

## The Relevance Between Intangible Assets and Accounting Earnings Quality in Chinese High-Tech Enterprises

PENG Xinyu<sup>[a]</sup>; XIAO Chan<sup>[a],\*</sup>

<sup>[a]</sup>School of Business Administration, South China University of Technology, Guangzhou, China.

\*Corresponding author.

Received 5 December 2016; accepted 25 February 2017  
Published online 20 March 2017

### Abstract

Much attention has been paid to Chinese listed companies, especially high technology enterprises. This paper follows 765 high technology enterprises in Shanghai and Shenzhen as sample, positively analyzes sample companies' intangible assets influence on accounting earnings quality. Study finds that high technology enterprises gross margin is significantly and positively correlated with intangible assets, and negatively correlated with the operating profit margin. This paper gives more explanation based on the findings, and put forward the corresponding suggestions.

**Key words:** Intangible assets; Value relevance; High technology enterprises

Peng, X. Y., & Xiao, C. (2017). The Relevance Between Intangible Assets and Accounting Earnings Quality in Chinese High-Tech Enterprises. *Management Science and Engineering*, 11(1), 87-93. Available from: URL: <http://www.cscanada.net/index.php/mse/article/view/9430>  
DOI: <http://dx.doi.org/10.3968/9430>

### INTRODUCTION

#### A. The Structure of Intangible Assets

According to International Accounting Standards to see the structure of intangible assets, western developed countries intangible assets category contains computer software, patents, trademark right, copyright, customer relationship or supplier relationship, market share and right of sales, etc., land use right is not included in intangible assets category, but fixed assets. However, in China, land use right is regarded as fixed assets, and accounts for a large proportion in high technology enterprises. Analysis

of three typical high technology industries shows the ratio of land use right to intangible assets are 78.3% in electronics industry, 51.2% in information technology industry, 71.8% in pharmaceutical industry, which means land use right has interference on intangible assets (Cui, 2013). This paper replaces net asset with a market value, then total assets minus tangible assets are equal to the intangible assets. In fact, intangible assets market value is derived from its recognition by the market, so as to weaken land use right interference on the intangible assets valuation, which leads to the establishment of intangible assets of real value. The basic assumptions of accounting earnings value relevance explain the reason for replacing net asset with a market value.

#### B. Accounting Earnings Value Relevance

The concept of accounting earnings value relevance is derived from the basic assumption that net book value and stock price are two dimensions for evaluation of enterprise value, in other words, two kinds of explanations from different dimensions. Therefore, it is rational that there is correlations between the two, and more surely, the two are theoretically the same (Easton & Harris, 1991). As a result, there is correlation between changes in the net book value (which mainly come out of the current accounting earnings and cash dividend) and changes in the stock price. And the model of net asset is established based on this:

$$P_t = BV_t + \varepsilon$$

$P_t$  represents stock prices under natural conditions,  $BV_t$  represents net book value. It can be seen that there are correlations between the two, and based on this to launch that the level of accounting earnings should be associated with the current stock returns, that is to say there are value relevance in accounting earnings. At the same time, they confirmed that stock returns were significantly and positively correlated with accounting earnings by empirical study. It further explained that stock price (in other word, market price) was significantly and positively correlated with net asset.

The corresponding period, Amir Etal researched the correlation between American listed companies financial statement prepared by domestic accounting standard and American listed companies financial statement prepared by American accounting standard. One of the models is the contrast analysis between market price and book value. The author used adjustments of earnings items and stock items to research if the difference between the market price per share and net book assets per share can be explained (Amir, 1993). The result showed that the one prepared by American accounting standard is more related to the one prepared by domestic accounting standard. Obviously, the original theories and the markets are fitting to each other, superficial mismatching of market value and net asset is caused by accounting standard and clearing method. Besides, other scholars studied the correlation between every part of accounting earnings and returns, stock price reactions to operating activities cash flow, etc. (Subramanyam, 1996), decomposition of accounting earnings for the five parts (non-affiliated sales revenue, affiliated sales revenue, main business cost, income from other operation and non-operating profit) and research the stock return reactions to every parts of accounting earnings.

