

Goodwill impairment, audit supervision and stock information content: Based on the empirical analysis of Chinese A-share listed companies

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Abstract: In recent years, goodwill impairment has become a considerable risk in China's capital market. This paper studies the effect of goodwill impairment on stock price from the perspective of the stock price informativeness and show that the impairment of goodwill is negatively correlated with the stock price informativeness. Furthermore, it is found that audit supervision has a significant inhibitory effect on the negative correlation between goodwill impairment and the stock price informativeness. This paper has enriched the research on the economic consequences of goodwill impairment, provided a new analysis perspective for investors to identify the information of stock price of listed companies and a new dimension for the study on the impact of goodwill impairment. The conclusions are helpful for the 19th national congress on maintaining the healthy and stable development of the financial market.

1. Introduction

Information influencing the securities price can be divided into three levels: company-level, industry-level and market-level (Campbell and Lettau, 1999). It is found that information at the company level is a direct reflection of the internal value of stocks and an important basis for investors' analysis and judgment (Chen and Mao, 2007). The ability of the stock price to reflect the true information of the enterprise is the information content of the stock price, which is the decisive factor to guide the correct allocation of resources and ensure the effective operation of the securities market (Morck et al., 2000). However, the earnings management behavior of the executives for their own interests will affect the synchronicity of stock price fluctuations, making the stock price unable to fully and accurately reflect the fundamental information of the company and reduce the stock price informativeness (Lu and Shen, 2011). There are various means of earnings management, and the use of goodwill impairment to manipulate profits is an important means of earnings management. Therefore, the amount of goodwill impairment may affect the information content of the company's stock price.

This paper select samples from all A-share listed companies from 2007 to 2017, eliminating financial companies, companies under special treatment and companies with missing or abnormal data. The conclusions are as follows: the impairment of goodwill is negatively correlated with the stock price informativeness. For companies with high and low stock price informativeness, the correlation coefficient symbols of goodwill impairment amount and the stock price informativeness are different. By distinguishing accounting firms, audit quality has an significant moderating effect on the relationship between the impairment of enterprise goodwill and the stock price informativeness. The higher the audit quality, the stronger the inhibiting effect on the behavior of enterprises to reduce the stock price informativeness through large-scale impairment of goodwill.

The research of this paper enriches the research of goodwill impairment from the perspective of the stock price informativeness, makes contributions to the development and improvement of the stock market and helps investors make rational investment decisions. The results show that accounting firms should take goodwill impairment as a special concern, restrain the intention of enterprise managers to use goodwill impairment for earnings management, and improve the quality of accounting information.

2. Hypothesis

2.1 The relationship between goodwill impairment and the stock price information

At present, the impairment test of goodwill is based on the comparison of the present value of recoverable amounts of budget asset groups in several periods with the carrying value of goodwill. Important parameters of the calculation process, such as the revenue increase and discount rate, are determined by the management. Therefore, the management will determine the relevant parameters according to the principle of maximum benefit and realize the management of earnings by adjusting the impairment of goodwill. In addition, for the purpose of discrediting the previous management and shirking responsibility, managers may deliberately lower the performance in a bad year in order to increase the profits of the next year (Chen, 2018). This method of earnings management by drawing large impairment of goodwill is also called doing big-bath charges.

As for the research on the stock price informativeness, information asymmetry theory can be used to explain this phenomenon in their research. When information is not transparent, external investors could not obtain the complete and accurate situation of the company, and the stock price could not be completely explained by the public information. Roll measured the stock price informativeness by the stock price fluctuation synchronization in 1988, pointing out that if the stock price reflects less information about the company's operation and finance, and more information is explained by public information in the market, the stock price volatility synchronization will be higher and the level of stock price reflecting company information will be correspondingly lower. The research results of Lu and Shen (2011) also show that earnings management makes the stock price reflect less information about the company and reduces the information content of the stock price. Based on the above analysis and derivation, the following hypothesis is proposed:

H1: When other conditions remain unchanged, the stock price informativeness is negatively correlated with the degree of goodwill impairment.

