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Risk Disclosure in Annual Reports and Corporate Investment

Efficiency

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Risk Disclosure in Annual Reports and Corporate Investment Efficiency

Abstract: We calculate a risk disclosure index (RDI) from annual reports by applying textual analysis and study how it affects investment efficiency in firms. The results show that the higher the frequency of risk disclosure in sections of "Significant Risk Factors and MD&A" is, the higher the corporate investment efficiency will be. In further analysis, we find that the effect of risk disclosure on corporate investment efficiency is more prominent in the more positive disclosure tone or more keywords about investment category as well as more demands of information and better ability of information processing from investors. Our results support the convergence argument on risk disclosure, and our findings advance the literature of both risk disclosure and investment efficiency.

Keywords: Information disclosure; Risk disclosure; Investment efficiency.

Risk Disclosure in Annual Reports and Corporate Investment Efficiency

1. Introduction

Risk expectation influences investing managers' behavior (Slovic, 1981). Therefore, any information regarding the risk of a firm is useful for investors. We contend that while information disclosure improves corporate investment efficiency by reducing information asymmetry and agency problems between investors and firms, the specificity of risk disclosure matters. This is because the specific risk disclosure affects corporate investment efficiency of a firm through two channels: providing overall risk information and revealing previous unknown specific risk factors.

The convergence hypothesis considers the homogeneity of risk information compared to other information in annual reports, which improves corporate investment efficiency by increasing public information available to investors, interpreting known risk factors and unexpected events, and reducing investors' risk perception (Hope et al., 2014). In contrast, the divergence hypothesis supports the heterogeneity of risk information, which reduces corporate investment efficiency by revealing previous unknown risk factors and unexpected events and raises investors' risk perception (Li, 2006; Kravet and Muslu, 2013; Campbell et al., 2014). However, it is not clear if the convergence or divergence hypothesis is more consistent in describing the impact of the risk disclosure on corporate investment behavior.

We study how risk disclosure influences investment efficiency using risk disclosure data derived from annual reports of the Chinese A-share market from 2007-2014. We use the sample of Chinese firms to conduct this research for two reasons. First, the US capital market is mature and has an effective regulatory mechanism. When the listed firms violate regulations in the disclosure, they will be severely

punished. While the risk disclosure is mandated in China, the content and quality of disclosure is often questionable. Therefore, whether China's annual report risk information disclosure has the same economic consequences as the US capital market must be further examined. Second, China's corporate investment efficiency is generally low. One of the main reasons for low investment efficiency is the low quality of information disclosure. Therefore, it is more meaningful to test the impact of risk information on investment efficiency in China.

Our findings suggest that the higher the frequency of risk disclosure in the "Significant Risk Factors and MD&A" Section from annual reports, the higher the investment efficiency of the firm will be. The findings are robust to a battery of robustness checks. The results are consistent with the convergence hypothesis. The risk disclosure derived from annual reports is sufficient to account for known risk factors, which increases the information transparency of the firm. In further analysis, we find that if the disclosure tone is more positive and more related to corporate investment or investors expect more information or an improved ability to process information, the impact of risk disclosure on corporate investment efficiency magnifies. Hence, the findings suggest that the specific information of the risk disclosure and investor characteristics contribute to the impact of risk disclosure on corporate investment efficiency.

We make four contributions:(1)The literature about risk disclosure focuses on the context of annual reports, and the effects on stock markets as well as analysts (Li, 2006; Kravet and Muslu, 2013; Campbell et al., 2014). These studies mainly are in the lens of external stakeholders. Our paper examine how risk disclosure influences corporate behavior which is in the lens of internal stakeholders. (2) The literature concludes that risk disclosure results in negative market reaction(Campbell et al.,

2014), and forecasts lower earnings (Li, 2006) as well as higher return volatility (or analysts' forecast dispersion) (Kravet and Muslu, 2013), which reflect negative effects from risk disclosure. We find that risk disclosure can increase investment efficiency, reflecting positive effects on firms and investors. (3)This paper extends the literature on information disclosure and investment efficiency. The literature seldom distinguishes different types of information. We consider such differences. Specifically, we consider the impact of different risk information on investment behaviors. (4) Our findings offer information to regulatory authorities to consider risk disclosure information, to managers in choosing disclosure options and to investors in making investment decisions.

2. Literature Review

2.1 Literature on information, risks and corporate investment

Information is the primary determinant of investment efficiency. Generally, corporate inefficient investment increases with the degree of information asymmetry (Bushman and Smith, 2001), while high quality accounting information can increase investment efficiency by improving contracts and supervision as well as reducing moral hazard and adverse selection (Healy and Palepu, 2001).

Jaideep et al. (2016) find that information asymmetry decreases following SOX and that there is a corresponding decrease in the investment–cash flow sensitivity. Dutta and Nezlobin(2016) find a dynamic effect between information disclosure and investment efficiency. They find that investment efficiency unambiguously improves in the precision of disclosure when such disclosure conveys information about future capital stock (i.e., balance sheet). In contrast, investment efficiency is maximized at an intermediate level of precision for disclosure about future cash flows (i.e.,

earnings).When dividing information into different categories, researchers find that idiosyncratic information disclosure increases investment efficiency by reducing stock price synchronicity (Durnev et al., 2004), corporate social responsibility disclosure restrains over-investment and raises investment efficiency (Cao et al., 2012), and non-financial information disclosure reduces financial constraints and then mitigates under-investment (Cheng et al., 2012).

Risk is another crucial determinant of investment efficiency. Panousi and Papanikolaou (2012) demonstrate the mechanism of corporate idiosyncratic risk having a negative relationship to corporate investment from the sight of the marginal costs of external finance. They find that it is difficult for a firm to obtain external financing when corporate idiosyncratic risk increases; it then affects the firm to obtain additional cash flow and restricts corporate investment. Gulen and Ion (2016) document a strong negative relationship between firm-level capital investment and the aggregate level of uncertainty associated with future policy and regulatory outcomes. Kim and Kung (2017) suggest that friction in redeploying assets affects liquidation values and therefore makes firms more cautious about making corporate investment decisions under uncertainty. However, Baum et al. (2010) find that uncertainty likely promotes corporate investment, while Leahy and Whited (1995) find no significant relationship between uncertainty and investment decision. Therefore, the effect of risk on investment efficiency is determined by risk heterogeneity. Wong (2017) found an asymmetric environment implies that the amount of risk sharing depends on the risk-free rates and the expected return of the risky project.