### C. Intangible Assets and Accounting Earnings Quality

Intangible assets as important input of factors of production increasingly contribute to factors of production, and its economic value lies in excess profits, related empirical research were also given by other scholars based on it (Ohlson, 1995). Study on the research and development expenditures influence on the enterprise profitability, found that the subsequent annual accounting earnings is significantly and positively correlated with research and development expenditures (Aboody & Lev, 1998). Following the methods of Abody, the study chose 1995-1998 listed companies as sample data, set growth opportunity, company asset scale and the original profit scale as control variables. The findings show that main business profit is significantly and positively correlated with intangible assets, whereas, main business profit

is significantly and positively correlated with fixed assets (Xue & Wang, 2001). Empirical analysis on the correlation between enterprise intangible assets and future performance showed that future performance stock is significantly and positively correlated with intangible assets stock (Wang & Lu, 2004).

Be compared with traditional non-high technology enterprises, high technology enterprises have the following characteristics: high-risks and high-rewards on enterprise investment (Lu & Shi, 2002). That is to say, intangible assets factor plays a more important role in high technology enterprises than in non-high technology enterprises (Ma, 2003). Does it as described above that intangible assets factor plays a more important role in high technology enterprises than in non-high technology enterprises? The paper analyzes the intangible assets stock of high technology industries and traditional industries.

## 1. HYPOTHESIS

The empirical data have proved that intangible assets influence on enterprise performance and accounting value relevance is different between high technology industries and traditional industries (Shao & Fang, 2006). This paper suggests that intangible assets are the key point of consistent profitability in high technology industries, which are regarded as technology-intensive and knowledge-intensive industries. This paper suggests market value is approximately equal to net asset base on the assumption of accounting earnings value relevance, and uses arithmetic average of 20 trading day market value before December 31, 2016 as representative of net asset, by reference to theoretical basis of "Important measures for the administration of asset reorganization of the listed company". Through the accounting equation: assets = liabilities + owner equity, enterprise total assets value are concluded.

According to:

$$V^* = V_T + V_I.$$

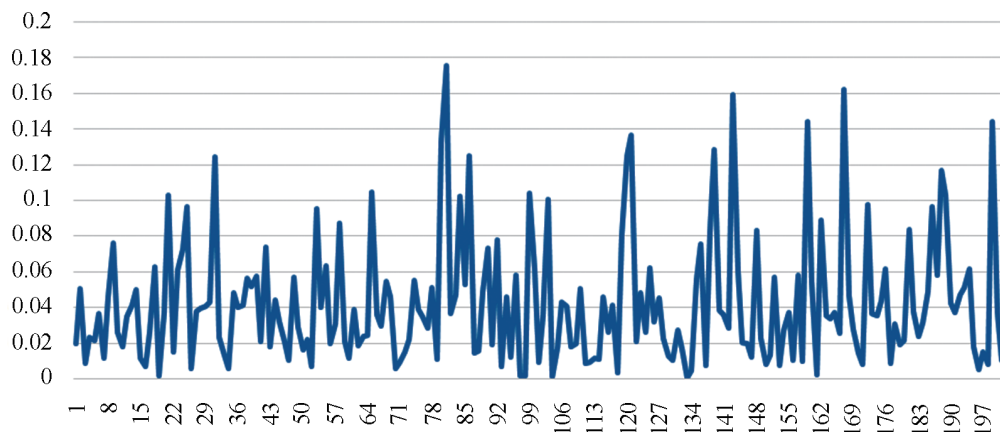
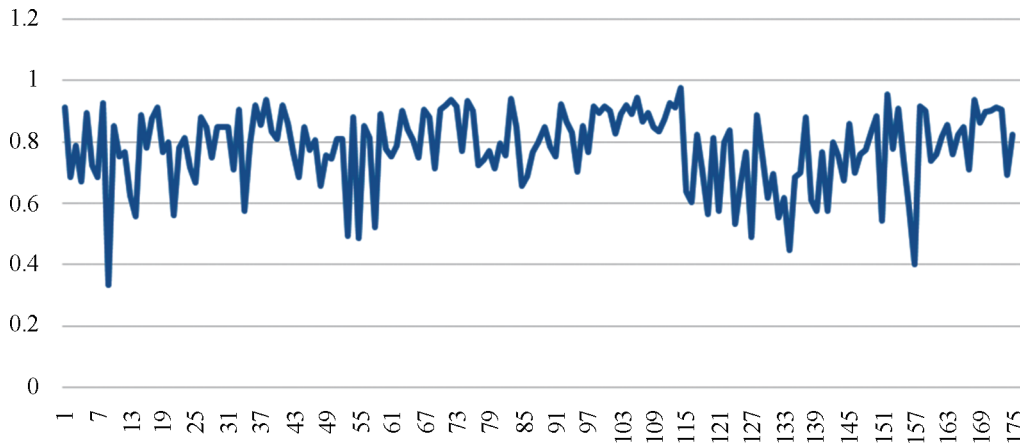


