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Profitability analysis of Chinese listed firms: 1992-2004

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Citation

RESEARCH ARTICLE

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Profitability analysis of Chinese listed firms: 1992—2004

Abstract   This research collects and analyses the profitability data of Chinese listed companies from 1992 to 2004. Results show that, on average, the profitability of Chinese listed companies has declined over the period. Post-IPO earnings also exhibit a downward trend. A further analysis reveals that changes in listed firms' profitability ratio follow a strong mean reversion pattern.

Keywords   profitability analysis, listed firms, stock market reform

摘要   根据历史数据，研究分析了我国上市公司 1992 年到 2004 年间的盈利状况。研究发现，平均来讲，我国上市公司的盈利水平在这一时间段内有显著的下降；公司上市后的业绩也呈下滑趋势；同时，上市公司的盈利能力有着较强的均值回归特性。

关键词   盈利能力分析，上市公司，股票市场改革

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1 Introduction

The purpose of this paper is simple: we attempt to collect and analyze the profitability data of Chinese listed firms from 1992 to 2004. In such a short period, Chinese stock market started up from zero, and has developed rapidly ever since. However, numerous problems and conflicts have also cropped up from the development of China's capital market during the corresponding period. Both the regulatory bodies and investors are concerned about these important questions, such as whether the stock market should be reformed, and if needed, how to reform, and where the bottlenecks are. Although the consensus has not yet been reached, one point is gaining wide acceptance: China's stock market will not develop further unless it is reformed. What is more, China's stock market will face the danger of being marginalized in the national economy unless it does develop further.

By examining and summarizing the profitability status of Chinese listed firms in their short period of existence, this paper tries to find clues to some of the current problems faced by China's stock market. Stock market is like a commodity market, and the profitability of listed firms represents the quality of the trading goods. It is important for us to pay close attention to the quality of Chinese listed firms. The great impact of the quality of listed firms on the development of stock market should never be ignored by any reform and development measures.[1]

A considerable amount of researches have discovered that factors which determine the quality of Chinese listed firms are the profitability fundamentals. Firm value is influenced by macroeconomic situation, industry development and strategies adopted by the firm. However, these factors influence the firm value through the accounting profitability in the end. When investors value a firm, they rely on the accounting profitability attributes of the firm to a large degree. Therefore, fundamental profitability of all listed firms in the stock market is a must for investors. Though there have been a few researches studying the profitability of Chinese listed firms, systematical analysis is scarce. Nissim and Penman (2001) documented fundamental profitability of American listed firms in the past thirty years, which provided references for investors to analyze financial statements and securities investment.

Following Nissim and Penman (2001), this paper first builds a framework of profitability analysis of listed firms based on the residual income valuation

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[1] On December 1st, 2005, the State Council issued the *Notice of the State Council on Approving and Forwarding the Opinions of China Securities Regulatory Commission on Improving the Quality of Listed Companies*, indicating that China's regulatory bodies start to pay more attention to the quality of listed firms.

model. Then relevant ratios are identified as the building blocks of the profitability analysis, including the return on equity and equity growth. Next, further analysis is conducted to find the fundamental value drivers which determine the firm value. Finally, we document Chinese listed firms' fundamental profitability under this structure according to historical data.

It must be pointed out that the purpose of this paper is to document Chinese listed firms' profitability, rather than to interpret the observed phenomenon. And the literal explanation of the data is as brief as possible. Readers who are interested in it can read the tables including data results in detail. The history of Chinese stock market is comparatively short and still in a continuous changing stage. Therefore, the short period performance does not represent the same trend in the long term. Further researches can explore why the event observed in the paper exists and analyzes the significance of this event to the reform of Chinese stock market.

2   The framework of profitability analysis

This paper focuses on profitability analysis based on residual income valuation model (Ohlson, 1995; Penman, 2004), which relates a company's value to accounting earnings and book value of equity, a major difference with dividend and cash-flow discount model. Further, residual income analysis brings new insights to profitability analysis. Formula (1) is the residual earnings model:

$$V_0^E = Equity_0 + \sum_{t=1}^{\infty} \rho_E^{-t} RE_t \qquad (1)$$

Where V_0^E is the value of equity at date 0, $Equity_0$ is the book value of equity, ρ_E is one plus the required return for equity (the equity cost of capital), RE_t is residual earnings or residual income at date t, and t is a counter of future years beyond the current year, year 0, t=1, 2, 3, …The definition of RE_t is

$$RE_t = NI_t - (\rho_E - 1) \times Equity_{t-1} = \left[ROE_t - (\rho_E - 1) \right] \times Equity_{t-1} \qquad (2)$$

It indicates that residual income of a company in any accounting period is equal to current net income minus return that required by equity in the same period, that is, it can be considered as excess earnings. From formula (1), we can infer that if residual income equals zero in the long-term, the firm's value is the book value of shareholders' equity.

Formulas (1) and (2) indicate that a firm's value is determined by two value drivers: the rate of return on equity (*ROE*) and the book value of shareholders'

equity, given the equity cost of capital constant or impossible to forecast in the long-term. If a company wants to increase shareholders' wealth, *ROE* must be improved on the basis of the size of shareholders' equity, and shareholders' equity will grow on the premise that *ROE* is greater than cost of equity capital. Thus, this paper focuses on the analysis of the rate of return on equity and the growth rate of equity.

