Accounting information quality, governance efficiency and capital investment choice

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ABSTRACT

This paper examines the relationship between accounting information quality and capital investment choice from the perspective of accounting information's governance function. Measuring capital investment choice as the correlation of growth of operating income between company and industry, this paper investigates whether and to what extent companies focus on their core business. The results show that the higher the quality of publicly listed firms' accounting information, the stronger that correlation, particularly when the corporate governance of the listed company is poor. The findings imply that accounting information quality can thus optimize the capital investment choice, which complements and strengthens the functioning of corporate governance. Hence, regulators should pay more attention to the market's power to supervise the behavior of listed firms, improve the governance functions of accounting information and increase the efficiency of capital allocation.

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1. Introduction

China's stock market has developed rapidly since 1990, when the capital market was set up. The number of listed companies increased from 10 in 1990 to 2063 in 2010. In the 1990–2010 period, about 5253.7 billion yuan in outside capital flowed into listed companies by initial public offerings, seasoned equity offerings or corporate bonds (China Statistical Yearbook, 2011). Whether companies allocated the capital into their own core businesses has become a very important issue, which more and more market participants are focusing on.

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However, this paper finds that in the 2000–2011 period, about 63.7% of capital was allocated to non-core operating activities, against their original investment plans. There are an average of 53 million yuan for each change, the average 6.7 months of change frequency, and the average 3.6 times change for every firm. Moreover, almost 69.6% of all the changes are inefficient. The frequent changes of the capital investment directions have become a notable problem in China, which severely harms capital allocation efficiency. Many scholars pay attention to this issue and research on it from the views of implementing laws and regulations or improving corporate governance, but the effect of these suggestions is not good to date. Based on this important issue, this paper examines the governance function of accounting information and whether high accounting information quality can form an enforcement mechanism to push management to make capital investment more efficiently.

Since China's Accounting Law was implemented in 1985, the Chinese government has devoted effort to complete the accounting principles system and related rules to improve accounting information quality. In 2006, the Chinese Ministry of Finance issued new accounting principles comprising one basic accounting standard, 38 specific standards and application guides that have been applied to publicly listed companies since 2007. The goal of these standards is to ensure the firms to provide useful accounting information and to help investors make good investment decisions. These accounting standards are created to reduce the information asymmetry between investors and listed companies, helping investors better understand those companies' risks and thus make more rational investment decisions. However, in China's current special institutional background, can accounting information also serve a governance function to influence managements' capital investment choice?

There are several objective external forces that enhance the governance function of accounting information in China's capital market. By the end of 2010, the country's number of securities investment funds had reached 704, with 2.4228 trillion yuan in total assets (China Statistical Yearbook, 2011). Institutional investors also play an important role in China to dig up and transfer the information disclosed by listed firms, compared with other investors. More importantly, institutional investors can also respond more quickly to abnormal accounting information, "vote by foot", and finally improve the market efficiency. We believe that in the long term, high-quality accounting information can help these investors to identify inefficient investments, and in turn incur the pressure on stock price by investors' voting by foot. In an efficient market, the potential decrease in stock prices will further push management to make good investments. Meanwhile, other market forces, such as individual investors and the media, have also begun to pay more attention to interpreting accounting information, and thus finally constrain and supervise the managements' investment behavior. Hence, accounting information has become increasingly important in China to optimize corporate capital investments.

This paper examines whether and how accounting information quality has an effect on corporate investment choices, based on the governance function of accounting information. This issue is very important to government, market participants, current and latent investors, and listed firms. Addressing this issue will help them (such as market participants) better understand the governance function of accounting formations, so as to help them make good decisions.

2. Literature review

Many researchers, both Chinese and foreign, have explored the role played by accounting information quality and information transparency in market efficiency. For example, Zhou and Chen (2008) investigate the influence of the transparency of industry accounting information on industry-level capital allocation based on data from all A-share listed companies on the Shanghai and Shenzhen exchanges from 1999 to 2004. They measured capital allocation efficiency as the allotment of shares and amount of newly raised funds, focusing on whether external capital flows to the best industries. Zhou and Chen (2008) find industry accounting information transparency to exert a significant effect on resource allocation, such that the more transparent that information is, the higher the efficiency of resource allocation.

Based on 3600 firm-year observations of A-share listed companies on the Shanghai and Shenzhen exchanges from 2004 to 2006, Li (2009) examines the influence of accounting information quality on the under- and over-investment of listed companies. His results show that high-quality accounting information

reduces the risks of moral hazard and adverse selection and inhibits both under-investment and over-investment by ameliorating contracts and supervision, thereby improving capital allocation efficiency at the company level.

Bhattacharya et al. (2003) investigate the influence of accounting opacity on the cost of equity capital in 34 countries, finding that the lower a country's degree of accounting information transparency, the higher its overall cost of equity capital and the smaller the trading scale of stocks. Hence, it appears that accounting information transparency also has an influence on capital allocation efficiency at the country level. Using the same 34 countries, Biddle and Hilary (2006) survey the effects of accounting information quality on capital investment efficiency (measured by the sensitivity of the amount of capital investment to net cash flows in operating activities, with the greater the sensitivity, the lower the degree of investment efficiency) at both the country and company levels. Their results indicate that high-quality accounting information reduces information asymmetry between managers and external capital providers, and therefore increase capital investment efficiency at both levels. Drawing on these studies, Biddle et al. (2009) research company-level capital investment efficiency in depth from both the over- and under-investment perspectives, which focus on the relationship between such efficiency and high-quality accounting information.

Using a sample of listed companies that had been examined by the U.S. Securities and Exchange Commission (SEC) or sued by shareholders because of accounting information distortions or restated financial statements, McNichols and Stubben (2008) investigate the role of accounting information in internal decision-making efficiency. Their results suggest that companies engage in over-investment during the periods of illegal accounting activity, but exhibit higher investment efficiency after that activity has been investigated. Hence, it appears that accounting information quality affects companies' internal decisions.

Based on 37 countries and 37 manufacturing industries for each country, Francis et al. (2009) examine the effect of country-level information transparency, rather than just accounting information quality, on resource allocation efficiency. They use the growth rate correlations between manufacturing industries and countries to measure resource allocations. The results show that the higher a matched country's degree of information transparency, the stronger the correlation of growth rate between industries and countries. Therefore, in countries with better information transparency environments, resources flow more smoothly to better-developed industries, resulting in more efficient industry-level resource allocation.

