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Research on the Effectiveness of Internal Control: Empirical Evidence from Emerging Markets

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Abstract

Effective internal control can reduce the risk of enterprises, and help enterprises to enhance their value. Many scholars at home and abroad have carried out research on the internal control, but there are still many deficiencies in the evaluation of the effectiveness of internal control. This paper is based on the emerging market assets, to Chinese listed companies as the research object, on the basis of the theory of literature, rules and regulations and management practices on the construction of the internal control effectiveness evaluation index system of listed companies, the group G1 weighting method combining with the variation coefficient method, determine the weight of each index, construct the listed company's internal control effectiveness evaluation model. This lays a solid foundation for the follow-up research, and has important theoretical value and practical significance for promoting the effectiveness of internal control.

Keywords: Effectiveness of Internal Control, Comprehensive Evaluation,Grop-G1 Method, Coefficient Variation Method

1. Introduction

The internal control construction of Chinese listed companies has undergone many years of development, and has made some remarkable achievements. The relevant system documents and supporting guidelines issued by the relevant departments of the state play a vital role in the internal control construction of listed companies. However, whether the internal control of a listed company is effective or not has not been given a clear answer from the academic and practical circles. In such a realistic background, many scholars have made a useful attempt around the effectiveness of internal control, and have achieved some results. However, there are still some problems that need to be improved and improved. As a representative of emerging market countries, China plays an important role in the global economic development. Therefore, it is of great practical significance to study the internal control problems of Chinese enterprises. Aiming at the existing problems of internal control effectiveness evaluation, weighted variation coefficient method based on the combination of group G1-, constructed the evaluation model of internal control of listed companies, and the effectiveness of internal control of listed companies China by descriptive analysis.

2. Literature review

At present, domestic and international research on the effectiveness of internal control mainly focus on two aspects: on the one hand, the effective factors of internal control. Simone et al. (2014) found that auditors' tax services can improve the quality of enterprise internal control. Lisic et al. (2016) the higher the CEO power, the higher the possibility of internal control deficiencies. Chen and Keung (2016) believe that there is a positive correlation between diversification and internal control deficiencies. Guo et al. (2016) found that employment policies could have an impact on the effectiveness of internal control. Doyle, et al (2007), Ashbaugh-Skaife, et al. (2008), Bardhan, etc. (2015) found that perfect internal control can effectively reduce the level of enterprise earnings management. Kim and others (2011) believe that when the internal control deficiencies exist, the enterprises will face higher financing costs. Costello (2011) found that firms experiencing significant internal controls were less likely to use debt financing. Hoitash et al. (2008) found that enterprises with defects in internal control had higher audit costs. Huang et al. (2016) found that after voluntary internal control information disclosure of enterprise IPO, underpricing was significantly lower. Tang et al. (2015) investigated the impact of internal control effectiveness on derivatives pricing.

There are too many studies exploring the effectiveness and economic consequences of the effectiveness of internal control, ignoring the quantitative study of the effectiveness of internal control. The shortcomings of the existing literature mainly include the following three points: first, ignoring the dimensional differences and

importance differences between different indicators. Most of these documents are directly added to the effectiveness of internal control indicators, thus the effectiveness of the internal control of enterprises. Second, the index empowerment can not achieve subjective and objective combination. Most of these documents are single, objective weighting or objective weighting, which leads to the possibility of bias in the effectiveness of internal control. Third, the validity of internal control is only qualitatively identified, that is, the effectiveness of internal control is 0-1 variables, which can not be quantitatively studied.

