.102788		2004	0.042948
	2005	0.024024		2005	0.006564		2005	0.039261
	2006	-0.01163		2006	-0.07259		2006	-0.00996
	2007	-0.01719		2007	-0.01438		2007	0.014924
	2008	0.011001		2008	0.036673		2008	-0.11288
	2009	0.007883		2009	-0.00597		2009	0.065803
YANZHOU COAL MINING CO., LTD.	2002	0.051708	OFFSHORE & OIL ENGINEERING CO.,LTD	2002	-0.02026			
	2003	-0.0411		2003	-0.00931			
	2004	-0.02201		2004	0.010114			
	2005	0.050657		2005	-0.02599			
	2006	-0.05647		2006	-0.01184			
	2007	-0.05162		2007	0.025623			
	2008	-0.0323		2008	-0.00601			
	2009	0.10114		2009	0.037672			

Earnings Management of Companies in Communication and Culture Industries

From the table below, we can see from 2002 to 2009 there are 16 observations in Communication and Culture Industries with negative EDA, meaning the enterprises made downward earnings management, and the maximum extent is -0.10; while another 24 observations showing positive EDA, indicating enterprises made income-increasing earnings management and the maximum extent is 0.07.

The enterprise which made the maximum upward and downward manipulation in earnings is CHINA TELEVISION MEDIA LTD.

During observation period the average earnings management of sample companies is 2E-07, showing that the whole industry executed an upward earnings management.

Table 2.2: Earnings Management Measurement in Communication and Culture Industries 2002-2009

Corporate Name	Year	EDA	Corporate Name	Year	EDA	Corporate Name	Year	EDA
BEIJING GEHUA CATV NETWORK CO., LTD.	2002	0.033385	TIME PUBLISHING & MEDIA CO., LTD.	2002	-0.02139	CHENGDU B-RAY MEDIA CO., LTD.	2002	0.013243
	2003	-0.0421		2003	-0.02705		2003	0.017483
	2004	0.040786		2004	-0.01837		2004	-0.00149
	2005	0.042888		2005	0.006197		2005	-0.0013
	2006	-0.0651		2006	0.004162		2006	0.033447
	2007	0.01058		2007	0.046368		2007	-0.09463
	2008	0.016384		2008	0.010501		2008	0.003891
	2009	-0.03681		2009	-0.00042		2009	0.029357
CHINA TELEVISION MEDIA LTD.	2002	0.01635	BROADCAST & TV NETWORK INTERMEDIARY (GROUP)CO.LTD	2002	0.008453			
	2003	-0.01738		2003	0.030361			
	2004	0.008633		2004	0.02398			
	2005	0.007832		2005	-0.03908			
	2006	-0.02128		2006	-0.0412			
	2007	0.037611		2007	0.017437			
	2008	-0.1029		2008	0.003757			
	2009	0.071132		2009	-0.00371			

Earnings Management of Companies in Power, Gas and Water Production and Supply Industries

From the table below, we can see from 2002 to 2009 there are 33 observations in Power, Gas and Water Production and Supply Industries with negative EDA, suggesting the enterprises made downward earnings management, and the maximum extent is -0.34; while 31 observations showing positive EDA, indicating enterprises made income-increasing earnings management, and the maximum extent is 0.40.

Both the upward and downward earnings management is greater than Mining and Quarrying Industries and Communication and Culture Industries. The annual earnings management of SHANGHAI ELECTRIC POWER CO., LTD. is the highest in the industry.

During observation period the average earnings management of sample companies is 6.25E-09, suggesting that the whole industry executed an upward earnings management.

Table 2.3: Earnings Management Measurement in Power, Gas and Water Production and Supply Industries 2002-2009

Corporate Name	Year	EDA	Corporate Name	Year	EDA	Corporate Name	Year	EDA
GUANGXI GUIGUAN ELECTRIC POWER CO.,LTD.	2002	-0.01795	CHONGQING THREE GORGES WATER CONSERVANCY AND ELECTRIC POWER CO.,LTD.	2002	0.035595	CHONGQING JIULONG ELECTRIC POWER CO.,LTD	2002	-0.014958
	2003	0.030438		2003	0.024314		2003	0.0024987
	2004	0.005867		2004	-0.08562		2004	0.0307792
	2005	-0.01334		2005	-0.01908		2005	-0.003627
	2006	0.0039		2006	0.001369		2006	-0.006341
	2007	-0.02819		2007	0.01672		2007	-0.014064
	2008	-0.00073		2008	0.011616		2008	-0.02078
	2009	0.020003		2009	0.015081		2009	0.0264913
GD POWER DEVELOPMENT CO., LTD	2002	-0.03989	SHANGHAI ELECTRIC POWER CO.,LTD.	2002	-0.27258	TOP ENERGY CO.,LTD	2002	0.0144688
	2003	0.049869		2003	-0.34402		2003	0.0860512
	2004	-0.0689		2004	0.051283		2004	0.0388369
	2005	-0.0619		2005	0.381531		2005	-0.058087
	2006	-0.02484		2006	0.242686		2006	-0.088147
	2007	-0.03224		2007	-0.33312		2007	0.0275613
	2008	-0.02642		2008	-0.12518		2008	-0.014157
	2009	0.204311		2009	0.39941		2009	-0.006528
HUADIAN POWER INTERNATION AL CO.,LTD.	2002	0.021555	SHENERGY CO.,LTD	2002	-0.0129			
	2003	-0.02872		2003	0.002409			
	2004	-0.03308		2004	0.035431			
	2005	0.030768		2005	-0.01499			
	2006	0.019901		2006	-0.03317			
	2007	-0.02004		2007	0.035471			
	2008	0.008897		2008	-0.00718			
	2009	0.000721		2009	-0.00508			

Earnings Management of Companies in Real Estate Industry

From the table below, we can see from 2002 to 2009 there are 32 observations in Real Estate Industry with negative EDA, suggesting the enterprises made downward earnings management, and the maximum extent is -0.15; while another 32 observations showing positive EDA, indicating enterprises made income-increasing earnings management and the maximum extent is 0.17.

The enterprise which made the maximum upward and downward earnings management is the same firm—SHANGHAI INDUSTRIAL DEVELOPMENT CO., LTD.

During observation period the average earnings management of sample companies is 3.13E-08 suggesting that the whole industry executed an upward earnings management.

Table 2.4: Earnings Management Measurement in Real Estate Industry 2002-2009

Corporate Name	Year	EDA	Corporate Name	Year	EDA	Corporate Name	Year	EDA
XI' AN GREE REAL ESTATE CO.,LTD	2002	-0.01983	SHANGHAI SHIMAO CO.,LTD	2002	-0.04579	BEIJING CAPITAL DEVELOPMENT CO.,LTD.	2002	0.103837
	2003	0.011975		2003	0.077664		2003	-0.05762
	2004	0.019295		2004	-0.03062		2004	-0.03567
	2005	-0.01292		2005	-0.00839		2005	-0.01374
	2006	-0.00998		2006	0.030284		2006	-0.01166
	2007	0.002773		2007	-0.06163		2007	0.005909
	2008	0.01436		2008	0.036309		2008	0.003358
	2009	-0.00568		2009	0.00217		2009	0.005581
SHANGHAI INDUSTRIAL DEVELOPMENT CO.,LTD.	2002	0.05403	SHANGHAI WAI GAOQIAO FREE TRADE ZONE DEVELOPMENT CO.,LTD.	2002	0.064475	NINGBO FUDA CO.,LTD.	2002	-0.00325
	2003	0.165086		2003	-0.09142		2003	0.042353
	2004	-0.03695		2004	0.053698		2004	-0.07325
	2005	-0.00923		2005	0.037644		2005	0.008913
	2006	0.132836		2006	0.086735		2006	0.048047
	2007	-0.15243		2007	0.058003		2007	-0.04503
	2008	-0.08716		2008	-0.12787		2008	-0.0124
	2009	-0.06619		2009	-0.08127		2009	0.034618
GEMDALE CORPORATION	2002	0.019274	BEIJING VANTONE REAL ESTATE CO.,LTD	2002	-0.00362			
	2003	-0.07713		2003	-0.0088			
	2004	0.007178		2004	0.022724			
	2005	0.053423		2005	-0.0126			
	2006	-0.08471		2006	-0.02868			
	2007	0.077771		2007	0.023713			
	2008	0.044157		2008	-0.01438			
	2009	-0.03996		2009	0.021654			

Earnings Management of Companies in Building Industry

From the table below, we can see from 2002 to 2009 there are 33 observations in Building Industry with negative EDA, suggesting the enterprises made downward earnings management, and the maximum extent is -0.40; while 31 observations showing positive EDA, indicating enterprises made income-increasing earnings management, and the maximum extent is 0.36.

Both the upward and downward earnings management is approximately at the same level as the Power, Gas and Water Production and Supply Industries. The earnings management of ZHEJIANG HANGXIAO STEEL STRUCTURE CO., LTD. is the highest in the industry.

During observation period the average earnings management of sample companies is 2.38E-07, suggesting that the whole industry executed an upward earnings management.

