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RESEARCH ARTICLE

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A research on impairment of assets in listed firms with negative earnings in China

Abstract Economic factors, such as the adverse change of the industry and performance of firms, are associated with the impairment of assets reported by these firms. Listed firms with negative earnings were more likely to write off substantial assets in consecutive years, but not in the initial years of loss. However, the relationship between the impairment of assets and economic factors is insignificant after the individual effect of the firms is taken into consideration, while earnings management factors still have a significant effect on the impairment of assets, yet the difference between loss years and profitable years is insignificant.

Keywords listed firms with negative earnings, impairment of assets, earnings management

摘要 亏损上市公司资产减值准备的计提，在一定程度上反映了公司所在行业和公司自身经营环境的不利变化。亏损上市公司进行巨额资产冲销，更可能是在连续亏损期间，而不是在首亏年度。在考虑不同公司的个体效应后，经济因素对亏损公司资产减值准备的计提并不具有显著影响，但盈余管理因素对此仍具有显著影响，不过这种影响在亏损年度和盈利年度并不存在显著差异。

关键词 亏损上市公司，资产减值准备计提，盈余管理行为

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1 Introduction

The primary objective of this paper is to examine whether listed firms with negative earnings manipulate earnings by the impairment of assets. To some extent, the loss incurred by the impairment of assets of Chinese firms reflects the adverse changes of the industry and the operational environment, in which they exist respectively. After controlling the influence of the economic factors, we still find evidence that listed firms with negative earnings has taken a big bath. At the end of 2000, the Chinese authorities issued the *China Accounting System for Business Enterprises*, which was put into action on January 1st, 2001. Since then, the difference between the Chinese accounting standards and the international standards has been narrowed and the robust principle has been emphasized.

For example, the range of the provisions for the impairment of assets is extended from four types to eight types and the set of the "borderline" for the impairment of assets is canceled. On the one hand, it requires more professional judgment skills and paves the way for reflecting the essentials of business; on the other hand, the issuance of the system of the impairment of assets provides opportunities for firms to take a big bath[1] or smooth earnings. The Securities and Exchange Commission will implement a special treatment (ST) for listed firms that are at a loss in two consecutive years, especially for listed firms with negative earnings. To avoid being specially treated, these firms may use the provisions for the impairment of assets to manipulate their earnings.

Previous research has found that impairment of assets in listed firms with negative earnings is significantly higher than that of non-listed firms with negative earnings. So they deem that listed firms have the motive to manage earnings by the impairment of assets. However, previous literature has several limitations. First, they did not go deeply into the reporting incentives of the impairment of assets. Second, they did not take the operating environmental factors into account, such as technology, markets, economy and legal environment, which have an important effect on the impairment of assets. In other words, they did not control these economic factors when they examined the rationality of the impairment of assets. Based on the adoption of *China Accounting System for Business Enterprises*, this paper examines the relationship between the reported impairment of assets and two important factors, economic factors and earnings management factors, with a sample of listed firms with negative earnings from 2001–2003. Results reveal that the economic factors have a significant effect on

[1] The big bath indicates that firms write off substantial assets. Firms can deliberately increase or decrease earnings by a big bath. Normally, firms at a loss are more insensitive to take a big bath than non-loss firms.

the reported impairment of asset. We also find that listed firms with negative earnings took a big bath by writing off assets after controlling the economic factors. Moreover, we also analyze the year characteristics of the impairment of assets.

This paper is structured as follows. Section 2 reviews the prior research. Section 3 presents the hypothesis development and research design. Section 4 is the empirical analysis. Section 5 presents the sensitivity analysis and Section 6 comes to a conclusion and contains relevant suggestions.

2 Literature review

Empirical studies of accounting policies on the impairment of assets reveal that two main factors influence the impairment: economic factors and earnings management factors. Economic factors refer to adverse changes of the industry and operational environment that caused asset impairment, while earnings management factors include changes in management, earnings smoothing, and the big bath.

However, results of previous research are different. Strong et al. (1987), Elliott et al. (1988) and Francis et al. (1996) find that economic factors have a significant effect on the impairment of assets. They also suggest that changes in senior management also have a great effect on the impairment of assets. In order to improve the future performance, impairment losses by reversals will have more impairment of assets (secret provision) when the main management has changed. However, Francis et al. (1996) reveal that the effect of earnings smoothing and the big bath on the impairment of assets and the proportion is not significant.