Figure 1 Intangible Assets Proportion of Traditional Industries

$V^*$  represents total assets value,  $V_T$  represents tangible assets value, and  $V_I$  represents intangible assets value, value of intangible assets can be obtained through the conversion of equation (Carol & Mary, 1993). Base on the above theory, we can get a contrast analysis diagram between traditional industries and high technology

industries. Traditional industries samples are collected from durables sector and clothing manufacturing industry. High technology industries samples are collected from pharmaceutical manufacturing industry. Reasons for samples: The sample quantity is adequate and is a typical representative of the related industries.



**Figure 2**  
**Intangible Asstes Proportion of High Technology Industries**

## 2. DATA FROM WIND DATABASE

According to the comparison, it is found that under the condition of the same sample quantity of 170-200, intangible assets ratio of traditional industries was significantly below the high technology industries. Intangible assets is very important to the enterprise value and innovation, have a profound influence on enterprise output. Based on above literature and statistics, this paper put forward the hypothesis one.

Hypothesis 1: In the case of other conditions established, high technology enterprise intangible assets proportion is significantly and positively correlated with enterprise accounting earnings.

Since the intangible assets proportion in high technology enterprises are much higher than that in traditional enterprises, so are there different degree of influence on quality of accounting earnings caused by high technology industries internal industries segmentation? The Chinese scholars picked out the electronics, information technology and biological medicine manufacturing industries out of high technology industries to carry on the detailed classification analysis of

intangible assets. The results showed that the intellectual property proportion of pharmaceutical manufacturing is higher, whereas, profitability of intellectual property in the information technology industries is higher. Based on this, the paper will analyze descriptive statistics of subdivision of high technology industries, the results found that information technology enterprises total intangible assets were more than that in pharmaceutical manufacturing industries. So this paper put forward the hypothesis two.

Hypothesis 2: In the case of other conditions established, information technology industry is more correlated with accounting earnings quality relevance than other industries in high technology industries.

## 3. STUDY DESIGN

### 3.1 Construction of Model

Combining above literature background, model is established according to the research of Chinese listed company's intangible assets value relevance, and to research the intangible assets proportional influence on quality of earnings:

$$\text{Earning}_t = \alpha + \beta_1 \times \text{Current}_t + \beta_2 \times \text{Fixed}_t + \beta_3 \times \text{Leverage}_t + \beta_4 \times \text{Intangible}_t + \varepsilon$$

Earning<sub>t</sub> represent the profitability of companies in *t* year (Shao & Fang, 2006). Main business gross profit margin and main business profit margin are selected as research indicators. The specific definition of main business gross profit margin and main business profit margin will be given in below.

### 3.2 Data Sources and Descriptive Statistics

According to the provisions of OECD, high technology

industries include the following five industries: computer related industry, electronic industry, information technology industry, bio-pharmaceutical industry and communications industry (Dietrich, 2003). This paper refers to the selection of the five industries of high technology industries (including pharmaceutical manufacturing, aerospace manufacturing, electronics and communications equipment manufacturing, electronic computer and office equipment manufacturing, medical

equipment and instrumentation manufacturing). Combined with wind industries data classification, the paper extracted nine segments of the data of high technology industries, including aerospace manufacturing industry, electronic devices and components manufacturing industry, Internet software and services industry, information technology service industry, software services industry, communications equipment and computer peripheral equipment manufacturing industry, semiconductor and semiconductor and semiconductor production equipment manufacturing, health care equipment and service industry and pharmaceutical manufacturing industry (pharmaceutical, biotechnology and life science industries) (Li & Gu, 2014). Data is from database of wind.

Data mainly focus on 765 high and new technology enterprise listed on the Shanghai and Shenzhen stock market in China before December 1, 2016, the data statistical interval is from January 1, 2016 to December 31, 2016. In order to ensure the integrity of the data and avoid the occurrence of abnormal value, this paper eliminates stocks of ST, \*ST and incomplete data. The listed companies which were sentenced to the suspension on December 1, 2016 to December 31, 2016 are eliminated as well (data acquisition of average market value, in this paper called net assets is the average of 20 trading days in the period from December 1, 2016 to December 31, 2016). 712 effective samples are extracted from this, and processed with 1% winsorization at the time of inspection.

