

# Reform of Inventory Standards, Informatization and Inventory Performance

## An Empirical Study Based on Listed Manufacturing Companies

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**Abstract**—Inventory is an important asset of manufacturing enterprises' production and management. Inventory management plays an extremely important role in the enterprise activities. In order to study the effects of the reform of the new inventory criteria and the two major factors of informatization on the inventory performance of manufacturing companies, this paper takes the A-share manufacturing listed company as the research object and establishes a multiple regression analysis model for empirical analysis. Research shows that both information technology investment and changes in inventory criteria can significantly improve the inventory performance of manufacturing companies. Moreover, after the change of the inventory policy, the effect of corporate IT investment on the performance of manufacturing companies' inventory will increase.

**Keywords**—informatization; inventory standards; inventory performance

### I. INTRODUCTION

In February 2006, China issued a new accounting standards system. The new accounting standards have achieved convergence with international standards in terms of standards system, normative objectives, concept foundations, content of standards, and measurement methods, greatly improving China's accounting standards system and improving the scientificity of corporate accounting work and accounting information quality. Since the promulgation of the new standard, some domestic scholars have studied the effect of the new standard, and they have mainly evaluated the level of earnings management, the relevance of the value of accounting information, and the efficiency of investment. Among them, Yu Bo (2009) and Wu Keping (2013) [1][2] have studied the overall accounting standards, and Liu Yunguo (2009)[3], Song Yuqing et al (2013)[4] have studied the effects of a specific criterion. The new inventory standards are based on qualitative research [5] and very few quantitative studies. This makes it doubtful whether the theoretical new inventory criteria system can be applied well in practice. This paper intends to examine the impact of changes in inventory standards on the inventory performance of manufacturing companies through empirical tests, so as to provide empirical evidence for whether the implementation of the new inventory standards can improve the inventory management of listed companies.

With the implementation of the "Made in China 2025" and "Internet Plus" programs, information technology has become a hot topic in the manufacturing industry. Manufacturing informatization will directly affect China's transition from a manufacturing power to a manufacturing powerhouse, and the impact of manufacturing companies' inventory management on its economic efficiency is particularly important. In this context, it is of positive significance to pay attention to the relationship between the information technology investment and inventory performance of manufacturing companies. The research on informational investment and corporate performance has become a hot issue in academic circles in recent years. Some scholars in foreign countries have found that increased investment in information technology has increased the inventory turnover rate of enterprises and reduced inventory holding costs [6][7]. According to the current domestic research situation, most scholars have a single choice for the selection of corporate performance indicators. The main concern is the profitability indicators, while neglect operational capacity, especially inventory performance [8]. In terms of research methods, a small number of domestic studies on information and inventory performance have been conducted. The empirical data are mostly obtained through questionnaires and are greatly subjective.

So far, few scholars have incorporated the new inventory standards and informatization into consideration and studied the impact of the two on the manufacturing company's inventory performance as well as the relationship between the two. In this regard, this paper selects Shanghai-Shenzhen A shares manufacturing listed companies as research samples, and compares and analyzes the effects of the two factors: reform of inventory standards and information investment, on the company's inventory performance, and provides a useful reference for follow-up research and enterprise practice.

### II. RESEARCH DESIGN

#### A. Research Hypothesis

Compared with the old inventory standards, the overall structure of the new inventory standards is more stringent, the hierarchy is clearer, the system is reasonable, fully reflects the coordination and convergence of the new accounting standards

and international standards. On the one hand, the company's inventory can be more truly reflected. On the other hand, it can more objectively and effectively reflect the company's financial status and operating results, thereby providing users with more effective information, and providing useful information for the business decisions. The full implementation of the new inventory policy will make the accounting of our inventory more standardized, so this paper puts forward the following assumptions:

Hypothesis 1: Changes in the new inventory standards can improve the inventory performance of manufacturing companies.