Table 2.5: Earnings Management Measurement in Building Industry 2002-2009

Corporate Name	Year	EDA	Corporate Name	Year	EDA	Corporate Name	Year	EDA
BEIJING URBAN CONSTRUCTION INVESTMENT& DEVELOPMENT CO.,LTD.	2002	0.325142	LONGJIAN ROAD & BRIDGE CO.,LTD.	2002	0.009608	SHANGHAI TUNNEL ENGINEERING CO., LTD.	2002	-0.015192
	2003	-0.12936		2003	-0.03538		2003	-0.196278
	2004	-0.1216		2004	-0.00727		2004	0.0130304
	2005	-0.02931		2005	0.013692		2005	0.0285371
	2006	-0.02314		2006	0.021476		2006	0.1342703
	2007	-0.04985		2007	-0.0026		2007	0.0062261
	2008	-0.0161		2008	-0.02093		2008	0.0130621
	2009	0.044228		2009	0.0214		2009	0.0163435
CHINA GEZHOUBA GROUP CO.,LTD.	2002	-0.13744	SHANGHAI CONSTRUCTION GROUP CO., LTD	2002	-0.0086	TENGD A CONSTRUCTION GROUP CO., LTD.	2002	0.0205575
	2003	0.205251		2003	0.01524		2003	0.0471286
	2004	-0.0177		2004	0.001053		2004	-0.08444
	2005	-0.05619		2005	-0.02627		2005	-0.001439
	2006	-0.03959		2006	-0.00812		2006	0.0295401
	2007	0.150551		2007	0.028986		2007	-0.003778
	2008	-0.10461		2008	-0.004		2008	0.0123829
	2009	-0.00027		2009	0.001724		2009	-0.019952
ZHEJIANG HANGXIAO STEEL STRUCTURE CO.,LTD	2002	0.01092	SICHUAN ROAD & BRIDGE CO.,LTD	2002	-0.00479			
	2003	0.247923		2003	0.017984			
	2004	-0.39745		2004	0.025996			
	2005	0.115082		2005	0.055466			
	2006	-0.00121		2006	0.075189			
	2007	0.361532		2007	0.020047			
	2008	-0.17789		2008	-0.00476			
	2009	-0.1589		2009	-0.18513			

Earnings Management of Companies in Transportation and Storage Industries

From the table below, we can see from 2002 to 2009 there are 33 observations in Transportation and Storage Industries with negative EDA, suggesting the enterprises made downward earnings management, and the maximum extent is -0.26; while 31 observations showing positive EDA, indicating enterprises made income-increasing earnings management, and the maximum extent is 0.33.

Both the upward and downward earnings management is little lower than the Power, Gas and Water Production and Supply Industries and Building Industry. The earnings management of TIANJIN PORT (GROUP) CO., LTD., COSCO SHIPPING CO., LTD. and GUANGZHOU BAIYUN INTERNATIONAL AIRPORT CO., LTD. are relatively high in the industry.

During observation period the average earnings management of sample companies is $-4.7E-09$, suggesting that the whole industry executed a downward earnings management.

Table 2.6 : Earnings Management Measurement in Transportation and Storage Industries, 2002-2009

Corporate Name	Year	EDA	Corporate Name	Year	EDA	Corporate Name	Year	EDA
GUANGZHOU BAIYUN INTERNATIONAL AIRPORT CO.,LTD.	2002	0.107145	JIANGSU EXPRESSWAY CO.,LTD	2002	0.010995	XIAMEN INTERNATIONAL AIRPORT CO.,LTD.	2002	0.0025981
	2003	0.043632		2003	-0.03074		2003	0.0008622
	2004	-0.13883		2004	0.01915		2004	-0.012494
	2005	0.02457		2005	0.018276		2005	0.0053858
	2006	0.046271		2006	-0.01521		2006	0.0073383
	2007	-0.04163		2007	0.030904		2007	-0.009009
	2008	-0.13014		2008	-0.03248		2008	-0.026733
	2009	0.088977		2009	-0.0009		2009	0.0320519
CHINA EASTERN AIRLINES CO.,LTD.	2002	-0.00531	TIANJIN PORT(GROUP) CO., LTD.	2002	0.273031	COSCO SHIPPING CO.,LTD.	2002	0.0341034
	2003	-0.03247		2003	-0.02557		2003	-0.11897
	2004	-0.06513		2004	-0.26216		2004	-0.176375
	2005	0.034469		2005	0.040488		2005	0.0473393
	2006	-0.00296		2006	-0.25821		2006	0.0745219
	2007	0.003045		2007	-0.08307		2007	0.0552685
	2008	-0.04838		2008	-0.0118		2008	0.1251472
	2009	0.116742		2009	0.327295		2009	-0.041035
SHANGHAI JINJIANG INTERNATIONAL INDUSTRIAL INVESTMENT CO.,LTD	2002	-0.02671	CHINA RAILWAY TIELONG CONTAINER LOGISTICS CO., LTD.	2002	0.076827			
	2003	0.019564		2003	-0.00491			
	2004	0.061263		2004	0.015125			
	2005	-0.0228		2005	-0.02231			
	2006	-0.0054		2006	-0.05802			
	2007	-0.04231		2007	-0.0718			
	2008	-0.03722		2008	0.076314			
	2009	0.053605		2009	-0.01123			

Earnings Management of Companies in Farming, Forestry, Animal Husbandry and Fishery Industries

From the table below, we can see from 2002 to 2009 there are 30 observations in Farming, Forestry, Animal Husbandry and Fishery Industries with negative EDA, suggesting the enterprises made downward earnings management, and the maximum extent is -0.15; while 34 observations showing positive EDA, indicating enterprises made income-increasing earnings management, and the maximum extent is 0.097.

The upward and downward earnings management of DAHU AGRICULTURE CO., LTD. is relatively high.

During observation period the average earnings management of sample companies is 1.61E-07, suggesting that the whole industry executed an upward earnings management.

Table 2.7 : Earnings Management Measurement in Farming, Forestry, Animal Husbandry and Fishery Industries, 2002-2009

Corporate Name	Year	EDA	Corporate Name	Year	EDA	Corporate Name	Year	EDA
HEILONGJIANG AGRICULTURE CO.,LTD.	2002	0.043544	HUNAN NEW WELLFUL CO.LTD.	2002	0.008027	SICHUAN HEJIA CO.LTD.	2002	0.006818
	2003	-0.10329		2003	-0.00175		2003	-0.00058
	2004	0.061204		2004	0.025463		2004	-0.00424
	2005	0.0128		2005	-0.02943		2005	-0.00709
	2006	0.002249		2006	-0.0929		2006	0.016067
	2007	-0.01589		2007	0.08982		2007	0.014595
	2008	-0.03188		2008	0.013911		2008	-0.01349
	2009	0.031255		2009	-0.01314		2009	-0.01207
DAHU AGRICULTURE CO.,LTD.	2002	0.023234	GANSU YASHENG INDUSTRIAL (GROUP) CO.,LTD	2002	0.001389	SHANGHAI KAICHUANG MARINE INTERNATIONAL CO.,LTD	2002	-0.01012
	2003	0.030611		2003	-0.00314		2003	-0.05752
	2004	-0.03053		2004	-0.01705		2004	0.063547
	2005	-0.0222		2005	-0.01265		2005	-0.00066
	2006	-0.0045		2006	-0.01256		2006	-0.04512
	2007	0.051193		2007	0.019213		2007	0.097482
	2008	0.095032		2008	0.014752		2008	-0.11198
	2009	-0.14284		2009	0.010051		2009	0.064365
TONGWEI CO.,LTD	2002	0.052486	XINJIANG TIANYE CO.,LTD.	2002	0.023914			
	2003	0.008171		2003	-0.15434			
	2004	-0.05433		2004	0.063552			
	2005	0.014493		2005	0.086975			
	2006	-0.135		2006	-0.00811			
	2007	0.048494		2007	-0.03073			
	2008	0.054329		2008	0.007857			
	2009	0.011357		2009	0.010884			

Earnings Management of Companies in Wholesale and Retail Trade Industries

From the table below, we can see from 2002 to 2009 there are 37 observations in Wholesale and Retail Trade Industries with negative EDA, suggesting the enterprises made downward earnings management, and the maximum extent is -0.21; while 27 observations showing positive EDA, indicating enterprises made income-increasing earnings management and the maximum extent is 0.51.

The upward and downward earnings management of SHANGHAI NEW WORLD CO., LTD. is highest (its upward earnings management is even higher), followed by SINOCHEM INTERNATIONAL CORPORATION.

During observation period the average earnings management of sample companies is -1.3E-08, suggesting that the whole industry executed a downward earnings management.

Table 2.8 : Earnings Management Measurement in Wholesale and Retail Trade Industries, 2002-2009

Corporate Name	Year	EDA	Corporate Name	Year	EDA	Corporate Name	Year	EDA
SHANGHAI BAILIAN GROUP CO.,LTD.	2002	-0.01088	XIAMEN INTERNATIONAL TRADE GROUP CO., LTD.	2002	-0.01224	CNTIC TRADING CO., LTD.	2002	0.0260869
	2003	-0.02925		2003	0.025056		2003	-0.047978
	2004	0.022338		2004	0.083504		2004	0.0221596
	2005	-0.0039		2005	-0.09156		2005	0.0085759
	2006	0.004409		2006	-0.02379		2006	-0.023086
	2007	0.026972		2007	0.031491		2007	0.0158818
	2008	-0.0079		2008	-0.0269		2008	-7.03E-06
	2009	-0.00179		2009	0.01444		2009	-0.001633
SHANGHAI LANSHENG CORPORATION	2002	0.007846	SHANGHAI NEW WORLD CO.,LTD.	2002	-0.01637	SINOCHEM INTERNATIONAL CORPORATION	2002	-0.029427
	2003	-0.01217		2003	-6.2E-05		2003	0.0831143
	2004	0.069125		2004	0.098902		2004	0.1264609
	2005	-0.01125		2005	-0.05323		2005	-0.116448
	2006	-0.06879		2006	-0.20838		2006	-0.171853
	2007	0.024899		2007	-0.15035		2007	-0.030385
	2008	0.016442		2008	0.509986		2008	-0.028778
	2009	-0.0261		2009	-0.18049		2009	0.1673154
BEIJING WANGFUJING DEPARTMENT STORE (GROUP)CO.,LTD.	2002	-0.01958	SHANGHAI FRIENDSHIP GROUP INCORPORATED COMPANY	2002	0.012433			
	2003	0.063678		2003	-0.00898			
	2004	-0.05378		2004	-0.00169			
	2005	0.012859		2005	-0.01624			
	2006	-0.03258		2006	-0.00252			
	2007	0.059862		2007	0.005439			
	2008	0.012386		2008	0.016936			
	2009	-0.04285		2009	-0.00538			

Earnings Management of Companies in Social Service Industry

From the table below, we can see from 2002 to 2009 there are 36 observations in Social Service Industry with negative EDA, suggesting the enterprises made downward earnings management, and the maximum extent is -0.52; while 28 observations showing positive EDA, indicating enterprises made income-increasing earnings management and the maximum extent is 1.12.