There is a lack of literature researching the effect of risk disclosure on investment efficiency. We argue that risk information can influence investment efficiency by affecting information transparency. In addition, risk information reveals

risk factors, which are important variables in investment function. For example, Dow et al. (2005) find that cash flow volatility influences corporate investment. The peculiarity of risk information affects the uncertainty of investment efficiency, leading to their relationship warranting further exploration.

2.2 Literature on risk information disclosure

Risk information has dual attributes, i.e., general and specific risk attributes. Risk disclosure can be more convergent to general public information. As the risk report quality increases, firms improve detailed risk information disclosure, which thereby enhances information transparency (Roulstone, 1999). In addition, if risk information quality deteriorates, then its disclosure decreases the readability and increases the difficulty of understanding annual reports. The coexistence of public disclosure and heterogeneous prior beliefs leads to large and fluctuant trading volumes, and the more underconfident the insider is, the greater is the degree of fluctuation (Gong and Liu, 2016). Thus, the effect of risk information disclosure on information transparency is ambiguous.

The research on the determinants of risk disclosure shows that firms may be reluctant to disclose risk information because competitors can obtain such confidential information from the disclosure, because risk information may be an adverse signal to the market, or because of proprietary costs (Verrecchia, 1983). However, firms may voluntarily disclose risks when litigation costs are high (Baginskiet al., 2002). Additionally, risk disclosure is positively correlated to corporate inherent risk (Campbell et al., 2014). Therefore, proprietary costs and inherent risk are the primary determinants of corporate risk disclosure.

There are different views among studies on the economic consequences of risk

disclosure. The divergence argument considers that risk disclosure improves investors' risk perception. Li (2006) finds that risk disclosure reveals the downward risk of operation, and the increasing risk disclosure leads to higher cost of capital due to the higher rate of return required by investors. Kravet and Muslu (2013) find that incremental disclosure of risks in annual reports increases the stock return volatility, trade volume, and lead to analysts forecast divergence and their modifications. Campellet al. (2014) find that risk disclosure in annual reports decreases information asymmetry and increases investors' risk perception. Yao and Zhao (2016) find that the more general, financial and operational risks that are disclosed within the prospectus, the lower the IPO underpricing and the higher the liquidity. Thus, the economic consequences of risk disclosure are in both informational and risk aspects. Although Yao and Zhao (2016) support the convergence argument in the examination of risk disclosure from prospectus, it is not clear if risk disclosure from annual reports is consistent with the convergence argument or whether its effect on investment efficiency remains under-explored.

3. Hypothesis Development

3.1 Convergence Hypothesis

The convergence hypothesis assumes that there is little heterogeneity of risk information. Firms have high information transparency and investors have low risk perception. After risk reporting quality is improved, information transparency rises (Elmy et al., 1998; Roulstone, 1999) and investment efficiency increases by lowering information asymmetry and agency problem.

There are several aspects of the hypothesis. First, management announcement on corporate risks indicates that the firm invests within a reasonable range (Campbell et al., 2014). Those disclosed risks update corporate risk condition while revealing

unknown risk factors, which increases the public information supply. It also indicates managers' confidence of managing the risks, which enhances investors' understanding of the company and reducing management opportunism in investment by promoting supervision on investing behavior. Second, more risk disclosure reflect the prudence attitude by management. When considering the environment of high risks and uncertainty, managers will prefer superior project over inferior and be encouraged to make optimal investment decision, which effectively moderate the agency problem between controlling shareholders and minority shareholders. Third, risk disclosure is helpful for investors to realize future volatility of earnings; therefore, it could reduce their required compensation for risks and result in more precise pricing (Klein and Bawa, 1976; Clarkson et al., 1996). Moreover, high quality information disclosure can reduce the external cost of capital and demand for excess capital resulting from temporary mispricing, assisting superior firms in obtaining optimal amount of capital, depressing overinvestment, and mitigating underinvestment, which increase investment efficiency(Healy and Palepu, 2001; Wang, 2003; Biddle and Hilary, 2006; Biddle et al.，2008).Accordingly, we put forth the convergence hypothesis:

H1: The corporate investment efficiency is improved by disclosing more risk information in annual reports.

3.2 Divergence Hypothesis

In this hypothesis, we consider that there is strong heterogeneity of risk information. Firms have low information transparency and investors have high-risk perception. The difficulty of quantifying risk information triggers market participants' fear of unknown risks in that it increases their risk perception (Kravet and Mulsu, 2013). Information asymmetry between investors and firms is intensified resulting

from an uncertainty of the information environment and increasing difficulty of understanding of risk disclosure (Campbell et al., 2014), because investors cannot judge genuine situations of a firm. When a firm discloses significant risk information, investors may perceive that the firm is facing huge risks and require compensation to avoid unknown risks, or even withdraw their ownership of the shares. The high cost of capital or insufficient capital will cause underinvestment. Risk disclosure may intensify agency problems. An insider with a more informative signal regarding the prospects of a project may be expected to involve himself in larger information-motivated transactions and enjoy greater profits (Liang et al., 2010). Corporate manager, who is clearer about the actual operating situation than others, may conceal or reveal risk information to influence investors' decisions for his/her personal benefit. which could be unfavorable to investment efficiency. Accordingly, we put forth the divergence hypothesis:

H2: The corporate investment efficiency decreases with more disclosure of risk information in annual reports.

4. Sample Selection and Descriptive Statistics

4.1 Sample Selection

Our sample period for risk disclosure is from 2007 to 2014, because the SEC in China did not mandate risk disclosure in annual reports until 2007. The initial sample consists of 18,651 firm-year observations. We delete: (1)318 observations from the financial industry;(2)3,300observations without investment efficiency data;(3)3,603 observations without risk text data due to formatting of annual reports; and (4)117 observations missing other financial data. The final sample comprises 11,313 firm-year observations. All continuous variables are winsorized at the 1st and 99th percentiles to mitigate the effects of outliers. The firm-level regressions are adjusted

for clustering to eliminate probable impact from heteroscedasticity and serial correlation.

4.2 Model and Variable Definition

Following Cao (2012), we estimate Eq. (1) as follows:

$Absinvest(Overinvest\ or\ Underinvest) = \beta_0 + \beta_1 Riskdisc_{t-1} + \beta_2 Control + \sum \beta_k Year + \sum \beta_j Industry + \varepsilon$ (1)

The dependent variable is *Absinvest*(overinvest/underinvest), indicating investment efficiency. We estimate investment efficiency by following Richardson(2006)and divide the investment spending into two parts: one is the spending for maintaining the daily assets operation and expected investment spending, which is related to growing opportunity, finance opportunity and industrial factors; the other is unexpected spending, which represents overinvestment when the sign is positive or underinvestment otherwise. The model is as follows:

$Invest_{i,t} = \beta_0 + \beta_1 Growth_{i,t-1} + \beta_2 Lev_{i,t-1} + \beta_3 Cash_{i,t-1} + \beta_4 Size_{i,t-1} + \beta_5 Return_{i,t-1} + \beta_6 Invest_{i,t-1} + \sum \beta_k Year + \sum \beta_j Industry + \varepsilon$(2)

Where *Invest*, measuring new investment, is the amount of spending for fixed assets construction, intangible assets and other non-current assets in the direct method statement of cash flow; *Growth* measures growth opportunity; *Lev* measures leverage; *Cash* is the amount of cash and cash equivalents; *Age* is the natural logarithm of firm's listed years; *Size* is the natural logarithm of total assets; and *Return* is annual stock return.