Chen et al. (2011) investigate the association between accounting information quality and the investment efficiency of private enterprises in emerging markets. They find that even when accounting information is of poor quality, it still exerts a positive influence on investment efficiency. Because private enterprises are dependent primarily on bank financing, the association is more obvious than in other scenarios.

The prior literature above examines not only the effects of accounting information quality or transparency on capital allocation efficiency at the country and industry levels, but also on company-level decision-making and investment efficiency from the over- and under-investment perspectives. Based on the analysis of this paper, listed companies frequently change the direction of their capital flows on a large scale. Hence, whether firms invest capital in their main businesses is a major factor in evaluating capital allocation efficiency. However, few studies focus on this issue. This paper thus makes two important contributions to the prior literature. First, it explores the relationship between accounting information quality and a company's choice of capital investment in depth, with a focus on whether it invested capital in its core business. Second, it also examines that relationship from the perspective of the market forces from which the governance function and efficiency of accounting information arise.

3. Theoretical analysis and hypothesis development

Beaver (1989) argues that the major objective of accounting information was to help its users make informed decisions. The quality of accounting information can be assessed in two ways. The first is valuation usefulness, which means that the information is useful to investors looking to make valuation decisions. It reflects the pricing function of accounting information. The second is contract validity, which means that the accounting information benefits contracts, particularly those between investors and administrators. It reflects the governance function of such information. Accordingly, accounting information has two basic functions: pricing and governance. First, accounting information implements its pricing function by influencing

capital costs and stock prices. High-quality information can alleviate information asymmetry, thereby reducing the capital cost of external financing (Myers and Majluf, 1984; Easley and O'Hara, 2004; Zeng and Lu, 2006). The pricing function can also be realized by influencing stock prices. To some extent, a listed company's stock price reflects special information about it. Higher quality, more transparent accounting information allows growth opportunities to be incorporated into the stock price, thereby attracting new investors. Second, by alleviating the ex-post information asymmetry among the interested parties to a contract, accounting information can reduce the imperfections of the contract and restrain and monitor the opportunistic behavior of management. In this way, accounting information serves a governance function. In the case of obtaining external capital, that governance function of accounting information helps listed firms to make rational decisions to focus on their main business and allocate the capital more efficiently.

Bushman and Smith (2003) finds that high-quality information disclosures are beneficial to investors by monitoring management, encouraging them to make investment decisions efficiently and effectively, and finally improving capital allocation efficiency and gaining more returns to investors. Ball and Shivakumar (2005) believe that high-quality accounting information strengthens investors' supervision of management, by placing restrictions on managerial pay for their own or others' interests and by optimizing investment decision-making. In addition, high-quality accounting information can also inform investors in a timely manner about the orientation of the firm's capital investments and help them to supervise managerial activities. Similarly, Biddle et al. (2009) argue that high-quality accounting information inhibits management from building "an empire," discourages unwise investments and improves the ability of investors to monitor the efficiency of managers' investment decisions. Fig. 1 shows how the two major functions of accounting information affect a company's capital investment choice.

On the other hand, the aim of accounting disclosures was to provide external stakeholders with useful information. The quantity and quality of accounting information will affect an investor's judgment on the intrinsic value of the company. If the company's share price or earnings declines, investors will seek to avoid losses through such actions as "exercising their decision-making right to vote" and/or "voting with their feet." Hence, accounting data constitute an essential information resource in determining whether a company's stock price is over- or underestimated. Ohlson (2005) builds a model that reflects the relationship between accounting information and firm value. Many scholars have demonstrated the usefulness of such information by showing how investors use it to make decisions (Beaver, 1968; Ball and Brown, 1968). Investors are concerned with the quality of accounting information because it helps them to better understand the company's operating situation and other fundamentals. High-quality accounting information affords external stakeholders a comprehensive understanding of firm fundamentals and allows them to take action to supervise management behavior. Once managements' activities are not aimed at maximizing the interests of stockholders, major shareholders can seek to alter it by voting for changes on the board of directors and taking part in shareholder meetings. Although minority shareholders are unable to influence management directly, they can influence the stock price by voting with their feet. Institutional investors (and other strategic investors) can also effect managerial changes both through their right to vote for board directors and by voting with their feet. High-quality accounting information thus helps external stakeholders, who can interfere with management either directly or indirectly, to gain a better understanding of a company's capital use and business performance, thereby affecting its choice of capital investment. Hence, the first hypothesis of this paper is developed as following.
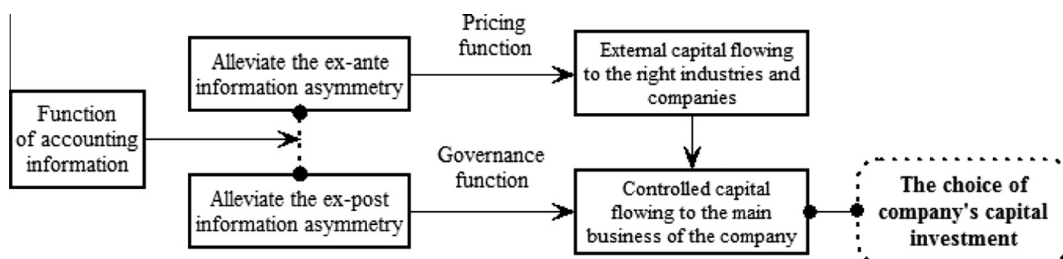

Figure 1. Theoretical analysis framework.

H₁. Companies with higher quality accounting information are more likely to invest more capital in their core business.

Most of the listed companies were established during the country's planned economy era. Hence, they have close relationships with the government that were complicated by the fiscal decentralization reforms that began at the end of the 1970s. Local governments' pursuit of economic and political objectives is heavily dependent on the listed companies under their control, state-owned enterprises (SOEs) in particular. Meanwhile, the legal environment governing Chinese listed companies is in urgent need of improvement. The incomplete nature of the regulatory system results in the companies not abiding by the law and the law not being strictly enforced. It also remains difficult for shareholders to file successful legal appeals, and thus effectively constrain or exert pressure on management.

Although listed firms in China have formally established boards of directors, in reality there are still a number of challenges to those boards' independence. First, the majority of board members are also managers, particularly in SOEs, which result in serious internal control problems. The State-owned Assets Management Department commonly appoints managers, which exacerbates these problems. Second, the role of independent directors is questionable in China because their appointment is intended to meet the requirements of regulators rather than to strengthen corporate governance. Finally, independent directors are normally nominated or appointed by the board chair, and thus constitute an extension of the chair's relationship with and control by the majority shareholders.