Both the upward and downward earnings management is at the highest level over 12 Industries. The earnings management of TIANJIN CAPITAL ENVIRONMENTAL GROUP PROTECTION CO., LTD. and HUANGSHAN TOURISM DEVELOPMENT CO., LTD. is relatively high in the industry.

During observation period the average earnings management of sample companies is -6.2E-08, suggesting that the whole industry executed a downward earnings management.

Table 2.9: Earnings Management Measurement in Social Service Industry, 2002-2009

Corporate Name	Year	EDA	Corporate Name	Year	EDA	Corporate Name	Year	EDA
TIANJIN CAPITAL ENVIRONMENTAL GROUP PROTECTION CO., LTD.	2002	-0.46809	SHANGHAI JINJIANG INTERNATIONAL HOTELS DEVELOPMENT CO.,LTD.	2002	0.026932	BEIJING CAPITAL CO.,LTD	2002	-0.03777
	2003	1.120592		2003	0.046065		2003	-0.00027
	2004	-0.12676		2004	-0.00436		2004	-0.06386
	2005	0.096181		2005	-0.03351		2005	-0.01418
	2006	-0.08995		2006	0.010717		2006	-0.00467
	2007	-0.39796		2007	-0.03142		2007	0.117963
	2008	-0.05853		2008	-0.00155		2008	0.008654
	2009	-0.07549		2009	-0.01288		2009	-0.00587
DAZHONG TRANSPORTATION (GROUP) CO.,LTD.	2002	0.008243	CHINA UNITED TRAVEL COMPANY LIMITED	2002	-0.02405	SHANDONG EXPRESSWAY COMPANY LIMITED	2002	-0.05575
	2003	-0.04774		2003	0.082543		2003	0.008243
	2004	0.019625		2004	0.000631		2004	-0.09339
	2005	0.01688		2005	0.041739		2005	0.274449
	2006	-0.01109		2006	-0.04667		2006	-0.10691
	2007	-0.00906		2007	-0.03106		2007	0.06646
	2008	0.018317		2008	0.020306		2008	0.009148
	2009	0.00482		2009	-0.04344		2009	-0.10225
HUANGSHAN TOURISM DEVELOPMENT CO.,LTD.	2002	-0.51836	SHANGHAI QIANGSHEN GROUP HOLDING CO.,LTD.	2002	0.007225			
	2003	0.172258		2003	0.005612			
	2004	0.024754		2004	0.067523			
	2005	0.321843		2005	-0.05983			
	2006	0.444827		2006	-0.0716			
	2007	-0.18842		2007	-0.03551			
	2008	-0.12342		2008	0.090564			
	2009	-0.13349		2009	-0.00398			

Earnings Management of Companies in Information Technology Industry

From the table below, we can see from 2002 to 2009 there are 34 observations in Information Technology Industry with negative EDA, suggesting the enterprises made downward earnings management, and the maximum extent is -0.34; while 30 observations showing positive EDA, indicating enterprises made income-increasing earnings management, and the maximum extent is 0.59.

The earnings management of SHANGHAI EAST-CHINA COMPUTER CO., LTD, and FUJIAN START GROUP CO. LTD. is relatively high in the industry.

During observation period the average earnings management of sample companies is 4.69E-09, suggesting that the whole industry executed an upward earnings management.

Table 2.10: Earnings Management Measurement in Information Technology Industry, 2002-2009

Corporate Name	Year	EDA	Corporate Name	Year	EDA	Corporate Name	Year	EDA
WUHAN YANGTZE COMMUNICATION INDUSTRY GROUP CO.,LTD	2002	0.018333	JIANGSU HONGTU HIGH TECHNOLOGY CO.,LTD	2002	-0.09111	FUJIAN START GROUP CO. LTD.	2002	-0.191322
	2003	0.002604		2003	0.006064		2003	0.0931483
	2004	0.029573		2004	0.044271		2004	-0.070806
	2005	-0.01963		2005	-0.01192		2005	-0.054493
	2006	-0.02495		2006	0.049741		2006	-0.083861
	2007	0.045274		2007	0.07401		2007	0.5939111
	2008	-0.00024		2008	-0.014		2008	-0.212498
	2009	-0.05097		2009	-0.05705		2009	-0.07408
FOUNDER TECHNOLOGY GROUP CORP.	2002	0.035847	SHANGHAI EAST-CHINA COMPUTER CO.,LTD	2002	0.174536	CHINA UNITED NETWORK COMMUNICATIONS LIMITED	2002	0.0278581
	2003	0.095485		2003	-0.00966		2003	-0.081031
	2004	-0.16631		2004	-0.04098		2004	-0.155165
	2005	-0.02516		2005	-0.33907		2005	0.0301986
	2006	0.084442		2006	0.244478		2006	0.040878
	2007	-0.03047		2007	-0.15168		2007	0.0821606
	2008	0.037168		2008	0.157214		2008	0.0447338
	2009	-0.031		2009	-0.03484		2009	0.0103663
SHANGHAI FEILO CO.,LTD.	2002	0.076518	SHANGHAI POTEVIO CO.,LTD.	2002	0.026421			
	2003	-0.03838		2003	0.003821			
	2004	-0.01521		2004	-0.03827			
	2005	-0.01515		2005	-0.01456			
	2006	0.056589		2006	-0.00838			
	2007	0.049933		2007	0.029961			
	2008	-0.02281		2008	0.026778			
	2009	-0.09149		2009	-0.02577			

Earnings Management of Companies in Manufacturing Industry

From the table below, we can see from 2002 to 2009 there are 34 observations in Manufacturing Industry with negative EDA, suggesting the enterprises made downward earnings management, and the maximum extent is -0.14; while 30 observations showing positive EDA, indicating enterprises made income-increasing earnings management, and the maximum extent is 0.17.

The earnings management of LAO FENG XIANG CO., LTD. and NINGBO SHANSHAN CO., LTD. is relatively high in the industry.

During observation period the average earnings management of sample companies is $8.67E-19$, suggesting that the whole industry executed an upward earnings management, but with tiny level.

Table 2.11: Earnings Management Measurement in Manufacturing Industry, 2002-2009

Corporate Name	Year	EDA	Corporate Name	Year	EDA	Corporate Name	Year	EDA
SHANGHAI FOSUN PHARMACEUTICAL (GROUP) CO.,LTD.	2002	-0.06274	HENAN LIANHUA GOURMET POWDER CO.LTD.	2002	0.018222	NINGBO SHANSHAN CO.,LTD.	2002	0.0739108
	2003	0.097457		2003	-0.03439		2003	-0.011484
	2004	-0.05897		2004	-0.00564		2004	-0.128137
	2005	0.035155		2005	-0.00128		2005	0.0124865
	2006	0.050361		2006	-0.00577		2006	-0.010159
	2007	-0.01492		2007	0.014323		2007	0.0628653
	2008	0.051356		2008	0.000181		2008	0.1282138
	2009	-0.0977		2009	0.014358		2009	-0.127697
BRIGHT DAIRY & FOOD CO.,LTD	2002	-0.02018	QINGDAO HAIER CO., LTD	2002	0.031104	CHINA CSSC HOLDINGS LIMITED	2002	0.0877412
	2003	0.007422		2003	-0.01475		2003	0.0273623
	2004	0.017047		2004	0.049655		2004	0.0102784
	2005	-0.01923		2005	-0.00557		2005	-0.043492
	2006	-0.01873		2006	-0.06672		2006	-0.073768
	2007	-0.00994		2007	-0.03171		2007	-0.016542
	2008	0.010803		2008	0.016082		2008	0.0126409
	2009	0.032807		2009	0.021917		2009	-0.004221
LAO FENG XIANG CO.,LTD.	2002	0.171288	SANY HEAVY INDUSTRY CO.,LTD	2002	-0.05337			
	2003	-0.13671		2003	-0.04478			
	2004	-0.00368		2004	0.009308			
	2005	-0.03676		2005	-0.03884			
	2006	-0.02801		2006	0.049746			
	2007	-0.00141		2007	0.082071			
	2008	-0.05754		2008	0.007061			
	2009	0.092824		2009	-0.0112			

Earnings Management of Companies in Integrated Industry

From the table below, we can see from 2002 to 2009 there are 31 observations in Integrated Industry with negative EDA, suggesting the enterprises made downward earnings management, and the maximum extent is -0.22; while 33 observations showing positive EDA, indicating enterprises made income-increasing earnings management, and the maximum extent is 0.18.

During observation period the average earnings management of sample companies is 3.25E-07, suggesting that the whole industry executed an upward earnings management.