3. Research design

3.1 Sample

The sample consists of all A-shares companies listed on the Shanghai and Shenzhen stock exchanges in the period 2009–2016, and the following requirements are employed to ensure the accuracy of results. First, we exclude ST (Special Treatment firms: the firm is labeled as an ST firm by the stock exchanges in accordance with certain guidelines put forward by China's securities regulatory authority when it falls into serious financial problems) and PT (Particular Transfer firms: firms downgraded from ST status due to continuous losses for one more year; this level entails a virtual suspension of trading of the particular downgraded firm's shares as well as a significant danger of de-listing) companies. Second, we remove listed financial companies. Third, we remove listed firms with missing financial data. After sifting, the final data consists of 16,362 firm-year observations. All the financial and governance data are obtained from the *CSMAR* and *Wind* databases

3.2 Construct index system

Based on the specific system background of China, this paper puts forward a target oriented internal control effectiveness evaluation system on the basis of drawing on existing research results and rules and regulations. The index system is divided into three levels: first, the strategic level. The strategic level mainly refers to the strategic objectives and effectiveness of the enterprise. It is based on the management objectives and the level of information disclosure. It is an important guarantee for the long-term development of the enterprise; second, the management level. Management level mainly refers to management objectives, legal compliance goals and asset security objectives, is the specific embodiment of the implementation of the strategic objectives; third, the information disclosure level. The level of information disclosure refers to the financial reporting objectives, financial statements should be true and reliable, the enterprise is the strategic level, management level and other objectives of the realization of the information feedback. The specific index system is shown in table 1.. In order to ensure the comparability between the indexes, the dimensionless treatment of all indexes is carried out.

4. Internal control effectiveness evaluation research

4.1 Index empowerment based on group G1 method

A total of 3 experts were invited to grade the indicators, because the results of the three experts were not the same. Therefore, this paper takes one expert's scoring as an example to analyze.

In the first step, experts determine the order of importance of the target layer according to the G1 method.

Strategic objectives *X1* > operating objectives *X2* > legal compliance objectives *X3* > asset security objectives *X4* > financial reporting objectives *X5*

The second step, experts give the importance of the next two dimensions, the importance of the ratio between X_{k-1} and X_k, the rational assignment of r_k. The ratio of the degree of importance given by an expert to a specific value:

$$r_2 = X_1 / X_2 = 1.6$$
$$r_3 = X_2 / X_3 = 1.2$$
$$r_4 = X_3 / X_4 = 1.4$$
$$r_5 = X_4 / X_5 = 1.2$$

In the third step, after obtaining the rational evaluation of the ratio of the importance degree of the expert to the rk, the financial reporting target *X5* has the weight φ_5 of the G1 method for the total target layer:

Table 1. Internal control effectiveness index system

Target layer		Iindex level	Index definition
Strategic	Strategic target X_1	Sustainable growth rate X_{11}	(Current earnings / initial stockholders' equity)* earnings retention rate
		Operating income growth rate X_{12}	Current operating income / revenue -1
		Total assets growth rate X_{13}	Business income / industry total revenue
		Market share X_{14}	Total assets at the end of the year / total assets -1
		Tobin Q X_{15}	(the stock market value +net debt) /(total assets - prepaid expenses-intangible assets and other assets - deferred tax assets)
		Risk assessment coefficient X_{16}	Annual Beta value in integrated market
Management	Management objective X_2	Earnings cash protection multiples X_{21}	Operating cash flow / net profit
		Cash content of operating income X_{22}	Cash / earnings received for the sale of goods or services
		Business cycle X_{23}	Inventory turnover days + accounts receivable turnover days - accounts payable turnover days
		Turnover of total assets X_{24}	Total business income / average assets
		Net asset yield X_{25}	(net profit *2/ (initial stockholders' equity + end stockholders' equity))
		The rate of return on invested capital X_{26}	(EBIT) (1- income tax / gross profit) *2/ (initial capital + end entry capital) *100%
	Legal compliance objectives X_3	The number of lawsuits X_{31}	The number of lawsuits being taken by an enterprise
		The number of illegal violations X_{32}	The number of enterprises violating laws and regulations
		Penalty amount X_{33}	The amount of the enterprise being fined
		Legal background X_{34}	Board of supervisors had a legal background of 1, or 0
		Audit Committee X_{35}	The enterprise has an internal audit committee of 1, or 0
	Asset security target X_4	Asset appreciation rate X_{41}	At the end of the rights and interests of the owners/owners' equity at the beginning of the period
		Impairment loss of assets X_{42}	Impairment loss of assets / total assets
		Loss of assets damage X_{43}	Loss or destruction of the total assets / total assets
		Related party X_{44}	Other receivables / total assets
		External guarantee X_{45}	External guarantee amount / total assets
Information disclosure	Financial reporting objectives X_5	Accruals management level X_{51}	Cross sectional modified Jones model
		True earnings management level X_{52}	Roychowdury(2006) model
		Opinion of audit report X_{53}	The standard audit opinion is 1, otherwise 0
		Financial restatement X_{54}	No financial restatements were made, or 1, otherwise 0
		Financial fraud X_{55}	No financial fraud was committed, or 1, or 0