The scarcity of board independence and the complex external governance environment make it difficult for corporate governance mechanisms to exert any real effect. Investors, in contrast, can exercise real external supervision by voting with their feet in the case of unreasonable investments, thus placing management under the threat of potential stock price revaluations and promoting the efficient resource allocation. High-quality accounting information can help investors to identify inefficient investments, thereby leading to a potential share price revaluation and putting pressure on the board of directors, which in turn push management to focus on the company's core business and improve the efficiency of capital allocation. Therefore, when a company's internal and external governance environment is weak, the effect of high-quality accounting information on capital investment choice is more pronounced. Hence, we posit the second hypothesis.

H₂. The influence of high-quality accounting information on management capital investment choices is more pronounced when the external governance environment is poor.

4. Research design

4.1. Measurement of accounting information quality

The prior literature measures accounting information quality by two approaches. The first is measured as earnings characteristics, such as accruals quality and earnings persistence, predictability, smoothing, aggressiveness and loss avoidance, mainly based on the financial statements. The second method is to use a company's stock price to measure the quality of accounting information, such as earnings value relevance, earnings timeliness and earnings conservatism. This approach reflects investors' recognition of accounting information quality, which is affected by factors such as the degree of capital market development and the knowledge of individual professionals. Due to weak or not efficient capital market in China, this paper measures accounting information quality as earnings-related characteristics based on financial statement data. We develop four measures to proxy for accounting information quality, such as *Accruals Quality*, *Earnings Persistence*, *Earnings Predictability* and *Earnings Smoothing*. Meanwhile, for robustness, this paper also constructs a comprehensive measurement by ranking the four variables above.

4.1.1. Accruals quality
The Jones model and modified Jones model are frequently used to assess companies' earnings management. However, it is difficult to measure the normal and abnormal components of accruals objectively and precisely. Therefore, Dechow and Dichev (2002) devise another method to measure accruals quality that is based on

whether a company's accruals correspond to its cash holdings in the past, present or future. The more (less) closely the company's past, present and future cash correspond to its accruals, the higher (lower) its accruals quality is. This paper calculates accrual quality based on the DD model. It takes into account how well the company's accruals in the current period (year t) match its cash in the previous period (year $t-1$), current period (year t) and next period (year $t+1$):

$$\Delta TotalCurrentAccrual = b_0 + b_1 CFO_{t-1} + b_2 CFO_t + b_1 CFO_{t+1} + \varepsilon_t,$$

where $\Delta TotalCurrentAccrual$ stands for the company's accruals in year t, which equals the current assets change in year t minus current liability changes, minus the changes of cash and cash equivalent changes in year t, plus change of short-term liability with interests in year t. *CFO* refers to the operating cash flow.

The regression residual means unrealized cash flow, which is relative to the company's expected accruals. The standard deviation (σ(residuals)) of all observation residuals is used to measure a company's accrual quality. A greater standard deviation means both lower accrual and accounting information quality. We calculate accrual quality by using these variables during the past 10 years for each firm.

4.1.2. Earnings persistence

Using time-series data, the persistence of a company's earnings is measured by regressing its current ROA_t on its previous ROA_{t-1} (Lev, 1983; Ali and Zarowin, 1992). The model is as follows.

$$ROA_t = \alpha_0 + \alpha_1 ROA_{t-1} + \varepsilon,$$

where ROA_t represents the return on assets in period t. Regression coefficient α_1 indicates the level of earnings persistence, with a larger α_1 indicating a higher earnings persistence. For ease of explanation, we take negative value of earnings persistence, which implies a larger $-\alpha_1$ is poorer quality accounting information. We calculate this measure by using data during the past 10 years for each firm.

4.1.3. Earnings predictability

Earnings predictability describes the ability of a company's current earnings to predict its future earnings. It is measured by the same model as that for earnings persistence, i.e.,

$$ROA_t = \alpha_0 + \alpha_1 ROA_{t-1} + \varepsilon.$$

The standard deviation of the residuals (σ(residuals)) obtained from the regression can be used to measure the prediction error in company earnings, with larger σ(residuals) indicating poorer earnings predictability or accounting information quality. We calculate this measure by using data during the past 10 years for each firm.

4.1.4. Earnings smoothing

Our measure of earnings smoothing is based primarily on the shift between accruals and cash in net income, which can be measured by the ratio of the standard deviation of net income to operating cash flow or by the correlation between changed accruals and operating cash flow in the current period. As the principles of the two methods are both based on the shift between accruals and cash in net income, they should produce the same results.

Here, we use the ratio of the standard deviation of net income to operating cash flow, that is, σ(net income)/σ(operating cash flow), where a larger ratio suggests a greater degree of artificial earnings smoothing and lower degree of accounting information quality. We calculate this measure by using data during the past 10 years for each firm.

4.1.5. Comprehensive index of accounting information quality

As we are unable to ascertain which measurement of accounting information quality above is the most important, we construct a comprehensive variable of accounting information quality according to the approach used in the prior literature (Bhattacharya et al., 2003; Biddle and Hilary, 2006). We calculate each unique measurement of accounting information quality for all firm-year observations, and then sort them by

decile ranks by year (with each variable falling between 0 and 9). Finally, we sum up the rank values of every measurement to obtain the comprehensive index of accounting information quality. The smaller the rank value, the better the comprehensive quality of the accounting information.

4.2. Capital investment choice

A company's capital investment choice refers simply to whether the capital it controls flows to its core business. Properly describing and measuring capital investment choice, however, is very complicated. Francis et al. (2009) measure resource allocation efficiency as the correlation between the growth rate of the manufacturing industry to which a focal company belongs and that of a matched sample of companies in the same industry to determine whether capital flows to the most efficient industries at the national level. If a company's capital flows to its main business or main industry, there should be a high degree of correlation and consistency between the firms' operating profits growth and that of the industry as a whole. Therefore, referring to Francis et al. (2009), this paper measures capital investment choice as the correlation between the growth rate of its own operating income and that of the industry as a whole based on the data during the past 10 years. The higher this correlation, the more capital that flows into the company's core business. In calculations, we take the average of the operating income growth of all companies apart from the focal company as the industry-level value. The variable $growth\_corr_t$ represents the correlation between a company's operating income growth and that of the industry in year t. Industries are divided into 13 types in accordance with the industry classifications released by the China Securities Regulatory Commission (CSRC). In robustness tests, we also use both the correlation of the growth of a company's sales with that of the industry and synchronicity to measure capital investment choice.

