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Accounting Education, Knowledge Management and Working Capital Management Performance: Evidence from China

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ABSTRACT

With the advent of the era of knowledge economy, skills training, knowledge acquirement and management are increasingly combined with business management practices. There is preliminary evidence show that the education, learning and management of accounting knowledge have a significant correlation with the enterprise performance. Based on the theory of accounting education and knowledge management, this paper investigates the influence of internal control on the performance of working capital management from the perspective of internal control acquisition, direct learning and indirect learning. The empirical study on China's capital market shows that with the improvement of accounting education and knowledge management, the quality of internal control of enterprises will also be improved, furthermore, the performance of working capital management will be obviously improved. The conclusion of this paper not only enriches the literature in the field of accounting education and knowledge management, but also provides the crucial evidence that how Chinese enterprise can improve the rationality and scientificity of working capital management decision.

Keywords: accounting education, knowledge management, working capital management, internal control

INTRODUCTION

The advent of the era of knowledge economy not only promoted the importance of enterprise to knowledge education, knowledge learning and knowledge management, but also promoted the importance of accounting education to the content of knowledge management. AACSB recently began to emphasize the importance to take big data and technology into accounting courses (Sledgianowski et al., 2017). There is preliminary evidence show that knowledge learning and management have a significant role in promoting enterprise performance (Reich et al., 2014; Cohen & Olsen, 2015; Zheng et al., 2017). In the information age, knowledge has become the most important source of wealth, it has become one of the hot issues for many scholars that how to use the knowledge and skill to enhance the enterprise performance (Andreeva & Kianto, 2012). Among all of the knowledge resources of the enterprise, the mastery and learning of accounting knowledge may be the most fundamental way to promote the improvement of enterprise performance. Especially, in recent years, the enterprise's internal control knowledge and system praised by many scholars, may become the booster for the improvement of enterprise performance. Since the promulgation of the SOX Act, internal control has gradually developed into an important part of corporate accounting system. Most of the listed companies in China have established internal control system. While this kind

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Contribution of this paper to the literature

- Based on the relevant contents of accounting education and knowledge management, this study examines the impact of internal control on working capital management, and expands the scope of the research on the economic consequences of internal control.
- This paper analyzes the influence of internal control on working capital management from two dimensions, direct and indirect, and defines the mechanism of internal control on working capital management.

of system establishment is a long-term learning and a process of improvement, and the impact on enterprise performance may also be gradual.

The impact of knowledge management on enterprise is realized mostly through the ways of the communication, sharing, cooperation, innovation of the enterprise members, and running through the whole business process of the enterprise. As one of the crucial parts of enterprise financial decision-making (Aktas et al., 2015), working management decision may be mostly influenced by accounting policies and knowledge management. Since 1930s, along with ever-changing global economic situations as well as intensified market competition, working capital management has increasingly drawn wide attention from the theoretical circle and the practical circle. Its content has expanded stepwise from the initial stage to the comprehensive stage that covers income management, supply chain management, and expenditure management. Compared to investment and financing management and profit distribution management, working capital management decisions are equally important to the financial management system as a member of the decision field. Existing research has proved that quite a great component of balance sheets of listed companies in various countries involves current assets and current liabilities as an important part of working capital (Mian & Smith, 1992). Operating risks and enterprise revenue are linked to the effectiveness of working capital management, which further impact on the realization of maximum enterprise values. Highly efficacious working capital management decisions are of great value relevance. A company is endowed with much better profitability, stock performance, and business performance if its working capital management decisions converge to the optimum value (Hassan, 2011; Baños-Caballero, 2014; Aktas et al., 2015; Mun & Jang, 2015).

However, the blossom of theoretical studies fails to promote leapfrogging development of working capital management practice in a real sense. When the Chinese government reformed the accounting system in 1993, the concept of working capital management was introduced into China – for its financial meaning – so that complying with the trend of international convergence. Through tracking and survey on working capital management of Chinese listed companies during the period 1997-2014, Pro. Wang et al. from China business working capital management research center conclude that working capital management of Chinese listed companies tends to: (1) have focused on and will focus more on investment activities; (2) lead to nonstop slight increases in the proportion of short-term financial liability and a constantly magnified working-capital-funded risk; (3) witness a continuously deteriorating management performance where accounts receivable and marketing channel gradually become the key to performance enhancement; (4) endow state-owned listed companies with much better performance and relatively higher short-term financial risk in comparison to non-state listed companies. Viewed as a whole, despite over 20 years of development, research on working capital management has still been underestimated such that risks and performance of working capital management remain trapped in the disadvantageous situation of continual exacerbation and that there still lacks systematic research into influential factors of working capital management (Wang et al., 2007). Based on the era of knowledge economy and the environment of China capital market, this paper holds the view that it is necessary to study the working capital management decision from the perspective of internal company, especially the internal control and knowledge management, and discuss the impact of internal control quality on enterprise working capital management performance. The significance of this study lies on that from the perspective of knowledge management, internal control may directly and indirectly affect the efficiency of the enterprise working capital allocation, thus promoting the substantial improvement of the overall working capital management performance of China's listed companies.

