The Empirical Research on the Relationship of Accounting Quality and Financial Constraints and the Innovation.
--Evidence form the Listed Companies in Zhejiang Province

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Abstract. Innovation is meaningful to firm's competiveness and the sustainable development of the macroeconomic. The quality of accounting information is the indispensable instrument to mitigate the information asymmetry, and innovation plays important role in the process of the maximization of enterprise value. By using the data of listed companies of Zhejiang province, based on the theory that accounting information can mitigate the financial constraints through improving the contract and supervision which can reduce the moral risk and converse option, this paper finally finds accounting information can affect innovation positively through the channel of mitigating the financial constraints, therefore the financial constraint is the one of the mediators between accounting quality and innovation. The finding of this research provides evidence for companies to improve the accounting information to promote innovation and for government to enforce firms to offer high accounting information quality.

Keywords: Accounting information quality; R&D investment; financial constraints.

1. Introduction

The firm innovation is the important momentum for economic growth and social progress, corporation can create value by investing R&D research which usually requires larger capital and higher risk. The accounting information that provides for both external and internal information users can mitigate information asymmetry. Accounting information can promote innovation positively through the channel of mitigating the financial constraints.

In order to realize the sustainable development, the corporation as the entity of innovation must increase R&D research. The related research in recent years focus on the impact of the quality of accounting information and financial constraints and innovation, however, the subjects of the influential mechanism between accounting information and innovation are barely studied.

By using the data of listed companies of Zhejiang province, this paper studied the influential mechanism and channel, and also tests the financial constraints as a mediator. Accordingly, the structure of this paper is as following: the first part of the paper is the literature review and research hypothesis; the second part of paper is methodology and the data; the third part of the paper is main results; the forth part of the paper is the conclusion.

2. Literature Review and Research Hypothesis

2.1 Accounting Information And Innovation

Base on the theories, the corporation which has higher quality of accounting information will has fewer external problem[1,2],information asymmetry[3] and agency problems[4], therefor, improve the level of firm innovation. Information asymmetry leads to inefficiency of distribution of resource which strangles the firm innovation [5,6].Chen lihong(2015)finds the positive relationship between the donation decisions and accounting information of comprehensive efficiencies[7].Han Meini (2016) proves accounting information can mitigate information asymmetry which finally obstructs the R&D investment [8].Belloc (2012) argues the R&D investment depends on the investment decision, while the investment decision is related to the accounting information quality [9].

Accordingly, the paper proposes the first hypothesis:

Hypothesis I: The accounting information quality is positively related to innovation.

2.2 Accounting Information Quality and Financial Constraints.

The foreign research about the relationship of accounting information quality and financial constraints began much earlier, Beaver (1968) studies the relationship between the accounting information quality and the asset pricing [10], finds the trade volume of stock is closely related to the accounting information quality which lay the solid foundation for the research of effects of accounting information and the asset pricing. Francis (2004) finds accrued information can reduce the equity cost [11]. Hall and lerner (2010) suggest innovation require plentiful capital as the guarantee [12]. Domestic research also finds the same result, Zeng ying and Lu Zhengfei (2006) show accounting information quality is negatively correlated to equity cost [13].

Accordingly, the paper proposes the second hypothesis:

Hypothesis II: The accounting information quality is negatively related to financial constraints.

2.3 Financial Constraints and Innovation

Innovation requires plentiful capital, Nelson and Arrow (1959) suggest it's difficult to invest R&D research without capital [1,2]. Hall and Lerner (2010) studies the relationship between financing and innovation, finds insufficient capital hinder the firm innovation [3]. In China, the problem of the financing became one of the most important factors that impact the R&D research especially for high-tech industry [14]. Accordingly, the paper proposes the third hypothesis:

Hypothesis III: The financial constraints negatively related to innovation.

3. Methodology

3.1 Sample

The samples in our passage are all from the listed companies in Zhejiang Province, and we study the data from 2012 to 2017. Among them, the indicators used for accounting information quality are from 2008 to 2017.The sample date is all from Shenzhen Taian CSMAR database and Wind information database for the indicators of the financial industry are quite different from other industries, this paper excludes the financial industry, and in order to avoid the influence of outliers, we exclude the value below 1% and above 99%. Finally, the number of samples obtained in this paper is 477.This paper uses Stata11.0 for data analysis and calculation.