Table 1
Variable definitions.

Variable	Variable definitions
Explained variable	
growth_corr	Correlation between operating profit growth at the company and industry levels, calculated over a 10-year cycle
Explanatory variables	
Accrual quality	Company accrual quality calculated on a 10-year cycle and analyzed by rank value
Smoothness	Company earnings smoothness calculated on a 10-year cycle and analyzed by rank value
Persistence	Company earnings persistence calculated on a 10-year cycle and analyzed by rank value
Predictability	Company earnings predictability calculated on a 10-year cycle and analyzed by rank value
TAQ	Company overall accounting information quality calculated by the sum of the four independent accounting information variables
Control variables	
Shr1	Ownership concentration measured by the mean of the largest shareholder's stake in a listed company during the 10-year period considered
Hfd_5	Degree of ownership restriction measured by the means of a listed company's second to fifth largest shareholders' Herfindahl index during the 10-year period
Mktscore	Degree of marketization in the region in which the listed company is located measured by the China marketization index compiled by Fan and Wang (2009)
Size	Company size measured by the logarithmic average assets of the listed company over 10 years
MTB	Corporate growth potential measured by the *MTB* mean of all listed companies in the 10-year period
ROA	Corporate profitability measured by the average *ROA* of the listed company in the 10-year period
σ(sales)	Volatility of sales measured by the company's standard deviation of revenues (standardized by assets at the previous year end) during the 10-year period
Leverage	Company debt level measured by the mean of the asset-liability ratio of all listed companies during the 10-year period
OperatingCycle	Company operating ability measured by the logarithmic average operating cycle of the listed company during the 10-year period
Industry	Dummy variable conforming to CSRC industry classification

Table 2
Descriptive statistics.

	Mean	Std.Dev.	Min.	Median	Max.	Obs.	Time horizon
Accrual quality	0.0404	0.0437	0.0017	0.0291	0.5258	711	2008
Persistence	−0.4411	0.8369	−2.9954	−0.4738	50.936	4503	2000–2009
Predictability	5.7386	43.6854	0.1018	3.0127	2036.1048	4503	2000–2009
Smoothness	0.9514	1.9316	0.0239	0.6101	51.0512	2519	2007–2009
TAQ	18.4505	8.9761	1.0000	18.0000	36.0000	711	2008
growth_corr	0.1881	0.3499	−0.9097	0.1987	0.9955	5407	2000–2009

Accrual quality, *persistence*, *predictability* and *smoothness* are calculated using the relevant model and a 10-year cycle and analyzed by their raw values. *TAQ* is calculated by summing up the four independent accounting information variables' decile rank values, and *growth_corr* is the correlation between operating income growth between the firm and its industry on the basis of the past 10-year cycle.

4.3. Control variables

The control variables in this paper are firm size, firm growth, profitability, operational volatility, debt ratio, operating cycle and industry fixed effects. The definitions of these control variables are listed in Table 1.

4.4. Model specification

Regression models (1) and (2) are used to test H_1 and H_2, respectively:

$$growth\_corr_{it} = a_0 + a_1 Rank\ of\ AQ_{it} + a_2 SHr1_{it} + a_3 Hfd\_5_{it} + a_4 Mktscore_{it} + a_5 Size_{it} + a_6 MTB_{it}$$
$$+ a_7 ROA_{it} + a_8 \sigma(Sales)_{it} + a_9 Leverage_{it} + a_{10} OperatingCycle_{it} + \varepsilon. \tag{1}$$

$$growth\_corr_{it} = a_0 + a_1 Rank\ of\ AQ_{it} + a_2 GOVER + a_3 Rank\ of\ AQ_{it} \times GOVER + a_4 Size_{it} + a_5 MTB_{it}$$
$$+ a_6 ROA_{it} + a_7 \sigma(Sales)_{it} + a_8 Leverage_{it} + a_9 OperatingCycle_{it} + \varepsilon. \tag{2}$$

In model (1), $growth\_corr_t$ represents the correlation between the company and industry operating income growth rates from years $t − 9$ to t. *Rank of AQ_{it}* (accounting quality) represents the accounting information quality, including accruals quality, earnings persistence, predictability and smoothness, and total accounting quality (TAQ_t). Due to big standard deviation of actual value of these variables, this paper takes the ranking value in decile level. The smaller the rank value of these measures, the higher is the accounting information quality. Total accounting quality (TAQ_t) is the sum of all four single variables' rank values in year t.

In model (2), $growth\_corr_t$ is the same as in model (1), but total accounting quality (TAQ_t) is used as a substitute for *Rank of AQ_{it}*.[1] *GOVOR* represents the corporate governance mechanism, such as *Shr1*, *Hfd_5* and *Mktscore*. Due to the highly correlations among the corporate governance variables, we test each variable separately to address potential multicollinearity in the model. The coefficient of $AQ_t \times GOVER$ allows us to infer whether the effects of accounting information quality on the capital investment choice are more pronounced with better corporate governance.

5. Data and empirical findings

5.1. Sample and data

All data and all variables come from the Wind Database. With 10 years adopted as the calculation cycle and data of operating cash flow disclosed from 1998 onward, this paper calculates the measurements of accounting information quality and capital investment choices based on different time horizons. The descrip-

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[1] This article also analyzes the rank values of the four single variables: accruals and earnings persistence, predictability and smoothness. The overall result is consistent with that based on total accounting quality (TAQ_t). Owing to space limitations, these results are omitted.

tive statistics for the key variables at the different time horizons based final samples with excluding missing values are listed in Table 2.

We know that the smaller the value of the five accounting information quality variables, the better the quality of the accounting information. In Table 2, earnings predictability has a mean value of 5.74 with a standard deviation of 43.69%, which indicates that it is easier to distinguish accounting information quality than the other four variables. Earnings persistence has a mean value of −0.44 and a standard deviation of 0.84. The comprehensive index of accounting quality, TAQ has a mean value of 18.45, and its minimum value and maximum values are 1 and 36, respectively. The maximum value of *growth_corr* is 1 and its minimum value is −0.91, which demonstrates that there are considerable inter-company differences in capital investment choice.

Table 3 reports the correlation matrix for the key variables.