The positive residual of regression using model (2) indicates overinvestment, while the negative residual indicates underinvestment. We measure investment efficiency using the absolute value of residual, where a large value represents low investment efficiency and small value represents high investment efficiency.

The independent variable, *Riskdisc*, is risk disclosure in annual reports. We

construct the risk disclosure index by textual analysis following Hope et al. (2014), Campbell et al. (2014) and Kravet and Mulsu (2013). First, we download annual reports from 2007 to 2014 of A-sharelisted firms and transform the PDF files into TXT files. Second, we extract textual risk keywords using a Python program. Following Kravet and Muslu (2013), we use "risk" and "uncertainty" as the keywords for risk. We collect some words to establish a dictionary for risk keywords in Chinese from 100 annual reports, including risk, uncertainty, trial, ambiguous, unstable, challenge, onerous, pressure, unfavorable, contradictive, complicated, varied, against, probable, influence, intensive, fluctuant, change, whether, and potential. We extract these keywords and count the frequency. Lastly, the annual reports contain two parts regarding risk disclosure (Significant Risk Factors and MD&A Section); therefore, we count the frequency of keywords in the Significant Risk Factors section to generate *Riskdisc_risk*, and the frequency of keywords in MD&Ato generate *Riskdisc*. Following Hope et al. (2014), we count the number of keywords in the MD&A section to generate *Direct* and count the total number of key words in the full annual report to generate *Ttrisk_num* following Campbell et al.(2014).

Firms have their own disclosure habits to disclose information in annual reports, thus the frequency of keywords is more comparable than the repeated times. Additionally, the SEC has mandated that firms disclose risks to investors in the first section that contains Important Notice, Content and Paraphrase and state significant risk warning separately, which includes the material risks unfavorable to the firm as well as the measures that have been or will be adopted. However, due to data availability, we primarily conduct the analyses using *Riskdisc* and the other risk disclosure variables are used in robustness tests.

The control variables in Eq. (1) include free cash flow (*Fcf*), share proportion of

the largest shareholder (*First*), corporate growth opportunity (*Growth*), share proportion of institutional investors (*Inshold*), size of firm (*Size*), leverage (*Lev*), listed years (*List*), discretionary accruals (*DA*), return on equity (*ROE*), size of board of directors (*Board*), state-owned enterprise (*SOE*), and auditor from Big 10 (*Big10*). We presents the definitions of all the variables in Table 1.

4.3 Descriptive Statistics

In Figure 1, the frequency count of risk keywords in the MD&A (*Direct*) section from 2007 to 2015 is drawn in blue, the frequency of those keywords (*Riskdisc*) is drawn in red, and the total number of words in the section (*Direct_num*) is drawn in green. We can see that the count and frequency of risk keywords boost from 2007 to 2008 for the probable reason that firms faced many complex risk factors from the financial crisis. Risks are increasingly disclosed from 2007 to 2015, especially from 2009 to 2015 when interest rates were high for each year. The tendency of risk disclosure and the related regulation are both growing and firms pay more attention to disclosing risk information, which is in line with the supervision institution.

Table 1 presents descriptive statistics for the main variables. The results show that: (1) the mean and median of the absolute value of new investment (*Absinvest*) are 0.026 and 0.018;(2) there are 7,121 observations of underinvestment and 4,192 of overinvestment; the mean of overinvestment (underinvestment) is 0.035 (-0.02), which indicates that the degree of overinvestment is more serious than underinvestment;(3) the mean of the frequency of risk keywords in the section of Future Development & Outlook is 0.008, with a maximum of 0.022 and a minimum of 0.000, indicating the diversity in risk disclosure among different firms;(4) the mean of the frequency of risk keywords in the section of Significant Risk Factors is 0.051, with a maximum of 0.109 and a minimum of 0.007;(5) 53.5% of the observations are

SOEs, 41.5% are audited by Big 10, and independent directors account for 36.9%.

Table 2 presents univariate tests on difference of investment efficiency (*Absinvest*) by more vs. less risk disclosure using the medians of various risk disclosure measures. The results show that the means and medians of investment efficiency in the more disclosure group is higher than that of the less disclosure group ata 1%significance level. The findings are robust to all three disk disclosure measure and using both means and medians.

5. Empirical Results

5.1 Risk disclosure in annual reports and corporate investment efficiency

Table 3 presents the results of the effect of Eq. (1) testing the effect of risk disclosure in MD&A (*Riskdisc*) on corporate investment efficiency (*Absinvest*). In Column (1), where we examine by OLS regression, and use the fixed effect in Column (2), we find that the coefficients of *Riskdisc* are negative and significant, which suggests that risk disclosure increases corporate investment efficiency and provides strong evidence supporting H1. Considering that there may be some missing variables as well as the influence of individual characteristics of the firm, the investment efficiency is tested after controlling the firm's individual fixed effect. The coefficient of *Riskdisc* continues to be significant and negative at the 10% level.

Furthermore, we divided the sample into two groups: overinvestment and underinvestment, testing the effects of annual risk information disclosure on investment behavior, respectively. Column (2) and Column (3) in Table3 show that the coefficient on *Riskdisc* is significantly negative in the overinvestment group, while it is insignificant in the underinvestment group. It shows that risk information disclosure can improve investment efficiency mainly by restraining excessive

investment behavior. This may be because when a firm has more risk disclosure, it also has a good awareness of risk and therefore is cautious in conducting its business. Consequently, its corporate investment efficiency improves.

5.2 Robustness tests

We perform several robustness tests in this paper. First, we change the way of measuring risk information disclosure. Referring to Campbell (2014), we use two other variables: a)*Riskdisc_risk*, which is the frequency of the risk keywords presented in the risk factor part; and b)*LN (Riskdisc)*, which is the logarithm of the frequency of keywords presented in the full text of annual reports. The results of Column (1) and Column (2) in Table4show that the coefficients continue to be negative and significant, further supporting H1.