McNichols et al. (1988), Linden (1990), Grover (1992), Zucca and Campbell (1992), Riedl (2004) and Chen et al. (2004) provide evidence that firms' earnings management is an important factor which influences the impairment of assets more than the other factors mentioned above. However, the relevant evidence is inconsistent. McNichols et al. (1988) find firms will have more impairment of assets when their earning level is higher or lower than others, which suggests that firms have the earnings smoothing incentive. Zucca and Campbell (1992) find the same evidence but they deem that more firms write off assets to take a big bath. Chen et al. (2004) reveal that the firms with CEO changes or big losses are more likely to write down assets and tend to write down assets by a larger amount. They also document an *ex post* association between the voluntary asset write-down and subsequent improvement of performance in terms of the return on assets but not in terms of cash flows. Riedl (2004) contrasts the characteristics of the impairment of assets reported before and after the issuance of SFAS No. 121. Their results are indicative of a closer relationship between the reported

impairment of assets and the big bath reporting behavior after the implementation of the standard. And this big bath behavior is more likely to reflect the opportunistic reporting by managers rather than the provision of their private information, which suggests the reporting of the impairment of assets under SFAS No. 121 has decreased in quality.

Some other researches find out that earnings management has no effect on the impairment choice. Ree et al. (1996) reveal that firms which write off their assets do not made impairment choices out of the objective of earnings management. They also analyze the relationship between the impairment of assets and abnormal accruals and find out the impairment choice is not a kind of opportunistic reporting behavior.

Opinions may differ among researches on the problem of under what circumstances companies will take a big bath. Walsh et al. (1991) find that abnormal accruals are positively correlated with the degree of the big bath by analyzing Australian data. Yoon and Miller (2002) suggest that Korean firms will manage their earnings when they are at a loss, and the firms with big losses are more likely to take a big bath. Kirschenheiter and Melumad (2002) obtain the same results as Yoon et al. (2002). They deem that managers will take a big bath to increase future earnings when facing 'bad news'; they will smooth earnings when facing 'good' news. And the amount smoothed depends on the observed cash flows.

In China, Li (2001) has examined the impairment of assets of A share listed firms' during 1998 and 1999 and found that the listed firms would normally choose not to write off assets. If they do write off assets, the ratio of the impairment of assets is very low. When the listed firms are forced to write off assets, the firms with reversing losses, Seasoned equity offering (SEO) and critical incentives, are more likely to choose the impairment policies that will increase (or not decrease) their current earnings. However, the firms with CEO changes or big losses are more likely to choose the impairment policies that increase (or not decrease) their future earnings. Using a sample of 201 A share listed firms and their control sample during 2000 and 2001, Zhang and Niu (2004) find the listed firms with losses the last year or high debt ratios have written off more assets in the current year to increase future earnings. However, to avoid the government intervention, big firms have the earnings smoothing incentive. The literature discussed above is useful in evaluating the consequences of the implementation of *China Accounting System for Business Enterprises*. But the limitations are: 1) they do not deeply explore the impairment of assets in specific situations; and 2) they do not control the economic and earnings management factors simultaneously. For instance, Zhang and Niu (2004) choose the sample period from 2000 to 2001, which obviously suggests they do not consider the

effects of the implementation of *China Accounting System for Business Enterprises*.

3 Hypothesis development and research design

3.1 Hypothesis development

This primary objective of this paper is to examine to what extent listed firms have considered the adverse changes of the industry and operational environment and whether they are opt for earnings management (big bath) incentives when they write off assets. On the one hand, for listed firms with negative earnings, there are accounting standards for the impairment of assets (SFAS 144, IAS 36,2004), which include indications of impairment for listed firms with negative earnings, worse performances, accelerating competition of the same industry or failed operating strategies. The decline in the earnings of firms at a loss will be partly reflected in the provision for the impairment of assets, which reveals the judgments of management authorities about the adverse changes of the industry and operational environment. On the other hand, if the supervision is not efficient enough, opportunistic management are not likely to write off assets or write off more assets to manipulate earnings. Especially for listed firms in China, if they are at a loss in consecutive two years, they will be specially treated; if they are at a loss in consecutive three years, they will be particularly transferred. So firms with negative earnings are more likely to write off more assets in loss years to avoid ST or PT.