Table 2.12: Earnings Management Measurement in Integrated Industry 2002-2009

Corporate Name	Year	EDA	Corporate Name	Year	EDA	Corporate Name	Year	EDA
SHANGHAI ORIENTAL PEARL(GROUP) CO.,LTD	2002	0.001902	NINGBO UNITED GROUP CO.,LTD.	2002	-0.01336	JIANGSU ZONGYI CO.,LTD	2002	-0.01883
	2003	-0.0093		2003	0.038602		2003	-0.01391
	2004	0.015027		2004	0.044065		2004	-0.04088
	2005	-0.00262		2005	-0.02103		2005	0.035172
	2006	-0.00813		2006	-0.0713		2006	-0.01474
	2007	-0.00211		2007	-0.06096		2007	0.023469
	2008	0.00453		2008	0.154922		2008	0.0317
SHANGHAI FUDAN FORWARD S&T CO., LTD	2002	0.012348	ZHEJIANG CHINA LIGHT&TEXTILE INDUSTRIAL CITY GROUP CO.,LTD.	2002	0.041499	SHANGHAI ZHANGJIANG HI-TECH PARK DEVELOPMENT Co.,LTD.	2002	0.057021
	2003	0.054497		2003	0.011042		2003	-0.01113
	2004	-0.18291		2004	0.045497		2004	0.018635
	2005	0.062373		2005	-0.10199		2005	0.169284
	2006	0.040964		2006	0.012066		2006	-0.07161
	2007	0.108658		2007	-0.11152		2007	-0.22143
	2008	0.126657		2008	-0.07945		2008	0.073672
SHANGHAI JIABAO INDUSTRY & COMMERCE (GROUP) CO.,LTD	2002	-0.00436	SHANGHAI TONGJI SCIENCE & TECHNOLOGY INDUSTRIAL CO.,LTD.	2002	0.016073			
	2003	-0.0009		2003	0.003449			
	2004	-0.00725		2004	-0.13249			
	2005	0.000491		2005	0.050583			
	2006	-0.00252		2006	0.006777			
	2007	0.038958		2007	0.063857			
	2008	-0.02126		2008	0.06171			
	2009	-0.00316	2009	-0.06995				

3.3.4 Summary on earnings management of Chinese listed companies

To sum up, through reviewing theoretical and empirical research on earnings management, we adopt Modified-Jones Model to measure the earnings management of sample companies, and at the same time made an effective analysis on the trend of earnings management. The main research findings are summarized as follows:

Earnings management in different industries: firms from 9 industries out of 12 exaggerate profits by increasing their discretionary accruals, firms from 3 industries make downward earnings management to hide profits; among them, sample companies in Social Services Industry show the highest earnings management level. The whole industry made downward adjustment on discretionary accruals to hide profits; firms in Communication and Culture Industry show the lowest earnings management level. The whole industry made an upward adjustment on discretionary accruals to exaggerate profits.

Trend in earnings management: from 2002 to 2009, the average earnings management of 93 sample companies gradually declined in fluctuation. The result shows that the overall earnings management level of listed companies is declining, and the accounting information quality of Chinese listed companies has seen an obvious improvement in recent years.

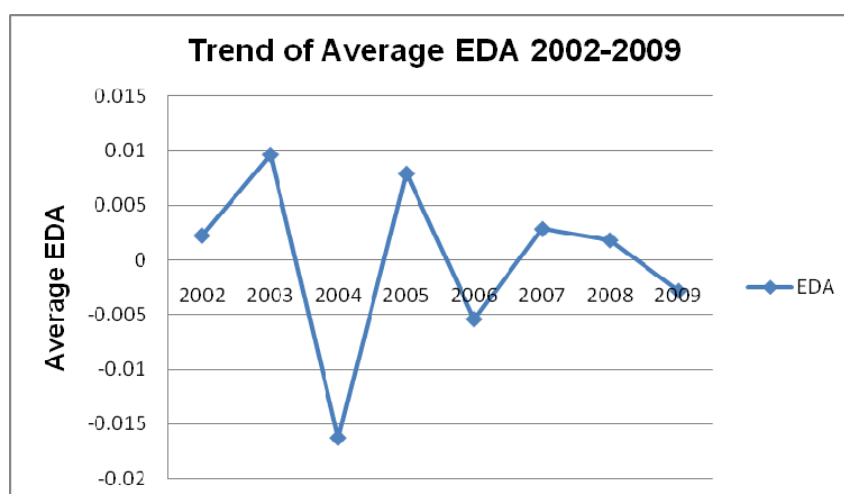


Figure 2: Trend in average earnings management of 93 sample companies 2002-2009

4. Analysis on Board Governance

As the board is not directly involved in the daily operation and management of the firm, its impact on firm's earnings is indirect. The governance structure of the board may affect the effectiveness of its role as decision-making and monitoring, which will indirectly affect the earnings management behavior.

In the circumstances that other factors affect earnings management equally, in the company where the board could effectively monitor managers and shareholders, earnings management behavior can be controlled. Managers cannot abuse their power, and controlling shareholders cannot transfer resources for their private benefits. So the degree of earnings management will be lower than the company lack of effective monitoring mechanisms. Thus better board governance structure will constrain earnings management to a greater extent.

4.1 Board governance variables

Through literature review and analysis on board governance structure, we introduce four variables: board size, board independence, board duality and board meetings, to evaluate the monitoring function of the board.

Based on samples selected for measuring earnings management of Shanghai A-share listed companies in previous chapter and the availability of board governance data², we narrowed our observation period to fiscal year ends between 2006 and 2009, and collected sample data on number of board members, number of independent directors, whether chairman and CEO is the same person and board meeting frequencies for the above four variables.

² Board data are hand-collected from annual reports of Chinese listed companies.

4.2 Explanations of board governance variables and descriptive statistics

Board Size (LN_DN): number of board members disclosed in annual reports of sample companies, including chairman, vice chairman, directors and independent directors. We will adopt the same measurement of board size proposed by Yu Dongzhi and Chi Guohua (2004)³, namely, for company i , board size is described as the logarithm $LN(DN_{it})$ of board members DN_{it} (excluding honorary director or chairman, candidates of directors and board advisor) disclosed in the annual report in year t . Table 3 shows that the minimum number of board members in sample companies is 5, and the maximum is 20. The average number of board members is 10.

Table 3: Descriptive statistics of board size from 2006 to 2009

Variable	Mean	Std. Dev.	Min	Max	Observations
DN	10	2.302167	5	20	N=372 T=4 n= 93
LN_DN	2.295233	0.2240569	1.609438	2.995732	N=372 T=4 n= 93

Note: n=number of sample companies; T=observation year; N =n*T

Board Independence (IND): number of independent directors employed by listed companies during the reporting period according to the disclosed information in annual reports, denoted as IND_{it} . Table 4 shows that the number of independent directors in sample companies is up to 10, low to 1, and the average number is 4.

³ Yu Dongzhi and Chi Guohua (2004) "board size, stability and Corporate Performance: Theoretical and empirical analysis" [J], Economic Research, Vol.4.

Table 4: Descriptive statistics of board independence from 2006 to 2009

Variable	Mean	Std. Dev.	Min	Max	Observations
IND	4	0.9421543	1	10	N=372 T=4 n= 93

Note: n=number of sample companies; T=observation year; N =n*T

Board Duality (DUA): according to the disclosed information in annual reports of sample companies, if chairman of the board and general manager is the same person, then DUA=1, otherwise DUA=0. Table 5 indicates that in the 93 sample companies, only less than one tenth of the companies whose chairman also serves as general manager, and this situation tends to decrease in the observation period.

Table 5: Descriptive statistics of board duality from 2006 to 2009

Variable	2006	2007	2008	2009	Observations
DUA=1	9	6	6	7	n= 93

Note: n =number of sample companies

Board Meetings (MEET) / individual characteristics of the board: according to the disclosed information in annual reports of sample companies, board meetings is calculated by deducting meetings held by means of communication from the total board meetings during the reporting period. Due to these specific features of the company generally cannot be fully reflected in companies' annual reports, it will be regarded as unobservable variable α_i .

5. Theoretical Hypotheses and Empirical Test on Board Governance and Earnings Management

In order to prove the role of the board as monitoring and constraining earnings management, we will conduct empirical test on the relations between board governance and earnings management of Chinese listed companies, where board governance can be measured through board size, board independence, board duality and board meetings.

5.1 Theoretical hypotheses

5.1.1 Board size and earnings management

A large body of academic literature from China and abroad have proved that board size, namely the number of board members, plays an important role in board monitoring efficiency, and also significantly influences earnings management of enterprises. But current studies do not draw consistent conclusion.

Some research find that a smaller board is more efficient, because communication and coordination between board members is much easier, and a small board can react to the problems in daily operation more quickly. While other studies suggest that a large board can offer better external resources, and by attracting more directors with business management experience and extensive finance knowledge into the board, the decision-making of the board will be more professional. A smaller board is likely to be controlled by internal management, leaving the board out of power. While a larger board will bring in more outside directors, which will reduce the level of internal control and increase board independence, thereby the board will play an effective monitoring role. Based on the analysis above, the following hypothesis is proposed:

H1: Earnings management is negatively associated with board size, namely, the larger the board size, the lower level of earnings management.

5.1.2 Board independence and earnings management

The purpose of introducing independent directors to the board is to further improve corporate governance structure, and to better regulate listed companies' operations. Increasing the proportion of independent outside directors in the board can reduce the level of internal control and increase board independence, thus help the board better fulfill its responsibilities. This leads to the following hypothesis:

H2: Earnings management is negatively associated with the independence of the board of directors, namely, the more independent directors in the board, the lower level of earnings management.

5.1.3 Board duality and earnings management

To some extent, whether the chairman and general manager is the same person reflects board independence. According to agency theory and transaction cost theory, in the case that chairman and general manager is the same person, the opportunistic behavior of managers and the agency loss will increase. Also there will be conflicts between two different functions, which make it difficult to protect the benefit of shareholders and other stakeholders. A large number of domestic and foreign empirical studies have proved that the board with chairman serves as general manager is difficult to impose effective monitoring on management. And China Securities Regulatory Commission (CSRC) regards the separation of the roles of chairman and CEO as an important method to improve corporate governance. Therefore, we test the following hypothesis:

H3: Earnings management is negatively associated with the separation of the roles of CEO and board chair, namely, the separation will reduce the level of earnings management.

5.1.4 Board meetings and earnings management

Board meetings mechanism is also one aspect of general concern in theoretical studies on board governance. Current studies have not reached consistent conclusion on the functions of board meetings. However, considering the reality of China's capital market, when the inside managers manipulate the earnings, they naturally want to reduce or distract the concern of such matters from outside directors, and reducing the frequency of board meetings is an effective way. Because the more frequent of board meetings, the more chances of board members vote on matters involving earnings management; contrarily, the fewer board meetings, its members may not pay attention to such matters. Therefore, the higher frequency of board meetings may reduce earnings management. This leads to the following hypothesis:

H4: Earnings management is negatively associated with board meeting frequency, that is, the higher frequency of board meetings, the lower level of earnings management.

5.2 Empirical test on board governance and earnings management

5.2.1 Panel data model

In order to examine the above hypotheses, we setup the following regression model taking earnings management as explained variable, board size, board independence, board duality and board meetings as explanatory variables, to test the impact of board governance on the extent of earnings management.