The informatization of manufacturing enterprises is the process in which information technology is applied to the fields of production, technology, business management, etc., and the efficiency of the development of information resources and the economic benefits of information are continuously improved. With the opportunity of the Internet+, listed companies in the manufacturing industry can use various information methods to seamlessly link production and sales, and realize centralized resource allocation and sharing. Informatization enables enterprises to use new technologies and combine them with their characteristics to solve their own inventory accounting and inventory management issues. Improving current inventory accounting and management systems by combining information technology will improve the efficiency of inventory accounting and the level of inventory management. It will help improve the company's ability to develop new product innovations and respond quickly to market forces, optimize the allocation of various resources and optimize the operation of various activities, and ultimately increase the core competitiveness of enterprises. At present, there has been theoretical analysis that enterprises have increased the efficiency and coordination of enterprise material management by investing in important information technology resources, thereby reducing the company's inventory level. Therefore, this article proposes the following assumptions:

Hypothesis 2: Information technology investment has a positive effect on the inventory performance of listed companies in the manufacturing industry.

In order to maintain coordinated internal and external development in the long term, the informatization of an enterprise must always maintain its coordination with macro policies so as to improve efficiency, reduce costs, improve the quality of decision-making, and enhance the competitiveness of enterprises. On one hand, the implementation of the new standard plays a crucial role in promoting and promoting the development of enterprise information. On the other hand, it also puts forward more stringent and scientific requirements. The information system of an enterprise must adapt to the requirements of the new standards. Under an effective normative environment, the informatization investment decision of the enterprise will be more procedural and may improve the performance of the enterprise. Therefore, the following hypothesis is proposed in this paper:

Hypothesis 3: After the inventory standards change, the effect of IT investment on manufacturing inventory performance will increase.

## *B. Variable Selection and Regression Model*

1) *Variable selection*: The analysis of this study involves dependent variables, independent variables, and control variables. In order to enable the theoretical analysis model to be tested in the empirical study, it is necessary to design the relevant variables on the basis of the existing researches and become specific indicators that can be operated and measured in practice.

a) *dependent variables*: In terms of the choice of dependent variables, this article uses the inventory turnover rate as the main indicator to measure the performance of the company's inventory. For one reason, the inventory turnover rate itself is a very intuitive and comprehensive indicator in finance, which can comprehensively reflect the level and efficiency of inventory management in an enterprise. Secondly, it is also financial indicators used the most frequently and widely by the domestic and foreign scholars in inventory management. The large inventory turnover rate means that the times of company's inventory turnover in a certain period of time are big, the time of a certain amount of inventory turnover is short, the inventory liquidity is strong, the unit inventory income is high, and the company's ability to manage inventory is also strong. Conversely, when the turnover rate is reduced, the inventory will occupy more funds, the inventory cost will increase accordingly, and the funds will be used inefficiently, indicating that the operating level is low. Inventory turnover rate is an important indicator reflecting the level of inventory management and operational performance of an enterprise.

b) *Independent variables*: This article uses the information technology hardware investment of a company to measure its investment in information technology. Existing research shows that when the correlation coefficient between IT hardware investment and comprehensive information technology investment (including software investment and human capital investment) is around 0.75-0.8, the information technology application of the company (Hitt, 1999) could be reasonably reflected [9]. Therefore, using hardware investment indicators not only has the convenience of data availability, but also has the feasibility of research methods. The information technology hardware investment refers to research conventions and approximately sets the year-end value (not considering depreciation and impairment provision) of a detailed item in fixed assets --"electronic equipment" as the company's IT investment for the year.

Since we also need to study the impact of changes in inventory accounting standards on inventory performance, we introduce the dummy variable NCAS for change in accounting standards. Take 0 before the change of standards (ie, take 0 before 2007), and take 1 after the change of standards. It is used to measure the impact of changes in inventory accounting standards on corporate IT investment performance. In other words, it is used to measure after changes in inventory standards, whether the effect of information technology investment in listed manufacturing companies on inventory performance changes, and whether the direction of change is improvement or weakening.

c) *Control variables*: Referring to the research literature on the factors affecting company performance, this paper also introduces two control variables: company size (SIZE) and capital structure (DR). This paper selects these two control variables to make the analysis results more objective and true. Consistent with most scholars, the company's scale is represented by the natural logarithm of the total assets, and the capital structure is expressed by the company's asset-liability ratio.