The above analyses result in the following hypotheses.

H1: economic factors will have a significant effect on the impairment of assets by listed firms with negative earnings.

H2: earnings management factors will have a significant effect on the impairment of assets of listed firms with negative earnings after controlling economic factors' effect.

Listed firms receive more scrutiny from the Securities and Exchange Commission, analysts and investors, and they face the risk of ST or PT in loss years. Therefore, the characteristics of asset impairment in loss years and non-loss years are different. In general, firms have the big bath incentive in loss years while they have the earnings smoothing incentive in non-loss years. Because the firms with negative earnings have the reversing loss incentive, earnings management factors have more effects on the impairment of assets in loss years.

The above analyses result in the following hypothesis.

H3: the effects of economic factors and earning management factors on the impairment of assets differ between loss years and non-loss years.

3.2 Research design

Based on the above analyses and the results of previous literature (Chen et al., 2004; Riedl, 2004 and so on). The following regression is first constructed to test H1 and H2. The proxy variables for economic factors, earnings management factors and other control variables are defined by considering previous literature

$$\begin{aligned} IATA_{it} = {} & \alpha_0 + \alpha_1 \Delta INDROA_{it} + \alpha_2 \Delta INDPEGR_{it} + \alpha_3 PRGR_{it} \\ & + \alpha_4 \Delta PRGR_{it} + \alpha_t PB_{it} + \alpha_6 CEOALTER_{it} + \alpha_7 BATH1_{it} \\ & + \alpha_8 BATH2_{it} + \alpha_9 FIRSTLOSS_{it} + \varepsilon_{it} \end{aligned} \quad (1)$$

where $IATA_{it}$ is firm i's reported ratio of the impairment of assets for period t, which is equal to IA_{it} divided by the sum of IA_{it} and TA_{it}. IA_{it} is the sum of the impairment of assets for period t, and TA_{it} is the total assets at the end of t.

$\Delta INDROA_{it}$ is the change in firm i's industry return on assets from period t-1 to t, divided by the return on assets from period t-1.

$\Delta INDPEGR_{it}$ is the change in firm i's industry profit on sales from period t-1 to t, divided by the profit on sales from period t-1.

The above two variables reveal the effect of the changes of the industry and operating environment on the impairment of assets.

$PRGR_{it}$ is firm i's main operating revenue ratio, which is equal to the revenue from main operations in period t, divided by the sum of IA_{it} and TA_{it}.

$\Delta PRGR_{it}$ is the change in firm i's revenue from main operations from period t-1 to t, divided by the sum of IA_{it} and TA_{it}.

The above two variables reveal the firm performance, which eliminate the effect of performance on the impairment of assets.

PB_{it} is the market-to-book ratio, which is equal to the price per share, divided by the net asset per share. Firms with high ratios have high quality assets and great development perspectives.

The above five variables capture the effect of economic factors on the impairment of assets from the dimensions of industries and firms.

$CEOALTER_{it}$ is a dummy variable equal to 1 if the firm changed its CEO because of its takeover and reorganization in the current year and 0 otherwise.

$BATH1_{it}$ is the proxy for big bath reporting, which is a dummy variable equal to 1 if the reported impairment of assets is more than the revenue from main operations in the current year, and 0 otherwise.

$BATH2_{it}$ is another proxy for big bath reporting, which is a dummy variable equal to 1 if the revenue from main operations in the current year is less than the revenue from main operations in the last year, and 0 otherwise. We assume that if the revenue from main operations in the current year is less than the revenue

from main operations in the last year, firms are more likely to take a big bath to manipulate earnings[2].

$FIRSTLOSS_{it}$ is a dummy variable equal to1 if the firm is at a loss for the first time, and 0 otherwise[3]. Whether the firm writes off more assets in the first loss year depends on the expectation of management about the development perspective. If the manager expects that the firm will reverse losses in the next year, they will write off more assets; if the manager expects that the firm will get specially treated (ST), the substantial writing-off of its assets is more likely to happen in consecutive loss years. The above three variables are used to analyze whether firms manipulate earnings by the impairment of assets after controlling economic factors.