2.1   Analysis of the rate of return on equity (*ROE*)

ROE is the summary profitability ratio in financial statements analysis, the definition is:

$$ROE = \frac{\text{Net income}}{\text{Average equity}}{}^2 \tag{3}$$

The purpose of profitability analysis is to forecast future profitability. Therefore, *ROE* is decomposed to more fundamental financial ratios. Understanding these fundamental ratios can help investors predict more accurately the direction of future *ROE*.

$$ROE = \frac{\text{Net income}}{\text{Average equity}}$$

$$= \frac{\text{Net income} + (1 - \text{Tax rate}) \times \text{Interest expense} + \text{Minority share of income} - (1 - \text{Tax rate}) \times \text{Interest expense-Minority share of income}}{\text{Average equity}}$$

$$= \frac{\text{Net income} + (1 - \text{Tax rate}) \times \text{Interest expense} + \text{Minority share of income}}{\text{Average asset}}$$

$$\times \frac{\text{Average asset}}{\text{Average equity}}$$

$$- \frac{(1 - \text{Tax rate}) \times \text{Interest expense} + \text{Minority share of income}}{\text{Average debt} + \text{Average minority interest sharing}}$$

$$\times \frac{\text{Average debt} + \text{Average minority interest shares}}{\text{Average equity}}$$

In short, the above formula can be expressed as:

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[2] Theoretically, residual income valuation requires that numerator be comprehensive income and denominator be prior equity. As a routine, however, this paper uses net income as the numerator and average equity as the denominator.

$$ROE = ROA \times (1 + LEV) - BC \times LEV = ROA + (ROA - BC) \times LEV \quad (4)$$

$$ROE = PM \times ATO + (PM \times ATO - BC) \times LEV \quad (5)$$

Where,

$$ROA = \frac{\text{Net income} + (1 - \text{Tax rate}) \times \text{Interest expense} + \text{Minority share of income}}{\text{Average total assets}}$$

$$PM = \frac{\text{Net income} + (1 - \text{Tax rate}) \times \text{Interest expense} + \text{Minority share of income}}{\text{Sales}}$$

$$ATO = \frac{\text{Sales}}{\text{Average total assets}}$$

$$BC = \frac{(1 - \text{Tax Rate}) \times \text{Interest Expense} + \text{Minority Share of Income}}{\text{Average Debt} + \text{Average Minority Interest Sharing}}$$

$$LEV = \frac{\text{Average Debt} + \text{Average Minority Interest Sharing}}{\text{Average Equity}}$$

Note: In this analysis, minority interest sharing is regarded as a kind of liability.

In the formula above, *ROA* is return on assets, which reflects the return on all assets that would be made without leverage from debt. *ROA* can be broken down into two components: profit margin (*PM*, or profit/sales ratio) and asset turnover (*ATO*). Profit margin captures the profitability of each dollar of sales, which are the whole current profit earned by shareholders, creditors and minor shareholders. And this ratio reflects the firms' ability to control cost and expense. Assets turnover reflects the efficiency of utilizing assets, *BC* reflects average borrowing cost and *LEV* is financial leverage equal to liability/equity. Finally, one plus *LEV* is another measurement of financial leverage, which equals to total assets/equity. The value of *ROA* minus *BC* indicates whether liability adds to the firm's value. If *ROA* minus *BC* is positive, the earnings from debt is greater than its cost, so borrowing money can increase shareholders' wealth, otherwise earnings from debt can not offset the borrowing cost, then borrowing money is against shareholders' interests. Thus the difference between *ROA* and *ROE* is determined by both the result of *ROA* minus *BC* and *LEV*.

2.2 Analysis of growth rate of shareholders' equity

As above, residual income valuation model indicates that the decisive drivers of growth in firm's value are the rate of return on equity and shareholders' equity. This section decomposes growth in these two drivers in order to help investors

understand the origin of growth in value.

We take the first order difference of Formula 4 and get the growth in *ROE* from year *t*–1 to *t*.

$$\Delta ROE_t = \left[ROA_t - ROA_{t-1} \right]$$
$$+ \left[(ROA_t - BC_t) \times LEV_t - (ROA_{t-1} - BC_{t-1}) \times LEV_{t-1} \right]$$

$$\Delta ROE_t = \Delta ROA_t + (\Delta ROA_t - \Delta BC_t) \times LEV_{t-1}$$
$$+ (ROA_{t-1} - BC_{t-1}) \times \Delta LEV_t + (\Delta ROA_t - \Delta BC_t) \times \Delta LEV_t \quad (6)$$

$\Delta ROE - \Delta BC$ is defined as $\Delta SPREAD$, so (6) can be shortly expressed as (7)

$$\Delta ROE_t = \Delta ROA_t + \Delta SPREAD_t \times LEV_{t-1}$$
$$+ \Delta LEV_t \times SPREAD_{t-1} + \Delta SPREAD_t \times \Delta LEV_t \quad (7)$$

According to (7), changes in *ROE* are influenced by changes in *ROA*, changes in *ROA–BC*, changes in *LEV* and LEV_{t-1}.

Analysis of growth in equity is the foundation of a firm's future growth prediction. Growth in sales is the most primary driver of growth in common equity. Given that assets turnover is constant, growth in sales needs growth in assets proportionally. Generally speaking, assets increase can be achieved through debt financing or equity finance, that is to say, growth in assets can be obtained by growth in debt or equity. Drawing on the accounting equation, we can deduce the following formulas:

$$Equity = Asset - Debt$$

$$Equity = Sales \times \frac{1}{ATO} - Debt$$

$$Equity = Sales \times \frac{1}{ATO} \times \frac{1}{1 + LEV} \quad (8)$$

Where *Equity* is average common equity and *Sales* is the current year sales. Growth in equity is the derivative of the natural logarithm of equity.

$$GroEquity_t = GroSales_t - GroATO_t - Gro(1 + LEV_t) \quad (9)$$

Formula (9) states that growth in equity depends not only on growth in sales but also on the extent of firm's debt financing.