Theoretically, there are at least three reasons why it is from the internal control perspective that studies are conducted on the access to promoting WCMP: 1. The Chinese Application Guidelines for Enterprise Internal Control raises claims for working capital management and its contents with regard to risk control and business procedure. The Application Guidelines for Enterprise Internal Control No.6 (finance activities), No.7 (purchasing business), No.8 (assets management), and No. 9 (sales business), respectively, list detailed operating guidelines for such components of working capital management as working capitals, supply chain management, inventory management, accounts receivable management, and prepayment management. 2. According to the stakeholder theory, high-quality internal control may spur stakeholder groups such as shareholders, employees, suppliers, and governments to change their behaviors towards a more efficient operating actions and working capital management for the company. 3. Present-day focus on working capital management decisions is mainly measurement of WCMP indices, rather than the connotations of internal control behind them. Direct requirements of the internal control system will significantly vary such indices as receivables turnover, inventory turnover, and current assets turnover. All in all, it is reasonable and of great theoretical and practical value to research into WCMP based on internal control, as what the paper does.

Given this, We intends to base on a comprehensive measurement of WCMP and the multiple regression analysis method as well to empirically test the impact of enterprise internal control on WCMP, with panel data of A-share main-board companies on Shanghai and Shenzhen stock markets from 2004 to 2013 as the research objective. According to relative research result, premium internal control with either DWC or WCP as the index can steadily enhance WCMP. Further studies show that with internal control, a company can effectively shorten DSO and DIO, albeit cutting down DPO at the same time. For the first time, the research achievements in the paper provide experimental experience for the positive correlations between enterprise internal control and WCMP. It not only identifies the access to upgrading WCMP, but also helps deepen recognition and understanding of the economic consequences arising from enterprise internal control.

THEORETICAL ANALYSIS AND RESEARCH HYPOTHESIS

Knowledge Management and Enterprise Performance

During the era of knowledge economy, knowledge has become an important means and resource for enterprise to gain competitive advantage, increase their wealth and improve their innovation ability (Bogner & Bansal, 2007). Wang (2009) proves the positive correlation between knowledge management orientation and enterprise performance based on the concept of knowledge management orientation. Enterprise through the knowledge learning and knowledge structure optimization, to promote knowledge sharing, transformation, innovation and application in internal enterprise. Optimization of knowledge and orderly process of knowledge management will effectively improve enterprise performance (Gold & Arvind Malhotra, 2001). Chang Lee et al. (2005) provides a new metric, knowledge management performance index (KMPI), for assessing the performance of a firm in its knowledge management (KM) at a point in time. Chen (2009) proposes an approach of measuring a technology university's knowledge management (KM) performance from competitive perspective. Mills (2011) uses survey data from 189 managers and structural equation modeling to assess the links between specific knowledge management resources and organizational performance. The results show that some knowledge resources (e.g. organizational structure, knowledge application) are directly related to organizational performance, while others (e.g. technology, knowledge conversion), though important preconditions for knowledge management, are not directly related to organizational performance. The above conclusions show that there is a significant positive correlation between knowledge management and firm performance.

Based on the above analysis, it can be seen that knowledge management has become a key factor of enterprise performance growth. In view of this, this paper will draw lessons from the related theory of knowledge management, take the process of enterprise internal control establishing and perfecting as the process of enterprise knowledge accumulation and the process of management optimizing. Furthermore, from the perspective of knowledge management, this paper will analyse the impact of internal control on enterprise working capital management performance.

Direct Impact of Internal Control on WCMP

Compared to the initial stage, the present-stage concept of working capital management has expanded greatly for its connotation and extension. Working capital management has been lifted to a comprehensive one where revenue (accounts receivable, procurement procedure, payments and receipts of accounts), supply chain (inventories and logistics), and expenditures (procurement and payments) are all managed (Kieschnick et al., 2013). As an important means of enterprise internal control, the internal control system is endowed with unique perspectives and efficacies in terms of controlling working capital risks, arranging working capital business procedures, and lifting WCMP. According to the specific requirements of the Chinese Application Guidelines for Enterprise Internal Control, there are several direct impacts of internal control on WCMP.