2.2 Effect of external audit on the relationship between goodwill impairment and the stock price informativeness

It is generally believed that improving the quality of external audit will improve the reliability and effectiveness of the information contained in the relevant data disclosed by enterprises. Auditors with higher profession will have more accurate and scientific considerations on the rationality of goodwill impairment results, and implement stricter supervision on those enterprises that try to use goodwill impairment for earnings management (Lu et al., 2010). This illustrates that the public accounting firm with high profession and strong ability often provide audit of high quality, and this will inhibit managers to conduct large-scale goodwill impairment to reduce the information content of stock information. Therefore, based on the above analysis, we proposed hypothesis 2:

H2: If the auditor of a company is one of the big four accounting firms, the negative relationship between goodwill impairment and stock price informativeness will be weakened.

3. Research design

3.1 Data and sample

Since the implementation of the new accounting standards in 2007, China has changed the treatment of goodwill from amortization to the implementation of annual impairment test. This paper selects Chinese A-share listed companies from 2007 to 2017 as research sample. Listed companies in the financial and insurance industry, research samples with missing or abnormal data, and listed companies under special treatment are excluded. The research data of this paper are mainly from CSMAR database and RESSET financial database. In this paper, winsorize tail reduction of up and down 1% is carried out for continuous variables.

3.2 Variable definitions and models

Roll proposed to measure the stock price informativeness by calculating the non-synchronicity of stock price fluctuations, which is also a widely recognized method in the academic circle. The

formula is as follows:

$$r_{i,j,t} = \beta_{i,0} + \beta_{i,m} \times r_{m,t} + \beta_{i,j} \times r_{j,t} + \varepsilon_{i,j,t} \quad (1)$$

The return rate of company *i* at the year *t* is set as $r_{i,j,t}$, the market return rate at year *t* is $r_{m,t}$, the weighted average return rate of industry *j* at year *t* (company *i* belongs to industry *j*) is $r_{j,t}$, and the residual is $\varepsilon_{i,j,t}$. The residual value reflects the explanation degree of $r_{m,t}$ and $r_{j,t}$ to the return rate. When the residual value is large, the explanation degree is low, and $\varepsilon_{i,j,t}$ contain more company-level information. Roll also proposed in 1988 to use $1-R^2_{j,t}$ to measure the non-synchronicity of stock price fluctuations, so as to quantify the stock price informativeness. The higher the value of $1-R^2_{j,t}$ is, the less the market and industry earnings can explain the fluctuation of corporate earnings, that is, the higher the stock price informativeness is. $1-R^2_{j,t}$ is the determinant coefficient of the equation. Based on this research, this paper uses the following formula to measure the stock price informativeness.

$$PI_{i,t} = \ln [(1-R_i^2) / (R_i^2)] \quad (2)$$

The higher the PI value is, the higher the stock price informativeness is and the higher the non-synchronicity of stock price is. PI is the dependent variable. The test variable is goodwill impairment rate, namely GWIMP. The moderating variable is the type of accounting firm, namely AQ, which indicates the audit quality. The control variables are the company's size, leverage, ROA, MB ratio and ownership structure.

3.3 Model settings

According to the practices of Lu et al. (2010), the following model is constructed to test the hypothesis by controlling the company's size, leverage ratio, operating performance, price-to-account ratio and shareholding ratio of the largest shareholder.

$$PI_{i,t} = \beta_0 + \beta_1 GWIMP_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 LEV_{i,t} + \beta_4 ROA_{i,t} + \beta_5 MB_{i,t} + \beta_6 TOP_{i,t} + \sum IND + \sum YEAR + \varepsilon_{i,t} \quad (3)$$

If hypothesis 1 is true, then β_1 is negative. Hypothesis 2 is also based on this model. For hypothesis 2, the samples were divided into four major international audit companies and four non-international audit companies and tested in groups.