After controlling for corporate size LnCSIZE (logarithm of year-end total assets), return on equity ROE (net income/ equity) and other factors, we should notice that board size, board composition and board duality may be endogenously determined by earnings management, firm performance and other variables. If we conduct OLS

regression without considering endogenous variables, there will be a large bias in the model. Therefore, we will use Panel Data Model to solve the endogenous problems of unobservable variables in company board.

Panel Data Model is set as follows:

$$EDA_{it} = \alpha_0 + \alpha_1 LNCSIZE_{it} + \alpha_2 ROE_{it} + \alpha_3 LNDN_{it} + \alpha_4 IND_{it} + \alpha_5 DUA_{it} + \alpha_i + \mu_{it}$$

Where,

$i = 1, 2, \dots, 93$, denotes 93 sample listed companies in Table 1;

$t=2006, 2007, 2008, 2009$, denotes observation years;

α_i denotes the features of each board that is independent of time, i.e. unobservable characteristics of the board

In order to be consistent with observation years of board governance variables, we adopt EDA data from 2006 to 2009 in Table 2.1-2.12.

Generally speaking, panel data is estimated according to fixed effect and random effect. A Fixed Effect Model is estimated by least squares dummy variable (LSDV); while a Random Effect Model is estimated through feasible generalized least squares (FGLS) (Greene, 2000). Both of them can greatly take the advantages of panel data, and minimize the estimation error. As for which model should we use, it will depend on the results of Hausman Test.

According to Panel Data Model, α_i features of each board that is independent of time, is difficult to be quantified or directly observed in most cases. Thus it will be explained from fixed effect and random effect.

5.2.2 Fixed effect model

First, we adopt fixed effect model⁴ of static panel data. In fixed effect model, individual features are reflected in specific intercept for each firm. By taking α_i , features of each board as intercept, we get the estimated results as follows⁵:

$$EDA_{it} = -0.048978 - 0.008895LNCSIZE_{it} - 0.002715ROE_{it} + 0.126085LNDN_{it} - 0.012877IND_{it} + 0.050883DUA_{it}$$

$$(-4.4756) \quad (-5.0221) \quad (-4.1933) \quad (13.3042) \quad (-8.0471) \quad (9.1790)$$

$$F = 33.4009 \quad P = 0.0071$$

5.2.3 Random effect model

The reason why dummy variables are introduced in fixed effect model is that there is incomplete information on explanatory variables. This can also be solved by decomposing the error term to describe the missing information.

Next we adopt random effect model, which assumes that all individuals have the same intercept, and the difference between individual samples is mainly reflected in the setting of random error. However, random effect model is setup under one assumption: individual effects (random errors) are not correlated to other explanatory variables. As board meeting is not correlated to board size, board independence and board duality, we take α_i , features of each board (board meetings) as random error and detailed regression results are as follows:

$$EDA_{it} = -0.104463 - 0.000248LNCSIZE_{it} - 0.025154ROE_{it} + 0.067115LNDN_{it} - 0.012793IND_{it} + 0.024318DUA_{it}$$

$$(-7.0027) \quad (-3.0594) \quad (-6.8763) \quad (15.4700) \quad (-13.6985) \quad (9.2690)$$

$$F = 86.6102 \quad P = 0.0012$$

⁴ In panel data model, if for different cross-sections or different time series, the intercept is different, dummy variables can be introduced into the model to estimate regression parameters.

⁵ The important reason for using EVIEWS6.0 here is that it can directly show estimates of unobservable features.

5.2.4 Regression results analysis

The value of F-statistics, which suggests the overall effectiveness of model, is 33.4009 under fixed effect regression model and 86.6102 under random effect model. Meanwhile the corresponding P-values are 0.0071 and 0.0012 respectively, indicating both of the fixed effect and random effect model passed significant test, and the regression model is effective.

The regression coefficients of board size $LN(DN_{it})$ are positive, which is the opposite of predicted sign. T- statistics are 13.3042 and 15.4700 under fixed effect and random effect model respectively, both statistically significant at 5% significance level. The regression results suggest that Hypothesis1 is not supported as the larger board of directors of listed companies or the greater number of board members, the higher degree of earnings management in the company.

The regression coefficients of board independence (IND) are negative, which is consistent with the predicted sign, and both of the t-statistics passed significant test. The results indicate that the larger number of independent directors, the lower level of earnings management. This provides support for Hypothesis 2.

The regression coefficients of board duality (DUA) are positive and t-statistics passed significant test. The results show that the separation of the roles of CEO and board chair will reduce the extent of earnings management, which is consistent with Hypothesis 3.

For the control variables, the coefficients of return on equity (ROE) are negative, indicating that ROE is negatively correlated to earnings management. According to the practical situation of Chinese listed companies, ROE of most companies is ranging from little profit to 10%, so the manipulation of earnings in Chinese listed companies is relatively large. The coefficients of corporate size LnCSIZE are negative, suggesting that the larger size of Chinese listed companies, the less extent of earnings management.

5.2.5 Hausman test and conclusions

For the fixed effect and random effect model above, we will run HAUSMAN-WU test to determine which effect can better explain the regression model. The basic idea is, under the assumption that α_i is independent from other explanatory variables, the coefficients estimated from fixed effect model and random effect model are unbiased and consistent, except that fixed effect model is not effective. If the assumption does not hold, it is still consistent estimation of coefficients under fixed effect model, but not for random effect model. Therefore, under the original assumption, coefficients estimated from both models should not have significant differences. So we can conduct statistical test based on the differences of coefficients.

Table 6: Correlated Random Effects - Hausman Test

Pool: TT

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	2.693211	5	0.7472

Hausman Test in Table 7 shows that under the random effect assumption, $x^2(5)$ statistic is 2.693211 and P-Value is 0.7472, indicating that we cannot reject the random effect assumption where board feature α_i is taken as random error. Therefore, we accept random effect model. After controlling for corporate size LnCSIZE (logarithm of year-end total assets), return on equity ROE (net income/equity) and other factors, we draw the following conclusions from random effect regression model:

(1) Earnings management of Chinese listed companies is positively associated with board size.

This empirical finding indicates that a smaller board is more efficient, because communication and coordination between board members is more convenient, and a small board will react to earnings management more quickly. It provides support for Agency Theory and Organizational Behavior Theory. And our empirical result is also consistent with the empirical findings of Yermack (1996), Eisenberg et al (1998) and Wu (2000) which indentify evidence small board of directors is doing better than relatively large board of directors in monitoring managers.

(2) Earnings management of Chinese listed companies is negatively associated with board independence

This empirical result suggests that the larger number of independent directors, the lower level of earnings management. This is based on Agency Theory that the ability of the board to act as an effective monitor is dependent upon its independence from management. And our empirical finding is consistent with most of the empirical results on this field, namely, the likelihood of managers making income-increasing abnormal accruals is negatively related to the proportion of outsiders on the board.

This result also reflects the introduction of independent director system in China has made some achievements. Independent directors are playing an important role to improve the board governance of Chinese listed companies. Although there are still many areas for improvement on independent director system, the influence of independent directors is gradually increasing as independent directors begin to closely take part in firm management, monitoring and presenting a series of independent views, which helps to reduce earnings management.

(3) Earnings management of Chinese listed companies is negatively associated with the separation of the roles of CEO and board chair.

This empirical finding indicates that the separation of the roles of CEO and board chair will reduce the level of earnings management. This is based on Agency Theory that if CEO and board chair is the same person, it will be difficult to impose effective monitoring on management. And it is consistent with the empirical findings of Dechow et al (1996) and Beasley (1996) which point out if the board is controlled by general manager, earnings management is more likely to occur.

The result also provides evidence for the instruction of China Securities Regulatory Commission (CSRC), namely, separating the roles of chairman and CEO is an important method to improve corporate governance of Chinese listed companies.

6. Conclusions and Suggestions

Excessive earnings management reduces the reliability of accounting information of listed companies, thereby misleads the users in decision-making and damages the companies' reputation. Through detailed systematic research on earnings management, board governance, and the relations between board governance and earnings management of Chinese listed companies, our main findings are summarized as follows:

6.1 Earnings management of Chinese listed companies

Through reviewing theoretical and empirical research on earnings management, we adopt Modified-Jones Model to measure the extent of earnings management of Chinese listed companies. Based on the measurement results, we find that:

- (1) Earnings management in different industries: 9 industries out of 12 exaggerate the profits through upward earnings management, 3 industries hide the profits through downward earnings management. Social Services Industry shows the highest earnings management level, while Communication and Culture Industry show the lowest earnings management level.
- (2) Trend in earnings management: from 2002 to 2009, the average earnings management of Chinese listed companies gradually declined in fluctuation. The result indicates the quality of accounting information of Chinese listed companies has improved obviously in recent years.

6.2 Board governance of Chinese listed companies

Through literature review and analysis on board governance structure, we introduce four variables: board size, board independence, board duality and board meetings, to evaluate the monitoring function of the board.

The descriptive statistics of the above variables show: the average number of board members in Chinese listed companies is 10; while the average number of independent directors is 4; only less than one tenth of Chinese listed companies have board chair also serves as CEO, and this situation tends to decrease.

6.3 Empirical findings on board governance and earnings management

By using Panel Data Model, we conduct empirical research on the relations between board governance and earnings management of Chinese listed companies. After controlling for corporate size, return on equity and other factors, we get the following regression results:

- (4) Earnings management of Chinese listed companies is positively correlated to board size, that is, a smaller board is more efficient, and will impose more effective constraints on earnings management;
- (5) Earnings management of Chinese listed companies is negatively correlated with board independence, namely, the more independent directors in the board, the stronger constraints on earnings management;
- (6) Earnings management is negatively correlated to the separation of the roles of CEO and board chair, that is, the separation of the roles of CEO and board chair will reduce the level of earnings management of Chinese listed companies.

Board governance and earnings management constraint problems are of great practical and theoretical significance, hope our systematic research on this field will provide references for improving accounting information disclosure and corporate governance of Chinese listed companies. But due to the reality of China's capital market development and research capacity limitations, there are still space for further study.