According to the Application Guidelines for Enterprise Internal Control No.6 – finance activities, the objective of internal-control-based working capital management is to realize balance between physical flow and fund flow and to comprehensively enhance the efficiency of fund operation as well. In addition, No.6 proposes detailed measures of lowering operating risks and upgrading fund benefits at the same time from the perspectives of capital budget management, short-term capital deployment, accounting system control (receipt, payment, examination and approval of funds), etc.

The Application Guidelines for Enterprise Internal Control No.7 – purchasing business arranges and improves the working capital management procedures related to supply chains of materials (labor service) procurement and payments, for example. Measures such as establishing, examining and approving the procurement system, separating authority from responsibility, and improving the evaluation mechanism are all complementary to the promotion of WCMP.

According to the Application Guidelines for Enterprise Internal Control No.8 – assets management, a company is supposed to introduce the modern concept of logistic management to regulate inventory management procedures. It should take full advantage of information system for a reasonable determination of the optimal inventory status, and ensure effective control on all risks of inventory management, in a way that promoting efficacious increase of inventory turnover.

The Application Guidelines for Enterprise Internal Control No.9 – sales business provides quite referential application measures with regard to enterprise sales business and accounts receivable management, which is considered by Wang et al. (2014) as the key for listed companies to upgrade their WCMP. On the one hand, No.9 accurately seizes the critical risk points of sales channel, and controls the business procedures of such links as market survey, conclusion of sales contract, sales process and after-sales service, so that the efficiency of assets management for the sales channel is substantially promoted. On the other hand, No.9 details control requirements of accounts receivable, the obstinate illness of WCMP, including receivables management, bill management, accounting system control, and bad debt treatment. The implementation of internal control on accounts receivable can reduce the probability of producing bad debt in an effective manner, accelerate accounts receivable turnover, and improve WCMP as well.

As can be seen from above, the direct impact of enterprise internal control on WCMP is mainly realized by formulating direct system requirements or detailed business procedure control requirements to intervene the indices of working capital management including content construction, risk control or evaluation indices. The intention is to radically free listed companies from invalid or inefficient management of working capitals.

Indirect Impact of Internal Control on WCMP

Internal control exerts direct impact on WCMP by posing requirements to the internal control system or by controlling relevant business procedures. Apart from this, enterprise internal control also has indirect influences on WCMP by promoting stakeholders to change their behaviors so that improving the operating management strategies. According to the stakeholder theory, stakeholders are realistic society subjects with the motivation for safeguarding self-interests (Donaldson & Preston, 1995). Stakeholders will adopt corresponding actions to maintain

positive influences or reverse negative influences exerted on their interests under the internal control system once they perceive such influences and feel the need. This will in turn impede the realization of WCMP or its objective. Theoretically, the essence of internal control is to protect and maximize the interests of stakeholders such as shareholders (investors), creditor, manager, employee, supplier, consumer, and government (Hoitash, 2009). High-quality internal control will urge stakeholder groups to optimize resources by intensifying superior resource allocation (Zhang, 2007), in a way that improving WCMP. The paper selects several typical kinds of stakeholders for a representative sketch of the access to indirect influences of internal control on WCMP.

From the perspective of shareholders, premium internal control brings cash holding appreciation (Huang et al., 2015), and helps improve stock performance and its execution achievements in the market (Hammersley et al., 2008). Shareholders who are informed of internal control information can precisely perceive the consequences of corresponding economic behaviors, and will thus decide to take measures such as inputting more assets or other superior resources to the company. The company that may expand its cash resource accordingly will finally have its WCMP improved in an indirect way.

From the perspective of creditors, the perception of high-quality internal control information will strengthen their confidence in continuous operation of the company, and promote them to upgrade the company's credit rating, extend the limitations of debt covenants or reduce loan interest rate (Costello, 2011; Sun et al., 2017). Any one of the above measures will benefit the company greatly by supplementing its capability of short-term financial loans or cash flow, whose WCMP is then be improved remarkably.

From the perspective of employees, effective internal control will both restrict and stimulate them so that improving their work efficiency and production enthusiasm. The implementation of internal control will not only enhance the company's productivity as a whole, but also curtail employee management costs, which will in turn supplement WCMP.

From the perspective of consumers or clients, high-class internal product control and corresponding information disclosure will strengthen their confidence in product quality. As a result, the company will not only have more products sold and payed in time, but also reinforce communication and interaction with consumers or clients (Su et al., 2014). The corresponding promotion of sales performance and payment reclamation as well as the reasonable arrangement of production schedule are particularly crucial to improving WCMP in relation to the company's sales channel.

From the perspective of suppliers, the rational system of procurement management will strengthen suppliers' confidence that the company will execute the contract and pay up on time. They will provide product support with larger discounts and longer credit extensions. In this way, not only can the company invest less assets than planned before, but the procurement period can be shortened, so that significantly enhancing WCMP in relation to the company's procurement channel.