For the same firm, the following regression is used to test H3[4]

$$\begin{aligned} IATA_{it} = {} & \text{lossyear}\,(\lambda_0 + \lambda_1 \Delta INDROA_{it} + \lambda_2 \Delta INDPEGR_{it} + \lambda_3 PRGR \\ & + \lambda_4 \Delta PRGR_{it} + \lambda_5 PB_{it} + \lambda_6 CEOALTER_{it} + \lambda_7 BATH1_{it} \\ & + \lambda_8 BATH2_{it}) + \text{nlossyear}\,(\gamma_0 + \gamma_1 \Delta INDROA_{it} + \gamma_2 \Delta INDPEGR_{it} \\ & + \gamma_3 PRGR + \gamma_4 \Delta PRGR_{it} + \gamma_5 PB_{it} + \gamma_6 CEOALTER_{it} \\ & + \gamma_7 BATH1_{it} + \gamma_8 BATH2_{it})\varepsilon_{it} \end{aligned} \quad (2)$$

Where lossyear is a dummy variable equal to 1 if the firm is at a loss in the current year and 0 otherwise; nlossyear is a dummy variable equal to 1 if the firm is not at a loss in the current year and 0 otherwise; the other variables are the same as model (1).

4 Empirical analyses

4.1 Sample selection and data sources

Our samples include all the listed firms with negative earnings during the period 2001–2003 and the total number of sample firms is 458, composed of 146 firms

[2] The choice of BATH depends on the research design. Generally, *BATH* is defined by comparing the firm performance and the mean industry performance. For instance, firms at a loss have a stronger insensitivity to take a big bath than those which are not at a loss. Riedl (2004) use the *BATH* variable as follows: the change in pre-write-off earnings from period *t*-1 to *t* is divided by the total assets at the end of period *t*-1; 1 when below the median of non-zero negative values of this variable, and 0 otherwise. Because this paper only studies the lost listed firms, we mainly consider the association between the principal earnings and the revenue from main operations in the last year and the impairment of assets reported in the current year.

[3] The first loss indicates that the listed firm pays off in the last year, but is at a loss in the current year; the continuous loss indicates the listed firm is at a loss in the last year and the current year.

[4] Model (2) use the stacked regression, details are in Maddala (1992) and Riedl (2004).

in 2001, 165 firms in 2002 and 147 firms in 2003. When the year characteristics of impairment of assets are analyzed, the sample includes the firms that are at a loss in 2003 but not in 2002 (86 observations) as well as those that are at a loss in 2002 but not in 2001 (39 observations). If the relevant data are unavailable, they are treated as missing values.

Our data are from CCER database except the reported impairment of assets which is from Tianxiang Investment database.

4.2 Descriptive data

Table 1 presents the descriptive data for the relevant variables. The mean ratio of the impairment of assets is 8.4%, and the median is 3.27%, all of which are significantly different from 0 at 1% level. Although the mean $\Delta INDPEGR_{it}$ is positive, the mean $\Delta INDROA_{it}$ is negative and the mean value and the median are both significantly different from 0. We can say that the adverse change of the industry has some effect on the impairment of assets reported. Furthermore, the mean $\Delta PEGR_{it}$ and median $\Delta PEGR_{it}$ of the firms with negative earnings are significantly negative, which suggests the losses of listed firms are affected by the decline in the revenue from main operations.

Table 1 Descriptive data for relevant variables

Variable	*N*	*Mean*	*Median*	Stand deviation	*Min.*	*Max.*
IATA	456	0.0840***	0.0327***	0.14838	–0.4106	0.85820
INDROA	458	–2.2834***	–0.7384***	3.89317	–9.2693	1.28947
INDPEGR	458	0.0913***	0.1199***	0.09052	–0.1264	0.73309
Δ*PRGR*	453	–0.0562***	–0.0359***	0.17724	–1.5325	0.55353
PRGR	453	0.3278***	0.2430***	0.32040	0	3.40462
PB	458	5.56452	4.1201	17.6367	–15.000	236.3636

Note: *** ** *denotes significance at <0.01, <0.05 and <0.10 levels, respectively, and the following is the same.