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Appendix

Regression results for parameter α_1 , α_2 and α_3 under Modified-Jones Model

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	

ta_ass1						
drvc1	-6.37e-11	2.98e-11	-2.14	0.033*	-1.22e-10	-5.28e-12
ppe1	-5.79e-12	2.62e-12	-2.21	0.027*	-1.09e-11	-6.64e-13
_cons	-.0041732	.0155875	-0.27	0.789	-.0347242	.0263778

ta_ass2						
drvc2	-4.64e-12	1.39e-12	-3.35	0.001*	-7.36e-12	-1.92e-12
ppe2	2.03e-12	1.34e-12	1.51	0.131	-6.01e-13	4.66e-12
_cons	-.0742289	.009753	-7.61	0.000*	-.0933444	-.0551134

ta_ass3						
drvc3	6.22e-11	1.83e-11	3.40	0.001*	2.63e-11	9.80e-11
ppe3	3.14e-13	8.99e-12	0.03	0.972	-1.73e-11	1.79e-11
_cons	-.0236155	.0334111	-0.71	0.480	-.0891001	.0418691

ta_ass4						
drvc4	-4.11e-11	2.40e-11	-1.71	0.087	-8.82e-11	5.97e-12
ppe4	-3.40e-10	1.62e-10	-2.10	0.036*	-6.59e-10	-2.21e-11
_cons	.0616274	.0289098	2.13	0.033*	.0049653	.1182896

ta_ass5						
drvc5	-2.18e-11	2.67e-10	-0.08	0.935	-5.45e-10	5.01e-10
ppe5	3.81e-11	1.25e-10	0.30	0.761	-2.08e-10	2.84e-10
_cons	-.0850205	.0388054	-2.19	0.028*	-.1610777	-.0089633

ta_ass6						
drvc6	1.47e-11	4.19e-11	0.35	0.725	-6.74e-11	9.69e-11
ppe6	-1.01e-10	5.04e-11	-1.99	0.046*	-1.99e-10	-1.65e-12
_cons	.0038873	.0098987	0.39	0.695	-.0155137	.0232884

ta_ass7						
drvc7	-1.67e-10	2.57e-11	-6.49	0.000*	-2.17e-10	-1.16e-10
ppe7	-5.97e-12	1.50e-11	-0.40	0.691	-3.54e-11	2.35e-11
_cons	-.0013661	.0324612	-0.04	0.966	-.0649889	.0622568

ta_ass8						

drvc8	-7.01e-11	1.81e-10	-0.39	0.698	-4.24e-10	2.84e-10
ppe8	-4.15e-10	1.91e-10	-2.17	0.030*	-7.90e-10	-4.08e-11
_cons	.0392561	.0383987	1.02	0.307	-.0360039	.1145162

ta_ass9						
drvc9	-5.81e-11	1.48e-11	-3.94	0.000*	-8.70e-11	-2.92e-11
ppe9	1.83e-11	1.68e-11	1.09	0.277	-1.47e-11	5.13e-11
_cons	-.1044566	.0465743	-2.24	0.025*	-.1957406	-.0131727

ta_ass10						
drvc10	1.34e-12	1.93e-12	0.69	0.488	-2.44e-12	5.11e-12
ppe10	4.58e-13	1.15e-12	0.40	0.689	-1.79e-12	2.70e-12
_cons	-.1384495	.050067	-2.77	0.006*	-.2365789	-.04032

ta_ass11						
drvc11	5.53e-11	3.91e-11	1.41	0.158	-2.14e-11	1.32e-10
ppe11	1.10e-11	8.91e-12	1.23	0.217	-6.46e-12	2.85e-11
_cons	-.0494297	.016832	-2.94	0.003*	-.0824198	-.0164396

ta_ass12						
drvc12	-3.98e-11	4.61e-12	-8.64	0.000*	-4.89e-11	-3.08e-11
ppe12	4.41e-12	6.60e-12	0.67	0.504	-8.53e-12	1.73e-11
_cons	-.0034275	.0104068	-0.33	0.742	-.0238245	.0169696

ta_ass13						
drvc13	-5.86e-11	1.46e-11	-4.01	0.000*	-8.73e-11	-3.00e-11
ppe13	1.39e-10	1.16e-10	1.19	0.233	-8.93e-11	3.66e-10
_cons	-.0386932	.0305228	-1.27	0.205	-.0985168	.0211303

ta_ass14						
drvc14	3.32e-11	3.01e-11	1.10	0.270	-2.58e-11	9.23e-11
ppe14	2.57e-10	1.21e-10	2.13	0.033*	2.02e-11	4.95e-10
_cons	-.0621031	.0237118	-2.62	0.009 *	-.1085773	-.0156289

ta_ass15						
drvc15	-9.56e-11	3.13e-11	-3.06	0.002*	-1.57e-10	-3.43e-11
ppe15	5.87e-11	6.78e-11	0.86	0.387	-7.43e-11	1.92e-10
_cons	.0516164	.0688714	0.75	0.454	-.0833691	.1866019

ta_ass16						
drvc16	3.34e-10	9.99e-11	3.35	0.001*	1.39e-10	5.30e-10
ppe16	8.78e-12	7.24e-12	1.21	0.226	-5.42e-12	2.30e-11
_cons	-.154124	.0190207	-8.10	0.000*	-.191404	-.1168441

ta_ass17						
drvc17	-2.06e-12	1.76e-12	-1.17	0.242	-5.50e-12	1.39e-12
ppe17	1.60e-11	3.33e-12	4.80	0.000*	9.47e-12	2.25e-11
_cons	-.0864767	.0200298	-4.32	0.000*	-.1257344	-.0472189

ta_ass18						
drvc18	1.35e-09	1.35e-10	9.98	0.000*	1.09e-09	1.62e-09
ppe18	-4.09e-09	3.01e-10	-13.59	0.000*	-4.68e-09	-3.50e-09
_cons	.8997046	.12552	7.17	0.000*	.65369	1.145719

ta_ass19						
drvc19	2.66e-11	7.32e-12	3.63	0.000*	1.23e-11	4.10e-11
ppe19	1.37e-10	1.95e-11	7.02	0.000*	9.88e-11	1.75e-10
_cons	-.290657	.0320422	-9.07	0.000*	-.3534586	-.2278553

ta_ass20						
drvc20	1.38e-10	5.79e-11	2.38	0.017*	2.43e-11	2.51e-10
ppe20	-4.31e-11	1.31e-11	-3.28	0.001*	-6.89e-11	-1.74e-11
_cons	-.0725718	.0201888	-3.59	0.000*	-.1121412	-.0330024

ta_ass21						
drvc21	1.13e-11	2.71e-12	4.17	0.000*	5.99e-12	1.66e-11
ppe21	-6.88e-12	9.77e-13	-7.04	0.000*	-8.80e-12	-4.97e-12
_cons	-.0108699	.009171	-1.19	0.236	-.0288448	.007105

ta_ass22						
drvc22	-3.56e-12	1.74e-12	-2.04	0.041*	-6.98e-12	-1.41e-13
ppe22	-4.24e-13	2.07e-13	-2.05	0.040*	-8.29e-13	-1.90e-14
_cons	-.0242505	.0067481	-3.59	0.000*	-.0374766	-.0110245

ta_ass23						
drvc23	1.94e-09	6.07e-10	3.20	0.001*	7.52e-10	3.13e-09
ppe23	-5.02e-10	3.76e-10	-1.33	0.182	-1.24e-09	2.35e-10
_cons	.2132432	.1181006	1.81	0.071	-.0182297	.444716

ta_ass24						
drvc24	-1.35e-11	2.86e-11	-0.47	0.636	-6.95e-11	4.25e-11
ppe24	1.52e-11	1.62e-11	0.94	0.348	-1.65e-11	4.69e-11
_cons	-.0706308	.0298423	-2.37	0.018*	-.1291207	-.012141

ta_ass25						
drvc25	-2.65e-11	5.64e-12	-4.70	0.000*	-3.76e-11	-1.55e-11
ppe25	-1.62e-10	2.02e-11	-8.06	0.000*	-2.02e-10	-1.23e-10
_cons	.1329012	.0216608	6.14	0.000*	.0904468	.1753556

ta_ass26						
drvc26		1.23e-10	2.13e-10	0.58	0.565	-2.94e-10 5.39e-10
ppe26		-1.42e-09	6.79e-10	-2.09	0.037*	-2.75e-09 -8.62e-11
_cons		.1482442	.1040364	1.42	0.154	-.0556634 .3521519

ta_ass27						
drvc27		4.64e-11	4.61e-12	10.06	0.000*	3.74e-11 5.54e-11
ppe27		-2.04e-10	4.15e-11	-4.92	0.000*	-2.85e-10 -1.23e-10
_cons		.0296667	.0144416	2.05	0.040*	.0013616 .0579718

ta_ass28						
drvc28		-2.97e-12	2.49e-12	-1.19	0.232	-7.85e-12 1.90e-12
ppe28		4.34e-15	5.65e-13	0.01	0.994	-1.10e-12 1.11e-12
_cons		-.0485444	.0235076	-2.07	0.039*	-.0946185 -.0024703

ta_ass29						
drvc29		-3.78e-11	9.03e-11	-0.42	0.676	-2.15e-10 1.39e-10
ppe29		3.60e-09	2.63e-09	1.37	0.172*	-1.56e-09 8.76e-09
_cons		-.110727	.0548668	-2.02	0.044*	-.218264 -.00319

ta_ass30						
drvc30		-5.29e-10	2.37e-10	-2.23	0.026*	-9.94e-10 -6.43e-11
ppe30		5.39e-11	1.84e-10	0.29	0.770	-3.07e-10 4.15e-10
_cons		-.0121272	.1267638	-0.10	0.924	-.2605797 .2363252

ta_ass31						
drvc31		2.63e-11	2.55e-10	0.10	0.918	-4.73e-10 5.25e-10
ppe31		7.38e-10	7.05e-10	1.05	0.295	-6.44e-10 2.12e-09
_cons		-.0666419	.0960837	-0.69	0.488	-.2549625 .1216788

ta_ass32						
drvc32		1.04e-11	5.34e-11	0.19	0.845	-9.43e-11 1.15e-10
ppe32		-8.82e-10	1.83e-09	-0.48	0.631	-4.47e-09 2.71e-09
_cons		.3405817	.2954233	1.15	0.249	-.2384373 .9196006

ta_ass33						
drvc33		-3.35e-11	6.76e-11	-0.50	0.620	-1.66e-10 9.89e-11
ppe33		-2.92e-10	4.64e-11	-6.29	0.000*	-3.83e-10 -2.01e-10
_cons		.1248408	.0200487	6.23	0.000*	.0855461 .1641355

ta_ass34						
drvc34		-5.89e-12	3.78e-12	-1.56	0.119	-1.33e-11 1.51e-12
ppe34		-6.34e-11	2.40e-11	-2.64	0.008*	-1.10e-10 -1.63e-11