3   The sample selection

In Section 2, *ROE* and the growth in equity are the most primary drivers to the growth in firms' value. And factors which determine changes in these two ratios are decomposed. The purpose of this paper, according to this structure, is to summarize and record these ratios and their changes in Chinese listed firms from 1992 to 2004.

We use all available observations on the CSMAR (China Stock Market & Accounting Research) database from 1992 to 2004. Until December 31, 2004, there are 1 492 firms whose common stock is traded on the Shanghai Stock Exchange and Shenzhen Stock Exchange, but CSMAR database provides only 1 331 firms' comprehensive financial statements. In our analysis from 1992 to 2004, the number of observations is 11 037. After eliminating nine financial firms (74 observations) and 1 378 observations lack of necessary data, a total of 9 585 firm-year observations are obtained. In addition, we delete 1 356 firm-year observations (IPO year) [3]. The final sample consists of 8 229 firm-year observations. Table 1 demonstrates the process of sample selection.

Table 1   Sample selection

Year	Listed firms	Delete: Financial firms	Delete: Missing data	Delete: Survivor bias	Total samples in CSMAR	Delete: IPO firms	Sample
1992	71	1	31	0	39	39	0
1993	218	2	53	0	163	124	39
1994	345	5	70	0	270	107	163
1995	381	5	82	0	294	24	270
1996	599	5	97	0	497	203	294
1997	821	5	113	1	702	206	496
1998	932	5	119	0	808	106	702
1999	1 032	6	121	0	905	97	808
2000	1 175	7	127	0	1 041	136	905
2001	1 254	7	127	3	1 117	79	1 038
2002	1 325	8	130	7	1 180	70	1 110
2003	1 392	9	138	7	1 238	65	1 173
2004	1 492	9	145	7	1 331	100	1 231
Total	11 037	74	1 353	25	9 585	1 356	8 229

Note: 1. From 1992 to 2004, there were nine financial firms in Chinese stock market;
    2. Missing data means CSMAR database does not provide financial ratio needed;
    3. Survivor bias means companies whose data were not included in the databank in year *t*;
    4. IPO firms include observations go public in year *t*.

The distribution of the sample firms' industries and stock exchanges listed at is

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[3] China had only 14 listed firms at the end of 1991. Considering the limited number, we do not use the observations before 1991.

given in Table 2. Manufacturing firms take a large percentage in listed firms (54.2%). Firms in other industries appear to be more or less evenly distributed, and the number of firms traded at Shanghai Stock Exchange is greater than that of at Shenzhen Stock Exchange.

Table 2 Industry and stock exchange distribution of sample firms

Industry	Exchange		Total	
	Shanghai	Shenzhen	Number	Ratio(%)
A. Agriculture, hunting , forestry and fishing	89	71	160	1.94
B. Mining and quarrying	38	52	90	1.09
C. Manufacturing	2 437	2 019	4 456	54.20
D. Electricity, gas and water supply	183	158	341	4.14
E. Construction	73	39	112	1.36
F. Transport, storage	181	104	285	3.46
G. Communications	288	205	493	5.99
H. Wholesale and retail trade	456	167	623	7.57
I. Financial intermediation	0	0	0	0.00
J. Real estate	207	247	454	5.52
K. Social service	120	135	255	3.10
L. Information and arts	59	24	83	1.01
M. Miscellaneous	447	430	877	10.70
Total	4 578	3 651	8 229	100.00

Many ratios in the present paper have extreme values, usually due to very small denominators. Following popular treatment in accounting research, we winsorize all variables at 1% and 99%.

4 Profitability analysis of listed firms in China

In this section, we will describe the aggregate level of profitability for Chinese listed firms from 1992 to 2004. Then changes in profitability are compared among years. At last, we analyze firm's post-IPO performance.

Table 3 summarizes the mean, median standard deviation, skewness and 10, 25, 75, and 90 percentile of the ratios pooled over all firms and all years, 1993−2004. The first panel gives the main drivers of the *ROE* component of residual earnings. The second panel gives ratios that measure the growth of residual earnings.

Over all firms and all years, the mean (median) *ROE* and the mean (median) *ROA* are 5.1% (7.3%) and 4.1% (4.8%), respectively. The standard DuPont profit margin (*PM*) and asset turnover (*ATO*) which drives *ROA* are given in the Panel 1 of Table 1. The mean (median) *PM* and the mean (median) *ATO* are 4.2% (9.0%) and 0.572 (0.460), respectively. The mean (median) annual borrowing

cost of 2.1% (2.2%) is lower than *ROA*, indicating that liability can improve equity value. With higher leverage for Chinese listed firms, the mean (median) debt/equity ratio reaches 116% (88%).