From the perspectives of government, a safe and sound internal control with high efficiency can improve the quality of a company's accounting information (Doyle et al., 2007; Altamuro & Beatty, 2010), and can strengthen the protection of investors (Gong et al., 2013; Peng, 2017). This will benefit the company in that the government will provide relatively loose regulatory environments and more policy support. A sound operating environment and favorable policy support provides certain help for the improvement of WCMP.

To sum up, no matter with direct constraints by system regulation, or with indirect constraints based on stakeholders' behavioral perception, the implementation of internal control will exert great positive influence on WCMP. On such foundation, we proposes the following research hypothesis H1 for verification:

Hypothesis 1: Internal Control is positively related to a firm's working capital management performance.

Table 1. Sample Distributions

Panel A: Sample Distribution by Calendar Year					
Year	2004	2005	2006	2007	2008
N	910	948	969	945	930
Percent of Sample	10.2	10.7	10.9	10.6	10.5
Year	2009	2010	2011	2012	2013
N	786	812	821	849	917
Percent of Sample	8.8	9.1	9.2	9.6	10.3
Panel B: Sample Distribution by Firm Type					
Firm Type	State-Owned	Non-State-Owned		Full Sample	
N	6109	2778		8887	
Percent of Sample	68.7	31.3		100	

RESEARCH DESIGN

Sample and Data

Panel data of A-share main-board companies on Shanghai and Shenzhen stock markets from 2004 to 2013 was selected as the research objective. For sample data selection and follow-up data processing, we mainly: (1) excluded the listed financial companies due to discrepancies of accounting criteria; (2) excluded the listed companies whose sample data for those years was in ST, *ST and PT; (3) excluded the listed companies that underwent IPO for those years; (4) excluded the listed companies with financial data loss; (5) conducted Winsorize processing on 1% quantile and 99% quantile of major continuous variables, with the intention of restricting possible impact of extremums on research conclusions. After the above processing, there was a total of 8,887 companies that satisfied our requirements and that spanned a decade's sample interval. For sample selection, we referred to the Guidelines for the Industry Classification of Listed Companies (2012 Revision), so that the selected sample covered all the 19 industries but the financial industry and were strongly representative.

As can be seen from **Table 1**, during the period of 2004-2013, samples of different years have similar numbers and fluctuate at the mean value of 888.7. The fluctuation is controllable and reasonable. In view of the samples' nature, there are 6109 state-owned companies and 2778 non-state companies, which occupies respective 68.7% and 31.3% of the total number of samples. This data distribution complies with the current special economic mechanism that state-owned business predominates national economy.

All the internal control index and other relevant financial data required in the research are derived from the following several database: (1) DIB internal control and risk management database; (2) CSMAR database; (3) CCER database. SPSS21.0 and Stata12.0 are used as the data processing software and the statistical analysis software for the research.

Model Design

The paper intended to construct a panel-based multiple regression model 1 to study on WCMP response to enterprise internal control, where Performance denoted the proxy index of WCMP. DWC and WCP were used for measurement of specific parameters required by the research. The internal control index (ICI) was chosen as the independent variable based on internal control objectives that were provided by DIB internal control and risk management data. The rest of variables were control variables. In the model, η_i was unobservable individual effects, e_t was time effect, and $v_{i,t}$ represented random disturbance terms. The specific model 1 was seen as follows:

$$Performance_{i,t} = \alpha_0 + \alpha_1 ICI_{i,t} + \alpha_2 SIZE_{i,t} + \alpha_3 ROA_{i,t} + \alpha_4 LEV_{i,t} + \alpha_5 Growth_{i,t} + \alpha_6 State_{i,t} + \eta_i + e_t + v_{i,t} \quad (1)$$

The relationship between internal control and WCMP was identified by the signal and significance of the internal control parameter α_1 in the model.

Variable Definition

Dependent variable: WCMP

There has long been research on WCMP evaluation. Financial evaluation indices that were used to reflect WCMP for most early-phase studies included accounts receivable turnover (period), inventory turnover (period), and current assets turnover (period). However, as the concept of working capital management expands, it is increasingly isolated and single-faceted to describe working capital management with financial evaluation indices. Comprehensively, there are mainly two types of indices that are universally recognized in theories and practice of working capitals: DWC and WCP.

DWC: The early-stage indices of inventory turnover and receivables turnover that correspond to contents of working capital management studies have been no longer adaptable to current tendencies of diversified working capital management. Early-stage evaluation indices in relation to working capital management emphasize on managing current assets, but ignore inherent relationships between evaluation indices. As a result, conflicts and contrasts occur during the process of actual application (Wang et al., 2007). More importantly, as the current liability part is completely excluded from early-phase evaluation indices, it is rather difficult to figure out the overall impact of such indices as inventories, accounts receivable, and accounts payable on working capitals.