_cons		.0409097	.023824	1.72	0.086	-.0057844	.0876038

ta_ass35							
drvc35		8.03e-12	4.79e-11	0.17	0.867	-8.59e-11	1.02e-10
ppe35		-4.96e-11	2.40e-11	-2.07	0.038*	-9.66e-11	-2.67e-12
_cons		.0251117	.0504656	0.50	0.619	-.0737991	.1240226

ta_ass36							
drvc36		-5.66e-11	5.82e-11	-0.97	0.330	-1.71e-10	5.73e-11
ppe36		3.45e-12	8.24e-11	0.04	0.967	-1.58e-10	1.65e-10
_cons		-.053489	.0333318	-1.60	0.109	-.1188182	.0118402

ta_ass37							
drvc37		-1.91e-10	1.46e-11	-13.12	0.000*	-2.20e-10	-1.63e-10
ppe37		5.97e-11	9.18e-12	6.51	0.000*	4.18e-11	7.77e-11
_cons		-.0889051	.0260423	-3.41	0.001*	-.1399471	-.037863

ta_ass38							
drvc38		4.88e-10	1.14e-10	4.29	0.000*	2.65e-10	7.11e-10
ppe38		-3.81e-09	1.02e-09	-3.73	0.000*	-5.81e-09	-1.80e-09
_cons		.3760302	.1072663	3.51	0.000*	.1657922	.5862683

ta_ass39							
drvc39		1.25e-11	1.22e-11	1.02	0.307	-1.15e-11	3.65e-11
ppe39		-2.84e-10	1.30e-10	-2.18	0.029*	-5.38e-10	-2.91e-11
_cons		.0453137	.0513761	0.88	0.378	-.0553816	.146009

ta_ass40							
drvc40		2.30e-11	8.15e-12	2.82	0.005*	7.00e-12	3.90e-11
ppe40		5.00e-11	4.17e-11	1.20	0.231	-3.18e-11	1.32e-10
_cons		-.069845	.0520025	-1.34	0.179	-.171768	.032078

ta_ass41							
drvc41		-2.69e-11	6.63e-12	-4.06	0.000*	-3.99e-11	-1.39e-11
ppe41		2.84e-10	1.00e-10	2.83	0.005*	8.74e-11	4.80e-10
_cons		-.0812239	.0352004	-2.31	0.021*	-.1502154	-.0122324

ta_ass42							
drvc42		3.61e-10	1.22e-10	2.94	0.003*	1.21e-10	6.01e-10
ppe42		1.22e-09	2.55e-10	4.77	0.000*	7.17e-10	1.72e-09
_cons		-.6591321	.1701032	-3.87	0.000*	-.9925282	-.3257359

ta_ass43							
drvc43		3.22e-11	1.59e-11	2.03	0.043*	1.09e-12	6.33e-11

ppe43	1.73e-10	1.05e-10	1.64	0.102	-3.41e-11	3.79e-10
_cons	-.0558058	.0468788	-1.19	0.234	-.1476866	.036075

ta_ass44						
drvc44	-6.49e-12	3.59e-12	-1.81	0.071	-1.35e-11	5.45e-13
ppe44	-8.41e-13	3.16e-13	-2.66	0.008*	-1.46e-12	-2.22e-13
_cons	-.0204858	.0075568	-2.71	0.007*	-.0352969	-.0056748

ta_ass45						
drvc45	9.05e-11	4.29e-11	2.11	0.035*	6.36e-12	1.75e-10
ppe45	-9.73e-11	3.48e-11	-2.79	0.005*	-1.66e-10	-2.91e-11
_cons	-.0285481	.0569036	-0.50	0.616	-.140077	.0829809

ta_ass46						
drvc46	-5.58e-11	2.71e-11	-2.06	0.040*	-1.09e-10	-2.61e-12
ppe46	5.95e-10	1.90e-10	3.13	0.002*	2.22e-10	9.67e-10
_cons	-.5070066	.1413666	-3.59	0.000*	-.78408	-.2299332

ta_ass47						
drvc47	5.59e-13	4.15e-12	0.13	0.893	-7.57e-12	8.69e-12
ppe47	-1.37e-10	2.00e-11	-6.85	0.000*	-1.76e-10	-9.77e-11
_cons	.2060299	.0426392	4.83	0.000*	.1224587	.2896011

ta_ass48						
drvc48	-7.32e-11	8.54e-11	-0.86	0.392	-2.41e-10	9.43e-11
ppe48	-6.61e-11	1.96e-11	-3.37	0.001*	-1.05e-10	-2.76e-11
_cons	-.014248	.0291266	-0.49	0.625	-.0713351	.042839

ta_ass49						
drvc49	3.09e-10	4.43e-10	0.70	0.485	-5.59e-10	1.18e-09
ppe49	9.09e-11	9.04e-11	1.01	0.314	-8.62e-11	2.68e-10
_cons	-.1719255	.0697055	-2.47	0.014*	-.3085458	-.0353051

ta_ass50						
drvc50	3.80e-11	8.49e-12	4.48	0.000*	2.14e-11	5.47e-11
ppe50	-1.12e-10	1.75e-11	-6.38	0.000*	-1.46e-10	-7.73e-11
_cons	.2065082	.026752	7.72	0.000*	.1540752	.2589412

ta_ass51						
drvc51	1.11e-11	1.18e-11	0.94	0.347	-1.21e-11	3.44e-11
ppe51	-2.03e-11	2.27e-11	-0.90	0.370	-6.48e-11	2.41e-11
_cons	.0112812	.0184087	0.61	0.540	-.0247993	.0473617

ta_ass52						

drvc52	-7.17e-12	1.19e-11	-0.60	0.547	-3.05e-11	1.62e-11
ppe52	-1.46e-12	2.55e-12	-0.57	0.568	-6.45e-12	3.54e-12
_cons	-.0327783	.0158286	-2.07	0.038*	-.0638017	-.0017548

ta_ass53						
drvc53	-1.31e-11	4.44e-12	-2.95	0.003*	-2.18e-11	-4.40e-12
ppe53	-1.40e-11	2.45e-11	-0.57	0.569	-6.21e-11	3.41e-11
_cons	-.0238284	.0325951	-0.73	0.465	-.0877136	.0400569

ta_ass54						
drvc54	3.61e-11	1.39e-11	2.60	0.009*	8.87e-12	6.33e-11
ppe54	-1.06e-11	3.87e-12	-2.73	0.006*	-1.82e-11	-2.99e-12
_cons	-.0075291	.0261485	-0.29	0.773	-.0587792	.043721

ta_ass55						
drvc55	-1.82e-11	3.70e-12	-4.91	0.000*	-2.55e-11	-1.09e-11
ppe55	-3.36e-12	5.19e-12	-0.65	0.518	-1.35e-11	6.81e-12
_cons	-.0266841	.021486	-1.24	0.214	-.0687959	.0154276

ta_ass56						
drvc56	2.20e-11	2.49e-11	0.88	0.377	-2.68e-11	7.08e-11
ppe56	4.35e-12	9.19e-12	0.47	0.636	-1.37e-11	2.24e-11
_cons	-.130153	.0298267	-4.36	0.000*	-.1886122	-.0716938

ta_ass57						
drvc57	-7.16e-11	2.56e-11	-2.80	0.005*	-1.22e-10	-2.15e-11
ppe57	1.74e-10	1.36e-10	1.28	0.200	-9.23e-11	4.40e-10
_cons	.0025507	.0306288	0.08	0.934	-.0574806	.0625821

ta_ass58						
drvc58	-1.73e-10	1.77e-10	-0.98	0.327	-5.19e-10	1.73e-10
ppe58	-1.32e-10	4.35e-10	-0.30	0.762	-9.84e-10	7.20e-10
_cons	.1563536	.0826766	1.89	0.059	-.0056895	.3183968

ta_ass59						
drvc59	-1.38e-11	2.99e-12	-4.62	0.000*	-1.97e-11	-7.94e-12
ppe59	3.87e-12	1.45e-12	2.67	0.008*	1.03e-12	6.71e-12
_cons	-.0384191	.0110308	-3.48	0.000*	-.0600391	-.0167991

ta_ass60						
drvc60	9.68e-10	1.86e-11	52.14	0.000*	9.32e-10	1.00e-09
ppe60	-4.43e-10	2.72e-11	-16.29	0.000*	-4.97e-10	-3.90e-10
_cons	.0003235	.0099576	0.03	0.974	-.0191931	.0198402

ta_ass61						
drvc61	-2.01e-11	6.94e-11	-0.29	0.772	-1.56e-10	1.16e-10
ppe61	1.06e-09	4.21e-10	2.51	0.012*	2.31e-10	1.88e-09
_cons	-.2076952	.0803694	-2.58	0.010*	-.3652163	-.0501741

ta_ass62						
drvc62	-1.18e-10	4.62e-11	-2.56	0.010*	-2.09e-10	-2.78e-11
ppe62	-5.63e-09	1.26e-09	-4.46	0.000*	-8.10e-09	-3.16e-09
_cons	.8149972	.2054915	3.97	0.000*	.4122413	1.217753

ta_ass63						
drvc63	-1.79e-11	1.62e-11	-1.10	0.270	-4.96e-11	1.39e-11
ppe63	5.95e-12	2.53e-12	2.35	0.019*	9.94e-13	1.09e-11
_cons	-.0371568	.0094493	-3.93	0.000*	-.0556771	-.0186364