Second, we change the way of measuring investment efficiency. In addition to the model of Richardson (2006), there are other ways to measure investment efficiency. To enhance the reliability of the results, we use the model of Biddle (2006), which directly considers the growth of the firm in calculating the investment efficiency;the model is as follows:

$$\text{Invest}_{i,t} = \gamma_0 + \gamma_1 \text{Growth}_{i,t-1} + \delta$$

The model is regressed by industry and year, and the absolute of residual valueis used to measure the investment efficiency. If the residual error above 0 represents overinvestment, then the residual error less than 0 represents underinvestment. The result of Column (3) in Table 4 shows that the more risk information is disclosed, the more efficient theinvestments.

Third, considerthe situation of moderate level of corporate investment. The model of Richardson (2006) ignores moderate level of investment; when the residual error in the model is close to zero, it is generally considered that the investment level

of the firm is appropriate. Therefore, we divide the overinvestment group and the underinvestment group into 10 groups, removing the two groupswith the residual error closest to 0to eliminate the result caused by the bias of the model. Then, the sample reduces9,049 firm-year observations. Table 4(Column4) shows a significantly negative correlation between *Riskdisc* and *Absinvest*, which indicates that taking out the moderate level of corporate investment does not change our base findings. Fourth, we mitigate the endogeneity problem. It is likely that there is boilerplate disclosure (Lehavy et al. 2011).We test how changes in risk disclosure relate to changes in activities of corporate investment before and after the filings. We use a changes model in order to examine the effect of new risk disclosure and address potential correlation with omitted variables (Kravet and Muslu, 2013). The results of Column (1) in Table5present show that the change in investment efficiency is negatively related with the changes in risk disclosure in the annual reports.

In addition, we use the Heckman two-stage regression to control the endogeneity of the sample selection. The first stage establishes the probit regression model of the determinants of risk information disclosure. The dependent variable is a dummy variable; if the disclosure of more risk information is equal to 1, the independent variables include Beta, Return, Lev, DA, Growth, and Size. Then, the inverse Mills coefficient is calculated and Column (2) in Table5 shows that the reverse Mills coefficient is insignificantly, indicating that the sample self-selection problem in this paper is not serious.After controlling the inverse Mills coefficient, the risk information disclosure (Riskdisc) is still negatively correlated with investment efficiency at the 5% level.

Fifth, the measure of risk disclosure has some drawbacks, such as difficulties distinguishing informational risks from fundamental risks. Furthermore, the inherent

risks impact corporate investment behaviors. An ideal test scenario of this paper is under the condition of the same inherent risk level and similar characteristic of other corporations, the corporations with greater risk information disclosure are more efficient than those with less risk disclosure. To eliminate the influence of inherent risk, we use a propensity score matching(PSM) method to address this problem as much as possible.

Using factor analysis, we calculate a weighted average risk index (*Risk*); the risks included in our factor analysis include market risk, operational risk, and financial risk. We control the variables that influence the risk information disclosure such as Lev, Size, Growth, SOE, Big10, DA, Risk, control year, and industry fixed effect, then regress, calculating a PScore. According to the tendency score, the samples were matched without return at 1:1.Finally, we obtain 5,441 experimental and 5,441 control samples. We test the impact of risk information disclosure on enterprise investment efficiency in the two groups. The balance panel test in Table 6 shows that there is no significant difference between the two groups of variables after matching; the matching results meet the balance panel requirement. Column (3) in Table 5 shows that the coefficients of risk information disclosure after PSM pairing are significantly negative, indicating that when the two groups of firms are similar in terms of inherent risks and other specific corporate characteristics, the investment efficiency with greater risk disclosure is higher, which further proves the robustness of this paper.

6. Additional analysis

6.1 The characteristics of risk information disclosure

We consider information disclosure being heterogeneous. Specifically, we examine the risk information disclosure tone. Previous literature regarding disclosure tone found that different tones of disclosure can bring different market reaction

(Kothari, 2013). An overly positive and negative tone will skew investors' beliefs (Davis, 2006). Kothari et al. (2009) find that favorable disclosure reduces the return volatility and unfavorable disclosure increases returns volatility. When firms disclose risk information, it is easy to bring panic to investors. Positive language will weaken the panic beliefs, resulting in higher earnings forecast and reducing the irrational consciousness of investors. Positive disclosure tone appears to increase the confidence of individual investors in their predictions so that they can rationally choose high-quality firms in which to invest, the resources of the capital market can be allocated reasonably, and the investment efficiency of firms can be improved. When the tone of risk information disclosure is more negative, it is more likely to cause panic among investors in the market as well as a biased judgment on corporations, amplify the irrational mood of investors, and result in a negative effect on corporate investment behaviors. Therefore, we propose that when the tone of risk information disclosure is more positive, the impact of risk information disclosure on the investment efficiency is more significant.

We follow Davis et al. (2006) to establish the disclosure tone index as well as $Rses\_dir$=(the positive words of MD&A-the negative words of MD&A)/the total words of MD&A; the positive or negative words list is from the Loughran and McDonald Dictionary. The larger the index value, the more positive the disclosure sentiment. According to the median of disclosure tone, we have the positive and negative tone groups. The results in Column (1) and Column (2) of Table 7show that the risk information disclosure significantly improves investment efficiency in the positive tone group.

Then, we consider the risk disclosure type. The literature does not consider different types of risks. However, Campbell et al. (2014) classified the risk type into

five categories through a well-defined dictionary: heterogeneity risk, systemic risk, financial risk, tax risk, and litigation risk. Yang (2012) found a different conclusion with the previous literature. For different risk types, some types of risk disclosure support the convergence argument while others support the divergence theory. He divided risk into 30 specific categories, 11 of which have an important influence on market risk perception; the longer the description of risk, the greater the effect on risk perception. This shows that the specific risk disclosure type may have different impacts on specific economic activities. We study the investment behaviors of corporations. Therefore, we examine the risk categories related to investing separately, as investors make investment decisions mainly influenced byinvestment information. Consequently, we propose that when there are more key words regarding investment category, the impact of risk information disclosure on investment efficiency is more significant.

We follow Kravet and Muslu (2013) to calculate the number of key words regarding investment risk in MD&A; the key word regarding investment risk is "investment" in this paper. Then, the sample was divided into two groups based on the median of the investment risk words: the more investment risk and the less investment risk group. The results in Column (3) and Column (4) in Table 7show that risk information disclosure significantly improves investment efficiency in the more investment risk group.