Table 3 results (for both the Pearson and Spearman coefficients) show that the four independent measures of accounting information quality are strongly correlated with one another at the 1% significance level, which indicates that all four are important measures. At the same time, the comprehensive accounting information quality variable is significantly correlated with all of the independent variables (at the 1% significance level). More importantly, the results of both the Pearson and Spearman coefficients show that TAQ has a significantly negative correlation with *growth_corr* at the 1% significance level, which suggests that the higher the level of comprehensive accounting information quality, the higher the governance efficiency, and the higher likelihood the firms focus on its core business.

The measurements of accounting information quality, such as *accrual quality*, *persistence*, *predictability* and *smoothness* have a negative correlation with *growth_corr*, significantly in Spearman index (at the 1% significance level), but not in Pearson index. This univariate tests show that the higher the quality of the accounting information the higher likelihood the company will focus on its core business.

5.2. Univariate analysis

For each independent variable, all of the sample firms are sorted by decile ranks in ascending order, and divided into groups 1–10, with the smaller the group number, the higher the quality of accounting information. Then, taking the median and mean of *growth_corr* in each group, we map the relationship between accounting information quality and capital investment choice, as shown in Fig. 2.

The direction of the curves in Fig. 2 depends on whether the independent variables or comprehensive variable are used in the calculation. The lower the level of accounting information quality, the smaller the median

Table 3
Correlation matrix for key variables.

	Accrual quality	Persistence	Predictability	Smoothness	TAQ	growth_corr
Accrual quality	**1.00000**	0.18186	0.88455	0.57421	0.65123	−0.03226
		(<.0001)	(<.0001)	(<.0001)	(<.0001)	(0.3918)
Persistence	**0.20200**	**1.00000**	0.21560	0.10588	0.45280	−0.04553
	(<.0001)		(<.0001)	(<.0001)	(<.0001)	(0.2266)
Predictability	**0.86502**	**0.34943**	**1.00000**	0.75685	0.58587	−0.03297
	(<.0001)	**(<.0001)**		(<.0001)	(<.0001)	(0.3814)
Smoothness	**0.64843**	**0.09898**	**0.70526**	**1.00000**	0.40354	−0.07013
	(<.0001)	**(0.0085)**	**(<.0001)**		(<.0001)	(0.0624)
TAQ	**0.86905**	**0.51453**	**0.93651**	**0.77887**	**1.00000**	−0.16026
	(<.0001)	**(<.0001)**	**(<.0001)**	**(<.0001)**		(<.0001)
growth_corr	**−0.13373**	**−0.09704**	**−0.16568**	**−0.12250**	**−0.17040**	**1.00000**
	(0.0004)	**(0.0098)**	**(<.0001)**	**(<.0001)**	**(<.0001)**	

This table presents the Pearson and Spearman correlation matrices. The upper-right diagonal reports the Pearson correlation coefficients, and the lower-left diagonal the Spearman correlation coefficients in bold. The *accrual quality*, *persistence*, *predictability* and *smoothing* variables are calculated on the basis of the relevant model and a 10-year cycle, and are analyzed by their decile rank values, *TAQ* is calculated by summing up the four independent accounting information variables and *growth_corr* is the correlation of company- and industry-level operating income growth over the 10-year cycle. The numbers reported in parentheses are *p* values.
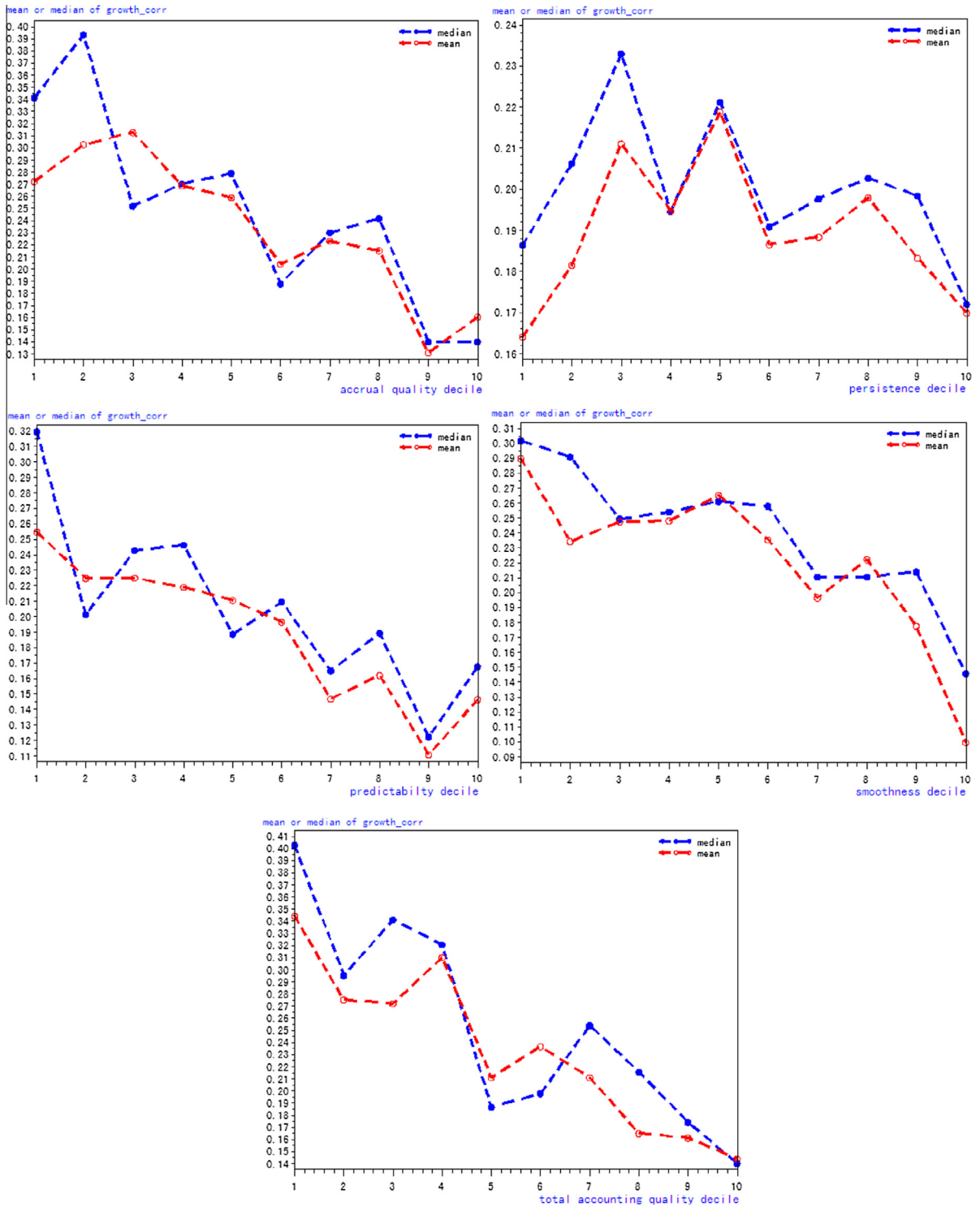
Figure 2. Relationship between *growth_corr* and accounting information quality.

or mean of *growth_corr*, which indicates that there is a significant relationship between whether a company invests its capital primarily in its main business and the quality of its accounting information, thus offering further evidence for this article's main assumption.