Given that it is defective to measure WCMP with the pure index of current assets turnover, Richards and Laughlin (1980) proposed the idea of using days of working capital as the WCMP index. Days of working capital can be simplified as the mean time span needed from cash payment to cash receipt, and can reflect the entire process of a company's working capital management activities. Therefore, days of working capital has been widely applied to empirical studies of WCMP (Deloof, 2003; Knauer & Wöhrmann, 2013). Below is the formula of days of working capital:

$$\text{Days of working capital (DWC)} = \text{days of sales outstanding (DSO)} + \text{days of inventory outstanding (DIO)} \\ - \text{days of payable outstanding (DPO)}$$

where

$$\text{DIO} = [(\text{initial inventories} + \text{ending inventories}) \times 365] / [2 \times \text{operating costs}]$$

$$\text{DPO} = [(\text{initial notes payable} + \text{initial accounts payable} + \text{ending notes payable} + \text{ending accounts payable}) \times 365] \\ / [2 \times \text{operating costs}].$$

The American REL consulting company and CFO magazine began to investigate working capitals of American listed companies based on the indices of DWC and cash conversion efficiency (CCE) in 1997. Since 2003, they have employed the aforementioned formula "DWC=DSO+DIO-DPO" to rank WCMP of American listed companies, which played an important role in promoting universal application of WCMP. This phenomenon also reflects that it is objective and rational to measure WCMP with DWC. Therefore, the paper used DWC as the first index to evaluate WCMP.

WCP: Initiated by the Boston Consulting Group (BCG), the concept of WCP takes comprehensive account of a company's working capital management efficiency and its business level, and acts as an integral index system to measure WCMP as a whole. This simple and practical index has been unanimously approved by the theoretical circle and the practical circle. WCP is hence used as the second means to evaluate WCMP in the paper. The corresponding formula is:

$$\text{WCP} = \text{net sales} / \text{annual average working capital volume}$$

Independent variable: ICI

Internal control index (ICI) that were provided by DIB internal control and risk management data was chosen as the proxy index to measure the internal control quality of Chinese listed companies. ICI is founded on

the basic norm of enterprise internal control, and combines five internal control objectives including operation, compliance, assets safety, strategy and report. It also reflects dynamic information of rectifying shortages of internal control for a consecutive publication from 2000 to 2014. The application of ICI will remarkably render the research conclusion more comparable and reliable. ICI refers to the quality of internal control of the firm and is represented by the natural logarithm of Dibo Company's internal control index.

Control variables

There are various influencing factors of WCMP according to relative studies, in line with the literature, we also control for other relative factors in the model 1. SIZE refers to the scale of the firm and is represented by the natural logarithm of total assets. Firms that are large in scale generally have more working capital to satisfy their business (Almazari, 2014), Scale will directly lead to a decline in efficiency of working capital. Therefore, we predict this variable also to be negatively related to a firm's WCMP. ROA refers the ratio of income before extraordinary items over total assets. According to the study by Palazzo (2012), the stronger the company's profitability, the more money it holds. LEV refers the ratio of total debt divided by total assets. According to the pecking order theory proposed by Myers (1984), Debt ratio is one of the important factors influencing the demand of working capital. Growth refers the firm's year-on-year sales growth. Kim et al. (1998), Opler et al. (1999) Consensus, the growth of the company will affect its future funding requirements. In view of the current nature of China's state owned economy, we also add a State variable to represent whether a firm is a State-Owned. State-Owned equals one if the ultimate owner of the firm is the government, and is otherwise equal to zero. In addition, we also control the time and industry dummy variables may influence the conclusions of the study (Nunn 1981).

EMPIRICAL RESULTS

Table 2 reports the descriptive statistics of the variables. As can be see, the mean value, maximum value, minimum value and range of DWC are 4.674, 8.143, 0.795, and 7.348, respectively, which is just slightly different from the survey data of DWC obtained by Wang (1997-2014). The mean value, maximum value, minimum value and range of WCP are 6.508, 92.703, -38.535, and 131.238, respectively. This result shows that different listed companies have diversified performance and efficiency of working capital management. The mean value, maximum value, minimum value and range of internal control index are 6.512, 5.926, 6.849 and 0.923, respectively. The possible reason for little discrepancies between internal control index/quality of different listed companies is that the domestic internal control system is still in a preliminary stage which is far from forming great quality diversification. Below shows the descriptive statistics of the rest of control variables. We will not repeat them.