3.2 Variables and Models.

3.2.1 Accounting Information Quality

$$\Delta AC_{i,t} = \alpha_0 + \alpha_1 CFO_{i,t-1} + \alpha_2 CFO_{i,t} + \alpha_3 CFO_{i,t+1} + \varepsilon_{i,t} \tag{1}$$

Where $\Delta AC_{i,t}$ is calculated by dividing the working capital changes by total assets, working capital consist of inventory + accounts receivable + other current assets -prepaid accounts and prepaid taxes. The changes are calculated by using the working capital of t year minus the working capital of t-1 year. $CFO_{i,t-1}, CFO_{i,t}, CFO_{i,t+1}$ mean the operating cash flow divided by total assets. Then calculate the standard deviation of residual from the t year and t-4year[11], Finally by dividing the opposite number of the standard deviation of residual into ten groups in sequence, get AQ 0-10 representing the accounting information quality.

3.2.2 Financial Constraints

$$SA = -0.737 \times LnSize + 0.043 \times (LnSize)^2 - 0.04Age \tag{2}$$

3.2.3 Innovation

This paper uses the natural logarithm of total research and development expenses as the indicator of the level of innovation.

3.2.4 Controlling Variables

Table 1. Index

Index name	The calculation of indexes
Ltr	Ln(R & D expenditure)
AQ	DD model
SA	Formula(2)
Lev	Liability/asset
Board	Number of board of directors
Topctrl1	Shareholding proportion of top ten shareholders
Size	Ln(Asset)
ROE	Financial index ROE
Age	Ln(Year-List year+1)

3.2.5 Models

First step: test the first hypothesis

$$\text{Ltr}_{i,t} = \alpha_0 + \alpha_1 AQ_{i,t} + \alpha_2 Lev_{i,t} + \alpha_3 Board_{i,t} + \alpha_4 Topctr1_{i,t} + \alpha_5 Size_{i,t} + \alpha_6 ROE_{i,t} + \varepsilon_{i,t}$$

Second step: test the second hypothesis

$$SA_{i,t} = \beta_0 + \beta_1 AQ_{i,t} + \beta_2 Lev_{i,t} + \beta_3 Board_{i,t} + \alpha\beta_4 Topctr1_{i,t} + \beta_5 Size_{i,t} + \beta_6 ROE_{i,t} + \varepsilon_{i,t}$$

Third step: test the third hypothesis

$$\text{Ltr}_{i,t} = \gamma_0 + \gamma_1 AQ_{i,t} + \gamma_2 SA_{i,t} + \gamma_3 Lev_{i,t} + \gamma_4 Board_{i,t} + \gamma_5 Topctr1_{i,t} + \gamma_6 Size_{i,t} + \gamma_7 ROE_{i,t} + \varepsilon_{i,t}$$

4. Main Results.

4.1 Descriptive Statistics

The paper shows the mean of AQ is 6.03, then divide the samples into two group by the mean of AQ, find in the higher AQ group, the company will have higher level of innovation, besides, the other indexes also show the same pattern which indicates accounting information quality, innovation, financial constraint and other firm-level characteristics do have some relationship.

Table 2. Summary statistics of variables

variable	mean	sd	p50	min	max
Ltr	18.2	1.201	18.29	13.92	21.88
SA	-2.349	0.202	-2.291	-2.913	-2.042
AQ	6.034	2.744	6	1	10
Lev	0.403	0.178	0.389	0.08	0.82
Board	8.595	1.459	9	5	15
Topctrl	54.19	14.32	54.18	19.94	91.72
Size	22.38	0.989	22.34	19.76	25.55
ROE	0.046	0.058	0.043	-0.157	0.211

Table 3. Summary statistics of variables by groups

GAQ	Ltr	SA	Lev	Board	Topctrl	Size	ROE
0	18.13	-2.351	0.428	8.446	55.03	22.38	0.0430
1	18.27	-2.347	0.377	8.761	53.26	22.39	0.0500
Total	18.20	-2.349	0.403	8.595	54.19	22.38	0.0460

4.2 The Accounting Information Quality and Innovation

The paper uses the method of fixed effect panel to regress all the samples. The first hypothesis assumes the accounting information quality is positively related to the firm innovation, the first column of the table 4 is the regression result of the first model. The result shows the coefficient of AQ is 0.035 at the significant level of 1% which indicates the accounting information quality will promote the firm innovation significantly. Meanwhile, Topctrl and Size have significant relationship with the firm innovation.