There are 63 firms that have changed their CEOs because of takeover and reorganization ($CEOALTER = 1$), accounting for 13.76% of all the sample firms. The reported impairment of assets in 224 firms is more than the revenue from main operations in the current year ($BATH1 = 1$), accounting for 48.91% of all the sample firms. The revenue from main operations of 344 firms in the current year is less than the revenue from main operations in the last year ($BATH2 = 1$), accounting for 75.11%. Two hundred and forty-five firms are at a loss for the first time, 213 firms are at a loss in consecutive years, accounting for 53.49% and 46.51% respectively.

4.3 Regression analysis

4.3.1 Economic and earnings management factors

Table 2 presents the regression results of model (1). $\Delta INDROA_{it}$ and $PRGR_{it}$ are significant, suggesting that the impairment of assets has reflected the adverse change of the industry and the firm's operating environment. The association between the impairment of assets and *CEOALTER* is insignificant. BATH1 is significantly positive; suggesting that the firm whose write-offs reported is more than the revenue from its main operations in the current year may take the big bath. *FIRSTLOSS* is significantly negative, revealing that the firms will choose not to write off substantive assets in the first loss year.

Table 2 The regression analysis of the impairment of assets of all listed firms with negative earnings from 2001 to 2003[5]

Independent variable	Parameter estimates	Stand error	*t*-statistic
Intercept	0.0658	0.0175	3.77***
INDROA	–0.0028	0.0016	–1.74*
INDPEGR	–0.0243	0.0614	–0.40
Δ*PRGR*	–0.0442	0.0428	–1.03
PRGR	–0.0466	0.0177	–2.63**
PB	–0.0007	0.0005	–1.44
CEOALTER	–0.0023	0.02075	–0.11
*BATH*1	0.1151	0.0113	10.20***
*BATH*2	–0.0060	0.0130	–0.46
FIRSTLOSS	–0.0405	0.0118	–3.43***

Notes: *F*-test is 12.99, *p*-value is 0, and the model is significant. *R*-Square is 0.2453. Moreover the *VIF* of all the variables is less 2, suggesting that the co-linearity does not exist among the variables.

4.3.2 Year characteristics

There are 86 firms that are in deficit in 2003 but not in 2002, while 39 firms that are in deficit in 2002 but not at a loss in 2001. Based on model (2), we analyze economic and earnings management factors' effects on the impairment of assets in the loss year and non-loss year by the above firm-years sample. We also examine whether the differences of these factors between the loss year and non-loss year is significant. We expect to explore whether listed firms manipulate earnings by the impairment of assets and obtain more relevant evidences. The empirical results are presented in Table 3.

[5] Breusch-Pagan Heteroskedasticity Chi-Square value is 255, *P*-value is 0.0001, and there is Heteroskedasticity in the model, so we report the robust stand error, robust t-statistic and robust *F*-test. The details are in Econometric Analysis (Greene, 2002).

Table 3 The analysis of economic and earnings management factors in the loss and non-loss year (OLS)

Variable	Loss year			Non-loss year			$\lambda_i - \gamma_i = 0$ *F*-statistic
	Parameter estimates (λ_i)	Stand error	*t*-statistic	Parameter estimates (γ_i)	Stand error	*t*-statistic	
INDROA	0.0002	0.0015	0.16	–0.00005	0.0016	–0.03	0.02
INDPEGR	0.0502	0.0788	0.64	–0.28544	0.1036	–2.75**	7.11***
Δ*PRGR*	–0.1628	0.0368	–4.43***	–0.01780	0.0167	–1.07	13.03***
PRGR	–0.0027	0.0224	–0.12	0.00427	0.0210	0.20	0.06
CEOALTER	–0.0187	0.0147	–1.27	0.00769	0.0230	0.33	0.94
*BATH*1	0.0673	0.0114	5.91***	0.16532	0.0251	6.59**	12.81***
*BATH*2	–0.0287	0.0116	–2.48**	0.00026	0.0118	0.02	3.30**
Intercept	0.0302	0.0105	2.87**				

Notes: *F*-test is 10.54, *p*-value is 0, and the model is significant. *R*-Square is 0.3889; Adj *R*-Square is 0.3520. Moreover, the *VIF* of all the variables is less 2, suggesting that the co-linearity does not exist among the variables.