$$\varphi_5 = \left(1+\sum_{k=2}^{5}\prod_{i=k}^{5} r_i\right)^{-1}$$
$$= \left(1+r_2\times r_3\times r_4\times r_5 + r_3\times r_4\times r_5 + r_4\times r_5 + r_5\right)^{-1}$$
$$= \left(1+1.6\times 1.2\times 1.4\times 1.2 + 1.2\times 1.4\times 1.2 + 1.4\times 1.2 + 1.2\right)^{-1}$$
$$= 0.10963$$

The fourth step, after the known, we can calculate the strategic target *X1*, the management target *X2*, the legal compliance target *X3*, the asset security target *X4* weight, the specific formula is as follows:

$$\varphi_{n-1} = r_n \times \varphi_n,\ n = 5,4,3,2,1$$

Specific calculation can be seen:

$$\varphi_4 = r_5 \times \varphi_5 = 1.2\times 0.10963 = 0.13156$$
$$\varphi_3 = r_4 \times \varphi_4 = 1.4\times 0.13156 = 0.18418$$
$$\varphi_2 = r_3 \times \varphi_3 = 1.2\times 0.18418 = 0.22101$$
$$\varphi_1 = r_2 \times \varphi_2 = 1.6\times 0.22101 = 0.35362$$

In the same way, this paper calculates the weights of other two experts, and averages the weights of the three experts in order to obtain the final weights of the indexes.

4.2 Index weighting based on coefficient of variation method

The first step is to calculate the standard deviation of each index.

$$\sigma_k = \sqrt{\frac{\sum_{i=1}^{n}\left(X_{ki} - \overline{X_k}\right)^2}{n}}$$

The second step is to calculate the coefficient of variation of each index.

$$c_k = \frac{\sigma_k}{\overline{X_k}}$$

The third step is normalization.

$$\omega_k = \frac{c_k}{\sum_{k=2}^{m} c_k}$$

After calculation, we can calculate the index weight of variance coefficient, and refer to table 3.

Table 2. Weight determination under group G1 method

Number	Target layer		Target layer		Final weight
	Layer weight	Weight index	Layer weight	Weight index	
1	X_1	0.34640	X_{11}	0.22613	0.07833
2			X_{12}	0.18137	0.06283
3			X_{13}	0.08015	0.02776
4			X_{14}	0.26659	0.09235
5			X_{15}	0.14298	0.04953
6			X_{16}	0.10278	0.03560
7	X_2	0.20395	X_{21}	0.10164	0.02073
8			X_{22}	0.13428	0.02739
9			X_{23}	0.09486	0.01935
10			X_{24}	0.13912	0.02837
11			X_{25}	0.30816	0.06285
12			X_{26}	0.22193	0.04526
13	X_3	0.20108	X_{31}	0.19914	0.04004
14			X_{32}	0.34179	0.06873
15			X_{33}	0.20981	0.04219
16			X_{34}	0.13188	0.02652
17			X_{35}	0.11738	0.02360
18	X_4	0.14195	X_{41}	0.35537	0.05045
19			X_{42}	0.22307	0.03167
20			X_{43}	0.16700	0.02371
21			X_{44}	0.15883	0.02255
22			X_{45}	0.09573	0.01359
23	X_5	0.10662	X_{51}	0.10748	0.01146
24			X_{52}	0.12852	0.01370
25			X_{53}	0.25425	0.02711
26			X_{54}	0.13642	0.01455
27			X_{55}	0.37333	0.03980