Table 1. Variable statement

name	symbol	statement
Stock price informativeness	PI	See the above calculation method
Goodwill impairment rate	GWIMP	goodwill impairment provision at year end/total goodwill at year end
Type of accounting firm	AQ	Equals 1 if it is big four; otherwise 0
Company size	SIZE	The natural log of total assets
leverage	LEV	Total liabilities at year end/total assets at year end
Return on assets	ROA	Net profit/average total assets
Market-to-book ratio	MB	Market value of the company/book value of the company
Ownership structure	TOP	The number of shares held by the largest shareholder/the total number of shares of the company
Industry	Industry	Control for industry fixed effects
Year	Year	Control for year fixed effect

4. Empirical analysis

4.1 Descriptive analysis and correlation analysis

The state-owned enterprises often enjoy some preferential policies of the government, which is

equivalent to an invisible guarantee to some extent (Wang, 2006). So the samples are classified according to the property right nature. As shown in table 2, state-owned enterprises have the maximum and minimum PI values of 2.834 and -3.721, and the standard deviation is 1.126 and the mean is -1.216, indicating that the overall stock price informativeness of state-owned enterprises is relatively low. The average value of GWIMP is 0.167, with a maximum value of 1 and a standard deviation of 0.337, indicating that a considerable number of state-owned enterprises did conduct goodwill impairment. For non-state-owned enterprise, the maximum and minimum PI values are 2.834 and -3.721 respectively, which are very similar to those of state-owned enterprises. The standard deviation is 1.223 and the mean is -1.039, indicating that the overall stock price informativeness of non-state-owned enterprises is also low, but slightly higher than that of state-owned enterprises. The average value of GWIMP is 0.139, the maximum value is 1, and the standard deviation is 0.309, indicating that non-state-owned enterprises have also carried out a certain degree of goodwill impairment, but the impairment degree and the difference between companies is generally smaller than that of state-owned enterprises.

Table 2. Descriptive statistics

Variables	State=1				
	observations	Mean	Std	Minimum	Maximum
PI	2002	-1.216	1.126	-3.721	2.834
GWIMP	2002	0.167	0.337	0.000	1.000
SIZE	2002	22.531	1.351	19.760	26.059
LEV	2002	0.505	0.201	0.052	0.889
ROA	2002	0.037	0.053	-0.147	0.189
MB	2002	1.860	1.756	0.198	11.177
TOP	2002	0.367	0.159	0.079	0.743
Variables	State=0				
	observations	Mean	Std	Minimum	Maximum
PI	5774	-1.039	1.223	-3.721	2.834
GWIMP	5774	0.140	0.309	0.000	1.000
SIZE	5774	21.974	1.225	19.760	26.059
LEV	5774	0.434	0.208	0.052	0.889
ROA	5774	0.045	0.048	-0.147	0.189
MB	5774	2.379	2.074	0.198	11.177
TOP	5774	0.338	0.147	0.079	0.743

Table 3 reports the Pearson correlation coefficient matrix of the sample. The results show that PI is negatively correlated with GWIMP. At the same time, there is no too high correlation coefficient between variables, so it is speculated that collinearity has little influence on variables. In general, the selection of variables is reasonable and can provide a basis for the following model.

Table 3. Pearson correlation coefficient matrix

	PI	GWIMP	SIZE	LEV	ROA	MB	TOP
PI	1.000						
GWIMP	-0.067	1.000					
SIZE	-0.033	-0.055	1.000				
LEV	-0.121	0.070	0.506	1.000			
ROA	0.132	-0.128	-0.040	-0.394	1.000		
MB	0.172	-0.036	-0.463	-0.488	0.308	1.000	
TOP	0.013	-0.032	0.271	0.095	0.083	-0.107	1.000

4.2 Regression results

4.2.1 Correlation between goodwill impairment and stock price informativeness

Table 5 lists the regression test results of model 1. Considering that mergers and acquisitions took place before 2010 and fewer enterprises reported goodwill assets, the control year is after 2010. The regression results show that the stock price informativeness is significantly negatively correlated with the consolidated goodwill impairment test rate regardless of whether the control variables and industry effects are taken into account. From the relationship between explanatory variables and

explained variables, the company manipulates the stock price through goodwill impairment to induce the acquirer's managers to pay a higher premium, form a higher goodwill and bring a higher impairment risk, and reduce the transparency of stock price and the information quality of stock price.