From Table 3, it can be seen that the effects of economic factors and earnings management factors on the impairment of assets are equally significant in the loss year and non-loss year. However, earnings management factors have a relatively closer relationship with the impairment of assets reported in the loss year as compared to those reported in the non-loss year. And the difference is significant. When the write-offs reported is more than the revenue from main operations in the current year, the firm writes off substantive assets to take a big bath. The $CEOALTER_{it}$ is insignificant and the difference between the loss year and non-loss year is insignificant too. As for economic factors, the impairment of assets of firms with negative earnings reported in the loss year is more affected by the decline in its revenue from main operations. But in the non-loss year, the impairment of assets reported is affected by the adverse change of the industry.

5 Robust analysis

We only consider the effects of the industry, firm performance and earnings management factors on the reported impairment of assets. However, Chen (2003) has found that firms with longer listed years are more likely to manipulate earnings excessively at Initial Public offerings (IPO) and are more likely to be at a loss. The excessive earnings management may result in the decline in asset quality, accordingly more impairment of assets reported after the implement of

China Accounting System for Business Enterprises. Furthermore, the change of auditors (ACALTER) may have an effect on the impairment of assets too. Therefore, we examine the effects of the industry, firm performance and earnings management factors on the impairment of assets reported after controlling the above factors. The relevant results are presented in Table 4. From Table 4, it can be seen that the listed years and the change of auditors both have a significant association with the impairment of assets reported. However, the associations between the impairment of assets and the industry, firm performance and earnings management are still significant after these factors are controlled.

Table 4 Robust analysis of the impairment of assets of all listed firms with negative earnings from 2001 to 2003[6]

Independent variable	Parameter estimates	Stand error	*t*-statistic
Intercept	0.03	0.022	1.28
INDROA	–0.0027	0.0016	–1.69*
INDPEGR	–0.0344	0.0614	–0.56
Δ*PRGR*	–0.042	0.043	–0.96
PRGR	–0.046	0.0188	–2.43**
PB	0.0006	0.0005	–1.31
CEOALTER	–0.0060	0.0200	–0.31
*BATH*1	0.1088	0.1090	9.98***
*BATH*2	–0.0040	0.0130	–0.27
FIRSTLOSS	–0.0370	0.0120	–3.17***
ACALTER	0.0310	0.0150	2.05**
Years	0.0047	0.0026	1.86*

Notes: *F*-test is 10.79, *p*-value is 0, and the model is significant. *R*-Square is 0.2594. Moreover, the *VIF* of all the variables is less than 2, suggesting that the co-linearity does not exist among the variables.

Because Chinese listed firms differ vastly in the property, the reported impairment of assets differs among various firms. Therefore, the fix-effect panel data model is used to analyze the above factors, namely model (3). And the results are presented in Table 5. The results reveal that the association between the reported impairment of assets and earnings management factors is still significant after the individual firm effect is controlled. However, the difference between loss years and non-loss years is insignificant. The association between

[6] Breusch-Pagan Heteroskedasticity Chi-Square value is 263.71, *P*-value is 0, and there is Heteroskedasticity in the model, so we report the robust stand error, robust t-statistic and robust *F*-test. The details are in Econometric Analysis (Greene, 2002).

the reported impairment of assets and the economic factors is insignificant too. The $CEOALTER_{it}$ has a significant effect on the impairment of assets, and the difference between loss years and non loss years is significant, which suggests that firms which change their CEOs in loss years are more likely to report less impairment of assets.