6.2The characteristics of investors

We consider characteristics of investors based on the risk information demands of investors. One of the main purposes of information disclosure is to meet the information demands of market participants. Market participants make use of information to make investment decisions, and the main source of information is the

annual report. When the information demand of investors is large, the information is more likely to be captured and utilized by investors. Investors are also more sensitive to the risk information disclosed by firms, and the risk information is more likely to bring about the corresponding economic consequences. When information needs are relatively small, they are not sensitive to the disclosure of public information. Although they disclose more risk information, they will not be read or used. Therefore, we propose that when investors' information demands are greater, the impact of risk information disclosure on investment efficiency is more significant.

Shleifer and Visliny (1997) found that institutional investors will exercise their voting rights at the shareholders' meetings for the information disclosure. Lin and Fu (2017) found institutional investors can enhance shareholder value by attracting more analysts and reducing insider ownership, these people need more information. Ajinkya et al. (2005) found that the higher proportion of institutional investors holding, the more inclined management is to disclose forecasting information more frequently. Therefore, when firms have more institutional investors, they also have greater informational needs. Firms must increase information transparency to address informational needs of senior investors. We use institutional investors' proportion on behalf of investors who demand a degree of enterprise information. In accordance, the median is divided into two groups: a higher proportion of institutional investors holding group and a lower proportion. The results in Column (1) and Column (2) of Table 8show that risk information disclosure significantly improves investment efficiency in the higher institutional investors' proportion group.

Then, we examine the investors' ability to process information. Investors have strong reprocessing information ability. Unprofessional investors cannot efficiently obtain the corresponding information from the annual report, and the risk perception

level of firms that disclose material defects is higher than that of firms that do not disclose. When the investors' ability to identify and process information is stronger, more incremental information can be obtained from risk information disclosure so that the risk situation of the firms can be better understood. This is helpful for investors to accurately judge and select higher quality investment projects. When investors have less experience, they do not have the ability to dig deep into the information in the disclosure and can only use the disclosure impression to make biased judgment. Therefore, we propose that when the investors' information processing ability is strong, the impact of risk information disclosure on investment efficiency is more significant.

As an important information intermediary in the capital market, the analyst possesses the professional information processing ability. This paper uses the number of analysts following the firm to measure investors' information processing ability. According to the median of the number of analysts following, we divide them into two groups: the more and the fewer analyst following groups. The results in Column (3) and Column (4) of Table 8show that risk information disclosure significantly improves investment efficiency in the more analyst following group.

6.3 Additional evidence from total corporate investment and free cash flow

We examine additional evidence for the main hypothesis from the perspective of total investment and cash flow. The main reason for the conclusion is that when a firm discloses more risk information, it will enhance its risk awareness and conduct its business more carefully. Therefore, if more risk information is disclosed, the enterprise reduces total investment in that year, which indicates that the enterprise is more cautious in its investment decisions and further proves the robustness of this paper. Second, if the enterprise increases the risk awareness, it will retain more cash

flow to satisfy its precautionary motivation so that the disclosure of risk information can increase the cash flow of the enterprise. If this conclusion is confirmed, it can also support the reliability of the full conclusion.

Therefore, we use risk information disclosure as the explanatory variable, the total investment of the following year and the cash holdings of the enterprise as the explanatory variables to test. The investment expenditure of fixed assets, intangible assets and other long-term assets is used to measure the total investment of firms (Invest). The coefficient is significantly negative in Column 1 of Table 9, which shows that when the risk information is disclosed more, the total investment of firms is less. Firm investments that are cut but are more efficient are more likely to be caused by cutting overinvestments. For insufficient investments, the enterprise does not have sufficient funds to invest. The more risk information that is disclosed, the less obvious the impact on the underinvestment, and the investment behavior and investment efficiency will be improved. Using the net operating cash flow of the previous year minus the normal investment estimated by Richardson's (2006) to measure the free cash flow of an enterprise (FCF), the coefficient is significantly positive in Column 2 of Table 9, which shows that when the firm is aware of more risk factors, more cash will be kept on hand to satisfy precautionary motives. These conclusions further prove that when firms disclose more risk information, investment decisions are more conservative and cautious, thus improving the investment efficiency of firms.

7. Conclusion

We study how risk disclosure influences corporate investment efficiency using risk disclosure data in annual reports of A-share during the period of 2007-2015. The

results show that (1) the higher the frequency of risk disclosure in sections of "Significant Risk Factors and MD&A" is, the higher the corporate investment efficiency will be, which is solid under a series of robustness tests. It is indicated that the heterogeneity of risk information in annual reports is weak in our country. The disclosures are sufficient explanation for known risks, which increase information transparency rather than risk perception. (2) In further analysis, we find that the effect of risk disclosure on corporate investment efficiency is more prominent in the more positive disclosure tone, or when there are more keywords about an investment category, more demands of information and better ability of information processing from investors. Our results support the convergence argument on risk disclosureand indicate that disclosure characteristics and investor characteristics may adjust the relationship between risk disclosure and investment efficiency.

Our study indicates that risk information in our country differs from the United States. Risk disclosure in our country supports the convergence argument, in which we interpret the known risks rather than reveal unknown risks. We consider that it may reflect the difference of risk disclosure emphasis and market maturity between China and the United States. From a corporate perspective, risk disclosure can influence investment behavior. Firms are encouraged to disclose the possible risks they may face without concealing, which increases information transparency and improves investment efficiency.

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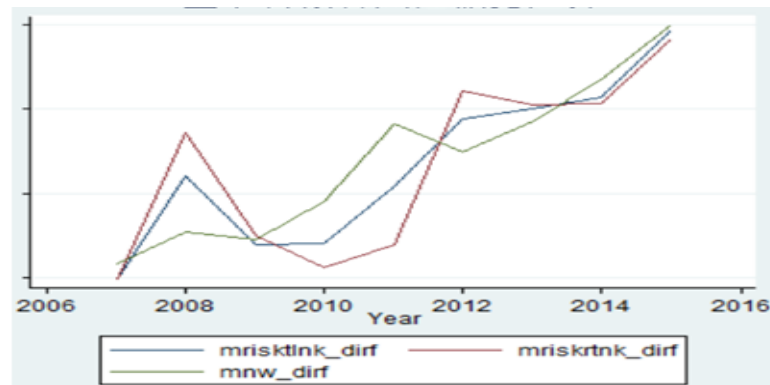
Figure 1: Tendency of risk disclosure