Table 3 Statistical description of listed firms' finance-related ratios: 1993–2004

Panel A. Drivers of *ROE*

	ROE	ROA	PM	ATO	BC	LEV	SPREAD
N	8 229	8 228	8 210	8 229	8 228	8 229	8 228
Mean	0.051	0.041	0.042	0.572	0.021	1.157	0.019
10	−0.048	−0.020	−0.043	0.165	−0.005	0.288	−0.049
25	0.023	0.022	0.039	0.290	0.009	0.519	0.001
Median	0.073	0.048	0.090	0.460	0.022	0.880	0.025
75	0.119	0.076	0.170	0.715	0.035	1.484	0.054
90	0.177	0.105	0.284	1.133	0.050	2.298	0.093
SD	0.179	0.074	0.458	0.431	0.026	1.139	0.079
SK	−2.845	−1.983	−4.951	1.758	−0.518	2.074	−1.809

Panel B Drivers of growth

	ΔROE	ΔROA	ΔPM	ΔATO	ΔBC	ΔLEV	GroEQUITY	GroSALES
N	8 227	8 225	8 203	8 227	8 225	8 227	8 229	8 219
Mean	−0.019	−0.009	−0.066	0.012	0.001	0.133	0.086	0.220
10	−0.127	−0.063	−0.185	−0.172	−0.024	−0.190	−0.116	−0.271
25	−0.043	−0.026	−0.056	−0.069	−0.010	−0.042	0.005	−0.053
Median	−0.008	−0.006	−0.012	0.004	0.000	0.066	0.049	0.126
75	0.015	0.010	0.014	0.080	0.011	0.226	0.129	0.348
90	0.074	0.041	0.084	0.197	0.027	0.506	0.375	0.698
SD	0.239	0.068	0.534	0.184	0.025	0.822	0.304	0.592
SK	−0.035	−0.565	−3.702	0.727	0.298	0.925	0.897	2.991

The distribution of both *ROE* and *ROA* is skewed to the left, which indicates that the distribution of the two ratios has a fatter left tail.

Panel B in Table 3 documents annual changes or growth of financial ratios and equity. The results in Panel B show that on average, the profitability of listed firms declined from 1992 to 2004. *ROE* falls annually 1.9% (0.8) on average, however *ROA* falls an annual 0.9% (0.6%). At the same period, leverage tends to rise among listed firms. Debt/equity ratio increases 13.3% annually. The mean growth rate in equity is 8.6% and the median 4.9%. The mean growth in sale is 22% and the median 34.8%.

Table 4 Profitability analysis: 1993–2004

Year	ROE		ROA		PM		ATO		BC		LEV		GroEquity		GroSALES	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
1993	0.196	0.161	0.105	0.091	0.212	0.153	0.697	0.612	0.003	0.017	1.030	0.701	0.701	0.626	0.923	0.816
1994	0.136	0.131	0.088	0.079	0.209	0.166	0.601	0.490	0.012	0.002	0.869	0.659	0.232	0.131	0.255	0.069
1995	0.093	0.092	0.064	0.062	0.145	0.105	0.630	0.522	0.021	0.021	1.013	0.760	0.062	0.018	0.176	0.097
1996	0.073	0.097	0.055	0.055	0.119	0.095	0.553	0.451	0.023	0.023	1.130	0.910	0.145	0.093	0.097	0.027
1997	0.090	0.112	0.067	0.070	0.110	0.127	0.587	0.479	0.023	0.025	1.066	0.885	0.183	0.117	0.230	0.088
1998	0.073	0.111	0.058	0.069	0.087	0.134	0.544	0.441	0.021	0.022	0.990	0.770	0.176	0.114	0.145	0.053
1999	0.069	0.098	0.053	0.062	0.096	0.126	0.524	0.439	0.023	0.023	1.051	0.768	0.085	0.056	0.169	0.087
2000	0.060	0.089	0.048	0.056	0.081	0.113	0.530	0.435	0.022	0.023	1.063	0.811	0.137	0.063	0.242	0.141
2001	0.034	0.063	0.030	0.043	0.025	0.089	0.521	0.419	0.022	0.023	1.086	0.823	0.036	0.019	0.178	0.086
2002	0.022	0.056	0.024	0.037	−0.027	0.071	0.557	0.442	0.022	0.021	1.197	0.891	0.032	0.027	0.226	0.129
2003	0.036	0.059	0.028	0.038	−0.009	0.070	0.602	0.477	0.021	0.020	1.281	0.999	0.054	0.061	0.248	0.176
2004	0.027	0.055	0.026	0.035	−0.017	0.061	0.658	0.535	0.021	0.021	1.412	1.109	0.035	0.036	0.293	0.208
Total	0.051	0.073	0.041	0.048	0.042	0.090	0.572	0.460	0.021	0.022	1.157	0.880	0.086	0.049	0.220	0.126

Table 3 presents only the pooled descriptive statistics of profitability ratios, and they give no indication of the variation and trends over time that is helpful for prediction. Table 4 gives the analysis by year. Then main ratios are analyzed in order to observe changes in these ratios from 1992 to 2004.

Consistent with the results in Table 3, Table 4 shows that the profitability of listed firms exhibits sharp decline and this decline is monotonous. The mean *ROE* falls from above 13% in 1993 and 1994 to below 4% after 2001. And the mean *ROA* falls from above 8% prior to 1994 to below 3% after 2001. The analysis about profit margin and asset turnover implies that the decreasing of *ROA* results from decreasing of profit margin which falls from above 10% prior to 1997 to below zero after 2002. In the same period, asset turnover, borrowing cost and leverage did not change drastically. From changes in growth of equity and sales, we find an obvious pattern is that the growth of equity decreased drastically, and it maintained below 5% after 2001. The growth of sales is fairly steady and keeps at around 22% for all years except year 1993.

Then, we examine the post-IPO profitability. IPO year is regarded as year 0 for all IPO firms and we observe changes in *ROE* and *ROA* in these firms in the following five years. Table 5 documents the results.