Table 2. Descriptive Statistics

Variables	N	Mean	SD	Min	Median	Max
DWC	8887	4.674	1.418	0.795	4.680	8.143
WCP	8887	6.508	13.909	-38.535	3.323	92.703
ICI	8887	6.512	0.156	5.926	6.531	6.849
SIZE	8887	21.770	1.194	19.244	21.656	25.274
ROA	8887	0.034	0.062	-0.220	0.030	0.223
LEV	8887	0.513	0.191	0.082	0.519	0.996
Growth	8887	0.235	0.641	-0.655	0.134	4.740
State	8887	0.687	0.464	0.000	1.000	1.000

Table 3 reports the difference examination in State-Owned and Non-State-Owned. Against the backdrop of the current special economic mechanism that state-owned business predominates national economy, the paper divided all the sample data into two sub-samples: state-owned companies and non-state companies. According to the ultimate nature of actual controllers in sample companies. The paper also conducted T test on the differences of paired sample's mean values and Wilcoxon rank sum test on the differences of median for the variables DWC, WCP, DSO, DIO, DPO, ICI. As can be seen from statistics in **Table 3**, compared to non-state listed companies, the state-owned companies have quite shorter DWC (4.518<5.018 / 4.523<4.968) and higher WCP (7.240>4.897 /

Table 3. Difference Examination in State-Owned and Non-State-Owned

Variables	Mean		Median	
	State=1	State=0	State=1	State=0
DWC	4.518	5.018*	4.523	4.968*
WCP	7.240	4.897*	3.784	2.534*
DSO	84.656	100.708*	60.026	67.204*
DIO	237.488	376.190*	94.845	125.200*
DPO	87.555	103.197*	69.716	77.690*
ICI	6.524	6.486*	6.535	6.520*

Notes: *Significance at 5 percent.

3.7784>2.534), which means that state-owned companies outstrip non-state companies with regard to WCMP. Wang (2013) also had similar conclusion. Meanwhile, state-owned companies predominate with shorter DSO, DIO and DPO than non-state companies. According to significance test on ICI, the internal control quality of state-owned companies surpasses that of non-state companies (6.524>6.486 / 6.535>6.520), which means that Chinese state-owned listed companies are ahead in developing the construction of the internal control system and in upgrading WCMP than non-state counterparts.

Table 4 and **Table 5** reports the regression results of Model (1). Given the panel characteristics of sample data, the panel-based multiple regression analysis method was used to conduct research on the impact of internal control on WCMP. Frequently-used panel-based multiple regression models are hybrid effect model, random effect model, and fixed effect model. The entity fixed effect model is mostly employed in empirical research by presuming that the error item of regression equation is related to a certain explanatory variable. The problem is that this model ignores time effect. This ignorance may cause the corresponding research results to greatly deviate from a real one in a way that deviating greater with the intensification of time effect (Zhao et al., 2012; Liu, 2017). To this end, we tested the joint significance of annual dummy variables of the sample data (F=497.86, P=0.0000. The test result that the null hypothesis of “no time effect” is strongly rejected shows that time effect should be considered in the model. Furthermore, in terms of the selection between fixed effect model and hybrid effect model, since F statistics is highly significant (as shown in **Table 4**) which corresponds to a significant individual effect for the model estimation, the fixed effect model should be the optimal one. When the fixed effect model and the random effect model is compared with each other, according to the result of Hausman test, the chi2 statistics is rather significant. This demonstrates that these two models have no noteworthy differences of model parameter estimation. In this case, we are supposed to be as conservative as selecting the fixed effect model.

Table 4. The regression results of DWC and ICI

$$DWC_{i,t} = \alpha_0 + \alpha_1 ICI_{i,t} + \alpha_2 SIZE_{i,t} + \alpha_3 ROA_{i,t} + \alpha_4 LEV_{i,t} + \alpha_5 Growth_{i,t} + \alpha_6 State_{i,t} + \eta_i + e_t + v_{i,t} \quad (2)$$

Variables	Coeff.	t-stat.	Prob.
Constant	4.148***	6.22	0.000
ICI	-0.450***	-5.65	0.000
SIZE	0.195***	9.42	0.000
ROA	-0.739***	-3.54	0.000
LEV	-0.078	-0.91	0.362
Growth	-0.192***	-14.43	0.000
State	-0.023	-0.52	0.600
Year		Control	
Ind		Control	
N		8887	
F Test		13.04 (0.000)	
Hausman		418.76 (0.000)	
Model		FE (fixed effect model)	
R ²		0.3613	

*Significance at 10 percent; **significance at 5 percent; ***significance at 1 percent.