**Table 1**  
**Definition of Related Variables**

|                               |  |
|-------------------------------|--|
| <b>Current<sub>t</sub></b>    | Ratio of current assets to total assets of <i>i</i> company at the end of <i>t</i> years   |
| <b>Fixed<sub>t</sub></b>      | Ratio of fixed assets to total assets of <i>i</i> company at the end of <i>t</i> years   |
| <b>Leverage<sub>t</sub></b>   | Ratio of total liabilities to total assets of <i>i</i> company at the end of <i>t</i> years  |
| <b>Intangible<sub>t</sub></b> | Ratio of intangible assets to total assets of <i>i</i> company at the end of <i>t</i> years  |
| <b>Earning<sub>1</sub></b>    | Main business gross profit margin of <i>i</i> company of <i>t</i> year, (main business income – main business cost) / main business income |
| <b>Earning<sub>2</sub></b>    | Main business profit margin of <i>i</i> company of <i>t</i> year, main business profit / total assets                                      |

**Table 2**  
**Descriptive Analysis of Related Variables**

| Variable                | N   | Average | Standard deviation | Minimum | Maximum |
|-------------------------|-----|---------|--------------------|---------|---------|
| Current <sub>t</sub>    | 712 | 16.48%  | 0.099              | 2.21%   | 68.89%  |
| Fixed <sub>t</sub>      | 712 | 4.92%   | 0.062              | 0.02%   | 68.49%  |
| Leverage <sub>t</sub>   | 712 | 10.45%  | 0.107              | 0.18%   | 70.77%  |
| Intangible <sub>t</sub> | 712 | 78.59%  | 0.134              | 10.25%  | 97.62%  |
| Earning <sub>1</sub>    | 712 | 39.65%  | 0.203              | -7.66%  | 96.93%  |
| Earning <sub>2</sub>    | 712 | 3.27%   | 0.0246             | -0.53%  | 51.37%  |

Table 2 shows descriptive statistics of main variables with no winsorization in the study. It can be seen from Table 2 that, high technology enterprise assets structure has changed comparing with past research by new ways of handling assets. For example, past research showed that current assets accounted for more than half proportion of the company's total assets (Shao, 2006), whereas, the average proportion of fixed assets in high technology enterprise is only 4.92% according to this paper work. And the proportion of intangible assets accounts for the most part of the company's total assets, which are a sign of improvement in knowledge innovation as the proportion of intangible assets is increasing in high technology enterprise. High technology enterprise is a kind of light assets management mode, that decrease of fixed assets is advantageous to enterprise profit and future

development.

#### 4. EMPIRICAL RESULTS AND ANALYSIS

It can be seen from Table 3 that there are significant correlations between enterprise profitability. And the influence of proportion of intangible assets and proportion of current assets on profitability is relatively complex. As for the gross profit margin, higher the proportion of intangible assets, higher the gross profit margin, and higher the proportion of current assets, lower the gross profit margin. As for main business profit margins, the proportion of intangible assets is significantly and negatively correlated with main business profit margins. Next we conduct respectively evaluation of two measurement indicators of proportion of intangible assets on the enterprise earnings quality.

**Table 3**  
**Person Related Parameters Estimate Matrix of Related Variables**

|                         | Earning <sub>1</sub> | Earning <sub>2</sub> | Current <sub>t</sub> | Fixed <sub>t</sub> | Leverage <sub>t</sub> | Intangible <sub>t</sub> |
|-------------------------|----------------------|----------------------|----------------------|--------------------|-----------------------|-------------------------|
| Earning <sub>1</sub>    | 1.000                |                      |                      |                    |                       |                         |
| Earning <sub>2</sub>    | 0.214***             | 1.000                |                      |                    |                       |                         |
| Current <sub>t</sub>    | -0.409***            | 0.436***             | 1.000                |                    |                       |                         |
| Fixed <sub>t</sub>      | -0.280***            | 0.326***             | 0.345***             | 1.000              |                       |                         |
| Leverage <sub>t</sub>   | -0.459***            | 0.346***             | 0.720***             | 0.625***           | 1.000                 |                         |
| Intangible <sub>t</sub> | 0.433***             | -0.474***            | -0.902***            | -0.717***          | -0.823***             | 1.000                   |

Note. \*, \*\*, \*\*\*, denote respectively statistic significant level at 0.10, 0.05, 0.01. Sample for 712. Variables have been through colinearity diagnostics, therefore there is no existing colinearity problem with equations.