Panel A and panel B of table 5 respectively show *ROE* and *ROA* in the IPO year and the following five years. They report not only for each year but report average value for all the period. Table 5 indicates that Chinese listed firm's performance is on the decline trend on average. In the IPO year, the mean (median) *ROE* is 11.1% (10.4%), it is 11.0% (11.0%), 8.0% (9.3%), 6.1% (7.7%), 4.0% (6.8%) and 3.0% (6.1%) during the following five years, respectively. In the IPO year, the mean (median) *ROA* is 7.4% (6.9%), it is 7.4% (7.1%), 5.9% (6.1%), 4.8% (5.3%), 3.6% (4.6%) and 2.9% (4.0%) during the following five years, respectively. The performance has been on a decline for the whole period during post-IPO period. And the results indicate that these companies being listed before 1999 enjoy higher profitability in the IPO year than those after 1999, and performance is better in some years after being listed.

Table 5 Post-IPO profitability

PANEL A: *ROE*

		IPO	IPO+1	IPO+2	IPO+3	IPO+4	IPO+5
1992	Mean	0.156	0.196	0.122	0.074	0.051	0.014
	Median	0.107	0.161	0.123	0.071	0.065	0.063
1993	Mean	0.135	0.141	0.093	0.066	0.056	0.052
	Median	0.117	0.133	0.091	0.083	0.102	0.086
1994	Mean	0.132	0.101	0.083	0.066	0.027	0.042
	Median	0.126	0.101	0.098	0.107	0.087	0.070

(*To be continued*)

(*Continued*)

		IPO	IPO+1	IPO+2	IPO+3	IPO+4	IPO+5
1995	Mean	0.138	0.105	0.086	0.062	0.028	0.040
	Median	0.117	0.113	0.106	0.108	0.079	0.067
1996	Mean	0.138	0.139	0.076	0.071	0.043	0.024
	Median	0.127	0.129	0.117	0.092	0.083	0.058
1997	Mean	0.129	0.126	0.093	0.062	0.041	0.017
	Median	0.118	0.119	0.100	0.086	0.062	0.045
1998	Mean	0.113	0.114	0.105	0.056	0.028	0.035
	Median	0.107	0.114	0.103	0.072	0.061	0.062
1999	Mean	0.093	0.096	0.054	0.037	0.015	0.028
	Median	0.092	0.098	0.071	0.061	0.047	0.038
2000	Mean	0.077	0.075	0.056	0.064	0.056	
	Median	0.073	0.070	0.064	0.061	0.062	
2001	Mean	0.069	0.053	0.056	0.045		
	Median	0.066	0.065	0.063	0.055		
2002	Mean	0.077	0.075	0.072			
	Median	0.072	0.081	0.100			
2003	Mean	0.077	0.078				
	Median	0.070	0.073				
2004	Mean	0.083					
	Median	0.074					
Total	Mean	0.111	0.110	0.080	0.061	0.040	0.030
	Median	0.104	0.110	0.093	0.077	0.068	0.061

PANEL B: *ROA*

		IPO	IPO+1	IPO+2	IPO+3	IPO+4	IPO+5
1992	Mean	0.073	0.105	0.082	0.052	0.044	0.033
	Median	0.057	0.091	0.082	0.052	0.048	0.050
1993	Mean	0.084	0.090	0.064	0.053	0.050	0.044
	Median	0.080	0.078	0.061	0.056	0.058	0.055
1994	Mean	0.081	0.067	0.061	0.056	0.032	0.030
	Median	0.075	0.064	0.060	0.059	0.046	0.045
1995	Mean	0.076	0.059	0.048	0.046	0.034	0.039
	Median	0.066	0.049	0.056	0.067	0.049	0.052
1996	Mean	0.091	0.091	0.063	0.047	0.038	0.022
	Median	0.084	0.087	0.075	0.064	0.056	0.038

		IPO	IPO+1	IPO+2	IPO+3	IPO+4	IPO+5
1997	Mean	0.089	0.086	0.070	0.055	0.034	0.022
	Median	0.084	0.084	0.069	0.061	0.043	0.035
1998	Mean	0.080	0.083	0.071	0.045	0.026	0.034
	Median	0.079	0.082	0.066	0.051	0.037	0.040
1999	Mean	0.066	0.064	0.042	0.038	0.028	0.030
	Median	0.063	0.064	0.047	0.041	0.036	0.032
2000	Mean	0.058	0.055	0.044	0.045	0.037	
	Median	0.056	0.050	0.046	0.043	0.040	
2001	Mean	0.050	0.043	0.043	0.036		
	Median	0.044	0.045	0.045	0.042		
2002	Mean	0.055	0.050	0.050			
	Median	0.051	0.055	0.054			
2003	Mean	0.056	0.053				
	Median	0.053	0.050				
2004	Mean	0.058					
	Median	0.051					
Total	Mean	0.074	0.074	0.059	0.048	0.036	0.029
	Median	0.069	0.071	0.061	0.053	0.046	0.040

5   Mean reversion in profitability

In Section 4, we analyze and document fundamental information of Chinese listed firms from 1992 to 2004. In this section, we analyze an important property of accounting profitability-mean reversion, which means that profitability does not maintain on an extreme high or an extreme low level in the long term. Firms with high profitability tend to have a decrease in profitability in the future, or vice versa. In the long run, the profitability of these firms with different profitability levels tends to converge.

The mean reversion in profitability is observed in matured capital market in developed countries. For example, Nissim and Penman (2001) found the mean reversion in American capital market. The explanatory for the mean reversion in profitability mainly focus on the influence of competition on profitability. In a competitive market, once the profitability is too high, more invertors will enter the market, then the profitability will decrease toward economy-wide levels, vice versa. A low profitability will also lead to the dissatisfaction of investors, the management turnover and changes in strategy, which result in improving

profitability.