The definition of specific variables is shown in the "Table I":

TABLE I. SELECTION AND DEFINITION OF VARIABLES

| Variable Type         | Variable Name                     | Variable Symbol | Variable Description   |
|-----------------------|-----------------------------------|-----------------|--|
| Dependent Variables   | Inventory Turnover                | INVT            | Operating Cost / Average Inventory   |
| Independent Variables | Information Technology Investment | ITS             | End Value of Electronic Equipment / Total Assets   |
|                       | Changes in accounting standards   | NCAS            | dummy variables, 1 after 2007 (inclusive), otherwise 0   |
|                       | Inter-variables                   | NCAS*ITR        | whether there are changes in the impact of IT investments on inventory performance after changes in inventory criteria |
| Control Variable      | Enterprise Size                   | SIZE            | Logarithm of Total Assets  |
|                       | Capital Structure                 | DR              | Total liabilities at the end of the period/Total assets at the end of the period                                       |

2) *Regression model*: In order to examine the relationship among changes in inventory standards, informatization, and inventory performance of manufacturing companies, we have established the following regression model:

$$INVT = \beta_0 + \beta_1 ITS + \beta_2 NCAS + \beta_3 SIZE + \beta_4 DR + \varepsilon \quad (1)$$

$$INVT = \beta_0 + \beta_1 ITS + \beta_2 NCAS + \beta_3 SIZE + \beta_4 DR + \varepsilon \quad (1)$$

In order to examine the interaction between changes in inventory standards and the investment in information technology, we established the following regression model:

$$INVT = \beta_0 + \beta_1 ITS + \beta_2 NCAS + \beta_3 NCAS * ITS + \beta_4 SIZE + \beta_5 DR + \varepsilon \quad (2)$$

$$INVT = \beta_0 + \beta_1 ITS + \beta_2 NCAS + \beta_3 NCAS * ITS + \beta_4 SIZE + \beta_5 DR + \varepsilon \quad (2)$$

Among them,  $\beta_0$  is an interception term,  $\beta_1$  to  $\beta_5$  are coefficients under estimation, and  $\varepsilon$  is a random term.

### C. Research Samples and Data Sources

This paper takes Shanghai and Shenzhen A-stock manufacturing listed companies from 2002 to 2016 in China as the primary selection samples. To reduce the influence of changes in accounting standards and the influence of sample

changes before and after the changes in standards, the paper selects balanced panel data and filters the samples as follows: (1) This paper has excluded ST, S\*ST and other types of listed companies as them, due to the particularity of the companies' sample data, their financial abnormalities exist in different degrees, the data may be distorted, and the exclusion of such companies is conducive to the reliability of the research results; (2) This paper has excluded companies in the financial industry because financial companies' operating methods and financing sources are very different from ordinary companies. (3) This paper has removed companies that lack relevant accounting data or financial indicators in the study interval. Finally, 53 company samples and 795 company year data were obtained. The data mainly comes from Reith and Guotai'an database. The data analysis tools used are EXCEL and SPSS.

### III. EMPIRICAL TEST

#### A. Descriptive Statistical Analysis

The following table reports the descriptive statistics of variables based on years before and after the change in accounting standards. According to the descriptive statistics in "Table II", it can be seen that the average value and median value of information technology investment and inventory turnover rate both show an upward trend after the change of the inventory standards. This phenomenon indicates that enterprises are paying more attention to informatization and are also new inventory. The positive side of the criteria is reflected.