It can be seen from Table 3 and Table 4 that the correlation between the proportion of intangible assets of high technology and the two indicators of enterprise earnings quality is the opposite, which is different from the estimated assumptions. First of all, according to the correlation of person, it is found that the asset-liability ratio is negatively related to business operating gross profit margin, it means that the higher the liability ratio, the stronger the enterprise profitability. And with observation into business profit margin, it is found that the higher the liabilities, the stronger the enterprise profitability. There appeared two contradictory facts. In fact, to explore it from the perspective of nature, it can be found that the focus of two profit indicators measurement

are different, the former measures the earnings per Chinese Yuan of sales revenue to investigate the enterprise product attractiveness to the customer, or in other words, to investigate the consumer expectations for the future of the product. Consumer expectations for the future of the product may come from the desire degree for looking to further increase, so they are worried about enterprise with higher liability ratio, resulting in decline of gross profit margin indicators. It is understandable why the higher the proportion of intangible assets, the higher the business gross profit margin. Intangible assets are the backbone of a high technology enterprise, with the increase of the proportion of intangible assets, consumer confidence as well as the recognition for product are enhanced.

**Table 4**  
**Intangible Assets Influence on Enterprise Earnings**

| $Earning_t = \alpha + \beta_1 \times Current_t + \beta_2 \times Fixed_t + \beta_3 \times Leverage_t + \beta_4 \times Intangible_t + \varepsilon$ |                                   |            |                             |           |
|--|-----------------------------------|------------|-----------------------------|-----------|
| Independent variables  | Main business gross profit margin |            | Main business profit margin |           |
|  | Parameter estimates               | T value    | Parameter estimates         | T value   |
| Constant   | 0.519                             | 39.790***  | 0.121                       | 12.589*** |
| Current <sub>t</sub>   | -0.336                            | -3.441***  | 0.045                       | 0.593***  |
| Fixed <sub>t</sub>   | -0.871                            | -13.757*** | 0.087                       | 14.344*** |
| Leverage <sub>t</sub>  | -0.647                            | -7.141***  | 0.031                       | 2.352***  |
| Intangible <sub>t</sub>  | 0.172                             | 2.946***   | -0.108                      | -10.118** |
| Adjusted R <sup>2</sup>  | 0.221                             |            | 0.229                       |           |
| F  | 101.993***                        |            | 106.302***                  |           |
| N  | 712                               |            |                             |           |

The later operating profit margin measures the contribution of main business per Chinese Yuan of assets investment. High technology enterprises are classified into different growth stages, including the seed period, start-up period, growth period, mature period (Xu, 2000). Enterprise ways of financing are not the same in different stage. In the stage of seed period, early product' future is unpredictable, so enterprises usually give priority to with equity financing. With enterprises development, the ways of financing become wider, so the debt financing predominates. So as to understand why the higher the creditor's rights, the higher the enterprises operating profit margin, which means the

more mature the enterprise development the higher the liabilities ratio. The increase of debt proportion also means that the better market prospects, the company increased investment in the intangible assets. It is impossible that reduced operating profit margins market overestimate, since measurement of the intangible assets value in this paper is derived from the basis measurement of market value, which means the greater the proportion the higher the market recognition. Then further analysis from the perspective of industry, it can be seen whether information technology with widely market bullish has higher significant. It's evidence of our conjecture.

It can be seen from Table 5 and Table 6 that in a typical information technology of Internet industry with good prospects, the correlation coefficient (0.730) is higher than other high technology industries, which means that the

actual operational efficiency will be lower than the other industries, its negative correlation index (0.455) is more obvious than other industry. It means that intangible assets may be excessive market overvalued.

**Table 5**  
**Regression Analysis of Business Gross Margin**

| Industries | Regression equation  |
|------------|--|
| 1          | $Earning_1 = 0.011 - 0.086Current - 0.048Fixed - 0.045Leverage + 0.116Intangible + \varepsilon$  |
| 2          | $Earning_1 = 0.310 - 0.124Current - 0.179Fixed - 0.572Leverage + 0.225Intangible + \varepsilon$  |
| 3          | $Earning_1 = 10.777 - 0.048Current - 0.217Fixed - 1.640Leverage + 0.730Intangible + \varepsilon$ |

Note. industry 1-3 denote respectively: Electronic devices and components manufacturing industry, pharmaceutical manufacturing industry, Internet software and services industry.