Table1
Variable definitions

Variables	Definition
Dependent variable	
Absinvest	The absolute value of residuals of regression using model (2) represent investment efficiency.
Overinvest	Overinvestment, if the residual in equation (2) is more than 0
Underinvest	Underinvestment, if the residual in equation (2) is less than 0
Independent variable	
Riskdisc	the number of keywords in the MD&A section / the total words in MD&A
Riskdisc_risk	the number of keywords in the Risk Factors section / the total words in the Risk Factor
Direct	the number of keywords in the MD&A section
Ttrisk_num	the number of key words in the full annual report
Control variable	
Fcf	Free cash flow. Operational cash flow of year t-1 less the estimated investment of t-1 using model in Richardson(2006)
First	Share proportion of the largest shareholder
Growth	Growth rate of revenue
Inshold	Share proportion of institutional shareholder at the year tend
Size	The natural logarithm of total assets
Lev	The ratio of total liabilities to total assets
List	The number of year be listed
DA	Discretionary accruals adjusted by Jones model
ROE	The ratio of net profit to total equity
Broadsize	The natural logarithm of 1 plus number of directors
SOE	Dummy. 1for state-owned enterprise, and 0 otherwise
Big10	Dummy. 1 if audited by Big10, and 0 otherwise
Independent	The proportion of independent directors in the board

This table presents the definitions of all the variables.

Table 2
Descriptive statistics

Variable	N	Mean	Sd	P25	P50	P75	Max	Min
Investment	11313	0.000	0.036	-0.02	-0.008	0.012	0.149	-0.081
Absinvest	11313	0.026	0.027	0.009	0.018	0.031	0.154	0
Overinvest	4192	0.035	0.036	0.008	0.022	0.048	0.149	0
Underinvest	7121	-0.020	0.016	-0.026	-0.016	-0.009	0	-0.081
Riskdisc	11313	0.008	0.005	0.004	0.007	0.011	0.022	0
Riskdisc risk	5721	0.050	0.022	0.032	0.051	0.065	0.109	0.007
Fcf	11313	-0.010	0.08	-0.054	-0.009	0.037	0.221	-0.25
Growth	11313	0.176	0.568	-0.058	0.086	0.246	4.073	-0.643
Size	11313	22.018	1.267	21.152	21.893	22.775	25.585	19.118
Lev	11313	0.499	0.217	0.335	0.498	0.656	1.123	0.069
Roe	11313	0.055	0.178	0.022	0.065	0.116	0.645	-1.033
Independent	11313	0.369	0.052	0.333	0.333	0.4	0.571	0.3
First	11313	35.505	15.347	23.193	33.549	46.589	74.824	8.787
Inshold	11313	6.811	9.21	1.52	3.94	8.244	56.51	0.19
DA	11313	0.091	0.161	0.022	0.05	0.099	1.272	0.001
SOE	11313	0.535	0.499	0	1	1	1	0
Big10	11313	0.415	0.731	0	0	1	11	0
List	11313	11.159	5.552	6	12	16	25	2
Boardsize	11313	1.167	0.193	1.099	1.099	1.386	2.079	0
Loss	11313	0.195	0.396	0	0	0	1	0

This table presents the descriptive statistics of the sample.

Table 3
Univariate tests

Variable	Investment efficiency of more risk disclosure subsample		Investment efficiency of Less risk disclosure subsample		Difference tests	
	Mean	Median	Mean	Median	T-test	Z-test
Riskdisc	0.025	0.170	0.027	0.018	4.256***	3.385***
Riskdisc_risk	0.022	0.145	0.024	0.153	2.130**	1.715*
investment keywords	0.021	0.017	0.024	0.019	7.363***	7.158***

Table 3 presents the results of two-sample tests on investment efficiency based on more versus low risk disclosure. *** indicates significant differences at the 1% level.** indicates significant differences at the 5% level.* indicates significant differences at the 10% level.

Table 4
Effect of risk information disclosure on corporate investment efficiency

	Absinvest OLS (1)	Absinvest Fixed effect model (2)	Absinvest Overinvestment group (3)	Absinvest Underinvestment group (4)
Riskdisc	-0.122**	-0.130*		
	(-2.00)	(-1.79)		
Over			-0.333***	
			(-2.65)	
Under				0.039
				(0.87)
Fcf	-0.031***	-0.020***	-0.018**	-0.047***
	(-7.81)	(-4.54)	(-2.08)	(-13.30)
Growth	0.003***	0.001***	0.004***	0.001***
	(4.35)	(2.62)	(2.77)	(2.82)
Size	-0.001***	0.001	-0.002***	-0.001***
	(-3.17)	(1.58)	(-3.46)	(-3.48)
Lev	-0.003*	-0.005	0.006	-0.006***
	(-1.92)	(-1.55)	(1.53)	(-4.68)
Roe	0.002	0.002	0.009**	-0.002
	(1.05)	(0.91)	(2.05)	(-1.17)
Independent	-0.002	-0.007	-0.004	0.003
	(-0.34)	(-0.71)	(-0.34)	(0.78)
First	-0.000	0.000***	0.000	0.000
	(-0.31)	(2.68)	(0.22)	(0.60)
Inshold	0.000***	0.000***	0.000**	0.000**
	(3.06)	(2.90)	(1.98)	(2.54)
DA	0.003	0.003*	0.012***	-0.000
	(1.48)	(1.67)	(2.68)	(-0.02)
SOE	-0.002**	-0.004	-0.003**	-0.001**
	(-2.54)	(-1.35)	(-2.22)	(-2.44)
Big10	-0.000	-0.000	-0.000	-0.000**
	(-1.39)	(-1.42)	(-0.60)	(-2.13)
Age	-0.000***	-0.002***	-0.000*	-0.000***
	(-4.32)	(-9.26)	(-1.73)	(-6.44)
Boardsize	0.001	-0.001	0.000	-0.002
	(0.30)	(-0.40)	(0.13)	(-1.19)
Loss	-0.000	-0.002**	0.001	0.000

	(-0.19)	(-2.12)	(0.77)	(0.67)
Intercept	0.060***	0.018	0.093***	0.047***
	(8.40)	(0.92)	(6.40)	(10.24)
Observation	11313	11313	4192	7121
Adj. R2	0.071	0.046	0.057	0.152
F-value	13.788	16.265	5.959	26.651

This table presents the estimation results for the effect of risk information disclosure on investment efficiency. The variables are defined in above. All the variables except the dummy variables are winsorized at the 1% and 99% levels. The numbers reported in parentheses are statistics based on heteroskedasticity-corrected errors clustered by firm. ***, **, and * indicate significant differences at the 1%, 5% and 10% levels.