Table 5. The regression results of WCP and ICI

$$WCP_{i,t} = \alpha_0 + \alpha_1 ICI_{i,t} + \alpha_2 SIZE_{i,t} + \alpha_3 ROA_{i,t} + \alpha_4 LEV_{i,t} + \alpha_5 Growth_{i,t} + \alpha_6 State_{i,t} + \eta_i + e_t + v_{i,t} \quad (3)$$

Variables	Coeff.	t-stat.	Prob.
Constant	18.010*	1.69	0.092
ICI	3.554**	2.49	0.013
SIZE	-1.734***	-5.20	0.000
ROA	-1.534	-0.46	0.648
LEV	-2.416*	-1.75	0.080
Growth	0.390*	1.82	0.069
State	0.398	0.56	0.574
Year		Control	
Ind		Control	
N		8887	
F Test		4.11 (0.000)	
Hausman		125.15 (0.000)	
Model		FE (fixed effect model)	
R ²		0.2681	

*Significance at 10 percent; **significance at 5 percent; ***significance at 1 percent.

Table 4 is the multiple regression result based on WCMP and the internal control index in model (2) where WCMP is represented by DWC. According to specific regression analysis results, the estimation parameter of the internal control index is obtained as -0.450, and has passed the 1% significance test. This result shows that on the premise that other variables that DWC responds to are controlled unchanged, the higher the internal control index (quality) is, the shorter the DWC is, and the higher the WCMP is. Therefrom, the research hypothesis H1 is directly proved true.

Table 5 demonstrates the multiple regression result based on WCMP and the internal control index in model (3). According to the results of F test and Hausman test, the fixed effect model is the best for multiple regression analysis on model (3) where WCMP is represented by WCP. The regression results show that the estimation parameter of the internal control index is obtained as 3.554, and has passed the 5% significance test. This result shows that on the premise that other variables that WCP responds to are controlled unchanged, the higher the internal control index (quality) is, the shorter the WCP is, and the higher the WCMP is. Therefrom, the research hypothesis H1 is directly proved true.

As can be seen from the above summaries, WCMP is positively correlated with the internal control index (quality) no matter being represented by DWC or by WCP. Namely: the less deficiencies the internal control system has, the higher the internal control quality is, and the better the WCMP is. This conclusion is uniform to the theoretical analysis and research hypothesis in the paper that premium internal control can directly or indirectly promote WCMP of Chinese listed companies to accelerate continuously.

It can also be seen that the impact of internal control on WCMP can be realized from two aspects: 1. Shorten DWC. The internal control system can be constrained through a series of regimes such that the DWC is shortened, which is of great significance to optimizing a company's working capital management decisions. 2. Improve WCP. Apart from direct constraints on the internal control system, WCP can be improved by means of information disclosure and other information transfer methods both within the enterprise and out of the enterprise. The combination of the above two aspects will together upgrade WCMP of Chinese listed companies.

Further Empirical Test

Conventional measurement indices of WCMP which are supposed to cover current assets turnover indices such as DSO and DIO significantly function in empirical research on the field of working capital management. However, as the scope of working capital management expands, these conventional indices have been shrunk to a mere part of DWC. Nevertheless, they still play an important part in evaluating WCMP. Therefore, in order to

ensure the prudence of the conclusions to be obtained herein, the paper conducted a further regression on the relationship between internal control and such indices as DSO, DIO, and DPO. This also aims to better clarify the correlations of internal control with various components of WCMP. The regression model required is shown as follows:

$$DSO_{i,t} = \alpha_0 + \alpha_1 ICI_{i,t} + \alpha_2 SIZE_{i,t} + \alpha_3 ROA_{i,t} + \alpha_4 LEV_{i,t} + \alpha_5 Growth_{i,t} + \alpha_6 State_{i,t} + \eta_i + e_t + v_{i,t} \tag{4}$$

$$DIO_{i,t} = \alpha_0 + \alpha_1 ICI_{i,t} + \alpha_2 SIZE_{i,t} + \alpha_3 ROA_{i,t} + \alpha_4 LEV_{i,t} + \alpha_5 Growth_{i,t} + \alpha_6 State_{i,t} + \eta_i + e_t + v_{i,t} \tag{5}$$

$$DPO_{i,t} = \alpha_0 + \alpha_1 ICI_{i,t} + \alpha_2 SIZE_{i,t} + \alpha_3 ROA_{i,t} + \alpha_4 LEV_{i,t} + \alpha_5 Growth_{i,t} + \alpha_6 State_{i,t} + \eta_i + e_t + v_{i,t} \tag{6}$$

Table 6 is the multiple regression results of the internal control index and various components of WCMP. According to the results of F test and Hausman test, the fixed effect model should be used for multiple regression analysis on model (4), (5), (6).

According to the regression result in **Table 6**, the regression coefficients of DSO, DIO, and DPO against internal control index are -118.393, -50.129, and -42.322, respectively, and separately passed the significance test at the significance level of 1%, 10%, and 1%. This shows that when other influencing factors remain unchanged, the internal control index and DSO, DIO and DPO are negatively correlated. Namely: the implementation of high-quality internal control can significantly shorten a listed company’s DSO, DIO and DPO.