TABLE II. DESCRIPTIVE STATISTICS

| Variables | Before the Inventory Standards Changed |         |                    | After the Inventory Standards Changed |         |                    |
|-----------|--|---------|--------------------|---------------------------------------|---------|--------------------|
|           | Mean                                   | Median  | Standard Deviation | Mean                                  | Median  | Standard Deviation |
| ITS       | 0.01716                                | 0.00966 | 0.01785            | 0.02153                               | 0.01071 | 0.02669            |
| INVT      | 3.84179                                | 3.57150 | 2.38916            | 4.85471                               | 3.90010 | 4.96975            |

#### B. Correlation Analysis

"Table III" shows the correlation coefficients of various variables of the model, in which information technology investments, changes in inventory standards, and interaction variables are all positively correlated with the inventory turnover rate at a statistically significant level of 1%. This has provided preliminary empirical evidence support for hypotheses 1, 2, and 3.

TABLE III. CORRELATION ANALYSIS

|                            |          | INVT  | ITS   | NCAS  | NCAS*ITS | SIZE  | DR    |
|----------------------------|----------|-------|-------|-------|----------|-------|-------|
| <b>Pearson correlation</b> | INVT     | 1.000 | .082  | .111  | .114     | .009  | .036  |
|                            | ITS      | .082  | 1.000 | .085  | .355     | .002  | -.019 |
|                            | NCAS     | .111  | .085  | 1.000 | -.069    | .339  | .073  |
|                            | NCAS*ITS | .114  | .355  | -.069 | 1.000    | -.106 | .052  |
| <b>Sig.</b>                | SIZE     | .009  | .002  | .339  | -.106    | 1.000 | .271  |
|                            | DR       | .036  | -.019 | .073  | .052     | .271  | 1.000 |
|                            | INVT     | .     | .010  | .001  | .001     | .402  | .157  |
|                            | ITS      | .010  | .     | .008  | .000     | .476  | .295  |
|                            | NCAS     | .001  | .008  | .     | .027     | .000  | .020  |
|                            | NCAS*ITS | .001  | .000  | .027  | .        | .001  | .070  |
|                            | SIZE     | .402  | .476  | .000  | .001     | .     | .000  |
|                            | DR       | .157  | .295  | .020  | .070     | .000  | .     |

**C. Multiple Regression Analysis**

"Table IV" is a summary of Model 1 and Model 2. It can be seen that the correlation coefficient of model 1 is R=0.141, the adjusted coefficient of determination is R<sup>2</sup> = 0.015, and the adjusted value of model 2 is R<sup>2</sup> = 0.023, indicating that after adding the interaction variable, the adjusted goodness of fit of Model 2 is greater than that of Model 1.

TABLE IV. SUMMARY OF MODELS

| Model | R     | R <sup>2</sup> | Adjusted R <sup>2</sup> | Error of Standard Estimation |
|-------|-------|----------------|-------------------------|------------------------------|
| 1     | .141a | .020           | .015                    | 4.2782496                    |
| 2     | .171b | .029           | .023                    | 4.2601963                    |

"Table V" shows the results of the analysis of variance of the model. It can be seen from the table that F = 4.015 and Sig = 0.003 in Model 1; F = 4.781 and sig = 0 in Model 2, indicating that both models have passed the test on the hypothesis of which significance is 0.05, and the regression equation as a whole has sufficient significance.

TABLE V. ANOVAB

| Model |                | Sum of Squares | df  | Mean Square | F     | Sig.  |
|-------|----------------|----------------|-----|-------------|-------|-------|
| 1     | Regression     | 293.952        | 4   | 73.488      | 4.015 | .003a |
|       | Residual Error | 14459.702      | 790 | 18.303      |       |       |
|       | Total          | 14753.654      | 794 |             |       |       |
| 2     | Regression     | 433.878        | 5   | 86.776      | 4.781 | .000b |
|       | Residual Error | 14319.776      | 789 | 18.149      |       |       |
|       | Total          | 14753.654      | 794 |             |       |       |