Table 4. Fixed effect panel regression estimation

	(1) Ltr	(2) SA	(3) Ltr
AQ	0.035*** (0.011)	-0.004*** (0.001)	0.022** (0.010)
Lev	-0.170 (0.220)	0.041* (0.024)	-0.050 (0.209)
Board	-0.001 (0.024)	0.005* (0.003)	0.012 (0.023)
Topctrl	-0.011*** (0.004)	0.002*** (0.000)	-0.006* (0.004)
Size	0.697*** (0.055)	-0.100*** (0.006)	0.402*** (0.071)
ROE	0.315 (0.486)	0.075 (0.054)	0.536 (0.462)
SA			-2.944*** (-0.482)
_cons	3.043*** (1.174)	-0.229* (0.130)	2.368** (1.116)
F	16.28	29.91	20.25

Standard errors in parentheses, * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

4.3 The Accounting Information Quality and Financial Constraints

The second hypothesis assumes the accounting information quality is negatively related to the financial constraints. The second column of the table 4 is the regression result of the model 2. The result shows the coefficient of AQ is negative 0.004 at the significant level of 1%. Moreover, the result also suggests the firm-level characteristics impact the firm financing.

4.4 The Financing Constraints and Innovation

The third hypothesis assumes the financial constraints are negatively related to the firm innovation. The third column of the table 4 is the regression result of the model 3. The result shows the coefficient of AQ is 0.022 at the significant level of 5%.the coefficient of SA is negative 2.944 at the significant level of 1% which means the financial constraint hinder the firm innovation. With the consideration of the financial constraints, the coefficient of AQ drops from 0.035 to 0.022 which means the financial constrains is one of the mediators between accounting quality and innovation.

4.5 Robust Test

In order to control the robustness and the heteroscedasticity problem, the paper test the result of table 3 using the method of the robust test of fixed effect panel and Bootstap sample method, the result gets the same conclusion.

Table 5. The result of robust test

	robust			Bootstrap		
	(1) Ltr	(2) SA	(3) Ltr	(1) Ltr	(2) SA	(3) Ltr
AQ	0.035** (0.015)	-0.004*** (0.001)	0.022* (0.013)	0.035** (0.015)	-0.004*** (0.001)	0.022* (0.012)
Lev	-0.170 (0.428)	0.041 (0.024)	-0.050 (0.341)	-0.170 (0.434)	0.041 (0.045)	-0.050 (0.323)
Board	-0.001 (0.031)	0.005* (0.003)	0.012 (0.029)	-0.001 (0.030)	0.005 (0.003)	0.012 (0.028)
Topctrl	-0.011 (0.007)	0.002*** (0.000)	-0.006 (0.007)	-0.011* (0.007)	0.002*** (0.000)	-0.006 (0.007)
Size	0.697*** (0.095)	-0.100*** (0.010)	0.402*** (0.128)	0.697*** (0.096)	-0.100*** (0.009)	0.402*** (0.127)
ROE	0.315 (0.570)	0.075 (0.077)	0.536 (0.602)	0.315 (0.578)	0.075 (0.077)	0.536 (0.599)
SA			-2.944*** (-0.604)			-2.944*** (-0.626)
_cons	3.043 (2.149)	-0.229 (0.196)	2.368 (2.033)	3.043 (2.166)	-0.229 (0.185)	2.368 (2.125)
F	16.28	29.91	20.25	——	——	——

Standard errors in parentheses, * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

5. Conclusion

How to improve the level of firm innovation through enhancing the quality of accounting information is one of the difficulties the corporations from the Zhejiang province encounter. This paper analyzes the impact of the accounting information quality on innovation through the mediator of financial constraints.

The paper sheds light on how accounting information quality affect the level of the firm innovation. Finally, the finding suggests accounting information can affect innovation positively through the channel of mitigating the financial constraints, therefore the financial constraint is the one of the mediators between accounting quality.

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