Table 3. Weight determination under the coefficient of variation method

Number	Target layer		Target layer		Final weight
	Layer weight	Weight index	Layer weight	Weight index	
1	X_1	0.47277	X_{11}	0.38401	0.18155
2			X_{12}	0.36891	0.17441
3			X_{13}	0.02282	0.01079
4			X_{14}	0.15592	0.07371
5			X_{15}	0.06699	0.03167
6			X_{16}	0.00136	0.00064
7	X_2	0.39388	X_{21}	0.00500	0.00197
8			X_{22}	0.43640	0.17189
9			X_{23}	0.05224	0.02058
10			X_{24}	0.00434	0.00171
11			X_{25}	0.00703	0.00277
12			X_{26}	0.49499	0.19497
13	X_3	0.09038	X_{31}	0.01203	0.00109
14			X_{32}	0.33394	0.03018
15			X_{33}	0.00539	0.00049
16			X_{34}	0.31894	0.02882
17			X_{35}	0.32970	0.02980
18	X_4	0.00715	X_{41}	0.34280	0.00245
19			X_{42}	0.07394	0.00053
20			X_{43}	0.06956	0.00050
21			X_{44}	0.42696	0.00305
22			X_{45}	0.08674	0.00062
23	X_5	0.03582	X_{51}	0.00597	0.00021
24			X_{52}	0.00341	0.00012
25			X_{53}	0.05271	0.00189
26			X_{54}	0.05357	0.00192
27			X_{55}	0.88434	0.03168

4.3 Subjective and objective weighting based on the ideal scheme

This section mainly calculates the proportion of subjective and objective weights.

$$\omega_{ki}=\alpha\times\omega_{ki}^{G}+\beta\times\omega_{ki}^{C}$$

Among them, it is the combination weight of i index in the first k target layer, the subjective weight ω_{ki}^{G}, the objective weight ω_{ki}^{C}, and the subjective weight coefficient α and the objective weight coefficient β.

This paper intends to use the ideal method to calculate the main and objective weight. The basic steps are as follows:

The first step is to build the ideal solution.

$$P^* = \left\{ \max x_{ij} \middle| i = 1,2,...,m \right\} = \left\{ x_1^*, x_1^*, ..., x_n^* \right\}$$

Among them, P^* the ideal scheme matrix; x_j^* ideal data for the program

In the second step, we calculate the weighted distance between the realistic scheme and the ideal scheme.

$$d_i = \sum_{j=1}^{n} \left| x_{ij} - x_j^* \right| \omega_{ij}$$

Where, d_i is the distance between the realistic scheme and the ideal scheme. When d_i=0, the realistic scheme is regarded as the ideal scheme.

The third step is to build a linear programming model.

$$\begin{cases} \min\ d = \sum_{i=1}^{m} d_i = \sum_{i=1}^{m} \sum_{j=1}^{m} \left| x_{ij} - x_j^* \right| \omega_{ij} = \sum_{i=1}^{m} \sum_{j=1}^{m} \left| x_{ij} - x_j^* \right| \left(\alpha \times \omega_{ij}^G + \beta \times \omega_{ij}^C \right) \\ s.t.\ \ \frac{1}{\alpha} + \frac{1}{\beta} = 1 \qquad\qquad \alpha, \beta > 1 \end{cases}$$

In the fourth step, the optimal solution of the Lagrange function is used to obtain the unique solution of the sum of α and β .