Table 4. Share price informativeness and goodwill impairment

Variables	PI (1)	PI (2)	PI (3)
GWIMP	-0.266 ^{***} (-5.29)	-0.188 ^{***} (-3.80)	-0.200 ^{**} (-2.33)
SIZE		0.086 ^{***} (5.28)	0.245 ^{***} (8.67)
LEV		-0.204 ^{**} (-2.09)	0.463 ^{**} (2.44)
ROA		1.777 ^{***} (4.82)	1.467 ^{**} (2.26)
MB		0.116 ^{***} (11.34)	0.195 ^{***} (8.48)
TOP		0.009 (0.09)	0.381 ^{**} (2.08)
Industry	Uncontrolled	Uncontrolled	Controlled
Year	Controlled	Controlled	Controlled
Number	6324	6324	1533
R-squared	0.005	0.047	0.157

Besides, an extended test on hypothesis 1 is carried out. The samples are divided into two groups according to whether the stock price informativeness is greater than zero. PI value lower than zero indicates that share price cannot reflect the company information at all. PI value higher than zero indicates that share price can reflect some of the company-level information. The results are shown in table 6. When the stock price can reflect the company information, business goodwill can significantly improve the stock price informativeness, this may be because these companies more reasonably conduct the goodwill impairment and make share price information content increase. However, Morck et al. (2000) pointed out that the stock price informativeness of listed companies in China is very low. This may due to the low efficiency of the stock market in China, the unique institutional background, ownership structure and weak legal protection system of Chinese securities market. Therefore, on the whole, goodwill impairment is negatively correlated with stock price informativeness.

Table 5. Extended test

Variables	PI (1)	PI (2)
GWIMP	0.261 ^{**} (2.51)	-0.106 ^{***} (-2.76)
SIZE	0.119 ^{***} (3.97)	0.069 ^{***} (5.04)
LEV	-0.254 (-1.35)	0.050 (0.61)
ROA	1.707 ^{***} (2.70)	0.703 ^{**} (2.38)
MB	0.035 ^{**} (2.08)	0.070 ^{***} (7.87)
TOP	-0.165 (-0.78)	-0.283 ^{***} (-3.40)
Industry	Controlled	Controlled
Year	Controlled	Controlled
Number	933	4832
R-squared	0.100	0.052

4.2.2 The moderating effect of auditing quality of accounting firms

As shown in table 6, when the auditors are the big four, the consolidated goodwill impairment test

rate can no longer significantly explain the changes in the stock price informativeness. At the same time, the test rate of consolidated goodwill impairment of non-international big four auditing companies still shows a significant negative correlation with the stock price informativeness, which indicates that the relatively high audit quality of the international big four has a certain inhibitory effect on the behavior of enterprises to influence the stock price informativeness by using goodwill impairment. Thus it can be seen that the international big four enterprises are more strict in auditing, and the risk of impairment of enterprise goodwill is generally lower than that of enterprises audited by other accounting firms. Auditors with higher professional standards will have more accurate and scientific considerations on the rationality of the goodwill impairment results, so as to adopt stricter supervision on the enterprises trying to use the goodwill impairment for earnings management.

Table 6. Influence of the type of accounting firm

Variables	AQ=1			AQ=0		
	PI(1)	PI(2)	PI (3)	PI(4)	PI(5)	PI (6)
GWIMP	-0.338* (-1.81)	-0.187 (-1.00)	-0.197 (-1.10)	-0.261*** (-5.03)	-0.192*** (-3.74)	-0.174*** (-3.41)
SIZE		0.189*** (3.52)	0.139*** (2.65)		0.046** (2.52)	0.068*** (3.64)
LEV		0.365 (0.88)	0.122 (0.27)		-0.175* (-1.74)	-0.163 (-1.56)
ROA		0.878 (0.53)	0.979 (0.64)		1.820*** (4.78)	1.967*** (5.17)
MB		0.280*** (3.55)	0.206*** (2.64)		0.109*** (10.51)	0.110*** (10.26)
TOP		0.179 (0.53)	-0.133 (-0.39)		-0.006 (-0.06)	0.049 (0.45)
Industry	Uncontrolled	Uncontrolled	Controlled	Uncontrolled	Uncontrolled	Controlled
Year	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled
Number	401	401	401	5923	5923	5923
R-squared	0.010	0.068	0.247	0.005	0.048	0.071