Studying the mean reversion in profitability and the speed and extent of reversion is helpful for investors to forecast the future profitability. The forecasted profitability is central to investment.

We examine these issues with reference to Fig. 1. The displays are based on ranking a given measure (such as *ROE*) in a base year, year 0, forming 10 portfolios from the rankings, and then tracking median values for each portfolio for the following five years. The ranking is done every year. The first portfolio is the group with the lowest ratio and the tenth portfolio is the group with the highest ratio. Other eight portfolios are the second to the ninth group with ratios from low to high. The figures give the mean of portfolio median over the eight sets of calculations.

Fig. 1 traces portfolio median of *ROE*, *ROA*, profit margin, asset turnover, debt/equity radio, borrowing cost, growth in equity and growth in sales over five years from the base year.

Fig. 1 indicates that profitability of Chinese listed firms shows a strong mean reversion pattern, and the reversion speed is fast, the extent is large. Ranking *ROE* in base year, we get ten portfolios. The 1st portfolio's *ROE* is only −14.0% in base year, but in the following year, the portfolio turns to be profitable on average— *ROE* is 1.5%. However, the 10th portfolio's *ROE* is 23.9% in base year, but reduce to 17% in one year. During the following years, the 1st portfolio enjoys the rising and the 10th portfolio continues decreasing. They are moving to converge. In *t+0*, the difference is 37.9% between these two portfolios. But after four years, the difference is only 1.4%. Five years later, the *ROE* in the 1st portfolio is greater than the 10th portfolio. Meanwhile, the other portfolios are facing the similar trend. Higher *ROE* will go down and lower *ROE* will rise. In year *t+5*, *ROE* in all the portfolios is around 5% on average.
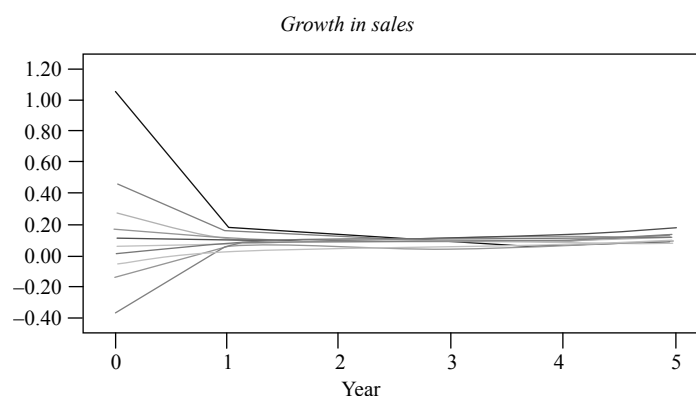