$$L = \sum_{i=1}^{m} \sum_{j=1}^{m} \left| x_{ij} - x_j^* \right| \left(\alpha \times \omega_{ij}^G + \beta \times \omega_{ij}^C \right) + \lambda \left(\frac{1}{\alpha} + \frac{1}{\beta} - 1 \right)$$

Order, $\frac{\partial L}{\partial \alpha} = 0$, $\frac{\partial L}{\partial \beta} = 0$, obtain α and β :

$$\alpha = \left(\sqrt{\sum_{i=1}^{m} \sum_{j=1}^{n} \left| x_{ij} - x_j^* \right| \omega_{ij}^G} + \sqrt{\sum_{i=1}^{m} \sum_{j=1}^{n} \left| x_{ij} - x_j^* \right| \omega_{ij}^C} \right) \Bigg/ \sqrt{\sum_{i=1}^{m} \sum_{j=1}^{n} \left| x_{ij} - x_j^* \right| \omega_{ij}^G}$$

$$\beta = \left(\sqrt{\sum_{i=1}^{m} \sum_{j=1}^{n} \left| x_{ij} - x_j^* \right| \omega_{ij}^G} + \sqrt{\sum_{i=1}^{m} \sum_{j=1}^{n} \left| x_{ij} - x_j^* \right| \omega_{ij}^C} \right) \Bigg/ \sqrt{\sum_{i=1}^{m} \sum_{j=1}^{n} \left| x_{ij} - x_j^* \right| \omega_{ij}^G}$$

The fifth step, normalized processing. Because of $\sum_{j=1}^{n} \omega_j = 1$, it is necessary to normalize the sum of α and β .And can be derived α^* and β^* , the specific formula is as follows:

$$\alpha^* = \sqrt{\sum_{i=1}^{m} \sum_{j=1}^{n} \left| x_{ij} - x_j^* \right| \omega_{ij}^C} \Bigg/ \left(\sqrt{\sum_{i=1}^{m} \sum_{j=1}^{n} \left| x_{ij} - x_j^* \right| \omega_{ij}^G} + \sqrt{\sum_{i=1}^{m} \sum_{j=1}^{n} \left| x_{ij} - x_j^* \right| \omega_{ij}^C} \right)$$

$$\beta^* = \sqrt{\sum_{i=1}^{m} \sum_{j=1}^{n} \left| x_{ij} - x_j^* \right| \omega_{ij}^G} \Bigg/ \left(\sqrt{\sum_{i=1}^{m} \sum_{j=1}^{n} \left| x_{ij} - x_j^* \right| \omega_{ij}^G} + \sqrt{\sum_{i=1}^{m} \sum_{j=1}^{n} \left| x_{ij} - x_j^* \right| \omega_{ij}^C} \right)$$

Furthermore, the optimal subjective weight coefficient α^* and the optimal objective weight coefficient β^* are calculated:

α^*=0.15966

β^*=0.54034

It can be seen that the formula for calculating the combined weight is:

$$\omega_{ki}=\alpha\times\omega_{ki}^{G}+\beta\times\omega_{ki}^{C}$$
$$=0.45966\times\omega_{ki}^{G}+0.54034\times\omega_{ki}^{C}$$

After finishing, we will be based on the ideal combination of weights calculated, and are listed in Table 4.