For examining the correlation between accounting information quality and capital investment choices, we classify the full sample into two groups based on two different methods. The first is to sort all sample firms by decile rank from smallest to largest into 10 groups, with the top and bottom 10% of firms constituting the high- and low-quality information groups, respectively. The second is to divide the sample into two groups by the median of accounting information quality, with the top 50% of the sample defined as the high-quality group, and the bottom 50% defined as the low-quality group. Table 4 reports the difference of investment choice between high and low quality of accounting information.

Table 4 shows that there are significant differences in the mean of *growth_corr* between the higher and lower quality groups based on two different classification methods, except for *persistence*. For example, the mean of *growth_corr* in the higher quality group is 0.1902, significantly higher (at the 1% significance level) than 0.0707 in the lower quality group for *smoothness*. These univariate results support our prediction, that is, accounting information quality has a significant influence on the choice of capital investment.

5.3. Multivariate analysis

Based on the regression model (1), Table 5 reports the multivariate results.

Table 5 shows all the results based on different measurements of accounting information quality. Except for persistence in model (2), all other measurements have a significant effect on capital investment choice, which support H$_1$. The results imply that higher quality accounting information makes a firm more inclined to invest its capital in its core business.

For testing H$_2$, Table 6 reports the results of the joint influence of corporate governance and accounting information quality on capital investment choice. Taking the comprehensive measure of accounting information quality (*Rank of AQ*) as main variable, columns (1)–(3) of Table 6 show different cross-sectional results based on the different measures of corporate governance, such as biggest shareholders ownership(*Shrl*), the Herfindahl index of second to fifth largest shareholders' ownership (*Hfd_5*) and market index (*Mktscore*) from Fan and Wang (2009). Column (4) shows the results when the three measures of corporate governance are included in one regression model. Table 6 shows that the coefficients on *Rank of AQ* are all significantly

Table 4
Differences in capital investment choices between the high- and low-quality accounting information groups.

	Bottom 10% versus top 10% groups		Bottom 50% versus top 50% groups	
	Mean difference of *growth_corr*	*t-value*	Mean difference of *growth_corr*	*t-value*
Independent accounting information quality				
Accrual quality	0.1118	1.91[*]	0.0963	3.66[***]
Persistence	−0.0058	−0.24	0.0088	0.85
Predictability	0.018	4.73[***]	0.0743	7.16[***]
Smoothness	0.1902	5.72[***]	0.0707	5.01[***]
Comprehensive accounting information quality				
TAQ	0.2005	3.62[***]	0.0987	3.75[***]

The results are reported for the two sample-division methods (i.e., bottom 10% *versus* top 10% and bottom 50% *versus* top 50%), and the variables are defined as follows. *Accrual quality*, *persistence*, *predictability* and *smoothness* are calculated on the basis of the relevant model and a 10-year cycle, and analyzed by decile rank value, *TAQ* is calculated by summing the four independent accounting information variables and *growth_corr* is the correlation of operating profit growth between the company and industry calculated based on the 10-year cycle. The mean difference in *growth_corr* is the difference in means between the two subsamples, and the *t*-value column reports the *t*-values of the tests for the equality of means.

[**] Significance at the 5% levels (two-tailed *t*-tests).
[***] Significance at the 1% levels (two-tailed *t*-tests).
[*] Significance at the 10% levels (two-tailed *t*-tests).

Table 5
Effect of accounting information quality on the choice of capital investment.

Variables	Column (1) Accruals quality	Column (2) Persistence	Column (3) Predictability	Column (4) Smoothness	Column (5) TAQ
Intercept	−0.8461**	−0.7955***	−0.6763***	−0.6615***	−0.7455*
	(−2.24)	(−5.24)	(−4.44)	(−3.26)	(−1.93)
Rank of AQ	−0.0113**	0.0019	−0.0059***	−0.0084***	−0.0035**
	(−2.27)	(0.96)	(−2.92)	(−3.26)	(−2.08)
Shr1	−0.0286**	−0.0213**	−0.0242**	−0.0279**	−0.0236**
	(−2.30)	(−2.02)	(−2.21)	(−2.26)	(−2.19)
Hfd_5	0.2767**	0.2575**	0.2114**	0.2073**	0.2174**
	(2.15)	(2.12)	(2.09)	(2.04)	(2.11)
Mktscore	0.0037**	0.0093***	0.0094***	0.0071***	0.0069***
	(2.19)	(3.21)	(3.26)	(2.89)	(2.66)
Size	0.0531***	0.0465***	0.0421***	0.0430***	0.0495***
	(3.08)	(6.56)	(5.91)	(4.60)	(2.83)
MTB	−0.0035	−0.0054***	−0.0044**	−0.0024	−0.0034
	(−0.86)	(−2.69)	(−2.16)	(−0.93)	(−0.83)
ROA	0.3464	0.7589***	0.6924***	0.4749	0.2569
	(0.62)	(3.44)	(3.16)	(1.60)	(0.46)
$\sigma(Sales)$	0.0032	−0.0002	−0.0002	0.0003	0.0021
	(0.16)	(−0.37)	(−0.24)	(0.39)	(0.11)
Leverage	0.0185	−0.0326	−0.0248	−0.0316	0.0171
	(0.21)	(−0.88)	(−0.67)	(−0.65)	(0.19)
OperatingCycle	−0.0080	−0.0110*	−0.0088	−0.0042	−0.0105
	(−0.53)	(−1.85)	(−1.47)	(−0.53)	(−0.70)
Industry/year	Control	Control	Control	Control	Control
Obs.	678	4195	4195	2416	678
Adj. R^2	8.89%	8.44%	8.85%	8.34%	8.87%