ROE

ROA

PM

ATO

LEV

BC

Growth in equity

Growth in sales
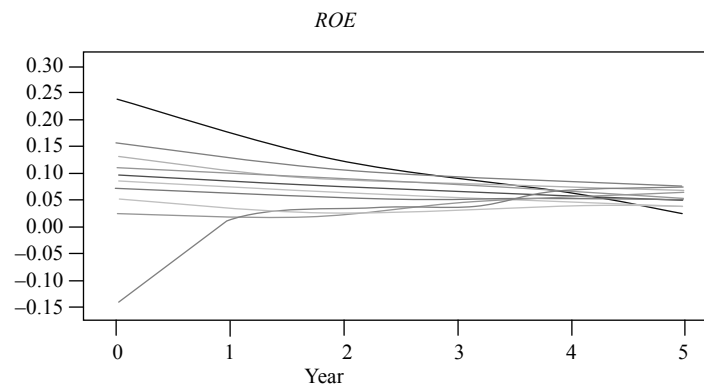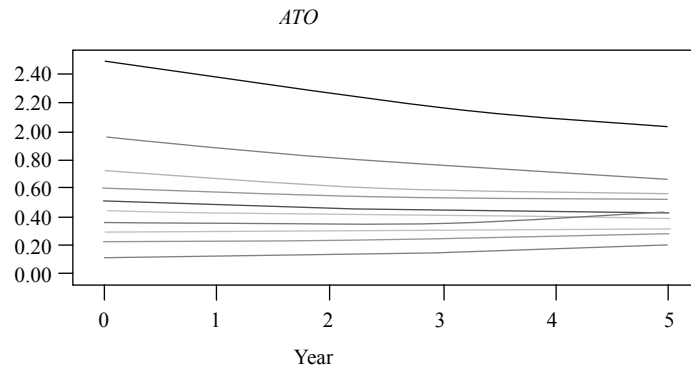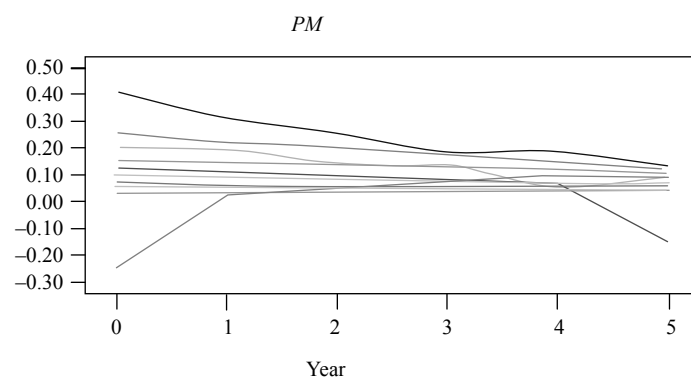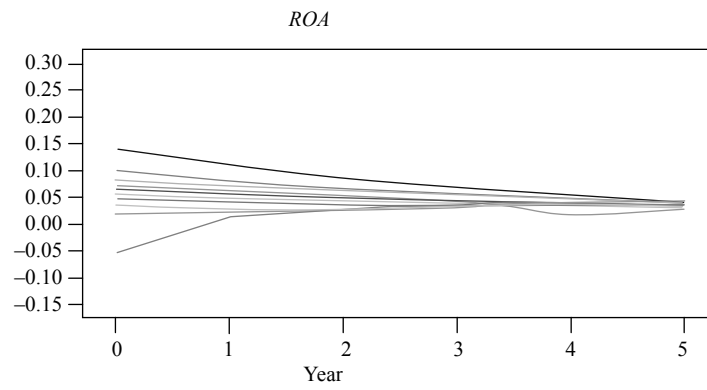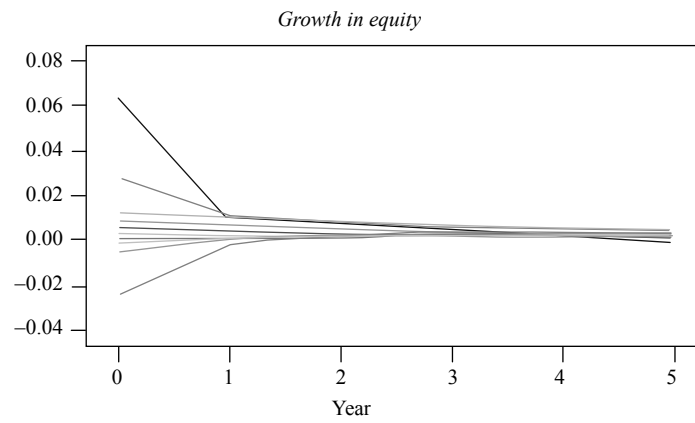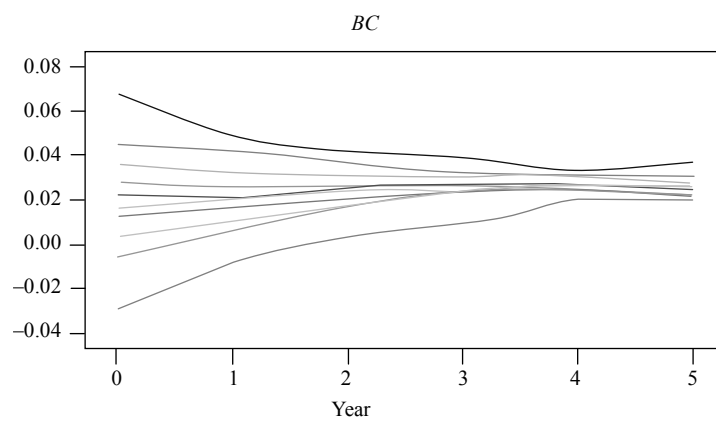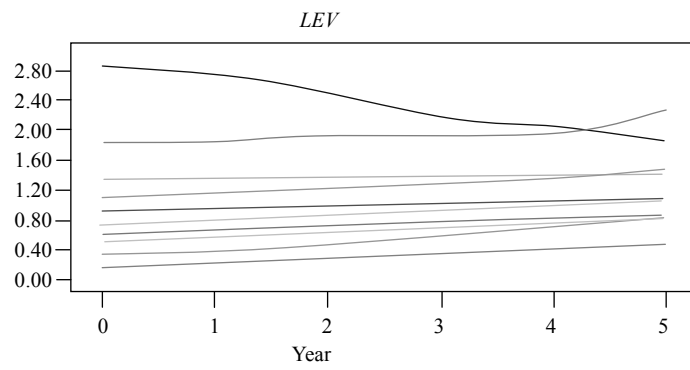
Fig.1   Mean reversion in ratios

ROA and profit margin show the similar mean reversion trend, and the speed and extent is similar to *ROE*.[4]

In contrast, asset turnover shows moderate mean reversion trend. Asset turnovers reduce drastically in the highest two portfolios, but increase slowly in the lowest portfolio. And, with the exception of the highest *ATO* portfolio, asset turnovers in other portfolios remain fairly constant. So, profit margin is the most important factor which drives decreasing in *ROE* and *ROA*. The effect of asset turnovers is non-significant.

Chinese listed firms vary greatly in debt financing and this difference will not disappear as time goes by. From debt/equity ratio figure, debt/equity ratio appears to mean revert to some extent, especially for the highest debt/equity ratio firms which will cut debt drastically in the following years. However, even after five years, the difference of debt/equity ratio is still large, with the highest portfolio is 186% but lowest one is only 47.6%.

The speed of mean reversion of borrowing cost is faster than the debt/equity ratio. In the base year, the difference between the highest borrowing cost portfolio (10th portfolio) and the lowest portfolio (1st portfolio) is above 9%, but it reduces to 1.7% in year *t+5*.

The growth in equity is another important factor that drives the firm's value. The industries with higher return should attract more investment and those with lower return will be difficult to borrow money. The figure of growth in equity shows that growth in equity cannot maintain for a long period. A company cannot always maintain a high growth in equity. On the other hand, it cannot survive if it

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[4] In the 6th portfolio of *PM*, the figure displays a drop. This shape results from the data in 1998. The base year is 1993, the 6th portfolio of *PM* have only two firms in year *t+5* (1998), with *PMs* of 0.06 and −3.14, respectively. It is noticed that the −3.14 is an outlier.

cannot borrow money. Similarly, growth in sales is not persistent in listed firms. The firms with high growth in sales cannot persist in the following years and the firms with low growth in sales will promote sales. The result in Fig. 1 demonstrates that high growth rate persists for only one year, in the next year there is little difference in growth.