Table 4. Determination of final weights based on ideal scheme

Number	Target layer	Index layer	Group G1 method	Variation coefficient method	Combination weight ideal method
1	X_1	X_{11}	0.07833	0.18155	0.13410
2		X_{12}	0.06283	0.17441	0.12312
3		X_{13}	0.02776	0.01079	0.01859
4		X_{14}	0.09235	0.07371	0.08228
5		X_{15}	0.04953	0.03167	0.03988
6		X_{16}	0.03560	0.00064	0.01671
7	X_2	X_{21}	0.02073	0.00197	0.01059
8		X_{22}	0.02739	0.17189	0.10547
9		X_{23}	0.01935	0.02058	0.02001
10		X_{24}	0.02837	0.00171	0.01397
11		X_{25}	0.06285	0.00277	0.03039
12		X_{26}	0.04526	0.19497	0.12616
13	X_3	X_{31}	0.04004	0.00109	0.01900
14		X_{32}	0.06873	0.03018	0.04790
15		X_{33}	0.04219	0.00049	0.01966
16		X_{34}	0.02652	0.02882	0.02776
17		X_{35}	0.02360	0.02980	0.02695
18	X_4	X_{41}	0.05045	0.00245	0.02451
19		X_{42}	0.03167	0.00053	0.01484
20		X_{43}	0.02371	0.00050	0.01117
21		X_{44}	0.02255	0.00305	0.01201
22		X_{45}	0.01359	0.00062	0.00658
23	X_5	X_{51}	0.01146	0.00021	0.00538
24		X_{52}	0.01370	0.00012	0.00636
25		X_{53}	0.02711	0.00189	0.01348
26		X_{54}	0.01455	0.00192	0.00772
27		X_{55}	0.03980	0.03168	0.03541

4.4 Construct internal control effectiveness evaluation model

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

5. Conclusion

The effectiveness of internal control has been a hot topic both in the field of practice and theory. Scholars have done a lot of research on the effectiveness of internal control and the internal control index, and have achieved certain results. However, there are still many deficiencies in the existing literature. In view of this, based on Evaluation of the effectiveness of internal control of listed companies on the internal control theory, system and practice status quo sort out on the basis of the construction of the internal control effectiveness evaluation index system, weighting method using group G1- coefficient of variation of the combination of subjective and objective, to determine the specific weights of various evaluation indexes. And the establishment of internal control effectiveness evaluation model. The results of this paper will provide a theoretical basis for the study of internal control field, and also provide policy guidance for the practice of enterprise internal control management

References

Ashbaugh-Skaife, H., Collins, D. W., Kinney, W. R. (2008).The effect of SOX internal control deficiencies and their remediation on accrual quality. *The Accounting Review*, 83(1): 217-250.

Bardhan, I., Lin, S., Wu, S. L. (2014).The quality of internal control over financial reporting in family firms. *Accounting Horizons*, 29(1): 41-60.

Chen, G. Z., Keung, E. C. (2016).Corporate diversification, institutional investors and internal control quality. *Accounting & Finance*, forcoming.

Costello, A. M. (2011). The impact of financial reporting quality on debt contracting: Evidence from internal control weakness reports. *Journal of Accounting Research*, 49(1): 97-136.

Doyle, J. T., Ge, W., McVay, S. (2007). Accruals quality and internal control over financial reporting. *The Accounting Review*, 82(5):1141-1170.

Guo, J., Huang, P., Zhang, Y., Zhou, N. (2015).The effect of employee treatment policies on internal control weaknesses and financial restatements. *The Accounting Review*, 91(4): 1167-1194.

Hoitash, R., Hoitash, U., Bedard, J. C. (2008). Internal control quality and audit pricing under the Sarbanes-Oxley Act. *Auditing: A Journal of Practice & Theory*, 27(1): 105-126.

Kim, J. B., Song, B. Y., Zhang, L. (2011). Internal control weakness and bank loan contracting: Evidence from SOX Section 404 disclosures. *The Accounting Review*, 86(4): 1157-1188.

Lisic, L. L., Neal, T. L., Zhang, I ., Zhang, Y. (2015).CEO power, internal control quality, and audit committee effectiveness in substance versus in form. *Contemporary Accounting Research*, 33(3):1199-1237.

Roychowdhury, S. (2006). Earnings management through real activities manipulation. *Journal of accounting and economics*, *42*(3), 335-370.

Simone, L. D., Ege, M. S., Stomberg, B. (2014).Internal control quality: The role of auditor-provided tax services. *The Accounting Review*, 90(4): 1469-1496.

Tang, D. Y., Tian, F., Yan, H. (2015).Internal control quality and credit default swap spreads. *Accounting Horizons*, 29(3): 603-629.