This table presents the regression results on the effect of each accounting information quality characteristic and TAQ on the choice of capital investment. The variables are defined as follows: *Rank of AQ is* calculated by the decile rank value based on the raw values of *accrual quality*, *persistence*, *predictability* and *smoothness*; *TAQ* is calculated by summing the four independent accounting information variables; *Shr1* is measured by the mean of the largest shareholder's stake in the focal listed company in the 10-year period under study; *Hfd_5* is measured by the mean of the company's second to fifth largest shareholders' Herfindahl index during the 10-year period; *Mktscore* is measured by the China marketization index compiled by Fan and Wang (2009); *Size* is measured by the logarithmic average assets of the listed company during the 10-year period; *MTB* is measured by the *MTB* mean of all listed companies during the 10-year period; ROA is measured by the company's average *ROA* during the 10-years period; $\sigma(sales)$ is measured by a company's standard deviation of revenues (standardized by assets at the previous year end) during the 10-year period; *Leverage* is measured by the mean of the asset-liability ratio of all listed companies during the 10-year period; *OperatingCycle* is measured by the company's logarithmic average operating cycle during the 10-year period; and *Industry* is a dummy variable that equals 1 if the firm is in an industry conforming to the CSRC industry classification standard, and 0 otherwise.
*** Significance at the 1% levels (two-tailed *t*-tests).
** Significance at the 5% levels (two-tailed *t*-tests).
* Significance at the 10% levels (two-tailed *t*-tests).

negative, inconsistent with Table 5. The interactive coefficients of corporate governance and accounting information quality in column (1)–(3) are positive for **Rank of AQ × Shrl**, negative for **Rank of AQ × Hfd_5** and negative for **Rank of AQ × Mktscore**, all significant at the 5% level, suggesting that accounting information quality plays a more important role in guiding a company to choose the right investment when the corporate governance environment is inefficient. In other words, the results imply that there is a complementary relationship between such quality and the corporate governance mechanisms.

6. Robustness tests

For robustness, we also perform the following tests.

Table 6

Cross-sectional analysis of the effect of accounting information quality on the choice of capital investment.

The model with different governance mechanism variables	Column (1)	Column (2)	Column (3)	Column (4)
Intercept	−.5964	−0.07082[*]	−0.9122[**]	−0.6631
	(−1.53)	(−1.83)	(−2.27)	(−1.62)
Rank of AQ	−0.0119[***]	−0.0047[**]	−0.0048[***]	−0.0079[**]
	(−2.83)	(−2.40)	(−2.79)	(−2.19)
Shr1	−0.4016[*]			−0.5293[**]
	(−1.82)			(−2.28)
Hfd_5		0.0745[***]		0.0715[***]
		(2.16)		(2.15)
Mktscore			0.0260[***]	0.0259[**]
			(2.58)	(2.50)
Rank of AQ × Shr1	0.0230[**]			0.0288[**]
	(2.16)			(2.60)
Rank of AQ × Hfd_5		−0.0058[**]		−0.0040[**]
		(−2.12)		(−2.11)
Rank of AQ × Mktscore			−0.0012[**]	−0.0011[**]
			(−2.43)	(−2.37)
Size	0.0520[***]	0.0512[***]	0.0510[***]	0.0509[***]
	(3.01)	(2.98)	(2.94)	(2.92)
MTB	−0.0025	−0.0035	−0.0035	−0.0029
	(−0.62)	(−0.84)	(−0.86)	(−0.70)
ROA	0.2019	0.2713	0.2047	0.1481
	(0.36)	(0.49)	(0.37)	(0.26)
σ(Sales)	0.0025	0.0022	0.0012	0.0015
	(0.13)	(0.11)	(0.06)	(0.08)
Leverage	0.0057	0.0159	0.0109	−0.0017
	(0.06)	(0.18)	(0.12)	(−0.02)
Operating Cycle	−0.0110	−0.00112	−0.0128	−0.0127
	(−0.75)	(−0.75)	(−0.86)	(−0.85)
Industry/year	Control	Control	Control	Control
Obs.	675	675	675	675
Adj. R[2]	5.46%	4.98%	5.14%	6.26%

This table presents the regression results of the interactive effect of corporate governance and accounting information quality on the choice of capital investment. The variables are defined as follows: *Rank of AQ is* calculated by the decile rank value based on the raw values of *accrual quality*, *persistence*, *predictability* and *smoothness*; *TAQ* is calculated by summing the four independent accounting information variables; *Shr1* is measured by the mean of the largest shareholder's stake in the focal listed company in the 10-year period under study; *Hfd_5* is measured by the mean of the company's second to fifth largest shareholders' Herfindahl index during the 10-year period; *Mktscore* is measured by the China marketization index compiled by Fan and Wang (2009); *Size* is measured by the logarithmic average assets of the listed company during the 10-year period; *MTB* is measured by the *MTB* mean of all listed companies during the 10-year period; ROA is measured by the company's average *ROA* during the 10-year period; *σ(sales)* is measured by a company's standard deviation of revenues (standardized by assets at the previous year end) during the 10-year period; *Leverage* is measured by the mean of the asset-liability ratio of all listed companies during the 10-year period; *OperatingCycle* is measured by the company's logarithmic average operating cycle during the 10-year period; and *Industry* is a dummy variable that equals 1 if the firm is in an industry conforming to the CSRC industry classification standard, and 0 otherwise.

[***] Significance at the 1% levels (two-tailed *t*-tests).
[**] Significance at the 5% levels (two-tailed *t*-tests).
[*] Significance at the 10% levels (two-tailed *t*-tests).

6.1. The effect of other unobservable information and endogeneity

The main analysis and variables above in this paper are based on a relatively long time period (i.e., 10 years), which unavoidably result in the problem: are the results above driven by other unobservable information? Meanwhile, the endogeneity problem also arises, as a company's choice of capital investment is likely to affect accounting information quality. To address these issues and problems, we control for **growth_corr in** $t − 1$ *period* (**growth_corr$_{t−1}$**) in regression model (1), and the results are presented in Table 7.

Table 7
Endogeneity analysis of the effect of accounting information quality on the choice of capital investment.