Table 5
The robustness tests

	Absinvest	Absinvest	Absinvest	Absinvest
	Riskdisc_risk	LN(Riskdisc)	Biddle Model	Rule out modest level of investment
	(1)	(2)	(3)	（4）
Riskdisc	-0.035**	-0.002*	-0.242**	-0.166***
	(-2.05)	(-1.78)	(-2.06)	(-2.73)
Fcf	-0.034***	-0.035***	-0.049***	-0.032***
	(-6.20)	(-8.30)	(-6.73)	(-8.59)
Growth	0.002***	0.003***	0.001	0.003***
	(2.94)	(4.57)	(1.63)	(5.37)
Size	-0.002***	-0.001***	0.003***	-0.001***
	(-4.24)	(-2.82)	(3.82)	(-3.58)
Lev	0.001	-0.004**	-0.010***	-0.004**
	(0.45)	(-2.28)	(-3.04)	(-2.35)
Roe	0.006**	0.003	0.009***	0.002
	(2.18)	(1.64)	(3.27)	(1.39)
Independent	0.001	-0.001	-0.020	-0.010*
	(0.18)	(-0.23)	(-1.51)	(-1.69)
First	0.000	-0.000	-0.000**	-0.000
	(0.40)	(-0.89)	(-2.55)	(-0.83)
Inshold	0.000	0.000***	0.000**	0.000***
	(1.55)	(3.29)	(2.47)	(3.23)
DA	0.002	0.003	-0.007**	0.004**
	(0.49)	(1.24)	(-2.25)	(2.05)
SOE	-0.003***	-0.002**	-0.003	-0.002***
	(-3.51)	(-2.29)	(-1.62)	(-2.97)
Big10	-0.000	-0.001**	0.001**	-0.000
	(-0.44)	(-1.99)	(2.31)	(-0.90)
Age	-0.000***	-0.000***	-0.001***	-0.000***
	(-3.50)	(-4.12)	(-9.01)	(-5.33)
Boardsize	0.004*	0.001	0.008**	0.002
	(1.71)	(0.62)	(2.15)	(1.19)
Loss	0.001	0.001	-0.005***	-0.000
	(1.07)	(0.68)	(-3.10)	(-0.51)
Intercept	0.065***	0.070***	0.021	0.065***
	(7.20)	(8.26)	(1.36)	(10.43)
Observation	5721	13598	11313	9049
Adj. R2	0.061	0.062	0.127	0.054
F-value	7.330	14.310	18.658	13.337

This table presents the robustness results for the effect of risk information disclosure on investment

efficiency: Riskdisc_risk, which is the frequency of the risk keywords presented in the risk factor part; and LN(Riskdisc), which is the logarithm of the frequency of keywords presented in the full text of annual reports. Other variables are defined above. All the variables but the dummy variables are winsorized at the 1% and 99% levels. The numbers reported in parentheses are statistics based on heteroskedasticity-corrected errors clustered by firm. ***, **, and * indicate significant differences at the 1%, 5% and 10% levels.

Table 6
Solve the endogeneity problem

	ΔAbsinvest (difference model) (1)		Absinvest Heckman (2)	Absinvest PSM (3)
ΔRiskdisc	-0.302***	Riskdisc	-0.122**	-0.171***
	(-2.60)		(-2.00)	(-2.66)
ΔFcf	0.045***	Fcf	-0.031***	-0.031***
	(8.13)		(-7.83)	(-7.90)
ΔGrowth	-0.000	Growth	0.003***	0.004***
	(-0.64)		(3.47)	(6.12)
ΔSize	0.009***	Size	-0.001**	-0.001***
	(5.67)		(-2.34)	(-4.60)
ΔLev	-0.004	Lev	-0.003*	-0.003**
	(-0.69)		(-1.94)	(-2.05)
ΔRoe	0.003	Roe	0.002	0.003
	(1.34)		(1.05)	(1.27)
ΔIndependent	-0.037**	Independent	-0.002	-0.004
	(-2.48)		(-0.35)	(-0.71)
ΔFirst	0.000	First	-0.000	-0.000
	(0.68)		(-0.30)	(-0.13)
ΔInshold	0.000	Inshold	0.000***	0.000***
	(1.35)		(3.04)	(3.76)
ΔDA	0.005**	DA	0.003	0.005**
	(2.39)		(1.45)	(2.37)
ΔSOE	-0.000	SOE	-0.002**	-0.002***
	(-0.33)		(-2.54)	(-3.17)
ΔBig10	0.000***	Big10	-0.001	-0.000
	(4.27)		(-0.88)	(-0.75)
ΔAge	-0.000	Age	-0.000***	-0.000***
	(-0.10)		(-4.30)	(-4.71)
ΔBoardsize	0.010*	Boardsize	0.001	0.000
	(1.96)		(0.30)	(0.17)
ΔLoss	-0.001	Loss	-0.000	0.001
	(-1.00)		(-0.20)	(0.85)
		Mills	-0.003	
			(-0.23)	
Intercept	-0.015***	Intercept	0.065***	0.067***
	(-4.00)		(3.04)	(10.19)
Observation	8796	Observation	11311	10882
Adj. R2	0.023	Adj. R2	0.071	0.060
F-value	6.066	F 值	13.478	17.392

This table presents the robustness results for the effect of risk information disclosure on investment efficiency to solve the endogeneity problem. ΔAbsinvest is the changes of risk disclosure between this year and last year. Other change variables are the changes between this year and last year. Other variables are defined above. All the variables except the dummy variables are winsorized at the 1% and 99% levels. The numbers reported in parentheses are statistics based on heteroskedasticity-corrected errors clustered by firm. ***, **, and * indicate significant differences at the 1%, 5% and 10% levels.
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Table 7
PSM balance panel test

Variables	Control	Treatment	T-Test	P>|T|
Lev	0.506	0.505	0.21	0.832
Size	22.032	22.015	0.75	0.454
Risk	0.016	-0.001	2.25	0.025
Growth	0.245	0.218	0.64	0.520
SOE	0.528	0.545	-1.72	0.086
Big10	0.406	0.390	1.36	0.174
DA	0.103	0.101	0.38	0.704

This table presents the PSM balance panel test between control group and treatment group, Other variables are defined above. All variables except the dummy variables are winsorized at the 1% and 99% levels. ***, **, and * indicate significant differences at the 1%, 5% and 10% levels.