**Table 6**  
**Regression Analysis of Operating Profit Margin**

| Industries | Regression equation   |
|------------|---|
| 1          | $Earning_2 = 0.013 - 0.096Current - 0.044Fixed - 0.047Leverage - 0.116Intangible + \varepsilon$ |
| 2          | $Earning_2 = 0.174 + 0.244Current + 0.153Fixed + 0.181Leverage - 0.158Intangible + \varepsilon$ |
| 3          | $Earning_2 = 0.013 + 0.102Current + 0.144Fixed + 0.332Leverage - 0.455Intangible + \varepsilon$ |

Note. industry 1-3 denote respectively: Electronic devices and components manufacturing industry, pharmaceutical manufacturing industry, Internet software and services industry.

## CONCLUSION

According to the general analysis of the high technology enterprises, it can be concluded that operating gross profit margin of accounting earnings quality in Hypothesis 1 is positively correlated with the proportion of intangible assets and negatively correlated with the profit margin. This is associated with the nature of high technology enterprises. Therefore, the assumed conditions must be more careful. Analyzing the industrial interval of high technology enterprise, intangible assets of high technology enterprise are indeed correlated with earnings quality. However, overestimate from consumers and market leads to the opposite state of profit margin and gross profit margin.

## SUGGESTIONS

Above all, it is suggested that

(a) Governments should enhance the supervision of the quality of intangible assets, to make the best use of its real value;

(b) More explicit classification of intangible assets categories to improve the effectiveness of the enterprise management;

(c) Put more specific consideration on the space of high technology enterprise intangible assets, to control rationality and market accuracy.

## REFERENCES

- Abody, D., & Lev, B. (1998). The value-relevance of intangibles: The case of software capitalization. *Journal of Accounting Research*, 36, 161-204.
- Amir, E., Harris, T. S., & Vemuti, E. K. (1993). A comparison of the value-relevance of US versus Non-US GAAP accounting measures using form 202-F reconciliation. *Journal of Accounting Research*, 31(Suppl.), 230-264.
- Carol, J. S., & Marry, W. S. (1993). The measurement and determinants of brand equity: A financial approach. *Marketing Science*, 12(1), 28-53.
- Cui, Y. G., & Zhao, Y. (2013). Current situation of intangible assets of high-tech corporations in China. *Journal of Accounting Research*, 3, 59-64.
- Easton, P., & Harris, T. (1991). Earnings as an explanatory variable for returns. *Journal of Accounting Research*, 29, 19-36.
- Li, L., Yan, B., & Gu, C. X. (2014). Intellectual property protection, information asymmetry and high-tech enterprise capital structure. *Management World*, 11, 1-9.
- Lu, Z. F., & Shi, Y. (2002). Researches on value decision on listed companies in sight of the financial appraisal system. *Journal of Accounting Research*, 5, 18-23.
- Ma, J. Y. (2003). The relevance of expenditure and development of expenditure on information and electronics industry. *Chinese Accounting Review*, 1, 93-108.

- Ohlson, J. (1995). Earnings, book value, and dividends in equity valuation. *Contemporary Accounting Research*, 661-687.
- Shao, H. X., & Fang, J. X. (2006). A study on the correlation of intangible assets value of listed companies in China—Re-examination based on classified information of intangible assets. *Journal of Accounting Research*, 12, 25-32.
- Subramanyam, K. R. (1996). The pricing of discretionary accrual. *Journal of Accounting and Economics*, 22, 250-265.
- Teoh, S. W., & Wong, T. J. (1993). Percieved auditor quality and the earnings response coefficient. *The Accounting Review*, 68, 346-366.
- Wang, H. C., & Lu, C. (2004). *A study on the correlation between intangible assets and future performance-empirical evidence based on China's capital market*. The Third International Symposium on Empirical Accounting Papers.
- Xu, L. (2000). The life cycle of high-tech enterprises and the allocation of financial resources. *The Journal of World Economy*, 6, 31-36.
- Xue, Y. K., & Wang, Z. T. (2001). A study on the relativity of information disclosure of intangible assets and its value—Evidence from Shanghai stock market. *Journal of Accounting Research*, 11, 40-47.