In summary, Fig. 1 shows the mean reversion property for Chinese listed firms. The mean reversion of all ratios excluding asset turnover and leverage has the characters of fast speed and large extent.

6   Conclusions

This paper documents Chinese listed firms' profitability from 1992 to 2004. We find that on average, the profitability of Chinese listed firms has been on the decline during this period; the post-IPO performance decreased year by year, and the financial ratios exhibit a strong mean reversion property.

Some characters of financial data are not unique to Chinese capital market. For example, the decrease problem in post-IPO's performance is also serious in America stock market (Ritter, 1991); Nissim and Penman (2001) also find mean reversion property of profitability in American listed companies. One of the limitations of this paper is that it does not go a step further to explain the reasons behind the profitability changes in Chinese listed firms. Therefore, we hope future analysis could examine the reasons and make contributions to the improvement of the quality of Chinese listed companies and to the development of Chinese stock market.

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Appendix: Definition of variables used in this paper

This appendix describes how financial ratios are defined and measured. Since some data in financial report may be incorrect, some of ratios may have calculation errors. Data codes are defined in accordance with the Appendix 3 in *CSMAR Financial Statement Database Update Manual (2002)*.

[1]Net income = Profit before income tax – Income tax– Minority interest + Fiscal Subsidy − Profits from mergers and acquisitions + Repayable income tax + Investing loss not yet recognized = #B140101 − #B140204 − #B140304 + #B140402 − #B140503 + #B140601 + #B140701. There are 114 firms whose net income calculated using above formula is different from it in financial report (#B150101).

[2] Average equity = (equity at beginning of year + equity at end of year)/2 = (#A300000 at beginning of year + #A300000 at end of year)/2. If the data of equity at the beginning of year is missing, equity at the end of year is used as a substitute.

[3] The rate of return on equity = *ROE* = Net income/Average equity, where net income is from financial report (#B150101) or calculated from the data of income statement. Because the information of preferred stock is not mandatory to disclose for listed firms, we cannot separate preferred stock from common stock. That is, average equity includes common and preferred stock. With respect to only below 0.4% sample companies has dividend on preferred stock, the conclusion in the paper is not influenced by the preferred stock.

[4] Income tax rate = Current tax / Profit before income tax = (Income tax − Fiscal Subsidy–Repayable income tax)/ Profit before income tax = (#B140204 − #B140402 − #B140601) / #B140101. According to the previous papers (Yao, 2003 and Qian, Li, 2003), "refund after collection" is common for Chinese listed firms prior to 2000. So the fiscal subsidiary and repayable income tax are deducted in order to calculate income tax rate. Though the Further Implementing the Circular of the State Council on Correcting the Locally Formulated Tax

Rebate Policies was issued in 2000, but in fact effective tax rate changes little for listed firms. With respect to most companies using tax payable method and little companies using tax effect accounting method, this paper ignores the influence caused by deferred tax debit (credit) on income tax expense.

[5] Interest expense = Financial expense = #B110604. Interest expense can not separated from financial expense because of Chinese accounting standard. We can't compute the accurate value of interest expense, so substitute interest expense with financial expense. This simplified calculation leads to higher *BC* and lower *SPREAD*.

[6] Minority interest= #B140304

[7] Average total assets = (total assets at beginning of year + total assets at end of year)/2 = (#A100000 at beginning of year + #A 100000 at end of year)/2. If data of total assets at end of year is missing, total assets at the beginning of year is used as a substitute.

[8] Return on assets =*ROA*= *PM*ATO* = [Net Income + (1－tax rate)*interest expense + minority shareholders' gain and lose]/Average total assets, where net income is from financial report (#B150101) or calculated from the data of income statement.

[9] Sales = prime operating income (#B110101). Net prime operating income is a better index to predict sales. But most net prime operating income is lost in CSMAR files, so we use prime operating income to measure sales.

[10] Profit margin = *PM* = [Net Income + (1－tax rate)*interest expense + minority shareholders' gain and lose]/Sales

[11] Asset turnover = *ATO* = Sales/ Average total assets.

[12] Average liability = (total liability at beginning of year+ total liability at end of year)/2 = (#A200000 at beginning of year + #A 200000 at end of year)/2. If data of total liability at end of year is missing, total liability at the beginning of year is used as a substitute.

[13] Borrowing cost = *BC*= [(1－tax rate)*interest expense+ minority shareholders' gain and lose]/ [Average total liabilities +Average minority interest sharing]. Theoretically, dividend on preferred stock should be added in both numerator and denominator. But due to lack of data, preferred stock in listed

firms is small, so it is slipped in calculation.

[14] Financial leverage = *LEV* = [Average total liabilities +Average minority interest sharing]/ Average equity. Theoretically, average preferred stock should be added in numerator and be minus from denominator. Because the data of preferred stock is not revealed, writer cannot get these data, so average preferred stock is slipped in calculation.

[15] Growth rate in common equity = *GroEquity* = (common equity at end of year–common equity at beginning of year)/ common equity at beginning of year = (#A300000 at end of year– #A300000 at beginning of year)/ #A300000 at beginning of year. If data of common equity at beginning of year is missing, common equity at the end of year is used as a substitute.

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[16] Growth rate in sales = *GroSales* = (prime operating income at end of year–prime operating income at beginning of year)/ prime operating income at beginning of year = (#B110101 at end of year–#B110101 at beginning of year)/ #B110101 at beginning of year. If data of prime operating income at beginning of year is missing, prime operating income at the end of year is used as a substitute.

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