$$\begin{aligned} IATA_{it} = \alpha_{\mathrm{i}} &+ \text{lossyear}\,(\lambda_1 INDROA_{it} + \lambda_2 INDPEGR_{it} + \lambda_3 PRGR_{it} \\ &+ \lambda_4 \Delta PRGR_{it} + \lambda_5 PB_{it} + \lambda_6 CEOALTER_{it} + \lambda_7 BATH1_{it} + \lambda_8 BATH2_{it}) \\ &+ \text{nlossyear}\,(\gamma_1 \Delta INDROA_{it} + \gamma_2 \Delta INDPEGR_{it} + \gamma_3 PRGR_{it} \\ &+ \gamma_4 \Delta PRGR_{it} + \gamma_5 PB_{it} + \gamma_6 CEOALTER + \gamma_7 BA\ TH1_{it} \\ &+ \gamma_8 BATH2_{it}) + \varepsilon_{it} \end{aligned}$$

where α_{i} is the fix-effect factor, $i = 1, 2, 3,\ldots\ldots, 124$. The other variables are the same as above.

Table 5 Analysis of economic and earnings management factors in loss and non-loss years (Panel data model)

Variable	Lost year			Non-lost year			*F*-statistic $\lambda_{\mathrm{i}} - \gamma_{\mathrm{i}} = 0$
	Parameter estimates (λ_{i})	Stand error	*t*-statistic	Parameter estimates (γ_{i})	Stand error	*t*-statistic	
INDROA	0.001595	0.00244	0.65	0.000277	0.00276	0.10	0.09
INDPEGR	0.014917	0.1335	0.11	–0.085910	0.13910	–0.62	0.23
Δ*PRGR*	0.109270	0.0731	1.49	–0.015420	0.02000	–0.77	2.69*
PRGR	–0.116790	0.1053	–1.11	–0.127380	0.09750	–1.31	0.12
CEOALTER	–0.036490	0.0178	–2.04**	0.018452	0.0281	0.66	3.21*
*BATH*1	0.065960	0.0139	4.75***	0.083001	0.0338	2.45**	0.26
*BATH*2	0.003886	0.0160	0.24	–0.000350	0.0144	–0.02	0.04
Intercept	0.045656	0.0454	1.01				

Note: The *VIF* of all the variables is less than 2, suggesting that the co-linearity does not exist among the variables.

6 Conclusions, relevant suggestions and limitations

The reported impairment of assets of listed firms with negative earnings has reflected the adverse change of the industry and firm performance. Earnings management factors have a significant effect on the reported impairment of assets after controlling these economic factors. The firms with negative earnings have

a very strong big bath incentive. Moreover, firms with negative earnings are more likely to write off substantial assets in consecutive years, not in the first loss year.

Economic and earnings management factors both have a significant association with the reported impairment of assets in loss years and non-loss years, but the earnings management incentive in loss years is stronger than it is in non-loss years and the difference is significant. As for economic factors, the reported impairment of assets of firms with negative earnings in loss years is more affected by the decline in its revenue from main operations. But in non-loss years, the reported impairment of assets is affected by the adverse change of the industry.

The industry, firm performance and earnings management factors all have a significant effect on the reported impairment of assets after controlling the listed years and the change of auditors. The association between the impairment of assets and economic factors is insignificant after the individual firm effect is controlled, while earnings management factors still have a significant effect on the impairment of assets, but the difference between loss years and non-loss years is insignificant. Therefore, we conclude that earnings management is the main factor which affects the reported impairment of assets in Chinese listed firms with negative earnings.

Based on the above research, we can conclude that after the implementation of *China Accounting System for Business Enterprises*, lots of professional judgments provide managers with more opportunities of manipulating earnings. Therefore, we suggest that management authorities disclose more information about the accounting policy and other aspects so that investors and other information users can estimate the use of professional judgments properly.

There are also some limitations in this paper. First, the proxy variables for the big bath are significant in loss years and the difference between loss years and non-loss years is significant. However, these variables are significant in non-loss years. So this paper does not provide any consistent evidence that firms with negative earnings manipulate earnings by the reported impairment of assets in all years. Second, this paper uses $BATH1_{it}$, $BATH2_{it}$, $FIRSTLOSS_{it}$ to capture the big bath behavior. But the defining of $BATH1_{it}$ depends on the information of dependent variables; this will induce the estimation bias. Because of the lack of relevant literature about the defining of the big bath, future research needs to obtain more evidence about the big bath behavior. Third, the robust analysis does not obtain any consistent evidence, which may impair the reliability of our conclusion.

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