Table 8
Effects of risk information disclosure characteristics

Variables	Positive tone Absinvest (1)	Negative tone Absinvest (2)	More investment risk Absinvest (1)	Less investment risk Absinvest (2)
Riskdisc	-0.157**	-0.108	-0.136*	-0.081
	(-2.09)	(-1.45)	(-1.73)	(-1.17)
Fcf	-0.027***	-0.023***	-0.022***	-0.041***
	(-7.03)	(-5.77)	(-4.57)	(-9.19)
Growth	0.003***	0.002***	0.003***	0.002***
	(4.42)	(3.59)	(4.13)	(3.65)
Size	-0.002***	-0.001	-0.001***	-0.001***
	(-4.42)	(-1.60)	(-3.40)	(-2.88)
Lev	-0.002	-0.005***	0.001	-0.007***
	(-0.80)	(-2.64)	(0.28)	(-3.67)
Roe	-0.000	0.003	0.007**	-0.001
	(-0.10)	(1.50)	(2.54)	(-0.42)
Independent	-0.003	-0.001	0.003	-0.007
	(-0.44)	(-0.07)	(0.48)	(-1.01)
First	-0.000	-0.000	0.000	-0.000
	(-0.30)	(-0.04)	(0.28)	(-0.56)
Inshold	0.000***	0.000**	0.000***	0.000***
	(3.43)	(2.42)	(2.82)	(3.05)
DA	0.003***	-0.001	0.003	0.003
	(2.59)	(-1.31)	(1.45)	(1.22)
SOE	-0.002***	-0.002*	-0.003***	-0.002**
	(-2.76)	(-1.94)	(-2.97)	(-1.97)
Big10	-0.000	-0.001	-0.000	-0.001
	(-0.81)	(-0.97)	(-0.65)	(-1.05)
Age	-0.000***	-0.000***	-0.000***	-0.000*
	(-4.34)	(-3.93)	(-6.33)	(-1.82)
Boardsize	0.001	0.001	0.000	0.001
	(0.28)	(0.46)	(0.12)	(0.72)
Loss	-0.001	0.001	-0.000	0.000
	(-0.56)	(0.54)	(-0.41)	(0.46)
Intercept	0.068***	0.050***	0.062***	0.058***
	(9.02)	(6.22)	(7.78)	(7.62)
Observation	6057	5159	5278	5938
Adj. R2	0.078	0.062	0.081	0.067
F-value	13.140	9.060	12.111	11.117

This table presents the estimation results for the effects of risk information disclosure characteristics on investment efficiency. The variables are defined above. All variables except the dummy variables are winsorized at the 1% and 99% levels. The numbers reported in parentheses are statistics based on heteroskedasticity-corrected errors clustered by firm. ***, **, and * indicate significant differences at the 1%, 5% and 10% levels.

Table 9
Effects of investors'characteristics

	Absinvest Lower institutional investors proportion (1)	Absinvest Higher institutional investors proportion (2)	Absinvest More analysts (1)	Absinvest Less analysts (2)
Riskdisc	-0.032	-0.183***	-0.359***	-0.021
	(-0.41)	(-2.66)	(-3.66)	(-0.35)
Fcf	-0.037***	-0.027***	-0.028***	-0.032***
	(-7.69)	(-6.17)	(-4.84)	(-8.24)
Growth	0.002***	0.003***	0.001	0.003***
	(2.92)	(4.81)	(1.03)	(6.30)
Size	-0.001***	-0.001***	-0.001**	-0.001***
	(-3.37)	(-3.10)	(-2.00)	(-4.09)
Lev	-0.004*	-0.003	-0.005**	-0.002
	(-1.79)	(-1.61)	(-2.24)	(-1.33)
Roe	0.004	-0.001	0.003	0.001
	(1.53)	(-0.34)	(1.10)	(0.28)
Independent	-0.004	-0.001	0.013	-0.008
	(-0.57)	(-0.19)	(1.32)	(-1.30)
First	-0.000	-0.000	0.000	-0.000
	(-0.02)	(-0.12)	(0.19)	(-0.61)
Inshold	0.000	0.001**	0.000*	0.000***
	(1.32)	(2.48)	(1.65)	(3.57)
DA	0.002	0.003	0.008***	0.000
	(0.92)	(1.50)	(2.81)	(0.00)
SOE	-0.002***	-0.002**	-0.002**	-0.002**
	(-2.62)	(-1.97)	(-2.17)	(-2.31)
Big10	-0.000	-0.000	-0.001	-0.000
	(-0.98)	(-0.20)	(-1.47)	(-0.36)
Age	-0.000***	-0.000***	-0.000***	-0.000***
	(-3.22)	(-4.94)	(-3.73)	(-4.81)
Boardsize	0.003*	-0.003	0.004	-0.001
	(1.66)	(-1.44)	(1.49)	(-0.57)
Loss	0.000	-0.000	0.001	-0.000
	(0.33)	(-0.41)	(0.54)	(-0.50)
Intercept	0.064***	0.059***	0.049***	0.066***
	(7.85)	(8.01)	(5.05)	(9.70)
Observation	5609	5704	3165	8148
Adj. R2	0.082	0.062	0.062	0.077
F-value	12.950	9.914	5.964	17.257

This table presents the estimation results for the effects of investors'characteristics on investment efficiency. The variables are defined above. All variables except the dummy variables are winsorized at the 1% and 99% levels. The numbers reported in parentheses are statistics based on heteroskedasticity-corrected errors clustered by firm. ***, **, and * indicate significant differences at the 1%, 5% and 10% levels.

Table 10
Additional evidence from total corporate investment and free cash flow

	Invest (1)	FCF (2)
Riskdisc	-0.368***	0.263*
	(-2.79)	-1.71
Growth	0.002*	0.002
	(1.70)	-1.14
Size	0.004***	-0.001
	(4.74)	(-0.94)
Lev	-0.012***	-0.046***
	(-3.15)	(-11.70)
Roe	0.012***	0.057***
	(4.23)	-12.36
Independent	-0.026*	-0.038***
	(-1.82)	(-2.62)
First	-0.000**	0.000***
	(-2.53)	-4.85
Inshold	0.000***	0
	(2.72)	-0.4
DA	-0.009**	-0.038***
	(-2.43)	(-8.12)
SOE	-0.002	0.001
	(-1.29)	-0.63
Big10	0.001	0
	(1.38)	-0.31
Age	-0.002***	0.002***
	(-9.46)	-10.33
Boardsize	0.009**	0.003
	(2.25)	-0.79
Loss	-0.006***	-0.013***
	(-3.28)	(-6.02)
Fcf	-0.054***	-0.040***
	(-6.37)	(-6.79)
Intercept	0.007	0.003
	(0.42)	-0.21
Observation	11317	11313
Adj. R2	0.142	0.073
F-Value	20.179	27.179

This table presents the estimation results of additional evidence from total corporate investment and free cash flow. The variables are defined above. All variables except the dummy variables are winsorized at the 1% and 99% levels. The numbers reported in parentheses are statistics based on heteroskedasticity-corrected errors clustered by firm. ***, **, and * indicate significant differences at the 1%, 5% and 10% levels.