"Table VI" is the regression coefficient table of the model. From this table, it can be found in column sig that the independent variables ITS and NCAS of Model 1 have passed the significance test, and positively correlated with the inventory turnover rate of the dependent variable at the level of 0.05, indicating that information investment and changes in inventory standards can significantly improve the inventory

performance of manufacturing companies, verifying Hypothesis 1 and Hypothesis 2. Judging from the regression coefficients, compared with the changes in the inventory standards, the major factor affecting the inventory performance of the listed companies in the manufacturing industry is the level of information investment. The Sig<0.01 of the interaction variables in Model 2 is positively correlated with the inventory turnover rate at a statistically significant level of 1%. It has verified Hypothesis 3, that is, as the inventory standards change; the effect of IT investment on manufacturing inventory performance will be enhanced. It is worth noting that the variance expansion factor VIF of each variable in the two regression equations in the table is less than 2, so it can be judged that the multicollinearity in the model is less likely.

TABLE VI. TABLE OF COEFFICIENTS

| Model |             | Non-Standardized Coefficients |                | Standard Coefficients | t      | Sig. | Co-Linear Statistics |       |
|-------|-------------|-------------------------------|----------------|-----------------------|--------|------|----------------------|-------|
|       |             | B                             | Standard error | Trivial vision        |        |      | Tolerance            | VIF   |
| 1     | (Constant)  | 7.739                         | 3.337          |                       | 2.319  | .021 |                      |       |
|       | ITS         | 13.064                        | 6.305          | .073                  | 2.072  | .039 | .992                 | 1.008 |
|       | NCAS        | 1.058                         | .344           | .116                  | 3.078  | .002 | .877                 | 1.140 |
|       | SIZE        | -.169                         | .158           | -.041                 | -1.068 | .286 | .823                 | 1.214 |
|       | DR          | .868                          | .796           | .040                  | 1.091  | .275 | .926                 | 1.080 |
| 2     | (Constant)  | 6.792                         | 3.340          |                       | 2.033  | .042 |                      |       |
|       | ITS         | 6.220                         | 6.745          | .035                  | .922   | .357 | .859                 | 1.164 |
|       | NCAS        | 1.125                         | .343           | .123                  | 3.279  | .001 | .873                 | 1.146 |
|       | Alternation | 45.473                        | 16.377         | .106                  | 2.777  | .006 | .850                 | 1.177 |
|       | SIZE        | -.122                         | .158           | -.030                 | -.771  | .441 | .814                 | 1.228 |
| DR    | .653        | .796                          | .030           | .820                  | .412   | .917 | 1.090                |       |

**IV. CONCLUSION AND INSUFFICIENCY**

This study takes a listed A-share listed company as a research sample to discuss the impact of changes of inventory standards and informational investment on manufacturing companies' inventory performance. The empirical results show that changes of inventory standards and informationalized investment can significantly improve the inventory performance of manufacturing companies, in which the impact of IT investment on inventory performance is greater than the impact of inventory changes. Manufacturing companies must continuously improve the level of informatization and use the "Internet +" opportunity to make the information technology of manufacturing industry develop to networks which are faster, of lower cost and more secure information, accelerate the application of big data, cloud computing, and the Internet of things on manufacturing industry, and lead the manufacturing industry to an efficient and secure information-based road. Moreover, the research also shows that after the inventory standards change, the effect of information technology investment on manufacturing inventory performance has been enhanced, and the research results have

a greater role in expanding the scope of impact of changes in accounting standards.

However, there are still some limitations in the entire study. First of all, information technology investment includes many aspects. However, because of the limitation of data sources, we only use hardware indicators to approximate the degree of information technology application of the enterprise, which affects the reliability and accuracy of the research results. Secondly, this paper adopts the dummy variable method when choosing the proxy variable of the changes of inventory standards. This method has been supported by many scholars. But simple dummy variables do not adequately measure the continuous impact of normative change. How to better measure the sustained economic consequences of normative change is the major direction of future research; Finally, there are many factors that affect the inventory performance of the listed companies in the manufacturing industry. This study is inevitably affected by these factors. How to further eliminate its influence also requires more thinking.

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