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	

ta_ass64						
drvc64	9.53e-11	4.59e-11	2.08	0.038*	5.37e-12	1.85e-10
ppe64	7.13e-11	1.69e-10	0.42	0.674	-2.60e-10	4.03e-10
_cons	.0761342	.1229281	0.62	0.536	-.1648004	.3170688

ta_ass65						
drvc65	-4.42e-11	9.33e-12	-4.74	0.000*	-6.25e-11	-2.59e-11
ppe65	-1.20e-11	1.83e-11	-0.65	0.513	-4.77e-11	2.38e-11
_cons	.0164943	.0138972	1.19	0.235	-.0107437	.0437322

ta_ass66						
drvc66	-3.15e-11	4.49e-12	-7.02	0.000*	-4.03e-11	-2.27e-11
ppe66	3.94e-11	2.17e-11	1.82	0.069	-3.02e-12	8.19e-11
_cons	-.0977301	.0316935	-3.08	0.002*	-.1598483	-.0356119

ta_ass67						
drvc67	-1.86e-11	1.04e-10	-0.18	0.858	-2.22e-10	1.85e-10
ppe67	1.84e-10	1.18e-10	1.56	0.119	-4.73e-11	4.15e-10
_cons	-.0568421	.0444605	-1.28	0.201	-.1439831	.0302989

ta_ass68						
drvc68	4.06e-12	4.65e-12	0.87	0.383	-5.05e-12	1.32e-11
ppe68	-2.32e-12	4.60e-12	-0.51	0.613	-1.13e-11	6.68e-12
_cons	-.0201925	.0301654	-0.67	0.503	-.0793156	.0389305

ta_ass69						
drvc69	-2.04e-10	8.29e-11	-2.46	0.014*	-3.67e-10	-4.17e-11

ppe69	-2.31e-11	5.68e-11	-0.41	0.684	-1.34e-10	8.82e-11
_cons	.0170265	.0660934	0.26	0.797	-.1125141	.1465672

ta_ass70						
drvc70	-2.79e-10	2.46e-11	-11.38	0.000*	-3.27e-10	-2.31e-10
ppe70	9.33e-12	1.03e-11	0.91	0.365	-1.08e-11	2.95e-11
_cons	-.1446435	.0286234	-5.05	0.000*	-.2007444	-.0885426

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	

ta_ass71						
drvc71	-6.02e-11	3.38e-11	-1.78	0.075	-1.26e-10	6.16e-12
ppe71	1.10e-11	3.90e-11	0.28	0.777	-6.54e-11	8.74e-11
_cons	.0197131	.0609443	0.32	0.746	-.0997355	.1391617

ta_ass72						
drvc72	-8.06e-11	2.91e-11	-2.77	0.006*	-1.38e-10	-2.36e-11
ppe72	1.28e-09	2.08e-10	6.12	0.000*	8.68e-10	1.68e-09
_cons	-.1912365	.0366899	-5.21	0.000*	-.2631475	-.1193256

ta_ass73						
drvc73	3.63e-13	5.59e-12	0.07	0.948	-1.06e-11	1.13e-11
ppe73	-2.43e-11	5.00e-11	-0.49	0.626	-1.22e-10	7.36e-11
_cons	.0328044	.0388904	0.84	0.399	-.0434194	.1090283

ta_ass74						
drvc74	1.11e-11	4.02e-11	0.28	0.783	-6.77e-11	8.98e-11
ppe74	2.80e-09	4.07e-09	0.69	0.492	-5.19e-09	1.08e-08
_cons	-.0406249	.0852333	-0.48	0.634	-.2076791	.1264293

ta_ass75						
drvc75	-6.03e-12	7.41e-12	-0.81	0.416	-2.05e-11	8.49e-12
ppe75	1.99e-11	1.06e-11	1.88	0.060	-8.23e-13	4.06e-11
_cons	-.1308635	.016892	-7.75	0.000*	-.1639711	-.0977559

ta_ass76						
drvc76	4.04e-11	3.66e-11	1.10	0.270	-3.14e-11	1.12e-10
ppe76	3.35e-10	1.98e-10	1.70	0.090	-5.21e-11	7.23e-10
_cons	-.2125689	.1782726	-1.19	0.233	-.5619767	.1368389

ta_ass77						
drvc77	1.10e-09	7.97e-10	1.39	0.166	-4.58e-10	2.67e-09
ppe77	-1.68e-10	2.68e-10	-0.63	0.531	-6.94e-10	3.58e-10
_cons	.0190945	.2062184	0.09	0.926	-.3850862	.4232751

ta_ass78							
drvc78		-5.27e-11	1.92e-11	-2.74	0.006*	-9.04e-11 -1.50e-11	
ppe78		-1.08e-11	1.93e-11	-0.56	0.575	-4.85e-11 2.69e-11	
_cons		-.0235665	.0410603	-0.57	0.566	-.1040431 .0569102	

ta_ass79							
drvc79		1.55e-11	1.62e-11	0.96	0.339	-1.63e-11 4.72e-11	
ppe79		3.38e-12	8.48e-12	0.40	0.690	-1.32e-11 2.00e-11	
_cons		-.0763425	.0212206	-3.60	0.000*	-.1179341 -.0347509	

ta_ass80							
drvc80		-1.41e-10	8.49e-11	-1.66	0.097	-3.07e-10 2.57e-11	
ppe80		3.97e-11	2.11e-10	0.19	0.851	-3.73e-10 4.53e-10	
_cons		.0326311	.0438974	0.74	0.457	-.0534061 .1186684	

ta_ass81							
drvc81		2.80e-11	1.16e-11	2.42	0.016*	5.29e-12 5.06e-11	
ppe81		-8.78e-11	2.45e-11	-3.58	0.000*	-1.36e-10 -3.97e-11	
_cons		.0582147	.0212178	2.74	0.006*	.0166286 .0998008	

ta_ass82							
drvc82		2.85e-13	7.85e-12	0.04	0.971	-1.51e-11 1.57e-11	
ppe82		-1.51e-11	1.25e-11	-1.21	0.225	-3.96e-11 9.31e-12	
_cons		-.0819604	.0361964	-2.26	0.024*	-.1529041 -.0110167	

ta_ass83							
drvc83		-6.15e-11	3.31e-11	-1.86	0.063	-1.26e-10 3.45e-12	
ppe83		5.31e-10	2.16e-10	2.45	0.014*	1.07e-10 9.55e-10	
_cons		.0295481	.021993	1.34	0.179	-.0135574 .0726537	

ta_ass84							
drvc84		-8.24e-11	2.87e-11	-2.87	0.004*	-1.39e-10 -2.62e-11	
ppe84		3.59e-11	3.72e-11	0.97	0.334	-3.70e-11 1.09e-10	
_cons		-.2105403	.2399234	-0.88	0.380	-.6807816 .259701	

ta_ass85							
drvc85		-2.33e-12	8.62e-13	-2.71	0.007*	-4.02e-12 -6.43e-13	
ppe85		-5.20e-14	1.90e-13	-0.27	0.784	-4.24e-13 3.20e-13	
_cons		-.1170374	.0296303	-3.95	0.000*	-.1751116 -.0589631	

ta_ass86							
drvc86		1.53e-13	6.49e-15	23.64	0.000*	1.41e-13 1.66e-13	
ppe86		1.36e-13	2.39e-14	5.69	0.000*	8.91e-14 1.83e-13	

_cons	-.1553525	.0087388	-17.78	0.000*	-.1724803	-.1382247

ta_ass87						
drvc87	-1.77e-10	1.30e-11	-13.67	0.000*	-2.03e-10	-1.52e-10
ppe87	-1.18e-09	3.75e-10	-3.14	0.002*	-1.91e-09	-4.41e-10
_cons	.1565114	.0475592	3.29	0.001*	.0632971	.2497256

ta_ass88						
drvc88	-3.60e-12	5.59e-13	-6.43	0.000*	-4.69e-12	-2.50e-12
ppe88	-7.22e-12	2.65e-12	-2.73	0.006*	-1.24e-11	-2.03e-12
_cons	.0150788	.0081836	1.84	0.065	-.0009608	.0311184

ta_ass89						
drvc89	1.83e-11	7.68e-12	2.38	0.017*	3.23e-12	3.33e-11
ppe89	4.44e-11	2.10e-11	2.12	0.034	3.36e-12	8.55e-11
_cons	-.1408386	.0361284	-3.90	0.000*	-.2116491	-.0700282

ta_ass90						
drvc90	-2.28e-10	1.30e-10	-1.75	0.079	-4.83e-10	2.67e-11
ppe90	-1.77e-09	1.50e-10	-11.82	0.000*	-2.06e-09	-1.48e-09
_cons	.7701569	.0727301	10.59	0.000*	.6276085	.9127052

ta_ass91						
drvc91	-3.27e-11	9.74e-12	-3.35	0.001*	-5.18e-11	-1.36e-11
ppe91	-3.08e-11	2.44e-11	-1.26	0.207	-7.85e-11	1.70e-11
_cons	-.0032247	.0621543	-0.05	0.959	-.1250448	.1185955

ta_ass92						
drvc92	6.77e-10	5.36e-10	1.26	0.206	-3.73e-10	1.73e-09
ppe92	3.79e-10	2.84e-10	1.34	0.182	-1.77e-10	9.35e-10
_cons	-.1145626	.0857328	-1.34	0.181	-.2825957	.0534706

ta_ass93						
drvc93	7.72e-12	2.49e-12	3.10	0.002*	2.83e-12	1.26e-11
ppe93	9.87e-12	3.15e-12	3.13	0.002*	3.69e-12	1.60e-11
_cons	-.2034646	.0339645	-5.99	0.000*	-.2700338	-.1368955