According to the regression analysis result in model (2), it is easy to find that the negative correlations between internal control and DWC was not realized by shortening DSO and DIO at the same time when prolonging DPO, but by simultaneously shortening DSO, DIO and DPO albeit the smaller changing magnitude of DPO. According to the regression result of DPO in model (6) in **Table 6**, the absolute value of the correlation coefficients of ICI is 42.322, much less than those of respective 118.393 and 50.129 for DSO in model (4) and DIO in model (5). This research result is similar to the research on WCMP by Kong et al. (2009) and the research on accounting prudence and WCMP by Du (2014).

Table 6. The regression results of the components of DWC and ICI

Variables	Model (4)		Model (5)		Model (6)	
	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.
Constant	638.169***	9.76	-1656.353***	-5.76	102.818**	2.10
ICI	-118.393***	-13.64	-50.129*	-1.31	-42.322***	-6.51
SIZE	13.070***	6.44	97.627***	10.93	9.281***	6.11
ROA	-175.272***	-8.56	67.034	0.74	-3.863	-0.25
LEV	19.744**	2.35	143.695***	3.89	96.892***	15.42
Growth	-23.913***	-18.30	-92.094***	-16.02	-21.103***	-21.58
State	13.220***	3.06	4.105	0.22	8.523***	2.64
Year	Control		Control		Control	
Ind	Control		Control		Control	
N	8887		8887		8887	
F Test	6.63 (0.000)		5.00 (0.000)		7.30 (0.000)	
Hausman	300.31 (0.000)		530.58 (0.000)		167.38 (0.000)	
Model	FE (fixed effect model)		FE (fixed effect model)		FE (fixed effect model)	
R ²	0.2909		0.3350		0.2466	

*Significance at 10 percent; **significance at 5 percent; ***significance at 1 percent.

DISCUSSION

With panel data of A-share main-board companies on Shanghai and Shenzhen stock markets from 2004 to 2013 as the research objective, the paper used the panel-based multiple regression model to have conducted empirical research on the relationship between internal control and WCMP. Based on the Application Guidelines of Enterprise Internal Control and the stakeholder theory, the paper first summarized the direct and indirect impact of internal control on WCMP, and proposed the core research hypothesis HO accordingly: internal control is positively correlated with WCMP. Then, the paper conducted follow-up multiple regression analysis on HO, and ascertained that with any of DWC and WCP as the alternatives of WCMP, internal control and WCMP presented positive correlations with each other, namely: better internal control leads to shorter DWC or higher WCP, through which resulting in better WCMP. (2) according to further regression analysis result, the negative correlations between internal control and DWC was not realized by shortening DSO and DIO at the same time when prolonging DPO albeit its smaller magnitude. The research achievement in the paper remedies shortages of contents in research on the economic consequences brought by internal control, and expands the connotations and extensions of economic consequences brought by internal control.

CONCLUSION

The results of this paper show that through in-depth accounting training and education, internal control can help the enterprise's knowledge management system to play an important role. Based on the optimization of knowledge structure and knowledge learning, can make the internal control of the quality of enterprises to be orderly upgrade and improve, and then applied to the enterprise's working capital management performance. This is a complete research chain, and the conclusion of the study not only enriches the research literature in the field of accounting education and knowledge management, but also provides an optimized path for enterprises to improve the performance of working capital management.

The research in the paper is of great guiding significance to tipping the scales against deteriorating working capital management of Chinese listed companies. Specifically, (1) it provides a practical access to upgrading WCMP. It is useless to apply conventional corporate governance strategies such as incentives and constraints, accounting control, information disclosure, and corporate culture constraints to manage working capitals in a modern sense, especially when the contents of working capital management has expanded to cover the supply chain channel. The paper has testified that the implementation of internal control plays a pivotal role in fully covering the contents of working capital management as well as in upgrading WCMP. Against the background of Chinese government departments striving for construction of the internal control system, it is undoubted a practical and low-cost shortcut to realize high-efficient working capital management via implementing internal control. (2) It is suggested to take advantage of the signal transmission function of internal control information, so that rationally arranging working capital activities ranging from short-term financing plan, production plan, sales plan to business credit. The quality of working capital activities exert profound influence on the company's risks and revenues. Research results show that disclosure of high-quality internal control information can drive the aforementioned stakeholders to change their behaviors by providing loose credit environment, higher business credit, and useful information of product demand to the company, which is conducive to the company's working capital management practice. Therefore, a company with relatively high-quality internal control is capable of scheduling its working capital management plan at will, and can realize maximum WCMP on the premise of balancing risks and earnings.

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