Variables	Column (1) Accruals quality	Column (2) Persistence	Column (3) Predictability	Column (4) Smoothness	Column (5) TAQ
Intercept	−0.6249[***]	−0.3661[***]	−0.2877[***]	−0.2519[***]	−0.6055[***]
	(−2.83)	(−3.79)	(−2.97)	(−2.09)	(−2.71)
Rank of AQ	−0.0054[*]	0.0031	−0.0021[*]	−0.0030[**]	−0.0018[*]
	(−1.80)	(1.55)	(−1.66)	(−1.99)	(−1.85)
$growth\_corr_{t-1}$	0.8168[**]	0.7887[**]	0.7878[**]	0.7963[**]	0.8162[***]
	(38.46)	(81.43)	(81.25)	(68.32)	(36.42)
Shr1	−0.0213[**]	−0.0168[**]	−0.0152[**]	−0.0224[**]	−0.0204[**]
	(−2.17)	(−2.11)	(−2.03)	(−2.43)	(−2.02)
Hfd_5	0.2850[**]	0.2138[**]	0.2153[**]	0.2147[**]	0.2605[**]
	(2.23)	(2.13)	(2.18)	(2.11)	(2.17)
Mktscore	0.0023[**]	0.0051[***]	0.0054[***]	0.0032[**]	0.0027[**]
	(2.56)	(2.81)	(3.03)	(2.54)	(2.26)
Size	0.0315[***]	0.0163[***]	0.0236[***]	0.0150[***]	0.0310[***]
	(3.12)	(3.62)	(3.00)	(2.69)	(3.06)
MTB	0.0027	−0.0001	0.0004	0.0017	0.0028
	(1.14)	(−0.04)	(0.33)	(1.14)	(1.18)
ROA	0.5591[*]	0.3154[**]	0.2543[*]	0.2891[*]	0.5171
	(1.73)	(2.26)	(1.84)	(1.66)	(1.59)
$\sigma(Sales)$	0.0143	0.0000	0.0001	0.0003	0.0137
	(1.27)	(0.01)	(0.14)	(0.75)	(1.22)
Leverage	0.0120	−0.0214	−0.0146	−0.0183	0.0112
	(0.23)	(−0.89)	(−0.61)	(−0.64)	(0.22)
OperatingCycle	−0.0004	0.0019	0.0026	0.0001	−0.0015
	(−0.05)	(0.50)	(0.69)	(0.10)	(−0.17)
Industry/year	Control	Control	Control	Control	Control
Obs.	675	3972	3972	2380	675
Adj. R^2	68.28%	64.05%	64.01%	67.60%	68.29%

This table reports regression results on the effect of each accounting information quality characteristic and *TAQ* on the choice of capital investment when the endogeneity problem is considered. The variables are defined as follows: *Rank of AQ is* calculated by the decile rank value based on the raw values of *accrual quality*, *persistence*, *predictability* and *smoothness*; *TAQ* is calculated by summing the four independent accounting information variables; *Shr1* is measured by the mean of the largest shareholder's stake in the focal listed company in the 10-year period under study; *Hfd_5* is measured by the mean of the company's second to fifth largest shareholders' Herfindahl index during the 10-year period; *Mktscore* is measured by the China marketization index compiled by Fan and Wang (2009); *Size* is measured by the logarithmic average assets of the listed company during the 10-year period; *MTB* is measured by the *MTB* mean of all listed companies during the 10-year period; ROA is measured by the company's average *ROA* during the 10-years period; *σ(sales)* is measured by a company's standard deviation of revenues (standardized by assets at the previous year end) during the 10-year period; *Leverage* is measured by the mean of the asset-liability ratio of all listed companies during the 10-year period; *OperatingCycle* is measured by the company's logarithmic average operating cycle during the 10-year period; and *Industry* is a dummy variable that equals 1 if the firm is in an industry conforming to the CSRC industry classification standard, and 0 otherwise.
[***] Significance at the 1% levels (two-tailed *t*-tests).
[**] Significance at the 5% levels (two-tailed *t*-tests).
[*] Significance at the 10% levels (two-tailed *t*-tests).

Table 7 shows that after controlling for ***growth_corr_{t-1}***, the coefficients of accounting information quality are still significantly negative at least the 10% level (except for *persistence*). Thus, the results are consistent with Table 5.

6.2. Measurement of the capital investment choice

For robustness, this paper finally refers to the ideas of Morck et al. (2000) about stock price synchronicity, and uses the synchronicity of operating income growth between industry and firm level as an alternative measurement of capital investment choice. This new measurement is based on the following model.

$$\text{Growth\_Firm}_t = \alpha_0 + \alpha_1 \text{Growth\_Indus}_t + \varepsilon,$$

where Growth_Firm$_t$ is the operating income growth of a given company in year t, and Growth_Indus$_t$ is that of the industry to which the company belongs (using the median of other companies' operating income growth in the same industry). We obtain the **R-square** (R^2) from the regression model above, which reflects the degree to which the industry's growth rate explains that of the company. A higher R^2 indicates greater synchronicity between the operating income growth rates of the company and industry. Based on this new measurement, the new results are consistent with those reported (untabulated due to space limitations).

7. Conclusion

This paper examines whether and how high-quality accounting information can push management to optimize the capital investment choice of listed firms. This is a very important issue. Addressing this issue can help researchers to realize the governance functions of accounting information. The empirical results show that the higher the accounting information quality is, the higher the correlation and synchronicity of operating income growth between the listed firm and its industry. Moreover, the relationship between accounting information quality and capital investment choice is more pronounced when the corporate governance environment is poor. These results imply that high-quality accounting information serves an important governance role, which can supervise and push management to optimize capital investment choices, and finally maximize stockholders' interests.

This paper has several important contributions. First, this paper provides new empirical evidence in a developing capital market. Second, this conclusion implies that regulators need to build a transparent and reliable information environment to allow accounting information to play an effective role to push listed firms to focus on their core business, optimize firms' capital investment choices, and finally increase resource allocation efficiency. Finally, this paper can also help researchers to better understand and realize the governance role of accounting information, and push them to investigate the other role of accounting information deeply and broadly.

One limitation of this paper is that we assume that a company's investment choice is effective only when it invests capital in its core business. It is of course possible that a better choice for some companies would be to change their current business (rather than increasing the level of investment in their core business), particularly in the case of an industry recession or excess capacity. Therefore, the relationship between accounting information quality and capital investment choice may differ with the different development stage of the industry. Maybe this issue is an important topic for future research.

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