5. Robustness test

The outbreak of the global financial crisis from 2007 to 2009 may potentially interfere with the research conclusions of this paper. Therefore, in this paper the annual restriction condition which requires the year greater than or equal to 2010 is removed in the robustness test, and regression analysis is conducted on the explained variables, explanatory variables and control variables again. The result shows that the two hypothesizes in this paper are still significantly valid, which proves that the research conclusion is robust.

Table 7. Robustness test after removing the year limit

Variables	Hypothesis 1	Hypothesis 2	
	PI	PI(AQ=1)	PI(AQ=0)
GWIMP	-0.139*** (-3.29)	-0.246 (-1.56)	-0.146*** (-3.34)
SIZE	0.079*** (5.51)	0.087** (2.04)	0.037** (2.23)
LEV	-0.155* (-1.74)	0.198 (0.54)	-0.118 (-1.27)
ROA	1.651*** (5.21)	1.630 (1.38)	1.684*** (5.1)
MB	0.105*** 11.18	0.205*** (3.38)	0.099*** (10.27)
TOP	0.142 (1.53)	0.017 (0.06)	0.116 (1.19)
Industry	Controlled	Controlled	Controlled
Year	Controlled	Controlled	Controlled
Number	7776.000	531	7245

R-squared

0.080

0.254

0.078

Besides, changing the explanatory variable GWIMP to GWIMP2 as the new explanatory variable is adopted. GWIMP2 is the ratio of ending impairment provision of goodwill to total assets. It is found that the hypotheses are both significantly valid, which further explain the robustness of the research conclusion.

Table 8 Robustness test for another explanatory variable

Variables	Hypothesis 1	Hypothesis 2
	PI	PI
GWIMP2	-4.185 ^{***} (-2.57)	0.317 ^{***} (5.30)
SIZE	0.109 ^{***} (6.91)	-4.190 ^{***} (-2.58)
LEV	-0.205 ^{**} (-2.03)	0.081 ^{***} (4.74)
ROA	2.018 ^{***} (5.50)	-0.178 [*] (-1.76)
MB	0.114 ^{***} (10.55)	2.008 ^{***} (5.47)
TOP	0.062 (0.60)	0.112 ^{***} (10.29)
AQ	-	0.050 (0.48)
Industry	Controlled	Controlled
Year	Controlled	Controlled
Number	6324	6324
R-squared	0.073	0.76

6. Conclusion

Taking A-share enterprises from 2007 to 2017 as samples and based on Roll's non-synchronous model of stock price fluctuations, this study shows the influence of goodwill impairment on the information content of a company's stock price. It is found that the degree of goodwill impairment is negatively correlated with the stock price informativeness. For most companies with low stock price information, larger goodwill impairment is likely to mean that the company's stock price reflects less information about operating results and financial condition. Moreover, it is found that the impairment of goodwill of enterprises whose share price can reflect certain fundamental information of the company. Further research shows that when the international big four accounting firms act as the auditors of enterprises, the degree of goodwill impairment can no longer significantly explain the change of stock price informativeness, which indicates that higher audit quality will have a certain inhibitory effect on enterprises' behavior of reducing stock price informativeness through the provision of goodwill impairment.

The research results of this paper add the perspective of goodwill impairment to investors' reasonable understanding of stock price information and guide investors to actively search for company information to make rational investment. For accounting firms, the conclusion of this paper shows that improving the audit quality of accounting firms and paying attention to the goodwill impairment of listed companies will effectively restrain this phenomenon and improve the availability of accounting information and the stock price informativeness. For other stakeholders, such as the government and other regulatory authorities, a number of measures can be taken to supervise the impairment of goodwill in the market in order to ensure the rationality of the test of impairment of goodwill of enterprises, and to reduce the interference to the market caused by the intentional provision of huge impairment of goodwill by enterprises.

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